FORTY-SEVENTH LUNAR AND PLANETARY SCIENCE CONFERENCE

PROGRAM OF TECHNICAL SESSIONS

MARCH 21–25, 2016

The Woodlands Waterway Marriott Hotel and Convention Center
The Woodlands, Texas

INSTITUTIONAL SUPPORT

Universities Space Research Association
Lunar and Planetary Institute
National Aeronautics and Space Administration

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Produced by the Lunar and Planetary Institute (LPI), 3600 Bay Area Boulevard, Houston TX 77058-1113, which is supported by NASA under Award No. NNX15AL12A. Logistics, administrative, and publications support for the conference were provided by USRA Houston Meeting Planning Services.

ABOUT LPSC

The Lunar and Planetary Science Conference brings together international specialists in petrology, geochemistry, geophysics, geology, and astronomy to present the latest results of research in planetary science. The four and a half-day conference is organized by topical symposia and problem-oriented sessions.

LOGISTICAL INFORMATION

Venue Address and Phone Number
The conference is being held at The Woodlands Waterway Marriott Hotel and Convention Center, 1601 Lake Robbins Dr., The Woodlands TX 77380. LPSC conference staff can be reached by calling the hotel at 281-367-9797 and asking for the conference registration desk.

Please note that copy and printing services are not available at the conference registration desk, and must be arranged through the hotel business center. For your convenience, a minimal number of laptops and printers will be available in the Wi-Fi access rooms (see below).

Registration
Conference registration and check-in will be held on Sunday from 4:00 to 8:00 p.m., from 8:00 a.m. to 5:00 p.m. Monday through Thursday, and from 8:00 to 10:00 a.m. Friday. Conference badges provide access to all technical sessions, special events, and shuttle service.

Speaker-Ready Room/Presentation Check-In
Presentation validation will be in the Alden Bridge Room. Those presenting on Monday morning should check in their presentations on Sunday evening when they register. Hours of Operation: Sunday, 4:00–8:00 p.m.; Monday–Thursday, 7:00 a.m.–5:30 p.m.; and Friday, 7:00–10:00 a.m.

Internet Access
Complimentary Wi-Fi service will be available throughout the duration of the conference in selected public areas, including the Town Center Exhibit Area and immediate vicinity. As in previous years, Wi-Fi service will NOT be available in the oral session rooms for anyone other than the selected LPSC microbloggers. This restriction is (and has been) in place to curtail activities that could be distracting to speakers during their presentations.

Conference Shuttle Service
Conference shuttle bus service between the venue and the approved list of hotels will be provided on Sunday evening during the registration time and throughout the duration of the conference. Shuttle service will run before and immediately following all technical sessions. Detailed shuttle schedules are available in the registration area and on the LPSC website at www.hou.usra.edu/meetings/lpsc2016/travel/shuttleInfo.

Poster Printing Available
AlphaGraphics will have a staffed booth at The Woodlands Waterway Marriott, just outside the Town Center Exhibit Area on the first floor. Poster presenters can pick up pre-ordered posters or place orders for posters beginning on Sunday, March 20. For more information, visit their website at www.txagprinting.com.

Personal Schedule
Create your own personal meeting schedule using the Personal Schedule tool found in the USRA Meeting Portal at https://www.hou.usra.edu/meeting_portal/schedule/. Select the sessions you want to attend or talks you want to hear, then create a shareable schedule that can be viewed on your smart phone or shared with a colleague.

47th LPSC

LIST OF EXHIBITORS

ADS/Smithsonian Astrophysical Observatory

60 Garden Street
Cambridge MA 02138

Contact: Donna Thompson
dthompson@cfa.harvard.edu

The NASA Astrophysics Data System (ADS) is a Digital Library portal containing the journal literature of astronomy and physics (including geophysics). Our new interface has some exciting new features that streamline your searching of our extensive database. Come and see some new searching techniques. Learn how to use ADS to populate your ORCiD profile. Even if you've used ADS in the past, stop by and see our new search engine, network visualizations, and metrics summary.

Arecibo Observatory

www.naic.edu
HC3 Box 53995
Arecibo PR 00612

Contact: Linda Rodriguez-Ford
lford@naic.edu

Located in Puerto Rico, the Arecibo Observatory is home to the largest and most sensitive single dish radio telescope in the world. It is an NSF facility managed under a cooperative agreement by SRI International, Universities Space Research Association, and Universidad Metropolitana. The Arecibo Planetary Radar program is supported by NASA's Near Earth Object Observation program. AO's planetary radar system is the world's most powerful instrument for post-discovery characterization and orbital refinement of near-Earth objects.

Astrogeology Science Center, U.S. Geological Survey

2255 North Gemini Drive
Flagstaff AZ 86001

Contact: Trent Hare
thare@usgs.gov

The United States Geological Survey's Astrogeology Science Center (USGS-ASC), located in Flagstaff, Arizona, provides support to the planetary community with unique inhouse and online resources and tools to help researchers accomplish their science objectives. The USGS-ASC conducts innovative research and develops state-of-the-art software and techniques that advance the fields of planetary geosciences, remote sensing, and cartography. The USGS-ASC also establishes mapping and archiving standards and supports the distribution of map and data products.

ASU Education Through eXploration (ETX Center)

www.etx.io/
ASU Tempe Campus School of Earth and Space Exploration Bateman Physical Sciences, F-Wing, Room 686
Tempe AZ 85287-1404

Contact: Leon Manfredi
lmanfred@asu.edu

The ASU Center for Education Through eXploration (ETX Center) advances a new educational philosophy that centers teaching and learning on open, transdisciplinary questions rather than simply mastering what is known. We call this philosophy "Education Through eXploration" (ETX) and are developing and deploying digital learning products and platforms that advance this philosophy engagingly, adaptively, and at scale as part of a new NASA education initiative of the School of Earth and Space Exploration.

Brown University DEEPS

www.brown.edu/academics/earth-environmental-planetary-sciences/
324 Brook Street
Providence RI 02912

Contact: Daniel Moriarty III
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Our graduate program is rated among the top programs in the nation and the world. Our faculty members, nationally and internationally acknowledged leaders in their fields, engage in externally supported research that is defining the direction of inquiry for the next decade.

Cambridge University Press

www.cambridge.org/us/academic
32 Avenue of the Americas
New York NY 10013

Contact: Emma Kiddle
ekiddle@cambridge.org

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Centre for Planetary Science and Exploration (CPSX)

www.cpsx.uwo.ca
Western University, Faculty of Science
1151 Richmond Street
London ON N6A 5B7 Canada

Contact: Zach Morse
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The Centre for Planetary Science and Exploration (CPSX) at Western University is the leading organization for planetary science and exploration research and training in Canada. Our goal is to provide Canada and the global space program with the necessary expertise to design and support future planetary mission activities.

e-Mars Team Web Application: MarsSI

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2 Rue Raphaël Dubois
Villeurbanne 69622 France

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MarsSI (Acronym of MARS System of Information) is a web geographic information system application that allows the managing and processing of martian orbital data. From this application, users are able to easily and rapidly select observations, process raw data via proposed automatic pipelines, and get back ready-to-use data for science. Also, MarsSI proposes automatic stereo-restitution pipelines to produce digital terrain models (DTM) from CTX and HIRISE stereo pairs.

Fibertek, Inc.

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13605 Dulles Technology Drive
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Fibertek provides space-qualified optical instrumentation for NASA asteroid, comet, lander, and planetary sensors. We have a particular expertise in lidar technologies supporting atmospheric CO_2, water vapor, methane from platforms including orbiters, small sat or cubesat, rovers. Other areas include 3D imaging topology and sample capture lidar, LIBS/Raman Lasers, metrology mass spectroscopy related fiber lasers, cubesat laser communication from deep space/orbiter/rover, small sat/cubesat lidar concepts for vehicle instruments, and free-flying small and cubesats.

Idaho National Lab

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stephen.johnson@inl.gov

The Space Nuclear Power and Isotope Technologies Division of the Idaho National Laboratory pursues the development, fueling, and testing of power systems for use in remote and hostile environments. They have supported the use of radioisotope power on various NASA missions including the Mars Exploratory Rover (2003), New Horizons (2006), and Mars Science Laboratory (2011). They are currently preparing to support the 2020 mission to Mars with a radioisotope power system.

Jacobs

www.jacobs.com
2224 Bay Area Blvd.
Houston TX 77058

Contact: Sara Stanley
sara.stanley@nasa.gov

Jacobs is one of the world's largest and most diverse providers of technical, professional, and construction services, including all aspects of engineering and scientific services. With more than 65 years of experience supporting government and commercial clients across multiple markets and geographies, we have earned a reputation for excellence and outstanding technical and managerial achievements in quality, performance, and safety. Jacobs provides comprehensive planetary science research and analysis services for the NASA Johnson Space Center.

JHU Applied Physics Laboratory

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MS 200 W569
Laurel MD 20723

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JHU's Applied Physics Laboratory in Laurel, Maryland makes critical contributions to our nation's critical challenges. JHUAPL has built over sixty spacecraft and many more instruments for a variety of applications, including New Horizons, MESSENGER, STEREO, and the upcoming Europa mission.

JMARS — Mars Space Flight Facility — Arizona State University

jmars.asu.edu
Arizona State University
P.O. Box 876305
Tempe AZ 85287-6305

Contact: Scott Dickenshied
sdickens@mars.asu.edu

JMARS (Java Mission-planning and Analysis for Remote Sensing) is a free, open-source, Java based geospatial information system developed by the Mars Space Flight Facility at Arizona State University. It is currently used for mission planning and scientific data analysis by several NASA missions, including Mars Odyssey, Mars Reconnaissance Orbiter, the Lunar Reconnaissance Orbiter, and the upcoming OSIRIS-REx mission.

Lockheed Martin

12257 S Wadsworth Blvd., Mail Stop S8110
Littleton CO 80125

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Expanding our knowledge and understanding of the universe is a challenging endeavor that Lockheed Martin has been actively engaged in for more than five decades. We have developed and deployed numerous spacecraft and products supporting our understanding of Earth and planetary science, heliophysics, and astrophysics. We're accountable to one standard — 100% mission success. We understand the risks and will not shy away from the hard challenges associated with this mission.

LPI-JSC Center for Lunar Science and Exploration

www.lpi.usra.edu/exploration
3600 Bay Area Blvd.
Houston TX 77058

Contact: Jennifer Steil
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The LPI-JSC Center for Lunar Science and Exploration is one of the founding members of the Solar System Exploration Research Virtual Institute (SSERVI). At LPSC, the Center will help faculty find classroom resources, advise university students about future training opportunities, and distribute educational and public outreach materials.

Lunar Reconnaissance Orbiter Camera SOC

lroc.sese.asu.edu/
P.O. Box 873603
Tempe AZ 85287

Contact: Nicholas Estes
nme@ser.asu.edu

The Lunar Reconnaissance Orbiter Camera Science Operations Center (LROC SOC) operates the LROC instrument on the Lunar Reconnaissance Orbiter. The LROC SOC has developed Lunaserv as a planetary capable WMS server package that anyone can use to integrate their planetary GIS data with WMS compatible client software.

NASA

21000 Brookpark Road
Cleveland OH 44135

Contact: Kristin Spear
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NASA leads the nation on a great journey of discovery, seeking new knowledge and understanding of our planet Earth, our Sun and solar system, and the universe out to its farthest reaches and back to its earliest moments of existence. Come and explore with us!

NASA/Lunar Reconnaissance Orbiter (LRO) Science and Data

lunar.gsfc.nasa.gov
8800 Greenbelt Road
Greenbelt MD 20771

Contact: Amalia Morusiewicz
amalia.p.morusiewicz@nasa.gov

Lunar Reconnaissance Orbiter, since June 2009, has successfully mapped the Moon in exquisite detail with multiple techniques, pioneered new technology for planetary observations, discovered important lunar resources, and revealed the Moon to be a more dynamic world than previously anticipated.

PDS Geosciences Node

geo.pds.nasa.gov
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Contact: Dan Scholes
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The PDS Geosciences Node of NASA's Planetary Data System (PDS) archives and distributes digital data related to the study of the surfaces and interiors of terrestrial planetary bodies. We work directly with NASA missions to help them generate well-documented, permanent data archives. We provide data to NASA-sponsored researchers along with expert assistance in using the data. All our archives are online and available to the public.

PROTO

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12350 Universal Drive
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PROTO is a leading provider of portable and laboratory based X-ray diffraction (XRD) systems for the characterization of materials. Our AXRD Benchtop powder diffraction system provides a low cost alternative for powder diffraction. This compact, easy to maintain system is ideal for Phase Identification, Quantitative Analysis or Structure Analysis. The AXRD Benchtop will bring you years of convenience and value for even the most demanding X-ray diffraction material investigation.

PTScientists

ptscientists.com
Landsberger Str. 243
Berlin 12623 Germany

Contact: Rolf Erdmann
re@ptscientists.com

Taurus-Littrow valley, the place where man last set foot on the Moon, serves as the starting point of the PTScientists mission back to the Moon. Driven by the scientific interest to uncover what happened to the artifacts of Apollo after 43 years, the mission serves as the testing ground for new private autonomous landing and robotic exploration technologies. Mission partners include the Audi AG, the German Space Center (DLR), and a number of educational partners.

Purdue University

www.eaps.purdue.edu/
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Purdue's Department of Earth, Atmospheric, and Planetary Sciences (EAPS) is dedicated to the scientific study of physical, chemical, and dynamic processes that include a broad range of phenomena from tectonics to asteroid impacts to severe weather. Come learn about the outstanding opportunities awaiting students interested in our department.

Regional Planetary Information Facility Network (RPIFN)

www.lpi.usra.edu/library/RPIF/
USGS Astrogeology Science Center
2255 North Gemini Drive
Flagstaff AZ 86001

Contact: David Portree
dportree@usgs.gov

The Regional Planetary Information Facility (RPIF) Network is a NASA-supported international, interdependent network of 16 data facilities. Each facility has unique holdings and expertise. First created in the 1980s to provide nodes for ready, economical access to paper maps and images, the RPIF Network has evolved to provide a wide range of planetary science data, archival and current, to their host institutions and the entire planetary science community.

Space Science Institute

spacescience.org
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Suite 205
Boulder CO 80301

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wuth@spacescience.org

The Space Science Institute (SSI) is a soft money nonprofit headquartered in Boulder, CO with locations across the U.S. and worldwide that brings together world-class expertise in space, planetary, and Earth science research and education. SSI is a proud sponsor of (and first-time exhibitor at) the LPSC 2016 conference. SSI staff will be at LPSC to talk about our programs and recruit research and education PIs all week, so please feel free to come by our booth to learn more about how soft money works and if SSI is the right place for you!

2016 LPSC WEEK AT A GLANCE

THE SESSION CODE APPEARS IN BOLD BRACKETS ABOVE EACH SESSION TITLE.

Day and Time	Waterway Ballroom 1	Waterway Ballroom 4	Waterway Ballroom 5	Waterway Ballroom 6	Montgomery Ballroom
Monday Morning, 8:30 a.m.	[M101] Mars Geomorphology: Sedimentology/Stratigraphy, Impact-Related Features and Processes, and Gullies	[M102] SPECIAL SESSION: Ceres Unveiled: Dawn Explores a New World	[M103] Origin of the Terrestrial Planets: Dynamical, Experimental, and Isotopic Constraints	[M104] Mars Atmosphere: Here Today, Gone Tomorrow	[M105] Mercury Inside Out
Monday Afternoon, 1:30 p.m.		[M141] PLENARY SESSION: Masursky Lecture and Award Presentations			
Monday Afternoon, 2:30 p.m.	[M151] Moon from Near and Far: Results from Recent Lunar Missions	[M152] SPECIAL SESSION: New Horizons at Pluto! First Year of Mapping		[M153] Martian Aeolian Processes: MSL at the Bagnold Dune Field	[M154] Planetary Differentiation: So Metal
Monday Evening, 5:30 p.m.		NASA Headquarters Briefing *Immediately Followed by Opening of Exhibits and Student/Scientist Event Located in the Town Center Exhibit Area*			
Tuesday Morning, 8:30 a.m.	[T201] Lunar Volatiles: Microanalysis, Remote Sensing, and Everything in Between	[T202] SPECIAL SESSION: Ceres Unveiled: The Next Layer	[T203] Impacts: Observations	[T204] Martian Mineralogy on the Surface and from Orbit	[T205] Chondrites: CAIs and Other Refractories
Tuesday Afternoon, 1:30 p.m.	[T251] Lunar Volcanism: New Perspectives on a Dynamic Moon	[T252] SPECIAL SESSION: Planet 9 from Outer Space: Pluto Geology and Geochemistry	[T253] Impacts: Numerical and Analytical Studies	[T254] Aqueous Alteration on Mars: A Complex History	[T255] Chondrites: Chondrules
Tuesday Evening, 6:00–9:00 p.m.	Town Center Exhibit Area Poster Session I				
Wednesday Morning, 8:30 a.m.	[W401] Merrily Measuring Moonlight: Insights from Remote Lunar Compositional Analysis ***followed at 10:15 a.m. by*** [W402] Cratering on the Moon	[W403] SPECIAL SESSION: Dwarf-Age Daydream: Surface Ice Dynamics on Dwarf Planets Ceres and Pluto	[W404] Magmatism to Volcanism: A Hot, Stressed, Viscous, and Fragmented Journey	[W405] Mars Geomorphology: Fluviolacustrine Activity to Global Climate Implications	[W406] Origins of the Solar System: Isotope Cosmochemistry

LPSC WEEK AT A GLANCE

THE SESSION CODE APPEARS IN BOLD BRACKETS ABOVE EACH SESSION TITLE.

Day and Time	Waterway Ballroom 1	Waterway Ballroom 4	Waterway Ballroom 5	Waterway Ballroom 6	Montgomery Ballroom
Wednesday Afternoon, 1:30 p.m.	[W451] (Is There) Life on Mars? Martian Exobiology Tools, Analogs, and Environments *followed at 3:30 p.m. by* [W452] Inside Out of Icy Satellites: Oceans to Plumes	[W453] Planetary Spatial Infrastructure: At the Intersection of GIScience and Planetary Science	[W454] Makeup of Mercury *followed at 3:30 p.m. by* [W455] Venus: Surface and Atmosphere	[W456] Physicochemical Evolution of Mars from Mantle to Crust	[W457] Chondrites: Whole Rock
Thursday Morning, 8:30 a.m.	[R501] Lunar Petrology and Geochemistry	[R502] Titan: Real Cool World	[R503] Dynamics to Tectonics: The Geodynamical Fate of Planetary Bodies	[R504] Mars Ice: Under Pressure It Flows	[R505] Presolar, Interplanetary, and Cometary Dust
Thursday Afternoon, 1:30 p.m.	[R551] Differentiated Meteorites: Multiple Parent Bodies and Multiple Models	[R552] SPECIAL SESSION: NASA Planetary Science Division Facilities	[R553] Comets and Carbonaceous Bodies: Not a Carbon Copy of Asteroids	[R554] Recurring Slope Lineae on Mars *followed at 3:30 p.m. by* [R555] Martian High Latitude Ice and Polar Layered Deposits	[R556] Space Weathering: It Turns Out that Radiation Doesn't Give Rocks Super Powers *followed at 3:30 p.m. by* [R557] Cosmochemical Origins: Disk Evolution
Thursday Evening, 6:00–9:00 p.m.	Town Center Exhibit Area Poster Session II				
Friday Morning, 8:30 a.m.	[F701] The Moon Who Soiled the Whirled: Lunar Physics and Surface Phenomena	[F702] Exobiology: Organic Delivery, Habitable Environments, Analogs, and Tools	[F703] Asteroids, NEOs, Meteors, and Other Space Oddities	[F704] New Insights into High Temperature: Martian Petrology and Geochemistry	[F705] Ziggy Faultscarps: Tectonics of the Outer Satellites

**** Denotes speaker***

Monday, March 21, 2016 [M101]
MARS GEOMORPHOLOGY: SEDIMENTOLOGY/STRATIGRAPHY, IMPACT-RELATED FEATURES AND PROCESSES, AND GULLIES
8:30 a.m. Waterway Ballroom 1

Chairs: **Fred Calef III**
Kenneth Edgett

8:30 a.m. Edgett K. S. *
The Other Sedimentary Rocks of Early Mars **[#1379]**
Mars sedimentary rocks studied since seminal Malin and Edgett (2000) are a sub-set of the whole and might dominate throughout the heavily cratered terrain.

8:45 a.m. Bramble M. S. * Mustard J. F.
Stratigraphic Relationships in Northeast Syrtis Major, Mars: Approximately 250 Million Years of Geological History Spanning the Noachian-Hesperian Boundary **[#2582]**
The rocks hold eons / How they lay tells us their age / In Northeast Syrtis.

9:00 a.m. Sneed J. * Mayer D. P. Lewis K. W. Kite E. S.
Origin of Sedimentary-Rock Mountains on Mars Constrained by Layer-Orientation Data **[#2219]**
We use 200 HiRISE DTM layer orientation measurements to show that bedding planes systematically dip away from the center of martian sedimentary mounds.

9:15 a.m. Gabasova L. R. Kite E. S. *
Sediment Compaction on Mars and Its Effect on Layer Orientation **[#1209]**
Layer tilts in Gale? / Compaction might be why, but / Donut shape is key.

9:30 a.m. Garvin J. B. * Edgett K. S. Fey D. M. Dotson R. Frawley J. J. et al.
Mars Sedimentary Rock Metrology from MAHLI Quantitative Relief Models **[#2834]**
Measurements of sub-mm scale relief of martian rocks from the Curiosity MAHLI camera have produced quantitative relief models (QRM's) for geologic analysis.

9:45 a.m. Sanders C. * Wordsworth R. Macdonald F.
Impact Gardening as a Mechanism for Hydrothermal Alteration and Atmospheric Evolution on Noachian Mars **[#2634]**
We present models which test the validity of a mechanism for hydrogen production on Noachian Mars: Impact-induced hydrothermal alteration of shocked material.

10:00 a.m. Barlow N. G. *
The Role of Uplift in the Formation of Central Pits in Martian Impact Craters **[#1316]**
Detailed study of central pit craters on Mars reveals evidence of uplift followed by collapse in the formation of both floor pits and summit pits.

10:15 a.m. Calef F. J. III * Newsom H. Williams J. Parker T. J. Lamb M. et al.
Gale Crater Morphology Compared to Other High Central Peak Craters on Mars **[#2822]**
Gale crater has a central peak equal or greater than its rim height. Using similar craters on Mars, we attempt to reconstruct the antecedent crater morphology.

10:30 a.m. Warner N. H. * Golombek M. P. Sweeney J. Pivarunas A.
Regolith Thickness Estimates from the Size Frequency Distribution of Rocky Ejecta Craters in Southwestern Elysium Planitia, Mars **[#2231]**
We provide an analysis of regolith thickness at Elysium Planitia using the onset diameter of rocky ejecta craters and accounting for local surface processes.

10:45 a.m. Sylvest M. S. * Conway S. J. Dixon J. C. Patel M. R. Barnes A.
Mars Gully Slope Constraints for Sublimation-Induced Granular Flows **[#3008]**
We use simulation experiments under martian conditions to explore the slope limits of mass wasting events triggered by CO_2 sublimation.

11:00 a.m. Núñez J. I. * Barnouin O. S. Seelos F. P. Murchie S. L.
Compositional Constraints on Martian Gully Formation as Seen by CRISM on MRO **[#3054]**
We present results from compositional analysis of martian gullies as seen with CRISM on MRO.

11:15 a.m. Diniega S. * Allen A. Perez T. Hansen C. J.
Tracking Gully Activity Within the North Polar Erg, Mars **[#1740]**
It's dark and cold, but / Frost or wind or in-between / Something moves the sand.

11:30 a.m. Allen A. R. * Diniega S. Hansen C.
Gully and Aeolian Activity Within the "Tleilax" Dune Field in the Olympia Undae, Mars **[#1759]**
Mars polar dune sea / Rough wind blows, or ice ruptures / Sand crests gullify.

Monday, March 21, 2016 **[M102]**
SPECIAL SESSION:
CERES UNVEILED: DAWN EXPLORES A NEW WORLD
8:30 a.m. Waterway Ballroom 4

Chairs: **Carol Raymond**
Thomas Prettyman

8:30 a.m. Russell C. T. * Raymond C. A. Ammannito E. Buczkowski D. L. De Sanctis M. C. et al.
Dawn Arrives at Ceres: Exploration of a Small Volatile-Rich World **[#1275]**
Dawn arrives at Ceres, finding evidence for a desiccated, porous lag layer, a rigid crust over a weak asthenosphere above a rocky core.

8:45 a.m. Prettyman T. H. * Yamashita N. Castillo-Rogez J. C. Feldman W. C. Lawrence D. J. et al.
Elemental Composition of Ceres by Dawn's Gamma Ray and Neutron Detector **[#2228]**
Elemental mapping of Ceres by Dawn's Gamma Ray and Neutron Detector reveals a hydrogen-rich regolith and evidence for near-surface water ice at high latitudes.

9:00 a.m. De Sanctis M. C. * Ammannito E. Ciarniello M. Carrozzo F. G. Frigeri A. et al.
Ceres Composition by VIR on Dawn: Highlights of the First Year of Observation **[#1832]**
VIR on Dawn confirmed previous observation of bands at 3.1, 3.3–3.5, and 3.9 μm and clearly identified a band at 2.72 μm distinctive of OH-bearing minerals.

9:15 a.m. Jaumann R. * Stephan K. Krohn K. Matz K.-D. Otto K. et al.
Age-Dependent Morphological and Compositional Variations on Ceres **[#1455]**
Extended smooth spectraly blue young plains cover the interior of a number of craters on Ceres including multiple flows, pits, fissures and cracks.

9:30 a.m. McSween H. Y. * Castillo-Rogez J. Emery J. P. De Sanctis M. C. Dawn Science Team
Rationalizing the Composition and Alteration of Ceres **[#1258]**
Ceres mineralogy is consistent with a more pervasively altered CM/CI chondrite, as appropriate for its large size.

9:45 a.m. Neveu M. * Desch S. J.
Geochemistry, Thermal Evolution, and Cryovolcanism on Ceres with a Muddy Ice Mantle **[#1384]**
Mud throughout Ceres / Liquid even now at depth / Cryovolcanoes?

10:00 a.m. Marchi S. * O'Brien D. P. Schenk P. Fu R. Ermakov A. et al.
Cratering on Ceres: The Puzzle of the Missing Large Craters **[#1281]**
Dawn revealed that Ceres surface is rich in small craters (<100 km), while lacks large craters (>300 km). This is odd, and we discuss possible explanations.

10:15 a.m. Schenk P. * Marchi S. O'Brien D. Bland M. Platz T. et al.
Impact Cratering on the Small Planets Ceres and Vesta: S-C Transitions, Central Pits, and the Origin of Bright Spots **[#2697]**
Craters big and small on planets mostly small. Is Ceres icy or is it not? The pictures say perhaps, but craters do not disappoint: Bright Spots resolved.

10:30 a.m. Bland M. T. * Raymond C. A. Schenk P. M. Fu R. R. Park R. et al.
Evidence for Limited, Laterally Heterogeneous Ice Content on Ceres from Its Deep (and Not-So-Deep) Impact Craters **[#1267]**
Craters of great depth / Pure ice will not maintain them / Rock. Salt. Little ice.

10:45 a.m. Castillo-Rogez J. C. * Bowling T. Fu R. R. McSween H. Y. Raymond C. A. et al.
Loss of Ceres' Icy Shell from Impacts: Assessment and Implications **[#3012]**
Dawn observations revealed Ceres' outer shell is dominated by rock, not ice. We model the removal of a 50 km ice shell via impact-induced sublimation.

11:00 a.m. Park R. S. * Konopliv A. S. Bills B. Castillo-Rogez J. Asmar S. W. et al.
Gravity Science Investigation of Ceres from Dawn **[#1781]**
The Dawn gravity science investigation utilizes the DSN radio tracking and on-board images to determine the global shape and gravity of Ceres.

11:15 a.m. Ermakov A. E. * Zuber M. T. Smith D. E. Fu R. R. Raymond C. A. et al.
Evaluation of Ceres' Compensation State **[#1708]**
We evaluate Ceres' topography compensation state based on the Dawn gravity and shape data. This helps constrain Ceres' internal structure and evolution.

11:30 a.m. Raymond C. A. * Marchi S. Bland M. T. Castillo-Rogez J. C. Park R. S. et al.
Evidence for Large-Scale Heterogeneity in Ceres' Subsurface **[#3016]**
Ceres surface exhibits morphologic variations that may indicate compositional and/or rheological variability in the volatile-rich outer shell.

Monday, March 21, 2016 **[M103]**
ORIGIN OF THE TERRESTRIAL PLANETS:
DYNAMICAL, EXPERIMENTAL, AND ISOTOPIC CONSTRAINTS
8:30 a.m. Waterway Ballroom 5

Chairs: **James Day**
Matthew Siegler

8:30 a.m. Palme H. * Zipfel J.
The Earth Contains a Large Fraction of Material not Represented by Meteorites **[#2252]**
Earth is not produced by any combination of carbonaceous and non-carbonaceous chondrites. A major fraction of Earth is not represented by meteorites.

8:45 a.m. Young E. D. * Kohl I. K. Warren P. H. Rubie D. C. Jacobson S. A. et al.
Oxygen Isotopic Evidence for Vigorous Mixing During the Moon-Forming Giant Impact **[#1803]**
We use new oxygen isotope ratio analyses of the Moon and Earth to show that the Earth-Moon system was well mixed. The degree of mixing is quantified.

9:00 a.m. Lock S. J. * Stewart S. T. Petaev M. I. Leinhardt Z. M. Mace M. et al.
A New Model for Lunar Origin: Equilibration with Earth Beyond the Hot Spin Stability Limit **[#2881]**
A new physical-chemical model for lunar origin by partial condensation from the Earth successfully predicts the isotopic and chemical composition of the Moon.

9:15 a.m. Stewart S. T. * Lock S. J. Petaev M. I. Jacobsen S. B. Sarid G. et al.
Mercury Impact Origin Hypothesis Survives the Volatile Crisis: Implications for Terrestrial Planet Formation **[#2954]**
Volatile depletion is not a necessary consequence of giant impacts.

9:30 a.m. Scheinberg A. Elkins-Tanton L. T. * Schubert G. Bercovici D.
Core Solidification and Dynamo Evolution in a Mantle-Stripped Planetesimal **[#1625]**
Planetesimal core: Freezing inward, making a magnetic field.

9:45 a.m. Nakajima M. * Stevenson D. J.
Dynamical Mixing of Planetary Cores by Giant Impacts **[#2053]**
Our impact calculations show that the Moon-forming impact can provide kinetic energy large enough to mix the stably stratified core of the early Earth.

10:00 a.m. Dalou C. * Hirschmann M. Mosenfelder J. von der Handt A. Armstrong L.
Constraints on Nitrogen Fractionation During Core-Mantle Differentiation **[#2607]**
We experimentally determine the effects of pressure, temperature, and oxygen fugacity on N partition coefficients between core-forming metal and basaltic melts.

10:15 a.m. Boyce J. W. * Treiman A. H. Eiler J. M. Stolper E. M. Greenwood J. P. et al.
Fractionating Chlorine Isotopes in the Lunar Magma Ocean **[#1542]**
Sea of lunar melt / Be free light chlorine, escape! / Basalts bear the scar.

10:30 a.m. Elardo S. M. * Shahar A.
A Non-Chondritic Iron Isotope Composition in Planetary Mantles as a Result of Core Formation **[#1193]**
Experiments show that the presence of Ni in planetary cores fractionates Fe isotopes and results in isotopically ‘light’ mantles in the Moon, Mars, and Vesta.

10:45 a.m. Jordan M. K. * Young E. D.
Equilibrium Metal-Silicate Fe Isotope Fractionation and the Implications for Planetary Differentiation **[#3032]**
We measure the equilibrium Fe isotope fractionation between metal and silicate in aubrite meteorites to determine if core formation has an isotopic signature.

11:00 a.m. Steenstra E. S. * Dankers D. Lin Y. H. Rai N. Berndt J. et al.
Metal-Silicate Partitioning of S, Mn, Cr, Ni, As, Se, Cd, In, Sb, Te, and Pb at High Pressure and Temperature and Its Relevance for Core Formation in the Moon, Asteroid Vesta and the Angrite Parent Body **[#1851]**
Pressure strongly increases the siderophile behavior of S, Te, Se and In, and S in the silicate melt strongly decreases the siderophile behavior of Pb and Cd .

11:15 a.m. Burkhardt C. * Borg L. E. Brennecka G. A. Shollenberger Q. R. Dauphas N. et al.
Meteoritic Nd Isotope Constraints on the Origin and Composition of the Earth **[#1908]**
^{142}Nd variations between chondrites and Earth's mantle are of nucleosynthetic origin, obviating hidden reservoir or super-chondritic Earth models.

11:30 a.m. Sharp Z. D. *
Evidence for a Nebular Contribution to the Earth's Water Inventory **[#3021]**
Here we propose that some of Earth's water was sourced from the solar nebula.

Monday, March 21, 2016 [M104]
MARS ATMOSPHERE: HERE TODAY, GONE TOMORROW
8:30 a.m. Waterway Ballroom 6

Chairs: **Melissa Trainer**
Stephen Wood

8:30 a.m. Lillis R. J. * Jakosky B. M. Luhmann J. G. Grebowsky J. Brain D. A.
Scientific Highlights from the MAVEN Mission to Mars **[#1170]**
We present new discoveries from the first 15 months of the MAVEN mission, including an update on atmospheric escape rates from Mars.

9:00 a.m. Slipski M. * Jakosky B. M. Alsaeed N. Mahaffy P. R. Benna M. et al.
Characterizing Mars' Atmospheric Loss Through Argon Isotopic Fractionation Observed with MAVEN **[#2422]**
Atmosphere once thick / Mars' isotopes suggest / Some gases Argon.

9:15 a.m. Kurokawa H. * Kurosawa K. Usui T.
A Lower Limit of Atmospheric Pressure on Early Mars Inferred from Nitrogen and Argon Isotopes **[#1220]**
Comparing model calculations of the atmospheric evolution with isotope data of trapped gas in ALH 84001 gave a lower limit of the atmospheric pressure at 4.1 Ga.

9:30 a.m. Thiemann E. M. B. * Chaffin M. S. Bhattacharyya D. Clarke J. T.
Density Retrievals of the Mars Hydrogen Exosphere from MAVEN Solar Lyman-Alpha Occultations **[#2353]**
MAVEN EUVM solar occultations are used to find absolute density retrievals of the Mars H exosphere spanning the first year of the MAVEN mission.

9:45 a.m. Crismani M. M. J. * Schneider N. M. Jain S. Plane J. Carrillo-Sanchez J. D. et al.
Meteoric Metal Layer in Mars' Atmosphere: Steady-State Flux and Meteor Showers **[#2791]**
Mars metal ions / In the upper atmosphere / Meteor showers.

10:00 a.m. Lo D. Y. * Yelle R. V. Schneider N. M. Jain S. K. Stewart A. I. F. et al.
Twilight Limb Observations of Aerosols in the Martian Atmosphere by MAVEN IUVS **[#2603]**
We make use of a single-scattering model to investigate aerosol scattering of sunlight observed by MAVEN IUVS in the nightside atmospheric limb.

10:15 a.m. Wood S. E. * Phillips R. J. Smith I. B. Putzig N. E. Bierson C. J.
Modeling the Recent Evolution of Mars Perennial CO_2 Caps and Atmospheric Mass **[#3074]**
Seasonally-resolved modeling of the martian CO_2 cycle over the past 400 kyr produces several >100-m-thick layers of perennial CO_2 ice at the south pole.

10:30 a.m. Wilson J. T. * Eke V. R. Massey R. J. Elphic R. C. Feldman W. C. et al.
Seasonal Variation of the Martian Polar CO_2 Caps in GCM Predictions and Mars Odyssey Neutron Spectrometer Data **[#2908]**
We examine seasonal variation in the polar CO_2 caps using a set of reconstructions based on MONS data and find disagreement with the predictions of the GCMs.

10:45 a.m. Brown A. J. * Calvin W. M. Becerra P. Byrne S.
The Martian North Polar Water Cycle **[#1753]**
Using CRISM observations of H_2O ice deposition on the martian NPRC, we found latitude-dependent 'mode flips' and quantified the total amount of water deposited.

11:00 a.m. Villanueva G. L. * Mumma M. J. Novak R. E.
Unidentified Chemistry on Mars? Strong Tests of Current Photochemical Models via Global Mapping of Water and Ozone (Sampled via O_2 Dayglow) **[#1158]**
We report maps of ozone and water on Mars, revealing a strong dependence on local orography. Could this be the signature of heterogeneous chemistry?

11:15 a.m. Fries M. * Christou A. Archer D. Conrad P. Cooke W. et al.
Martian Methane from a Cometary Source: A Hypothesis **[#2932]**
There's methane on Mars / Why focus on a ground source? / The sky is there too.

11:30 a.m. Roos M. * Atreya S. K. Webster C. R. Mahaffy P. R.
Cometary Origin of Methane on Mars Highly Unlikely **[#1159]**
Atmospheric methane measurements by SAM/MSL do not show a correlation with predicted meteor shower events on Mars, which are a possible source of methane.

Monday, March 21, 2016 [M105]
MERCURY INSIDE OUT
8:30 a.m. Montgomery Ballroom

Chairs: **Mark Perry**
Krista Soderlund

8:30 a.m. Soderlund K. M. * Schubert G.
Evolution of Mercury's Core Dynamo **[#2262]**
We investigate the evolution of Mercury's core and magnetic field using interior models and dynamo theory.

8:45 a.m. Anderson B. J. * Korth H. Johnson C. L. Phillips R. J. Philpott L. C. et al.
Closure of Birkeland Currents at Mercury: Constraints on the Electrical Conductivity of the Crust and Mantle **[#1243]**
Field aligned currents at Mercury close through the planet and constrain the electrical conductivity.

9:00 a.m. Johnson C. L. * Phillips R. J. Philpott L. C. Anderson B. J. Byrne P. K. et al.
Mercury's Lithospheric Magnetic Field **[#1391]**
We report MESSENGER observations of Mercury's lithospheric magnetic field. The strongest fields are associated with the Caloris and circum-Caloris regions.

9:15 a.m. Hood L. L. *
Magnetic Anomalies Concentrated Near and Within Mercury's Impact Basins: Early Mapping and Interpretation **[#1301]**
Early mapping of MESSENGER magnetometer data shows that crustal magnetic anomalies are concentrated near and within the Caloris and Sobkou impact basins.

9:30 a.m. James P. B. * Phillips R. J. Grott M. Hauck S. A. Solomon S. C.
The Thickness of Mercury's Lithosphere Inferred from MESSENGER Gravity and Topography **[#1992]**
We compare theoretical admittance and correlation spectra with observed MESSENGER gravity and topography to characterize the early lithosphere on Mercury.

9:45 a.m. Padovan S. * Tosi N. Plesa A.-C.
Mercury's Early History: Impacts, Tides, and Convection **[#1824]**
Mercury´s wild youth / Impacts, decay, and the tide / But now all is quiet.

10:00 a.m. Knibbe J. S. * van Westrenen W.
Mercury's Past Rotation and Cratering Distribution **[#1445]**
We present simulation results of the cratering distribution for Mercury's current rotation state and orbit and possible former spin-orbit resonances.

10:15 a.m. Fassett C. I. * Crowley M. C.
High-Resolution Stereo Digital Terrain Models of Mercury: Crater Degradation and Morphometry **[#1046]**
Mercury craters / Appear to degrade quickly / Faster than the Moon.

10:30 a.m. Herrick R. R. * Wheeler E. M. Crumpacker W. G. Bates D.
The Unusual Cratering and Resurfacing History of Mercury as Revealed by the Spatial Density of Craters **[#2766]**
We examine distribution of craters on Mercury using a global database of craters for D > 5 km that tracks filled versus unfilled craters.

10:45 a.m. Denevi B. W. * Ernst C. M. Prockter L. M. Robinson M. S. Spudis P. D. et al.
The Origin of Mercury's Oldest Surfaces and the Nature of Intercrater Plains Resurfacing **[#1624]**
Geologic evidence is consistent with the idea that Mercury's early crust was enriched in graphite, low in reflectance, and largely buried by later volcanism.

11:00 a.m. Susorney H. C. M. * Barnouin O. S. Ernst C. M.
The Distribution of Surface Roughness In and Around Complex Craters on Mercury **[#1705]**
Ejecta/secondary fields of large complex craters may be the source of the increased surface roughness values of Mercury's older terrains (not crater cavities).

11:15 a.m. Ernst C. M. * Chabot N. L. Barnouin O. S.
Examining the Potential Contribution of the Hokusai Impact to Water Ice on Mercury **[#1374]**
We characterize Hokusai crater and derive a range of possible projectile sizes to examine the potential contribution of the impact to water ice on Mercury.

11:30 a.m. Deutsch A. N. * Chabot N. L. Mazarico E. Ernst C. M. Head J. W. et al.
Comparison of Areas in Shadow from Imaging and Altimetry in the North Polar Region of Mercury and Implications for Polar Ice Deposits **[#1134]**
Using MESSENGER images and altimetry, we map persistent and permanent shadow in Mercury's north polar region, and we discuss the implications for water ice.

Monday, March 21, 2016 [M141]
PLENARY SESSION:
MASURSKY LECTURE AND AWARD PRESENTATIONS
1:30 p.m. Waterway Ballroom 4 and 5

Chairs: Stephen Mackwell
Eileen Stansbery

Presentation of the 2015 GSA Stephen E. Dwornik Award Winners —

Best Graduate Oral Presentation:
Robert E. Jacobsen, University of Tennessee, *"Wet-to-Dry Hydrological Transition Encapsulated in Fluvial Stratigraphy of Aeolis Dorsa, Mars"*

Honorable Mention (Graduate Oral):
Alison R. Santos, University of New Mexico, *"Petrology of Iron, Titanium, and Phosphorus Rich Clasts Within Martian Meteorite Northwest Africa 7034"*

Best Graduate Poster:
Hannah C. M. Susorney, Johns Hopkins University, *"The Surface Roughness of Mercury: Investigating the Effects of Impact Cratering, Volcanism, and Tectonics"*

Honorable Mention (Graduate Poster):
Jessica A. Watkins, University of California–Los Angeles, *"Role of Hydrated Silicates in Long-Distance Transport of Landslides in Valles Marineris, Mars"*

Best Undergraduate Oral:
Jonathan Oulton, Florida State University, *"Chemical Evidence from Gujba for Differentiation and Evaporation/Re-Condensation Processes During the CB-Impact Event"*

Honorable Mention (Undergraduate Oral):
Roger J. Michaelides, Cornell University, *"Titan's Empty Lake Basins: Constraining Surface Physical Properties by Investigating Radar Backscatter Behavior at Multiple Incidence Angles"*

Best Undergraduate Poster:
Hank M. Cole, Colorado School of Mines, *"The Anatomy of a Wrinkle Ridge Revealed in the Wall of Melas Chasma, Mars"*

Honorable Mention (Undergraduate Poster):
Amanda Stadermann, Washington University, St. Louis, *"Revisiting the Youngest Mare Basalts on the Moon: Analysis of Primary and Secondary Crater Distributions in the Basalts South of Aristarchus Crater"*

Presentation of the 2016 LPI Career Development Award Winners —

Chrysa Avdellidou, *University of Kent, Canterbury*
Thomas James Barrett, *Open University, Milton Keynes*
Ernest Bell, *University of Maryland, Gaithersburg*
Laura Corley, *University of Hawaii, Honolulu*
Matthew Cross, *University of Western Ontario, London*
Karanam Durga Prasad, *Physical Research Laboratory, Ahmedabad*
Gavin Kenny, *Trinity College, Dublin*
Levke Kööp, *University of Chicago*
Marie McBride, *Purdue University, Lafayette*
Kathleen Scanlon, *Brown University, Providence*
Sarah Sutton, *Lunar and Planetary Laboratory, Tucson*
Jason Williams, *Southern Illinois University, Carbondale*

Masursky Lecture —

Stern S. A. * New Horizons Team
New Horizons: The Exploration of the Pluto System and the Kuiper Belt Beyond **[#1317]**
New Horizons explored Pluto in the summer of 2015. This Masursky lecture will describe key results.

S. Alan Stern is a planetary scientist at the Southwest Research Institute in Boulder, Colorado, and is the principal investigator of the New Horizons mission to the Pluto system, which launched in 2006 and reached its target in a milestone flyby in July 2015. A former Associate Administrator for NASA's Science Mission Directorate, Stern has been involved in 27 suborbital, orbital, and planetary space missions, including eight for which he served as instrument or mission principal investigator. Stern has also developed eight scientific instruments for planetary and near-space research missions and has been a guest observer on numerous NASA satellite observatories, including the International Ultraviolet Explorer, the Hubble Space Telescope, the International Infrared Observer and the Extreme Ultraviolet Observer. A pilot, Stern also has a degree in aerospace engineering and is currently active as a consultant for private sector space efforts. In 2007, Stern was listed among Time Magazine's 100 Most Influential People in the World.

Monday, March 21, 2016 **[M151]**
MOON FROM NEAR AND FAR:
RESULTS FROM RECENT LUNAR MISSIONS
2:30 p.m. Waterway Ballroom 1

Chairs: **Kurt Retherford**
William Farrell

2:30 p.m. Zuber M. T. * Smith D. E. Goossens S. J. Neumann G. A. Lemoine F. G. et al.
Exploring the Depth Distribution of Lunar Crustal Mass Anomalies Using GRAIL Gravity and LOLA Topography **[#2105]**
Gravity and topography are combined to infer structure within the lunar crust from the high degree component of the Bouguer gravity field.

2:45 p.m. Ding M. * Soderblom J. M. Zuber M. T. Bierson C. J. Nimmo F. et al.
Target Porosity Controls Crater Residual Bouguer Anomaly in the Lunar Highlands **[#1359]**
We spatially map crater RBA, and find that the large-scale spatial variations in crater RBA can be explained by variations in regional porosity.

3:00 p.m. Smith D. E. * Zuber M. T. Neumann G. A. Goossens S. J. Mazarico E. et al.
The Lunar South Polar Crust **[#2374]**
The relationship of Bouguer gravity of the polar crust to crustal thickness; major impact features and the geological environment is investigated.

3:15 p.m. Xie L. * Zhang X. Zheng Y. Guo D.
The Effect of Backscattered Solar Wind Protons on the Current Measurement of the Lunar Dust Experiment **[#1106]**
We find the current measured by the Lunar Dust Experiment (LDEX) is mainly caused by backscattered solar wind protons and the backscattering depends on both the SW parameters and SZA.

3:30 p.m. Colaprete A. * Wooden D. Cook A. Shirley M. Sarantos M.
Observations of Titanium, Aluminum, and Magnesium in the Lunar Exosphere by LADEE UVS **[#2635]**
Presented here are preliminary observations of lunar exosphere aluminum, titanium, and magnesium acquired during limb “noon” time LADEE UVS observations.

3:45 p.m. Grava C. * Retherford K. D. Hurley D. M. Feldman P. D. Gladstone G. R. et al.
LRO-LAMP Observations of the Lunar Exospheric Helium Coordinated with LADEE and ARTEMIS: Analysis of Off-Nadir Pitches **[#2472]**
We discuss the detection of lunar exospheric helium with LRO/LAMP. We present latitudinal dependence of column density and constrain endogenic source rate of He.

4:00 p.m. Ling Z. C. * Jolliff B. L. Zhang J. Li B. Sun L. Z. et al.
Differentiation of Basaltic Lava at Chang’e-3 Landing Site **[#2545]**
The in situ detection by Yutu rover discovers a new type of basaltic rock and suggests that the young lava has experienced chemical differentiation event.

4:15 p.m. Fa W. *
Ejecta Properties of Zi Wei Crater as Revealed by Chang'E-3 Lunar Penetrating Radar **[#1185]**
Ejecta properties of the Zi Wei crater over which China's Chang'E-3 spacecraft landed were investigated using the Lunar Penetrating Radar data.

4:30 p.m. Wang Z. C. * Wu Y. Z. Zheng Y. C. Blewett D. T. Cloutis E. A. et al.
Use of Radiative-Transfer Modeling to Estimate Nanophase Iron Abundance at the Chang'e-3 Site **[#1404]**
We have carried out radiative-transfer modeling of the spectra with the goals of quantifying the abundance of SMFe and estimate the soil age at the CE-3 site.

Monday, March 21, 2016 **[M152]**
SPECIAL SESSION:
NEW HORIZONS AT PLUTO! FIRST YEAR OF MAPPING
2:30 p.m. Waterway Ballroom 4 and 5

Chairs: **Orkan Umurhan**
Kelsi Singer

2:30 p.m. Spencer J. R. * Moore J. M. McKinnon W. B. Stern S. A. Young L. A. et al.
The Geology of Pluto and Charon Revealed by New Horizons **[#2440]**
The New Horizons spacecraft has revealed complex and ongoing geological activity on Pluto, and ancient resurfacing on Charon.

3:00 p.m. Grundy W. M. * Binzel R. P. Cook J. C. Cruikshank D. P. Dalle Ore C. M. et al.
Surface Compositions on Pluto and Charon **[#1737]**
This talk will focus on the complex surface compositions of Pluto and Charon, the two largest bodies in the system explored by New Horizons in 2015.

3:30 p.m. Summers M. E. * Gladstone G. R. Stern S. A. Ennico K. Olkin C. B. et al.
The Neutral Atmospheres of Pluto and Charon **[#2864]**
The New Horizons Pluto flyby has given us a wealth of information on Pluto's atmosphere and constraints for an atmosphere on Charon. We discuss these results.

4:00 p.m. Porter S. B. * Showalter M. R. Weaver H. A. Spencer J. R. Binzel R. P. et al.
The Small Satellites of Pluto **[#2390]**
An overview of the four small satellites of Pluto and what we learned about them from the New Horizons Pluto flyby.

4:30 p.m. McKinnon W. B. * Moore J. M. Spencer J. R. Grundy W. M. Gladstone G. R. et al.
The Pluto-Charon System Revealed: Geophysics, Activity, and Origins **[#1995]**
New Horizons has revealed the character and evolution of a small, icy binary planet, one born in a giant impact much closer to the Sun over 4 billion years ago.

Monday, March 21, 2016 **[M153]**
MARTIAN AEOLIAN PROCESSES:
MSL AT THE BAGNOLD DUNE FIELD
2:30 p.m. Waterway Ballroom 6

Chairs: **Lori Fenton**
James Zimbelman

2:30 p.m. Bridges N. T. * Ehlmann B. L. Ewing R. C. Newman C. E. Sullivan R. et al.
Investigation of the Bagnold Dunes by the Curiosity Rover: Overview of Initial Results from the First Study of an Active Dune Field on Another Planet **[#2298]**
MSL is now passing through an active sand dune field. We review initial results from the campaign at a high level.

2:45 p.m. Lapotre M. G. A. * Ewing R. C. E. Lamb M. P. Fischer W. W. Lewis K. W. et al.
Orbital and In-Situ Observations in Support of the Existence of an Unknown Stable Aeolian Bedform Regime on Mars **[#1510]**
We report on the discovery of a new stable aeolian bedform regime based on orbital and rover observations of dunes fields on Mars.

3:00 p.m. Ewing R. C. * Bridges N. T. Sullivan R. Lapotre M. G. A. Fischer W. W. et al.
Aeolian Sedimentary Processes at the Bagnold Dunes, Mars: Implications for Modern Dune Dynamics and Sedimentary Structures in the Aeolian Stratigraphic Record of Mars **[#2783]**
Analysis of MSL Curiosity rover images of sand dunes reveals both familiar and strikingly different sedimentary structures from those recognized on Earth.

3:15 p.m. Achilles C. N. * Vaniman D. T. Blake D. F. Bristow T. F. Rampe E. B. et al.
Mineralogy of Eolian Sands at Gale Crater **[#2532]**
The mineralogy of active, Bagnold, and inactive, Rocknest, eolian sand deposits in Gale Crater, Mars is compared and constraints on their sources are explored.

3:30 p.m. Cousin A. * Forni O. Meslin P. Y. Schroeder S. Gasnault O. et al.
Chemical Diversity Among Fine-Grained Soils at Gale (Mars): A Chemical Transition as the Rover is Approaching the Bagnold Dunes? **[#2044]**
This study focuses on soil analyses by ChemCam along the traverse as we approach the Bagnold dunes, the first active dune field accessible by a Mars rover.

3:45 p.m. Ehlmann B. L. * Bridges N. Fraeman A. A. Lapotre M. G .A. Edgett K. et al.
Chemistry and Mineralogy In Situ at the Bagnold Sand Dunes: Evidence for Aeolian Sorting and Size-Dependence in Sand Composition **[#1536]**
We provide an overview of in situ chemistry and mineralogy results from the Curiosity rover science campaign at the Bagnold dunes.

4:00 p.m. O'Connell-Cooper C. D. * Thompson L. M. Spray J. G. Berger J. A. Desouza E. D. et al.
Preliminary Comparison of Soils Within Gale Crater to Those from Gusev Crater and Meridiani Planum **[#2477]**
APXS analyses highlight compositional similarities between soils at Gale, Gusev, and Meridiani, whilst showing varied compositions in soils at Bagnold Dunes.

4:15 p.m. Chojnacki M. * Urso A. C. Michaels T. I. Fenton L. K.
Aeolian Dune Sediment Flux Heterogeneity in Meridiani Planum, Mars **[#2091]**
Widespread dune migration is detected in the region surrounding the Opportunity rover. Results show spatially and temporally variable sand fluxes for dunes.

4:30 p.m. Banham S. G. Gupta S. Rubin D. M. Watkins J. A. Sumner D. Y. et al.
Reconstruction of an Ancient Eolian Dune Field at Gale Crater, Mars: Sedimentary Analysis of the Stimson Formation **[#2346]**
Surface observations of the Stimson formation, Gale crater, lead us to interpret that it was deposited by an eolian dune field, undergoing episodic aggradation.

Monday, March 21, 2016 [M154]
PLANETARY DIFFERENTIATION: SO METAL
2:30 p.m. Montgomery Ballroom

Chairs: Etienne Médard
Kathleen Vander Kaaden

2:30 p.m. Duncan M. S. * Dasgupta R.
Experimental Constraints on Carbon Solubility in Terrestrial Magma Oceans: Implications for the Efficiency of Early Carbon Cycling on Earth and Mars **[#1774]**
Experiments show / Carbon in magma oceans / Degas at low P.

2:45 p.m. Steenstra E. S. * Lin Y. H. Rai N. Jansen M. van Westrenen W.
Carbon as the Dominant Light Element in the Lunar Core **[#1842]**
Geochemical arguments suggest carbon, not sulfur is the dominant light element in the lunar core.

3:00 p.m. Vander Kaaden K. E. * McCubbin F. M. Ross D. K. Rapp J. F. Danielson L. R. et al.
Carbon Solubility in Si-Fe-Bearing Metals During Core Formation on Mercury **[#1474]**
Mercury's carbon / Will it go into metal? / Depends on Si.

3:15 p.m. Rubie D. C. * Laurenz V. Jacobson S. A. Morbidelli A. Palme H. et al.
High Concentrations of Highly Siderophile Elements were Stripped from Earth's Mantle by the Segregation of Exsolved Iron Sulfide Melt **[#1112]**
Contrary to conventional wisdom, segregating metal increases HSE concentrations in Earth's mantle during core formation because of effects of P, T, and S content.

3:30 p.m. Wang Z. * Laurenz V. Petitgirard S. Becker H.
Earth's Moderately Volatile Element Composition May Not Be Chondritic: Evidence from In, Cd, and Zn **[#1219]**
Indium, Cd, and Zn abundances in silicate Earth and high P-T metal-silicate partitioning data are combined to discuss volatile element composition of bulk Earth.

3:45 p.m. Righter K. * Pando K. Danielson L. R. Humayun M. Righter M. et al.
Effect of Silicon on Activity Coefficients of Siderophile Elements (P, Au, Pd, As, Ge, Sb, and In) in Liquid Fe, with Application to Core Formation **[#2116]**
Measured activity coefficients in Fe-Si liquids show that high PT equilibration of Earth's mantle with a Si-bearing core can explain mantle In, Ge, As, and Sb.

4:00 p.m. Fei Y. * Shibazaki Y.
Compositions and Mobility of Metallic Immiscible Liquids at High Pressure and Temperature: Implications for Differentiation of Small Planetary Bodies **[#1719]**
We examine melting behavior and composition of immiscible liquids in the Fe-Ni-S-O-Si system and percolative behavior of immiscible liquids in olivine matrix.

4:15 p.m. Jacobson S. A. * DeMeo F. Morbidelli A. Carry B. Frost D. et al.
There's Too Much Mantle Material in the Asteroid Belt **[#1895]**
The ratio of crust to mantle material in the asteroid belt indicates that these bodies originate as ejecta from giant impacts on the growing terrestrial planets.

4:30 p.m. Lunning N. G. * McCoy T. J. Corrigan C. M.
Consequences of Hercynite Crystallization During Differentiation of CV Chondrite-Composition Parent Bodies **[#1682]**
Hercynite may crystallize and segregate from silicate partial melts, keeping ^{26}Al in planetesimal interiors during differentiation under oxidizing conditions.

Tuesday, March 22, 2016 **[T201]**
LUNAR VOLATILES:
MICROANALYSIS, REMOTE SENSING, AND EVERYTHING IN BETWEEN
8:30 a.m. Waterway Ballroom 1

Chairs: **Juliane Gross**
Lisa Gaddis

8:30 a.m. Greenwood J. P. * Sakamoto N. Itoh S. Singer J. A. Warren P. H. et al.
Volatile Content of the Lunar Magma Ocean: Constraints from KREEP Basalts 15382 and 15386 **[#2484]**
The lunar magma ocean volatile content is estimated from Cl/Nb and F/Nd in KREEP basalts. All lunar samples are depleted in Cl/Nb and F/Nd relative to Earth.

8:45 a.m. Füri E. * Deloule E.
New Constraints on the Production Rate of Cosmogenic Deuterium at the Moon's Surface **[#1351]**
The D content of lunar olivines indicates that the production rate of cosmogenic D at the lunar surface is significantly higher than previously estimated.

9:00 a.m. Mosenfelder J. L. * Hirschmann M. M.
SIMS Measurements of Hydrogen and Fluorine in Lunar Nominally Anhydrous Minerals **[#1716]**
We surveyed plagioclase and other NAMs from 6 lunar samples for H and F using an ultra-low blank SIMS technique recently calibrated for feldspars.

9:15 a.m. Day J. M. D. * Moynier F. Shearer C. K.
Condensate Zinc on the Surface of the Moon Evidenced from the 'Rusty Rock,' 66095 **[#2516]**
Condensate zinc exists on the surface of the Moon, supporting loss of volatiles during a magma ocean phase.

9:30 a.m. Jean M. M. * Bonder B. Farley C. Taylor L. A.
'Rusty Rocks' from the Moon: Volatile-Element Contributions from Meteorites **[#2498]**
We provide evidence for hydration and oxidation of FeNi metal grains from Apollo 16 which demonstrate volatile compositions associated with meteorite fragments.

9:45 a.m. Burney D. * Neal C. R. Simonetti A.
Moderately Volatile Elements in Lunar Basalts: Implications for the Lunar Volatile Budget **[#2169]**
The data presented here demonstrates the application of a method to measure moderately volatile trace elements on the moon, and preliminary data trends seen.

10:00 a.m. Li S. * Milliken R. E.
Heterogeneous Water Content in the Lunar Interior: Insights from Orbital Detection of Water in Pyroclastic Deposits and Silicic Domes **[#1568]**
We quantify the potential indigenous water of lunar pyroclastic deposits and silicic domes to assess magma volatiles and variations in magma degassing history.

10:15 a.m. Rubanenko L. * Aharonson O. Schorghofer N.
Temperature Distribution of Rough Airless Bodies and Volatile Stability **[#1650]**
We develop and apply a thermophysical model to calculate the stability of surface and subsurface ice on rough airless planetary bodies.

10:30 a.m. Patterson G. W. * Stickle A. M. Turner F. S. Jensen J. R. Bussey D. B. J. et al.
Mini-RF/AO Bistatic Observations of the Floor of Cabeus Crater and Their Implications for the Presence of Water Ice **[#2320]**
Mini-RF and Arecibo Observatory bistatic radar data of Cabeus floor materials show an opposition response that may indicate the presence of water ice.

10:45 a.m. Schwadron N. A. * Wilson J. K. Jordan A. P. Looper M. D. Petro N. E. et al.
Top Hydration Layer Near Poles from LRO/CRaTER: Search for Time-of-Day Dependence **[#1583]**
We report here on the first search for time-of-day dependence of the surface hydration layer near the poles from CRaTER's proton albedo.

11:00 a.m. Fisher E. A. * Lucey P. G. Lemelin M. Greenhagen B. Siegler M. et al.
Search for Lunar Volatiles Using the Lunar Orbiter Laser Altimeter and the Diviner Lunar Radiometer **[#2574]**
Albedo and temperature show a complex relationship at the lunar poles that may indicate influence by space weathering, volatile deposition, or other processes.

11:15 a.m. Hendrix A. R. * Greathouse T. K. Retherford K. D. Mandt K. E. Gladstone G. R. et al.
Lunar Hydration Measurements by LRO/LAMP **[#2857]**
Far-ultraviolet measurements of the Moon from LRO are used to study hydration signatures.

11:30 a.m. Farrell W. M. * Hurley D. M. Poston M. J. Hayne P. O.
Cold Trapping of Lunar Polar Crater Volatiles: A Comparison of Two Theories **[#1224]**
We compare and contrast two different volatile-surface cold-trapping mechanisms – the Watson and Barrie approaches – currently presented in the literature.

Tuesday, March 22, 2016 **[T202]**
SPECIAL SESSION:
CERES UNVEILED: THE NEXT LAYER
8:30 a.m. Waterway Ballroom 4

Chairs: **Debra Buczkowski**
Ottaviano Ruesch

8:30 a.m. McCord T. B. * Combe J.-Ph. Raymond C. A. De Sanctis M. C. Jaumann R. et al.
Ceres Evolution: What We Have Learned from Dawn So Far **[#1607]**
A summary of knowledge of Ceres evolution before Dawn, what is learned from Dawn, and how the understanding of evolution is evolving.

8:45 a.m. Li J.-Y. * Le Corre L. Reddy V. Nathues A. Hoffmann M. et al.
Spectrophotometric Modeling and Mapping of Ceres **[#2095]**
We present the global spectrophotometric properties of Ceres and the maps of its various photometric properties across the surface.

9:00 a.m. Pieters C. M. * Ammannito E. Ciarniello M. De Sanctis M. C. Hoffman M. et al.
Surface Processes and Space Weathering on Ceres **[#1383]**
Processes active on dwarf planet Ceres are related to those of rocky and icy bodies, except in a unique combination. Observed properties evolve with time, but….

9:15 a.m. Ammannito E. * De Sanctis M. C. Ciarniello M. Frigeri A. Combe J.-Ph. et al.
Distribution of Phyllosilicates on Ceres **[#3020]**
We present here the distribution of phyllosilicates on Ceres' surface as measured by the IR spectrometer onboard the Dawn spacecraft.

9:30 a.m. Palomba E. * Longobardo A. De Sanctis M. C. Cloutis E. Ammannito E. et al.
Characterization of Carbonates on Ceres **[#2166]**
The objective of this work is to constrain the carbonate minerals present on the Ceres surface.

9:45 a.m. Platz T. * Nathues A. Schaefer M. Schenk P. Kneissl T. et al.
Impact Cratering on Ceres: The Simple-to-Complex Transition **[#2308]**
We present how the simple-to-complex transition has been determined for Ceres and make inferences about surface target properties.

10:00 a.m. Otto K. A. * Jaumann R. Krohn K. Buczkowski D. L. von der Gathen I. et al.
Origin and Distribution of Polygonal Craters on (1) Ceres **[#1493]**
We investigate the distribution of polygonal craters on Ceres and discuss possible formation processes with respect to Ceres' geology.

10:15 a.m. Buczkowski D. L. * Schenk P. M. Scully J. E. C. Otto K. von der Gathen I. et al.
Linear Structures on Ceres: Morphology, Orientation, and Possible Formation Mechanisms **[#1262]**
Linear structures identified on Ceres include grooves, pit crater chains, fractures and troughs. Multiple formation mechanisms are explored.

10:30 a.m. Scully J. E. C. * Raymond C. A. Buczkowski D. L. O'Brien D. P. Mitri G. et al.
Implications for the Geologic Evolution of Ceres, Derived from Global Geologic Mapping of Linear Features **[#1618]**
We present a global geologic map and relative ages of fractures and ejecta ray systems on Ceres. One set of fractures is one of the oldest features on Ceres.

10:45 a.m. Bowling T. J. * Ciesla F. J. Marchi S. Davison T. M. Castillo-Rogez J. C. et al.
Impact Induced Heating of Occator Crater on Asteroid 1 Ceres **[#2268]**
Occator, once hot / Liquid water flowed beneath / Alas, no longer.

11:00 a.m. Hughson K. H. G. * Russell C. T. Combe J.-Ph. Scully J. E. C. Platz T. et al.
Shedding Light on Oxo Crater: A Detailed Investigation of the Geology and Morphology of One of Ceres' Youngest Features Using Dawn Spacecraft Data **[#2387]**
We present a detailed analysis of the geology and morphology of Oxo crater and its immediate surroundings and discuss its place in the evolution of Ceres.

11:15 a.m. Combe J.-Ph. * McCord T. B. Tosi F. Raponi A. De Sanctis M. C. et al.
Detection of H_2O-Rich Materials on Ceres by the Dawn Mission **[#1820]**
Exposed H_2O ice or H_2O-bearing minerals in crater Oxo on Ceres are revealed by near-infrared reflectance spectra acquired by the Dawn mission.

11:30 a.m. Villarreal M. N. * Russell C. T. Prettyman T. H. Yamashita N. Jia Y. D. et al.
How Can Ceres Generate Energetic Electrons? Confirming the Presence of a Temporary Bow Shock **[#1687]**
Energetic electrons between 20–100 keV are investigated as evidence for a temporary bow shock at Ceres.

Tuesday, March 22, 2016 **[T203]**
IMPACTS: OBSERVATIONS
8:30 a.m. Waterway Ballroom 5

Chairs: **Catherine Neish**
Kirby Runyon

8:30 a.m. Kenkmann T. * Sturm S. Krüger T. Salameh E. Al-Raggad M. et al.
The Tectonic Inventory of Small Complex Impact Structures: A Case Study at Jebel Waqf as Suwwan, Jordan **[#1299]**
Our structural analysis showed that impact obliquity affects crater modification from the center to the rim. Buckling of the ring syncline is a novel feature.

8:45 a.m. Sharpton V. L. * Lalor E. Mouginis-Mark P. M.
Reconstructing Excavation Cavity Shapes from Anomalous Rim Height Variations in Fresh Lunar Craters **[#1115]**
Rim crest range and height characteristics provide clues to reconstructing the shapes of excavation cavities in fresh lunar craters.

9:00 a.m. Neish C. D. * Herrick R. R. Smith D. Ripper R. Lashley J.
The Role of Pre-Impact Topography in Impact Melt Emplacement on Terrestrial Planets **[#1520]**
Lazy impact melts / Find path of least resistance / Over rim crest low.

9:15 a.m. Plescia J. B. * Baloga S. M.
Rheology of Lunar Impact Melt Flows **[#2585]**
Estimates of impact melt rheology suggest significant variations in rheology, perhaps indicative of varying energy partitioning into melt and disruption.

9:30 a.m. Kenny G. G. * Whitehouse M. J. Kamber B. S.
Differentiated Impact Melt Sheets May Be a Potential Source of the Hadean Detrital Zircon Population **[#2473]**
Impact melt sheet differentiation, strongest in the presence of a hydrosphere, was likely a major source of the Hadean zircons, not plate tectonic interactions.

9:45 a.m. Young K. E. * Mercer C. M. Hodges K. V. van Soest M. C. Osinski G. et al.
Developing a Strategy for Geochronologic Sampling of the South Pole-Aitken Basin Based on Experiences with Low-Temperature Thermochronology of Terrestrial Craters **[#1754]**
We discuss a sampling strategy for dating the South Pole-Aitken Basin based on the low-temperature thermochronology of a terrestrial analog crater.

10:00 a.m. O'Connell-Cooper C. D. * Dickin A. P. Spray J. G.
The Manicouagan Impact Melt Sheet: Identification of Protoliths and Degree of Initial Mixing and Heterogeneity **[#2259]**
Sm-Nd, Rb-Sr, and Pb-Pb isotopes highlight initial homogenization of Manicouagan impact melt and later Rb/Sr fractionation, identifies Paleoproterozoic protolith.

10:15 a.m. Winkler R. * Poelchau M. H. Michalski C. Kenkmann T.
Subsurface Deformation of Experimental Hypervelocity Impacts in Quartzite and Marble Targets **[#1480]**
Impact experiments in quartzite and marble targets reveal a highly localized fracture pattern in quartzite and a more pervasive deformation in marble.

10:30 a.m. Jaret S. J. * Johnson J. R. Sims M. Glotch T. D.
Micro-Raman Spectroscopy of Experimentally Shocked Albite **[#1530]**
Flat Plate Hit Albite / Resists More Than Andesine / Says Raman Spectra.

10:45 a.m. Avdellidou C. * Price M. C. Delbo M. Cole M. J.
The Effect of Target's Porosity on the Fate of the Impactor in Hypervelocity Collisions **[#1551]**
We investigate the fragmentation, implantation, and final state of the impactor after hypervelocity collisions on targets with different porosities.

11:00 a.m. Okamoto T. * Kurosawa K. Genda H. Matsui T.
Ultra-High-Speed Imaging of the Impact Ejecta: Comparison with a SPH Simulation **[#2515]**
We conducted impact experiments to investigate the high-speed ejecta from near the impact point, comparing the results with those of SPH simulations.

11:15 a.m. Aschauer J. * Kenkmann T. Rudolf M.
Impact Cratering Processes on Slopes Using Analogue Experiments **[#1350]**
The effect of target morphology on the impact cratering process is investigated with a systematic parameter study using analogue experiments on inclined slopes.

11:30 a.m. Runyon K. D. * Barnouin O. S.
Ejecta Emplacement in the Lab **[#1075]**
Crater ejecta / Laboratory analog / Scour, mix, rock, and roll.

Tuesday, March 22, 2016 **[T204]**
MARTIAN MINERALOGY ON THE SURFACE AND FROM ORBIT
8:30 a.m. Waterway Ballroom 6

Chairs: **Abigail Fraeman**
Damien Loizeau

8:30 a.m. Milliken R. E. * Hurowitz J. A. Bish D. L. Grotzinger J. P. Wiens R.
The Chemical and Mineralogical Stratigraphy of Lower Mt. Sharp: Relating Rover Observations to Orbital Predictions **[#1495]**
Integrated analysis of rover data reveals important links to predicting geologic processes from orbit.

8:45 a.m. Fraeman A. A. * Ehlmann B. L. Arvidson R. E. Edwards C. S. Grotzinger J. P. et al.
The Stratigraphy and Evolution of Lower Mt. Sharp from Spectral, Morphological, and Thermophysical Orbital Datasets **[#2224]**
We generate a refined stratigraphy of Mt. Sharp using orbital geologic and spectral mapping. Results provide insights into its formation and evolution.

9:00 a.m. Jackson R. S. * Wiens R. C. Vaniman D. T. Beegle L. W. Nachon M. et al.
ChemCam Investigation of the Pahrump Hills Drill Sites **[#1767]**
What can ChemCam say / About the rocks that were drilled / At the Pahrump Hills.

9:15 a.m. McAdam A. C. * Knudson C. A. Sutter B. Franz H. B. Archer P. D. et al.
Reactions Involving Calcium and Magnesium Sulfates as Potential Sources of Sulfur Dioxide During MSL SAM Evolved Gas Analyses **[#2277]**
Sulfates expected to evolve SO_2 at temperatures above the SAM range may produce SO_2 at lower temperatures due to interactions with other phases during heating.

9:30 a.m. Hanley J. * Horgan B.
A Novel Method to Remotely Sense Martian Chlorine Salts **[#2983]**
We explain a new method for systematically detecting chlorine salts by remote sensing.

9:45 a.m. Gasda P. J. * Frydenvang J. Wiens R. C. Grotzinger J. P. Watkins J. A. et al.
Potential Link Between High-Silica Diagenetic Features in Both Eolian and Lacustrine Rock Units Measured in Gale Crater with MSL **[#1675]**
Ancient Gale lake bed / Linked to Gale sandstone by same / Diagenesis?

10:00 a.m. Sun V. Z. * Milliken R. E. Robertson K. M.
Hydrated Silica on Mars: Relating Geologic Setting to Degree of Hydration, Crystallinity, and Maturity Through Coupled Orbital and Laboratory Studies **[#2416]**
Spectral variations in hydrated silica are strongly linked to geomorphologic setting globally across Mars and may reflect formation or diagenetic conditions.

10:15 a.m. Farrand W. H. * Rogers A. D. Wright S. P. Glotch T. D.
Partially Devitrified Glass as a Component of the Martian Surface Layer: Thermal Infrared Evidence **[#1956]**
Partially devitrified volcanic glass sample spectra were used in modeling of TES Mars surface spectra and form a significant fraction of the Mars surface layer.

10:30 a.m. Bishop J. L. * Gross C. Rampe E. B. Wray J. J. Parente M. et al.
Mineralogy of Layered Outcrops at Mawrth Vallis and Implications for Early Aqueous Geochemistry on Mars **[#1332]**
New imagery at Mawrth Vallis enabled a refined stratigraphy including five mineralogical units mapped with HRSC and HiRISE DTMs and a wider grasp of geochemistry.

10:45 a.m. Loizeau D. * Carter J. Millot C. Flahaut J. Quantin C. et al.
Extended Aqueous Surface Weathering South of Coprates Chasma, Mars **[#2280]**
Pedogenic clay sequences are studied on the plateau south of Coprates Chasma, Mars. Age and thickness are evaluated.

11:00 a.m. Pan L. * Ehlmann B. L. Carter J. Ernst C. M.
The Stratigraphy of the Northern Plains Inferred from Mineralogy of Impact Craters **[#2338]**
Widespread mafic and hydrated minerals have been detected in craters using CRISM at different depths of the stratigraphy within the northern plains of Mars.

11:15 a.m. Viviano-Beck C. E. * Seelos K. D. Murchie S. L. Brown A. J.
Alteration Associated with Large Impact Basins on Mars **[#1738]**
Detailed mineral mapping from Isidis to Hellas Basin reveals low-temperature metamorphism in the crust and carbonate associated with large impact basins.

11:30 a.m. Tirsch D. * Erleking G. Bishop J. L. Tornabene L. L. Hiesinger H. et al.
Geologic Context of Lacustrine Mineral Deposits at Bradbury Crater, Mars **[#1444]**
The current work is directed towards shedding light on the origin and timing of aqueous alteration processes at Bradbury Crater on Mars.

Tuesday, March 22, 2016 [T205]
CHONDRITES: CAIs AND OTHER REFRACTORIES
8:30 a.m. Montgomery Ballroom

Chairs: **Andrew Davis**
Denton Ebel

8:30 a.m. Laurent B. Roskosz M. * Remusat L. Leroux H.
Deuteration of Insoluble Organic Matter and Silicates by Ionizing Irradiation in the Solar Nebula **[#1845]**
We performed experiments on IOM and hydrous silicate analogues. Irradiation may explain the deuteration of the IOM relative to silicates found in CI chondrites.

8:45 a.m. Daly L. * Bland P. A. Evans K. Dyl K. A. Forman L. V. et al.
Composition of Refractory Metal Nuggets: Implications for Their Origins **[#1880]**
In situ analyses of refractory metal nuggets reveal two populations consistent with crystallisation and sulphidation processes, not condensation models.

9:00 a.m. Simon J. I. * Jordan M. K. Tappa M. J. Kohl I. E. Young E. D.
Calcium and Titanium Isotope Fractionation in CAIs: Tracers of Condensation and Inheritance in the Early Solar Protoplanetary Disk **[#1397]**
Ca and Ti isotope ratios measured in CAIs are compared to condensation fractionation models. High precision evidence of Ca isotopic zoning in a CAI is reported.

9:15 a.m. Davis A. M. * Zhang J. Hu J. Greber N. D. Dauphas N.
Titanium Isotopic Anomalies, Titanium Mass Fractionation Effects, and Rare Earth Element Patterns in Allende CAIs and Their Relationships **[#3023]**
Titanium isotopes in Allende CAIs show both mass-dependent and non-mass-dependent isotopic effects, neither of which is correlated with REE patterns.

9:30 a.m. Ustunisik G. * Ebel D. S. Walker D.
Temperature and Compositional Controls on Trace and REE Partitioning Between CAI-Type Melts and Grossite, Melilite, Hibonite, and Olivine: Insights from Isothermal Crystallization Experiments **[#2406]**
Trace and REE partitioning experiments between grossite, melilite, hibonite, olivine, and CAI-type melts reveal isochemical and isothermal controls on Min-MeltDi.

9:45 a.m. Zega T. J. * Manga V. Domanik K. Muralidiharan K.
Nanostructural Analysis of Several Perovskite Grains from an Allende CAI: Evidence for Equilibrium or Non-Equilibrium Condensation? **[#2807]**
We examine the microstructure of several perovskite grains from an Allende CAI. The data call into question whether equilibrium condensation occurred for this CAI.

10:00 a.m. Paque J. M. * Burnett D. S. Beckett J. R. Guan Y.
Submicron Inclusions in Melilite in a Leoville CAI and Relevance to Early Solar System Processes **[#1997]**
Inclusion compositions vary widely. Some inclusions are relict, while others may be exsolved or crystallized from trapped liquids.

10:15 a.m. Russell S. S. * Itoh S. Salge T. Higashi Y. Kawasaki N. et al.
A CAI in the Highly Unequilibrated Ordinary Chondrite Northwest Africa 8276: Implications for CAI Formation and Processing **[#1989]**
We have found a very unusual CAI in an LL3.0 chondrite and discuss the implications for CAI formation and how they were altered.

10:30 a.m. Weisberg M. K. * Bigolski J. Ebel D. S.
Calcium-Aluminum-Rich (CAI) and Sodium-Aluminum-Rich (NAI) Inclusions in the PAT 91546 CH Chondrite **[#2152]**
CH chondrites have a range of objects including Na-Al-rich inclusions, which may be products of fractional condensation or fragments of a differentiated body.

10:45 a.m. Mendybaev R. A. * Richter F. M.
Chemical and Isotopic Fractionation During Evaporation of AOA- and FoB-Like Materials **[#2929]**
AOAs as precursors of FoBs. Results of experiments on evaporation of AOA- and FoB-like materials in vacuum and 1 atm hydrogen furnaces will be discussed.

11:00 a.m. Kawasaki N. Yurimoto H. * Simon S. B. Grossman L.
Oxygen Isotope Variation with Crystal Growth Observed in Allende Coarse-Grained Type B CAI TS34 — Revisited **[#1856]**
Fassaite crystallization in TS34 CAI started ^{16}O-poor and ended ^{16}O-rich, indicating that surrounding nebula changed from ^{16}O-rich, ^{16}O-poor and then ^{16}O-rich.

11:15 a.m. Nguyen A. N. * Keller L. P. Messenger S. Rahman Z.
Coordinated Isotopic and Mineral Characterization of Highly Fractionated ^{18}O-Rich Silicates in the Queen Alexandra Range 99177 CR3 Meteorite **[#2941]**
We report mineralogical and Mg and Fe isotopic studies of highly fractionated ^{18}O-rich silicates. The grains likely condensed from fractionated ^{18}O-rich gas.

11:30 a.m. Krot A. N. * Nagashima K. Van Kooten E. M. M. E. Bizzarro M.
High-Temperature Rims Around Calcium-Aluminum-Rich Inclusions from the CR, CB, and CH Carbonaceous Chondrites **[#1203]**
High-temperature rims around CAIs in CRs, CBs, and CHs recorded high-temperature processing in the ^{16}O-rich, CAI-forming and ^{16}O-poor, chondrule-forming regions.

Tuesday, March 22, 2016 **[T251]**
LUNAR VOLCANISM:
NEW PERSPECTIVES ON A DYNAMIC MOON
1:30 p.m. Waterway Ballroom 1

Chairs: **Lillian Ostrach**
R. Aileen Yingst

1:30 p.m. Sood R. * Chappaz L. Melosh H. J. Howell K. C. Milbury C.
Detection of Buried Empty Lunar Lava Tubes Using GRAIL Gravity Data **[#1509]**
GRAIL gravity data is utilized to detect the presence and extent of candidate empty lava tube structures beneath the surface of the lunar maria.

1:45 p.m. Kiefer W. S. * Taylor G. J. Andrews-Hanna J. C. Head J. W. Jansen J. C. et al.
The Bulk Density of the Small Lunar Volcanos Gruithuisen Delta and Hansteen Alpha: Implications for Volcano Composition and Petrogenesis **[#1722]**
GRAIL gravity shows that the lunar volcanos Gruithuisen Delta and Hansteen Alpha have bulk densities of ~2150 kg m^{-3}, consistent with a rhyolitic composition.

2:00 p.m. Kreslavsky M. A. * Head J. W. Neumann G. A. Zuber M. T. Smith D. E.
Mare-Forming Lava Flows on the Moon Revealed by Detrended LOLA Topography **[#1331]**
High-precision topographic data from LOLA reveal boundaries of volcanic flow units forming lunar maria and kilometer-scale topographic patterns of some units.

2:15 p.m. Elder C. M. * Hayne P. O. Ghent R. R. Bandfield J. L. Williams J.-P. et al.
Regolith Formation on Young Lunar Volcanic Features **[#2785]**
Regolith covers / Young volcanic features on / The lunar surface.

2:30 p.m. Clegg-Watkins R. N. * Jolliff B. L. Watkins M. J.
LRO NAC-Derived Albedo Map of Silicic Volcanics **[#1125]**
Hapke photometric parameter maps at the m-scale reveal differences in albedo at lunar silicic regions that may be attributed to compositional differences.

2:45 p.m. Stopar J. D. * Lawrence S. J. Robinson M. S. Gaddis L. R. Giguere T. A. et al.
Proximal Volcanic Deposits: Roughness and Implications for Lunar Volcanism **[#2555]**
New details of small-area deposits (cones, layering, spatter deposits, lava breaches) in plains and shield-style volcanic terrains on the Moon.

3:00 p.m. Gaddis L. R. * Horgan B. McBride M. Bennett K. Stopar J. et al.
Alphonsus Crater: Compositional Clues to Eruption Styles of Lunar Small Volcanoes **[#2065]**
We use M^3 data to map volcanic glass and mafic minerals at volcanic centers in the floor of Alphonsus crater. Results support a vulcanian eruption mechanism.

3:15 p.m. Needham D. H. * Petro N. E. Bleacher J. E. Carter L. M.
Constraining Surface Characteristics that Influence the Morphology of Lunar Sinuous Rilles **[#2351]**
We analyze two lunar sinuous rilles and their surroundings to determine how surface properties influenced the final morphology of lunar sinuous rilles.

3:30 p.m. Giguere T. A. * Hawke B. R. Boyce J. M. Gillis-Davis J. J. Lawrence S. J. et al.
The Volcanic Processes of the Gassendi Crater Interior **[#1884]**
The interior of Gassendi crater was investigated with LROC and other data. Three lava lakes were identified and characterized. Formation processes postulated.

3:45 p.m. Keske A. L. * Robinson M. S. Bennett K. A.
The Morphometry of Lunar Localized Dark Mantle Deposits **[#3048]**
NAC DTMs were used to analyze the volume relationship between localized dark mantle deposits and their vents to determine the proportion of juvenile material.

4:00 p.m. Allen C. * Hayne P. Greenhagen B. Bandfield J. Lucey P. et al.
Aristarchus in Eclipse — Insights into a Pyroclastic Deposit **[#1309]**
Lunar eclipse temperatures show that Aristarchus pyroclastics have lower TI than nearby mare, due to differences in rock populations in the upper millimeters.

4:15 p.m. van der Bogert C. H. * Gaddis L. Hiesinger H. Ivanov M. Jolliff B. et al.
Revisiting the CSFDs of the Taurus Littrow Dark Mantle Deposit: Implications for Age Determinations of Pyroclastic Deposits **[#1616]**
Thick DMDs at Taurus Littrow yield absolute model ages consistent with Apollo 17 basalt/glass samples, despite having a deficiency of small diameter craters.

4:30 p.m. Lawrence S. J. * Stopar J. D. Ostrach L. R. Jolliff B. L. Robinson M. S.
Assessing the Relationship Between Absolute Age and Surface Roughness with LROC **[#2755]**
We explore the relationship between absolute age and surface roughness using LRO Narrow Angle Camera DTMs.

Tuesday, March 22, 2016 [T252]
SPECIAL SESSION:
PLANET 9 FROM OUTER SPACE: PLUTO GEOLOGY AND GEOCHEMISTRY
1:30 p.m. Waterway Ballroom 4

Chairs: **Carey Lisse**
Ross Beyer

1:30 p.m. Cruikshank D. P. * Stern S. A. Grundy W. M. Moore J. M. Young L. A. et al.
Pluto and Charon: Surface Colors and Compositions — A Hypothesis **[#1696]**
A hypothesis is proposed to explain the neutral color and exposed ammonia/ammonia hydrate on the otherwise water ice dominated surface of Pluto's moon Charon.

1:45 p.m. Cook J. C. * Cruikshank D. P. Dalle Ore C. M. Ennico K. Grundy W. M. et al.
The Identification and Distribution of Pluto's Non-Volatile Inventory **[#2296]**
Using data from New Horizons, water ice has been detected on Pluto. We analyze several specific spots. We find submicrometer water grains are present on Pluto.

2:00 p.m. Dalle Ore C. M. * Cook J. C. Cruikshank D. P. Ennico K. Grundy W. M. et al.
Charon's Near IR Ice Signature as Seen by New Horizons **[#2122]**
Analysis of part of Charon's surface as seen by NH/LEISA reveals wide-spread low-level amounts of NH_3 intimately mixed with H_2O ice mostly in crystalline form.

2:15 p.m. Soto A. * Rafkin S. C. R. Michaels T. I.
Atmospheric Circulation and Distribution of Nitrogen Ice on Pluto Due to Surface Ice and Topography **[#1648]**
Pluto general circulation simulations show that the presence of topography and regional ice strongly perturbs the circulation and volatile cycle.

2:30 p.m. Davies E. J. * Stewart S. T.
Beating Up Pluto: Modeling Large Impacts with Strength **[#2938]**
Pluto gets hit hard / Residual strength matters / Localizing heating.

2:45 p.m. Cheng A. F. * Summers M. E. Gladstone G. R. Strobel D. F. Young L. A. et al.
Haze Layers in Pluto's Atmosphere **[#2316]**
New Horizons images reveal optically thin hazes in Pluto's atmosphere, structured into intricate layers.

3:00 p.m. Schenk P. * Singer K. Robbins S. Bray V. Beyer R. et al.
Topography of Pluto and Charon: Impact Cratering **[#2795]**
Pluto and Charon, Twins in Space / Craters abound large and small / Some are eroded, some are still in place!

3:15 p.m. Singer K. N. * McKinnon W. B. Robbins S. J. Schenk P. M. Greenstreet S. et al.
Craters on Pluto and Charon — Surface Ages and Impactor Populations **[#2310]**
Pluto and Charon's craters give timeframes for episodes of geologic activity, and also help us constrain outer solar system impactor population characteristics.

3:30 p.m. Nimmo F. * Bierson C. Hamilton D. P. Moore J. M. McKinnon W. B. et al.
Loading, Relaxation, and Tidal Wander at Sputnik Planum, Pluto **[#2207]**
Sputnik Planum's location is due to Charon tidal torques acting on a positive gravity anomaly. This implies surface loading and a present-day subsurface ocean.

3:45 p.m. Keane J. T. * Matsuyama I.
Pluto Followed Its Heart: True Polar Wander of Pluto Due to the Formation and Evolution of Sputnik Planum **[#2348]**
Why is Pluto's heart / Aligned with tidal axis? / True polar wander!

4:00 p.m. Hammond N. P. * Barr A. C. Parmentier E. M.
Ocean Survival, Ice II Formation and Recent Tectonic Activity on Pluto **[#2234]**
We model the thermal evolution of Pluto and find two possible outcomes: (1) an ocean survives to the present; (2) the ocean freezes and Ice II forms at depth.

4:15 p.m. McKinnon W. B. * Nimmo F. Wong T. Roberts J. S. Schenk P. M. et al.
Thermal Convection in Solid Nitrogen, and the Depth and Surface Age of Cellular Terrain Within Sputnik Planum, Pluto **[#2921]**
Solid nitrogen / Overturned by Pluto heat / The Planum abides.

4:30 p.m. Trowbridge A. J. * Melosh H. J. Freed A. M.
Pluto's Geologic Activity and a Universal Criterion for Planetary Vigor **[#2431]**
We have developed a new parameterized convection model. Our results indicate that ammonium plays a pivotal role in Pluto's mantle convection.

Tuesday, March 22, 2016 [T253]
IMPACTS: NUMERICAL AND ANALYTICAL STUDIES
1:30 p.m. Waterway Ballroom 5

Chairs: **Sarah Stewart**
Stuart Robbins

1:30 p.m. Canup R. M. Salmon J. *
On an Origin of Phobos-Deimos by Giant Impact **[#2598]**
We consider a possible origin of Phobos-Deimos by impact, using SPH impact simulations and accretion simulations of the evolution of an impact-generated disk.

1:45 p.m. Lock S. J. * Stewart S. T.
A Hot Spin Stability Limit for Terrestrial Planets **[#2856]**
Planets form previously unrecognized internal structures when the hot spin stability limit is exceeded, with implications for lunar origin and core formation.

2:00 p.m. Carter P. J. * Leinhardt Z. M. Elliott T. Walter M. J. Stewart S. T.
The Effects of Collisions and Dynamical Excitation on the Composition of Growing Terrestrial Planet Embryos **[#2300]**
Exploring the effects of imperfect collisions and excitation from Jupiter's Grand Tack on the compositions of embryos during terrestrial planet formation.

2:15 p.m. Movshovitz N. * Nimmo F. Korycansky D. G. Asphaug E. Owen J. M.
Disruption in Gravity-Dominated Impacts: Simulation Results and Scaling **[#1531]**
We present results from simulated impacts between 100–1000 km radius bodies and derive a scaling law for the threshold of catastrophic disruption.

2:30 p.m. Malhotra R. * JeongAhn Y.
Mars/Moon Impact Rate Ratio of Kilometer-Size Impactors **[#2935]**
The present-day Mars/Moon impact rate ratio is in the range 3.0–5.0, reflecting the uncertainty in our current knowledge of the kilometer-size Mars impactors.

2:45 p.m. Collins G. S. * Kring D. A. Potter R. W. K.
Testing Models of Peak-Ring Impact Crater Formation **[#2014]**
How do peak rings form? / Before Chicxulub drilling / Ask Moon for answers.

3:00 p.m. Milbury C. * Johnson B. C. Melosh H. J. Collins G. S. Nimmo F. et al.
The Effect of Pre-Impact Porosity on the Morphology of Complex Craters on the Moon **[#2748]**
Maria, highlands / Crater depths are different / Porosity, yes!

3:15 p.m. Prieur N. C. * Xiao X. Wünnemann K. Werner S. C.
Effects of Target Properties on Crater Sizes and Its Implications on Age Determination — Insights from Numerical Experiments **[#1988]**
We develop new scaling laws for brecciated and competent rocks to quantify the influence of target properties on age determination by crater counting.

3:30 p.m. Johnson B. C. * Bowling T. J. Melosh H. J.
Steps Toward Implementing the Grady-Kipp Fragmentation Model in an Eulerian Hydrocode **[#1492]**
We focus on reproducing results from laboratory scale impact experiments with the ultimate goal of understanding meteorite ejection and secondary cratering.

3:45 p.m. Luther R. * Zhu M. -H. Wünnemann K. Artemieva N. A.
Impact Ejecta Mechanics: Atmospheric Interaction and Fragment-Size Distribution from Numerical Modeling **[#1950]**
We simulate the impact induced target fragmentation and describe the movement of ejected particles and their interaction with an atmosphere using iSALE.

4:00 p.m. Bottke W. F. * Vokrouhlicky D. Ghent B. Mazrouei S. Robbins S. et al.
On Asteroid Impacts, Crater Scaling Laws, and a Proposed Younger Surface Age for Venus **[#2036]**
We deduce a new crater scaling law using NEOs and <3 Ga craters on Moon/Venus/Mars. Our results, different from hydrocodes, yield a Venus surface age of ~150 Ma.

4:15 p.m. Flynn G. J. * Durda D. D. Patmore E. B. Jack S. J. Molesky M. J. et al.
Hypervelocity Impact Disruption and Cratering Measurements on the Northwest Africa 869 Ordinary Chondrite **[#1081]**
Hypervelocity impacts show NWA 869 is more resistant to impact disruption than basalt and crater ejecta provides more momentum than direct momentum transfer.

4:30 p.m. Bruck Syal M. * Owen J. M. Miller P. L.
Momentum Transfer by Hypervelocity Impact: Target Shape and Structure Effects **[#1697]**
We numerically investigate how realistic asteroid shapes and rubble-pile internal structures affect the outcome of kinetic-impact deflection attempts.

Tuesday, March 22, 2016 [T254]
AQUEOUS ALTERATION ON MARS: A COMPLEX HISTORY
1:30 p.m. Waterway Ballroom 6

Chairs: **Mariek Schmidt**
Steven Ruff

1:30 p.m. Hurowitz J. A. * Grotzinger J. P. Fischer W. W. Milliken R. E. Dehouck E. et al.
Dynamic Geochemical Conditions Recorded by Lakebed Mudstones in Gale Crater, Mars **[#1751]**
A comparison of the geochemistry and mineralogy of mudstones from Gale Crater enables reconstruction of paleo-environmental conditions on Mars.

1:45 p.m. Rampe E. B. * Ming D. W. Morris R. V. Blake D. F. Bristow T. F. et al.
Diagenesis in the Murray Formation, Gale Crater, Mars **[#2543]**
Mineralogy and geochemistry of targets from the Murray formation measured by the Curiosity rover indicate a complex history of diagenesis.

2:00 p.m. Schmidt M. E. * Berger J. A. Gellert R. Izawa M. R. M. Ming D. W. et al.
APXS Classification of Lower Mount Sharp Bedrock: Silica Enrichment and Acid Alteration **[#2043]**
Geochemical diversity observed by APXS point toward a complex hydraulic system that interacted with basaltic sediments in Gale Crater.

2:15 p.m. Berger J. A. * Schmidt M. E. Izawa M. R. M. Gellert R. Ming D. W. et al.
Phosphate Stability in Diagenetic Fluids Constrains the Acidic Alteration Model for Lower Mt. Sharp Sedimentary Rocks in Gale Crater, Mars **[#1652]**
Phosphate stability in acidic diagenetic fluids may explain elevated P in high silica Gale Crater rocks interpreted to be altered by acidic fluids.

2:30 p.m. McCollom T. M. * Donaldson C.
Mobility of Phosphorous in Acid-Sulfate Environments on Earth and Mars **[#1690]**
P is relatively immobile in terrestrial acid-sulfate fumaroles and layered sulfate deposits at Meridiani, maybe due to sequestration in Fe-phosphate minerals.

2:45 p.m. Forni O. * Nachon M. Mangold A. Blaney D. L. Wiens R. C. et al.
Fluorinein the Pahrump Outcrop, Gale Crater: Implications for Fluid Circulation and Alteration **[#1990]**
We report a summary of the fluorine detections occurring at the Pahrump outcrop and Murray formations and the implications for fluid circulation and alteration.

3:00 p.m. Frydenvang J. * Gasda P. J. Hurowitz J. A. Grotzinger J. P. Wiens R. C. et al.
Discovery of Silica-Rich Lacustrine and Eolian Sedimentary Rocks in Gale Crater, Mars **[#2349]**
Curiosity's detection of silica enrichment across lacustrine and eolian sedimentary rocks likely the youngest water-rock interaction observed in Gale Crater.

3:15 p.m. Yen A. S. * Blake D. F. Ming D. W. Morris R. V. Gellert R. et al.
Cementation and Aqueous Alteration of a Sandstone Unit Under Acidic Conditions in Gale Crater, Mars **[#1649]**
Chemical and mineralogical signatures of multiple fluid episodes suggest alteration under acidic conditions in Gale Crater.

3:30 p.m. Ruff S. W. * Farmer J. D.
Evidence for an Alkali Chloride Hydrothermal System in the Columbia Hills, Mars **[#2827]**
Fluids that produced Home Plate opaline silica probably came from alkali chloride hot springs or geysers based on TIR spectral evidence for halite crusts.

3:45 p.m. McHenry L. J. * Carson G. L. Hynek B. M.
Assessing Icelandic Fumaroles and Hot Springs as Analogs for Mars **[#1207]**
We identify specific Icelandic hydrothermal sites as excellent Mars analogs due to their Fe-rich basalt, relevant aqueous conditions, and associated minerals.

4:00 p.m. Schwenzer S. P. * Bridges J. C. McAdam A. Steer E. D. Conrad P. G. et al.
Modeling of Sulfide Microenvironments on Mars **[#1886]**
Dissolving sulphides cause acidic microenvironments in rocks, but haloes are small in Antarctic analogs. Models for Gale rocks demonstrate buffering capacity.

4:15 p.m. Peretyazhko T. S. * Fox A. Sutter B. Niles P. B. Adams M. et al.
Synthesis of Akaganeite in the Presence of Sulfate: Implications for Akaganeite Formation in Yellowknife Bay, Gale Crater, Mars **[#2200]**
Synthesis of akaganeite with sulfate at variable pHs in order to constrain formation conditions of akaganeite in Yellowknife Bay, Gale crater on Mars.

4:30 p.m. Yant M. H. * Rogers A. D. Nekvasil H. Zhao Y.-Y. S. Bristow T.
Spectral Characterization of Acid Weathering on Synthetic Martian Basaltic Glasses with Spirit and Pathfinder Compositions **[#1323]**
In order to more reliably interpret remote spectra of altered terrains, we obtain IR spectral data of acid-weathered synthetic martian basaltic glasses.

Tuesday, March 22, 2016 **[T255]**
CHONDRITES: CHONDRULES
1:30 p.m. Montgomery Ballroom

Chairs: **Sara Russell**
Cyrena Goodrich

1:30 p.m. Mai C. * Desch S. J. Boley A. C.
Magnetic Fields Behind Chondrule-Forming Planetary Bow Shocks **[#2519]**
Hot gas in the wake / Of chondrule-forming bow shocks / Will B fields diffuse?

1:45 p.m. Wakita S. * Matsumoto Y. Oshino S. Hasegawa Y.
Planetesimal Collisions as a Heating Event for Chondrule Formation **[#1078]**
We report chondrule formation via impact jetting by planetesimal collisions using semi-analytical calculations and a shock physics code.

2:00 p.m. Richardson M. L. A. * Ouellette N. Morris M.
Chondrule Formation from Ejecta Melts with Adaptive Mesh Refinement **[#2283]**
We discuss numerical models of the formation of CH/CB chondrules in impact ejecta.

2:15 p.m. Schrader D. L. * Fu R. R. Desch S. J.
Evaluating Chondrule Formation Models and the Protoplanetary Disk Background Temperature with Low-Temperature, Sub-Silicate Solidus Chondrule Cooling Rates **[#1180]**
We constrain chondrule cooling rates between 400° and 600°C to test chondrule formation models and constrain the protoplanetary disk background temperature.

2:30 p.m. Schoelmerich M. O. * Seitz H.-M. Klimm K.
Evaporational Loss of Lithium During High Temperature Experiments: Implications for Chondrule Formation **[#1461]**
A series of evaporation experiments were conducted to investigate elemental (Mg, Fe, Li) and isotopic (Li) fractionations during chondrule formation.

2:45 p.m. Boesenberg J. S. * Young E. D. Kohl I. Parman S. W.
Oxygen Isotopic Exchange Between Carbon Monoxide Gas and Silicate Melt: Implications for the Early Solar Nebula **[#2481]**
Oxygen isotopic exchange experiments between Allende and CO gas have been conducted at one atmosphere. Exchange occurs, reversing an earlier study's results.

3:00 p.m. Kita N. T. * Tenner T. J. Ushikubo T. Rudraswami N. G. Weisberg M. K. et al.
Internal Homogeneity of Oxygen Isotope Ratios in Chondrules **[#2375]**
We review SIMS O-isotope data of 330 chondrules, demonstrating >90% of chondrules have internally homogeneous O-isotope ratios, contrary to conventional wisdom.

3:15 p.m. Greenwood R. C. * Franchi I. A. Zolensky M. E. Buchanan P. C.
The Origin and Significance of the CCAM Line: Evidence from Chondrules and Dark Inclusions in Allende (CV3) **[#2153]**
The oxygen isotopic composition of chondrules and dark inclusions from the Allende (CV3) chondrite casts doubt on the primary significance of the CCAM line.

3:30 p.m. Huyskens M. H. * Yin Q.-Z. Sanborn M. E. Amelin Y. Merle R. et al.
Possible Uranium Isotopic Heterogeneity in Allende Chondrules and Its Impact on Pb-Pb Ages: A First Case of U and Pb Isotopes from a Single Chondrule **[#2727]**
U isotopic composition of an individual Allende chondrule and its impact on Pb-Pb ages of chondrules.

3:45 p.m. Jacquet E. * Gounelle M. Alard O.
The Origin of the Type I/Type II Dichotomy in Chondrules: Insights from Trace Element Analyses **[#1011]**
In situ LA-ICP-MS analyses of LL chondrite chondrule phases suggest that type II chondrules cooled faster than their type I counterparts.

4:00 p.m. Miller K. E. * Lauretta D. S. Connolly H. C. Jr. Berger E. L. Domanik K.
Chondrules and Opaque Phases in Unequilibrated R Chondrites: A Comprehensive Assessment of Their Formation **[#1496]**
FeO-rich chondrules, Cu-rich lamellae and Ca-, P-rich inclusions in sulfides formed via aqueous, gas or melt processes in a pre- or post-accretionary setting.

4:15 p.m. Moyano-Cambero C. E. Nittler L. R. * Trigo-Rodríguez J. M.
Alexander C. M. O'D. Davidson J. et al.
A Space Oddity: A Nanosims Study of a Primitive Ultracarbonaceous Clast and Fine-Grained Matrix in the LaPaz Icefield 02342 CR Chondrite **[#2537]**
Results of a NanoSIMS isotopic survey of the CR chondrite LAP 02342, including a C-rich clast that may be similar to ultracarbonaceous micrometeorites.

4:30 p.m. Brearley A. J. * Jones R. H.
Dissolution and Replacement of Cristobalite by Amorphous Fe-Rich Silicate Gel in Silica-Bearing Type I Chondrules in the Elephant Moraine (EET) 92042 CR2 Carbonaceous Chondrite **[#1897]**
Cristobalite in silica-bearing rims in the type I chondrules in the EET 92042 CR chondrite has been replaced by a hydrated amorphous Fe-rich silicate gel.

Wednesday, March 23, 2016 **[W401]**
MERRILY MEASURING MOONLIGHT:
INSIGHTS FROM REMOTE LUNAR COMPOSITIONAL ANALYSIS
8:30 a.m. Waterway Ballroom 1

Chairs: **Deepak Dhingra**
Noah Petro

8:30 a.m. Yamamoto S. * Nakamura R. Matsunaga T. Ogawa Y. Ishihara Y. et al.
Global Distribution of Glass-Rich Material Sites on the Moon **[#1395]**
We report the global distribution of exposed areas of glass-rich materials on the Moon revealed by Spectral Profiler onboard the SELENE (Kaguya).

8:45 a.m. Stickle A. M. * Cahill J. T. S. Grier J. A. Greenhagen B. Patterson G. W.
Examining Lunar Surface Maturity at a Variety of Wavelengths, from UV to Radar **[#2928]**
In many wavelengths / Aging of the Moon's surface / Can be seen by us.

9:00 a.m. Lemelin M. * Lucey P. G. Gaddis L. R. Miljković K. Ohtake M.
Constraints on the Depth of Origin of Basin Rings and the Composition of the Lunar Crust Using the Kaguya Multiband Imager **[#2408]**
A shallow depth of origin for the basins' innermost ring allows to reconcile the mineralogy of the basin rings and that of central peaks.

9:15 a.m. Moriarty D. P. III * Pieters C. M.
Impact Melt and Magmatic Processes in Central South Pole — Aitken Basin **[#1735]**
In central SPA, a relatively smooth, HCP-bearing deposit is observed. This ~700 km region may represent early non-mare volcanism induced by SPA formation.

9:30 a.m. Ohtake M. * Uemoto K. Haruyama J. Nakamura R. Matsunaga T. et al.
Mineralogical Investigation of Possible Impact Melt Pool of the Moon's South Pole-Aitken Basin **[#1414]**
Mineralogical investigation of impact melt pool of the Moon's South Pole-Aitken basin suggest that the SPA impact event occurred after the mantle overturn.

9:45 a.m. Petro N. E. * Ostrach L. R. Clegg-Watkins R. Jolliff B. L. Cahill J. T. S. et al.
Unraveling the Geologic History of the South Pole-Aitken Basin Interior: A Case Study of the Bhabha Region Using Multiple Remote Sensing Datasets **[#2669]**
The current suite of remote sensing data offers an opportunity to characterize the lunar regolith. A region in central SPA is explored using an array of LRO data.

Wednesday, March 23, 2016 **[W402]**
CRATERING ON THE MOON
10:15 a.m. Waterway Ballroom 1

Chairs: **Harald Hiesinger**
Peter Schultz

10:15 a.m. Spudis P. D. * Sliz M. U.
Impact Melt from the Lunar Crisium Multi-Ring Basin **[#1463]**
We have identified remnants of the Crisium basin impact melt sheet. We characterize its chemical composition and compare it to other lunar basins.

10:30 a.m. Schultz P. H. *
Impactor Footprints or Transient Craters: Origin of Basin Gravity Anomalies **[#2931]**
The inner peak ring and interior ring of impact basins are proposed to reflect the zone of downward displacement initiated at the earliest stages of cratering.

10:45 a.m. Curren I. S. * Paige D. A. Esturas L.
An Impact Model for the Origin of Rocky Surfaces and Melt Deposits at the Antipode of Tycho Crater **[#2756]**
Impact at Tycho / Ejecta to antipode / Rubble, melt, and flow.

11:00 a.m. Dhingra D. * Head J. W. Pieters C. M.
Elevation Differences on the Floors of Complex Craters: Insights into the Crater Evolution Processes **[#2718]**
We note elevation differences among large, coherent floor sections of complex craters and are exploring the likely causal geological scenarios.

11:15 a.m. Jansen J. C. * Andrews-Hanna J. C. Milbury C. Li Y. Melosh H. J. et al.
Radial Gravity Anomalies Associated with Secondary Crater Chains Surrounding the Orientale Basin Found in GRAIL Data **[#2776]**
Gravitational signatures associated with secondary crater chains at Orientale, found in GRAIL data, are discussed in terms of density anomaly and their source.

11:30 a.m. Conrad J. W. * Nimmo F. Neumann G. A. Kamata S. Fassett C. I.
Characterizing Hidden Impact Basins Discovered by GRAIL Gravity Data **[#2208]**
New ancient lunar impact basins have been uncovered thanks to the GRAIL mission's gravity measurements. We have dated and characterized these new basins.

11:45 a.m. Speyerer E. J. * Povilaitis R. Z. Robinson M. S. Thomas P. C. Wagner R. V.
Impact of Secondary Surface Changes on Regolith Gardening **[#2645]**
LROC NAC temporal observations provide our first detailed look at new impacts and secondary surface changes that are altering and gardening the lunar regolith.

Wednesday, March 23, 2016 **[W403]**
SPECIAL SESSION:
DWARF-AGE DAYDREAM: SURFACE ICE DYNAMICS ON DWARF PLANETS CERES AND PLUTO
8:30 a.m. Waterway Ballroom 4

Chairs: **Paul Schenk**
Hanna Sizemore

8:30 a.m. Schorghofer N. * Byrne S. Mazarico E. Platz T. Prettyman T. H. et al.
The Permanently Shadowed Craters of Ceres as Seen by the Dawn Spacecraft **[#1629]**
Permanently shadowed areas are identified on Ceres, and the amount of ice they may have accumulated is estimated.

8:45 a.m. Hayne P. O. * Aharonson O.
Ice Sublimation, Outgassing, and Melting on Ceres: Models and Observations **[#2736]**
We apply models of ice sublimation, melting, and outgassing to interpret observations of Ceres reported by the Dawn mission, and Earth-based observers.

9:00 a.m. Schmidt B. E. * Hughson K. G. Chilton H. T. Scully J. E. C. Platz T. et al.
Ground Ice on Ceres? **[#2677]**
We present geomorphological evidence that suggests ice is an important component of near surface material on Ceres.

9:15 a.m. Landis M. E. * Byrne S. Schorghofer N. Schmidt B. E. Raymond C. A. et al.
Behavior and Stability of Ground Ice on Ceres: Initial Clues from Dawn **[#2401]**
We consider the long-term stability and vapor production of pore-filling and regional surface ice on Ceres with input from new data from Dawn.

9:30 a.m. Krohn K. * Jaumann R. Otto K. A. von der Gathen I. Matz K.-D. et al.
Channels and Cryogenic Flow Features on Ceres **[#2001]**
Ceres' surface is affected by numerous impact craters. Some of them show channels or multiple flow events, indicating possible post-impact resurfacing.

9:45 a.m. Ruesch O. * Platz T. Schenk P. McFadden L. A. Castillo-Rogez J. C. et al.
Ahuna Mons: A Geologically-Young Extrusive Dome on Ceres **[#2279]**
We present morphological, morphometric, and model investigations of Ahuna Mons on Ceres.

10:00 a.m. Moore J. M. * Howard A. D. White O. L. Umurhan O. M. Schenk P. M. et al.
Sublimation as a Landform-Shaping Process on Pluto **[#1636]**
Pluto exhibits many examples of eroded terrains and landforms we ascribe to sublimation. We present both observations and initial modeling.

10:15 a.m. Howard A. D. * Moore J. M. White O. L. Umurhan O. Schenck P. et al.
Present and Past Glaciation on Pluto **[#1089]**
Pluto is presently experiencing nitrogen glaciation. Pluto has had extensive nitrogen paleoglaciation.

10:30 a.m. Philippe S. * Schmitt B. Grundy W. M. Protopapa S. Cruikshank D. P. et al.
CH_4-Rich Ices Distribution at the Surface of Pluto Evidenced by New Horizons **[#2757]**
The New Horizons mission revealed Pluto's surface. CH_4 ice rich areas are detected using a band position parameter and an anti-correlation to N_2 ice rich zones.

10:45 a.m. Schmitt B. * Philippe S. Grundy W. M. Protopapa S. Cruikshank D. P. et al.
Mixing and Physical State of Pluto's Surface Materials from New Horizons LEISA Spectro-Images **[#2794]**
Analysis of spectro-images of Pluto to understand how N_2, CH_4, and H_2O ices and reddish materials are mixed and what this implies in terms of evolution processes.

11:00 a.m. Protopapa S. * Berry K. L. Binzel R. P. Cook J. C. Cruikshank D. P. et al.
Methane to Nitrogen Mixing Ratio Across the Surface of Pluto **[#2815]**
Constraints on the abundances and scattering properties of the materials across the surface of Pluto as seen by NH/LEISA are presented and discussed.

11:15 a.m. Umurhan O. M. * Howard A. D. Moore J. M. Schenk P. Beyer R. A. et al.
Examining Scenarios for Glacial Flow of Volatile Ices onto Pluto's Sputnik Planum **[#2093]**
We examine various glacial flow scenarios to explain observed surface features on Pluto's Sputnik Planum and consider their implications for volatile transport.

11:30 a.m. Desch S. J. * Neveu M.
Differentiation and Cryovolcanism in the Pluto-Charon System **[#1647]**
Pluto and Charon / Worlds differentiated / Cryovolcanic.

Wednesday, March 23, 2016 **[W404]**
MAGMATISM TO VOLCANISM:
A HOT, STRESSED, VISCOUS, AND FRAGMENTED JOURNEY
8:30 a.m. Waterway Ballroom 5

Chairs: **Kelsey Young**
Michael Sori

8:30 a.m. Schools J. * Montési L. G. J.
Generation of Barriers to Melt Transport in the Martian Lithosphere **[#2080]**
Melt must stop rising / But Mars still has volcanoes / Maybe tectonics?

8:45 a.m. McGovern P. J. * Kirchoff M. R. White O. L. Schenk P. M.
Magma Ascent Pathways Associated with Large Volcanoes on Io **[#1341]**
Io's unusual crustal stress state, due to rapid volcanic resurfacing, is adverse to further magma ascent, but adding mountain-building stress may clear pathways.

9:00 a.m. Gregg T. K. P. *
Oh Give Me a Home with a Resurgent Dome: Loki Patera, Io **[#2517]**
Does Loki Patera, Io, contain a resurgent dome? Model results are inconclusive.

9:15 a.m. Le Corvec N. * McGovern P. J. Grosfils E. B. Galgana G. A.
The Role of Plasticity in the Stability of Elliptical Magma Reservoirs on Venus **[#1792]**
Calderas on Venus suggest for elliptical magma reservoirs. Using finite element modeling we study the role of plasticity in their stability.

9:30 a.m. Davies A. G. * de Pater I. de Kleer K. Wilson L. Head J. W. III
Modelling the Thermal Signature of Large Eruptions on Io **[#1575]**
Large voluminous eruptions on Io are a template for events that shaped many other planets. We use a sophisticated thermal model to derive eruption parameters.

9:45 a.m. Hughes S. S. * Kobs Nawotniak S. E. Borg C. Mallonee H. C. Purcell S. et al.
Diverse Eruptions at ~2,200 Years B.P. on the Great Rift, Idaho: Inferences for Magma Dynamics Along Volcanic Rift Zones **[#2841]**
Diverse lava flows erupted on the Great Rift of Idaho ~2.2 ka during a "flare-up" of activity have implications for magma dynamics along volcanic rift zones.

10:00 a.m. Qiao L. * Head J. W. Wilson L. Kreslavsky M. A. Xiao L.
Compound Flow Fields in Southwest Mare Imbrium: Geomorphology, Source Regions, and Implications for Lunar Basin Filling **[#2038]**
Detrended LOLA data reveals the presence and nature of lunar mare compound flow fields in SW Imbrium, which may represent major filling modes of lunar basins.

10:15 a.m. Rumpf M. E. * Lev E.
Investigating the Effects of Substrate Roughness on Lava Flow Emplacement Through Analog Experiments **[#2442]**
"Lava" in the lab / Substrate roughness changes flow / Let's go look at Mars!

10:30 a.m. Dundas C. M. * Keszthelyi L. Jaeger W. L. Milazzo M. P.
Tilted-Facet Terrain of Elysium Planitia, Mars **[#2334]**
Chaotic deformation associated with young lavas may be due to invasive lava.

10:45 a.m. Marcucci E. C. * Hamilton C. W. Herrick R. R.
Lava-Ice Interactions in Lost Jim Lava Flow, Seward Peninsula, Alaska, and Tartarus Colles Lava Flow, Elysium Planitia, Mars **[#2893]**
We use the unique Lost Jim Lava Flow in Alaska, where there is evidence of lava-ice interactions, to identify and understand similar volcanic activity on Mars.

11:00 a.m. Jawin E. R. * Head J. W. Wilson L.
Huge Pyroclastic Cones Surrounding Cobra Head, Aristarchus Plateau: Relation to Vallis Schroteri **[#1505]**
The formation of several major volcanic features on the Aristarchus Plateau can be explained through an extended fire-fountain eruption centered on Cobra Head.

11:15 a.m. Renggli C. J. * King P. L. Henley R. W.
Metal Transport and Deposition in Lunar Fire Fountain Eruptions **[#1760]**
Linking thermochemical evolution of a lunar volcanic gas in a fire fountain eruption with ballistic flight paths of glass beads and metal deposition.

11:30 a.m. Weider S. Z. * Nittler L. R. Murchie S. L. Peplowski P. N. McCoy T. J. et al.
Evidence from MESSENGER for Sulfur- and Carbon-Driven Explosive Volcanism on Mercury **[#1217]**
Mercury bright, "red" / Pyroclastic driven by / Sulfur, carbon loss.

Wednesday, March 23, 2016 [W405]
MARS GEOMORPHOLOGY: FLUVIOLACUSTRINE ACTIVITY TO GLOBAL CLIMATE IMPLICATIONS
8:30 a.m. Waterway Ballroom 6

Chairs: **John Grant**
Devon Burr

8:30 a.m. Kite E. S. * Armstrong J. C. Goldblatt C. Gao P. Mayer D. P.
Cadence and Cause of Lake-Forming Climates on Mars **[#1312]**
Rare shifts in Mars' mean obliquity can trigger short-lived lake-forming climates, resolving the tension between lake hydrology and olivine persistence.

8:45 a.m. Grant J. A. * Wilson S. A.
The Nature and Extent of Aqueous Deposits Related to the Hale Impact Crater on Mars **[#2530]**
Aqueous flows related to formation of Hale crater extend considerably further than previously recognized and highlight the widespread effects of the impact.

9:00 a.m. Horvath D. G. * Andrews-Hanna J. C.
The Influence of Climate and Permeability on the Formation and Geologic Stability of the Gale Crater Lake **[#2474]**
The influence of permeability and climate on the stability and formation of a Gale Crater lake on Mars are investigated using a hydrological model.

9:15 a.m. Goudge T. A. * Milliken R. E. Head J. W. Mustard J. F. Fassett C. I.
Sedimentology of the Jezero Crater Western Fan Deposit: 1. Evidence for a Deltaic Origin and Implications for Future Exploration **[#1122]**
The stratigraphic architecture and mineralogy of the Jezero western fan deposit indicate it is a delta, and is highly compelling for future in situ exploration.

9:30 a.m. Davis J. M. * Balme M. Grindrod P. M. Williams R. M. E. Gupta S.
Inverted Channels in Arabia Terra, Mars: Remnants of an Ancient Drainage Network **[#1982]**
CTX-scale mapping project of inverted fluvial channels throughout Arabia Terra, Mars, which may bridge the gap between the equator and the northern lowlands.

9:45 a.m. Adeli S. * Hauber E. Kleinhans M. Le Deit L. Platz T. et al.
Well-Preserved Amazonian-Aged Fluvial System in the Terra Cimmeria Region, Mars **[#2211]**
We are reporting here the presence of a complex fluvial system of Amazonian age, located in the southern mid-latitude regions of Mars.

10:00 a.m. Burr D. M. * Jacobsen R. E. Lefort A.
Thermal Detection of an Extensive Buried Fluvial Unit in the Aeolis Dorsa Region, Medusae Fossae Formation, Mars **[#1392]**
Thermal data indicate that the numerous surficial inverted fluvial deposits in the Aeolis Dorsa are underlain by a more extensive near-surface fluvial unit.

10:15 a.m. Buhler P. B. * Fassett C. I. Head J. W. III Lamb M. P.
Timescales of Fluvial Activity and Intermittency in Milna Crater, Mars **[#2587]**
The time to construct the lacustrine sediment fill in Milna is compared to regional hydrology timescales to obtain transport intermittency (0.01–0.1%).

10:30 a.m. Rogers A. D. * Head J. W.
Understanding Late Noachian Surface Environments on Mars Through Analyses of Basin-Filling Bedrock Units **[#1924]**
Geologic observations of Noachian units in Terra Cimmeria are presented and discussed in the context of different climate scenarios for early Mars.

10:45 a.m. Irwin R. P. III *
Noachian Geomorphic Surfaces and Implications for the Paleoclimate of Mars **[#3015]**
Intercrater geomorphic surfaces on Mars indicate a Noachian paleoclimate that was more arid than around the Noachian/Hesperian boundary.

11:00 a.m. Fastook J. L. * Head J. W.
Late Noachian Icy Highlands Ice Flow Synthesis **[#1161]**
Using an ice sheet model we evaluate features of Late Noachian ice sheets that can leave a lasting impact on the landscape after the ice sheets are removed.

11:15 a.m. Parker T. J. * Anderson R. C.
Mars Was Warm and Wet, But Not for Long? Twelve Years of Field Geomorphology at Meridiani Planum **[#2689]**
Several distinct morphologies visited by Opportunity suggest a short-lived transgressive marine environment that was likely a direct result of the LHB.

11:30 a.m. Clifford S. M. * McCubbin F.
How Well Does the Present Surface Inventory of Water on Mars Constrain the Past? **[#2388]**
The present near-surface inventory of ice places no constraint on either the past near-surface inventory of H_2O or the former presence of a northern ocean.

Wednesday, March 23, 2016 **[W406]**
ORIGINS OF THE SOLAR SYSTEM:
ISOTOPE COSMOCHEMISTRY
8:30 a.m. Montgomery Ballroom

Chairs: **Subrata Chakraborty**
Katherine Bermingham

8:30 a.m. Dwarkadas V. V. * Dauphas N. Meyer B. S.
Investigating a Stellar Wind Origin for High ^{26}Al and Low ^{60}Fe in the Early Solar System **[#1717]**
Using numerical simulations and analytical methods, we test if the high ^{26}Al/^{60}Fe ratio in the early solar system is due to enrichment from massive star winds.

8:45 a.m. Krabbe N. * Kruijer T. S. Kleine T.
Tungsten Stable Isotope Variations in Meteorites and Terrestrial Samples by Double Spike MC-ICPMS **[#2451]**
Tungsten stable isotope variations in meteorites and terrestrial samples are limited, suggesting that high temperature processes induce small mass-dependent effects.

9:00 a.m. Greber N. D. * Dauphas N. Millet M. A. Puchtel I. S.
The Titanium Isotopic Composition of Chondrites and Earth **[#1448]**
We present mass-dependent Ti isotope data for chondrites, komatiites, and USGS reference materials and discuss the state of knowledge for this isotope system.

9:15 a.m. Williams C. D. * Sanborn M. E. Yin Q.-Z.
Tracing Petrogenetic Links Among Planetary Materials with Ti-Cr-O Systematics **[#1538]**
We report mass-independent Ti-Cr-O variations in bulk meteorites to further elucidate potential petrogenetic links among planetary materials.

9:30 a.m. Nagai Y. * Yokoyama T.
Molybdenum Isotope Anomalies in Non-Carbonaceous Meteorites **[#1888]**
Molybdenum isotope anomalies for non-carbonaceous meteorites suggest two reservoirs of distinct Mo isotopic compositions in the solar nebula.

9:45 a.m. Bermingham K. R. * Worsham E. A. Walker R. J.
Refining the Mo-Ru Cosmic Correlation **[#1488]**
Refinement of the Mo-Ru cosmic correlation using new high precision Mo and Ru isotope data.

10:00 a.m. Mayer B. * Humayun M.
Nucleosynthetic Anomalies in Palladium from Bulk Meteorites **[#2047]**
Nucleosynthetic anomalies in Pd from bulk meteorites are correlated with other elements and differences are discussed in light of solar nebula processes.

10:15 a.m. Fukai R. * Yokoyama T.
Nucleosynthetic Neodymium Isotope Anomalies in Carbonaceous and Ordinary Chondrites **[#1298]**
Our results indicate that negative μ^{142}Nd values observed in chondrites simply reflect the heterogeneous distribution of s- plus p-process nuclides.

10:30 a.m. Tissot F. L. H. * Dauphas N. Grossman L.
Evidence for a Single Environment of r-Process Nucleosynthesis from Live ^{247}Cm in the Early Solar System **[#1605]**
We show that ^{247}Cm was present in meteorites at a level of $(1.1 \pm 0.3) \times 10^{-4}$, which is consistent with a single stellar environment of *r*-process nucleosynthesis.

10:45 a.m. Wang K. * Jacobsen S. B.
Potassium Isotope Cosmochemistry Revisited **[#1667]**
We report new high-precision K isotope data for chondrites and discuss implications for the volatile element depletion of inner solar system bodies.

11:00 a.m. Meshik A. * Pravdivtseva O. Hohenberg C.
Micro-Distribution of Fission Xenon Isotopes: A Possible Explanation of Xenon Composition in Phase Q **[#3038]**
Micro-distribution of fission Xe is isotope-specific. It can modifies apparent fission yields and provide a new interpretation of Xe composition in phase-Q .

11:15 a.m. Chakraborty S. * Kehoe H. Thiemens M. H.
New Experimental Evidence of Silicate Formation with Meteorite Like Oxygen Isotopes on a Dust Surface Analog **[#2242]**
New experimental results showing a chemical pathway to form silicate with meteorite-like O-isotopic composition (slope ~1 in three-isotope space) on grain surface.

11:30 a.m. Smith R. L. * Blake G. A. Boogert A. C. A. Pontoppidan K. M. Lockwood A. C.
High-Resolution Observations of CO Toward Massive Young Stellar Objects: Investigations of Protoplanetary Carbon and Oxygen in the Galaxy **[#3028]**
In the galaxy / Near and far, far away… / Massive YSOs observed with Keck / Carbon and oxygen isotopes / May evolve differently than their solar-type neighbors.

Wednesday, March 23, 2016 **[W451]**
(IS THERE) LIFE ON MARS?
MARTIAN EXOBIOLOGY TOOLS, ANALOGS, AND ENVIRONMENTS
1:30 p.m. Waterway Ballroom 1

Chairs: **Caroline Freissinet**
Lindsay Hays

1:30 p.m. Johnson S. S. * Goerlitz D. Benison K. C. Mormile M. R. Ming D. W.
Early Acidification of Mars and the Potential Implications for Biology **[#2068]**
Acid salt lakes in the Yilgarn Craton not only suggest an alternate view of climate history on Mars but also have important implications for astrobiology.

1:45 p.m. Bywaters K. F. * Quinn R. C.
Perchlorate Reducing Bacteria: Evaluating the Potential for Growth Utilizing Nutrient Sources Identified on Mars **[#2946]**
Evaluation of the potential for growth of perchlorate reducing bacteria in media containing phosphate and different combinations of nitrogen and carbon sources.

2:00 p.m. Freissinet C. * Glavin D. P. Buch A. Szopa C. Summons R. E. et al.
First Detection of Non-Chlorinated Organic Molecules Indigenous to a Martian Sample **[#2568]**
We detected low-temperature release chlorinated organics and high-temperature release non-chlorinated organics in the Cumberland sample on Mars.

2:15 p.m. Rodriguez-Colon B. J. * Rivera-Valentin E. G.
Investigating the Biological Potential of Gale Crater's Subsurface **[#2026]**
We use the criterion for special regions to assess the biologic potential of Gale's subsurface by investigating aqueous solutions resulting from deliquescence.

2:30 p.m. Dequaire T. * Meslin P. Y. Jaber M. Rapin W. Cousin A. et al.
Search for Organic Matter at Mars with LIBS and Reflectance Complementary Measurements of the ChemCam Instrument Onboard the Curiosity Rover **[#1364]**
ChemCam onboard Curiosity performs analyses in LIBS and reflectance spectroscopy. This work investigates these techniques to search for organic matter on Mars.

2:45 p.m. Millan M. * Szopa C. Buch A. Belmahdi I. Coll P. et al.
Effect of the Presence of Chlorates and Perchlorates on the Pyrolysis of Organic Compounds: Implications for Measurements Done with the Sam Experiment Onboard the Curiosity Rover **[#1418]**
Study of the effect of oxychlorine phases on the pyrolysis of organic matter to help the data interpretation of the SAM experiment onboard the Curiosity rover.

3:00 p.m. Morrison M. Buch A. * Szopa C. Glavin D. P. Freissinet C. et al.
Search for Organic Material on Mars with the Thermochemolysis Derivatization Technique Onboard the MOMA Experiment **[#2159]**
Using in situ thermochemolysis analysis to search for organic material on Mars.

Wednesday, March 23, 2016 **[W452]**
INSIDE OUT OF ICY SATELLITES: OCEANS TO PLUMES
3:30 p.m. Waterway Ballroom 1

Chairs: **Christopher Glein**
Ganna Portyankina

3:30 p.m. Portyankina G. * Esposito L. W. Ali A. Hansen C. J.
Modeling of the Enceladus Water Vapor Jets for Interpreting UVIS Star and Solar Occultation Observations **[#2600]**
By fitting results of 3D DSMC model for Enceladus jets to UVIS observations we determine water vapor velocity and relative production rates of single jets.

3:45 p.m. Perry M. E. * Teolis B. D. Grimes J. Miller G. P. Hurley D. M. et al.
Direct Measurement of the Velocity of the Enceladus Vapor Plumes **[#2846]**
Using its alternate observing mode, Cassini's Ion and Neutral Mass Spectrometer (INMS) directly measures the velocity of neutrals in the plumes of Enceladus.

4:00 p.m. Teolis B. D. * Waite J. H. Perry M. E. Hansen C. J.
Constraining Enceladus Plume Structure and Variability from Cassini INMS and UVIS Observations **[#2820]**
We use Cassini INMS and UVIS Enceladus plume data to constrain the plume source properties and extrapolate the plume's 3D structure and variability.

4:15 p.m. Glein C. R. * Waite J. H. Lunine J. I.
How Much Hydrothermal Hydrogen Might We Find in Enceladus' Plume? **[#2885]**
We provide a theoretical framework for interpreting Cassini INMS measurements of molecular hydrogen that may be present in Enceladus' plume.

4:30 p.m. Méndez A. S. J. * Izquierdo-Ruíz F. Prieto-Ballesteros O.
Textural Evolution of Clathrate-Salt Hydrates-Water Ice Assemblage and the Induced Geological Activity in Icy Moons **[#2396]**
Simulation experiments are carried out at high pressure following textural evolution of $MgSO_4$-CO_2-H_2O system as an approach of Europa's ocean composition.

4:45 p.m. Wyrick D. Y. * Teolis B. D. Bouquet A. Magee B. Waite J. H. Jr.
The Effects of Plumes and Other Geologic Activity on Europa's Exospheric Structure and Composition **[#2258]**
Sputtering and plumes / Europa's breath may reveal / Her inner secrets.

Wednesday, March 23, 2016 **[W453]**
PLANETARY SPATIAL INFRASTRUCTURE:
AT THE INTERSECTION OF GISCIENCE AND PLANETARY SCIENCE
1:30 p.m. Waterway Ballroom 4

Chairs: **Samuel Lawrence**
Daniella DellaGiustina

1:30 p.m. Kirk R. L. *
Planetary Cartography: What, How, and Why Begin with Where **[#2151]**
An introduction to planetary cartography. More than just paper maps, it's spatial data processing and infrastructure, a key enabler for missions and research.

1:45 p.m. McEwen A. S. * Heyd R. Sutton S. Espinosa Y. Fennema A. et al.
For the People: HiRISE Data Products **[#1371]**
Power to the Pixels!

2:00 p.m. Chabot N. L. * Denevi B. W. Murchie S. L. Hash C. D. Ernst C. M. et al.
Mapping Mercury: Global Imaging Strategy and Products from the MESSENGER Mission **[#1256]**
MESSENGER's global imaging mapping campaigns of Mercury have resulted in seven complementary maps that enable Mercury's surface to be robustly investigated.

2:15 p.m. Archinal B. A. * Edmundson K. L. Kirk R. L. Gaddis L. R.
Registering Planetary Datasets for Data Fusion: A "Force Multiplier" for Planetary Science **[#2377]**
Discussion of the importance of registering and geodetically controlling planetary data sets to allow data fusion for maximum science and exploration benefit.

2:30 p.m. DellaGiustina D. N. * Barnouin O. S. Nolan M. C. Johnson C. A. Le Corre L. et al.
Cartographic Planning for the OSIRIS-REx Asteroid Sample Return Mission **[#1668]**
This abstract presents the cartographic planning being conducted to support the primary objective of the OSIRIS-REx Asteroid Sample Return Mission.

2:45 p.m. Hare T. M. Gaddis L. R. * LaVoie S. K. Isbell C. E. Milazzo M. P. et al.
NASA Planetary Data System Support for Cartographic Sciences **[#2281]**
The PDS CIS Node supports NASA's larger image archives, sophisticated search and retrieval tools, and cartographic and technical expertise for planetary bodies.

3:00 p.m. A'Hearn M. F. *
Small Solar System Bodies — Products and Standards **[#2739]**
We describe the complications involved in mapping small bodies vis a vis the larger bodies of the solar system.

3:15 p.m. Beyer R. A. * Schenk P. Sides S. Edmundson K. Berry K. et al.
Cartography at the Edge of the Solar System **[#2690]**
A description of the cartographic process of taking New Horizons images and developing a control network for scientific applications.

3:30 p.m. Williams D. A. *
Cartographic Needs for Geologic Mapping During Active Orbital Planetary Mission **[#1588]**
I discuss how to implement a geologic mapping campaign during an active planetary mission, and the required cartographic support and products to be successful.

3:45 p.m. Grant J. A. *
Geologic Mapping as a Guide to Rover Mission Planning on Mars **[#2018]**
Geologic mapping enables robust interpretation of surface evolution and is a critical mission planning tool for guiding rovers to high priority science targets.

4:00 p.m. Bleacher J. E. * Eppler D. E. Garry W. B.
Cartographic and Geospatial Infrastructure Planning in Support of Human Planetary Exploration Based on Lessons Learned from the Desert Research and Technology Studies **[#2341]**
A discussion of cartographic and geospatial infrastructure needs related to missions involving human exploration across the solar system.

4:15 p.m. Laura J. R. *
At the Intersection of GIScience and Planetary Science **[#2405]**
Defining planetary cartography using the GIScience Body of Knowledge.

4:30 p.m. Lawrence S. J. * Hagerty J. Gaddis L. R. Archinal B. A. Radebaugh J. et al.
The Mapping and Planetary Spatial Infrastructure Team (MAPSIT): Addressing Strategic Planning Needs for Planetary Cartography **[#1710]**
The mission and functions, and 2016 community plans for the new Mapping and Planetary Spatial Infrastructure Team are summarized.

Wednesday, March 23, 2016 **[W454]**
MAKEUP OF MERCURY
1:30 p.m. Waterway Ballroom 5

Chairs: **Noam Izenberg**
Asmaa Boujibar

1:30 p.m. Parman S. W. * Parmentier E. M. Wang S.
Crystallization of Mercury's Sulfur-Rich Magma Ocean **[#2990]**
Solidification of Mercury's sulfide-rich magma ocean may have produced a buoyant sulfide primary crust. This would have slowed cooling of the planet.

1:45 p.m. Boujibar A. * Righter K. Rapp J. F. Ross D. K. Pando K. M. et al.
The Origin of Mercury's Surface Composition, an Experimental Investigation **[#2925]**
Mercury's surface / High pressure experiments / Polybaric melts.

2:00 p.m. Lawrence D. J. * Peplowski P. N. Beck A. W. Feldman W. C. Frank E. A. et al.
Compositional Terranes on Mercury Derived from Measurements of Fast Neutrons **[#1253]**
Fast-neutrons at Mercury delineate four compositional terranes, and show a unique signature at Hokusai crater, which is one of the youngest craters on Mercury.

2:15 p.m. Morlok A. * Klemme S. Weber I. Stojic A. N. Sohn M. et al.
Diffuse Reflectance FTIR and Raman Spectroscopy of Synthetic Glasses with Mercury Surface Composition for the BepiColombo Mission **[#2136]**
We present mid-infrared spectra of synthetic glasses with chemical composition based surface areas on Mercury for the BepiColombo ESA/JAXA mission.

2:30 p.m. Trang D. * Lucey P. G. Izenberg N. R.
Mapping of Submicroscopic Carbon and Iron on Mercury with Radiative Transfer Modeling of MESSENGER VIRS Reflectance Spectra **[#1396]**
Submicroscopic carbon is necessary to successfully model the VIRS reflectance spectra. We produced submicroscopic carbon and iron abundance maps.

2:45 p.m. Klima R. L. * Blewett D. T. Denevi B. W. Ernst C. M. Frank E. A. et al.
Global Distribution and Spectral Properties of Low-Reflectance Material on Mercury **[#1195]**
Distinctive low-reflectance material, mostly excavated by craters, is present on Mercury. We assess the spectral properties and distribution of these exposures.

3:00 p.m. Thomas R. J. * Hynek B. M. Rothery D. A. Conway S. J. Anand M.
Hollows as Evidence for the Nature and Source of Mercury's Low-Reflectance Substrates **[#1109]**
The spectral character of Mercury's hollows indicates that the low reflectance of widespread surface units does not derive from their volatile component.

Wednesday, March 23, 2016 **[W455]**
VENUS: SURFACE AND ATMOSPHERE
3:30 p.m. Waterway Ballroom 5

Chairs: **Lynn Carter**
Sarah Davey

3:30 p.m. Smrekar S. E. * Xie M. Handcock M. S.
A Statistical Model of Relative Surface Age on Venus **[#2647]**
Relative age units can be mapped based on total crater density and the density of craters whose extended ejecta blankets have been removed.

3:45 p.m. Carter L. M. * Douglas M. M. Campbell B. A. Campbell D. B.
Searching for Pyroclastic Deposits on Venus **[#2121]**
A systematic search for pyroclastics using radar polarimetry data reveals smooth mantling deposits associated with lava flows, shield fields, and small domes.

4:00 p.m. Treiman A. H. * Harrington E. Sharpton V. L.
Venus' Radar-Bright Highlands: Chlorapatite Near the Equator, but Not on Maxwell Montes **[#1037]**
Chlorapatite is likely the ferroelectric material on Venus' equatorial highlands, but not on near-polar highlands! Different atmosphere structure or rock types?

4:15 p.m. Davey S. C. * Ernst R. E. Samson C.
Evaluation of VIRTIS Emissivity Anomalies Using Cross-Cutting Relationships in the Vicinity of Mielikki Mons, Venus **[#1013]**
Graben and lava flows emanating from Yunya-mana Mons (Phoebe Regio) are younger than the VIRTIS high emissivity lava flows of Mielikki Mons (Themis Regio).

4:30 p.m. Martone A. A. * Montesi L. G. J.
Lithospheric Weakening Effects on the Development of Narrow Rifts on Venus **[#2104]**
Mechanical weakening mechanisms are necessary to localize deformation on Venus and produce narrow rifts such as Devana and Ganis Chasmata.

4:45 p.m. Bethell E. * Ernst R. E. Samson C. Buchan K. L.
Circumferential Graben-Fissure Systems of Venusian Coronae as Possible Analogues of Giant Circumferential Dyke Swarms on Earth **[#1471]**
Giant terrestrial circumferential dyke swarms may be analogues of Venusian coronae and their associated circumferential graben-fissure systems.

Wednesday, March 23, 2016 **[W456]**
PHYSICOCHEMICAL EVOLUTION OF MARS
FROM MANTLE TO CRUST
1:30 p.m. Waterway Ballroom 6

Chairs: **Janice Bishop**
Elizabeth Rampe

1:30 p.m. Kiefer W. S. * Rapp J. F. Usui T. Draper D. S. Filiberto J.
Constraints on Mantle Plume Melting Conditions in the Martian Mantle Based on Improved Melting Phase Relationships of Olivine-Phyric Shergottite Yamato 980459 **[#1817]**
Melting experiments to eight GPa on shergottite Yamato 980459 and mantle plume models show that it is much easier to create Y98-like melts than was once believed.

1:45 p.m. Balta J. B. *
Modeling Melting of the Martian Mantle Using pMELTS **[#1674]**
I apply the pMELTS algorithm to investigate fractional melting of the martian mantle and then compare calculated melts to experiments and shergottites.

2:00 p.m. Kruijer T. S. * Kleine T. Borg L. E. Brennecka G. A. Fischer-Gödde M. et al.
Coupled ^{142}Nd–^{182}W Evidence for Early Crust Formation on Mars **[#2115]**
New analyses of martian meteorites provide evidence for a global mantle differentiation on Mars around 20–30 Ma after solar system formation.

2:15 p.m. Tobita M. * Usui T. Moriwaki R. Yokoyama T.
New Constrains on the Shergottite Petrogenesis by Analysis of Pb Isotopic Compositional Space: Evidence for Mantle Heterogeneity and Crustal Assimilation on Mars **[#1416]**
We analyze all the available Pb isotopic compositions of shergottites, and imply the existence of heterogeneous mantle and an enriched crustal reservoir on Mars.

2:30 p.m. Gazel E. * McSween H. Y. Moore L. R.
Crustal Evolution of Earth and Mars **[#1619]**
The continental crust is unique to Earth and records processes distinctive to our planet.

2:45 p.m. Cannon K. M. * Parman S. W. Mustard J. F.
Hot and Steamy: Alteration of the Primordial Martian Crust by Supercritical Fluids During Magma Ocean Cooling **[#1265]**
We conduct experiments to determine if supercritical fluids at the base of a magma ocean outgassed atmosphere could have formed some of the clays on Mars.

3:00 p.m. DiFrancesco N. J. * Nekvasil H. Lindsley D. H. Rogers A. D.
Modifying Martian Surface Chemistry: Chlorides as Sublimates from Volcanic Degassing on Mars **[#1517]**
Hot martian magma / Iron and chlorine exsolved / Into salt they turn?

3:15 p.m. Humayun M. * Yang S. Righter K. Zanda B. Hewins R. H.
The Germanium Dichotomy in Martian Meteorites **[#2459]**
We show that Ge is twice as high in minerals from nakhlites and chassignites compared with shergottites, which might indicate volcanic outgassing of Ge on Mars.

3:30 p.m. Mittlefehldt D. W. * Gellert R. VanBommel S. Arvidson R. E. Clark B. C. et al.
Alumina + Silica ± Germanium Alteration in Smectite-Bearing Marathon Valley, Endeavour Crater Rim, Mars **[#2086]**
In situ compositional measurements reveal impact breccias enriched in Al, Si, and sometimes Ge in a region bearing Fe-Mg smectites as determined from orbit.

3:45 p.m. Catalano J. G. * Chemtob S. M. Nickerson R. D. Morris R. V. Agresti D. G.
Ferrous Smectites and the Redox Evolution of Early Mars **[#1609]**
Ferric smectites observed on Mars today may be altered remnants of earlier ferrous clays, indicating that planetary-wide oxidation postdates the Noachian.

4:00 p.m. Bellucci J. J. * Whitehouse M. J. John T. Nemchin A. A. Snape J. F.
Halogen Content and Cl Isotope Systematics on Mars: From the Atmosphere to the Hydrosphere to the Lithosphere **[#1434]**
Halogen and Cl isotopic composition of martian meteorite phosphates, implications for atmospheric/low temperature process recorded in basaltic rocks.

4:15 p.m. Archer P. D. Jr. * Ming D. W. Sutter B. Morris R. V. Clark B. C. et al.
Oxychlorine Species on Mars: Implications from Gale Crater Samples **[#2947]**
Every sample analyzed by SAM on MSL has released oxygen from oxychlorine species. Oxychlorine formation has occurred throughout Mars' history and is global.

4:30 p.m. Gainey S. R. * Hurowitz J. A.
The Geochemistry and Habitability of Martian Aquifers **[#2088]**
Thermodynamic and kinetic modeling of the geochemistry and habitability of martian aquifers coupled with evaporation simulations under Mars relevant conditions.

4:45 p.m. Murchie S. L. * Ehlmann B. L. Arvidson R. E.
Geological Water Resources for Humans on Mars: Constraints from Orbital Spectral Mapping and In Situ Measurements **[#1261]**
Mars regolith may yield 1 wt% water by heating to 500°C; select clay and sulfate bearing rocks may have up to 10%, much releasable by heating to 250°C or lower.

Wednesday, March 23, 2016 [W457]
CHONDRITES: WHOLE ROCK
1:30 p.m. Montgomery Ballroom

Chairs: **Neyda Abreu**
Emmanuel Jacquet

1:30 p.m. Johnson B. C. * Walsh K. J. Minton D. A.
Late Formation and Migration of the Giant Planets as Constrained by Formation of CB Chondrites **[#1136]**
Accretion models that include giant planet migration can explain the formation of CB chondrites and the age of CBs constrain the timing of such a migration.

1:45 p.m. Dauphas N. * Pourmand A. Barrat J. -A.
Refractory Lithophile Abundance Patterns: The Devil is in Thulium **[#1276]**
All refractory lithophile elements are not present in CI proportions in all planetary bodies; the devil is in Tm.

2:00 p.m. Archer G. J. * Tino J. Walker R. J. Wasson J. T.
The ^{182}Hf-^{182}W Isotopic Systematics of H Chondrite Metal: Constraining the Thermal History of the H Chondrite Parent Body **[#2973]**
The ^{182}Hf-^{182}W isotopic system constrains the thermal evolution of the H chondrite parent body. H chondrite metal grains have nucleosynthetic W anomalies.

2:15 p.m. Crowther S. A. * Theis K. J. Schönbächler M. Lawton T. Wilson A. et al.
The Thermal Evolution of H Chondrites as Revealed by the I-Xe Chronometer **[#2128]**
I-Xe data indicate cooling of the H chondrite parent body was more complicated than can be accounted for by the onion-shell model.

2:30 p.m. Abreu N. M. *
Are Phyllosicate CR Chondrite Matrices Generated by Hydrothermal Alteration? **[#1926]**
Criptic aqueous alteration of CR chondrites did not result from varying hydrothermal temperatures.

2:45 p.m. King A. J. * Schofield P. F. Russell S. S.
Characterizing Type 1 Aqueous Alteration in CM Carbonaceous Chondrites with Modal Mineral Abundances **[#1130]**
CM1 chondrites contain more phyllosilicates but are depleted in carbonates relative to CM2s. Aqueous alteration was more extensive due to higher temperatures.

3:00 p.m. Noguchi T. * Yabuta H. Itoh S. Sakamoto N. Mitsunari T. et al.
Early Stage of Aqueous Alteration and Interaction Between Inorganic and Organic Materials in Cometary Bodies: Insights from Antarctic Micrometeorites **[#1426]**
We have revealed a series of aqueous reactions in cometary bodies with special interests on the interaction among silicate, oxides, organic materials, and water.

3:15 p.m. Chan Q. H. S. * Zolensky M. E. Bodnar R. J. Farley C.
A Raman Study of Carbonates and Organic Contents in Five CM Chondrites **[#1403]**
With the use of Raman spectroscopy, we determined the structure of the insoluble organic matter in the matrix and carbonate phases in five CM chondrites.

3:30 p.m. Kebukawa Y. * Zolensky M. E. Fries M. Nakato A. Kilcoyne A. L. D. et al.
STXM-XANES Analysis of Organic Matter in Dark Clasts and Halite Crystals in Zag and Monahans Meteorites **[#1802]**
We report results of C-, N-, and O-XANES analysis of C-rich particles in a dark clast and halite crystals (both xenolithic) in the H5 ordinary chondrites.

3:45 p.m. Piani L. * Remusat L. Robert F. Yurimoto H.
Hydrogen Isotopic Evolution of Water and Organic Compounds on Chondritic Asteroids **[#1707]**
In situ isotopic analyses by SIMS suggest differences in the water and organics accreted by carbonaceous and ordinary chondrites in the early solar system.

4:00 p.m. Nakato A. * Chan Q. H.-S. Nakamura T. Kebukawa Y. Zolensky M. E.
Mineralogy of Experimentally Heated Tagish Lake **[#1218]**
We describe mineralogical change during heating of Tagish Lake, and compared them with thermally metamorphosed carbonaceous chondrites.

4:15 p.m. Bryson J. F. J. * Weiss B. P. Scholl A. Young A. T. Nimmo F.
Paleomagnetic Evidence for a Partially Differentiated H Chondrite Parent Planetesimal **[#1546]**
We find evidence that the Portales Valley H chondrite experienced ancient magnetic fields and argue that its parent body was therefore partially differentiated.

4:30 p.m. Tarduno J. A. * O'Brien T. M. Smirnov A. V.
Does the Magnetization of CV Meteorites Record a Parent Body Core Dynamo? **[#2609]**
No dynamo recorded by the Allende meteorite.

Thursday, March 24, 2016 **[R501]**
LUNAR PETROLOGY AND GEOCHEMISTRY
8:30 a.m. Waterway Ballroom 1

Chairs: **Dave Draper**
Barbara Cohen

8:30 a.m. Schmitt H. H. *
Symplectites in Dunite 72415 and Troctolite 76535 Indicate Mantle Overturn Beneath Lunar Near-Side **[#2339]**
Symplectites of Cr-spinel, Ca-cpx, and Mg-opx samples 72415 and 76535 provide mineralogical and textural evidence in that they originated in the lunar mantle.

8:45 a.m. Neal C. R. * Draper D. S.
Are Ferroan Anorthosites Direct Products of the Lunar Magma Ocean? **[#1165]**
Trace element data from ferroan anorthosite plagioclases are consistent with being crystallized from a cooling lunar magma ocean.

9:00 a.m. Rapp J. F. * Draper D. S.
Moonage Daydream: Reassessing the Simple Model for Lunar Magma Ocean Crystallization **[#2691]**
Moon magma ocean / Experiments show things are / Not so simple now…

9:15 a.m. Warren P. H. * Boehnke P.
Precise Igneous Crystallization Ages for Ferroan Anorthosites: Merely Difficult, or Impossible? **[#2997]**
The "pristinity" of ferroan anorthosites does not mean we can safely assume their isotopic systems closed, permanently, immediately, at igneous crystallization.

9:30 a.m. Hilton A. * Gross J. Korotev R. Calzada-Diaz A.
Classifying the Unknown — The Lunar Edition: North West Africa 10401 a New Type of the Mg-Suite Rock? **[#1168]**
The curious case of lunar meteorite NWA 10401; bearing characteristics of Mg-suite rocks, yet depleted in REE. A new type of FHT (non-KREEP) Mg-suite rock?

9:45 a.m. Kruijer T. S. * Kleine T.
High-Precision ^{182}W Measurements on Mare Basalts: Constraints on the Origin and Differentiation of the Moon **[#2132]**
Low-Ti and high-Ti mare basalts as well as KREEP share a common ^{182}W composition, showing that lunar magma ocean differentiation occurred after ^{182}Hf extinction.

10:00 a.m. Simon S. B. * Sutton S. R.
Valence of Ti, V, and Cr in the Reduced Apollo 14 Basalts 14053 and 14072 **[#1251]**
We report results of XANES measurements of Ti, V, and Cr valences, and Ti coordination environments, in olivine and pyroxene in two A-14 Al-rich basalts.

10:15 a.m. Richter F. M. * Chaussidon M. Mendybaev R. A. Taylor L. A.
Magnesium Isotopic Zoning of an Olivine Grain from Lunar Microgabbro 15555: Constraints on Crytallization and Cooling **[#1146]**
Magnesium isotopic fractionation of a zoned lunar olivine grain documents the extent to which diffusion affected the zoning and constrains the cooling rate.

10:30 a.m. Williams K. B. * Krawczynski M. J. Nie N. X. Dauphas N. Couvy H. et al.
The Role of Differentiation Processes in Mare Basalt Iron Isotope Signatures **[#2779]**
Two deltas diverge / In a molten Moon. Attempt / To recreate both.

10:45 a.m. Valencia S. N. * Jolliff B. L. Korotev R. L.
Petrography and Chemistry of the Mafic and REE-Rich Components in Apollo Sample 12013 **[#2361]**
Apollo Twelve / Rare earth element rich rock / Mafic gabbro too.

11:00 a.m. Nemchin A. A. Snape J. F. Whitehouse M. J. Norman M. * Bellucci J. J. et al.
Lunar Pb **[#1815]**
Pb-Pb systems in lunar rocks ranging from breccias to basalts can be successfully studied using SIMS, opening an opportunity to define Pb evolution of the Moon.

11:15 a.m. Grange M. L. * Norman M. D. Assis Fernandes V.
Clues to the Origin of Gabbroic Lunar Meteorite Northwest Africa 5000 **[#1784]**
We present new major, trace element and isotope compositions of mineral separates from NWA 5000 and discuss its possible origin on the Moon.

11:30 a.m. Zeigler R. A. * Korotev R. L.
Petrography and Geochemistry of Lunar Meteorite Miller Range 13317 **[#2554]**
The petrography and geochemistry of lunar meteorite Miller Range 13317 is reviewed. The meteorite is a new basaltic regloith breccia.

11:45 a.m. Nekvasil H. Lindsley D. H. DiFrancesco N. J.
Contemporaneous Formation of Diverse Lunar Magma Ocean Residual Liquids: The Role of Hercynitic Spinel **[#2354]**
Fractionation of hercynitic spinel in the lunar magma ocean may have played an important role in diversifying late-stage liquids and producing “sodic” magmas.

Thursday, March 24, 2016 [R502]
TITAN: REAL COOL WORLD
8:30 a.m. Waterway Ballroom 4

Chairs: **Karl Mitchell**
Alexander Hayes

8:30 a.m. Singh S. * McCord T. B. Combe J.-Ph. Rodriguez S. Cornet T. et al.
Acetylene on Titan’s Surface **[#2823]**
Identification of acetylene on the surface of Titan using laboratory and Cassini VIMS data.

8:45 a.m. Hodyss R. * Cable M. Vu T. H. Malaska M. J.
Carbon Dioxide Chemistry on Titan’s Surface **[#2089]**
Carbon dioxide reacts with primary amines under Titan surface conditions, constraining the lifetime of free carbon dioxide on the surface and in the atmosphere.

9:00 a.m. Malaska M. J. * Hodyss R. Lunine J. I. Hayes A. G. Hofgartner J. et al.
The Dissolved Nitrogen Fluffiness of Titan Lakes **[#1729]**
Drip-drop, fizz-fizz, oh what a nitrogen release it is!

9:15 a.m. Hayes A. G. * Mastrogiuseppe M. Lunine J. I. Poggiali V. Lorenz R. D. et al.
The Bathymetry and Composition of Titan's Lakes and Seas **[#1904]**
The Cassini RADAR has recently been used as a sounder to probe the depth and composition of Titan's seas. We will present new results in the ongoing campaign.

9:30 a.m. Mitchell K. L. * Lunine J. I. Barmatz M. B. Jamieson C. S. Malaska M. J. et al.
Towards an End-to-End Model Relating Microwave Observations to Bulk Chemistry of Titan's Lakes and Seas **[#2544]**
Titan's obscured seas / Peer inside with microwave / Dielectric soup.

9:45 a.m. Grima C. * Mastrogiuseppe M. Hayes A. Wall S. Stiles B. et al.
Radar Statistical Reconnaissance with the Cassini RADAR: Roughness of Titan's Seas **[#1660]**
We apply the Radar Statistical Reconnaissance (RSR) technique to the Cassini radar data set over Titan's seas in order to constrain their surface properties.

10:00 a.m. Neighbour D. G. * Singh S. S. Chevrier V. F.
Cryogenic Viscous Liquids on Icy Moons **[#1483]**
The analysis of cryogenically viscous liquids offers critical insight into the effect of sediments upon icy moons' fluid dynamics.

10:15 a.m. Farnsworth K. * McMahon Z. Laxton D. Chevrier V. Soderblom J.
Experimental Study of the Effects of Freezing on Liquid Hydrocarbons on the Surface of Titan **[#2485]**
An experimental analysis of the freezing processes of ethane and methane/ethane mixtures under Titan surface conditions.

10:30 a.m. Hofgartner J. D. * Buratti B. J. Brown R. H. Barnes J. W. Sotin C. et al.
Erosion of Titan's Craters from Cassini RADAR and VIMS Imagery **[#2591]**
Craters on Titan / Aeolian and fluvial erosion / Cassini RADAR and VIMS reveal.

10:45 a.m. Kinser R. M. * Neish C. D. Howard A. D. Schenk P. Bray V. J.
Geological Conditions Required for the Fluvial Erosion of Titan's Impact Craters **[#2627]**
Crater holding strong / Exposed on a diverse world / Can it endure time?

11:00 a.m. Schurmeier L. R. * Dombard A. J. Radebaugh J.
Titan's Isolated Mountain Plateaus: Investigating Possible Support Mechanisms and Cryovolcanic Origins **[#2197]**
Mountains on Titan / Not Airy isostatic / Cryovolcanic?

11:15 a.m. Lorenz R. D. * Le Gall A. Turtle E. P. Mastrogiuseppe M. Poggiali V. et al.
The Edge of Xanadu: Investigation with Altimetry and Nadir Emissivity **[#1910]**
Bright and Dark Lands Meet / Titan's Mystery Contrast / New data look down.

11:30 a.m. Cartwright R. J. * Burr D. M. Nagle N. N.
Using Terrestrial Analogs to Test Alluvial Fan Formation Mechanisms on Titan **[#1362]**
We are analyzing the radar signatures of debris flow and sheetflood fans in Death Valley, CA and comparing them to hypothesized fans on Titan.

Thursday, March 24, 2016 **[R503]**
DYNAMICS TO TECTONICS:
THE GEODYNAMICAL FATE OF PLANETARY BODIES
8:30 a.m. Waterway Ballroom 5

Chairs: **Nicolas Le Corvec**
Ana-Catalina Plesa

8:30 a.m. O'Neill C. * Marchi S. Zhang S. Bottke W.
Impact-Driven Tectonism During the Hadean **[#2733]**
Impacting may have been an important driver for tectonism in the Hadean, and we show tectonism may have been coupled to evolving impact flux.

8:45 a.m. Andrews-Hanna J. C. * Bottke W. F.
The Post-Accretionary Doldrums on Mars: Constraints on the Pre-Noachian Impact Flux **[#2873]**
A lack of large basin-forming impacts during the pre-Noachian between the formation of Borealis and Hellas reveals a 400 Myr lull in martian bombardment.

9:00 a.m. Thiriet M. * Michaut C. Breuer D.
Effect of a Buried Felsic Component in the Southern Crust of Mars on Lithosphere Growth **[#1925]**
Comparative study of the stagnant lid growth in the two hemispheres of Mars, considering a buried felsic and pyroclastic component in the Mars Southern crust.

9:15 a.m. Weller M. B. *
The Thermal Evolution of Mars and Mars-Type Planets: Geodynamic and Geochemical Potential for Early Mobility **[#2666]**
Early mobility? / Obtainable with Models / But is it expected?

9:30 a.m. Brustel C. * Flahaut J. Hauber E. Fueten F. Stesky R. et al.
Valles Marineris Tectonic and Volcanic History Inferred from Dikes in Eastern Coprates Chasma Mars **[#2724]**
Role of dikes in the tectonic and volcanic history of Valles Marineris.

9:45 a.m. Şengör A. M. C. Acar D. Özeren M. S. * Ülgen S. C. Önsel İ. E. et al.
Valles Marineris and the Martian Chasmata as Thermokarstic Poljes **[#2257]**
Instead of a rift / Could Valles Marineris / Be thermokarstic?

10:00 a.m. Nahm A. L. *
A New Map of Graben on the Lunar Nearside: Initial Observations and Classification **[#1855]**
The lunar nearside / Graben, graben everywhere / Where did they come from?

10:15 a.m. Mang M. * Michaut C. Culha C.
Domes, Pits, and Small Chaos on Europa Produced by Water Sills **[#1213]**
We present a model for the formation of pits, domes, and small chaos on Europa by injection of liquid water in sills. We also map those features.

10:30 a.m. Radebaugh J. * Lorenz R. D. Liu Z. Y-C. Kirk R. L.
The Highest Point on Titan **[#2694]**
Titan's highest point? Mithrim Montes hazy peak 3K meters high.

10:45 a.m. Cole H. M. * Andrews-Hanna J. C.
Low Dip of a Fault Associated with a Wrinkle Ridge Seen in Melas Chasma, Mars **[#2511]**
A Monte Carlo inversion is used to examine uncertainty of a low dip measured from a ridge that preserves the geometry of a wrinkle-ridge-forming fault on Mars.

11:00 a.m. Byrne P. K. * Klimczak C. LaFond J. K.
The East Kaibab Monocline: A Terran Lobate Scarp? **[#1022]**
Are there lobate scarps / On Earth? Yes, the East Kaibab / Monocline is one.

11:15 a.m. Williams N. R. * Bell J. F. III Shirzaei M. Watters T. R. Banks M. E. et al.
Evidence for Active Tectonism at the Lunar Surface **[#2808]**
Active tectonics / Young ridges, scarps, and graben / Shaking up the Moon.

11:30 a.m. Hurford T. A. * Asphaug E. Spitale J. N. Hemingway D. Rhoden A. R. et al.
Stretch Marks on Phobos **[#2575]**
Phobos spirals in / Tide rises, surface stretches / Grooves form in tension.

Thursday, March 24, 2016 **[R504]**
MARS ICE: UNDER PRESSURE IT FLOWS
8:30 a.m. Waterway Ballroom 6

Chairs: **Richard Soare**
James Head III

8:30 a.m. Brough S. * Hubbard B. Hubbard A.
Two-Dimensional Numerical Ice Flow Modeling of an Empirically Reconstructed Martian Glacier-Like Form **[#1994]**
We present results of a higher-order, 2D numerical ice flow model for an empirically reconstructed glacier-like form in eastern Hellas Planitia, Mars.

8:45 a.m. Parsons R. A. * Holt J. W.
Evidence for Variable Ice Accumulation or Viscosity of Martian Glaciers on Opposing Slopes of Euripus Mons, Mars from Numerical Ice Flow Modeling **[#1462]**
A higher ice viscosity is predicted for S. Euripus Mons, but multiple ice deposition events affecting only the S. lobe provides a better fit to HRSC topography.

9:00 a.m. Soare R. J. * Conway S. J. Gallagher C. J. Dohm J. M.
"Ice-Rich" (Periglacial) and "Icy" (Glacial) Depressions in the Argyre Region, Mars **[#1175]**
We discuss depressions in the Argyre region that are scalloped, metres to decametres-deep, decametres to kilometres in scale, flat-floored and polygonised.

9:15 a.m. Voelker M. * Hauber E. Jaumann R.
Distribution and Geomorphology of the Latitude-Dependent Mantling Deposit in Hellas Planitia, Mars **[#1360]**
The abstract presents the geospatial distribution and evolution of LDM within Hellas Planitia, based on results of the newly developed grid-mapping method.

9:30 a.m. Bernhardt H. * Reiss D. Hiesinger H. Ivanov M. A.
The Honeycomb Terrain on the Hellas Basin Floor, Mars: Arguments for Salt or Ice Diapir Scenarios **[#1871]**
Based on plausibility studies of potential formation mechanisms of the honeycomb terrain on Hellas Planitia, we present arguments for a salt/ice diapir origin.

9:45 a.m. Jawin E. R. * Head J. W.
Patterns of Martian Deglaciation: Assessing the Distribution of Paraglacial Features in Mid-Latitudes Craters **[#1246]**
The distribution of paraglacial features in martian mid-latitude glaciated craters suggests variable patterns of deglaciation at multiple spatial scales.

10:00 a.m. Viola D. * McEwen A. S. Dundas C. M. Byrne S.
Subsurface Volatile Abundance in a Martian Double Layer Ejecta Crater **[#2202]**
Ice content within a DLE crater is measured based on superposed thermokarstically-altered secondary craters, with implications for the DLE-forming mechanism.

10:15 a.m. Head J. W. III * Weiss D. K. Horan A. M.
Lyot Crater, Mars: Major Amazonian-Aged Impact and the Nature of Target Substrate, Ejecta Emplacement, and Modification **[#1190]**
Lyot Crater is examined to assess the substrate, ejecta emplacement, and hydrological cycle modification processes.

10:30 a.m. Weiss D. K. * Head J. W.
Evaluating the Thickness of the Martian Ice-Cemented Cryosphere Using Thermal Modeling and Impact Crater Morphology **[#1066]**
Mars crater morphology suggests supply-limited ice-cemented cryosphere ~1–3 km thick. Thermal models match cryosphere only under ancient martian conditions.

10:45 a.m. Ackiss S. E. * Campbell A. Horgan B. Seelos F. P. Wray J. J. et al.
Mineralogical Evidence for Subglacial Volcanoes in the Sisyphi Montes Region of Mars **[#1305]**
Fire under ice? / Exploring Sisyphi's role / Near martian south pole.

11:00 a.m. Scanlon K. E. * Head J. W. Fastook J. L. Wordsworth R. D.
The Dorsa Argentea Formation and the Noachian-Hesperian Transition: Climate and Glacial Flow Modeling **[#1315]**
We used early Mars GCM and glacial flow model simulations to constrain the climates allowing a large south polar ice sheet consistent with DAF geomorphology.

11:15 a.m. Butcher F. E. G. * Conway S. J. Arnold N. S. Balme M. R.
The Dorsa Argentea, Mars: Comparison to >5900 Terrestrial Esker Systems and Statistical Tests for Topographic Relationships **[#1247]**
Plan view geometries of the Dorsa Argentea, Mars are similar to >5900 eskers in Canada and esker-like topographic relationships are statistically significant.

11:30 a.m. Grimm R. E. * Harrison K. P. Kirchoff M. R. Stillman D. E.
Secular Retention of Tropical Ground Ice on Mars **[#2592]**
D/H and inferred depths to tropical ground ice both imply sublimation loss of only 10 m GEL. H_2O escape was likely restricted by pore-occluding mineralization.

Chairs: **Ryan Ogliore**
Reto Trappitsch

8:30 a.m. Hoppe P. * Pignatari M. Kodolanyi J. Groener E.
New Insights into Supernova Nucleosynthesis from a Presolar SiC Grain with Unique Carbon Isotopic Composition **[#1108]**
A SiC SN grain identified by ion imaging has the highest $^{12}C/^{13}C$ ever found for presolar grains and provides a unique opportunity to study SN He shell matter.

8:45 a.m. Kodolányi J. * Vollmer C. Hoppe P. Müller M.
NanoSIMS and TEM Investigations of Supernova SiC Grains **[#1478]**
Hexagonal crystals (in particular the 6H polytype) are more common among presolar SiC grains of SN origin than among SiC from the winds of AGB stars.

9:00 a.m. Trappitsch R. * Stephan T. Davis A. M. Pellin M. J. Rost D. et al.
Simultaneous Analysis of Iron and Nickel Isotopes in Presolar SiC Grains with CHILI **[#3025]**
Using CHILI, we analyzed 11 presolar SiC grains for their Fe and Ni isotopic composition and element ratios. These elements are proxies for studying GCE effects.

9:15 a.m. Haenecour P. * Floss C. José J. Amari S. Lodders K. et al.
Presolar Graphite from a CO Nova **[#1580]**
We report coordinated in situ isotopic, elemental, and microstructural analyses of the first plausible presolar graphite grain from a CO nova.

9:30 a.m. Jadhav M. * Holt M. Winarksi R. Miller D. J.
Combined Nano Computed Tomography and X-Ray Fluorescence Measurements of a Presolar Grain **[#2829]**
We present results from a new synchrotron-based X-ray nano tomography-assisted chemical correlation (nTACCo) study of a presolar graphite grain.

9:45 a.m. Stroud R. M. * Pravdivtseva O. V. Meshik A. P. Shatoff E. A.
Aberration-Corrected STEM Analysis of Electrophoresis Separates of Allende Nanodiamond **[#2311]**
STEM analyses of Allende nanodiamond separates reveal microstructural variation, including a 0.6 nm Ir-rich particle in a Xe-HL-rich fine fraction.

10:00 a.m. Floss C. * Haenecour P.
Meteorite Hills (MET) 00526: An Unequilibrated Ordinary Chondrite with High Presolar Grain Abundances **[#1030]**
Presolar silicate abundances are ~100 higher in the UOC MET 00526 than Semarkona, emphasizing the need for systematic presolar grain searches in other UOCs.

10:15 a.m. Snead C. J. * Keller L. P. McKeegan K. D. Messenger S.
Precision Oxygen Isotope Measurements of Two C-Rich Hydrated Interplanetary Dust Particles **[#2850]**
We report results of oxygen isotope measurements of two C-rich hydrated interplanetary dust particles.

10:30 a.m. Defouilloy C. * Nakashima D. Joswiak D. J. Brownlee D. E. Tenner T. J. et al.
High Precision Oxygen Three-Isotopes Analyses from Comet 81P/Wild 2 and Probable Cometary Material from a Giant Cluster IDP **[#1584]**
O isotope analyses from Wild 2 and GC-IDP silicates show a possible link with CR chondrites while ^{16}O-rich Wild 2 pyroxenes could be linked to AOAs.

10:45 a.m. Joswiak D. J. * Brownlee D. E.
Possible Igneous Origins of Sulfide-Silicate Assemblages Found in Comet Wild 2 and a Giant Cluster IDP of Probable Cometary Origin **[#1679]**
Some coarse-grained sulfide-silicate assemblages found in comet Wild 2 and a giant cluster IDP may have formed at high temperatures.

11:00 a.m. Gainsforth Z. * Butterworth A. L. Jilly-Rehak C. E. Westphal A. J. Brownlee D. E. et al.
Possible GEMS and Ultra-Fine Grained Polyphase Units in Comet Wild 2 **[#2366]**
Chemical compositions and morphologies of two objects in the wake of a terminal particle of track C2086,22,191 suggest they may be a GEMS and UFG-PU.

11:15 a.m. De Gregorio B. T. * Stroud R. M.
What Would a Cometary Interplanetary Dust Particle Look Like After Hypervelocity Impact in Silica Aerogel? **[#2673]**
An offshoot terminal particle from Track 196 is consistent with a porous impactor, with abundant pyroxene "whiskers" and carbonaceous matter. Perhaps an IDP?

11:30 a.m. Croat T. K. * Haas B. A. Floss C.
The Composition of Surviving Fine Grained Cometary Material in Stardust Al-Foil Craters **[#2204]**
We present SEM-EDX and Auger semi-quantitative analysis methods for Al-foil-captured cometary fines along with compositional data from 150 Stardust craters.

Thursday, March 24, 2016 **[R551]**
DIFFERENTIATED METEORITES:
MULTIPLE PARENT BODIES AND MULTIPLE MODELS
1:30 p.m. Waterway Ballroom 1

Chairs: **Brent Turrin**
Hilary Downes

1:30 p.m. Mittlefehldt D. W. * Greenwood R. C. Peng Z. X. Ross D. K. Berger E. L. et al.
Petrologic and Oxygen-Isotopic Investigations of Eucritic and Anomalous Mafic Achondrites **[#1240]**
Studies of eucrite-type meteorites reveal an array of anomalous characteristics that bespeak multiple parent asteroids. Winner: 2016 Best LPSC Abstract Award!

1:45 p.m. Sanborn M. E. * Yin Q.-Z. Mittlefehldt D. W.
The Diversity of Anomalous HEDs: Isotopic Constraints on the Connection of EET 92023, GRA 98098, and Dhofar 700 with Vesta **[#2256]**
We present high-precision Cr isotopic measurements of the anomalous HEDs EET 92023, GRA 98089, and Dhofar 700 to investigate their connection with Vesta.

2:00 p.m. Barrett T. J. * Barnes J. J. Anand M. Franchi I. A. Greenwood R. C. et al.
The Isotopic Composition of Chlorine in Apatite from Eucrites **[#2746]**
We present preliminary isotopic compositions of chlorine in apatite from two eucrites. The values of which show some similarities to the Moon.

2:15 p.m. Ashcroft H. O. * Wood B. J.
HED Petrogenesis: An Insight from Low-Ca Pyroxene-Melt REE Partitioning **[#2155]**
Pyroxene-melt partition coefficients for REEs were determined experimentally, and used to investigate the trace element variations in eucrites and diogenites.

2:30 p.m. Dhaliwal J. K. * Day J. M. D. Tait K. T.
Establishing a Pristinity Index for Eucrites Using the Highly Siderophile Elements **[#2644]**
Elucidating planetary differentiation on the HED parent body using potentially primitive HSE mantle signatures in pristine unbrecciated eucrite samples.

2:45 p.m. Downes H. * Beard A. D. Franchi I. A. Greenwood R. C.
Origin of Opal (Hydrated Silica) in Polymict Ureilites **[#1443]**
Petrography of opal clasts in a brecciated ureilite indicates an extraterrestrial origin but NanoSIMS oxygen isotope data lie on terrestrial fractionation line.

3:00 p.m. Goodrich C. A. * Treiman A. H. Kita N. T. Defouilloy C.
Increasing Diversity of Ordinary Chondrite and Rumuruti-Type Chondrite Clasts in Polymict Ureilites **[#1617]**
We describe new and increasingly diverse OC and RC chondritic clasts in polymict ureilites. These clasts extend the diversity of known RC materials.

3:15 p.m. Shearer C. K. * Bell A. S. Burger P. V. Papike J. J. Jones J. et al.
The Cr Redox Record of fO_2 Variation in Angrites. Evidence for Redox Conditions of Angrite Petrogenesis and Parent Body **[#1370]**
We exam the origin and conditions of melting on the angrite parent body through micro-scale determinations of Cr redox state in olivine from volcanic angrites.

3:30 p.m. Santos A. R. * Agee C. B. Shearer C. K. McCubbin F. M.
Northwest Africa 8535 and Northwest Africa 10463: New Insights into the Angrite Parent Body **[#2590]**
New angrite meteorites NWA 8535, a dunite, and NWA 10463, a basalt, were studied to provide insight into igneous processes on the angrite parent body.

3:45 p.m. Neumann W. O. * Breuer D. Kleine T. Kruijer T. S.
Heating and Melt Segregation During Planetesimal Differentiation and the Significance of Hf-W Model Ages of Iron Meteorites **[#3047]**
We calculated the differentiation of the magmatic iron meteorite parent bodies. Our results are in a good agreement with the metal separation data available.

4:00 p.m. Weiss B. P. * Bryson J. F. J. Harrison R. J. Neufeld J. A. Elkins-Tanton L. T. et al.
A Core Dynamo on an Iron Meteorite Parent Body and the Magnetism of Metallic Asteroids **[#1661]**
We present the first identification of a dynamo on an iron meteorite parent body. Magnetic field generation was likely powered by inward core crystallization.

4:15 p.m. Jones J. H. * Ross D. K. Chabot N. L. Keller L. P.
Implications for Metallographic Cooling Rates, Derived from Fine-Scale Analytical Traverses Across Kamacite, Taenite, and Tetrataenite in the Butler Iron Meteorite **[#2432]**
The distribution of Ni and Ge in iron meteorites, coupled with measured diffusivities, imply that Ni-derived cooling rates may not be applicable below ~500°C.

4:30 p.m. Gregory J. D. * Mayne R. G. Boesenberg J. S. Humayun M. Silver A. P. et al.
Choteau Makes Three: A Characterization of the Third Member of the Vermillion Subgroup **[#2393]**
First Vermillion, then / Yamato 8451 / Now Choteau makes three.

4:45 p.m. Worsham E. A. * Bermingham K. R. Walker R. J.
Comparative Molybdenum-Tungsten-Osmium Isotope Evidence for the Diverse Genetics and Chronology of IAB Complex Iron Meteorites **[#2392]**
Mo-W-Os isotopes show that the IAB complex represents multiple parent bodies and metal segregation events. Much of the complex is genetically similar to Earth.

Thursday, March 24, 2016 [R552]
SPECIAL SESSION:
NASA PLANETARY SCIENCE DIVISION FACILITIES
1:30 p.m. Waterway Ballroom 4

Chairs: **Jonathan Rall**
Doris Daou

1:30 p.m. Hagerty J. J. * Anderson R. C. Byrne S. Hager M. Hayes A. et al.
The NASA Regional Planetary Image Facility Network: A Globally Distributed Resource for the Planetary Science Community **[#2120]**
The RPIFN's goal is to serve as a resource that makes it possible to remove the barriers associated with locating, accessing, and using planetary science data.

1:45 p.m. Milliken R. E. * Hiroi T. Patterson W.
The NASA Reflectance Experiment Laboratory (RELAB) Facility: Past, Present, and Future **[#2058]**
Overview of past, current, and future capabilities of RELAB instrumentation and spectral database.

2:00 p.m. Williams D. A. * Smith J. K.
NASA Facilities Overview: Planetary Aeolian Laboratory **[#1524]**
This invited presentation will discuss one of NASA's Planetary Science Division Facilities, the Planetary Aeolian Laboratory.

2:15 p.m. Kremic T. * Nakley L. Vento D. Balcerski J. Kulis M. et al.
GLENN Extreme Environments Rig (GEER) for Planetary Science **[#2146]**
The presentation discusses the NASA Glenn Extreme Environment Rig (GEER) and the potential applications and benefits it offers planetary science.

2:30 p.m. Karcz J. S. * Bowling D. Cornelison C. Parrish A. Perez A. et al.
The Ames Vertical Gun Range **[#2599]**
The Ames Vertical Gun Range (AVGR) is a national facility for conducting laboratory-scale investigations of high-speed impact processes.

2:45 p.m. Horanyi M. * James D. Kempf S. Munsat T. Sternovsky Z.
The SSERVI-IMPACT Dust Accelerator Facility at the University of Colorado **[#1653]**
The talk describes the hypervelocity dust accelerator at the University of Colorado supported by NASA's SSERVI IMPACT Team.

3:00 p.m. Barnouin O. S. * Ernst C. M. Stickle A. M. Ramesh K. T.
The Johns Hopkins University Applied Physics Laboratory's Planetary Impact Laboratory **[#2622]**
We present the capabilities of the Planetary Impact Laboratory (PIL) at the Johns Hopkins University Applied Physics Laboratory.

3:15 p.m. Draper D. S. * Astromaterials Research and Expl. Science Div.
NASA Johnson Space Center's Planetary Sample Analysis and Mission Science (PSAMS) Laboratory: A National Facility for Planetary Research **[#2013]**
Our proposed facility's capabilities enable comprehensive, multidisciplinary planetary studies possible at no other institution.

3:30 p.m. Hauri E. H. * Alexander C. M. O'D. Carlson R. W. Cody G. Nittler L. R. et al.
Planetary Materials Laboratory Capabilities and Facility Experience at the Carnegie Institution of Washington **[#2715]**
Laboratory capabilities and experience gained as a multi-user facility are described at the Carnegie Institution of Washington.

3:45 p.m. Meshik A. * Pravdivtseva O.
Noble Gas Laboratory at Washington University: History and Analytical Cababilities **[#1681]**
Analytical capabilities of Noble Gas Laboratory at Washington University (WUNGL).

4:00 p.m. Ziegler K. * Sharp Z. D.
Stable Isotope Facilities at the Center for Stable Isotopes (CSI), University of New Mexico **[#2717]**
We present our new college-wide Center for Stable Isotopes (CSI) at the University of New Mexico, and its focus on addressing planetary-related research.

4:15 p.m. Bose M. * Hervig R. L. Williams L. B. Williams P.
Secondary Ion Mass Spectrometry at Arizona State University **[#1452]**
The Secondary Ion Mass Spectrometry (SIMS) facility at Arizona State University and current applications on ims6f and NanoSIMS 50L will be presented.

4:30 p.m. Hanna R. D. * Edey D. R. Maisano J. A. Ketcham R. A.
UTCT: The University of Texas High-Resolution X-Ray Computed Tomography Facility **[#3000]**
We describe the UTCT facility, which provides X-ray CT (non-destructive 3D imaging) acquisition and analysis services to the planetary community.

Thursday, March 24, 2016 **[R553]**
COMETS AND CARBONACEOUS BODIES:
NOT A CARBON COPY OF ASTEROIDS
1:30 p.m. Waterway Ballroom 5

Chairs: **Michael Zolensky**
Neyda Abreu

1:30 p.m. Ulamec S. * Biele J. Cozzoni B. Delmas C. Fantinati C. et al.
Rosetta Lander — Philae: Operations on 67P/Churyumov-Gerasimenko **[#1835]**
Operations after the successful landing of Philae during the first science sequence and after "wake-up" in summer 2015 are described.

1:45 p.m. El-Maarry M. R. * Thomas N. Pajola M. Massironi M. Marchi S. et al.
Comet 67P Dichotomy and Morphology of the Southern Hemisphere from Rosetta/OSIRIS Images **[#2108]**
We describe the morphology of comet 67P's southern hemisphere using new data from Rosetta/OSIRIS and compare it to the northern hemisphere.

2:00 p.m. A'Hearn M. F. * Vincent J.-B. OSIRIS Team
Mini-Outbursts in Comets Churyumov-Gerasimenko and Tempel 1 **[#2678]**
We observed numerous mini-outbursts by comet Churyumov-Gerasimenko. Many aspects are similar to, but better studied than, the mini-outbursts from Tempel 1.

2:15 p.m. Ciarletti V. * Lasue J. Herique A. Kofman W. Guiffaut C. et al.
CONSERT First Constrains on the Fine Scale Heterogeneity Inside the Nucleus of 67P/Churyumov-Gerasimenko **[#2722]**
The work presented aims at constraining the small scale heterogeneity inside the volumes investigated by the CONSERT radar East and West of Abydos.

2:30 p.m. Stenzel O. J. * Hilchenbach M. Kissel J. Langevin Y. Briois C. et al.
Refractory Elements from High Resolution Mass Spectra of 67P Particles as Found by Rosetta/COSIMA **[#1934]**
The dust composition analyzer COSIMA collects and analyzes dust particles in the coma of comet 67P. We report on the refractory elements in these particles.

2:45 p.m. Scheeres D. J. * Hirabayashi T. Chesley S. Marchi S. McMahon J. et al.
Fission and Reconfiguration of Bilobate Comets Revealed by 67P/C-G **[#1615]**
Cracks in 67P's neck formed during a past epoch of fast spin. When 67P eventually does fission, its lobes can't escape and will reimpact and reconfigure itself.

3:00 p.m. Galiazzo M. A. * Maindl T. Wiegert P. Wandel O. Burger C. et al.
Possible Origin(s) of Comet 67P/Churyumov-Gerasimenko **[#1021]**
67P/Churyumov-Gerasimenko is a bi-lobed comet connected by a thick neck. The aim of our work is to find the possible origins of this comet, dynamically and physically.

3:15 p.m. Vilas F. * Hendrix A. R.
Implications for the Origin of Jovian Irregular Satellites from Reflectance Spectra **[#1093]**
Where did eight outer / Jovian irregular / Satellites come from?

3:30 p.m. Zolensky M. E. * Mikouchi T. Hagiya K. Ohsumi K. Komatsu M. et al.
Unique View of C Asteroid Regolith from the Jbilet Winselwan CM Chondrite **[#2148]**
Highly brecciated, partially-shocked, and dehydrated lithologies like those in Jbilet Winselwan dominate C-class asteroid regolith.

3:45 p.m. Steckloff J. K.
Jets on Comets' Cliffs are the Dominant Cause of Rotation State Changes **[#2868]**
Comets sublimate / Most flux comes from the cliffs / So says the models.

4:00 p.m. El Mir C. * Hazeli K. Ramesh K. T. Delbo M. Wilkerson J.
Thermal Fatigue: Lengthscales, Timescales, and Their Implications on Regolith Size-Frequency Distribution **[#2586]**
We investigate the contribution of thermal fatigue to regolith size-frequency distribution by identifying the length and timescales involved in this mechanism.

4:15 p.m. Hiroi T. * Kaiden H. Imae N. Yamaguchi A. Kojima H. et al.
Estimating the Carbon Contents and Distinguishing the Types of Carbonaceous Chondrites by Spectral Instruments Onboard Hayabusa2 Spacecraft **[#1084]**
By the principle component analysis to four select bands each of ONC-T and NIRS3 onboard Hayabusa2, six groups of carbonaceous chondrites could be distinguished.

4:30 p.m. Yoshikawa M. * Tsuda Y. Watanabe S.
Current Status of Asteroid Sample Return Mission Hayabusa2 **[#1927]**
Hayabusa2 conducted the Earth swing-by successfully on December 3, 2015. In this paper, we summarize the status of Hayabusa2 mission so far.

Thursday, March 24, 2016 [R554]
RECURRING SLOPE LINEAE ON MARS
1:30 p.m. Waterway Ballroom 6

Chairs: **Cecilia Leung**
Vincent Chevrier

1:30 p.m. Dundas C. M. * McEwen A. S. Milazzo M. P.
How Wet is Recent Mars? Insights from Gullies and RSL **[#2327]**
CO_2 may cause martian gully formation. RSL more strongly resemble aqueous features, but processes with little water are possible; recent Mars may be nearly dry.

1:45 p.m. Chevrier V. F. * Melchiorri R.
Global Distribution of Aqueous Brines on Mars: Implications for RSLs and Special Regions **[#2843]**
This paper presents new results on the stability and formation of liquid brines on the surface of Mars, providing constraints on the formation of RSLs.

2:00 p.m. Hibbitts C. A. Mushkin A. * Gillespie A. Irvin B. Wing B.
Investigating the Origin of Mars Recurring Slope Line Through Laboratory Experiments Under a Relevant Environment **[#2902]**
If the origin of Mars RSL is due to water, they may be a remnant physical expression of very recently lost water and are not evidence of actual wetness.

2:15 p.m. Stillman D. E. * Michaels T. I. Grimm R. E. Hanley J.
Seasonality of Valles Marineris Recurring Slope Lineae (RSL) Suggests Multiple Water Sources **[#2584]**
VM RSL are widespread. The majority of VM RSL have the same seasonality, but Juventae RSL are different and likely less briny.

2:30 p.m. Leung C. W.S. * Rafkin S. C. R. Stillman D. E. McEwen A. S.
Fogs and Clouds are a Potential Indicator of a Local Water Source in Valles Marineris **[#2878]**
Warm Canyon Bottom / Implies Local Water Source / Controls RSL?

2:45 p.m. Wilson J. T. * Eke V. R. Massey R. J. Elphic R. C. Feldman W. C. et al.
Recurring Slope Lineae on Mars are Not Fed by Subsurface Water **[#2813]**
An improved resolution MONS data set shows that sites containing recurring slope lineae cannot be distinguished from those without by using hydrogen abundance.

3:00 p.m. Amador E. S. * Mushkin A. Gillespie A.
Spectral Characteristics of Dark Slope Streaks on Mars: A Global Survey with CRISM **[#2696]**
Dark slope streaks on Mars, dynamic on a year-decadal timescale, show spectral characteristics similar to RSL "dry," or inactive, periods.

Thursday, March 24, 2016 **[R555]**
MARTIAN HIGH LATITUDE ICE AND POLAR LAYERED DEPOSITS
3:30 p.m. Waterway Ballroom 6

Chairs: **Patricio Becerra**
Andrew Dombard

3:30 p.m. Becerra P. * Byrne S. Sori M. M. Sutton S. Herkenhoff K. E.
Stratigraphy of the North Polar Layered Deposits of Mars from High-Resolution Topography **[#1325]**
We map NPLD stratigraphy with HiRISE topography. The protrusion of exposed layers from a scarp is a better descriptor of the stratigraphy than layer brightness.

3:45 p.m. Nerozzi S. * Holt J. W.
Reconstructing the Initial Emplacement of the North Polar Layered Deposits, Mars with SHARAD **[#2665]**
SHARAD through pole ice / Finds new units and helps us / Learn how they first formed.

4:00 p.m. Landis M. E. * Byrne S. Daubar I. J. Herkenhoff K. E. Dundas C. M.
Surface Age and Resurfacing Rates of the North Polar Layered Deposits, Mars **[#2154]**
We present results from crater statistics and thermal modeling that suggest the north polar layered deposits is undergoing rapid resurfacing.

4:15 p.m. Stuurman C. M. * Levy J. S. Holt J. W.
Quantifying Midlatitude Ice Loss on Mars: "Missing" Ice in Utopia Planitia **[#2700]**
Icy soil lost / Where, when, and how goeth thee? / We ask Utopia.

4:30 p.m. Noe Dobrea E. Z. * Stoker C. R. Berman D. C. Krčo M. Davila A. F. et al.
Timescales for Crater Degradation and Burial in the Phoenix Landing Region **[#2721]**
We investigate the loss of small (<1 km) craters in the Phoenix Landing Site region and propose rapid crater loss due to infilling and viscous relaxation.

4:45 p.m. Dombard A. J. * Noe Dobrea E. Z.
Relaxation of Small Craters at Phoenix Landing Site Latitudes on Mars **[#1766]**
Previous works suggested an ice-rich layer 40–70 m thick, and found craters 0.2–1 km wide appeared viscously relaxed. We confirm relaxation's plausibility.

Thursday, March 24, 2016 **[R556]**
SPACE WEATHERING:
IT TURNS OUT THAT RADIATION DOESN'T GIVE ROCKS SUPER POWERS
1:30 p.m. Montgomery Ballroom

Chairs: **Rachel Klima**
Jeffrey Gillis-Davis

1:30 p.m. Keller L. P. * Berger E. L. Christoffersen R. Zhang S.
Direct Determination of the Space Weathering Rates in Lunar Soils and Itokawa Regolith from Sample Analyses **[#2525]**
We directly determined space weathering rates for lunar soils and Itokawa grains.

1:45 p.m. Burgess K. D. * Stroud R. M.
Nanophase Fe-Oxide, Fe-Sulfide, and Ilmenite in High-Ti Lunar Soil **[#2021]**
High resolution measurements of space weathered lunar soil show nanocrystals include a range of compositions and oxidation states in addition to metallic Fe.

2:00 p.m. Corley L. M. * Gillis-Davis J. J. Lucey P. G. Trang D.
Space Weathering at the Lunar Poles: The Effect of Temperature on Reflectance of Materials Weathered by Laser Irradiation **[#2692]**
We compare the reflectance and submicroscopic iron produced for minerals laser space weathered at room temperature and temperatures comparable to PSRs.

2:15 p.m. Christoffersen R. * Loeffler M. J. Dukes C. A. Keller L. P. Baragiola R. A.
Compositional and Microstructural Evolution of Olivine Under Multiple-Cycle Pulsed Laser Irradiation as Revealed by FIB/Field-Emission TEM **[#2747]**
Pulsed laser impact / Melt and vapor mixed together / Makes olivine dark.

2:30 p.m. Gillis-Davis J. J. *
Laser Space Weathering of Possible (1) Ceres Analogs **[#1857]**
Laser space weathering of (1) Ceres analogs show how spectra of minerals and simple mineral mixtures change in response to micrometeorite simulated impacts.

2:45 p.m. Thompson M. S. * Zega T. J. Howe J. Y.
Simulation of Micrometeorite Impacts Through In Situ Dynamic Heating of Lunar Soil **[#2744]**
We subject lunar soils to thermal shocks inside the transmission electron microscope to simulate space weathering processes.

3:00 p.m. Kulchitsky A. V. * Hurley D. M. Johnson J. B. Duvoy P. Zimmerman M.
Particle Size Distribution Influence on Access of Solar Wind to Lunar Regolith **[#2934]**
This work quantifies the relationship between lunar regolith particle size distribution and solar wind access to buried grains of the regolith.

Thursday, March 24, 2016 **[R557]**
COSMOCHEMICAL ORIGINS: DISK EVOLUTION
3:30 p.m. Montgomery Ballroom

Chairs: **Jeffrey Cuzzi**
Alessandro Morbidelli

3:30 p.m. Morbidelli A. * Bitsch B. Crida A. Gounelle M. Guillot T. et al.
A Fossilized Snowline in the Solar System Protoplanetary Disk **[#1116]**
The formation of proto-Jupiter intercepted the radial flow of ice grains. Thus inner solar system bodies remained dry even when the temperature later dropped.

3:45 p.m. Krijt S. Ciesla F. J. *
Tracing Solids and Vapor During Particle Growth: Communication Between the Midplane and Surface Layers of a Protoplanetary Disk **[#2020]**
Dust and gas move / Between midplane and surface / Does dust growth limit?

4:00 p.m. Estrada P. R. * Cuzzi J. N.
Fractal Growth and Radial Migration of Solids: The Role of Porosity and Compaction in an Evolving Nebula **[#2854]**
Outside the snow line / Particles grow fractally / My don't they drift slow.

4:15 p.m. Cuzzi J. N. * Hartlep T. Estrada P. R.
Planetesimal Initial Mass Functions and Creation Rates Under Turbulent Concentration Using Scale-Dependent Cascades **[#2661]**
After allowing for the new scale dependence of turbulent concentration, forming large planetesimals requires dm-radius aggregates rather than single chondrules.

4:30 p.m. Fischer R. A. * Nimmo F. O'Brien D. P.
Radial Mixing Under Different Accretion Scenarios: Observational Constraints **[#2454]**
Different accretion scenarios imply different feeding zones for planets, which can be seen in K/U ratios and Ru-Mo isotopes.

4:45 p.m. Carballido A. * Matthews L. S. Hyde T. H.
Dust Relative Velocities in the Vicinity of a Gap-Opening Jupiter-Mass Planet **[#2855]**
We calculate collision speeds of dust grains in the solar nebular, in which a gap has been opened by Jupiter. Speed values are highest inside the gap.

Friday, March 25, 2016 **[F701]**
THE MOON WHO SOILED THE WHIRLED:
LUNAR PHYSICS AND SURFACE PHENOMENA
8:30 a.m. Waterway Ballroom 1

Chairs: **Georgiana Kramer**
Amanda Hendrix

8:30 a.m. Thomson B. J. * Spudis P. D. Hayne P. O. Cahill J. T. S. Patterson G. W. et al.
Evidence for Possible Low-Density Regolith at the Lunar Poles **[#2426]**
At the lunar poles / Radar CPR is low / Fluffy regolith?

8:45 a.m. Paige D. A. * Siegler M. A.
New Constraints on Lunar Heat Flow Rates from LRO Diviner Lunar Radiometer Experiment Polar Observations **[#2753]**
The heat flow rate near the lunar south pole is much lower than was measured at the Apollo 15 and Apollo 17 landing sites.

9:00 a.m. Hobosyan M. A. * Martirosyan K. S.
Tuning of Lunar Regolith Thermal Insulation Properties Utilizing Reactive Consolidation by Activated Thermites **[#1035]**
We present regolith consolidation using activated thermite method, to produce porous product with low thermal insulation coefficient in 1.9K–400K range.

9:15 a.m. Nayak M. * Garrick-Bethell I. Hemingway D.
Diverse Lunar Paleopoles Inferred from South Pole-Aitken Basin Magnetic Anomalies **[#2506]**
A large diversity in implied paleopole directions of magnetic anomalies in the lunar South Pole-Aitken basin provides constraints on their formation mechanisms.

9:30 a.m. Hood L. L. * Tsunakawa H. Spudis P. D.
Magnetic Anomalies Within the Schrodinger Impact Basin: Orbital Evidence for the Persistence of the Former Core Dynamo into the Imbrian Epoch **[#1303]**
Mapping of Kaguya magnetometer data shows the presence of magnetic anomalies within Schrodinger, implying persistence of the core dynamo into the Imbrian epoch.

9:45 a.m. Oran R. * Shprits Y. Weiss B. P.
Can Impact-Amplified Magnetic Fields be Responsible for Magnetization on the Moon? **[#3057]**
A magnetohydrodynamic investigation of the formation of lunar magnetic anomalies.

10:00 a.m. Oliveira J. S. * Wieczorek M. A.
Testing the Axial Dipole Hypothesis for the Moon by Modeling the Direction of Crustal Magnetization **[#2288]**
The hypothesis that the Moon possessed an axial dipolar magnetic field is tested by modeling the direction of magnetization associated with magnetic anomalies.

10:15 a.m. Wieczorek M. A. *
Depth and Origin of Lunar Magnetic Anomalies from a Localized Magnetic Power Spectrum Analysis **[#2009]**
Magnetic sources are in general located 10-20 km below the surface. An exception includes the South Pole-Aitken basin where sources are close to the surface.

10:30 a.m. Deca J. * Divin A. Wang X. Lembège B. Markidis S. et al.
Solar Wind Interaction with Lunar Magnetic Anomalies: Vertical vs. Horizontal Dipole **[#1065]**
Solar wind interaction with lunar magnetic anomalies: We find the amount of reflected ions to be a tracer for the underlying field structure.

FRI ORALS

10:45 a.m. Tai Udovicic C. J. * Kramer G. Y. Harnett E. M.
Applications of Solar Wind Particle Impact Simulations at Lunar Magnetic Anomalies to the Study of Lunar Swirls **[#2648]**
Protons clash with field / Lunar swirls track fallen wind / Student traces swirls.

11:00 a.m. Blewett D. T. * Denevi B. W. Klima R. L. Cahill J. T. S.
Near-Ultraviolet and Near-Infrared Characterization of Space Weathering at Lunar Magnetic Anomalies **[#2066]**
Maturity trends defined by NIR continuum slope and near-UV slope differ between lunar swirls/magnetic anomalies and non-magnetic areas.

11:15 a.m. Cahill J. T. S. * Hendrix A. R. Retherford K. D. Denevi B. W. Stickle A. M. et al.
Far-Ultraviolet Mapping of Lunar Swirls and Other Enigmatic Low-Albedo Features **[#2991]**
Here we examine and map enigmatic low-albedo features with LRO LAMP non-polar nighttime far-UV and LROC WAC near-UV data.

11:30 a.m. Kinczyk M. J. * Denevi B. W. Boyd A. K. Clegg-Watkins R. N. Hapke B. W. et al.
Controls on the Photometric Properties of Lunar Swirls in Comparison to Fresh Crater Ejecta **[#2343]**
High-resolution LROC NAC observations of the Firsov swirls and fresh impact craters are compared in order to examine implications for their regolith properties.

Friday, March 25, 2016 [F702]
EXOBIOLOGY: ORGANIC DELIVERY, HABITABLE ENVIRONMENTS, ANALOGS, AND TOOLS
8:30 a.m. Waterway Ballroom 4

Chairs: **Aaron Burton**
Haley Sapers

8:30 a.m. Ertem G. * Cooper G.
Effect of Shock Impacts on the Survivability of RNA and Protein Monomers **[#2653]**
Effect of shock pressures up to 40 GPa mimicking the asteroid impacts on the survivability of biomolecules mixed with martian analog minerals.

8:45 a.m. Chan Q. H. S. * Zolensky M. E. Burton A. S. Locke D. R.
Amino Acids in the Asteroidal Water-Bearing Salt Crystals Hosted in the Zag Meteorite **[#1402]**
The amino acid abundances and distributions of the Zag meteorite and its aqueous fluid inclusion-bearing halite crystals measured by UPLC-FD/ToF-MS.

9:00 a.m. Simkus D. N. S. * Hilts R. W. Herd C. D. K. Aponte J. C. Elsila J. E.
First Report of Aldehydes and Ketones in the Tagish Lake Meteorite: Optimized Methodology and Preliminary Results **[#2370]**
Using an optimized PFBHA derivatization method, carbonyl precursors to previously detected amino acids were identified in the Tagish Lake meteorite.

9:15 a.m. Cooper G. * Rios A. C.
Chiral Analysis of Rare and Common Sugar Derivatives in Carbonaceous Meteorites **[#2612]**
Chiral analyses of carbonaceous chondrites reveal that certain sugar acids, rare and common, contain D-enantiomer excesses that increase with carbon number.

9:30 a.m. Aponte J. C. * Dworkin J. P. Elsila J. E.
Molecular Distribution of Aliphatic Amines in Antarctic CR2 and CM2 Carbonaceous Chondrites **[#1039]**
In this abstract we describe our findings on the molecular abundances of aliphatic amines in Antarctic CR2 and CM2 carbonaceous chondrites.

9:45 a.m. Kaplan H. H. * Milliken R. E. Luo G. M.
Quantifying Organic Content with Reflectance Spectroscopy: Applications to Carbonaceous Chondrites and Planetary Surfaces **[#1482]**
Sedimentary rocks and kerogen are measured with reflectance spectroscopy and spectral modeling is used to predict organic abundances.

10:00 a.m. Potter-McIntyre S. L. * Williams J. Lander C. M. O'Connell L.
Diagenetic Alteration of Biosignatures Preserved in Spring Carbonates: Implications for Mars **[#1356]**
Diagenetic alteration of biosignatures are characterized at a unique field site with modern microbial mats and a succession of older carbonate deposits.

10:15 a.m. Harrold Z. R. * Hausrath E. M. Bartlett C. L. Garcia A. H. Tschauner O. et al.
Bioavailability of Mineral-Bound Iron to a Snow Algae Community and Implications for Life in Extreme Environments **[#2720]**
We investigate the bioavailability of mineral-bound iron to a snow algae-bacteria community and its implications for life on icy worlds.

10:30 a.m. Sapers H. M. * Ota T. Nakamura E. Osinski G. R. Banerjee N. R. et al.
Major, Minor, and Trace Elemental Variability of Ries Impact Glass: Implications for Habitability **[#2347]**
Sub-micron major, minor, and trace elemental variability in glass clasts from Ries highlight differences between tubule- crystallite-rich regions.

10:45 a.m. Pavlov A. A. * Glavin D. Dworkin J. McLain H. Eigenbrode J.
Rapid Degradation of the Amino Acids in Martian Subsurface Rocks and Regolith Due to Exposure to Cosmic Rays **[#2577]**
Destruction rates of the organic biomolecules in surface martian rocks due to exposure to cosmic rays are much faster than were thought previously.

11:00 a.m. Teodoro L. F. A. * Davila A. F. McKay C. P. Dartnell L. R. Elphic R. C.
Ionizing Radiation on the Surface of Europa: Implications for the Search for Evidence of Life **[#2601]**
We recreated the most favorable radiation environment on Europa, and evaluated its possible effects on organic biomarkers within the shallow ice-shell.

11:15 a.m. Lyons J. R. *
Isotope Fractionation Due to Self-Shielding for Idealized Molecular Spectra **[#2792]**
I present results of analytical models for isotope fractionation by self-shielding for idealized spectra. Results are applied to S-MIF on early Earth.

11:30 a.m. Johnson T. V. * Mousis O. Lunine J. I. Madhusudhan N.
Exoplanet Habitability: Small Variations in Stellar C/O Can Have Big Effects **[#2266]**
Exoplanet systems with only mildly super-solar C/O will be poor in water ice even beyond the snow line, affecting habitability anywhere in the system.

Friday, March 25, 2016 **[F703]**
ASTEROIDS, NEOs, METEORS, AND OTHER SPACE ODDITIES
8:30 a.m. Waterway Ballroom 5

Chairs: **Andrew Rivkin**
Sherry Fieber-Beyer

8:30 a.m. Graves K. J. * Minton D. A. Hirabayashi M.
The Formation of Q-Type Asteroids from YORP Spin-Up and Fission **[#2187]**
To make all Q-types / Tides are not nearly enough / YORP, to save the day!

8:45 a.m. Tardivel S. * Sánchez P. Scheeres D. J.
The Story of 2008 EV5 — Evidence of Fission **[#1036]**
A small world severed / EV5's concavity / Telltale of its past.

9:00 a.m. Michel P. * Jutzi M. Goodrich C. A. O'Brien D. P. Richardson D. C. et al.
Selective Sampling During Catastrophic Disruption: The Effect of the Parent Body's Size and the Impact Energy Regime **[#1413]**
Numerical models of disruptions in low impact energy regimes show that larger remnants sample a depth of the parent body close to the one expected for ureilite.

9:15 a.m. Okada T. *
Thermal Inertia of Surface Materials of Solar System Small Bodies and Its Dependence on Porosity **[#1457]**
Dependency of porosity on thermal inertia under micro-gravity and vacuum conditions like an asteroid surface is investigated using the past experimental data.

9:30 a.m. Arnold J. A. * Schräpler R. Donaldson Hanna K. L. Lindsay S. S. Bowles N. E. et al.
The Effect of Porosity on Infrared Spectra **[#2847]**
We present measured and modeled spectra of high-porosity silica samples, an analog to "fairy-castle" structures.

9:45 a.m. Legett C. IV * Glotch T. D. Lucey P. G.
Characterizing the Optical Effects of the Finest Fractions of the Solar System: Nanophase Absorbers in Transparent and Scattering Matrices **[#2967]**
Very tiny stuff / Makes spectroscopy quite hard / Hides spectral features.

10:00 a.m. McMahon J. W. * Farnocchia D. Scheeres D. J. Chesley S. R.
Understanding Kaula's Rule for Small Bodies **[#2129]**
Kaula's rule is used to bound uncertainty on a gravity field prior to being estimated. Here we show how this should be modified for application to small bodies.

10:15 a.m. Taylor P. A. * Richardson J. E. Rivera-Valentin E. G. Rodriguez-Ford L. A. Zambrano-Marin L. F. et al.
Radar Observations of Near-Earth Asteroids from Arecibo and Goldstone **[#2772]**
We will present a subset of radar results from the 108 near-Earth asteroids detected with Arecibo and Goldstone in 2015 from spheroids to peanuts and binaries.

10:30 a.m. Charnoz S. Rosenblatt P. Dunseath K. M. Terao-Dunseath M. Trinh A. et al.
Formation of Phobos and Deimos in a Giant Collision Scenario Facilitated by a Large Transient Moon **[#1943]**
We study the origin of Phobos and Deimos in a giant impact. We form Phobos and Deimos successfully with the right masses and orbit for the first time.

10:45 a.m. Galache J. L. Beeson C. L. McLeod K. K. Elvis M. *
The Need for Speed in Near-Earth Asteroid Characterization **[#2745]**
To obtain good orbits and compositions of the bulk of near-Earth asteroids requires a dedicated 4-meter class telescope to take data within 10 days of discovery.

11:00 a.m. Rivkin A. S. * Emery J. P. Howell E. S.
The L-Band Main-Belt and NEO Observing Program (LMNOP): Some Final Results from Phase 1 **[#1975]**
Though black to the eye / In infrared, asteroids' / Varied natures shine.

11:15 a.m. Plesko C. S. * Ferguson J. M. Gisler G. R. Weaver R. P.
Impact Hazard Mitigation Research at Los Alamos National Laboratory: Current Status **[#2764]**
LANL is modeling PHO mitigation by kinetic impactor, nuclear stand-off burst, and nuclear impactor, as part of an NNSA/NASA collaboration on impact prevention.

11:30 a.m. Sansom E. K. * Bland P. A. Rutten M. G.
Exploring Advanced Estimators from Guidance, Navigation and Control in Fireball Modelling **[#1892]**
Advanced estimators used in the field of guidance, navigation and control are able to fully characterise a meteoroid during its trajectory through the atmosphere.

Friday, March 25, 2016 [F704]
NEW INSIGHTS INTO HIGH TEMPERATURE: MARTIAN PETROLOGY AND GEOCHEMISTRY
8:30 a.m. Waterway Ballroom 6

Chairs: **Yang Liu**
Christopher Herd

8:30 a.m. Lindsay F. N. * Delaney J. S. Turrin B. D. Herzog G. F. Park J. et al.
Ar Ages of Martian Meteorite Northwest Africa 7034 **[#3013]**
We present Ar-Ar ages of martian sedimentary rock NWA 7034. We examine the age relationship between bulk samples and separate minerals with lithilogic context.

8:45 a.m. Liu Y. * Ma C. Beckett J. Flannery D. Allwood A.
Metamorphism on Mars: A View from Eskolaite-Bearing Chromite-Magnetites in Northwest Africa (NWA) 7533 **[#1127]**
First report of eskolaite in 'Black Beauty' meteorite, implication for metamorphism on Mars.

9:00 a.m. Humayun M. * Hidaka H. Yoneda S. Göpel C. Zanda B. et al.
Samarium Isotopic Constraints for an Early Compaction Age of Northwest Africa 7533 **[#1725]**
Neutron capture on Sm isotopes provides an estimate of the duration that the components in NWA 7533 martian breccia spent in the regolith implying a 4.3 Ga age.

9:15 a.m. Bell A. S. * Shearer C. K.
Is Crustal Sulfate Assimilation a Potential Key to Understanding Redox Diversity Among the Shergottites? **[#1507]**
This abstract explores crustal assimilation as a potential mechanism for increasing the fO_2 of the shergottites.

9:30 a.m. Mikouchi T. * Takenouchi A.
Mineralogical Investigation of Yamato 002712 Basaltic Shergottite: Implications for the Redox Change During Crystallization **[#2456]**
We found Y002712 basaltic shergottite is an augite-rich rock, showing fO_2 decrease with decreasing T, and is similar to NWA 2975 in mineralogy and petrology.

9:45 a.m. Jean M. M. * Howarth G. H. Bodnar B. Klyukin Y. Taylor L. A.
Petrogenesis of the New Basaltic Shergottite Northwest Africa 10299: fO_2 Consistent with an Intermediate to Depleted Geochemical Source **[#2698]**
Martian basalt NWA 10299 is one of the latest finds and new EMP and LA-ICPMS results reveals evidence for a complex crystallization history.

10:00 a.m. Herd C. D. K. * Walton E. L. Ziegler K. Vaci Z. Agee C. B. et al.
The Northwest Africa 10416 Olivine-Phyric Martian Basalt: Product of Magma Mixing, Assimilation, and Alteration **[#2527]**
The petrogenesis of the NWA 10416 martian meteorite may have included assimilation of heavily altered basaltic material, and martian hydrothermal alteration.

10:15 a.m. Udry A. * Howarth G. H.
Petrogenesis of the Enriched Shergottite Northwest Africa 7320: A New Martian Gabbroic Sample **[#1730]**
The petrogenesis of NWA 7320, one of the first gabbroic martian rocks, shows that this intrusive shergottite underwent slow cooling and plagioclase accumulation.

10:30 a.m. Hewins R. H. * Zanda B. Pont S.
Northwest Africa 10414, a Pigeonite Cumulate Shergottite **[#1898]**
NWA 10414 pigeonite composition can be reproduced from a 1 bar Shergotty liquid. It is like the ~1 cm wide pigeonite-phyric contact facies of EETA 79001 B.

10:45 a.m. Righter M. * Lapen T. J. Andreasen R. Irving A. J.
Lu-Hf and Sm-Nd Isotopic Studies of Nakhlite Northwest Africa 10153 **[#2780]**
We report Sm-Nd and Lu-Hf ages for new nakhlite NWA 10153 and discuss similarities and potential source affinities among nakhlites.

11:00 a.m. Bridges J. C. * Edwards P. H. Anderson R. Dyar M. D. Fisk M. et al.
Igneous Differentiation on Mars: Trachybasalts in Gale Crater **[#2160]**
Gale igneous rocks are differentiated from basalt to trachybasalt (ChemCam 53 wt% SiO_2) - the result of crystal fractionation from Spirit-like basalt.

11:15 a.m. Morris R. V. Vaniman D. T. * Blake D. F. Gellert R. Chipera S. J. et al.
High-Temperature, Perhaps Silicic, Volcanism on Mars Evidenced by Tridymite Detection in High-SiO_2 Sedimentary Rock at Gale Crater, Mars **[#2581]**
The high-temperature SiO_2 polymorph tridymite was detected by XRD in the Buckskin outctop at Gale Crater, providing evidence for silicic volcanism on the planet.

11:30 a.m. Bouchard M. C. * Jolliff B. L.
Comparing MER Opportunity Rock Groups and Martian Meteorites Using Hierarchical Clustering and a Similarity Index **[#2551]**
A method of rapid, quantitative assessment for relating rocks investigated in situ on Mars (Endeavour crater) to each other and to a set of martian meteorites.

Friday, March 25, 2016 **[F705]**
ZIGGY FAULTSCARPS:
TECTONICS OF THE OUTER SATELLITES
8:30 a.m. Montgomery Ballroom

Chairs: **Emily Martin**
Michael Bland

8:30 a.m. Mohr K. J. * Rhoden A. R. Hurford T. A. Dubois D.
Implications of Europa's Global Cycloid Population **[#2782]**
Cycloid cusps don't match / Our lineament models / Stressful Europa.

8:45 a.m. Pappalardo R. T. * Patthoff D. A. Li J. B. Ayton B. J. Dubois D.
Cycloidal and Wavy Lineaments on Europa from Diurnal, Obliquity, and Nonsynchronous Rotation Stresses in a Visco-Elastic Ice Shell **[#2712]**
Europa lineae / Cycloids, wavy, arcuate / Additive stresses.

9:00 a.m. Walker C. C. * Schmidt B. E.
From Order to Disorder: Characterizing the Transition from Cracked to Collapse on Europa **[#2839]**
Using fractal and fragmentation theories, which we have been using to characterize terrestrial ice shelf collapse, we investigate collapse morphology on Europa.

9:15 a.m. Noviello J. L. * Rhoden A. R.
Order from Chaos: A Quantitative Approach to Identifying Small Chaos Features on Europa **[#2579]**
Chaos appears red / Enough to discriminate? / We can argue yes.

9:30 a.m. Leonard E. J. * Yin A. Pappalardo R. T. Patthoff D. A. Lin J.
Analyzing Surface Structures on Icy Satellites: A Physical Analogue Modeling Approach **[#2278]**
Analogue model / Ductile ice implications / For surface structures?

9:45 a.m. Spencer J. R. * Howett C. J. A. Verbiscer A. J. Hurford T. A. Gorius N. J. P.
High Resolution Observations of Active and Passive Thermal Emission from Enceladus' South Pole in 2015: The Closest and the Coldest **[#2860]**
Cassini thermal observations of Enceladus in 2015 provided the highest resolution ever mapping of tiger stripe thermal emission and unique heat flow constraints.

10:00 a.m. Kamata S. * Nimmo F.
Interior Thermal State of Enceladus Inferred from the Viscoelastic State of Its Icy Shell **[#1097]**
The presence of Enceladus' regionally thick subsurface ocean suggests a heat flux ~10 times higher than that from radiogenic heating in the silicate core.

10:15 a.m. Craft K. L. * Patthoff D. A. Rhoden A. R. Martin E. S.
Subsurface Fractures, Tidal Stress, and Opening of Conduits at the Damascus Tiger Stripe on Enceladus **[#2906]**
Fractures within ice / Releasing plumes into space / Stresses open, close.

10:30 a.m. Roberts J. H. *
Evolution of the Ice Shell on Enceladus **[#1503]**
The ice shell thickens / Heat loss outstrips production / Grids must be redrawn.

10:45 a.m. Patthoff D. A. * Pappalardo R. T. Maue A. Martin E. S. Chilton H. T. et al.
Exploring Enceladus' Geologic History Through Time **[#1772]**
The ice shell thickens / Single burst is nearly done / Did life find a way?

11:00 a.m. Beyer R. A. * Nimmo F. McKinnon W. Moore J. Schenk P. et al.
Tectonics of Charon **[#2714]**
A description of the tectonic features revealed on Pluto's moon Charon from the New Horizons flyby.

11:15 a.m. Bland M. T. * McKinnon W. B. Singer K. N.
Tectonic Resurfacing of Ganymede Enabled by Concomitant Viscous Relaxation **[#1287]**
Jupiter's great moon / Resurfaced by tectonics? / Relaxing is key.

11:30 a.m. Hemingway D. J. * Zannoni M. Tortora P. Nimmo F. Asmar S. W.
Dione's Internal Structure Inferred from Cassini Gravity and Topography **[#1314]**
Cassini gravity analysis confirms that Dione is differentiated. Consistent with the presence of an internal ocean, the topography appears to be compensated.

POSTER SESSION I
Tuesday, 6:00–9:00 p.m. Town Center Exhibit Area

PLUTO: NEW HORIZONS RESULTS FROM ATMOSPHERES TO ICES [T301]

Berry K. L. Sides S. C. Edmundson K. L. Sucharski T. L. Titus T. N. ***POSTER LOCATION #1***
Support for New Horizons Instruments Within ISIS3 **[#2526]**
A description of new extensions to USGS Astrogeology's Imaging Software for Imagers and Spectrometers (ISIS) developed to support the New Horizons mission.

Lisse C. M. McNutt R. L. Bagenal F. Stern S. A. Cravens T. E. et al. ***POSTER LOCATION #2***
The Puzzling Detection of Pluto in the X-Ray by Chandra **[#2449]**
We used Chandra to detect Pluto from 0.3–0.6 keV at SNR > 5.5. The 3.7e–5 cps X-ray count rate is very high vs. CXE and solar X-ray scattering production models.

Hoey W. A. Yeoh S. K. Trafton L. M. Goldstein D. B. Varghese P. L. ***POSTER LOCATION #3***
Rarefied Gas Dynamic Simulation of Transfer and Escape in the Pluto-Charon System with the DSMC Method **[#3031]**
High-resolution 3-D simulations of the atmospheric region above Pluto's exobase performed with Direct Simulation Monte Carlo techniques.

Porter S. B. Showalter M. R. Weaver H. A. Spencer J. R. Binzel R. P. et al. ***POSTER LOCATION #4***
Shapes and Poles of the Small Satellites of Pluto **[#2402]**
Styx, Nix, Kerberos, and Hydra / Lumpy and sideways / Spin rapidly.

Robbins S. J. Singer K. N. Bray V. J. Schenk P. McKinnon W. B. et al. ***POSTER LOCATION #5***
A Consensus Crater Catalog of Pluto, Charon, and Nix **[#1756]**
Pluto, Charon, Nix: / Lots of craters. Let me count / Them all! One ... two ... three ...

Zangari A. M. Singer K. N. Beyer R. A. Schenk P. M. Moore J. M. et al. ***POSTER LOCATION #6***
Have Stellar Occultations Probed Charon's Chasmata? **[#1535]**
Did New Horizons / see what occultations caught / from the ground on Earth?

White O. L. Stern S. A. Weaver H. A. Olkin C. B. Ennico K. et al. ***POSTER LOCATION #7***
Geomorphological Mapping of the Encounter Hemisphere on Pluto **[#2479]**
Geomorphological mapping of Pluto, which commenced in the Sputnik Planum region, is extended to the eastern and western extremities of the encounter hemisphere.

Singer K. N. White O. L. Schenk P. M.
Moore J. M. McKinnon W. B. et al. ***POSTER LOCATION #8***
Pluto's Putative Cryovolcanic Constructs **[#2276]**
New Horizons imaged two large mounds with deep central depressions that may represent a unique form of cryovolcanism.

Mount C. P. Desch S. J. ***POSTER LOCATION #9***
Thermal Modeling of Cyrovolcanic Vents on Charon: Ascent vs. Freezing Timescales **[#2682]**
We created a numerical thermal model to test the upper limit radius for a cryovolcanic conduit to completely freeze on a Charon-like body.

Ahrens C. J. McMahon Z. M. Chevrier V. F. Elwood Madden M. E. ***POSTER LOCATION #10***
Icy Composition Measurements in Simulated Pluto Conditions **[#1469]**
The objective of our Pluto simulation cryo-chamber will provide spectral signatures of mixed gases-ices and hydrates.

TUES POSTERS

Buie M. W. Stern S. A. Young L. A. Olkin C. B. Weaver H. A. et al. ***POSTER LOCATION #11***
Photometric Properties of Pluto **[#2927]**
We provide an investigation of the surface albedo units on Pluto after geometric variations are removed. Global Hapke parameters are provided as well.

Grundy W. M. Binzel R. P. Cook J. C.
Cruikshank D. P. Dalle Ore C. M. et al. ***POSTER LOCATION #12***
Highest Spatial Resolution New Horizons LEISA Spectral-Imaging Scan of Pluto **[#2284]**
We present results from the highest spatial resolution infrared spectral mapping of Pluto by New Horizons.

Cruikshank D. P. Clemett S. J. Grundy W. M.
Stern S. A. Olkin C. B. et al. ***POSTER LOCATION #13***
Pluto and Charon: The Non-Ice Surface Component **[#1700]**
The non-ice component of Pluto's surface appears to be a colored tholin, which can be synthesized in the lab by radiolysis of a mix of CH_4, N_2, and CO ices.

Ennico K. Parker A. Howett C. A. J. Olkin C. B. Spencer J. R. et al. ***POSTER LOCATION #14***
Hemispherical Pluto and Charon Color Composition from New Horizons **[#1775]**
New Horizons shows Pluto's encounter hemisphere coloring trends continue on far side. Charon (excluding red pole) remains spectrally neutral at lower latitudes.

Bierson C. J. Nimmo F. McKinnon W. B. ***POSTER LOCATION #15***
Testing for a Compositional Difference Between Pluto and Charon **[#2176]**
We test if the observed density contrast between Pluto and Charon can be explained by differences in the porosity structure alone.

Hanley J. Stufflebeam T. Grundy W. Tegler S. Dillingham R. et al. ***POSTER LOCATION #16***
A Band for Detecting Carbon Monoxide Mixed with N_2 **[#2438]**
Carbon Monoxide / Can we detect on Triton / Mixed with Nitrogen?

CERES UNVEILED: COMPLETELY NAKED [T302]

Williams D. A. Buczkowski D. L. Mest S. C.
Scully J. E. C. Jaumann R. et al. ***POSTER LOCATION #17***
Geologic Mapping Campaign for Ceres from NASA Dawn Mission **[#1515]**
In this presentation we discuss the geologic mapping campaign for Ceres being done as part of NASA's Dawn mission.

Ruesch O. McFadden L. A. Hiesinger H. Scully T. Kneissl T. et al. ***POSTER LOCATION #18***
Geologic Mapping of the Ac-H-1 Quadrangle of Ceres from NASA's Dawn Mission **[#2050]**
We present the geologic map of the north pole area of Ceres.

Pasckert J. H. Hiesinger H. Williams D. A.
Crown D. A. Mest S. C. et al. ***POSTER LOCATION #19***
Geologic Mapping of the Ac-H-2 Coniraya Quadrangle of Ceres from NASA's Dawn Mission **[#1450]**
We report on our geologic mapping results for the Coniraya Quadrangle at Ceres based on Dawn's Framing Camera mosaics from the High Altitude Mapping Orbit.

Kneissl T. Schmedemann N. Neesemann A.
Williams D. A. Crown D. A. et al. ***POSTER LOCATION #20***
Geologic Mapping of the Ac-H-3 Dantu Quadrangle of Ceres from NASA's Dawn Mission **[#1967]**
We discuss the results of the Dawn mission-based geologic mapping of the quadrangle Ac-H-3 Dantu on (1) Ceres.

Scully J. E. C. Raymond C. A. Williams D. A.
Buczkowski D. L. Mest S. C. et al. ***POSTER LOCATION #21***
Geologic Mapping of the Ac-H-4 Ezinu Quadrangle of Ceres from NASA's Dawn Mission **[#1627]**
We map a region of Ceres from 21–66 °N, 180–270 °E. Key geologic features are linear features; Occator, Ezinu, Datan, and Geshtin craters; and Erntedank Planum.

Hughson K. H. G. Russell C. T. Williams D. A.
Buczkowski D. L. Mest S. C. et al. ***POSTER LOCATION #22***
Geologic Mapping of the Ac-H-5 Fejokoo Quadrangle of Ceres from NASA's Dawn Mission **[#1556]**
We present the Low Altitude Mapping Orbit-based geologic map of Ceres' Ac-H-5 Fejokoo quadrangle (21–66 °N and 270–360 °E) and discuss its geologic evolution.

Krohn K. Jaumann R. Tosi F. Nass A. Otto K. A. et al. ***POSTER LOCATION #23***
Geologic Mapping of the Ac-H-6 Quadrangle of Ceres from NASA's Dawn Mission: Changes in Composition **[#1977]**
In this abstract we discuss the geologic evolution of the Ac-H-6 Haulani Quadrangle.

Williams D. A. Mest S. C. Kneissl T. Pasckert J. H. Hiesinger H. et al. ***POSTER LOCATION #24***
Geologic Mapping of the Ac-H-7 Kerwan Quadrangle of Ceres from NASA Dawn Mission **[#1522]**
In this presentation we present a geologic map of the Ac-H-7 Kerwan quadrangle of dwarf planet Ceres and discuss the geologic evolution of this region.

Frigeri A. De Sanctis M. C. Ammannito E.
Carrozzo G. Williams D. et al. ***POSTER LOCATION #25***
Geologic Mapping of the AC-H-08 Nawish Quadrangle of Ceres from NASA's Dawn Mission **[#2271]**
Herein we present geologic mapping of the Ac-H-08 Nawish quadrangle of Ceres, based on the first scientific orbit data from NASA's Dawn mission.

Buczkowski D. L. Williams D. A. Scully J. E. C.
Mest S. C. Crown D. A. et al. ***POSTER LOCATION #26***
Geologic Mapping of the Ac-H-9 Occator Quadrangle of Ceres from NASA's Dawn Mission **[#1255]**
We present the geology of the Ac-H-9 Occator quadrangle of Ceres, located between 22°S–22°N and 216–288°E.

Platz T. Nathues A. Sizemore H. G. Ruesch O. Hoffmann M. et al. ***POSTER LOCATION #27***
Geological Mapping of the Ac-H-10 Rongo and Ac-H-15 Zadeni quadrangles of Ceres from NASA's Dawn Mission **[#2595]**
We present geological maps of Ceres' quadrangles Rongo and Zadeni and highlight the geological evolution of Ceres inferred from these regions.

Schulzeck F. Krohn K. Jaumann R.
Williams D. A. Buczkowski D. L. et al. ***POSTER LOCATION #28***
Geologic Mapping of the Ac-H-11 Sintana Quadrangle of Ceres from NASA's Dawn Mission **[#1955]**
We will present an updated geologic map and interpretation of the Ac-H-11 Sintana quadrangle of Ceres with new data from the Dawn spacecraft.

Mest S. C. Williams D. A. Crown D. A.
Yingst R. A. Buczkowski D. L. et al. ***POSTER LOCATION #29***
Geologic Mapping of the Ac-H-12 Toharu Quadrangle of Ceres from NASA's Dawn Mission **[#1561]**
Geologic mapping of the Toharu Quadrangle of Ceres using Dawn FC image data reveals the surface is dominated by smooth and rugged terrains, and impact craters.

Sizemore H. G. Williams D. A. Platz T. Mest S. C. Yingst R. A. et al. ***POSTER LOCATION #30***
Geologic Mapping of the Ac-H-13 Urvara Quadrangle of Ceres from NASA's Dawn Mission **[#1599]**
The Dawn Science Team is conducting a geologic mapping campaign for Ceres. In this abstract we discuss the geologic evolution of the Ac-H13 Urvara Quadrangle.

Crown D. A. Yingst R. A. Mest S. C. Platz T. Sizemore H. G. et al. ***POSTER LOCATION #31***
Geologic Mapping of the Ac-H-14 Yalode Quadrangle of Ceres from NASA's Dawn Mission **[#1602]**
The surface geology and geologic evolution of the Yalode Quadrangle of Ceres are discussed based on geologic mapping using Dawn Mission data.

Roatsch Th. Kersten E. Matz K.-D. Preusker F. Scholten F. et al. ***POSTER LOCATION #32***
High Resolution Ceres HAMO Atlas Derived from Dawn FC Images **[#1436]**
The Ceres HAMO atlas was produced in a scale of 1:750,000 and consists of 15 tiles. The proposed nomenclature was approved by IAU and applied to the atlas.

Yingst R. A. Crown D. A. Sizemore H. G.
Mest S. C. Berman D. C. et al. ***POSTER LOCATION #33***
Urvara and Yalode Basins: Stratigraphic Markers in the Geologic Record of Ceres **[#1787]**
Basins on Ceres / Markers of stratigraphy / Or merely old holes?

Wagner R. J. Schmedemann N. Stephan K. Jaumann R. Kneissl T. et al. ***POSTER LOCATION #34***
Stratigraphy of (1) Ceres from Geologic and Topographic Mapping and Crater Counts Using Images of the Dawn FC2 Camera **[#2156]**
In this paper we use image and topographic data of the Dawn FC2 camera from dwarf planet (1) Ceres to map geologic units and to carry out crater counts.

Neesemann A. Kneissl T. Schmedemann N.
Walter S. H. G. Michael G. G. et al. ***POSTER LOCATION #35***
Size-Frequency Distributions of km to Sub-km Sized Impact Craters on Ceres **[#2936]**
We investigate size-frequency distributions of km to sub-km sized impact craters on Ceres and exemplify prospects for absolute model age estimates.

Preusker F. Scholten F. Matz K.-D. Elgner S. Jaumann R. et al. ***POSTER LOCATION #36***
Dawn at Ceres — Shape Model and Rotational State **[#1954]**
We have used several thousand images acquired with the Dawn FC to reconstruct the surface and to determine the rotational state of dwarf planet Ceres.

Travis B. J. Feldman W. C. ***POSTER LOCATION #37***
Ceres Model Suggests Large Scale Topography May Reflect Early Time Internal Convection **[#2762]**
Numerical modeling of internal dynamics in Ceres suggests that large scale hydrothermal convection occurred and could sustain large scale surface topography.

Neumann W. O. Breuer D. Spohn T. ***POSTER LOCATION #38***
Differentiation of Ceres and Her Present-Day Thermal State **[#2307]**
We calculate differentiation of Ceres, assess how water separation and convection influence the temperature, and draw conclusions about the presence of liquids.

King S. D. Bland M. T. Fu R. Park R. Castillo-Rogez J. et al. ***POSTER LOCATION #39***
3D Spherical Convection Modeling of the Interior of Ceres **[#1699]**
Inner turmoil grows / beautiful symmetry gone / heat escapes to space.

Jordan J. S. Hesse M. A. ***POSTER LOCATION #40***
Analogue Benchmark for Simplified Planetary Differentiation Models **[#1167]**
Analogue ice-sand slurry column experiments are conducted to benchmark development of numeric planetary accretion models.

Hendrix A. R. Vilas F. Li J.-Y. ***POSTER LOCATION #41***
Ceres' Ultraviolet Signatures and Compositional Clues **[#2844]**
We present results from recent HST/STIS UV measurements of Ceres.

Zambon F. De Sanctis M. C. Tosi F. Longobardo A. Ciarniello M. et al. ***POSTER LOCATION #42***
Identification and Distribution of the Different Spectral Units on Ceres. Results from Survey and HAMO Phase **[#2049]**
We analyzed data from the VIR spectrometer onboard Dawn to define different spectral units on Ceres. We search for a link between spectral and geological units.

Palomba E. Longobardo A. De Sanctis M. C.
Ammannito E. Carrozzo F. G. et al. ***POSTER LOCATION #43***
Compositional Characteristics of Ceres Bright Spots **[#2198]**
In this work a catalogue of the Bright Spots present on the Ceres surface is built and a thorough spectral and compositional analysis is performed.

Zolensky M. E. Chan Q. H. S. Gounelle M. Fries M. ***POSTER LOCATION #44***
Bright Stuff on Ceres = Sulfates and Carbonates on CI Chondrites **[#2174]**
We contend that observations of chondritic materials in the lab shed light on the nature of the bright spots on Ceres.

De Angelis S. Manzari P. De Sanctis M. C. Ammannito E. Di Iorio T. ***POSTER LOCATION #45***
VIS-IR Spectral Trends in Brucite — Clay Minerals — Carbonate Mixtures **[#1222]**
Brucite-carbonate-clay mixtures have been analyzed using VIS-IR reflectance spectroscopy. Diagnostic band parameters have been analyzed.

Bu C. Rodriguez Lopez G. Dukes C. A. McFadden L. A. Li J.-Y. et al. ***POSTER LOCATION #46***
Optical Effects Due to Hydration and Dehydration of Salts: Laboratory Measurements with Applications to Ceres **[#3061]**
Laboratory experiments to measure effects of hydration/dehydration on optical spectra for several salts to compare with observations of Ceres' bright spots.

Longobardo A. Palomba E. De Sanctis M. C.
Ciarniello M. Tosi F. et al. ***POSTER LOCATION #47***
Average Photometric Properties of Ceres Spectral Parameters **[#2239]**
The average photometric behavior of spectral parameters that describe the Ceres surface is obtained by analyzing VIR data at low spatial resolution.

Hoffmann M. Nathues A. Platz T. Schaefer M. Thangjam G. S. et al. ***POSTER LOCATION #48***
The Sub-Surface Distribution of Volatiles on Ceres **[#1980]**
An inventory and description of volatile-rich exposures at impact craters of Ceres is presented, based on diagnostic visual and NIR color ratios from Dawn FC.

von der Gathen I. Jaumann R. Krohn K. Buczkowski D. L. Elgner S. et al. ***POSTER LOCATION #49***
Deformational Features on Ceres' Surface Compared to Other Planetary Bodies **[#1961]**
Deformational features, especially fractures, have been studied on Ceres' surface and have been compared to those on icy satellites and the Moon.

Sizemore H. G. Platz T. Schorghofer N. Mest S. C. Crown D. A. et al. ***POSTER LOCATION #50***
Preliminary Constraints on the Volumetric Concentration of Shallow Ground Ice on Ceres from Geomorphology **[#1628]**
We describe preliminary global searches for pits, scarps, and deflation features associated with sublimation or more energetic gas-phase volatile loss on Ceres.

Yamashita N. Prettyman T. H. ***POSTER LOCATION #51***
Data Processing Pipeline for Dawn's Gamma Ray and Neutron Detector at Ceres **[#2968]**
We present data processing steps required for accurate determination of elemental concentrations using Dawn's Gamma Ray and Neutron Detector at Ceres.

Perry M. E. Neumann G. A. Johnson C. L.
Phillips R. J. Ernst C. M. et al. ***POSTER LOCATION #53***
Radio-Frequency Occultations and the Low-Degree Shape of Mercury **[#2549]**
We extract measurements of Mercury's radius from RF occultations of MESSENGER and then combine them with altimeter data to determine Mercury's low-degree shape.

Neumann G. A. Perry M. E. Mazarico E. Ernst C. M. Zuber M. T. et al. ***POSTER LOCATION #54***
Mercury Shape Model from Laser Altimetry and Planetary Comparisons **[#2087]**
The shape of Mercury is determined precisely from laser altimetry and radio occultations. A complementary control point network from images is compared.

Mazarico E. Barker M. K. Neumann G. A. Smith D. E. Zuber M. T. ***POSTER LOCATION #55***
Mercury's Rotational State from the Mercury Laser Altimeter **[#2062]**
Altimetric crossovers from data acquired by the Mercury Laser Altimeter onboard MESSENGER are used to estimate the orientation of Mercury.

Mazarico E. Genova A. Goossens S. Lemoine F. G. Smith D. E. et al. ***POSTER LOCATION #56***
The Gravity Field of Mercury After MESSENGER **[#2022]**
MESSENGER radio tracking and altimetry enable the recovery of Mercury's gravity field and orientation. Our solution uses the complete dataset, up to impact.

Abrahams J. N. H. Cao H. Stevenson D. J. ***POSTER LOCATION #57***
Inner Core Translation, True Polar Wander, and Mercury's North-South Asymmetric Magnetic Field **[#2502]**
We explore the implication of inner core translation and inertial interchange true polar wander on Mercury's asymmetric magnetic field.

Mariani M. J. Genova A. Iess L. ***POSTER LOCATION #58***
BepiColombo Radio Science to Determine Mercury's Gravity and Orientation **[#2703]**
This paper reports the ability of BepiColombo through the Mercury Orbiter Radio science Experiment to provide a global determination of Mercury's gravity field.

Habermann M. Boujibar A. Righter K. Danielson L. Rapp J. et al. ***POSTER LOCATION #59***
Partitioning of U, Th, and K between Metal, Sulfide, and Silicate: Insights into the Volatile Content of Mercury **[#2604]**
Upon the surface / Mercury's bulk volatiles / Are not as they seem.

Kaufman S. V. Corrigan C. M. McCoy T. J. Bullock E. S. ***POSTER LOCATION #60***
Mineral Associations in Enstatite Chondrites: Possible Insights into Minerals on Mercury **[#2743]**
Associations between roedderite and djerfisherite in enstatite chondrites give us insight into conditions on Mercury.

Vander Kaaden K. E. McCubbin F. M. Nittler L. R.
Peplowski P. N. Weider S. Z. et al. ***POSTER LOCATION #61***
Mineralogy of the Mercurian Surface **[#1476]**
MESSENGER data/ Shows minerals are diverse/ And so are the rocks.

Stangarone C. Helbert J. Maturilli A. D'Amore M. Ferrari S. et al. ***POSTER LOCATION #62***
Ab Initio Calculated Reflectance Spectra at Room and High Temperature of Mg-Silicates of Mercury Surface: A Tool to Interpret Thermal IR Emissivity Spectra Acquired in Remote Sensing **[#2414]**
Studying Mercury's surface by means of HT-IR vibrational frequencies: Ab initio calculated and compared with TIR spectra acquired in remote sensing.

Maxwell R. E. Izenberg N. R. Holsclaw G. M. ***POSTER LOCATION #63***
Implications for Iron and Carbon in Mercury Surface Materials from Ultraviolet Reflectance **[#1606]**
We use UVVS spectral reflectance to improve Mercury's surface mineralogy and discuss the implications for variations in iron and carbon abundances.

Phillips M. S. Emery J. P. Moersch J. E. ***POSTER LOCATION #64***
Hollows on Mercury: No Geographic Trends in Reflectance **[#2178]**
Trends in reflectance / Geographically absent / In Hollow features.

Frank E. A. Potter R. W. K. Abramov O. Mojzsis S. J. Nittler L. R. ***POSTER LOCATION #65***
Investigations into the Origin of Mercury's High-Magnesium Region **[#1270]**
Here we explore scenarios for the emplacement of Mercury's high-Mg region and test the likelihood of an impact origin.

Kreslavsky M. A. Head J. W. Neumann G. A. Zuber M. T. Smith D. E. ***POSTER LOCATION #66***
Features of the Northern Smooth Plains of Mercury Revealed by Detrended MLA Topography: Comparison with the Moon **[#1333]**
High-precision topography from MLA shows that volcanic emplacement style of Borealis Planitia on Mercury differs from lunar mare-forming volcanism.

Byrne P. K. Fassett C. I. Klimczak C.
Ostrach L. R. Chapman C. R. et al. ***POSTER LOCATION #67***
The Interplay Between Volcanism and Tectonics on Mercury **[#1227]**
Mercury has linked / Volcanic and tectonic / Histories ohhh yeeeaaahhh...

Fegan E. R. Rothery D. A. Marchi S. Conway S. J. Anand M. et al. ***POSTER LOCATION #68***
Late Movement of Basin-Edge Lobate Scarps on Mercury **[#2359]**
Compression of Mercury's surface resulted in lobate scarps at the edge of basin volcanic fills. Activity on these features appears to have ceased ~1 Ga.

Fegan E R. Rothery D. A. Conway S. J. Anand M. ***POSTER LOCATION #69***
Mercury Catenae: Linear Features and Lighting Bias **[#2945]**
We show lighting bias affects the results of orientation analysis even for large linear features, relevant for catenae and lobate scarps.

Galluzzi V. Ferranti L. Guzzetta L. Giacomini L. Massironi M. et al. ***POSTER LOCATION #70***
Investigating the Architecture and Evolution of the Victoria Rupes — Antoniadi Dorsum Array, Mercury **[#2164]**
This work describes the structural and timing analyses done on the fault systems located inside the H02 quadrangle of Mercury.

Giacomini L. Massironi M. Ferrari S. Zagato N. ***POSTER LOCATION #71***
Dating the Activity of Tectonic Systems on Mercury **[#1872]**
We dated the activity of two thrust systems on Mercury. The results allowed us to better constrain the beginning of the contraction of the planet.

Gemperline J. D. Hynek B. M. Robbins S. J. ***POSTER LOCATION #72***
Initial Results from Buffered Crater Counting for Two Large Rupes on Mercury Indicate Possible Influence from Secondary Craters **[#2457]**
Buffered crater counting for two rupes on Mercury give an age of >4.0 Ga, indicating secondary crater populations may be influencing crater statistics.

Banks M. E. Xiao Z. Braden S. E. Marchi S. Chapman C. R. et al. ***POSTER LOCATION #73***
Revised Age Constraints for Mercury's Kuiperian and Mansurian Systems **[#2943]**
Densities of fresh craters are used to estimate revised age limits for Mercury's Kuiperian and Mansurian systems of ~300 Ma and ~1.9 Ga respectively.

Wright J. Rothery D. A. Balme M. R. Conway S. J. ***POSTER LOCATION #74***
Preliminary Observations of Rustaveli Basin, Mercury **[#2063]**
This impact basin is currently understudied. We introduce our observations of the young age, smooth infill, irregular peak-ring and polygonality of Rustaveli.

Kinczyk M. J. Prockter L. M. Chapman C. R. Susorney H. C. M. ***POSTER LOCATION #75***
A Morphological Evaluation of Crater Degradation on Mercury: Revisiting Crater Classification Using MESSENGER Data **[#1573]**
We describe an updated approach to crater classification on Mercury and discuss the results of classifying craters on a global scale.

Horstman R. M. Barlow N. G. ***POSTER LOCATION #76***
Summit Pit Craters on Mercury and Comparisons to Central Peak Craters **[#1156]**
We have used MESSENGER MDIS images to identify central pit and peak craters on Mercury. Results indicate that summit pits form by collapse of central peaks.

Fastook J. L. Head J. W. ***POSTER LOCATION #77***
Cold-Based Glaciation on Mercury: Accumulation and Flow of Ice in Permanently-Shadowed Circum-Polar Crater Interiors **[#1162]**
An ice sheet model is used to evaluate accumulation and flow of ice in permanently-shadowed circum-polar crater interiors on Mercury.

Deutsch A. N. Head J. W. Fassett C. I. Chabot N. L. ***POSTER LOCATION #78***
Ice Deposits at Mercury's North Polar Region: Host Craters Provide Maximum Age **[#2319]**
We present crater counts and crater size-frequency distributions for ice-hosting craters to estimate the maximum age of polar deposits at Mercury's north pole.

Chabot N. L. Ernst C. M. Nair H. Deutsch A. N. Head J. W. et al. ***POSTER LOCATION #79***
Imaging of Mercury's Polar Deposits During MESSENGER's Low-Altitude Campaign **[#1252]**
Results from this campaign support the theory that all of Mercury's available cold traps are occupied by volatiles and water ice.

Merline W. J. Chapman C. R. Tamblyn P. M. Nair H. Chabot N. L. et al. ***POSTER LOCATION #80***
Search for Vulcanoids and Mercury Satellites from MESSENGER **[#2765]**
During the cruise/orbital phases of the MESSENGER mission, we searched for vulcanoids and Mercury satellites. No detections of either class of object were made.

MESSENGER GLOBAL DATA PRODUCTS [T304]

Nittler L. R. Frank E. A. Weider S. Z.
Crapster-Pregont E. Vorburger A. et al. ***POSTER LOCATION #81***
Global Major-Element Maps of Mercury Updated from Four Years of Messenger X-Ray Observations **[#1237]**
X-rays from Merc'ry / Tell us about elements / Pretty planet maps.

Denevi B. W. Seelos F. P. Ernst C. M. Keller M. R. Chabot N. L. et al. ***POSTER LOCATION #82***
Final Calibration and Multispectral Map Products from the Mercury Dual Imaging System Wide-Angle Camera **[#1264]**
We report on the time-dependent, empirical calibration that will be applied to MESSENGER wide-angle camera image products delivered to the PDS in May 2016.

Izenberg N. R. Lawrence D. J. Peplowski P. N. Malaret E. Mauceri C. ***POSTER LOCATION #83***
MESSENGER Advanced Products I: VIRS Hyperspectral Cube, Energetic Electron Events, Thermal Neutron Map **[#1079]**
Come see Mercury / In new colors, electrons / And thermal neutrons.

Becker K. J. Robinson M. S. Becker T. L.
Weller L. A. Edmundson K. L. et al. ***POSTER LOCATION #84***
First Global Digital Elevation Model of Mercury **[#2959]**
We derived the first global digital elevation model of Mercury sampled at 665 meters/pixel from MESSENGER MDIS NAC and WAC-G orbital images.

MEGABYTE IMPACT STUDIES [T305]

Korycansky D. G. ***POSTER LOCATION #85***
Numerical Simulations of the Chelyabinsk and SL9 Impacts **[#1388]**
Results from hydrodynamic simulations of the Chelyabinsk and SL9 impacts are presented. Sensitivity to initial conditions ("chaos") is evident.

Korycansky D. G. Catling D. C. Zahnle K. J. ***POSTER LOCATION #86***
Atmospheric Erosion by Planetary Impacts **[#1381]**
We present results from simulations of planetary atmospheric erosion by impacts. Our results support the scaling proposed by V. Shuvalov for impact mass loss.

Kuzmicheva M. Yu. Losseva T. V. ***POSTER LOCATION #87***
Additional Heating: Interaction of Impact Ejecta with an Expanding Fireball **[#1329]**
An ejecta heating above Curie point and melting in a fireball is examined. Gneiss Bombs deposited in breccias of Popigai crater resemble the modeling ejecta.

Artemieva N. A. Shuvalov V. V. ***POSTER LOCATION #88***
Mass Deficiency Problem in Large Meteorite Falls **[#1749]**
Using numerical models of meteoroid's entry, we show that large bodies are transformed into tiny fragments, "cosmic dust," which are not easy to recover.

Artemieva N. A. Zanetti M. ***POSTER LOCATION #89***
Modeling Small Impact Craters on Ejecta Blankets: Self-Secondaries Versus Unrecognizable Primaries **[#2143]**
High angle ejecta are able to create small craters on a freshly deposited ejecta blanket while small primary craters may be hidden on its rough surface.

Harris T. H. S. ***POSTER LOCATION #90***
Inferred Ejecta Launch Location from Suborbital Ballistic Emplacement **[#1214]**
Oblique terrestrial impacts into volatiles may leave no obvious shock or cratering signatures. Proxies may present to locate and study such events: example….

Raggio D. Bland M. Abramov O. Kring D. Kumar A. et al. ***POSTER LOCATION #91***
Advancements in Scaling Models for Ejecta Blankets of Lunar Impact Craters **[#1401]**
Using Lunar Reconnaissance Orbiter Laser Altimeter data to assess the accuracy of models developed using Apollo landing data on 100 lunar impact craters.

Jögi P. M. Paige D. A. ***POSTER LOCATION #92***
Retrieving Ballistic Parameters from the Ray Patterns of Impact Ejecta on the Moon; Mainly that of the Tycho Crater **[#2686]**
Lunar ray patterns provide tests of impact and ejecta dynamics models. We extract model restricting ballistic launching parameters from detailed LROC images of such rays.

Silber E. A. Osinski G. R. Grieve R. A. F. ***POSTER LOCATION #93***
Differences in Transitional Crater Morphologies as a Function of Impactor Properties **[#1086]**
We use numerical modeling to investigate the influence of the projectile properties on the observed morphological differences in transitional craters on Moon.

Potter R. W. K. Head J. W. ***POSTER LOCATION #94***
Investigating the Formation and Structure of Procellarum-Sized Lunar Basins **[#1119]**
Numerical modeling is used to study the effects of mega-scale impacts on to the Moon.

Potter R. W. K. Head J. W. ***POSTER LOCATION #95***
Lunar and Mercurian Impact Basin Formation: Similar or Dissimilar? Insights from Numerical Modeling **[#1117]**
Numerical models suggest the dynamic phase of basin formation is similar on the Moon and Mercury. Observed differences are likely due to post-impact processes.

Werner S. C. Zhu M.-H. Wünnemann K. Rolf T. ***POSTER LOCATION #96***
Mass Delivery onto Terrestrial Planets — Insight from Scaling Laws and Basin Record **[#1844]**
We derived numerically basin–projectile size scaling laws to reconcile the crater record with mass delivery onto terrestrial planets and candidate projectile sources.

Minton D. A. Fassett C. I. ***POSTER LOCATION #97***
Crater Equilibrium as an Anomalous Diffusion Process **[#2623]**
Her blanket of stone / The Moon is a soft mistress / More silken with time.

Holsapple K. A. Henych T. ***POSTER LOCATION #98***
On the Evolution of the Main Belt Asteroids **[#2897]**
We perform Monte Carlo analyses of the effects of a large number of impacts into individual asteroids. The outcomes are distributions of spin vs. asteroid size.

Galiazzo M. A. Silber E. A. Bancelin D. Wiegert P. Osinski G. R. ***POSTER LOCATION #99***
V-Type NEAS: Orbital Dynamics and Collissional Interactions with Terrestrial Planets **[#1393]**
Statistics of close encounters and impacts between V-NEAs, basaltic Near-Earth Asteroids, and the terrestrial planets, within 10 Myr.

Lisse C. M. Sitko M. L. Marengo M. ***POSTER LOCATION #100***
KIC 8462852: Further Evidence for Late Heavy Bombardments in the Astronomical Record **[#2965]**
The discovery of the 20% drop in starlight from the main sequence star KIC 8462852 has prompted a host of followup studies converging on giant exocomet infall.

IMPACT STUDIES: TARGETS AND EJECTA [T306]

Bell M. S. ***POSTER LOCATION #102***
Characterization of Shock Effects in Calcite by Raman Spectroscopy: Results of Experiments **[#1196]**
Raman spectral analysis of calcite systematically shocked from 9.0 to 60.8 GPa provides evidence for its stability under these experimental conditions.

Rucks M. J. Glotch T. D. ***POSTER LOCATION #103***
Shock Effects in Northwest Africa 6234: A Spectroscopic Investigation of the Mineralogy of the Shock Generated Melts **[#2608]**
Shock induced melting / Though first look is not shocking / Still may hold much more.

Shimaki Y. Kunihiro T. Suzuki A. I. Hasegawa S. Nakamura E. ***POSTER LOCATION #104***
Shock Metamorphism of Olivine Monolith and Regolith Impacted by Steel **[#3037]**
Impact experiments of steel into olivine monolith and regolith were conducted to examine physical and chemical interaction on asteroids.

Bhattacharya A. Dutta A. ***POSTER LOCATION #105***
Raman Spectroscopic Studies of Shock Induced Diamonds from Ordinary Chondritic Meteorites **[#2150]**
Microdiamonds of different polytypes from ordinary chondrites along with shocked silicates identified by Raman Spectroscopy indicates to its HPHT origin.

Wickham-Eade J. E. Burchell M. J. ***POSTER LOCATION #106***
Fragmentation of Basalt and Shale Projectiles in Hypervelocity Impacts in the Laboratory **[#1235]**
Here we report on the survival of basalt and shale projectiles fired into water at speeds up to 6 km s^{-1}.

Daly R. T. Schultz P. H. ***POSTER LOCATION #107***
Hypervelocity Impact Experiments Implicate Impact Melt as a Host for Impact-Delivered Water on Asteroids **[#1319]**
Experiments at the NASA Ames Vertical Gun Range have documented projectile-derived water in impact glasses. We explore the implications for asteroids.

Christoffersen R. Montes R. Cardenas F. Cintala M. J. ***POSTER LOCATION #108***
Experimental Investigation of the Distribution of Shock Effects in Regolith Impact Ejecta Using an Ejecta Recovery Chamber **[#2452]**
Carbon plates with wax / Catch small impact ejecta / Effects seen by SEM.

Kowitz A. Güldemeister N. Schmitt R. T.
Reimold W. U. Wünnemann K. et al. ***POSTER LOCATION #109***
Revision and Recalibration of Existing Shock Classifications for Quartzose Rocks Using Low Shock Pressure Recovery Experiments (2.5–20 GPa) and Meso-Scale Numerical Modeling **[#1412]**
Shock deformation (≤20 GPa) experimentally generated in dry + water-sat. porous sandstones + quartzite results in a revision of existing shock classifications.

Carl E. C. Danilewsky A. D. Liermann H. L.
Mansfeld U. M. Langenhorst F. L. et al. ***POSTER LOCATION #110***
Phase Transitions of SiO_2 Under Dynamic Compression and Up to 1200 K **[#1225]**
Time-resolved X-ray diffraction experiments reveal a transition from quartz to stishovite under dynamic compression with rates up to 3 GPa/s and up to 1200 K.

Chen Y. Liu Y. Asimow P. D. Guan Y. ***POSTER LOCATION #111***
Experimental Study of Chemical Effects During Impact Process: Preliminary Results **[#1777]**
We report preliminary shock experiments on analogous Earth rocks to investigate the effect of impact on the volatile signatures in martian meteorites.

Ishiyama K. Kumamoto A. Takagi Y. Nakamura N. Hasegawa S. ***POSTER LOCATION #112***
Measurements of the Permittivity, Density, and Volume Fraction of Crack Around Artificial Impact Crater **[#1976]**
An anisotropic crack around artificial impact crater changed the bulk permittivity, which was explained by the effective medium theory.

Kurosawa K. Okamoto T. Yabuta H. Komatsu G. Matsui T. ***POSTER LOCATION #113***
Shock Vaporization of Water Ice in an Open System Investigated Using a Two-Stage Light Gas Gun **[#1838]**
We constructed a new experimental system to investigate shock vaporization and post-impact chemistry of icy materials.

Jack S. J. Strait M. M. Flynn G. J. Durda D. D. ***POSTER LOCATION #114***
Meteorite Disruption with Varying Speeds and Sizes of Projectiles **[#2659]**
The speed and size of the projectile used to disrupt a sample affects the size range of the fragments produced.

Dahl J. M. Schultz P. H. ***POSTER LOCATION #115***
Syncompressional Shear Measurements in Oblique Impact Experiments **[#2976]**
In situ shear measurements from impact experiments show that oblique impacts can generate substantial horizontal shear strains.

Davies E. J. Root S. Stewart S. T. Spaulding D. K. Jacobsen S. B. ***POSTER LOCATION #116***
Experimental Study of Shock-Induced Vaporization of Rocky Planet Constituents **[#3001]**
Z machine charging / Flyer hits samples, shocking / Now we analyze.

Shirai N. Akhter R. Ebihara M. ***POSTER LOCATION #117***
Precursor Materials of Australasian Tektites in Light of Chemical Compositions **[#1847]**
We determined elemental abundances including platinum group elements of the Australasian tekites in order to place constraints on their precursor materials.

Koeberl C. Schulz T. ***POSTER LOCATION #118***
Osmium Isotopic Investigation of Tektite-Like Glasses from Belize **[#1654]**
Os isotopic analysis of tektite-like glasses from Belize show a volcanic provenance but no extraterrestrial component.

Harris T. H. S. ***POSTER LOCATION #119***
Tektite Suborbital Summary **[#1033]**
Advances in hydrocode modeling of oblique impact, shock ionization, high-temp plasmas and X-ray CT clarify inter-hemispheric transport of Australasian tektites.

Meier M. M. M. Artemieva N. ***POSTER LOCATION #120***
Two Alternative Scenarios to Explain the Strange Extraterrestrial Spinel Grain Record of the Late Eocene **[#1552]**
We propose two alternative interpretations of the recently reported ET spinel grain peaks in the Late Eocene: A NEO breakup and an Eltanin-like marine impact.

Hoffmann V. H. Kaliwoda M. Hochleitner R. Funaki M. Torii M. ***POSTER LOCATION #121***
Investigating Possible Belize Tektites — Request of an Extended Database on Magnetic and Raman Spectroscopical Signature of Natural Glasses **[#2482]**
The focus of our contribution is a first step towards an extended database of the magnetic and Raman Spectroscopical signature of natural glasses.

King D. T. Jr. Cornec J. H. Petruny L. W. Zou H. ***POSTER LOCATION #122***
Tektites of Western Belize — Characteristics and Possible Origin **[#2910]**
Belize tektite composition and inclusions suggests a local volcanic target. The ~800 ka tektites are found in a residual layer atop a Miocene clay formation.

Harris R. S. Fleisher C. Jaret S. J. ***POSTER LOCATION #123***
Mineralogy of Spherules at the Cretaceous-Paleogene Impact Boundary in South Carolina: Implications for Plume Processes and Bolide Identification **[#2840]**
Ti-Fe oxides grains contained in altered impact spherules at the C-Pg boundary in South Carolina record the high temperature reactions in the vapor plume.

Hamann C. Wilk J. Hecht L. Kenkmann T. ***POSTER LOCATION #124***
Melt Formation on Shatter Cone Surfaces in Sandstone, Part II: Melt Composition **[#2381]**
We study melt films detected on experimentally produced shatter cones and discuss P–T conditions that led to melting and lubrication of the striation surfaces.

Wilk J. Hamann C. Kenkmann T. Hecht L. ***POSTER LOCATION #125***
Melt Formation on Shatter Cone Surfaces in Sandstone, Part I: Surface Morphology **[#2636]**
We analyzed with SEM shatter cone like features, displaying curved and striated surfaces, found in the MEMIN hypervelocity cratering experiments.

TERRESTRIAL CRATERS AND CRATER-LIKE FEATURES [T307]

Rathbun K. Ukstins Peate I. Drop S. Gutierrez F. ***POSTER LOCATION #127***
A Preliminary Report on the Structure of Monturaqui Crater, Chile **[#2876]**
We present new structural data that show preservation of part of the overturned fold at Monturaqui Crater, Chile.

Rathbun K. Ukstins Peate I. Drop S. Gutierrez F. ***POSTER LOCATION #128***
A New Geologic Map of Monturaqui Meteorite Impact Crater, Chile: Implications for Satellite-Based Geologic Mapping of Small Craters **[#2583]**
A new field-based geologic map has been generated to compare with satellite-based maps to assess the reliability of using remote mapping for small craters.

Gaither T. A. Hagerty J. J. Gullikson A. L. ***POSTER LOCATION #129***
Meteor Crater Impact Melt Formation: Evidence for Carbonate Melting **[#2113]**
We present new compositional data for Meteor Crater impact melt glasses, carbonate inclusions, and metallic inclusions.

Gullikson A. L. Gaither T. A. Villarreal K. A. Hagerty J. J. ***POSTER LOCATION #130***
Lithostratigraphic Analysis of the Meteor Crater Ejecta Blanket **[#1541]**
We have produced cross-sections of the ejecta blanket from four transects to highlight the extent of target rock-projectile mixing and internal structures.

Denton C. A. Kring D. A. ***POSTER LOCATION #131***
Differential Vertical and Radial Displacement Along Faults in the Crater Wall During the Formation of Meteor Crater, AZ **[#1197]**
We collected structural data and remapped faults in the southeast corner of Meteor Crater to determine the types of motion that occurred during formation.

Losiak A. Belcher C. Hudspith V. Zhu M. Bronikowska M. et al. ***POSTER LOCATION #132***
How to Form Charcoal in a Small Impact Crater? A Kaali Crater Case **[#1467]**
100-m impact craters shouldn't cause forest fires. But we have found charcoal in proximal ejecta of Kaali crater. We investigate its formation mechanisms.

Greenberger R. N. Ehlmann B. L. Osinski G. R.
Tornabene L. L. Green R. O. et al. ***POSTER LOCATION #133***
Lithologic Mapping of Impactites from the Haughton Structure, Canada, Using Imaging Spectroscopy **[#1259]**
Imaging spectroscopy is well-suited to mapping heterogeneous samples such as those from impact structures. We map lithologies in impactites from Haughton.

Marion C. L. Osinski G. R. Linnen R. L.
Zylberman W. Rochette P. et al. ***POSTER LOCATION #134***
Textural Evidence for Impact Melt in Drill Core at the Haughton Impact Structure, Nunavut, Canada **[#2173]**
Igneous textures indicative of rapid cooling of a carbonate-silicate melt have been identified in drill core from the Haughton impact structure.

Schedl A. D. Seabolt A. ***POSTER LOCATION #135***
The Challenges of Studying Meteorite Impacts into Carbonate Rocks: Jeptha Knob Kentucky **[#1589]**
Using calcite stress piezometer confirms earlier work showing that Jeptha Knob is an impact structure and shows hydrothermal activity has obscured its origin.

Newman J. D. Osinski G. R. ***POSTER LOCATION #136***
Geological Mapping of the Tunnunik Impact Structure, Victoria Island, Canadian High Arctic **[#1591]**
The first detailed study of the Tunnunik impact structure begins with the creation of a geological map from formation, fault, and impact breccia data.

Brown J. J. Spray J. G. Thompson L. M. ***POSTER LOCATION #137***
Shock Attenuation Within the Manicouagan Impact Structure **[#1996]**
A shock attenuation study of drill core and surface samples is used in iSALE modelling of the Manicouagan impact structure.

Milam K. A. Henderson T. Steinberg R. M. Martin J. ***POSTER LOCATION #138***
Shock Metamorphism of Shatter-Coned Knox Group Dolostones from the Central Uplifts of the Flynn Creek and Wells Creek Impact Structures **[#2504]**
Peak broadening occurs in powder XRD patterns of shatter-coned dolostones from two complex impact craters in mid-continent North America.

Adrian D. R. King D. T. Jr. Ormo J. Petruny L. W. Hagerty J. J. et al. ***POSTER LOCATION #139***
Analysis of Drill Core FC77-1 from the Flynn Creek Impact Structure, Tennessee USA **[#2953]**
The coarsening-upward trends and lack of clast mixing in this Flynn Creek drill core suggest origin by slumping or another non-aqueous depositional mechanism.

MacLagan E. A. Herd C. D. K. Walton E. L. ***POSTER LOCATION #140***
Investigation of Impact Melt Clasts in Allochthonous Crater-Fill Deposits of the Steen River Impact Structure **[#1641]**
A detailed study of the impact melt clasts in the crater-fill breccia of the Steen River Impact Structure.

Mohr-Westheide T. Greshake A. Wirth R. Reimold W. U. ***POSTER LOCATION #141***
Transmission Electron Microscope Studies of Platinum Group Element-Rich Micronuggets in Barberton Spherule Layer Samples **[#1875]**
First results of a TEM study of three submicrometer -sized, primary PGE metal nuggets in Archean spherule layers from the Barberton Greenstone Belt, South Africa.

Nimura T. Ebisuzaki T. Maruyama S. ***POSTER LOCATION #142***
Global Cooling and Mass Extinction at the End of the Cretaceous Period Driven by a Dark Cloud Encounter **[#1345]**
We found the evidence of a dark nebula encounter at the end of the Cretaceous period in pelagic sediment core in the deep sea floor as an iridium-rich layer.

De Marchi L. Hauser N. Reimold W. U. Crósta A. P. Braz L. ***POSTER LOCATION #143***
Geological and Petrographical Characterization of the Polymict Impact Breccia of the Araguainha Dome, Brazil **[#1120]**
We present the results of a detailed geological and petrographical study of the polymict impact breccias of the central uplift of Araguainha Dome.

Mougel B. Moynier F. Koeberl C. Gopel C. ***POSTER LOCATION #144***
Chromium Isotope Evidence in Impact Ejecta for the Nature of the Impactors of the Sudbury and Vredefort Structures **[#2483]**
We present Cr isotope data for impact ejecta related to Sudbury and Vredefort impact events, and discuss the nature of the impators at their origin.

Deseta N. Boonsue S. ***POSTER LOCATION #145***
Shock-Related Textures in the Core of the Central Uplift of the Vredefort Dome: Rapid Compression and Decompression in an Impact Regime **[#2562]**
This study provides a detailed petrological analysis of shock-induced microtextures in impactites from the central uplift of the Vredefort Dome.

Wilks R. P. A. Osinski G. R. ***POSTER LOCATION #146***
Melt Veins at the West Clearwater Impact Structure: In-Situ vs. Injected Melt **[#1570]**
Melt veins by impact / injected or in-situ? / chem to the rescue.

Shankar B. Tornabene L. L. Osinski G. R. Roffey M. Bailey J. M. et al. ***POSTER LOCATION #147***
Automated Lineament Extraction Technique for the Sudbury Impact Structure Using Remote Sensing Datasets — An Update **[#1424]**
This study provides updates on the automated lineament extraction methodology for structural analysis for the Sudbury impact structure.

Shankar B. Tornabene L. L. Osinski G. R. Roffey M. ***POSTER LOCATION #148***
A Comprehensive Study of Structural Features for Several Terrestrial Complex Craters in Canada Using an Automated Extraction Technique **[#1432]**
This is a comprehensive overview on automated lineament extraction methodology for structural analysis around terrestrial complex craters in Canada.

Güldemeister N. Wünnemann K. ***POSTER LOCATION #149***
Quantification of Seismic Signals Generated by Hypervelocity Impacts from Numerical Modeling and Laboratory Experiments **[#1935]**
We quantify seismic signals induced by hypervelocity impacts from numerical models. Therefore, a calibration of numerical material models is required.

Harris R. S. ***POSTER LOCATION #150***
Evidence for an Early Mesozoic Impact in Southeastern North America **[#3049]**
Lamprophyric rocks in east-central Georgia contain xenocrysts exhibiting petrographic evidence of shock metamorphism.

Xie Z. Zuo S. ***POSTER LOCATION #151***
The Occurrences of Taihu Lake Iron-Rich Concretions Indicate Their Formation Relating to Airburst Fallout Deposition Rather than Groundwater Colloidal Deposition **[#2398]**
Describe details of occurrence of Fe-rich concretions in a specific mud layer in Taihu lake. Discuss whether it is related to impact fallout or water deposition.

Albin E. F. Harris R. S. ***POSTER LOCATION #152***
Woodbury Astrobleme: Further Evidence for a Late Proterozoic Impact Structure in West-Central Georgia, USA **[#1398]**
We consider the Woodbury feature to be a deeply eroded peak ring that formed at the center of a 35 to 40 km diameter impact structure.

LUNAR IMPACT CRATER STUDIES [T308]

Byrne C. J. ***POSTER LOCATION #153***
A Sequenced Catalog of the Moon's Largest Craters and Basins **[#1337]**
This new sequenced catalog of lunar basins and craters > 200 km in diameter provides more resolution to lunar history, showing better detail in the EHB and LHB.

Byrne C. J. ***POSTER LOCATION #154***
The Rim of the South Pole-Aitken Basin: New Empirical Evidence **[#1354]**
A 3-D simulation of the South Pole-Aitken Basin is confirmed by removing a model of the far side bulge from the topography: the conventional rim is a peak ring.

Robbins S. J. ***POSTER LOCATION #155***
Developing a Global Lunar Crater Database, Complete for Craters ≥1 km **[#1525]**
To the Moon, rocks come / Forming craters upon it / How many? We'll see…

Bermingham K. R. Walker R. J. ***POSTER LOCATION #156***
Tracing the Genetics of Lunar Impactors **[#1485]**
Tracing the genetics of lunar impact events through the application of newly refined Ru isotope analytical techniques using N-TIMS.

Miljkovic K. Collins G. S. Wieczorek M. A.
Johnson B. C. Soderblom J. M. et al. ***POSTER LOCATION #157***
Subsurface Morphology and Scaling of Lunar Impact Basins **[#1764]**
Target properties effect impact-basin formation. This work refined impact scaling laws and analyzed lunar basin subsurface morphology as observed by GRAIL.

Krüger T. Kenkmann T. ***POSTER LOCATION #158***
New Insights into the Formation of Complex Crater Rims: Structural Uplift, Ejecta Thickness and Transient Crater Measurements of Complex Lunar Mare Craters **[#2079]**
We measured the structural uplift, ejecta thickness and transient crater cavities of complex lunar mare craters.

Williams J.-P. Paige D. A. Greenhagen B. T. Sefton-Nash E. ***POSTER LOCATION #159***
Large Impacts on the Moon: Rays, Halos, and Melts **[#2444]**
A compilation of over five years of Diviner data highlights how impact craters have modified regolith thermophysical and radiative properties globally.

Elliott J. Huang Y.-H. Minton D. A. Freed A. M. ***POSTER LOCATION #160***
The Length of Lunar Crater Rays Explained Using Secondary Crater Scaling **[#2774]**
Rays criss-cross the Moon / Why are some relatively / Longer than others?

Matiella Novak M. A. Neish C. Zanetti M. Kobs Nawotniak S. Hughes S. ***POSTER LOCATION #161***
Terrestrial Analogs for Self-Secondary Impact Features — Comparing Lunar Features to Features at Kings Bowl, Idaho **[#2716]**
We compare self-secondary impact features within the lava field at Kings Bowl to self-secondary impact features within the impact melt of Aristarchus Crater.

Xiao Z. Prieur N. C. Stephanie S. C. ***POSTER LOCATION #162***
Emplacement History of Self-Secondaries **[#1441]**
The emplacement history of self-secondaries in the frame of impact cratering process in general is discussed based on morphology, count, and shock mechanics.

Mahanti P. Robinson M. S. Thompson T. J. van der Bogert C. H. ***POSTER LOCATION #163***
What Accelerates the Degradation of Small Lunar Craters? — Unexpected, Contrasting Rates Observed at Apollo 16 and 17 Regions **[#1202]**
Degradation rates at Apollo 16 - Cayley plains and Apollo 17 mare plains are estimated from depth-to-diameter ratio statistics of small lunar crater populations.

Huang Y. H. Minton D. A. Elliott J. Hirabayashi T. Freed A. M. et al. ***POSTER LOCATION #164***
The Role of Vertical Mixing Process Across Mare and Highland Contacts **[#2521]**
Recursive impacts / Mixing down but asking more / Always regolith.

Atwood-Stone C. Bray V. J. McEwen A. S. ***POSTER LOCATION #165***
Crater Concentric Ridges on the Moon and Mercury: Antidunes? **[#2082]**
Ridges in the ejecta of fresh, few-km lunar craters are reexamined using high-resolution datasets to investigate their morphologies and different formation hypotheses.

Cassanelli J. P. Head J. W. ***POSTER LOCATION #166***
Did the Orientale Impact Melt Sheet Undergo Large-Scale Igneous Differentiation by Crystal Settling? **[#1174]**
We explore crystal settling as a mechanism for large-scale igneous differentiation of the lunar Orientale basin impact melt sheet.

Xie M. Zhu M.-H. ***POSTER LOCATION #167***
Estimates of Primary Ejecta and Local Material for the Orientale Basin on the Moon **[#1747]**
We propose a model to re-investigate the thickness distribution of primary ejecta and local material of the Orientale basin on the Moon.

Kring D. A. Kramer G. Y. Collins G. S. Potter R. W. K. ***POSTER LOCATION #168***
Using the Schrodinger Basin on the Moon to Infer Properties of the Buried Chicxulub Crater Peak Ring **[#1659]**
The dramatically exposed Schrodinger peak ring basin on the Moon provides clues to the buried peak ring of the K-T boundary Chicxulub impact crater.

Ding X. Z. Pang J. F. Han K. Y. Wang L. ***POSTER LOCATION #169***
Features and Genesis of the Impact Crater and Accumulation of Sinus Iridum Area of the Moon **[#1828]**
Based on morphological features, the lunar impact craters can be divided into seven types and the accumulative materials are divided into six types and nine accumulative formations.

Zhang F. Zhu M.-H. ***POSTER LOCATION #170***
Intrusions Below Volcanically Buried Craters in Mare Fecunditatis Indicated by Extrusive Features Associated with Mare Ridge Ring Structures **[#1798]**
Our study focused on the relationship between magma ascent and some volcanically buried craters in Mare Fecunditatis on the Moon.

Ishihara Y. Chiba T. Haruyama J. Otake H. Ohtake M. ***POSTER LOCATION #171***
Structural and Geological Interpretation of the Posidonius Crater: Did the Posidonius Crater Floor Float on Basal Sill? **[#1210]**
We interpreted of the Posidonius crater's structure based on Kaguya data. We propose that the central part of the crater floor was floated on basal sill.

Öhman T. Kramer G. Y. McGovern P. J. ***POSTER LOCATION #172***
Geomorphologic Sketch Mapping of a Fresh Lunar Crater Eimmart A **[#1948]**
Eimmart A on the NE rim of Crisium is one of the freshest craters. Ejected melt distribution is not controlled by topography, but interior melt distribution is.

MARS IMPACTS [T309]

Baker D. M. H. ***POSTER LOCATION #173***
Updated Catalogs of Peak-Ring Basins and Protobasins on Mars **[#3046]**
Previous catalogs of basins on Mars are reanalyzed with current orbital data to provide updated catalogs of peak-ring basins and protobasins.

Tornabene L. L. Piatek J. L. Hansen K. T.
Hutchinson S. J. Barlow N. G. et al. ***POSTER LOCATION #174***
Visible and Thermophysical Characteristics of the Best-Preserved Martian Craters, Part 1: Detailed Morphological Mapping of Resen and Noord **[#2879]**
Visible mapping / Thermal images add depth / Best preserved craters.

Pan C. Rogers A. D. ***POSTER LOCATION #175***
Thermally and Compositionally Distinct Crater Ejecta on Mars and Geological Implications **[#1544]**
Thermal and compoitional distinct ejecta are found in Chryse Planitia, Northern Hellas, and Tyrrhena Terra regions, which may represent the subsurface lithology.

Piatek J. L. Tornabene L. L. Barlow N. G. Osinski G. R. Robbins S. J. ***POSTER LOCATION #176***
Visible and Thermophysical Characteristics of the Best-Preserved Martian Craters, Part 2: Thermophysical Mapping of Resen and Noord **[#2903]**
Infrared reveals / Blocky floors, radial sand / Best-preserved craters.

Mouginis-Mark P. J. Sharpton V. L. ***POSTER LOCATION #177***
The Asymmetric Ejecta Pattern of Zunil Crater, Mars **[#1368]**
We explore the azimuthal differences in rim topography and morphology of Zunil Crater, Mars, in the context of the crater's secondary crater field.

Daubar I. J. Golombek M. P. McEwen A. S.
Tornabene L. L. Calef F. J. III et al. ***POSTER LOCATION #178***
Depth-Diameter Ratio of Corinto Secondary Craters **[#2950]**
Secondary craters ~850 km from Corinto crater have unusually low depth/diameter ratios. This could be due to lower impact velocities than expected.

Daubar I. J. Golombek M. P. McEwen A. S.
Dundas C. Britton A. W. et al. ***POSTER LOCATION #179***
New Impact Modification of Corinto Secondary Craters **[#2984]**
A new impact in the InSight landing site area affected secondary craters from Corinto, shedding light on the nature of their ejecta and new impact blast zones.

Boyce J. M. Mouginis-Mark P. J. Barlow N. G. ***POSTER LOCATION #180***
The Two Types of Double Layer Ejecta (DLE) Craters on Mars **[#1327]**
Morphometric data is presented to support the contention that there are fundamentally two types of layered ejecta craters on Mars.

Jones E. ***POSTER LOCATION #181***
An Index of Subsurface Volatiles On Mars **[#1147]**
Results from a principal component analysis (PCA) study of martian layered ejecta craters, identifying indices of target volatiles.

Moretti P. J. Gregg T. K. P. ***POSTER LOCATION #182***
Do Ejecta Features Support Volatiles as a Basis for Central Pit Craters on Mars? **[#2788]**
Assuming that martian impact craters with central pits are associated with volatiles in the target material, we examine their ejecta for evidence of volatiles.

Turner S. M. R. Bridges J. C. Grebby S. Ehlmann B. L. ***POSTER LOCATION #183***
Hydrothermal Activity Recorded in Post Noachian-Aged Impact Craters on Mars **[#2915]**
CRISM characterization of post Noachian-aged impact craters on Mars, with one crater showing evidence for phyllosilicates located in fans on its central peak.

Hill J. R. Christensen P. R. ***POSTER LOCATION #184***
Global Distribution of Low Thermal Inertia Halos Surrounding Small Young Martian Impact Craters **[#2964]**
The global distribution and classification, based on their apparent state of degradation, of low thermal inertia halos surrounding small young impact craters.

Slezak T. J. Radebaugh J. Christiansen E. H. ***POSTER LOCATION #185***
Quantitative Planetary Landform Analysis Using Geometric Morphometrics **[#2980]**
We apply methods of geometric morphometrics to paterae on Io and simple lunar impact craters for a quantitative comparison and analysis of these landforms.

Ivanov B. A. ***POSTER LOCATION #186***
Impact Shaking of the Phobos Surface **[#1833]**
Impact numerical modeling illustrates how the Phobos internal structure attenuates seismic shaking of the surface.

DIGITAL AND VIRTUAL EDUCATION RESOURCES AND EXPERIENCES [T310]

Caprarelli G. Oliver C. White A. Ngov P. Orosei R. et al. ***POSTER LOCATION #187***
The Mars Australian Remote Virtual Experiment Laboratory (MARVEL): A MARSIS Research Platform Fostering STEM Education Excellence **[#1283]**
MARVEL is a planetary research and STEM education virtual laboratory in its proof-of-concept stage. Here we present its underpinning STEM education concepts.

Anbar A. D. Elkins-Tanton L. T. Klug Boonstra S.
Ben-Naim D. Semken S. ***POSTER LOCATION #188***
Education Through Exploration: Using Space Science to Teach and Enable Exploration of the Unknown **[#2930]**
Arizona State University, partnered with NASA SMD Education, proposes new, adaptive ways for learners of all ages to participate in NASA's exploration.

Gay P. L. Lehan C. Bracey G. Yamani A. Francis M. et al. ***POSTER LOCATION #189***
CosmoQuest: Better Citizen Science Through Education **[#2845]**
CosmoQuest is a virtual research center where the public and professionals learn about and explore our universe. Real people, doing real research.

Gibson E. K. Tindle A. G. Kelley S. P. Pillinger J. M. ***POSTER LOCATION #190***
Virtual Microscope Views of the Apollo 11 and 12 Lunar Samples **[#1199]**
Virtual microscope images of the Apollo 11 and 12 samples have been prepared and are available for viewing at: www.virtualmicroscope.org/content/apollo.

Hansen C. J. Schwamb M. E. Portyankina G.
Aye K.-M. Martin A. et al. ***POSTER LOCATION #191***
Planet Four Terrains: A Citizen Science Project to Study the South Polar Region of Mars **[#2672]**
Planet Four: Terrains, a new citizen science project to identify particular types of terrain in CTX images of Mar's south polar region, will be described.

Lehan C. Gay P. ***POSTER LOCATION #192***
Crowd-Sourced Science Using Citizen Science Builder **[#2803]**
Citizen Science Builder uses crowd-sourcing methods to assist in processing data using lay persons, rather than scientists, without sacrificing accuracy.

ENGAGING THE STEM PIPELINE IN MISSION AND INSTRUMENT DESIGN [T311]

Bleacher L. V. Lakew B. Guzewich S. Bracken J. Brown T. et al. ***POSTER LOCATION #194***
NASA Goddard's Planetary Science Winter School: Training Goddard's Early Career Planetary Scientists in Flight Instrument Design Through Experiential Learning **[#2069]**
GSFC's early career planetary scientists learn the flight instrument lifecycle by designing an instrument under consideration for proposal and development.

Budney C. J. Lowes L. L. Mitchell K. L. Sohus A. M. Wessen A. S. ***POSTER LOCATION #195***
Career and Workforce Impacts of the NASA Planetary Science Summer School: Team X Model 1999–2015 **[#1208]**
We present the PSSS authentic learning strategy for planetary mission concept development, participant profiles, and alumni career impact/employment status.

Gamblin R. B. Bering E. A. III Canales D.
Nowling M. Ehteshami A. et al. ***POSTER LOCATION #196***
Student Organized Research via High-Altitude Balloon Investigations: Undergraduate Student Instrumentation Project **[#3014]**
The Undergraduate Student Instrumentation Project is an inclusive platform of undergraduate research.

Smith H. D. Sloan K. Duncan A. G. Robertson D. Anderson A. ***POSTER LOCATION #197***
The University Rover Challenge: An International Rover Competiton Under Simulated Mars Operational Conditions **[#3066]**
For the University Rover Challenge, undergraduate teams design and build the next generation of rovers to compete in science and engineering tasks.

Jones A. J. P. Heldmann J. L. Sheely T. Karlin J. Johnson S. et al. ***POSTER LOCATION #198***
FINESSE Spaceward Bound — Teacher Engagement in NASA Science and Exploration Field Research **[#2295]**
Teachers in the field / Experience science here / Bring back to students.

Sipos A. Vizi P. G. ***POSTER LOCATION #199***
10 Years of the Simulated Mars Rover Model Competition **[#2098]**
10 Years of the Simulated Mars Rover Model Competition: Report about the success, organization, and management of the competition events from 2006 to 2015.

Bering E. A. III Slagle E. M. Nieser K. Carlson C. Kapral A. J. et al. ***POSTER LOCATION #200***
Planetary Science Missions as Vehicles for Introducing Space Science and Engineering in Grades 3–8: Mars Rover Celebration **[#1658]**
The Mars Rover Celebration and Curriculum (MRC) for grades 3–8 are centered around an open-ended, student-led collaborative project to design a mission to Mars.

MOON FROM NEAR AND FAR: RESULTS FROM RECENT LUNAR MISSIONS [T312]

Keller J. W. Petro N. E. ***POSTER LOCATION #201***
The Lunar Reconnaissance Orbiter — Revealing a New Moon with 6+ Years of Observations: Status, Data, and Future Opportunities **[#1562]**
An update on the status and recent discoveries from the Lunar Reconnaissance Orbiter mission.

Stooke P. J. ***POSTER LOCATION #202***
Surveyor Retro-Rockets in LROC Images **[#1025]**
The pre-Apollo Surveyor landers used retro-rockets, discarded before landing. LROC images clearly show two of them (S3 and S6) and candidates for the others.

Stubbs T. J. Glenar D. A. Wang Y.
McClanahan T. P. Myers D. C. et al. ***POSTER LOCATION #203***
Searching for Lunar Horizon Glow with the LRO Star Tracker Cameras **[#2851]**
Initial test-case simulation suggests some "excess brightness" imaged just above the limb caused by surface-reflected sunlight rather than scattering by dust.

Barker M. K. Mazarico E. Smith D. E. Sun X. Zuber M. T. et al. ***POSTER LOCATION #204***
Searching for Lunar Horizon Glow with the Lunar Orbiter Laser Altimeter **[#1985]**
We describe the method and initial results of a new campaign by the Lunar Orbiter Laser Altimeter to observe lunar horizon glow.

Patterson G. W. Stickle A. M. Mini-RF Team ***POSTER LOCATION #205***
Radar Scattering Characteristics of Crater Ejecta Observed During the Mini-RF/AO Bistatic Campaign **[#2331]**
Mini-RF/AO bistatic radar scattering characteristics for the ejecta of three craters show variations suggestive of a relationship with crater age.

Calla O. P. N. Mathur S. Gadri K. L. ***POSTER LOCATION #206***
Study of the Behaviour of Lunar Equitorial Features Using Datasets of Chandrayaan-1 Mini-SAR **[#1154]**
δ, m, CPR values over Equatorial analysed using Mini-SAR. DC of these features is estimated by Campbell model. A correlation between CPR and LOLA roughness observed.

Kitazato K. Iwata T. Abe M. Ohtake M. Tsumura K. et al. ***POSTER LOCATION #207***
Near-Infrared Spectroscopy of the Earth and Moon During the Hayabusa2 Earth Swing-By **[#2158]**
We present the initial results from the Hayabusa2 near-infrared spectrometer (NIRS3) observations of the Earth and Moon obtained during the Earth swing-by.

Lai J. Xu Y. Zhang X. Tang Z. ***POSTER LOCATION #208***
Subsurface Structure Analysis of Chang'e-3 Landing Site **[#1923]**
Obtaining the structure of the mare subsurface provides valuable information for understanding the evolution of the lunar regolith and the mare thermal history.

Sun L. Z. Ling Z. C. Zhang J. ***POSTER LOCATION #209***
Mineralogical Constraints of Basalt Thickness Near Chang'e-3 Landing Site **[#2400]**
The thickness of the Eratosthenian basalt near the CE-3 landing region ranges from 33.6 m to 50 m based on variation of olivine and ilmenite abundances.

Meng Z. G. Ping J. S. Tang Z. S. Zhao R. Cai Z. C. et al. ***POSTER LOCATION #210***
Internal Thermal Features of Tycho Area Revealed by CELMS Data **[#1960]**
The microwave thermal emission is special around Tycho crater, the study on which will be valuable to understand the internal thermal structure of the region.

PLANETARY MISSION CONCEPTS: MOON [T313]

Niles P. B. Eppler D. B. Kennedy K. J. Lewis R. Spann J. F. et al. ***POSTER LOCATION #211***
Research Objectives for Human Missions in the Proving Ground of Cis-Lunar Space **[#2734]**
Discussion of the possible research objectives for future human missions to the Proving Ground in cis-lunar space.

Jolliff B. L. Petro N. E. Shearer C. K. Cohen B. A. Liu Y. et al. ***POSTER LOCATION #212***
South Pole-Aitken Basin Sample-Return Science: Critical Clues for Planet Formation **[#2818]**
Sample return from Moon's South Pole-Aitken Basin addresses processes that affected the early solar system and is thus a high priority for planetary science.

Clark P. E. Malphrus B. Brown K. Reuter D. MacDowall R. et al. ***POSTER LOCATION #213***
Lunar Ice Cube Mission: Determining Lunar Water Dynamics with a First Generation Deep Space CubeSat **[#1043]**
Lunar Ice Cube, a science requirements-driven deep space exploration 6U cubesat mission was selected for a NASA HEOMD NextSTEP slot on the EM1 launch.

Hayne P. O. Greenhagen B. T. Paige D. A.
Camacho J. M. Cohen B. A. et al. ***POSTER LOCATION #214***
Lunar Flashlight: Illuminating the Lunar South Pole **[#2761]**
Lasers shine on Moon / Shadows brighten for first time / Small mission profits.

Hardgrove C. Bell J. Starr R. Colaprete T. Robinson M. et al. ***POSTER LOCATION #215***
The Lunar Polar Hydrogen Mapper (LunaH-Map) CubeSat Mission **[#2654]**
The Lunar Polar Hydrogen Mapper (LunaH-Map) is a 6U CubeSat mission selected by NASA SMD to reveal abundances of lunar polar hydrogen using neutron spectroscopy.

Kamps O. M. Flahaut J. D. Foing B. H. ***POSTER LOCATION #216***
Lunar Polar Sites and Rover Traverse Planning for a Study on Volatiles and Ices **[#2412]**
Results of a site selection and comparison project as preparation for a rover traverse planning near the lunar poles for a tele-operated, sample return mission.

Zuo W. Li C. L. Zhang Z. B. Zeng X. G. Zou Y. L. et al. ***POSTER LOCATION #217***
Scientific Data and Its Release of Chang'e-3 Mission **[#1353]**
This article describes the scientific data of Chang'E-3 mission which was obtained through the four science instruments CE-3 lander and Yutu rover each carried.

Kim K. J. van Gasselt S. Ju G. H. Lee S.-R. Wöhler C. et al. ***POSTER LOCATION #218***
Framework of Lunar Landing Site Selection and Resource Analysis for the 2020 Korean Lunar Mission **[#1706]**
This contribution reports on activities and concepts related to the Lunar landing site selection and resource analysis for the 2020 Korean Lunar Mission.

Kerber L. Nesnas I. Ashley J. W. Malaska M. J. Parcheta C. et al. ***POSTER LOCATION #219***
A Concept for Exploring the History of Lunar Mare Deposits with the Axel Extreme Terrain Rover **[#2969]**
Lunar mare pits provide access to the cross-sections of the lunar maria. The AXEL Extreme Terrain Rover can provide the mobility necessary to explore them.

McDonald F. E. Martin D. J. P. Steenstra E. S.
Paisarnsombat S. Venturino C. S. et al. ***POSTER LOCATION #220***
A Long Duration Human-Assisted Robotic Sample Return Mission to the Schrödinger Basin Part 1: Traversing the Basin Center **[#1464]**
A lunar farside rover traverse, planned as part of the HERACLES mission concept, to return ~30 kg of sample and address in situ resource utilization potential.

Martin D. J. P. McDonald F. E. Steenstra E. S.
Paisarnsombat S. Venturino C. S. et al. ***POSTER LOCATION #221***
A Long Duration Human-Assisted Robotic Sample Return Mission to the Schrödinger Basin Part 2: Traversing Towards the Basin Wall **[#1468]**
A three year HERACLES-based mission concept to the Schrödinger basin to return at least 30 kg of samples from 8 geologic units, including SPA basin material.

Foing B. H. ***POSTER LOCATION #222***
Highlights from MoonVillage Workshop at ESTEC, December, 2015 **[#2719]**
We present highlights from the ESA/ILEWG Moon Village Workshop 2015 in ESTEC addressing Moon Habitat Design, Science and Technology, and Engaging Stakeholders.

Batenburg P. Winter D. Calzada A.
Jaime Albalat A. Kleinschneider A. M. et al. ***POSTER LOCATION #223***
Towards a Moon Village: Results from ESTEC 2015 Workshop Splinter Sessions **[#2798]**
We report on ESTEC 2015 Moon Village Workshop specific sessions on Moon Habitat Design, science and technology potentials, and engaging stake-holders.

PLANETARY MISSION CONCEPTS: MARS, PHOBOS, AND DEIMOS [T314]

Horvath A. F. Bérczi Sz. Vizi P. G. ***POSTER LOCATION #225***
Nano and Pico Landing Space Probe Swarm to Search the Possibility of Life at the Southern Pole of Mars with an Environmental Friendly Structure **[#2570]**
Micro mother-ship-like fleet of nano-sized measuring systems make it possible to survey a surface region of a planetary body in one time, landing like a meteor.

De Hon R. A. ***POSTER LOCATION #226***
Loess Cave Habitats on Mars **[#1144]**
Excavation of alcoves on Mars offers an alternative to natural caves. Loess and loess-like materials are easy to excavate and provide stable, interior spaces.

Elphic R. C. Lee P. Zolensky M. E. Mittlefehldt D. W. Lim L. F. et al. ***POSTER LOCATION #227***
Neutron Spectroscopy Can Constrain the Composition and Provenance of Phobos and Deimos **[#2957]**
Neutron spectrometer measurements taken during multiple flybys of Phobos and Deimos can provide significant constraints on surface composition.

Ramsley K. R. Bramble M. S. Cassanelli J. P.
Deutsch A. N. Horan A. M. et al. ***POSTER LOCATION #228***
Science Exploration Architecture for Phobos and Deimos: Are the Moons of Mars in the Critical Pathway of Human Exploration of Mars? **[#2345]**
We provide a mission architecture for exploring Phobos/Deimos to determine their origin and whether they lie in the critical pathway for Mars human exploration.

Acedillo S. M. M. Lee P. ***POSTER LOCATION #229***
Human Exploration of Phobos and Deimos: Robotic Precursor Measurements **[#2624]**
We identify specific robotic precursor measurements required to fill NASA's Strategic Knowledge Gaps for planning future human missions to Phobos and Deimos.

PLANETARY MISSION CONCEPTS: SMALL BODIES [T315]

Elkins-Tanton L. T. Asphaug E. Bell J. Bercovici D. Bills B. G. et al. ***POSTER LOCATION #231***
Asteroid (16) Psyche: The Science of Visiting a Metal World **[#1631]**
Psyche got a hit-and-run, and now shows metal. We want to go see.

Levison H. F. Lucy Science Team ***POSTER LOCATION #232***
Lucy: Surveying the Diversity of the Trojan Asteroids, the Fossils of Planet Formation **[#2061]**
Lucy is a low-cost, high-heritage Phase A Discovery mission that will probe six Trojan asteroids (both L4/L5 swarms, all taxonomic types, an equal-mass binary).

Mori O. Okada T. Bibring J.-P. Ulamec S. Nakamura R. et al. ***POSTER LOCATION #233***
Science Experiments on a Jupiter Trojan Asteroid in the Solar Powered Sail Mission **[#1822]**
Science experiments and strawman payloads were studied including mass spectrometry for the surface of Jupiter Trojan asteroid in the Solar Powered Sail mission.

Abell P. A. Mazanek D. D. Reeves D. M.
Chodas P. W. Gates M. M. et al. ***POSTER LOCATION #234***
The Asteroid Redirect Mission (ARM) **[#2217]**
The Asteroid Redirect Mission will visit a NEA and return a boulder to cis-lunar space for a later crewed mission to visit and return asteroid samples to Earth.

Barnouin O. S. Biele J. Carnelli I. Ciarletti V. Cheng A. et al. ***POSTER LOCATION #235***
The Asteroid Impact and Deflection Assessment (AIDA) Mission: Science Proximity Operations **[#1427]**
We summarize the proximity operations needed to achieve the scientific objectives of the Asteroid Impact Mission to satisfy its mission objectives.

Herique A. Ciarletti V. AIM Team ***POSTER LOCATION #236***
A Direct Observation of the Asteroid's Structure from Deep Interior to Regolith: Two Radars on the AIM Mission **[#2096]**
This paper reviewes the deep interiror radar and the shallow subsurface radar onboard the AIM-AIDA/ESA mission: science objectives, instruments concepts.

Rivkin A. S. Pravec P. Moskovitz N. Thirouin A. Scheirich P. et al. ***POSTER LOCATION #237***
The Observing Working Group for the Asteroid Impact and Deflection Assessment (AIDA) **[#2386]**
An impact demo / With nobody watching it / Is not an option.

Michel P. Kueppers M. Carnelli I. Galvez A. Mellab K. et al. ***POSTER LOCATION #238***
Asteroid Impact Mission (AIM): The European Component of the AIDA Space Project **[#1204]**
The ESA Asteroid Impact Mission (AIM), part of the AIDA mission, plans to characterize the binary asteroid Didymos and observe the impact by the DART impactor.

Cheng A. F. Michel P. Barnouin O. Campo Bagatin A. Miller P. et al. ***POSTER LOCATION #239***
Asteroid Impact and Deflection Assessment (AIDA) Mission: The Double Asteroid Redirection Test (DART) **[#2032]**
DART will be the first demonstration of asteroid deflection by kinetic impact, within the joint NASA-ESA AIDA mission currently in Phase A at both agencies.

Stickle A. M. Barnouin O. S. Bruck Syal M. Cheng A. El Mir C. et al. ***POSTER LOCATION #240***
Impact Simulation Benchmarking for the Double Asteroid Redirect Test (DART) **[#2832]**
We present impact simulation benchmarking results from a variety of hydrocodes in support of the NASA/ESA Asteroid Impact and Deflection Assessment mission.

Schwartz S. R. Asphaug E. Cheng A. Housen K. R. Michel P. et al. ***POSTER LOCATION #241***
Asteroid Impact and Deflection Assessment (AIDA) Mission: Modeling and Simulation of Impact Outcomes — Ejecta Properties and Evolution **[#3002]**
We present results from the AIDA working group tasked to analyze ejecta from the DART kinetic impactor deflection test involving the asteroid Didymos in 2022.

Richardson D. C. Barnouin O. S. Benner L. A. M.
Bottke W. F. Jr. Campo Bagatin A. et al. ***POSTER LOCATION #242***
Dynamical and Physical Properties of 65803 Didymos **[#1501]**
We present preliminary information on the dynamical and physical properties of binary asteroid 65803 Didymos, the proposed AIDA mission target.

Kohout T. Näsilä A. Tikka T. Penttilä A. Muinonen K. et al. ***POSTER LOCATION #243***
ASPECT CubeSat Mission to a Binary Asteroid Didymos **[#2059]**
ASPECT is a CubeSat proposal to study composition of the Didymos binary asteroid as a part of the AIDA mission.

PLANETARY MISSION CONCEPTS: VENUS, EUROPA, JUPITER, ENCELADUS, TITAN [T316]

Ghail R. C. Wilson C. F. Widemann T. ***POSTER LOCATION #244***
EnVision M5 Venus Orbiter Proposal: Opportunities and Challenges **[#1511]**
With its advanced radars and IR/UV instruments, EnVision will detect and measure activity on Venus. Here we outline our plans for ESA's next call.

Hensley S. Smrekar S. Nunes D. Seu R. Lombardo P. et al. ***POSTER LOCATION #245***
Single Pass X-Band Radar Interferometry for Topographic Mapping of Venus **[#1979]**
The VISAR instrument is a single pass X-band radar interferometer that is part of the VERITAS proposed Discovery mission to Venus.

Glaze L. S. Garvin J. B. Johnson N. M. Atkinson D. Atreya S. et al. ***POSTER LOCATION #246***
DAVINCI: Deep Atmosphere Venus Investigation of Noble Gases, Chemistry, and Imaging **[#1560]**
DAVINCI will study the composition of Venus' atmosphere at a level of detail not possible on earlier missions and will image the surface at optical wavelengths.

Amato M. Generie J. Glaze L. Robinson D. Mahaffy P. et al. ***POSTER LOCATION #247***
The Davinci Probe Descent Module and Engineering Development Unit Testing **[#2566]**
The Davinci Venus mission in situ probe design and probe descent sphere engineering test unit build and test work is discussed.

Amato M. Spidaliere P. Mahaffy P. Schiff C. Hsu O. et al. ***POSTER LOCATION #248***
Biosignature Explorer for Europa Probe (BEE) — The Concept for Directly Searching for Life Evidence on Europa at Lower Cost and Risk **[#2602]**
The Biosignature Explorer for Europa (BEE) Plume Probe is designed to collect and analyze samples for life evidence as a potential part of the Europa mission.

Pappalardo R. T. Prockter L. M. Senske D. A. Klima R. ***POSTER LOCATION #249***
Fenton Vance S. et al.
Science Objectives and Capabilities of the NASA Europa Mission **[#3058]**
The goal, objectives, instruments, and unified science traceability of NASA's Europa mission are summarized.

Blanc M. Jones G. H. Prieto-Ballesteros O. Sterken V. J. EI-M5 Team ***POSTER LOCATION #250***
The Europa Initiative for ESA's M5 Call (EI-M5): A Potential European Contribution to NASA's Europa Multiple-Flyby Mission **[#2455]**
We will report on the science community-based proposition of a possible ESA contribution to NASA's Europa mission as a candidate for the upcoming ESA M5 mission.

James P. B. ***POSTER LOCATION #251***
Geophysical Constraints on Europa's Ice Shell and Rocky Core from a Flyby Mission **[#2513]**
Line-of-sight residuals from a flyby mission will offer a way to study Europa's ice shell structure and sea floor, even when coverage is not fully global.

Burgett B. J. Long J. Whaley P. Raz A. Herrick R. R. et al. ***POSTER LOCATION #252***
Mini-MAGGIE: CubeSat MAGnetism and Gravity Investigation at Europa **[#1928]**
The Mini-MAGGIE satellite mission will accompany the future Europa mission to aid the primary satellite in measuring gravity and magnetic fields.

Iwata T. Matsuura S. Tsumura K. Yano H. Hirai T. et al. ***POSTER LOCATION #253***
A Study of Cruising-Phase Sciences Using the Solar Power Sail **[#2000]**
We present the scientific objectives and instruments in the cruising-phase of the Solar Power Sail, a Japanese candidate deep-space probe.

John K. K. Wynne J. J. Powell K. E.
MacKenzie S. M. Caswell T. et al. ***POSTER LOCATION #254***
THEO Mission Concept: Testing the Habitability of Enceladus' Ocean **[#1277]**
Fly to Saturn moon / Is ocean habitable? / THEO could find out.

Ross F. Lee G. Polidan R. Sen B. Sokol D. ***POSTER LOCATION #255***
Titan Lifting Entry and Atmospheric Flight (T-LEAF) System Concept for Exploration of Saturn's Moon Titan **[#2453]**
Both entry vehicle and maneuverable atmospheric rover, T-LEAF (Titan Lifting Entry and Atmospheric Flight) performs both surface and atmospheric science at Titan.

MARS LANDING SITES [T317]

Sweeney J. Warner N. H. Golombek M. P. Kirk R. Fergason R. et al. ***POSTER LOCATION #257***
Crater Degradation and Surface Erosion Rates at the InSight Landing Site, Western Elysium Planitia, Mars **[#1576]**
Crater morphology and degradation timescales at the InSight landing site suggest low erosion rates and imply that infilling is the dominant degradational process.

Putzig N. E. Morgan G. A. Campbell B. A. Grima C. Smith I. B. et al. ***POSTER LOCATION #258***
Radar Properties of the Proposed InSight Landing Site in Western Elysium Planitia on Mars **[#1655]**
We examine roughness, layering, and other properties of the InSight study area with observations from MRO's Shallow Radar (SHARAD) and Arecibo's S-band radar.

Golombek M. Warner N. Daubar I. J. Kipp D. Huertas A. et al. ***POSTER LOCATION #259***
Surface and Subsurface Characteristics of Western Elysium Planitia, Mars **[#1572]**
Western Elysium Planitia is smooth, flat, with few rocks, and a broken up regolith suitable for landing InSight and penetrating ~5 m with the heat flow mole.

Golombek M. P. Grant J. A. Farley K. A. Williford K. Chen A. et al. ***POSTER LOCATION #260***
Downselection of Landing Sites Proposed for the Mars 2020 Rover Mission **[#2324]**
Eight landing sites have been selected for futher study for the Mars 2020 Rover based mostly on the science merits of 21 sites evaluated at an open workshop.

Ryan C. H. Tornabene L. L. Osinski G. R.
Cannon K. M. Mustard J. F. et al. ***POSTER LOCATION #261***
Geomorphological Mapping of the Hargraves Ejecta and Polygonal Terrain Associated with the Candidate Mars 2020 Landing Site, Nili Fossae Trough **[#2524]**
Geomorphological mapping of the Mars 2020 potential landing site in Nili Fossae Trough was undertaken using HiRISE and CTX imagery.

Hurowitz J. A. Karunatillake S. Kerber L. Mischna M. ***POSTER LOCATION #262***
Volatile Insight on Global Circulation on Mars, with Implications for Mars 2020 Landing Sites **[#2008]**
Settle's acid-fog hypothesis on GCMs and dilution of bulk soil by Cl and S. We also identify regions less suited for Mars 2020 from a habitability perspective.

Eckes S. Warner N. H. Gupta S. O'Shea M. Smith J. et al. ***POSTER LOCATION #263***
Timing of Fluvial Activity in the Xanthe Terra Region of Mars: Implications for Hypanis Delta, a Potential Landing Site for Mars2020 **[#2196]**
Fluvial activity at Xanthe Terra occurred over a broad period of Mars history from the Late Noachian to the Early Amazonian.

Sefton-Nash E. Bridges J. C. Kissick L. Butcher F. Donnelly P. et al. ***POSTER LOCATION #264***
Characterizing Rock Abundance at ExoMars Landing Site Candidates **[#1918]**
We present preliminary rock count results and discuss techniques to characterize rock abundance and hazardous obstacles at ExoMars Rover landing site candidates.

Bridges J. C. Henson R. A. Vago J. L.
Loizeau D. Williams R. M. E. et al. ***POSTER LOCATION #265***
ExoMars Landing Site Characterisation and Selection **[#2170]**
Oxia Planum, Aram Dorsum, Mawrth Vallis are the candidate sites for the ExoMars Rover. They contain clays, alluvial and deltaic environments.

Quantin C. Carter J. Thollot P. Broyer J. Davis J. et al. ***POSTER LOCATION #266***
Oxia Planum — The Landing Site for ExoMars 2018 **[#2863]**
Oxia Planum is a wide noachian clay bearing plain hosting younger fluvio-deltaic deposits which has been chosen by ESA as the landing site for Exomars 2018.

Carter J. Quantin C. Thollot P. Loizeau D. Ody A. et al. ***POSTER LOCATION #267***
Oxia Planum: A Clay-Laden Landing Site Proposed for the ExoMars Rover Mission: Aqueous Mineralogy and Alteration Scenarios **[#2064]**
We investigate the mineralogy and propose aqueous alteration settings for Oxia Planum, one of the final landing sites for the ExoMars rover mission.

Balme M. R. Grindrod P. M. Sefton-Nash E.
Davis J. M. Gupta S. et al. ***POSTER LOCATION #268***
Aram Dorsum: A Noachian Inverted Fluvial Channel System in Arabia Terra, Mars (and Candidate ExoMars 2018 Rover Landing Site) **[#2633]**
Aram Dorsum, one of many inverted fluvial channels found in Arabia Terra, is an ExoMars Rover candidate landing site. This geological mapping details the area.

Gross C. Poulet F. Michalski J. Horgan B. Bishop J. L. ***POSTER LOCATION #269***
Mawrth Vallis — Proposed Landing Site for ExoMars 2018/2020 **[#1421]**
We present a short overview of the ExoMars landing ellipse proposed for Mawrth Vallis to strengthen the merits of this high-level astrobiological region.

Calef F. J. III Archer D. Clark B. Day M. Goetz W. et al. ***POSTER LOCATION #270***
Assessing Gale Crater as an Exploration Zone for the First Human Mission to Mars **[#2901]**
We propose a 'go where you know' concept evaluating Gale crater as the first exploration zone for a human mission to Mars, assessing science and traversability.

Gallegos Z. E. Newsom H. E. ***POSTER LOCATION #271***
Mars' Mesopotamia: A Previously Unexplored Region on the Eastern Rim of Hellas Basin with Prospects for Future Robotic and Human Missions **[#3033]**
This study area offers intriguing geologic, astrobiologic, and resource potential. Future lander, rover, and human missions should target this exploration zone.

AQUEOUS ALTERATION ON MARS: A COMPLEX HISTORY [T318]

Schwenzer S. P. Bullock M. A. Bridges J. C.
Chavez C. L. Filiberto J. et al. ***POSTER LOCATION #273***
Noble Gas Fractionation in Hydrous Rock Alteration Under Diagenetic Pressure and Temperature Conditions **[#1889]**
Long-term alteration experiments are presented with results from alteration mineralogy and noble gas adsorption, both relevant to the nakhlite meteorites.

Saetre C. Riu L. Dypvik H. Hellevang H. Pilorget C. et al. ***POSTER LOCATION #274***
Experimental Studies on Liquid and Vapor Phase Alteration of Basaltic Glass: Implications for Earth and Mars **[#1865]**
We perform hydrothermal alteration experiments to study weathering and alteration of amorphous phases in various hydrous regimes with a martian perspective.

Fairen A. G. Gil-Lozano C. Losa-Adams E.
Gago-Duport L. Uceda E. R. et al. ***POSTER LOCATION #275***
Introducing Fully Open Systems in the Kinetic Modeling of Divergent Mineral Sequences on Mars **[#1101]**
Highly fractured basalt (large reactive surface) would form clays, while massive basalt (small reactive surface) would result in the precipitation of salts.

Black S. R. Hynek B. M. Hoover R. Beckerman L. G. Alvarado G. E. ***POSTER LOCATION #276***
Characterization of Hydrothermal Alteration in Costa Rica: Mineralogy, Methodology, and Implications for Mars **[#2546]**
Investigating the effects of primary lithology on secondary mineralogy in hydrothermal regions, and identification via Mars analog instrumentation.

Losa-Adams E. Gil-Lozano C. Fairen A. G.
Chevrier V. Davila A. F. et al. ***POSTER LOCATION #277***
Using a Reverse Osmosis Reactor to Model the Crystallization of Secondary Minerals in Mars During Long-Term Evaporation Processes **[#3063]**
We used by batch reactors connected to reverse osmosis (RO) membranes to model long-term evaporation processes on Mars.

Parnell S. P. Phillips-Lander C. M. McGraw L. E. Elwood Madden M. E. ***POSTER LOCATION #278***
Carbonate Dissolution Rates in High Salinity Brines **[#1460]**
Calcite and magnesite experiments show slower dissolution rates in high salinity brines.

Phillips-Lander C. M. Legett C. Parnell S. R.
Elwood Madden A. S. Elwood Madden M. E. ***POSTER LOCATION #279***
Pyroxene Dissolution Rates in High Salinity Brines: Implications for Post-Noachian Aqueous Alteration on Mars **[#1313]**
Initial dissolution rates for ultrapure water nearly ~10× slower than NaCl and Na_2SO_4 brines. These differences are not linked to pH, but aqueous complexation.

Dehouck E. McLennan S. M. Sklute E. C. Dyar M. D. ***POSTER LOCATION #280***
Stability of 2-Line Ferrihydrite at Gale Crater, Mars: Experimental Approach **[#2223]**
We present lab experiments exploring the stability of two-line ferrihydrite in various conditions relevant to Mars in general, and Gale crater in particular.

Craig P. I. Ming D. W. Rampe E. B. Morris R. V. ***POSTER LOCATION #281***
Insights into the Aqueous History of Mars from Acid-Sulfate Weathered Phyllosilicates **[#2434]**
Acid sulfate-weathered phyllosilicates may explain observations of sulfates and phyllosilicates in close proximity to each other on Mars.

Melwani Daswani M. Kite E. S. ***POSTER LOCATION #282***
Late-Stage Weathering and Chlorapatite Dissolution as a Possible Source for Chlorides on the Martian Surface **[#2681]**
Chlorides in dry lakes / Where did the chlorine come from? / Phosphate unlikely.

Filiberto J. Knafelc J. Dyar M. D. Ferré E. C. Friedman S. A. et al. ***POSTER LOCATION #283***
Olivine Oxidation and Implications for Planetary Surface Processes **[#2171]**
Fo-Oxidation / Hematite dominates but / Magnetite as well.

Hausrath E. M. Goetz W. Cousin A. Wiens R. C. Meslin P.-Y. et al. ***POSTER LOCATION #284***
Signs of Transport of Chemical Elements and Soil-Forming Processes in Surface Soils at Gale Crater, Mars **[#2493]**
Millimeter-scale depth profiles measured by ChemCam across vertical soil faces at Gale Crater were examined for chemical transport and soil-forming processes.

Crumpler L. S. Arvidson R. E. Mittlefehldt D. W.
Jolliff B. L. Farrand W. H. et al. ***POSTER LOCATION #285***
Opportunity, Geologic and Structural Context of Aqueous Alteration in Noachian Outcrops, Marathon Valley and Rim of Endeavour Crater **[#2272]**
In situ study of outcrops by Opportunity at Endeavour crater identifies the context of smectite detection in crater rims throughout Noachian terrains of Mars.

Nickerson R. D. Chemtob S. M. Catalano J. G. ***POSTER LOCATION #286***
Clay Formation and Iron Partitioning During Anoxic Isochemical Hydrothermal Basalt Alteration: Implications for Formation of Fe Smectites on Early Mars **[#2458]**
Anoxic hydrothermal alteration of basalt produced a ferrous smectite structurally similar to clays found on Mars. May be a globally relevant process.

Sheppard R. E. Milliken R. E. Russell J. M. ***POSTER LOCATION #287***
Mineralogical and Chemical Characterization of Cores from Lake Towuti, Indonesia as a Comparative Study for Curiosity Observations at Gale Crater, Mars **[#2680]**
Analyses of the mineralogy and chemistry of core samples from Lake Towuti, Indonesia, a potential modern analogue to the paleolake basin Gale Crater.

Gellert R. Berger J. A. Boyd N. Campbell J. L. Desouza E. D. et al. ***POSTER LOCATION #288***
Chemical Evidence for an Episode of Acidic Leaching at the Base of Mount Sharp, Gale Crater, Mars, as seen by the APXS **[#2368]**
MSL APXS data indicate large scale acidic leaching at the base of Mount Sharp by elevated Si, S, Ti. Various elemental trends with SiO_2 will be discussed.

Thompson L. M. Schmidt M. E. Gellert R. Spray J. G. MSL APXS Team ***POSTER LOCATION #289***
APXS Compositional Trends Along Curiosity's Traverse, Gale Crater, Mars: Implications for Crustal Composition, Sedimentary Provenance, Diagenesis, and Alteration **[#2709]**
MSL APXS rock compositions reveal regional and stratigraphic trends, sedimentary provenance, diagenesis, and alteration history; and Gale crustal composition.

Newsom H. E. Belgacem I. Jackson R. Ha B. Vaci Z. et al. ***POSTER LOCATION #290***
The Materials at an Unconformity Between the Murray and Stimson Formations at Marias Pass, Gale Crater, Mars **[#2397]**
After Stimson deposition on unaltered Murray, diagenesis of lowermost Stimson involved calcium sulfate as veins and cement, and enrichment of SiO_2 up to 75 wt%.

MARTIAN MINERALOGY FROM ORBIT AND ON THE SURFACE [T319]

Clark R. N. Swayze G. A. Murchie S. L.
Seelos F. P. Viviano-Beck C. E. et al. ***POSTER LOCATION #291***
Mapping Water and Water-Bearing Minerals on Mars with CRISM **[#2900]**
We have analyzed over 200 CRISM scenes, and find diverse signatures of water using the 2-micron absorption.

Seelos F. P. Viviano-Beck C. E. Morgan M. F. Romeo G. Aiello J. J. et al. ***POSTER LOCATION #292***
CRISM Hyperspectral Targeted Observation PDS Product Sets — TERs and MTRDRs **[#1783]**
Targeted Empirical Records (TERs) and Map-projected Targeted Reduced Data Records (MTRDRs) — High level CRISM targeted observation data product sets.

Pan C. Rogers A. D. ***POSTER LOCATION #293***
Olivine-Rich Basalt Outcrops in the Subsurface of Western Noachis Terra, Mars, and Geological Implications **[#1528]**
Olivine-rich outcrops found in Ladoon Valles and Uzboi Vallis, suggesting they may be widespread and form a continuous unit in Valles Marineris and Ares Vallis.

Brown A. J. Viviano-Beck C. E. Bishop J. L.
Cabrol N. A. Andersen D. et al. ***POSTER LOCATION #294***
A Serpentinization Origin for Jezero Crater Carbonates **[#2165]**
Using CRISM, we investigated spectral signatures of carbonates in Jezero Crater and conclude they are more like Nili Fossae brethren than previously suspected.

Jain N. S. Chauhan P. Rajashekhar P. ***POSTER LOCATION #295***
Evidences of Aqueous Past of Ladon Valles Region on Mars Through Morphology and Mineralogy **[#1114]**
Mineralogy, geomorphology and morphometric analysis of Ladon valleys, Mars.

Robertson K. Wiseman S. ***POSTER LOCATION #296***
Determining the Mineralogy of the Polyhydrated Sulfate Class in Capri Chasma Using Radiative Transfer Modeling **[#2270]**
We perform radiative transfer modeling of DISORT corrected CRISM spectra from Capri Chasma to model the spectral variations in the polyhydrated sulfate class.

Weitz C. M. Bishop J. L. Tornabene L. Mest S. C. Grant J. A. et al. ***POSTER LOCATION #297***
Disrupted Hydrated Deposits in Southeastern Noctis Labyrinthus: Possible Displaced Subsurface Materials from Oudemans Crater? **[#1610]**
We have identified disrupted hydrated materials that could represent subsurface target rocks that were displaced northward during formation of Oudemans crater.

Smith I. B. Viviano-Beck C. E. Chojnacki M. Quantin C. Putzig N. E. ***POSTER LOCATION #298***
Characterization of Layered Deposits at the Valles Marineris Plateau With Multiple Instruments **[#2725]**
We detect and characterize altered layered deposits near Valles Marineris rim with a suite of instruments looking towards analogs with other sites.

Matiella Novak M. A. Viviano-Beck C. Seelos K. Buczkowski D. ***POSTER LOCATION #299***
Looking for Volcanic Ash Deposits Within the Interior Layered Deposits of Valles Marineris, Mars — Physical and Chemical Characteristics of Ash Falls and Flows **[#2752]**
We investigate the presence of volcanic ash falls within the Interior Layered Deposits of Valles Marineris, Mars.

Pascuzzo A. C. Mustard J. F. ***POSTER LOCATION #300***
Determining the Composition of Various Martian Central Mounds **[#2758]**
Survey and compositional analyses of martian craters containing large central mound sedimentary deposits to help in determining their various origins.

Edwards C. S. Rogers A. D. ***POSTER LOCATION #301***
Evaluating Flat-Crater Floor Fill Compositions: Insights into Volcanic and Sedimentary Processes **[#2273]**
Infilled craters on Mars have diverse histories, exhibiting compositions and morphologies consistent with unaltered volcanic fill to altered sedimentary fill.

Sessa A. M. Parra S. A. Wray J. J. Irwin R. P. III Maxwell T. A. et al. ***POSTER LOCATION #302***
Compositional Mapping of Noachian Impact Crater Floors on Mars **[#2391]**
Martian crater floors / Infrared spectra reveal / Diverse minerals.

Hood D. R. Judice T. Karunatillake S. Rogers D. Dohm J. et al. ***POSTER LOCATION #303***
Assessing the Geologic Evolution of Greater Thaumasia, Mars with Chemistry and Mineralogy **[#2737]**
Regions surrounding Thaumasia Planum, Mars are examined using chemical and mineralogical data, assessing composition and potential evolution models.

Susko D. Karunatillake S. Hood D. R. Barbato A. ***POSTER LOCATION #304***
Investigations into the Source of K and Th Decoupling Across Terrestrial Bodies **[#2749]**
K and Th tend to couple together on Mars and the Moon, but decouple on Earth. Terrestrial rocks are analyzed to determine potential sources of decoupling.

Ruff S. W. Morris R. V. ***POSTER LOCATION #305***
Evidence for Mixed Magnesium and Iron Carbonates in the Comanche Outcrops of the Columbia Hills, Mars **[#2896]**
Comanche outcrops display TIR spectral features of mixed Mg/Fe carbonates probably from evaporative precipitation of fluids that soaked Algonquin-like rocks.

Farrand W. H. Johnson J. R. Bell J. F. III Mittlefehldt D. W. ***POSTER LOCATION #306***
VNIR Multispectral Observations of Rocks at Spirit of St. Louis Crater and Marathon Valley on the Rim of Endeavour Crater Made by the Opportunity Rover Pancam **[#1983]**
Multispectral observations by the Opportunity Pancam at Spirit of St. Louis and Marathon Valley indicate evidence of aqueous alteration at Endeavour Crater.

Carter J. Gondet B. Langevin Y. ***POSTER LOCATION #307***
MSL Homing in on a Large Smectite Clay Deposit: An Orbital Perspective **[#1899]**
Orbital detections of smectite clays in close proximity to MSL offer near-term perspectives that would improve both in situ analyses and orbital remote sensing.

Johnson J. R. Cloutis E. Fraeman A. A.
Ehlmann B. L. Wiens R. C. et al. ***POSTER LOCATION #308***
Chemcam Passive Reflectance Spectroscopy of Recent Drill Tailings, Hematite-Bearing Rocks, and Dune Sands **[#1155]**
ChemCam reflectance spectra (400–840 nm) documented recent drill tailings, hematite-like features in outcrops, and olivine-bearing sands in the Bagnold Dunes.

Le Deit L. Mangold N. Forni O. Cousin A. Lasue J. et al. ***POSTER LOCATION #309***
The Potassic Sedimentary Rocks in Gale Crater, Mars as Seen by ChemCam Onboard Curiosity **[#1163]**
We present a synthesis of the chemical composition of the potassium-rich rocks at Cooperstown and Kimberley according to their stratigraphic unit and facies.

Gasda P. J. Delapp D. M. McInroy R. E.
Wiens R. C. Bridges J. C. et al. ***POSTER LOCATION #310***
Identification of Fresh Feldspars in Gale Crater Using ChemCam **[#1604]**
Identification of feldspar grains in float rocks and conglomerates in Gale Crater, Mars ChemCam dataset supported by modeling and experimental LIBS studies.

Bultel B. Quantin C. Andreani M. Klein F. ***POSTER LOCATION #311***
Storage of Water and CO_2 in the Martian Crust by Serpentinization and Carbonation **[#2384]**
We present and quantify a mechanism to store water and CO_2 in the martian crust.

Peters G. H. Anderson R. C. Abbey W. Beegle L. Carey E. M. et al. ***POSTER LOCATION #312***
Relative Strengths of Rocks Drilled at Mars' Gale Crater **[#1640]**
The Sample Acquisition/Sample Preparation and Handling (SA/SPaH) system aboard Curiosity rover may be used to determine the relative strength of rocks.

McGraw L. E. Elwood Madden M. E. Phillips-Lander C. M.
Parnell S. Elwood Madden A. S. ***POSTER LOCATION #314***
Development of a Rapid, Nondestructive Method to Measure Aqueous Carbonate and Perchlorate in High Salinity Brines Using Raman Spectroscopy **[#2728]**
This abstract details the beginning stages of developing a rapid and nondestructive method of remotely measuring solutes in brines using Raman spectroscopy.

Elwood Madden M. E. Phillips-Lander C. M. Burkhart J. W.
Johnson J. R. Kosemund C. R. et al. ***POSTER LOCATION #315***
Raman Measurement of Solute Chemistry in Brines for Remote Analysis of Planetary Fluids **[#1131]**
Laser zapping brine produces Raman signals, measuring solutes .

Hamilton D. Daly M. G. Cloutis E. A. Tait K. ***POSTER LOCATION #316***
A Raman Spectroscopy Comparison of an Iron-Bearing and a Non-Iron-Bearing Sulphate at Both Green and UV Excitation Wavelengths **[#2138]**
Ligand-metal charge transfer in transition metal complexes causes intense and broad absorption bands which hinders UV Raman of Mars analogue iron sulphates.

Hibbert R. Price M. C. Kinnear T. M. Burchell M. J. ***POSTER LOCATION #317***
The Effects of Temperature on the Raman Spectrum of Labradorite Crystals **[#1446]**
Our work has shown that the Raman peak positions of labradorite crystals shift while the sample is being subjected to temperature changes.

Benedix G. K. Hamilton V. E. Reddy S. M. ***POSTER LOCATION #318***
μ-FTIR Spectroscopy and Electron Backscatter Diffraction of Martian Shergottite Robert Massif 04262 **[#1951]**
Martian minerals provide accurate spectral analogs for Mars.

De Angelis S. Manzari P. De Sanctis M. C. Ammannito E. Di Iorio T. ***POSTER LOCATION #319***
Hyperspectral Micro-Imaging of Martian Shergottite Northwest Africa 8657 Fragment in the Visible-Infrared Range **[#1223]**
Laboratory study has been performed on a slab of martian meteorite Shergottite NWA 8657, by means of high spatial resolution VIS-IR hyperspectral micro-imaging.

Wu Z. C. Wang Alian. ***POSTER LOCATION #320***
Oxidants Generated by Electrostatic Discharge in a Martian Environmental Chamber — Implication for Perchlorates Formation on Mars **[#2227]**
We experimentally demonstrated that wide variety and large amount of oxidants were generated by Electrostatic Discharge (ESD) under Mars relevant conditions.

Rogers A. D. Gregerson J. Sklute E. C. Rucks M. Jensen H. B. et al. ***POSTER LOCATION #321***
Sequestration of Mixed Salts in the Amorphous Soil Fraction on Mars **[#1736]**
Rapid dehydration products of chloride-sulfate and carbonate-sulfate brine mixtures can form X-ray amorphous solids. Spectra and stability are reported.

Bishop J. L. Davila A. Hanley J. Roush T. L. ***POSTER LOCATION #322***
Dehydration-Rehydration Experiments with Cl Salts Mixed into Mars Analog Materials and the Effects on their VNIR Spectral Properties **[#1645]**
VNIR spectra measured of Mars analogs enriched in Cl salts as the samples adsorbed H_2O from the air showed changes in the spectral properties of the Cl salts.

Losiak A. Derkowski A. Skala A. Trzciński J. ***POSTER LOCATION #323***
Evaporites on Ice: How to Form Gypsum on Antarctica and on Martian North Polar Residual Cap? **[#1972]**
We plan to determine how many melting-freezing cycles are required to form detectable amounts of evaporites under simulated Antarctic and martian conditions.

Bramble M. S. Mustard J. F. ***POSTER LOCATION #324***
Investigating the Antarctic Meteorite Analog of Carbonate Formation on Mars **[#2553]**
Carbonates on Mars / Did they form when cold and dry? / Let's see in the lab!

Fu X. H. Wang A. L. Krawczynski M. J. ***POSTER LOCATION #325***
Characterizing Silicate Glasses with Vibrational Spectroscopy **[#2470]**
We built a calibration curve using Raman peak area ratios to semi-quantify the polymerization degrees of silicate glasses, and validated using natural glasses.

Wright S. P. ***POSTER LOCATION #326***
Shocked Soils and Baked Zones from a Basaltic Target Provide Insight into Mars Sample Return Goals and Detections of Impact Glass **[#1001]**
Pre-impact soils and baked zones now exist as clasts in impact breccia. Sample analyses have implications for Mars sample return and detections of impact glass.

AEOLIAN PROCESSES: SOMETHING IN THE AIR [T321]

Quintana S. N. Schultz P. H. ***POSTER LOCATION #327***
A Global Distribution of Impact-Wind Streak Craters on Mars **[#1548]**
We present a global distribution of impact-vapor wind streak craters on Mars and discuss its significance.

Quintana S. N. Schultz P. H. Horowitz S. S. ***POSTER LOCATION #328***
New Experiments in Martian Impact Vapor-Induced Wind Streak Analysis **[#1553]**
New experimental results explore impacts into layered targets, atmospheric density, and volatile projectiles in the development of vapor in the laboratory.

Reiss D. ***POSTER LOCATION #329***
First Observations of Terrestrial Dust Devils in Orbital Image Data: Comparison with Dust Devils in Amazonis Planitia, Mars **[#2912]**
Here we report about the first terrestrial dust devil observations with visible and thermal satellite data on an alluvial fan in the Taklimakan desert (China).

Mayer D. P. Kite E. S. ***POSTER LOCATION #330***
Pacing Wind-Induced Saltation Abrasion on Mars: Using Crater Counts to Constrain Aeolian Exhumation **[#1479]**
Undergrads count craters / Landscape exhumation rate / Organics preserved?

Czaplinski E. Horgan B. ***POSTER LOCATION #331***
Constraining the Mechanisms of Slipface Failure on Martian Sand Dunes from a New Global Survey **[#2006]**
Mars has global dunes / What causes their odd features? / Wind and grain flows, yes.

Ku Y.-J. Zimbelman J. R. ***POSTER LOCATION #332***
Regional Wind Patterns on Mars Inferred from Dune Field Studies **[#1868]**
We classified 15 types of sand dunes distributed around Mars, providing statistical information of different types and a recent view of wind patterns on Mars.

Charles H. R. Titus T. N. Hayward R. K. Edwards C. S. ***POSTER LOCATION #333***
Comparison of the Mineral Composition of the Sediment Found in Two Mars Dune Fields: Ogygis Undae and Gale Crater **[#3006]**
The mineral composition in two Mars dune fields, Ogygis Undae and Gale crater dune field, are analyzed using thermal emission spectra and thermal imaging.

Charles H. R. Titus T. N. Hayward R. K. Fenton L. K. Horgan B. ***POSTER LOCATION #334***
Mars Global Digital Dune Database: Adding Mineral Composition to the Mix **[#2769]**
The next addition to the Mars Global Digital Dune Database (MGD3) will include mineral abundances obtained from deconvolving emissivity spectra.

Bennett K. A. Fenton L. Bell J. F. III ***POSTER LOCATION #335***
The Albedo of Martian Dunes: Insights into Dune Migration and Wind Regimes **[#2389]**
We show that while albedo measurements cannot be used as a proxy for migration rates of martian dunes, they can yield information about the local wind regime.

Lapotre M. G. A. Ehlmann B. L. Fraeman A. A.
Minson S. E. Ayoub F. et al. ***POSTER LOCATION #336***
A Quantitative Assessment of Aeolian Fractionation at the Bagnold Dunes of Gale Crater, Mars, from Orbit to the Ground **[#1513]**
We assess the mineralogy of active sands from orbital visible-near infrared spectra along the traverse of Curiosity and compare our estimates to ground truth.

Van Kooten S. J. Putzig N. E. O'Shea P. M. Fenton L. K. ***POSTER LOCATION #337***
Investigating the Poleward Trend of Southern Dune Field Stabilization on Mars Using Thermophysical Observations **[#2528]**
We hunt subsurface martian ice by matching thermal data to thermophysical models, explaining latitude-dependent dune field morphology and tracing local climate.

Fenton L. K. Bishop J. L. King S. Lafuente B. ***POSTER LOCATION #338***
Aeolian Transport in Olympia Undae, Mars, Based on a Field Study at White Sands National Monument, New Mexico, USA **[#2183]**
Gypsum on Mars dunes,white crystals blown to the crests.How does wind do that?

Ballard M. J. Ewing R. C. Lapotre M. G. A. ***POSTER LOCATION #339***
Variations in Bedform Wavelength by Elevation on Mars **[#2977]**
Dune, TAR, ripple, and protodune wavelengths are measured across a range of elevations on Mars. The wavelength-elevation correlation depends on bedform type.

Bishop B. B. Lewis C. L. Radebaugh J. R. Christiansen E. H. C. ***POSTER LOCATION #340***
Dune Width and Spacing in Titan's Belet Sand Sea in Relation to Topography Highlights Potential Sediment Transport Patterns **[#2663]**
Dune width/spacing in Titan's Belet Sand Sea in relation to latitude, distance from upwind margins, and regional topography highlight transport patterns.

Nield E. V. * Burr D. M. Bridges N. T. Smith J. K. Emery J. P. et al. ***POSTER LOCATION #341***
A Wind Tunnel Study of the Effect of Pressure on Saltation Threshold Conditions **[#1028]**
The proportion of grains entrained under fluid and impact conditions is measured using high-speed videography for a range of surface pressures (1–20 bar).

Burr D. M. Nield E. V. Neakrase L. D. V. ***POSTER LOCATION #342***
A Community Archive of Threshold (Minimum) Wind Speed Data from Wind Tunnel Experiments: Initiation of an Aeolian Data Archive **[#1047]**
Understanding aeolian processes advances by experiment. We are creating an archive of threshold data from wind tunnels and welcome additional contributions.

Yu X. Horst S. M. He C. Bridges N. T. Burr D. M. ***POSTER LOCATION #343***
Quantifying Water Content and Equilibration Timescale of Wind Tunnel Materials **[#2683]**
To improve our understanding of the effect of interparticle forces, we measured water content and equilibration timescales for various wind tunnel materials.

Swann C. Ewing R. C. Sherman D. J. ***POSTER LOCATION #344***
Thresholds for Aeolian Sand Transport on Earth and Mars **[#2410]**
This study proposes the use of scale dependent threshold to model aeolian transport processes at micro and macro scales.

Marshall J. R. ***POSTER LOCATION #345***
Longevity of Martian Aeolian Sand: Attrition May Be More Benign than on Earth **[#1807]**
Sand attrition on Mars may be more benign than on Earth as indicated by abrasion and wind tunnel experiments, fracture analysis, and aerodynamics analysis.

Bourke M. C. Nield J. M. Diniega S.
Hansen C. J. McElwain J. N. et al. ***POSTER LOCATION #346***
The Geomorphic Effect of Sublimating CO_2 Blocks on Dune Lee Slopes at Grand Falls, Arizona **[#2407]**
On steep desert dunes / The ice block hovers downslope / Leveed grains flowing.

Titus T. N. Hayward R. K. Bogle R. ***POSTER LOCATION #347***
Grand Falls Dune Field — An Analog Lesson about Sediment Flux **[#1201]**
This work focuses on the characterization of sediment flux and what lessons are to be learned from the Mars analog site - Grand Falls dune field, AZ.

Sullivan R. Hallet B. Herkenhoff K. Zimbelman J. ***POSTER LOCATION #348***
Evaluating Wind Strengths Required to Mobilize Martian Coarse-Grained Ripples: Gusev, Meridiani Planum, and Gale **[#2918]**
We propose a method to estimate wind conditions prevailing when megaripples were last active, and apply this on Mars at Gusev, Meridiani Planum, and Gale.

Baker M. Lewis K. W. Bridges N. Newman C. Van Beek J. et al. ***POSTER LOCATION #349***
Aeolian Transport of Coarse Sediment in the Modern Martian Environment **[#2894]**
We use Mastcam images from seven sites along Curiosity's traverse to show that aeolian transport is controlled by local topography and seasonal variability.

Silvestro S. Vaz D. A. Yizhaq H. Esposito F. ***POSTER LOCATION #350***
Non-Transverse Aeolian Ripples on Mars **[#1905]**
In this report we show the presence of non-transverse (oblique and longitudinal) wind ripple migration in Herschel Crater on Mars.

Zimbelman J. R. Johnson M. B. ***POSTER LOCATION #351***
Ripple Orientations as Indicators of Recent Surface Winds on Martian Sand Dunes **[#1157]**
Wind ripple patterns on sand dunes from 40 sites widely distributed around Mars are presented and discussed.

Ashley J. W. Golombek M. P. ***POSTER LOCATION #352***
Analog Studies of Iron Meteorites Found on Mars — Features, Processes, and Comparisons **[#2461]**
Highly weathered meteorites found on Mars by roving spacecraft are compared with terrestrial analogs to enhance understanding of martian surface processes.

Northrup D. Radebaugh J. Christiansen E. H. Fowler B. Kerber L. et al. ***POSTER LOCATION #353***
Comparisons of Yardangs on Titan with Mega and Mesoyardangs in Argentina and China **[#2629]**
Detailed analysis of straight wind carved ridges known as yardangs yields valuable insights to similar features seen on Titan and their conditions of formation.

Kerber L. ***POSTER LOCATION #354***
Controls on the Morphology of Yardangs on the Earth and Mars **[#2708]**
Yardangs are being shaped / By many different things / Water, wind, collapse.

Urso A. C. Chojnacki M. ***POSTER LOCATION #355***
Dune-Yardang Interaction in Becquerel Crater, Mars **[#3026]**
Sand fluxes of dunes appear to be influenced by their location relative to layered deposits. Results suggest yardangs were carved geologically recently.

MARS ATMOSPHERE, SURFACE, AND FIELDS: TOP-DOWN AND ON THE GROUND [T322]

Horan A. Head J. ***POSTER LOCATION #356***
Early Mars Climate History: Exploring the Possibility of Transient Melting Through Peak Seasonal Temperatures **[#2394]**
We explore the possibility of transient melting through peak seasonal temperatures as a mechanism for valley network formation on early Mars using the LMD GCM.

Chappelow J. E. Golombek M. P. Calef F. J. ***POSTER LOCATION #357***
Does the Littleton Meteorite Require a Past, Denser Martian Atmosphere? **[#1662]**
Unlike previous meteorite finds on Mars, the recently discovered large iron meteorite "Littleton" requires a past, denser martian atmosphere to land intact.

Gröller H. Yelle R. V. Koskinen T. T.
Montmessin F. Lacombe G. et al. ***POSTER LOCATION #358***
Martian Temperature Profiles Measured by MAVEN and MRO from 20 to 160 km **[#1811]**
We present the combined martian temperature profiles measured by IUVS/MAVEN and by MCS/MRO spanning the altitude range from the lower to the upper atmosphere.

Plesa A.-C. Grott M. Lemmon M. Müller N. Piqueux S. et al. ***POSTER LOCATION #359***
Interannual Perturbations of the Martian Surface Heat Flow by Atmospheric Dust Opacity Variations **[#1945]**
We quantify the effects of atmospheric dust loading on the martian heat flow by using dust opacity data obtained by the Mars Exploration Rover Opportunity.

Audouard J. Piqueux S. Poulet F. Vincendon M. Gondet B. et al. ***POSTER LOCATION #360***
Analysis of Curiosity Surface Temperature Data **[#1506]**
We analyse the first year of surface temperature data recorded by Curiosity, which proves to be a challenge for our understanding of the martian climate.

Pandya B. M. Haider S. A. ***POSTER LOCATION #361***
Production of Metallic Ions at Mars During Encounter of Comet C/2013 A1 Siding Spring: MAVEN Observations **[#1052]**
By Calculating production rate of six metals observed by MAVEN during encounter of comet C/2013 A1, we reveal future scope of change in the chemistry on Mars .

Gondet B. Bibring J.-P. ***POSTER LOCATION #362***
Mesospheric CO_2 Clouds at Mars: Seven Martian Years Survey by OMEGA/MeX **[#2040]**
we will present results of seven years of CO_2 martian cloud observations by the spectro-imager OMEGA onboard Mars Express.

McConnochie T. H. Toigo A. D. Guzewich S. D. Kleinboehl A. ***POSTER LOCATION #363***
Ertel Potential Vorticity of the Mars Polar Vortex from MGS-TES and MRO-MCS Temperature Soundings **[#2979]**
This presentation explores the accuracy and implications of Ertel potential vorticity derived from temperature soundings in the martian winter polar regions.

Titus T. N. ***POSTER LOCATION #364***
Characterizing the Mars Diurnal CO_2 Cycle **[#2960]**
A thermal model is used to determine if the effects of the seasonal cap edge diurnal CO_2 cycle could possibly be an analysis tool for probing the near-surface.

Smith I. B. Spiga A. Tyler D. Ewing R. C. ***POSTER LOCATION #365***
Wind at the North Pole of Mars: Comparisons of Modeling and Observations **[#1632]**
We simulate winds at the north pole of Mars for each 5° Ls with high spatial and temporal resolution to compare with geology and find a seasonal dependence.

Steele L. J. Balme M. R. Lewis S. R. ***POSTER LOCATION #366***
Regolith-Atmosphere Water Vapour Interaction at Gale Crater **[#1944]**
We use a mesoscale model coupled to a subsurface regolith model to study the interaction of water vapour between the regolith and atmosphere around Gale crater.

Trainer M. G. Franz H. B. Mahaffy P. R.
Wong M. H. Atreya S. K. et al. ***POSTER LOCATION #367***
Update on the Seasonal Atmospheric Composition Measurements by the Sample Analysis at Mars Instrument **[#1739]**
Polar caps grow, shrink / Mars' seasons as witnessed by / Curiosity.

Franz H. B. Trainer M. G. Malespin C. A.
Mahaffy P. R. Conrad P. G. et al. ***POSTER LOCATION #368***
Initial Experiments with the Sample Analysis at Mars Onboard Calibration Gas Cell **[#2015]**
We will discuss results from SAM's first in situ calibration experiments relevant to measurements of atmospheric composition.

Luhmann J. G. Ma Y. J. Dong C. Chi P. J. Russell C. T. et al. ***POSTER LOCATION #369***
Maven-Validated Model Implications for Insight Measurements **[#2926]**
Data-validated models are used to explore possible use of the technique of interior conductivity sounding at Mars, when MAVEN and Insight are there together.

Mittelholz A. Johnson C. L. ***POSTER LOCATION #370***
Global-Scale External Fields at Mars Measured at Satellite Altitudes: Preparation for Magnetic Sounding of the Martian Interior **[#1534]**
We map global-scale external fields at Mars and their dominant periodicities (1 day, 26 days, 1 year) using MGS and MAVEN data.

ASTEROID PROPERTIES AND DYNAMICS: STUFF THEY DO BEFORE CRUSHING YOUR HOUSE [T323]

Baziotis I. B. Ferrière L. Brandstätter F. Topa D. Asimow P. D. ***POSTER LOCATION #371***
Shock Metamorphism in Ordinary Chondrites: Examples from Chelyabinsk (LL5) and Chantonnay (L6) Meteorites **[#1440]**
Pyroxene glass and chromite exsolutions in Chelyabinsk, and jadeite in Chantonnay suggests minimum pressure at ~7 GPa.

Baziotis I. B. Ferrière L. Asimow P. D. Topa D. Brandstätter F. ***POSTER LOCATION #372***
P-Rich Olivines in the Impact Melt Lithology of the Chelyabinsk Meteorite **[#1437]**
After a high-T thermal event, the olivine from the impact melt lithology of Chelyabinsk, was rapidly evolved from Mg-rich to Fe-rich, incorporating phosphorus.

McMahon J. W. Benner L. A. M. Naidu S. P. ***POSTER LOCATION #373***
The Predicted BYORP Driven Evolution of 65803 Didymos **[#2285]**
The possible long-term evolution of the binary asteroid Didymos is discussed based on current estimates of the asteroid size, shape, and orbit.

Kikuchi H. Miyamoto H. ***POSTER LOCATION #374***
Numerical Test of the Formational Process of Grooves on Phobos **[#2019]**
Numerical simulations support that the origin of grooves on Phobos is the impacts from a collection of smaller fragments which orbited Mars.

Matsumoto K. Ikeda H. ***POSTER LOCATION #375***
Inhomogeneous Two-Layer Internal Structure and Moments of Inertia of Phobos **[#1846]**
Phobos' moments of inertia (MOI) is calculated using a two-layer model to show that at least a few percent accuracy of MOI is required for future missions.

Bell E. Jr. Schmerr N. Plescia J. ***POSTER LOCATION #376***
Numerical Simulations of Seismic Wave Propagation Within Asteroids **[#1750]**
Use of numerical methods to determine appropriate capabilities of hardware for the exploration and seismic probing of the interior of an asteroid.

Sánchez D. P. Scheeres D. J. ***POSTER LOCATION #377***
Angles of Repose of Granular Beds Using a Soft-Sphere Discrete Element Method (SSDEM) **[#1230]**
Calibration and validation tests of a soft-sphere DEM code for used planetary sciences applications.

Lyons R. J. Ciesla F. J. Walsh K. J. Davison T. M. Collins G. S. ***POSTER LOCATION #378***
Thermal Analysis of Post-Impact Bodies in the Early Solar System **[#1603]**
We perform hydrocode, gravitational reaccumulation, and thermal evolution simulations to investigate the formation of non-magmatic irons.

Pohl L. Britt D. T. ***POSTER LOCATION #379***
Orbital Evolution and the Possiblity of Thermal Dehydration of Asteroid 2008 EV5 **[#2688]**
We determine the probability of volatile survival on Asteroid 2008 EV5 based on its orbital history and degree of thermal aleration.

Zeng X. Y. Liu X. D. ***POSTER LOCATION #380***
A Method to Generate Periodic Orbits Near Dumbbell-Shaped Asteroids with Application to 216 Kleopatra **[#1150]**
The focus of this study it to provide a method to search for periodic orbits near dumbbell shaped asteroids starting from a simplified model.

Trappitsch R. Roth A. S. G. Leya I. ***POSTER LOCATION #381***
Modeling Solar Cosmic Ray Induced Cosmogenic Nuclides in Small Meteoroids **[#2658]**
We calculate and deconvolute mixed SCR/GCR cosmogenic records in small ordinary chondrites and constrain their CRE age and their mean irradiation radius.

Glavin D. P. Pavlov A. A. Stern J. C. Elsila J. E. Parsons A. M. et al. ***POSTER LOCATION #382***
Investigating the Effects of Cosmic Ray Exposure on Amino Acids in Meteorites: Implications for Future Small Body Sample Return Missions **[#1040]**
Exposure of the Murchison meteorite to gamma radiation leads to significant amino acid decomposition although enantiomeric and C-isotopic ratios were preserved.

Nishiizumi K. Caffee M. W. Jull A. J. T. ***POSTER LOCATION #383***
Large Solar Cosmic Ray Effects on Oued Awlitis 001 Lunar Meteorite and Northwest Africa 10134 Shergottite **[#1669]**
High solar cosmic ray produced ^{26}Al and 14C found in Oued Awlitis 001 lunar and NWA 10134 martian meteorite indicate low atmospheric ablation.

Keszthelyi L. Hagerty J. King T. Ridley I. Trilling D. et al. ***POSTER LOCATION #384***
Initiating a USGS Assessment of Asteroid Mineral Resources **[#2254]**
The USGS, with the assistance of others, is working on a formal assessment of asteroid mineral resources.

GENESIS: LATEST RESULTS [T324]

Goreva Y. S. Burnett D. S. Jurewicz A. J. Guan Y. ***POSTER LOCATION #385***
Using Combination of Near Surface SIMS and ToF-SIMS Depth Profiles as a Success Criteria for Genesis Solar Wind Collector Cleaning **[#2253]**
Genesis collector fragments that appear clean to surface sensitive techniques may carry buried contamination if oxidizing cleaning techniques were employed.

Jurewicz A. J. G. Rieck K. D. Wadhwa M.
Burnett D. S. Hervig R. et al. ***POSTER LOCATION #386***
New Constraints on SW Mg Isotopes from Understanding Genesis DoS Collectors, with Implications **[#2350]**
SW Mg isotopes from Genesis DoS gives a plausible, non-zero fractionation when the diamond-like carbon is assumed chemically and structurally inhomogeneous.

Kuhlman K. R. Kim H. Jurewicz A. J. G. Gonzalez C. P. Allums K. K. ***POSTER LOCATION #387***
Catastrophic Impact of Silicon on Silicon: Unraveling the Genesis Impact Using Sample 61881 **[#2460]**
Scanning transmission electron microscopy was used to investigate the interface between Genesis silicon sample 61881 and silicon contamination on its surface.

Kuhlman K. R. Schmeling M. Gonzalez C. P.
Allums K. K. Allton J. H. et al. ***POSTER LOCATION #388***
Small Particulate Contamination Study of Genesis Flight Sample 61423 **[#2499]**
Cellulose acetate extraction replicas were used to clean Genesis silicon sample 61423. TRXRF and SEM were used to characterize the efficacy of the replicas.

Koeman-Shields E. C. Huss G. R. Ogliore R. C.
Jurewicz A. J. G. Burnett D. S. et al. ***POSTER LOCATION #389***
Hydrogen Fluence Calculated from Genesis Collectors **[#2800]**
We present final H-fluence data from Genesis DOS collectors for four solar wind regimes, compare with the Genesis Ion Monitor, give implications, and future work.

Rieck K. D. Jurewicz A. J. G. Burnett D. S.
Hervig R. L. Williams P. et al. ***POSTER LOCATION #390***
Bulk Solar Wind Na and K Measured in Genesis Collectors **[#2922]**
Bulk solar wind Na and K elemental abundances were measured in Genesis silicon and diamond-like carbon collectors using secondary ion mass spectrometry.

Allton J. H. Gonzalez C. P. Allums K. K. ***POSTER LOCATION #391***
Genesis Solar Wind Science Canister Components Curated as Potential Solar Wind Collectors and Reference Contamination Sources **[#1171]**
The science canister for the Genesis sample return mission has surfaces which were exposed to the solar wind and potentially useful for solar wind science.

EXOPLANETS… OR PLANET X? [T325]

Costa G. Jacobson N. S. Fegley B. Jr. ***POSTER LOCATION #393***
Vaporization and Thermodynamics of Forsterite-Rich Olivine **[#1454]**
The vaporization behavior and thermodynamic properties of fosterite-rich olivine have been explored by high-temperature Knudsen effusion mass spectrometry.

Melwani Daswani M. Kite E. S. ***POSTER LOCATION #394***
Constraints on H_2O and H_2 Proportions in the Volatile Envelopes of Young, H_2-Producing, Small-Radius Exoplanets **[#2866]**
At right fO_2 / Outgas H_2 envelopes / Kepler small planets.

Margot J. L. ***POSTER LOCATION #395***
A Quantitative Criterion for Defining Planets **[#2699]**
A simple criterion can be used to generalize and simplify the definition of a planet. All eight planets and all classifiable exoplanets satisfy the criterion.

Holt T. R. Hurley J. R. ***POSTER LOCATION #396***
Stability of a Habitable Zone Jovian Planet in the Presence of a Second Jovian **[#2914]**
Multiple SWIFT simulations of two jovian planets are undertaken to examine the orbital stability of a theoretical Jovian in the habitable zone.

Saxena P. Petro N. E. Mandell A. M. ***POSTER LOCATION #397***
The Atmospheric Evolution of Magma-Ocean Worlds: Application to the Early Moon and Exoplanets **[#1242]**
The Early Moon may have possessed a moderately thick and dynamic atmosphere akin to some exoplanets due to radiative contributions from the Sun, Earth and LMO.

Kite E. S. Fegley B. Schaefer L. Gaidos E. ***POSTER LOCATION #398***
Volcanism on Magma Planets: Extreme Volcanism is Regulated by Planet Mass, Temperature, and Initial Composition **[#1601]**
The daysides of close-in rocky exoplanets, which are now being observed, are surface magma pools. We provide estimates of outgassing rates and magma composition.

Futó P. ***POSTER LOCATION #399***
Earth-Like Interior Structure Models for the Transiting Terrestrial Exoplanets: Kepler-78 b and Kepler-93 b **[#1018]**
It has been found that Kepler-78b and Kepler-93b have a similar interior structure as of Earth.

PLANETARY GEOLOGIC MAPPING [T326]

Prockter L. M. Kinczyk M. J. Byrne P. K.
Denevi B. W. Head J. W. III et al. ***POSTER LOCATION #401***
The First Global Geological Map of Mercury **[#1245]**
We present the first global geological map of Mercury, using MESSENGER image data.

Goosmann E. Buczkowski D. L. Ernst C. M. Denevi B. W. Kinczyk M. J. ***POSTER LOCATION #402***
Geologic Map of the Caloris Basin, Mercury **[#1254]**
We present a 1:5M geologic map of the Caloris basin, based on MESSENGER data and previously published scientific analyses.

Wright J. Rothery D. A. Balme M. R. Conway S. J. ***POSTER LOCATION #403***
Preliminary Findings from Geological Mapping of the Hokusai (H5) Quadrangle of Mercury **[#2067]**
This is the first quadrangle geological map of this region. The map will be produced at a 1:2M scale. We introduce the prominent features of the area.

Galluzzi V. Guzzetta L. Mancinelli P. Giacomini L. Ferranti L. et al. ***POSTER LOCATION #404***
Merging of New 1:3M Mercury Geologic Maps at Northern Mid-Latitudes: Status Report **[#2119]**
This work describes the newly mapped quadrangles of Mercury H02, H03, H04, H06 and the methods used for merging these products into an unique 1:3M geologic map.

Hynek B. M. Robbins S. J. Osterloo M. K.
Mueller K. Gemperline J. et al. ***POSTER LOCATION #405***
Unlocking Mercury's Geological History with Detailed Mapping of Rembrandt Basin **[#2312]**
Draft geologic map of the Rembrandt basin, Mercury (to be submitted to the USGS) is unraveling the complex history of this region.

Liu J. Z. Guo D. J. Chen S. B. Sun Y. Chen J. P. et al. ***POSTER LOCATION #406***
Chinese 1:2.5 M Geologic Mapping of the Global Moon **[#2039]**
This abstract talks about the Chinese lunar global geologic mapping at the scale of 1:2.5 M, including the data, mapping objectives and contents, and approachs.

Sliz M. U. Spudis P. D. ***POSTER LOCATION #407***
New Geological Map of the Lunar Crisium Basin **[#1678]**
An updated geological map of the Crisium Basin allowed compositional studies and identification of possible melt sheet remnants within the Mare Crisium.

Han K. Y. Ding X. Z. Pang j. F. ***POSTER LOCATION #408***
Geological Mapping of Sinus Iridum Area of the Moon Based on the Chang'e-1 Data of China **[#1825]**
Based on CCD image, DEM data obtained by the Chang'e-1 lunar exploration project of China in 2007, a 1:2.5M-scale digital geological map of Sinus Iridum area was compiled.

Yingst R. A. Chuang F. C. Berman D. C. Mest S. C. ***POSTER LOCATION #409***
Geologic Mapping of the Planck Quadrangle of the Moon (LQ-29) **[#1188]**
As part of a new systematic lunar geologic mapping effort, we present a 1:2,500,000-scale geologic map of the lunar Planck Quadrangle (Lunar Quadrangle 29).

Mest S. C. Garry W. B. Ostrach L. R. Han S.-C. Staid M. I. ***POSTER LOCATION #410***
Characterization of Lunar Farside Plains **[#1565]**
Plains materials within the lunar farside highlands are being investigated to evaluate their nature as mare, cryptomare, impact melt, or impact ejecta.

Wang J. Zhou C. H. Cheng W. M. Luo W. ***POSTER LOCATION #411***
Automatic Mapping of Landforms from DEM on Moon **[#1302]**
Iso cluster unsupervised classification performs landforms mapping of Moon on input raster bands of six morphologic parameters.

Salih A. L. Mühlbauer M. Grumpe A. Pasckert J. H. Wöhler C. et al. ***POSTER LOCATION #412***
Automatic Age Map Construction for the Floor of Lunar Crater Tsiolkovsky **[#1526]**
A spatially resolved CSFD-based age map of the lunar crater Tsiolkovsky was constructed by applying an automatic crater detection algorithm to Kaguya TC data.

Mohr K. J. Williams D. A. Garry W. B. ***POSTER LOCATION #413***
Geologic Mapping of Ascraeus Mons, Mars **[#1550]**
Preliminary geologic mapping of Ascraeus Mons has provided diverse lava morphologies indicating differing types of eruptions styles during shield formation.

Caudil C. M. Osinski G. R. Tornabene L. L. McEwen A. S. ***POSTER LOCATION #414***
Geologic Mapping of Bakhuysen Crater, Mars: Insights into Large Basin Impact Cratering Processes **[#2360]**
Bakhuysen Crater is mapped here to lend to the understanding of basin structures at the meter to sub-meter scale using current remote sensing datasets.

Huff A. E. Hunter M. A. Skinner J. A. Jr. Hare T. M. ***POSTER LOCATION #415***
Digitization of the 1:5,000,000-Scale Mariner 9-Based Geological Maps of Mars: Packaging, Deployment and Analysis **[#2501]**
The 1:5,000,000-scale Mariner 9-based geologic maps of Mars were digitized using ArcGIS and will be published as a historical resource in a modern format.

Skinner J. A. Jr. Fortezzo C. M. Barton M. L. ***POSTER LOCATION #416***
Surface and Section Geology of Non-Crater Basin Strata Exposed in Central Hadriacus Cavi, Mars **[#2806]**
We describe and interpret strata exposed in the Hadriacus Cavi, NE Hellas basin rim of Mars based on 1:24,000 scale geologic mapping and section analyses.

Fortezzo C. M. Gullikson A. L. Rodriguez J. A. P. Platz T. Kumar P. S. ***POSTER LOCATION #417***
Mapping Geology in Central Valles Marineris, Mars **[#1981]**
Mapping in central Valles Marineris is nearing completion. New results include categorized mass wasting deposits, subdivided ILD, and an initial CMU and DMU.

Crown D. A. Berman D. C. Platz T. ***POSTER LOCATION #418***
Geologic Mapping of Alba Mons, Mars **[#2383]**
Geologic mapping of Alba Mons provides new constraints on the distribution, styles, and timing of volcanism in the northern Tharsis region of Mars.

Martin J. R. Hynek B. M. Chojnacki M. ***POSTER LOCATION #419***
Geologic Mapping of Putative Paleolake Deposits in a Coprates Catena, Mars **[#2625]**
Work on a 1:25,000-scale map in the Coprates Chasma quadrangle catena revealed putative lake deposits, interpreted as laterally continuous basal deposits.

Wilson S. A. Grant J. A. ***POSTER LOCATION #420***
Geologic Mapping in Margaritifer Terra on Mars and a Closer Look at the Confluence of Nirgal and Uzboi Valles **[#2505]**
Mapping at 1:1M scale in Uzboi Vallis and vicinity constrains the timing, source, and duration of aqueous and other geomorphic processes in shaping the landscape.

Chojnacki M. Hynek B. M. Black S. R. Hoover R. Martin J. R. ***POSTER LOCATION #421***
Geologic Mapping of the Coprates Chasma (MTM -15057), Mars: Year 2 **[#2828]**
We report work related to a geologic map in eastern Coprates Chasma that will be submitted for peer-review and publication by the USGS.

Pascuzzo A. C. Mustard J. F. Newton R. M. ***POSTER LOCATION #422***
Geologic Mapping and Characterization of Nicholson Crater, Mars **[#2435]**
Morphologic analyses of Nicholson crater-understanding its recent geologic past and likely origin of its 3.6 km thick sedimentary central mound deposit.

Tirsch D. Pritzkow C. Söte T. Nass A. Walter S. et al. ***POSTER LOCATION #423***
HRSC Mapping Database: A New Tool to Collect and View Available HRSC-Based Geological Maps Worldwide **[#1849]**
We present a new online database for quick and easy access to already published HRSC-based geological mappings on Mars.

Ebinger E. K. Mustard J. F. ***POSTER LOCATION #424***
Classification of Curvilinear Ridges in the Nilosyrtis Highlands of Mars **[#2731]**
We mapped the characteristics, orientations, elevations, and geologic contexts of over 12,000 ridges in the Nilosyrtis Highlands to test hypotheses of formation.

Clark C. S. Clark P. E. Stooke P. J. ***POSTER LOCATION #425***
Constant-Scale Natural Boundary Mapping and (I) Graphic Analysis of Shear Cracks on Enceladus, (II) Geomorphology on Comet 67P/Churyumov-Gerasimenko, and (III) Context of Tombaugh Regio on Pluto **[#1044]**
Here we apply our natural boundary based cartographic alternative to three small body, very different targets: Enceladus, Comet 67P, and Pluto.

Lazareva M. S. Kokhanov A. A. Karachevtseva I. P. ***POSTER LOCATION #426***
Mapping of Outer Planet Satellites **[#1074]**
Geomorphologic studies and mapping of Gallilean moons and Enceladus on base of new created CPN are described.

Stryk T. Stooke P. J. ***POSTER LOCATION #427***
The Surface of Asteroid 5535 Annefrank **[#1148]**
In 2002, the Stardust spacecraft passed 5535 Annefrank. Images presented as processed by T. Stryk, with mapping of the asteroid surface by P. Stooke.

Johnson C. A. DellaGiustina D. N. ***POSTER LOCATION #428***
Thematic Map of Hazards and Regions of Interest for Asteroid Bennu **[#1672]**
This abstract describes the thematic map of Hazards and Regions of Interest, a data product that highlights hazards and regions of exclusion and interest.

Lee J.-C. Massironi M. Giacomini L. Ip W.-H. OSIRIS Team ***POSTER LOCATION #429***
Geomorphological Mapping on the Southern Hemisphere of Comet 67P/Churyumov-Gerasimenko **[#1727]**
We provide the geomorphological maps on the southern hemisphere of comet 67P/Churyumov-Gerasimenko with linear features and geological units identified.

MARS GEOMORPHOLOGY FROM ORBIT [T327]

McEwen A. S. Sutton S. S. Hansen C. J. HiRISE Team ***POSTER LOCATION #431***
The First Decade of HiRISE at Mars **[#1372]**
Happy DTMs are here again, for Landing Sites you can trust. Size does matter. Remember the anaglyph!

Fernando J. Schmidt F. Douté S. ***POSTER LOCATION #432***
Martian Surface Microtexture Estimated from Orbit: A New Perspective for the Characterization of Geological Processes **[#1665]**
The surface microtexture estimated from orbit using photometry shows that Mars experimented varied geological processes still preserved in the microtexture.

Hill J. R. Christensen P. R. ***POSTER LOCATION #433***
A Quality Constrained THEMIS Daytime Infrared Global Mosaic **[#2326]**
A quality constrained version of the THEMIS Day IR Global Mosaic has been compiled using images acquired during the first fourteen years of the Odyssey mission.

Liu Y. Glotch T. D. Scudder N. A. Kraner M. L. Condus T. et al. ***POSTER LOCATION #434***
Spectral Unmixing of CRISM Hyperspectral Data Over Southwest Melas Chasma, Mars **[#2838]**
We report the spectral unmixing analysis of CRISM data over SW Melas Chasma and how we use the derived mineral abundances to better understand its water history.

Lowe D. R. Bishop J. L. Beyer R. A. Wilhelm M. B. Wray J. J. et al. ***POSTER LOCATION #435***
Characterization of Aeolian and Sedimentary Features in the Mawrth Vallis Region, Mars **[#1651]**
Bedrock in the Mawrth Vallis region, Mars, includes over 300 m of interlayered sediments including aeolian basaltic detritus and subaqueous clay-bearing beds.

Orosei R. Cantini F. Caprarelli G. Carter L. M. Papiano I. et al. ***POSTER LOCATION #436***
Radar Sounding by MARSIS Over Lucus Planum, Mars **[#1869]**
Probed by the MARSIS radar sounder, Lucus Planum is found to be laterally inhomogeneous, its central part consisting of denser, more radar-attenuating material.

MARTIAN GULLIES, SLOPE STREAKS, AND MASS WASTING [T328]

Glines N. H. Gulick V. C. Freeman P. M. Rodriguez J. A. P. Hargitai H. ***POSTER LOCATION #437***
Indications of Meltwater-Driven Gully Formation in Moni Crater, Mars **[#2464]**
Glacial and post-glacial processes have significantly modified the landscape of Moni Crater, Mars, where meltwater is likely the key gully formation mechanism.

Conway S. J. Harrison T. N. Lewis S. R. Soare R. J. Balme M. R. et al. ***POSTER LOCATION #438***
Martian Gully Orientation and Slope Used to Test Meltwater and Carbon Dioxide Hypotheses **[#1973]**
We use re-analysis of the global gully-data and 1D climate models to assess the CO_2 and meltwater hypotheses for gully-formation.

Puga F. Pina P. ***POSTER LOCATION #439***
13 Years of Temporal Fading Quantification in Dark Slope Streaks from Lycus Sulci **[#2076]**
We present a tool to measure the full pixel analyses albedo contrast between slope streaks and their neighborhood regions.

Sarkar R. Singh P. Ganesh I. ***POSTER LOCATION #440***
Origin of Mass Wasting Features in Juventae Chasma, Mars **[#1876]**
This contribution reports mass- wasting features originating from the walls of Juventae Chasma.

Debniak K. T. Kromuszczynska O. ***POSTER LOCATION #441***
Geomorphological Characteristics of Mass-Wasting Features in Ius Chasma, Valles Marineris, Mars **[#1890]**
Mass-wasting features mapped in Ius Chasma have been assigned to six major categories. The results present a new classification of large landslide deposits.

Pietrek A. Weis J. Kenkmann T. ***POSTER LOCATION #442***
Morphometric Analysis and Comparison of Martian Landslides and Layered Deposits of Impact Crater Ejecta Blankets **[#2250]**
Morphometric and morphologic comparison of longitudinal striations on Coprates Landslide and the DLE crater Steinheim to study similarities in emplacement style.

MARS GEOMORPHOLOGY: IMPACT-RELATED [T329]

Craddock R. A. Bandeira L. Howard A. D. ***POSTER LOCATION #443***
Assessment of Potential Regional Variations in Modified Impact Crater Morphology on Mars **[#2404]**
Modified craters were analyzed for differences in morphology that could reflect changes in the climate over time. We found evidence for a global atmosphere.

Sheehan B. C. Barlow N. G. ***POSTER LOCATION #444***
Sinuosity and Ejecta Extent of Martian Impact Craters in the Northern Hemisphere **[#1307]**
We investigated lobateness and ejecta mobility variations in martian layered ejecta craters, finding no strong trends with location, elevation, or albedo.

Whitmore P. G. Frey H. V. ***POSTER LOCATION #445***
Buried Impact Craters at Hesperia Planum, Mars **[#2652]**
Analysis of quasi-circular depressions (QCDs) in Mare Tyrrhenum indicates that the center of Hesperia Planum is more deeply buried than the boundary.

Michalski J. R. Bleacher J. E. ***POSTER LOCATION #446***
Deep Martian "Craters" (or Collapse Features) with High Depth/Diameter Ratios: Outstanding Questions Related to Processes and Timing **[#1611]**
Some deep crater-like features on Mars have high depth/diameter ratios and might not be impact craters at all. We discuss possibilities for their origins.

Vijayan S. Sinha R. K. ***POSTER LOCATION #447***
Multi Layered Ejecta (MLE) Craters Over Arabia Terra, Mars: Crater Ages and Its Implications **[#1864]**
Multi-layered ejecta craters formed over the Arabia Terra region date from ~3.66 Ga to ~30 Ma suggesting their reproducible nature over time.

Beddingfield C. B. Moersch J. E. McSween H. Y. ***POSTER LOCATION #448***
Martian Crater Thermal Inertia: A Function of Degradation or Rim Mantling? **[#2556]**
We test two hypotheses for why martian crater rims exhibit various TI values. These values are likely affected by rim mantling and not crater degradation state.

Watters W. A. Fassett C. I. Gibson R. Hundal C. ***POSTER LOCATION #449***
Morphometric Characterization of Crater Modification in Diverse Settings on Mars **[#2972]**
We measure morphometric parameters for simple craters in CTX and HiRISE-derived stereo topography and relate measured distributions to dominant surface processes.

Kukkonen S. Kostama V.-P. ***POSTER LOCATION #450***
Crater Counts by Using Small Impact Craters of the CTX and HiRISE Images: Results from the Harmakhis Vallis Channel, Mars **[#2052]**
The CTX- and HiRISE-based crater count results from Harmakhis Vallis of Mars are compared to discuss the usability of small craters in age determination.

MARS GEOMORPHOLOGY: ROVING ON MARS [T330]

Arvidson R. E. Maimone M. ***POSTER LOCATION #451***
Curiosity Rover Mobility Issues Crossing Martian Megaripple Fields **[#1137]**
A Curiosity ripple-crossing experiment was conducted to understand mobility issues and their relationships to terrain and sand material properties.

Erkeling G. Ivanov M. A. Tirsch D. Reiss D. Bishop J. L. et al. ***POSTER LOCATION #452***
Bradbury Crater, Mars: Morphology, Morphometry, Mineralogy, and Chronostratigraphy **[#1451]**
Bradbury crater located at south Isidis Planitia reveals a diverse and complex setting of fluvial and lacustrine landforms.

Edgett K. S. Yingst R. A. Edgar L. A. Gasda P. J. Banham S. G. et al. ***POSTER LOCATION #453***
Recent Observations by Curiosity's Mars Hand Lens Imager (MAHLI) of Rock Strata and Eolian Sediment on the Lower North Slope of Aeolis Mons, Gale Crater, Mars **[#1382]**
Recent observations by MAHLI of Murray formation mudstones, Stimson formation sandstones, Stimson/Murray erosional unconformity, and Bagnold eolian dune sands.

Gasnault O. Le Mouélic S. Newsom H. E.
Johnson J. R. Le Deit L. et al. ***POSTER LOCATION #454***
Imaging at Long Distance with ChemCam Remote Micro-Imager Onboard MSL **[#2329]**
This abstract illustrates geomorphology studies that can be accomplished by the ChemCam RMI camera on Mars through a few examples of long distance mosaics.

Heydari E. Calef F. III Parker T.
Rowland S. K. Williams R. M. E. et al. ***POSTER LOCATION #455***
Unconformity Surfaces of the Kimberley Region and Their Significance on Sedimentological Evolution of Gale Crater, Mars **[#1795]**
A major unconformity is identified in Gale crater. It separates strata deposited during crater filling from those formed after crater excavation.

Anderson R. B. Dundas C. M. Edgar L. A.
Gasnault O. Le Mouélic S. et al. ***POSTER LOCATION #456***
Ongoing and Planned Long Distance Remote Micro Imager Observations of Targets on Aeolis Mons Identified from Orbit **[#1770]**
Watching Mt. Sharp with / Curiosity's spyglass / to see more clearly.

Watkins J. A. Grotzinger J. Stein N. Banham S. G. Gupta S. et al. ***POSTER LOCATION #457***
Paleotopography of Erosional Unconformity, Base of Stimson Formation, Gale Crater, Mars **[#2939]**
We quantitatively reconstruct the paleotopography along a significant erosional unconformity in lower Mt. Sharp, Gale crater using rover and orbital data.

Dickson J. L. Head J. W. Kulowski M. ***POSTER LOCATION #458***
Active Flows at the Mars Science Laboratory Landing Site: Results from a Survey of Mastcam Imagery Through Sol 971 **[#1726]**
Low-albedo flows correlated with outcrop fractures are documented. This is an active process that suggests more dynamic slope processes than previously thought.

Reynolds M. J. II Rice M. S. Johnson J. R. Bell J. F. III Studer-Ellis G. ***POSTER LOCATION #459***
MER Spirit Albedo Observations: Insights to Surface Processes and Atmospheric Phenomena at Gusev Crater, Mars **[#1804]**
Albedo measurements from MER Spirit provide insights to surface evolution at Gusev Crater, Mars, including a temporal analysis of a scene for over 250 sols.

Rice J. W. Chuang F. C. Berman D. C. Crown D. A. ***POSTER LOCATION #460***
Morphologic and Topographic Analyses of Geologic Features in the Columbia Hills, Gusev Crater, Mars **[#2904]**
Exploration of the Columbia Hills in Gusev crater by the Spirit rover between 2004 and 2010 revealed a diversity of geologic materials and processes.

House-Hay E. H. Lewis K. W. ***POSTER LOCATION #461***
Bedding Orientation Along the Opportunity Rover Traverse **[#2571]**
We analyze bedding geometry within the Burns Formation using stereo data from the Opportunity rover, focusing on outcrops outside of well-studied craters.

Herkenhoff K. E. Arvidson R. E. Mittlefehldt D. W. Sullivan R. J. ***POSTER LOCATION #462***
Opportunity Microscopic Imager Results from the Western Rim of Endeavour Crater **[#1664]**
The Mars Exploration Rover Opportunity continues to explore the textures of ancient rocks exposed in the rim of Endeavour crater using its Microscopic Imager.

GEOCHEMISTRY AND PETROLOGY OF MARS [T331]

Beaty D. W. McSween H. Y. Goreva Y. S. Hausrath E. Herd C. D. K. et al. ***POSTER LOCATION #463***
Recommended Maximum Temperature for Mars Returned Samples **[#2662]**
This abstract describes scientific constraints for the maximum temperature of the samples to be collected by the Mars 2020 sample-collecting rover.

Cassata W. S. ***POSTER LOCATION #464***
$^{40}Ar/^{39}Ar$ Systematics and Noble Gas Components in the Early Amazonian Martian Meteorite Northwest Africa 8159 **[#2118]**
Ar-Ar data confirm an early Amazonian age for NWA 8159. Martian atmospheric Xe, either from the early Amazonian or a later shock event, is present in NWA 8159.

Park J. Nyquist L. E. Herzog G. F. Turrin B. D. Lindsay F. N. et al. ***POSTER LOCATION #465***
$^{40}Ar/^{39}Ar$ Ages of Nakhlites Miller Range (MIL) 090030, 090032 and 090136 **[#1821]**
We report the first Ar/Ar ages of the paired nakhlites MIL 090030, 090032 and 090136. We report crystallization ages of ~1.4 Ga and aqueous alteration of ~0.7 Ga.

Irving A. J. Andreasen R. Righter M. Lapen T. J. Busemann H. et al. ***POSTER LOCATION #466***
Northwest Africa 4480 Revisited: Petrologic, Isotopic, and Noble Gas Studies of an Unshocked, Maskelynite-Free Mafic Shergottite with a Long Cosmic Ray Exposure Age **[#2330]**
Shockingly unshocked, from a unique depleted martian mantle reservoir and launched ~16 million years ago. New isotopic data for intermediate shergottites too.

Combs L. M. Udry A. Day J. M. D. ***POSTER LOCATION #467***
Petrography and Mineral Chemistry of the New Enriched Lherzolitic Shergottite Northwest Africa 10169 **[#2804]**
NWA 10169 is a new lherzolitic shergottite with a bulk REE profile and mineral composition that closely resemble the enriched lherzolitic shergottites.

Provencio P. Shearer C. K. Bell A. S. Burger P. V. ***POSTER LOCATION #468***
Nano-Scale Investigation of Spinel-Orthopyroxene Intergrowths in Northwest Africa 8159. A Record of fO_2 But at What Temperature? **[#2411]**
We examine magnetite-orthopyroxene intergrowths in NWA 8159 to determine whether they are magmatic or subsolidus in origin.

Burger P. V. Shearer C. K. Papike J. J. Bell A. S. Muttik N. ***POSTER LOCATION #469***
Igneous Spinel Chemistry as a Function of Temperature and Oxygen Fugacity in Martian Melts **[#1769]**
We examine how the chemistry of igneous spinels, crystallized from a Yamato 980459 (Y98)-composition melt, reflect their formation conditions.

Sutton S. R. Rao M. N. Nyquist L. E. Ross D. K. ***POSTER LOCATION #470***
Vanadium K XANES Studies of Elephant Moraine A79001 Impact-Melt Glasses Revisited **[#2195]**
Vanadium K XANES of EETA79001 impact glasses shows V3+ with possible V2+ in Lith. A and V3+,V4+ in Lith. B, demonstrating the heterogeneity of shock reduction.

Basu Sarbadhikari A. Babu E. V. S. K. Vijaya Kumar T. ***POSTER LOCATION #471***
Olivine-Hosted Melt-Inclusions in Martian Meteorite Tissint **[#1836]**
Martian meteorite Tissint underwent a unique petrogenesis through martian mantle and crust, recorded by different generations of olivine-hosted melt inclusions.

Castle N. Herd C. D. K. ***POSTER LOCATION #472***
Trace Elements in Martian Meteorites and the Olivine Peritectic Reaction: Insights from Tissint Experimental Petrology **[#2467]**
Results of experimental investigation of Tissint, specifically the role of oxidation during crystallization; application to shergottites and martian volcanism.

Collinet M. Grove T. L. ***POSTER LOCATION #473***
Melting Conditions of Alkali- and Phosphorus-Rich Primary Magmas from the Martian Mantle **[#2837]**
Low-degree experimental melts constrain the incongruent melting reactions of the martian mantle and the effect of variable amounts of phosphorus.

Shearer C. K. Bell A. S. Burger P. V. Papike J. J. Jones J. et al. ***POSTER LOCATION #474***
The Mineralogy, Geochemistry, and Redox State of Multivalent Cations During the Crystallization of Primitive Shergottitic Liquids at Various fO_2. Insights into the fO_2 of the Martian Mantle and Crustal Influences on Redox Conditions of Martian Magmas **[#1373]**
This presentation explores the effect of fO_2 on the liquid line of descent (LLD) for primitive shergottite liquid compositions.

Ferdous J. Brandon A. D. Peslier A. H. Pirotte Z. ***POSTER LOCATION #475***
Basaltic Shergottite Northwest Africa 856: Differentiation of a Martian Magma **[#2126]**
The crystallization history of an enriched basaltic shergottite, NWA 856, constrains differentiation processes in martian magmatic systems.

Peluso D. O. Balta J. B. ***POSTER LOCATION #476***
Rare Earth Element Variations in Recharging Martian Magma Chambers: Impact on Shergottite Compositions **[#1789]**
Rare earth element variations during resupply of active martian magma chambers.

Koike M. Takahata N. Sano Y. Nagaishi K. Ishikawa T. ***POSTER LOCATION #477***
Lithium and Lead Isotopic Signatures of Martian Sub-Surface Components Recorded in Shergottites Phosphates **[#1843]**
We present our preliminary in-situ δ7Li analyses of shergottites phosphates along with U-Pb data. These phosphates might provide martian crustal information.

Jacobs G. M. Anand M. Franchi I. A. Grady M. M. ***POSTER LOCATION #478***
Investigating the History of Proto-Breccia Clasts in Martian Regolith Breccia Northwest Africa 7034 **[#2787]**
Proto-breccia clasts are identified and their histories evaluated using SEM and C-T data, in martian brecciated meteorite NWA 7034.

Santos A. R. Agee C. B. Humayun M. McCubbin F. M. Shearer C. K. ***POSTER LOCATION #479***
Petrogenesis of Igneous-Textured Clasts in Martian Meteorite Northwest Africa 7034 **[#2971]**
New chemical data from igneous-textured clasts within NWA 7034 provides insight into their formation history and suggests they derive from separate sources.

McCubbin F. M. Barnes J. J. Santos A. R. Boyce J. W. Anand M. et al. ***POSTER LOCATION #480***
Hydrogen Isotopic Composition of Apatite in Northwest Africa 7034: A Record of the "Intermediate" H-Isotopic Reservoir in the Martian Crust? **[#1326]**
Reservoirs abound / Is hydrogen in the mix? / We may never know.

MacArthur J. L. Bridges J. C. Hicks L. J. Burgess R. Joy K. H. ***POSTER LOCATION #481***
Water and the Formation of the Northwest Africa 8114 Martian Regolith **[#2916]**
NWA 8114 pyroxene recrystallised and oxidised to magnetite and amorphous silicate, with later low-T goethite formation, shown by TEM and synchrotron FTIR, XRD.

Peslier A. H. Cintala M. J. Montes R. Cardenas F. ***POSTER LOCATION #482***
FTIR Analysis of Water in Pyroxene and Plagioclase in Allan Hills 84001 and Nakhlites **[#1173]**
Degassing and shock control the water content of pyroxene and plagioclase/maskelynite in ALH 84001 and nakhlites.

Martin A. M. Médard E. Lanzirotti T. ***POSTER LOCATION #483***
3D-Mapping of Fayalite Oxidation Using Synchrotron: Implications for Volatiles Evolution During Planetary Crust Formation **[#3059]**
We present Fe redox maps of oxidized fayalite crystals oriented in three crystallographic directions, and constrain the evolution and role of volatiles.

Takenouchi A. Mikouchi T. ***POSTER LOCATION #484***
Iron Micro-XANES Analysis of Colored Olivine in Martian Meteorites **[#1755]**
We analyzed various colored olivine in ten martian meteorites by SR-XANES and considered their formation processes combining previous SEM observation results.

McKeeby B. E. Mahmood S. Lowe M. Greenwood J. P. ***POSTER LOCATION #485***
An Investigation of Jarosite and Associated Alteration Mineralogy in Martian Meteorite Roberts Massif 04262 Using Micro-Raman Spectroscopy **[#1311]**
Martian thin section RBT 04262,30 was studied using a micro-Raman spectroscopy, SEM BSE and EDS. Jarosite was imaged as vein fill crosscutting sulfate grains.

Vaci Z. Newsom H. E. Agee C. B. Brearley A. J. Tschauner O. et al. ***POSTER LOCATION #486***
Electron Probe Microanalysis, Micro X-Ray Diffraction, and Deuterium-Hydrogen Analysis of Hydrous Alteration in Martian Meteorites Northwest Africa 10416 and 8159 **[#2538]**
Altered olivine grains in NWA 8159 and 10416 were analyzed by electron microprobe. NWA 10416 was further analyzed by micro-XRD and D/H mass spectrometry.

Usui T. Alexander C. M. O'D. Wang J. Simon J. I. Jones J. H. ***POSTER LOCATION #487***
Coordinated In Situ NanoSIMS Analyses of H-C-O Isotopes in Allan Hills 84001 Carbonates **[#1780]**
This study provides a new estimate on the hydrogen isotopic composition (D/H = ~1.5-2×SMOW) of the Noachian surface water.

Izawa M. R. M. Schmidt M. E. Berger J. A. Gellert R. ***POSTER LOCATION #488***
Evaluating the Influence of Magamatic Sulphides on Chalcophile Element Enrichments in the Bradbury Assemblage, Gale Crater, Mars, Using APXS Measurements **[#2705]**
Chalcophile element enrichments in Gale crater measured by APXS may be influenced by magmatic sulphides.

Adcock C. T. Tschauner O. Hausrath E. M. ***POSTER LOCATION #489***
An Investigation of Shock Effects on Mars-Relevant Phosphate Minerals: Shock-Transformation of Chlorapatite **[#1577]**
Results and implications of shock-recovery experiments and synchrotron studies on Mars-relevant phosphate minerals.

Walton E. L. Tschauner O. Herd C. D. K. Agee C. B. ***POSTER LOCATION #490***
Shock Effects in New Martian Olivine Basalt Northwest Africa 10416: Distinct from Shergottites but Akin to Northwest Africa 8159 **[#1639]**
Shock effects in new martian basalt NWA 10416 are described which imply a relatively low shock pressure but longer shock duration compared to shergottites.

Hu J. Sharp T. G. ***POSTER LOCATION #491***
Shocked Feldspar in Martian Meteorites: Evidence Against Pervasive Melting and Resetting **[#2542]**
We investigate the textures of shock-induced feldspar glass in martian meteorites and suggest the amorphization occurs mostly under moderate to low temperature.

Kaiden H. Misawa K. Niihara T. ***POSTER LOCATION #492***
Model for the Shock-Resetting Conditions of Uranium-Lead Systematics of Baddeleyite: Implications for Martian Meteorite Chronology **[#3019]**
We evaluated the conditions of shock-resetting of U–Pb isotopic systematics in baddeleyite and conclude that U-Pb isotopic systematics was not disturbed.

Arakawa S. Nakamoto T. ***POSTER LOCATION #494***
Compound Chondrule Formation Via Instantaneous Crystallization of Supercooled Droplets Triggered by Collisions **[#2029]**
This model can reproduce three features: non-porphyritic texture, size ratio of primary to secondary, and the fraction of compound chondrules.

Varela M. E. ***POSTER LOCATION #495***
Glasses in Chondrules: Understanding the Role of Liquids During Chondrule Formation Processes **[#1472]**
Major and trace elements in glasses of different types of chondrules are compared to understand the role of liquids (the glass precursor) during crystal growth.

Florentin L. Faure F. Tissandier L. Deloule E. Lequin D. ***POSTER LOCATION #496***
Heated Olivine-Hosted Glass Inclusions from Allende CV3 Meteorite: Insight on Chondrules' Origin **[#1863]**
Glass inclusions from Allende chondrules were heated up to 1750°C. Na_2O results suggest that olivines formed in a Na-rich environment.

Jacquet E. Gounelle M. Alard O. ***POSTER LOCATION #497***
Enstatite Chondrite Chondrules: Condensation Versus Sulfidation **[#1012]**
Oldhamite in enstatite chondrites may have formed by sulfidation in chondrule mesostases before expulsion rather than by condensation at high C/O ratios.

Hanna R. D. Ketcham R. A. ***POSTER LOCATION #498***
3D Morphology of Fine-Grained Rims in CM Murchison **[#2185]**
Using XCT we are measuring the 3D morphology of FGRs in Murchison. Our data supports FGR formation in the nebula with later modification on the parent body.

Vollmer C. Pelka M. Leitner J. Janssen A. Hoppe P. ***POSTER LOCATION #499***
TEM Investigations of Amorphous Silicates in Fine-Grained Rims from Antarctic CR2 Chondrites **[#1933]**
We investigated amorphous silicates in fine-grained rims of Antarctic CR2 chondrites by FIB-TEM. Mineralogy and texture indicate nebular formation conditions.

Budde G. Kleine T. Kruijer T. S. Burkhardt C. Metzler K. ***POSTER LOCATION #500***
Isotopic Complementarity of Chondrules and Matrix and the Age and Origin of Chondrules **[#1453]**
Complementary W isotope anomalies of Allende chondrules and matrix require that both formed from a common nebular reservoir within a narrow time interval.

Yamanobe M. Nakamura T. Nakashima D. ***POSTER LOCATION #501***
Oxygen Isotope Ratios of Chondrules and Isolated Forsterite and Olivine Grains in the WIS91600 Carbonaceous Chondrite from D-Type Asteroid **[#1861]**
We present a suite of date for oxygen isotope ratios of chondrules and chondrule fragments from D-type asteroids to understand that of the outer solar system.

Telus M. Huss G. R. Nagashima K. Ogliore R. C. Tachibana S. ***POSTER LOCATION #502***
^{60}Fe-^{60}Ni Systematics of Chondrules: Constraints from In Situ Analyses **[#1816]**
We use in situ Fe-Ni isotope analyses to constrain the upper and lower limit of the initial $^{60}Fe/^{56}Fe$ ratio of chondrules in unequilibrated ordinary chondrites.

Wetteland C. J. Patchen A. Sickafus K. E. McSween H. Y. Taylor L. A. ***POSTER LOCATION #503***
High-Current Proton Irradiations of Early Nebular Solids **[#2490]**
The irradiation conditions necessary for melting a silicate mixture of olivine-pyroxene-plagioclase using high-energy protons are investigated.

Dobrica E. Le Guillou C. Brearley A. J. ***POSTER LOCATION #504***
Hydration and Oxidation of Porous Microchondrules in Semarkona **[#2337]**
We have investigated the iron oxidation state of one porous microchondrule in Semarkona to understand if it has been modified by aqueous fluids.

CHONDRITES: CLASTS [T333]

Dobrica E. Brearley A. J. Ebel D. S. Weisberg M. K. Ziegler K. ***POSTER LOCATION #505***
A Highly Unusual Clast in Semarkona with a Complex Evolutionary History: Further Evidence of the Diversity of Solar Nebula Materials and Processes **[#2317]**
We have discovered a complex clast in Semarkona. This object appears to be the first documented example of such clastic material in this meteorite.

Ruzicka A. M. Schepker K. L. Greenwood R. C. Franchi I. A. ***POSTER LOCATION #506***
Combined Chemical-Oxygen Isotope Study of Large Igneous Inclusions in Ordinary Chondrites **[#2230]**
A combined geochemical and O isotope study of large igneous inclusions in ordinary chondrites suggest a variety of formation processes and settings.

Ebel D. S. Weisberg M. K. Dobrica E.
Bigolski J. N. Brearley A. J. et al. ***POSTER LOCATION #507***
Micro-Inclusions in a Layered Clast in Semarkona **[#1779]**
A unique ~6 mm diameter object in Semarkona (LL3.00) shows complex metal+Fe-oxide+FeS+FeO-free silicates core, a sulfide + oxide-free layer, and accreted micro-CAIs.

Niihara T. Misawa K. Yokoyama T. ***POSTER LOCATION #508***
Petrology and Mineralogy of an Igneous Clast in Northwest Africa 1665: Comparison with Alkali-Rich Igneous rock Fragments in Yamato-74442 **[#1891]**
We performed mineralogy and petrography of clasts in Northwest Africa 1685 comparison with those of alkali-rich rock fragments in Yamato-74442.

Corrigan C. M. Lunning N. G. ***POSTER LOCATION #509***
A Variety of Melt Clasts in Ordinary Chondrite Breccia Meteorite Hills 01004 **[#2729]**
Melted by impact / Antarctic meteorite / Many different clasts.

Goodrich C. A. Kring D. A. ***POSTER LOCATION #510***
A Large Igneous Clast in the Northwest Africa 092 Chondrite (L3.7): Xenolith from a Differentiated Parent Body or Product of an Ordinary Chondrite-Related Melt? **[#1233]**
We describe a new 1-cm melt clast in L3.7 NWA 092 and investigate whether it is a xenolith from a differentiated body or a product of an OC-related melt.

Kuehner S. M. Wittke J. H. Ziegler K. Irving A. J. ***POSTER LOCATION #511***
Mineralogy and Oxygen Isotopic Composition of Exotic F6 Chondrite Clasts in the Cumberland Falls Aubrite **[#2304]**
Black shock-melted F6 chondrite clasts in the Cumberland Falls aubrite contain distinctive sulfides and phosphides. Oxygen isotopes match those in NWA 7135.

Cervantes de la Cruz K. E. Ortega Gutiérrez F. Alba Aldave L. A.
Reyes Salas A. M. Ángeles García B. S. et al. ***POSTER LOCATION #512***
Impact Origin of Dark Inclusion: Nuevo Mercurio (c) H5–6 Ordinary Chondrite **[#2992]**
We show a dark inclusion in an equilibrated meteorite Nuevo Mercurio (c) and prove that it originated from a melt pocket-like fragment.

Johnson J. M. Zolensky M. E. Chan Q. Kring D. A. ***POSTER LOCATION #513***
Intriguing Dehydrated Phyllosilicates Found in an Unusual Clast in the LL3.15 Chondrite Northwest Africa 6925 **[#1608]**
Dehydrated clays abundant in an OC indicate wet past.

Greshake A. Hoppe P. Wirth R. ***POSTER LOCATION #514***
D/H-Ratio and Microstructure of a Strongly Hydrated Microclast in the Rumuruti Chondrite Northwest Africa 6828 **[#1026]**
The D/H ratio and microstructure of a hydrous microclast in the R chondrite NWA 6828 support an asteroidal origin of the Earth's water and volatile content.

CHONDRITES: CAIS, AOAS, AND OTHER REFRACTORIES [T334]

Kööp L. Davis A. M. Rout S. S. Villalon K. L. Heck P. R. ***POSTER LOCATION #515***
Investigations into the Formation Mechanisms of CM Hibonites at the Micro- to Nanoscale Using the SEM and TEM **[#2005]**
We studied the petrology of a PLAC and a SHIB using SEM and TEM. The goal is to gain new insights into the formation mechanisms of these CAIs.

Kööp L. Heck P. R. Busemann H. Maden C. Wieler R. et al. ***POSTER LOCATION #516***
Enhanced Cosmogenic Neon-21 and Helium-3 in Hibonite-Rich CAIs **[#1689]**
We report enhanced cosmogenic He-3 and Ne-21 abundances for two CM hibonites, which indicate precompaction exposure to cosmic rays.

Ivanova M. A. Shornikov S. I. Ryazantsev K. M. MacPherson G. J. ***POSTER LOCATION #517***
Model Calculations for Evaporation of Pristine CAIs Enclosed in the 3N Compound CAI from the Northwest Africa 3118 CV3 Chondrite **[#2315]**
We present results on thermodynamic calculations of vaporization of pristine CAIs enclosed in the 3N host CAI and discuss the trends of composition changes.

Jeffcoat C. R. Kerekgyarto A. G. Lapen T. J.
Righter M. Simon J. I. et al. ***POSTER LOCATION #518***
New Petrology, Mineral Chemistry, and Stable Mg Isotope Compositions of an Allende CAI: EK-459-7-2 **[#2944]**
We present petrology, mineral chemistry, and Mg isotope compositions of a Type B CAI with characteristics found in both B1 and B2 CAIs.

Mishra R. K. Simon J. I. Ross D. K. Marhas K. K. ***POSTER LOCATION #519***
CAIs in Semarkona (LL3.0) **[#2750]**
Rare CAIs in the least altered, unequilibrated ordinary chondrite Semarkona (LL3.0) showing diverse morphology and mineralogy are reported.

Komatsu M. Fagan T. J. Yamaguchi A.
Mikouchi T. Zolensky M. E. et al. ***POSTER LOCATION #520***
Petrology of Amoeboid Olivine Aggregates in Antarctic CR Chondrites: Comparison with Other Carbonaceous Chondrites **[#1906]**
Petrology of AOAs and matrices of Antarctic CR chondrites suggests that they largely escaped from secondary alteration and preserve the nebular condensation conditions.

Shollenberger Q. R. Brennecka G. A. Borg L. E. ***POSTER LOCATION #521***
Clues to the Isotopic Evolution of the Solar System from Er and Yb in Allende CAIs **[#1964]**
Er and Yb isotopic compositions of CAIs support an isotopically homogeneous reservoir for the CAI-forming region that is distinct from terrestrial standards.

Mane P. Torrano Z. A. Romaniello S. J.
Brennecka G. A. Shollenberger Q. R. et al. ***POSTER LOCATION #522***
Zirconium and Chromium Isotopic Systematics of Non-Allende CAIs **[#2778]**
We report Zr and Cr isotope systematics of Allende and non-Allende CAIs to ascertain the degree of isotopic heterogeneity in the CAI-forming region.

Mane P. Bose M. Defouilloy C. Kita N. T. MacPherson G. J. et al. ***POSTER LOCATION #523***
Formation Timescales of Wark-Lovering Rims Around Calcium-Aluminum Rich Inclusions **[#2560]**
We report O isotopic systematics and Al-Mg chronology of CAIs and their Wark-Lovering rims and discuss the timescales of formation of Wark-Lovering rims.

Han J. Keller L. P. Brearley A. J. Danielson L. R. ***POSTER LOCATION #524***
Stacking Defects in Synthetic and Meteoritic Hibonites: Implications for High-Temperature Processes in the Solar Nebula **[#2848]**
We present TEM observations of synthetic hibonite in the CaO-Al_2O_3-MgO system to understand the origin of defect-structured hibonite found in meteorites.

Tang H. Liu M.-C. McKeegan K. D. Tissot F. L. H. Dauphas N. ***POSTER LOCATION #525***
^{36}Cl-^{36}S Systematics in Curious Marie: A ^{26}Mg-Rich U-Depleted Fine-Grained CAI from Allende **[#2539]**
We find elevated and uniform excesses in ^{36}S, similar to those for ^{26}Mg excesses in Curious Marie CAI to study its complicated multi-stage history.

Kerekgyarto A. G. Jeffcoat C. R. Lapen T. J.
Andreasen R. Righter M. et al. ***POSTER LOCATION #526***
Al-Mg Isotope Study of Allende 5241 **[#3041]**
Al-Mg (radiogenic and stable) study of a well characterized CAI, Allende 5241.

CHONDRITES: NEW, MINOR AND RARE COMPONENTS [T335]

MacPherson G. J. Lin C. Hollister L. S.
Bindi L. Andronicos C. L. et al. ***POSTER LOCATION #527***
The Khatyrka Meteorite: A Summary of Evidence for a Natural Origin of Its Remarkable Cu-Al Metal Alloys **[#2655]**
We summarize all of the arguments for and against a natural origin for Cu-Al alloys in the Khatyrka CV3 chondrite, and conclude the alloys are natural.

Nakanishi N. Yokoyama T. Usui T. Iwamori H. ***POSTER LOCATION #528***
Re–Os Isotope Systematics and Fractionation of Siderophile Elements in Metal Phases from CB Chondrites **[#1788]**
We report in-situ Os isotope data in CB metals for understanding of high temperature processes during metal formation.

Ma C. Beckett J. R. ***POSTER LOCATION #529***
Burnettite, $CaVAlSiO_6$, and Paqueite, $Ca_3TiSi_2(Al_2Ti)O_{14}$, Two New Minerals from Allende: Clues to the Evolution of a V-Rich Ca-Al-Rich Inclusion **[#1595]**
Two new refractory minerals, burnettite and paqueite, have been discovered as micron-sized crystals within melilite in a V-rich, fluffy Type A CAI in Allende.

Ma C. Paque J. Tschauner O. ***POSTER LOCATION #530***
Discovery of Beckettite, $Ca_2V_6Al_6O_{20}$, a New Alteration Mineral in a V-Rich Ca-Al-Rich Inclusion from Allende **[#1704]**
We present a new vanadium aluminate mineral, beckettite, from a V-rich Type A CAI in Allende and discuss its origin and implications for alteration processes.

Zolotov M. Yu. ***POSTER LOCATION #531***
Formation of Sulfates on Parent Bodies of Carbonaceous Chondrites, Ceres, Europa, and Other Icy Bodies **[#1778]**
Formation of sulfates is explained by accretion of irradiated water ices containing strong oxidants (O_2, H_2O_2) and oxidized sulfur species (H_2SO_4 and SO_3).

Mikouchi T. Hagiya K. Sawa N. Kimura M. Ohsumi K. et al. ***POSTER LOCATION #532***
Synchrotron Radiation XRD Analysis of Indialite in Yamato-82094 Ungrouped Carbonaceous Chondrite **[#1919]**
We performed SR-XRD on a cordierite-like phase in Al-rich chondrule of Y-82094 ungrouped C chondrite and revealed that it is a high-T polymorph (indialite).

Walker B. W. Hu J. H. Sharp T. S. ***POSTER LOCATION #533***
Feldspar-Chromite Mineral Assemblages in Ordinary Chondrites **[#1806]**
The purpose is to determine possible origins of these chromite-plagioclase intergrowths and test the hypothesis that they result from shock metamorphism.

Hutson M. L. Ruzicka A. M. Farley K. R.
Schepker K. L. Hugo R. C. et al. ***POSTER LOCATION #534***
Carbides in Ordinary Chondrites Revisited **[#1377]**
We report the results of a combined EMP, SEM, EBSD, and TEM study on H- and L- chondrites to constrain the occurrence and origin of carbides in such meteorites.

PLANETARY DIFFERENTIATION AND THE ORIGIN OF THE TERRESTRIAL PLANETS [T336]

Lasbleis M. Laneuville M. Helffrich G. ***POSTER LOCATION #536***
Evolution of an Initially Stratified Liquid Core and Onset of a Dynamo **[#1896]**
Accretion models predict initially strongly stratified core. We study how to destabilize and start convection in such a liquid metal layer.

Lin Y. Tronche E. J. Steenstra E. S. van Westrenen W. ***POSTER LOCATION #537***
Solidification Evolution of a Dry Lunar Magma Ocean: Constraints from Experimental Petrology **[#1296]**
This work shows firstly the whole solidification evolution of a dry lunar magma ocean based on experimental petrology.

Zhang Y. X. ***POSTER LOCATION #538***
The Mass of the Depleted MORB Mantle is Less Than That of the Upper Mantle **[#1666]**
Whether continental crust and depleted MORB mantle (DMM) are complementary is re-assessed. The results show that the mass of DMM is 83% of the upper mantle.

Condie K. C. Shearer C. K. ***POSTER LOCATION #539***
Incompatible Element Ratios in Plate Tectonic and Stagnant Lid Planets **[#1058]**
Nb/Th and Zr/Nb in basaltic mantle sources in the Earth and Moon suggests that Earth was in a stagnant lid regime prior to the onset of plate tectonics about 3 Ga.

Medard E. Martin A. M. Righter K. Lanziroti A. Newville M. ***POSTER LOCATION #540***
Platinum Partitioning at Low Oxygen Fugacity: Implications for Core Formation Processes **[#2801]**
Pt is dissolved as anions in silicate melts under fO_2 relevant for core formation. This could partly explain excess siderophile elements in the Earth's core.

Armstrong K. Frost D. J. McCammon C. M. Rubie D. Boffa-Ballaran T. ***POSTER LOCATION #541***
Oxidation States of Fe in Silicate Melts as a Function of Pressure and Implications for Redox Evolution of the Early Mantle **[#2580]**
High pressure experimental results of Fe^{3+}/FeT ratio in silicate melts.

Li Y. Dasgupta R. Tsuno K. Monteleone B. Shimizu N. ***POSTER LOCATION #542***
Establishing the Carbon and Sulfur Budget of the Earth's Silicate Reservoir by Accretion and Core Formation Process **[#2486]**
The partitioning of carbon and sulfur between Fe-rich alloy melt and silicate melt at magma ocean conditions, with implications for Earth's accretion process.

Render J. Fischer-Gödde M. Burkhardt C. Kleine T. ***POSTER LOCATION #543***
Molybdenum Isotopes and the Building Blocks of the Earth **[#2639]**
Our Mo isotopic data of enstatite and ordinary chondrites suggests that Earth cannot have accreted from a combination of any of the known chondrite groups.

Zube N. G. Nimmo F. Jacobson S. A. ***POSTER LOCATION #544***
Tungsten Isotopic Evolution and Mantle Equilibration in Grand Tack Accretion Simulations **[#2480]**
The evolution of the Hf/W isotopic system is followed through the accretionary collisions of 28 N-body simulations using the Grand Tack scenario.

Ipatov S. I. Marov M. Ya. ***POSTER LOCATION #545***
Migration of Planetesimals to Forming Terrestrial Planets from the Feeding Zone of Jupiter and Saturn **[#1458]**
A considerable fraction of water could be delivered to the embryo of the Earth when its mass was smaller than the present mass of the Earth.

Hesse M. A. Ghanbarzadeh S. Prodanovic M. ***POSTER LOCATION #546***
Hysteresis in Melt Network Topology Allows Core Formation by Porous Flow **[#2664]**
We show that hysteresis in the melt network topology allows the segregation high dihedral angle melts and rapid core formation by porous flow in plantesimals.

Zhu M. -H. Wünnemann K. ***POSTER LOCATION #547***
Giant Impact Forming the Crustal Thickness Dichotomy of the Moon **[#1771]**
Giant impact could reproduce the crustal thickness dichotomy and farside highlands of the Moon.

Laneuville M. ***POSTER LOCATION #548***
Effect of Tidal Dissipation on Lunar Crust Formation **[#1694]**
Recent studies show the source of the lunar crust is heterogeneous. I study asymmetric magma ocean crystallization due to temperature-dependent tidal heating.

Petaev M. I. Jacobsen S. B. Huang S. Lock S. J. Stewart S. T. ***POSTER LOCATION #549***
Testing Models of the Moon's Origin, III: Phase Diagram of a Proto-Lunar Disk and Condensation of Trace Elements **[#2468]**
Concentrations of major and trace elements in silicate melts condensed in a proto-lunar disk of BSE composition are compared with estimates of the bulk Moon.

Pahlevan K. ***POSTER LOCATION #550***
Isotopic Constraints on Proto-Lunar Disk Evolution **[#2999]**
We use stable isotopic measurements on samples to develop new constraints on proto-lunar disk evolution.

Jacobsen S. B. Petaev M. I. Boatwright B. Lock S. J. Stewart S. T. ***POSTER LOCATION #551***
A New Model for Lunar Origin: Elemental and Isotopic Constraints **[#2713]**
The composition of the Moon is consistent with it condensing out of bulk silicate Earth vapor. Its core forms with insignificant effects in the Hf-W isotopic system.

Murri M. Scandolo L. Fioretti A. M. Alvaro M. Nestola F. et al. ***POSTER LOCATION #552***
Fe-Mg Exchange Reaction in Clinopyroxene and Its Application to the Thermal History of Planetary Bodies **[#1425]**
New equilibrium annealing experiments (800 to 1000°C) have been performed on a Fe-poor augite to obtain a new geothermometer for augites from martian nakhlites.

Charnoz S. Bugnet L. Siebert J. ***POSTER LOCATION #553***
Processing of Moon Material in the Protolunar Disk: Devolatilisation During the Protolunar Disk Phase **[#2012]**
We study the Moon's formation and investigate the process of material devotalisation. We find that devolatilisation may occur in the protolunar disk.

LUNAR CRATERING CHRONOLOGY: TIME WILL CRAWL [T337]

O'Brien D. P. Marchi S. Schenk P. M. ***POSTER LOCATION #554***
The Lunar Chronology Cannot Be Directly Scaled to the Asteroid Belt **[#2024]**
We show that directly scaling the lunar chronology curve to Vesta and other bodies in the asteroid belt is inconsistent with a range of fundamental constraints.

Frey H. V. ***POSTER LOCATION #555***
Comparing the Early and Late Heavy Bombardments on the Moon **[#1238]**
Evidence for an Early Heavy Bombardment prior to 4.0 BY ago on the Moon suggests it may have been more intense than the traditional Late Heavy Bombardment.

Schultz P. H. ***POSTER LOCATION #556***
The Basin-Impactor Debris Model for the Origin of the Late Heavy Bombardment **[#2905]**
Rather than an onslaught of small asteroids producing the Late Heavy Bombardment, they are fragments from oblique collisions by a few large bodies.

Michael G. G. Kneissl T. Neesemann A. ***POSTER LOCATION #557***
Planetary Surface Dating from Crater Size-Frequency Distribution Measurements: Poisson Timing Analysis **[#2073]**
Exact evaluation of crater chronology models using Poisson statistics, resulting in a PDF with an intrinsic uncertainty, to replace binning/fitting methods.

Meyer H. M. Mahanti P. Robinson M. S. Boyd A. K. ***POSTER LOCATION #558***
Quantifying the Effect of Slope on Crater Density: A Preliminary Overview **[#2740]**
Crater densities of sloped areas are artificially low. It's critical that we understand the effect of slope since it is used to derive absolute model age.

Pritchard I. M. Wang J. Stooke P. J. ***POSTER LOCATION #559***
Lunar Crater Population Statistics and Related Accuracies from an Elevation-Based Impact Crater Detection Technique **[#1179]**
This work examines the crater population statistics and associated accuracies of the Cratermatic detection system using high-resolution LOLA elevation data.

Ostrach L. R. Petro N. E. Fassett C. I. Whitten J. L. Denevi B. W. et al. ***POSTER LOCATION #560***
A New Look at Copernican and Eratosthenian Crater Populations on the Moon and Assessment of Lunar Chronology **[#2099]**
Two youngest classes / Of Wilhelms' crater ages / New assessments, yay!

Hiesinger H. Pasckert J. H. van der Bogert C. H.
Robinson M. S. Weinauer J. et al. ***POSTER LOCATION #561***
New Crater Size-Frequency Distribution Measurements for Autolycus Crater, Moon **[#1879]**
We performed new crater size frequency distribution measurements for Autolycus crater in an attempt to further constrain the lunar chronology.

Dhingra S. Bhattacharya A. ***POSTER LOCATION #562***
Surface Roughness Measurements and Crater Statistics for Aristillus Impact Crater **[#2041]**
Surface roughness is estimated using LOLA data and crater statistics is used to estimate the age for specific regions of Aristillus crater.

LUNAR VOLCANISM: NEW PERSPECTIVES ON A DYNAMIC MOON [T338]

Walcek H. R. Jolliff B. L. Zanetti M. ***POSTER LOCATION #563***
Volumes of Volcanic Constructs at the Compton-Belkovich Volcanic Complex on the Moon **[#2933]**
This abstract explores the volumes of various domes at the Compton-Belkovich Volcanic Complex (CBVC) on the Moon.

Zeng X. G. Zuo W. Li C. L. Zou Y. L. Zhang Z. B. et al. ***POSTER LOCATION #564***
Global Lunar Dome Identification and Analysis Using Chang'e-2 Data **[#1181]**
Global lunar domes are identified with Chang'E-2 data, the method and result might be useful for the lunar vocalism study.

Brown H. B. Robinson M. S. Stopar J. D. Lawrence S. J. ***POSTER LOCATION #565***
Visualizing the Topography of the Marius Hills Complex **[#2993]**
The Marius Hills shield volcano hypothesis is explored through a detailed topographic characterization in relation to the associated free-air gravity anomaly.

Zhao J. Xiao L. Qiao L. ***POSTER LOCATION #566***
The Mons Rümker Volcanic Complex of the Moon: A Candidate Landing Site for Chang'e-5 Mission **[#1758]**
We analyze the topography, mineral and rock type, geomorphologic features, and the evolutionary history of Mons Rümker and proposed two candidate landing sites.

Qiao L. Head J. W. Xiao L. Wilson L. Dufek J. ***POSTER LOCATION #567***
Sosigenes Lunar Irregular Mare Patch (IMP): Morphology, Topography, Sub-Resolution Roughness and Implications for Origin **[#2002]**
We report morphologic, topographic, and subresolution roughness observations of Sosigenes IMP, and then evaluate several previously proposed formation scenarios.

Jozwiak L. M. Head J. W. Wilson L. ***POSTER LOCATION #568***
An Analysis of Eruption Styles in Lunar Floor-Fractured Craters **[#1169]**
We analyze pyroclastic vents and deposits in lunar floor-fractured craters, and explore implications for emplacement timing and style.

Ivanov M. A. van der Bogert C. H. Hiesinger H. Pasckert J.-H. Bauch K. ***POSTER LOCATION #569***
Bracketing the Age of Lunar Pyroclastic Deposits in Oppenheimer Crater **[#1070]**
Pyroclastic deposits on the floor of Oppenheimer crater formed between 3.98 and 3.66 Ga.

Clegg-Watkins R. N. Jolliff B. L. Petro N. E. Lawrence S. J. ***POSTER LOCATION #570***
The Distribution of Mare and Cryptomare in the South Pole-Aitken Basin: New Perspectives from Multiple Datasets **[#2072]**
Diverse datasets / For South Pole-Aitken Basin / But we need samples.

Head J. W. III Wilson L. ***POSTER LOCATION #571***
Mare Basalt Volcanism: Generation, Ascent, Eruption and History of Emplacement of Secondary Crust on the Moon **[#1189]**
Synthesis of the generation, ascent, intrusion and effusive/explosive eruption of lunar mare basalts, and emplacement history.

Yamamoto K. Haruyama J. Ohtake M. Iwata T. Ishihara Y. ***POSTER LOCATION #572***
Relevance of the Volcano Complexes in the Western Oceanus Procellarum, Moon **[#1713]**
GRAIL-derived lunar gravity field is used to investigate the geophysical relevance of the major volcanic complexes in the western Oceanus Procellarum.

Varatharajan I. Crawford I. A. Downes H. ***POSTER LOCATION #573***
Spectral Reflectance Studies of the Mare Basalts on the Feldspathic Highland Terrane of Lunar Farside Using M^3 Datasets of Chandrayaan-1 **[#1930]**
Spectral heterogeneity of the lunar farside mare basalts on the FHT is studied for detailed mineralogy, spatial and temporal assessment of farside volcanism.

Saran S. Das A. Pandey D. ***POSTER LOCATION #574***
Physical Properties of Lunar Volcanic Terrains Using LRO Data **[#2249]**
We utilize multi-wavelength datasets from LRO to investigate the morphology, composition, and structure of some volcanic domes and related depressions.

Hiesinger H. Gebhart J. van der Bogert C. H.
Pasckert J. H. Weinauer J. et al. ***POSTER LOCATION #575***
Stratigraphy of Low Shields and Mare Basalts of the Marius Hills Region, Moon **[#1877]**
We dated 43 low shields and 27 adjacent mare basalts in the Marius Hills region with CSFD measurements and found a wide range of absolute model ages.

LUNAR VOLATILES: SCIENCE FAIR FOR GROWNUPS [T339]

Lin Y. Steenstra E. S. van Westrenen W. ***POSTER LOCATION #577***
Hydrous Early Moon? Constraints from Hydrous Lunar Magma Ocean Solidification Experiments **[#1295]**
Our experimental results imply that the early Moon was hydrous, and that the water content was up to ~3000 ppm in the primitive lunar magma ocean.

Hurley D. M. ***POSTER LOCATION #578***
Lunar Polar Volatiles: Evaluation of Existing Data Sets **[#1110]**
This paper summarizes the state of knowledge of lunar polar volatiles — a white paper was submitted to NASA's HEOMD.

Mitchell J. L. Lawrence S. J. Speyerer E. J.
Robinson M. S. Denevi B. W. ***POSTER LOCATION #579***
Assessment of Water Ice at the Lunar North Pole Based on LROC Narrow Angle Camera Imagery and Mini-RF Data **[#1746]**
LROC imagery and LRO Mini-RF S-band radar were used to assess the presence of blocks versus ice in permanently shadowed regions at the Moon's north pole.

McClanahan T. P. Mitrofanov I. G. Boynton W. V.
Chin G. Parsons A. et al. ***POSTER LOCATION #580***
Diurnally Modulating Neutron Flux in the Moon's High-Latitudes: Evidence for Transported Hydrogen Volatiles and/or Complex Regolith Compositions in Topographic Slope **[#2646]**
Correlation of the Moon's diurnally modulating neutron flux with surface temperature may imply hydrogen volatile transport or complex regolith dynamics.

Zhong F. Siegler M. A. Woods-Robinson R. Carey E. M. Paige D. A. ***POSTER LOCATION #581***
Thermal Conductivity of Cryogenic Regolith **[#2995]**
Beware, your current / Thermal conductivity / Assumption is wrong.

Patrick E. L. Mandt K. E. ***POSTER LOCATION #582***
Volatiles at the Lunar Surface: Constraints from the Apollo Era **[#2649]**
New analysis of Apollo 12 CCGE response, pressure profiles resulting from exposure of JSC-1A lunar simulant to gases, and recommendations for future missions.

Kramer G. Y. Combe J.-Ph. ***POSTER LOCATION #583***
The Fate of Hydroxyl and Water on the Lunar Surface Over Time **[#1579]**
A project with two goals is described. Improve the thermal correction for M^3 data. Determine lunar soil properties that favor formation and retention of OH and HOH.

Retherford K. D. Greathouse T. K. Gladstone G. R.
Hendrix A. R. Mandt K. E. et al. ***POSTER LOCATION #584***
LRO Lyman Alpha Mapping Project (LAMP) Far-UV Albedo Maps: A New View of the Moon **[#2433]**
LRO-LAMP measurements provide a unique perspective on the lunar "hydrological cycle" using an innovative nightside observing technique for UV reflectances.

O'Reilly B. von Frese R. R. B. ***POSTER LOCATION #585***
Lunar Exploration for He-3 **[#1971]**
With a rapidly depleting stockpile of He-3, it is imperative that an alternate source is found. That source can be found in the Moon.

Tang H. Li X. Y. Wang S. J. Liu J. Z. ***POSTER LOCATION #586***
Effect of Different Minerals on the Formation of OH/H_2O Implanted by Lunar Solar Wind **[#1720]**
Five different minerals have been experimented by H+ bombardment to simulate the effect of the grains type on formation of water by solar wind implantation.

Mahmood S. S. McKeeby B. Lowe M. E. Greenwood J. P. ***POSTER LOCATION #587***
Hydrous Glasses of Lunar Sample 75055: A Micro-Raman Spectroscopy Investigation **[#1257]**
We investigate the water and OH content of Apollo sample 75055 utilizing micro-Raman spectroscopy.

Wales E. M. Boyce J. W. ***POSTER LOCATION #588***
A Terrestrial Perspective on the Record of Lunar Volatiles as Recorded by Apatite **[#2181]**
The rocks down below /Now confound the story of /Lunar H_2O.

Konecke B. A. Fiege A. Simon A. C. ***POSTER LOCATION #589***
Hydrothermal Activity on Earth's Moon Recorded by Sulfur-in-Apatite **[#2816]**
We report similarities between the S-signatures of apatites from an iron oxide–apatite (IOA) ore deposit (Carmen, Chile) and the S-signatures of lunar apatites.

Burney D. Neal C. R. Simonetti A. ***POSTER LOCATION #590***
Developing a Method for Measuring Moderately Volatile Elements in Lunar Basalt Using Solution Mode ICP-MS **[#1514]**
Methods presented here will quantify the major interferences for moderately volatile trace elements allowing accurate measurements using solution mode ICP-MS.

Robinson K. L. Barnes J. J. Anand M. Taylor G. J. Franchi I. A. ***POSTER LOCATION #591***
Volatiles in Highly Evolved Lunar Rocks: Connecting Water and Chlorine **[#2199]**
Apollo 15 QMDs have the lowest D/H ratios reported thus far in lunar apatite. New Cl isotope data suggests they obtained H and Cl from different sources.

McCubbin F. M. Ustunisik G. Vander Kaaden K. E. ***POSTER LOCATION #592***
Apatite-Melt Partitioning at 1 Bar: An Assessment of Apatite-Melt Exchange Equilibria Resulting from Non-Ideal Mixing of F and Cl in Aapatite **[#1184]**
Non-ideal mixing / The fluorine vacuum from hell / Why apatite why?

Lowe M. Mahmood S. McKeeby B. Greenwood J. P. ***POSTER LOCATION #593***
Cl-Rich Britholite Substitution in Apatite of High-Titanium Basalt 75055: A Chlorine and REE-Enriched Phase of Lunar Phosphates **[#1285]**
We studied a REE and silica-enriched phosphate with a chlorine and fluorine in the halogen site from the Apollo 17 high-titanium basalts.

Barnes J. J. Tartèse R. Anand M. McCubbin F. M. Neal C. R. et al. ***POSTER LOCATION #594***
The Chlorine Isotopic Composition of Lunar urKREEP **[#1439]**
Apatite from a diverse range of lunar rocks show Cl isotope compositions significantly heavier than those obtained for terrestrial or chondritic materials.

Saran S. Pathak S. Chauhan M. Bhattacharya S. Das A. et al. ***POSTER LOCATION #595***
Detection of OH/H_2O of Possible Magmatic Origin Along the Inner Flanks of Crater Proclus **[#2441]**
We report the detection of water/hydroxyl of possible magmatic origin along the inner flanks of crater Proclus.

Wilson L. Head J. W. ***POSTER LOCATION #596***
Explosive Volcanism Associated with the Silicic Compton-Belkovich Volcanic Complex: Implications for Magma Water Content **[#1564]**
Explosive volcanism at the Compton-Belkovich Volcanic Complex accompanied silicic lava extrusion and was driven by H_2O in magma stored at the base of the crust.

EDUCATION AND ENGAGEMENT: ENGAGING OUR AUDIENCES [T340]

Mader M. M. Ireland D. Ng W. Tait K. Engels S. et al. ***POSTER LOCATION #598***
21st Century Engagement: "Space Rocks" Game Jam. An Immersive, Open-Ended, and Collaborative Science Outreach Program **[#2419]**
Gateway to learning / By making video games / Inspired by space.

Jones A. J. P. Bleacher L. V. Shaner A. Day B. Buxner S. et al. ***POSTER LOCATION #599***
International Observe the Moon Night: Engaging a Global Audience in NASA Planetary Science and Exploration **[#2899]**
Everyone look up / To the Moon and far beyond / Science with the world.

Hill P. J. A. Kerrigan M. C. Osinski G. R. ***POSTER LOCATION #600***
Education and Public Outreach for the 2015 CanMars MSR Analogue Mission **[#2216]**
An overview of the media and public outreach campaign conducted for the 2015 CanMars MSR Analogue Mission.

Shaner A. J. Shupla C. LaConte K. Hackler A. Ballard Y. et al. ***POSTER LOCATION #601***
Public Engagement with the Lunar and Planetary Institute **[#2017]**
Public programming at the Lunar and Planetary Institute has been successful. Now, the Institute aims to engage the public outside of our facility.

Graff P. V. Foxworth S. Kascak A. Luckey M. K. Mcinturff B. et al. ***POSTER LOCATION #602***
Engaging Students, Teachers, and the Public with NASA Astromaterials Research and Exploration Science (ARES) Assets **[#2558]**
Engaging students, teachers, and the public with ARES assets prepares future explorers/inspires pursuit of knowledge promoting SMD research, exploration, and NASA's mission.

Grady M. M. Dryer B. Russell S. S. Aléon J. Berthoud L. et al. ***POSTER LOCATION #603***
EURO-CARES: The Education and Outreach Opportunities Offered by a European Sample Curation Facility **[#2358]**
The education and outreach programme the EURO-CARES Consortium is planning as part of its European Sample Curation Facility Roadmapping project.

Felder Stokes C. S. ***POSTER LOCATION #604***
STEM Camp Space and More Smorgasbord **[#2940]**
As a post secondary STEM instructor, it is important to expose high school students to real-world STEM experiences and career options.

Milazzo M. P. Clark J. Anderson R. Gaither T. Vaughan R. G. ***POSTER LOCATION #605***
Planetary Learning that Advances the Nexus of Engineering, Technology, and Science **[#2576]**
Collaborations / Between scientists, teachers / Bring planets to kids.

Zambrano Marin L. F. Rivera-Valentin E. G. Schmelz J.
Rodriguez-Ford L. A. Aponte B. et al. ***POSTER LOCATION #606***
The Arecibo Observatory Space Academy: 4 Years of STEAM Engagement **[#2617]**
The Arecibo Observatory Space Academy (AOSA) is an intense ten (10) week research program, for highly qualified pre-college students residing in Puerto Rico.

Bailey B. E. Schmidt G. K. Day B. Minafra J. A. ***POSTER LOCATION #607***
Exploration Science Opportunities for Students Within Higher Education **[#1286]**
SSERVI provides opportunities for students to bridge the scientific and generational gap currently existing in the planetary exploration field.

EDUCATION AND ENGAGEMENT: IMPROVING OUR PRACTICE [T341]

Taylor W. L. Minitti M. E. Buxner S. Bruce G. Hufford M. et al. ***POSTER LOCATION #610***
Assessing STEM Learning and Engagement Through Virtual Field Trips and Experience Boxes **[#2817]**
We developed and tested Virtual Field Trips, embedded labs and hands-on "Experience Boxes" to engage and instruct students in STEM topics.

Runyon C. J. Hurd D. Hall C. R. Williams M. Quinn K. et al. ***POSTER LOCATION #611***
Visualizing Space Science: Touching to See and Understand **[#2241]**
Three tactile books and relevant educator resources will be shared: small bodies in the solar system, the solar eclipse, and spectroscopy of planetary surfaces.

Urquhart M. L. ***POSTER LOCATION #612***
Building Teacher Understanding of Seasons and Seasonal Thermal Energy Balance **[#2492]**
Includes a discussion of strategies for teacher professional development on seasons and a new activity on thermal energy balance for seasons and more.

Shupla C. Bialeschki D. Buxner S. Felske L. Foxworth S. et al. ***POSTER LOCATION #613***
Partnering to Enhance Education and Public Engagement Programs **[#1598]**
LPI presents lessons learned in their partnerships, which strengthen LPI programs by providing diverse resources, expertise, and expanding the audience.

Hagerty J. J. Barlow N. Heynssens J. Porter R. Titus T. N. ***POSTER LOCATION #614***
Northern Arizona Planetary Science Alliance (NAPSA): Year 2 Progress and Initiatives **[#2209]**
NAPSA is a collaborative effort among research groups in Northern Arizona. A major goal of the effort is to engage the next generation of planetary scientists.

ENVIRONMENTAL ANALOGS: 2015 CANADIAN MARS SAMPLE RETURN ANALOGUE MISSION [T342]

Osinski G. R. Francis R. Haltigin T. Kerrigan M. C. Pontefract A. et al. ***POSTER LOCATION #616***
Overview of the 2015 CanMars Mars Sample Return Analogue Mission **[#2616]**
In this contribution we provide an overview of the 2015 CanMars Mars Sample Return analogue mission, conducted in Utah in November 2015.

Pontefract A. Tornabene L. L. Haltigin T. Kerrigan M. C. Duff S. et al. ***POSTER LOCATION #617***
Science Overview for the 2015 CanMars MSR Analogue Mission: The Evolution from Pre-Mission Hypotheses to In-Situ Science **[#2117]**
Overview of the science conducted during pre-mission and mission for the CanMars 2015 Mars sample return analogue mission.

Kerrigan M. C. Osinski G. R. ***POSTER LOCATION #618***
2015 CanMars MSR Analogue Mission: Mission Control Team Structure and Operations **[#1596]**
MOMs work is never / Easy but a mission team / This awesome helps eh?

Silber E. A. Osinski G. R. Francis R. Cross M. D. G. Pritchard I. M. ***POSTER LOCATION #619***
2015 CanMars MSR Analogue Mission: An Overview of the Mission Control Tactical Team **[#1083]**
This abstract summarizes the role of the Tactical Team in the 2015 CanMars MSR Analogue Mission.

Sapers H. M. Pilles E. Francis R. Osinski G. R. Cross M. et al. ***POSTER LOCATION #620***
Mars Sample Return Analogue Mission: Daily Activity Planner Enhanced by Environment Simulation Software **[#2469]**
Daily activity planning during the 2015 CanMars MSR Analogue mission using the rover-integrated Symphony software with 3D environmental simulation.

Cross M. D. G. Pritchard I. M. Francis R. Osinski G. R. ***POSTER LOCATION #621***
Science Activity Resource Planning for 2015 CanMars MSR Analogue Mission **[#1581]**
The 2015 CanMars MSR analogue mission was a high-fidelity 11-sol campaign to test the science activity planning required for remote science exploration.

Francis R. Cross M. D. G. Kerrigan M. C. Osinski G. R. ***POSTER LOCATION #622***
Exploration and Decision-Making Rules and Resources on the 2015 CanMars MSR Analogue Mission: An Analogue for Mars 2020 Rover Operations **[#2735]**
Resource costs, task links / Remote science instruments / Shape science planning.

Harrison T. N. Mittelholtz A. Pontefract A. J. Osinski G. R. ***POSTER LOCATION #623***
The Importance of Imaging in Space Exploration: Lessons Learned from the 2015 CanMars MSR Analogue Mission **[#1250]**
We summarize the impact of high-resolution imaging in the geologic interpretations of a Mars analogue site during the 2015 CanMars Mars Sample Return Mission.

Morse Z. R. Choe B. H. Tornabene L. L. Osinski G. R. ***POSTER LOCATION #624***
2015 CANMARS MSR Analogue Mission: GIS and Mapping Results **[#2287]**
Mapping unknown land / To learn the context for our / Analog mission.

Morse Z. R. Osinski G. R. ***POSTER LOCATION #625***
Use of Immersive Technologies in the 2015 CANMARS Analogue Mission **[#2306]**
Virtual field trip / View outcrops far far away / As if you were there.

Christoffersen P. A. Newman J. D. Morse Z. R.
Tornabene L. L. Osinski G. R. ***POSTER LOCATION #626***
Geologic Map and Stratigraphy of the Yggdrasil Quadrangle from the 2015 CanMars MSR Analogue Mission **[#2225]**
Geologic map / And stratigraphic column / Tells much about past.

Ryan C. H. Haid T. M. Osinski G. R. Tornabene L. L. ***POSTER LOCATION #627***
2015 CanMars MSR Analogue Mission: The Utilization of the Three-Dimensional Exploration Multispectral Microscopic Imager (TEMMI) for In Situ Analysis **[#1991]**
The TEMMI instrument is an imaging device hosted on the Canadian Space Agency's Mars Exploration Science Rover, used in the 2015 CanMars MSR Analogue mission.

Zylberman W. Hickson D. Haid T. Osinski G. R. ***POSTER LOCATION #628***
2015 CANMARS MSR Analogue Mission: The Key-Role of LiDAR in Rover Navigation and Potential for Future Missions **[#1041]**
The benefits of incorporating LiDAR onto a future Mars rover for precise navigation and simultaneous surface mapping are investigated here.

Caudill C. M. Grau Galofre A. Pontefract A. Osinski G. R. ***POSTER LOCATION #629***
2015 CanMars MSR Analog Mission: In Situ Geochemical Insights from X-Ray Fluorescence Spectrometry **[#1731]**
X-ray fluorescence spectrometer (XRF) instrument results from the 2015 CanMars Mars sample return (MSR) rover (CSA MESR) analogue mission.

Mittelholz A. Maloney M. Osinski G. R. ***POSTER LOCATION #630***
The Use of Raman Spectroscopy for the 2015 CanMars MSR Analogue Mission **[#1578]**
We discuss the dataset collected by the Raman spectrometer for the 2015 CanMars MSR analogue mission including interpretation of data and challenges associated.

ENVIRONMENTAL ANALOGS: MARS-LIKE TERRAINS ON EARTH [T343]

Foroutan M. Zimbelman J. R. Marshall S. J. ***POSTER LOCATION #631***
A Terrestrial Analog for Transverse Aeolian Ridges on Mars in the Lut Desert of Iran **[#2884]**
A new unique terrestrial analog site for TARs is described in study, with potential relevance toward a better understanding of TARs on Mars.

Zaki A. S. Jr. ***POSTER LOCATION #632***
Morphology and Sedimentology of Landforms Associated with Playas in Western Desert of Egypt: Possible Analogs for Mars **[#2773]**
This work sheds light on morphology and sedimentology of landforms associated with playas in Western Desert of Egypt and its analogs on Mars.

Zaki A. S. Jr. ***POSTER LOCATION #633***
Inverted Channels on Earth Analogs for Inverted Topography on Mars **[#2466]**
The abstract illustrates some examples for inverted channels in Sahara and Arabia as possible analogs for Mars.

Thorpe M. T. Hurowitz J. A. Dehouch E. ***POSTER LOCATION #634***
Source-to-Sink Mineralogy of Basaltic Sediment Generated in an Icelandic Watershed **[#2172]**
Cold fluvial conditions lead to sediments near source preserving mafic mineralogy and sediments transported greater distances forming secondary amorphous phases.

Cavanagh P. D. Pratt L. M. ***POSTER LOCATION #635***
Jarosite Detection in Evaporitic Shoreline Crust from a Small Lake on the Margin of the Greenland Ice Sheet **[#2651]**
Jarosite detection confirms an active weathering process (including oxidation of pyrrhotite) providing local sources of sulfur for permafrost-isolated lakes.

Bentz J. L. Peterson R. C. ***POSTER LOCATION #636***
Clays and Clay-Like Material in the Mudflats of Bolivian Salars: Applications to Mars **[#1724]**
Mudflats from salars on the Bolivian Altiplano were sampled as an environmental analogue to Mars to study in-situ processes of clay mineral formation.

Jackson R. S. Newsom H. E. Fawcett P. J. ***POSTER LOCATION #637***
Investigation of Aqueous Processes in Valle Grande Lake, Valles Caldera as a Martian Analog **[#1776]**
How can lake mud, silt / Convey of changing climate? / Will this work on Mars?

Williams J. R. Potter-McIntyre S. L. Phillips-Lander C. M. O'Connell L. ***POSTER LOCATION #638***
Characterizing Spring Deposits in Ten Mile Graben, Utah, USA; Possible Terrestrial Analogs for Ancient Aqueous Environments on Mars **[#3068]**
This study documents the sedimentary structures common in spring deposits in an effort to understand how structures are preserved over geologic timescales.

Xiao L. Wang J. Dang Y. N. Cheng Z. Y. Huang T. et al. ***POSTER LOCATION #639***
Qaidam Basin, NE Tibetan Plateau: A New Unique Mars Analogue Site for Its Wet Past and Dry Environment Today **[#1330]**
Qaidam Basin is the highest desert and rich in aeolian and fluvial landforms, salt lakes and playas, evaporites, dry and cold environment similar to Mars.

El-Maarry M. R. Watters W. A. Yoldi Z. Pommerol A. Fischer D. et al. ***POSTER LOCATION #640***
Dried Lakes in Western United States as Analogue to Desiccation Fractures on Mars **[#2078]**
We carry out fieldwork in several dried lakes with desiccation features in the U.S. as an analog for sites on Mars displaying potential desiccation cracks.

Martin P. E. Ehlmann B. L. Blaney D. L.
Bhartia R. Allwood A. C. et al. ***POSTER LOCATION #641***
Outcrop-Scale Studies of a Lacustrine-Volcanic Mars Analog with a Mars 2020-Like Instrument Suite **[#2569]**
Mars 2020 rover-like outcrop analyses were conducted to assess instrument synergies and to create protocols for in situ exploration during the Mars 2020 mission.

Farris H. N. Davila A. ***POSTER LOCATION #642***
Deliquescence-Driven Brine Formation in the Atacama Desert, Chile: Implications for Liquid Water at the Martian Surface **[#2518]**
Hygroscopic salts adsorb water in large enough quantities to sustain microbial life, even in the driest place on Earth. Could the same be happening on Mars?

Gallardo-Carreño I. Blanco Y. Wettergreen D.
Minick S. Chong G. et al. ***POSTER LOCATION #643***
Robotic Investigation of Subsurface Life in the Atacama Desert, Characteristics and Distribution of Life from the Coast to the Altiplano **[#1912]**
Life in the Atacama (LITA) project explored and measured the gradients of subsurface life in the Atacama Desert in a field campaign involving a 1-meter drill..

Petersen E. I. Holt J. W. Stuurman C. M. Levy J. S. Nerozzi S. et al. ***POSTER LOCATION #644***
Sourdough Rock Glacier, Alaska: An Analog to Martian Debris-Covered Glaciers **[#2535]**
The wrinkled glaciers on Mars / Are moving no longer / But their young Alaskan cousin / Races down the slope / And makes a big show of it.

Pharr J. D. Holt J. W. Levy J. S. Nerozzi S. Peterson E. I. et al. ***POSTER LOCATION #645***
Internal Structure and Composition of the Upper Galena Creek Rock Glacier, Wyoming, Inferred from Electromagnetic Methods **[#2809]**
Internal structure / Galena Creek rock glacier / Martian analog?

Groemer G. Losiak A. Soucek A. Plank C. Zanardini L. et al. ***POSTER LOCATION #646***
Terrestrial Operational Analog of the Mars Mission: Lessons Learned from the Glacier Simulation AMADEE-15 by Austrian Space Forum **[#1940]**
Between August 2 and 14, 2015, 11 experiments were conducted by a field crew on Kaunertal Glacier (Austria) coordinated by a Mission Support Center in Innsbruck.

Dickson J. L. Head J. W. Levy J. S. ***POSTER LOCATION #647***
Austral Winter Imaging of Don Juan Pond, Antarctica: Polar Desert Brine Flow at –40°C on Earth and Implications for Mars **[#1545]**
Imaging of Don Juan Pond reveals brine flow when surface temperatures are below -40°C. This provides a mechanism for fluvial activity throughout Mars' history.

ENVIRONMENTAL ANALOGS: NASA ACTIVITIES [T344]

Graff T. Miller M. Rodriguez-Lanetty M. Chappell S. Naids A. et al. ***POSTER LOCATION #648***
NEEMO 20: Science Training, Operations, and Tool Development **[#2212]**
A summary of the scientific training, scientific operations, and tool development conducted during the NEEMO 20 mission.

Bleacher J. E. Eppler D. B. Bussey D. B. Neal C. R. ***POSTER LOCATION #649***
Astronaut Geology Training: Back to the Future, or Deja Vu All Over Again… **[#2378]**
We discuss the recent and ongoing efforts related to geology training of astronauts for Earth observation from ISS and planetary exploration.

Young K. E. Yant M. H. Rogers A. D. Evans C. A. Bleacher J. E. et al. ***POSTER LOCATION #650***
Characterizing Hawaiian Hydrothermal Basaltic Alteration Using Field Portable and Laboratory Techniques **[#2313]**
We use multiple analytical techniques to characterize Hawaiian basaltic alteration products at the planetary analog December 1974 flow at Kilauea Volcano, HI.

Ito G. Rogers A. D. Young K. E. Bleacher J. E. Edwards C. S. et al. ***POSTER LOCATION #651***
Assessing the Incorporation of Portable Infrared Imaging into Planetary Geological Field Work **[#1953]**
We evaluate the incorporation efforts of infrared spectral imaging for planetary human missions at Kilauea Volcano, Hawaii.

Kobs Nawotniak S. E. Borg C. Hughes S. S. Sears D. W. G. Trcka A. et al. ***POSTER LOCATION #652***
Reconstructing Phreatic Blasts from Ballistic Block Fields at Kings Bowl, Idaho **[#2514]**
Ballistic ejecta at Kings Bowl, Idaho, indicate a series of phreatic blasts along a fissure. Modeling suggests a way to calculate in-ground volatile budget.

Lim D. S. S. Cohen B. A. Young K. E. Brunner A. Elphic R. E. et al. ***POSTER LOCATION #653***
Pre-Mission Input Requirements to Enable Successful Sample Collection by a Remote Field/EVA Team **[#1300]**
Simulations yield / Astronaut training wisdom: / Good sampling takes time.

Heldmann J. L. Lim D. S. S. Hughes S. Kobs Nawotniak S. Garry B. et al. ***POSTER LOCATION #654***
Overview of NASA FINESSE (Field Investigations to Enable Solar System Science and Exploration) Science and Exploration Project **[#1269]**
The FINESSE project is a science and exploration field-based program to generate strategic knowledge prior to human and robotic exploration of planetary bodies.

ENVIRONMENTAL ANALOGS: VENUS, THE MOON, AND EUROPA [T345]

Buchan K. L. Ernst R. E. ***POSTER LOCATION #656***
Giant Circumferential Dyke Swarms on Earth as Possible Analogues of Coronae on Venus **[#1183]**
A new class of dyke swarms on Earth, giant circumferential swarms, is introduced; these are potential terrestrial analogues of Venusian Coronae.

Yang H. W. Zhao W. J. Xiong S. Q. Feng B. Z. Wang Q. et al. ***POSTER LOCATION #657***
Lunar Basalt Experimental Fields Detections and Suggestions for Future Lunar Missions **[#1399]**
Lunar basalt experimental field built in China with similar environment to Moon's makes effective approaches and required equipment available for future missions.

Kamps O. M. Offringa M. J. Foing B. H. ***POSTER LOCATION #658***
Preparations ExoGeoLab Lander for Lunar Analogue Field Campaign, Eifel, Germany **[#2508]**
As preparation for a lunar sample return mission we will present results and lessons learned from a lunar analog campaign with the ExoGeoLab lunar lander.

Cross M. D. G. McIsaac K. A. ***POSTER LOCATION #659***
Driving in the Dark: Results from South Lunar Pole Analogue Study **[#2221]**
Results of a study teleoperating a rover in harsh lighting conditions analogous to the lunar south pole.

Berisford D. F. Hand K. P. Skiles S. M.
Duffy E. R. Richardson M. L. et al. ***POSTER LOCATION #660***
Europa Landing Site Analog: LiDAR Surveys of Devil's Golf Course as a Pathological Case for the Surface Morphology of Europa **[#2771]**
Aerial LiDAR surveys over Devil's Golf Course provide insight to guide early concept development efforts for the Europa Lander.

Lawrence J. D. Schmidt B. E. Winslow L. Doran P. Kim S. et al. ***POSTER LOCATION #661***
Insight into Ice-Ocean Interactions on Earth and Europa **[#2161]**
Earth's thick ice shelves provide an important analog for the physicochemical, and potentially microbial, characteristics of icy worlds such as Europa.

Kintner P. Winebrenner D. P. Koutnik M. Matsuoka K. MacGregor J. A. ***POSTER LOCATION #662***
Estimating Oxygen Flux into Subglacial Lake Vostok, Antarctica, Using the Relationship Between Temperature and Englacial Radar Attenuation **[#2824]**
We use a 1-D temperature model to constrain the oxygen flux into Subglacial Lake Vostok, an Europa analog environment, using englacial radar attenuation.

METEORITE LOCATION AND ACQUISITION [T346]

Povenmire H. ***POSTER LOCATION #663***
Extending the Belize Tektite Strewn Field **[#1123]**
Description of recent expedition trip to Belize, mapping strewn field, describing specimens, strategies for successful hunting.

Vizi P. G. Bérczi Sz. Csizmadia Sz. Hegedus T. ***POSTER LOCATION #664***
Extended Meteor Hunting with Smartphones as Surveillance Cameras **[#1797]**
Fireball and meteor hunting by deploying smartphones to extend the possibilities to collect more fireball and meteor tracking data and to positioning falling.

MATERIAL ANALOGS: MARS [T347]

Eibl M. A. Fedo C. M. ***POSTER LOCATION #665***
A Mars Analog Study of 2D Textural Image Analysis: Effects of Shadows, Image Resolution, and Comparisons to Actual Sediment Textures from Aeolian Dune Sand, Moses Lake, WA **[#2321]**
A Mars analog study comparing textural analyses of sediments performed on images and actual sediments.

Kuhn N. J. Kuhn B. Hartmann A. ***POSTER LOCATION #666***
Experimental Investigation of Gravity Effects on Sediment Sorting on Mars **[#1529]**
The study presents results of analogue simulations of sandy sediment settling in water on Mars conducted during reduced gravity flights using settling tubes.

Funderburg R. Elwood Madden M. E. Joo Y. J. Marra K. Soreghan G. S. ***POSTER LOCATION #667***
Reactive Surface Area of Sediments from End-Member Climates: Implications for Paleoclimate on Earth and Mars **[#2613]**
Glacial sediment has a high reactive surface and may create higher than expected chemical fluxes, which is significant for Mars and Icehouse Earth.

Chow B. J. Chen T. Qiao Y. ***POSTER LOCATION #668***
Producing Martian "Bricks" by Using Raw Martian Soil Simulants **[#1038]**
By simply compressing appropriate martian soils under a high pressure, strong and robust "bricks" can be formed. No terrestrial components are needed.

Cannon K. M. Mustard J. F. Cooper R. F. Parman S. W. ***POSTER LOCATION #669***
Through the Basaltic Looking Glass: Paired Remote Sensing and Experimental Studies of Glass on Mars **[#1363]**
We report on lab studies synthesizing a suite of realistic martian glasses, and remote sensing efforts to identify glass at multiple spatial scales on Mars.

Panossian L. T. Peters G. H. Carey E. M. Shiraishi L. R. ***POSTER LOCATION #670***
Mechanical Properties of Rock Analogs for the Mars 2020 Mission **[#2949]**
A current set of Earth analogs for the Mars 2020 mission have been tested for mechanical properties to better understand their basic rock structure.

Scudder N. A. Horgan B. Havig J. Rutledge A. Rampe E. B. et al. ***POSTER LOCATION #671***
Differentiating Hydrothermal, Pedogenic, and Glacial Weathering in a Cold Volcanic Mars-Analog Environment **[#2937]**
Icy volcanoes / Alteration type changes / Rock surface spectra.

Thomas A. E. Schmidt M. E. Schrader C. M. ***POSTER LOCATION #672***
What does the Martian Mantle Look Like? Comparing Metasomatized and Cumulate Mantle Xenoliths from Earth as Analogues **[#1164]**
Assess martian mantle processes, by comparing two terrestrial suites of ultramafic xenoliths that have, produced magmas similar in composition to martian rocks.

Poitras J. P. Cloutis E. A. Mann P. ***POSTER LOCATION #673***
Mars Analogue Minerals' Spectral Reflectance Characteristics Under Martian Surface Conditions **[#2294]**
Three Mars analogs / Under martian conditions/ Hydroxyl persists.

Riu L. Poulet F. Pilorget C. Bibring J.-P. Hamm V. et al. ***POSTER LOCATION #674***
Characterisation of Martian Analogs Samples with MicrOmega Hayabusa2 Flight Spare Model **[#2083]**
The flight spare model of imaging spectrometer MicrOmega-MASCOT was used to characterize martian analogs samples using NIR spectroscopy coupled with imagery.

Williams J. L. Kargel J. S. Dalton J. B. III Shirley J. H. Vance S. ***POSTER LOCATION #675***
Visible and NIR Spectral Characteristics of Andesite and Saline Mud Field Samples from Lake Abert, Oregon and Implications for Compositional Investigations of Martian Evaporites **[#2446]**
Spectral characteristics of samples from Lake Abert were investigated in the visible and NIR (0.35–12 μm) and explored as analogs to martian geochemistry.

Ye C. Glotch T. D. ***POSTER LOCATION #676***
VNIR Reflectance and MIR Emissivity Spectral Character of Chloride-Bearing Mineral Mixtures **[#2811]**
Laboratory work about the spectral features of the chloride-bearing mineral mixtures on Mars.

Katz S. M. Nickerson R. D. Ehlmann B. L. Catalano J. G. ***POSTER LOCATION #677***
Synthesis and Analysis of Synthetic Smectite Clays for Use as Spectral Standards **[#1683]**
This work details the analysis of synthetic ferric smectites to determine differentiating features that will ultimately result in new spectral standards.

Sklute E. C. Dyar M. D. Kashyap S. Holden J. F. Jaret S. ***POSTER LOCATION #678***
Spectral Characteristics of Nanophase Iron Oxides and Hydroxides **[#2112]**
Nanophase Iron oxides and oxyhydroxides are common phases on many rocky solar system bodies. Synthetic samples have been characterized by multiple techniques.

Ray D. Shukla A. D. Chandra U. ***POSTER LOCATION #679***
Mineralogy, Geochemistry and Mossbauer Spectroscopy of Iron Concretions from Jurassic Formation of Kutch, India: More Insights in to the Depositional History and Implications to Martian "Blueberries" **[#1016]**
Hematite concretions chemistry suggests uniform fluid composition resulted rind concretions and multiple precipitation likely responsible for larger concretions.

Leask E. K. Ehlmann B. L. ***POSTER LOCATION #680***
Quantifying Mineral Abundance through VSWIR Microspectroscopy in Carbonate/Serpentine Systems **[#1409]**
Carbonate and serpentine mineral abundances are quantified using linear spectral unmixing from VSWIR reflectance spectra, and compared to XRD and EDS results.

Sekerak M. A. J. Koziol A. M. ***POSTER LOCATION #681***
Investigation of Svalbard, Norway Carbonates in Basaltic Samples as an Earth Analog for Carbonate Globules Within Martian Meteorite Allan Hills 84001 **[#1198]**
This undergraduate project compares carbonate globules in ALH 84001 and samples from an analog site in Svalbard, Norway, to better understand carbonate formation.

Evans M. E. Niles P. B. Locke D. R. Chapman P. ***POSTER LOCATION #682***
Two Distinct Secondary Carbonate Species in Ordinary Chondrite (OC) Meteorites from Antarctica are Possible Analogs for Mars Carbonates **[#2475]**
Two distinct carbonates form on Antarctic OCs with regional $\delta^{18}O$ variation. $\delta^{13}C$ and $\delta^{18}O$ suggest atmos. CO_2 dominates formation as Mars carbonate process analog.

Ende J. J. Szynkiewicz A. ***POSTER LOCATION #683***
Understanding Mechanism of Sulfate Formation on Mars: Experimental Study on the Oxidation of H_2S Under Laboratory Conditions **[#2372]**
Sulfate formation / H_2S Oxidation / How does it happen?

Flahaut J. Bishop J. L. Daniel I. Silvestro S. Tedesco D. et al. ***POSTER LOCATION #684***
Spectral Characterization of the Sulfate Deposits at the Mars Analog Site of La Solfatara (Italy) **[#2233]**
Field and laboratory observations were used to better constrain the mineralogic assemblages of several Mars analog sulfate-rich deposits at la Solfatara, Italy.

Miller K. M. Phillips-Lander C. M.
Elwood Madden A. S. Elwood Madden M. E. ***POSTER LOCATION #685***
Low Temperature Anhydrite Formation in Flow-Through Dissolution Experiments **[#1308]**
Flow-through and batch reactor experiments were conducted combining K-jarosite with varying wt. % CaCl2 brines; all reaction products were identified via XRD.

Sun V. Z. Milliken R. E. Robertson K. M. Ruff S. W. Farmer J. D. ***POSTER LOCATION #686***
Spectral Characterization and Mineralogy/Chemistry of Opaline Silica Samples from Diverse Mars Analog Sites **[#2071]**
Samples from both Yellowstone and Hawaii are rich in opal-A yet spectrally distinct, possibly reflecting differences in hydration and formation environment.

Hadnott B. H. Hayes A. H. Glotch T. D. Rossman G. R. Leao J. B. ***POSTER LOCATION #687***
Characterization of the Temperature Dependence of O-H Vibrational Modes in Hydrated and Hydroxylated Minerals, with Application to Planetary Exploration **[#2547]**
Hydrated and hydroxylated minerals are characterized for application to remote sensing and fundamental mineral physics using FTIR and geochemical methods.

Mann P. Cloutis E. A. Durell C. ***POSTER LOCATION #690***
Temporal Variations in Spectral Reflectance of Spectralon **[#2335]**
A change in the manufacturing process of a well known calibration target affects its overall spectral characteristics.

Chen T. Chow B. J. Qiao Y. ***POSTER LOCATION #691***
Lunar Infrastructural Materials Based on Raw Lunar Soil Simulants **[#1563]**
By using ~96 wt% raw lunar soil simulant and ~4 wt% polymer binder, strong structural parts can be produced through a fast and energy-efficient procedure.

Mueller R. P. Kelso R. M. Romo R. Andersen C. ***POSTER LOCATION #692***
Planetary Basalt Construction Field Project of a Lunar Launch/Landing Pad — PISCES/NASA KSC Project Update **[#1009]**
PISCES and NASA KSC have robotically-constructed a basalt launch and landing pad to demonstrate construction technologies for Moon/Mars.

Offringa M. S. Foing B. H. ***POSTER LOCATION #693***
Laboratory Spectroscopy Measurements of Moon-Mars Analogue Samples **[#2522]**
Spectroscopy measurements of Moon-Mars analog samples, focused on calibration of UV-VIS and NIR reflectance spectrometers in support of a lunar lander mission.

Nelson R. M. Piatek J. L. Boryta M. D.
Vandervoort K. Hapke B. W. et al. ***POSTER LOCATION #694***
Planetary Regolith Analogs Appropriate for Laboratory Measurements **[#1695]**
We describe a suite of Aluminum Oxide particulates that are particularly appropriate for simulating a high albedo planetary regolith in the laboratory.

Boivin A. Hickson D. Cunje A. Ghent R. Daly M. ***POSTER LOCATION #695***
Broadband Measurements of Dielectric Permittivity of Planetary Regolith Analog Materials Using a Coaxial Transmission Line in Vacuum **[#2025]**
Preliminary broadband measurements of dielectric permittivity of lunar and asteroid regolith analog materials in vacuum using a coaxial transmission line.

Hickson D. Sotodeh S. Daly M. Ghent R. ***POSTER LOCATION #696***
Boundary Conditions Modelling of Permittivity Measurements of Powders in Coaxial Airline **[#2137]**
A model is developed to account for boundary condition effects in measurements of the dielectric constant of alumina using the transmission line method.

Donohue P. H. Hill E. Huss G. R. Drake M. J. ***POSTER LOCATION #697***
Experimentally Determined Metal — Olivine Element Partitioning and Diffusion in Olivine with Applications to Pallasites **[#1172]**
Many pallasite olivines exhibit element zonation, but why? New subsolidus diffusion rates for Fe, Ni, Co, Cr, and Mn yield environmental constraints.

Mahjoub A. Poston M. Hand K. Brown M. Blacksberg J. et al. ***POSTER LOCATION #698***
Using Chemistry and Spectroscopy of Laboratory Simulants to Constrain the Origins of the Jupiter Trojan Asteroids **[#1757]**
We explore in laboratory the hypothesis that links the color bimodality in Jupiter's Trojans to the presence of H_2S in the surface of their precursors.

Applin D. M. Cloutis E. A. Izawa M. R. M. ***POSTER LOCATION #699***
Reststrahlen Bands Near 3 Microns in Carbon-Bearing Compounds and Applications to Asteroid Spectroscopy **[#2557]**
Some carboxylic acids and carbonates exhibit Reststrahlen bands near 3 μm. These may be consistent with features observed in spectra from Ceres.

Applin D. M. Izawa M. R. M. Cloutis E. A. ***POSTER LOCATION #700***
Ultraviolet Reflectance Spectroscopy of Condensed Carbonaceous Materials **[#2540]**
Reflectance spectra from 0.2 to 0.5 μm of graphites, coals, bitumens, and other carbonaceous materials are measured.

Molesky M. J. Jack S. J. Clayton A. N. Strait M. M. Durda D. D. et al. ***POSTER LOCATION #701***
Investigation of the Hydration of Anhydrous Chondrite Meteorites **[#3007]**
An investigation into hydrating anhydrous chrondrites as analogs for carbonaceous chrondrites.

Berisford D. F. Foster J. Poston M. J. Hand K. P. ***POSTER LOCATION #702***
Cryogenic Ices Under Vacuum: Preliminary Tests Related to Sampling Material on Europa's Surface **[#2998]**
A low-cost experimental apparatus allows qualitative evaluation of the behavior of cutting tools applied to cryogenic ices under vacuum conditions.

Carey E. M. Peters G. H. Chu L. Zhou Y. M. Cohen B. et al. ***POSTER LOCATION #703***
Development and Characteristics of Mechanical Porous Ambient Comet Simulants (MPACS) as Comet Surface Analogs **[#2299]**
Here we describe the Mechanical Porous Ambient Comet Simulants (MPACS) suite of materials currently used to test and validate the Bible Comet Sampling System.

Faure M. Quirico E. Faure A. Baklouti D. Boduch P. et al. ***POSTER LOCATION #704***
Origin of Chondritic and Cometary Refractory Organic Matter: Radiolytic or Thermal Carbonization? **[#2056]**
We explore the formation of refractory organic matter by ion irradiation of polyethylene glycol. This formation appears challenging without high temperature.

Hillier J. K. Price M. C. Burchell M. J. Hiscock J. R. Srama R. et al. ***POSTER LOCATION #705***
Cosmic Dust Analogues for Hypervelocity Impact Research: Expanding the Library **[#2243]**
We present progress in producing novel analogs for volatile-rich and/or low-density cosmic dust, for use in laboratory hypervelocity impact experiments.

Nuth J. A. Johnson N. M. Ferguson F. T. ***POSTER LOCATION #706***
Difficulties and Solutions in Measuring the Rates of Surface Mediated Reactions Such as the Fischer-Tropsch Type Reaction **[#2265]**
Measuring reaction rates per unit surface area for materials whose surface area increase in proportion to the extent of the reaction presents unique challenges.

Levine W. G. Leitner M. A. Vance S. D. ***POSTER LOCATION #707***
Geochemical Constraints on Europa's Ocean Composition and Possible Signatures of Hydrothermal Activity **[#2500]**
We assess varying accreting chondritic materials for Europa and their effects on ocean chemistry through ramifications for proposed hydrothermal chemistry.

POSTER SESSION II
Thursday, 6:00–9:00 p.m. Town Center Exhibit Area

NASA PLANETARY SCIENCE DIVISION FACILITIES [R601]

Papanastassiou D. A. ***POSTER LOCATION #1***
Facilities, Individuals, and Individuals in Facilities **[#2898]**
A personal perspective on the function of facilities is presented.

Clegg S. M. Wiens R. C. Delapp D. M. McInroy R. E. Maurice S. ***POSTER LOCATION #2***
LIBS — Raman Research Facility at Los Alamos National Laboratory **[#2985]**
LANL has a facility dedicated to the development of LIBS, Raman, and fluorescence spectroscopy.

Hiroi T. Sasaki S. Okazaki M. Matsuoka M. Sato Y. et al. ***POSTER LOCATION #3***
Interlaboratory Comparison Study of Visible and Near-Infrared Reflectance Spectra Using a set of Common Standard Materials **[#1105]**
Four visible and near-infrared spectrometers produced consistent reflectance spectra of a common set of standard materials when their resolutions are adjusted.

Glotch T. D. Rogers A. D. Hurowitz J. A. ***POSTER LOCATION #4***
Spectroscopy and Geochemistry Facilities at the Stony Brook University Center for Planetary Exploration **[#1922]**
Geochemistry and spectroscopy for you. All at Stony Brook.

Maturilli A. Helbert J. ***POSTER LOCATION #5***
The Planetary Spectroscopy Laboratory (PSL): Spectral Measurements of Planetary Analogues from UV to FIR **[#1986]**
The Planetary Spectroscopy Laboratory (PSL) provide spectral measurements under vacuum to cover the spectral range from UV (0.2 μm) to FIR (200 μm and above).

Dyar M. D. Breves E. A. Sklute E. C. ***POSTER LOCATION #6***
Facilities for Mössbauer and Laser-Induced Breakdown Spectroscopy at Mount Holyoke College **[#2205]**
Mount Holyoke College hosts two Investigator Facility instruments for use by planetary scientists: the Mössbauer and Laser-Induced Breakdown Spectroscopy labs.

Sharma M. ***POSTER LOCATION #7***
Determination of High Precision Isotope Ratios in Returned Samples Using Multi-Ion Counting **[#2679]**
I suggest a facility in the U.S. where high-precision measurements of radiogenic isotopes in samples weighing a few micrograms could be routinely made.

Young E. D. Kohl I. E. McCain K. Isa J. Rumble D. III ***POSTER LOCATION #8***
A Novel High-Mass Resolution Gas-Source Mass Spectrometer Facility at UCLA **[#2238]**
A novel high-mass-resolution gas-source mass spectrometer facility has been established at UCLA for exploring new isotope tracers for gases, ices, and rocks.

McKeegan K. D. Harrison T. M. Liu M.-C. ***POSTER LOCATION #9***
New Developments at the UCLA-NSF National Ion Microprobe Facility **[#2872]**
The history, technical capabilities, new instrumentation, and management structure of the UCLA National Science Foundation National Ion Microprobe Facility are described.

Dauphas N. Davis A. M. Yokochi R. Mendybaev R. A. Heck P. R. et al. ***POSTER LOCATION #10***
C^3 (C-Cubed): A Consortium of Instruments and Resources in Chicago for NASA-Based Research and Education **[#1274]**
The C^3 is a consortium of research laboratories in Chicago whose main focus is in the analysis of meteorites, returned samples, and their constituents.

THURS POSTERS

Floss C. Croat T. K. Gyngard F. Ogliore R. ***POSTER LOCATION #11***
The Laboratory for Space Sciences at Washington University in St. Louis **[#1260]**
The Laboratory for Space Sciences has a long history of development of microanalytical instrumentation for advancing planetary and space science research.

Wittmann A. Convey D. Sharp T. Wadhwa M. Buseck P. et al. ***POSTER LOCATION #12***
The Electron Microprobe Laboratory at Arizona State University **[#3018]**
ASU's Electron Microprobe Laboratory offers state-of-the-art microchemical analytical capacities for the study of planetary materials.

Cohen B. A. ***POSTER LOCATION #13***
The MSFC Noble Gas Research Laboratory (MNGRL): A NASA Investigator Facility **[#2760]**
MNGRL is a NASA Investigator Facility designed to conduct noble gas analysis of planetary microsamples, including Ar-Ar dating and cosmic-ray exposure ages.

Huss G. R. Nagashima K. Thomen A. Krot A. N. ***POSTER LOCATION #14***
The W. M. Keck Cosmochemistry Laboratory at the University of Hawaii at Manoa **[#2786]**
We discuss the operation and productivity of the W. M. Keck Cosmochemistry Laboratory and argue that continued robust funding is in NASA's long-term interest.

Agee C. B. ***POSTER LOCATION #15***
COMPRES: A Community-Based Consortium for Research on Materials Properties of Earth and Planetary Interiors **[#2589]**
COMPRES is a community organization that operates facilities at national laboratories for research in the materials properties of Earth and planetary interiors.

Schoonen M. Hill J. Thieme J. Chu Y. Tappero R. et al. ***POSTER LOCATION #16***
Planetary Science Capabilities at National Synchtrotron Light Source-II, Brookhaven National Laboratory **[#2951]**
National Synchrotron Light Source-II provides nanoscale-resolution X-ray imaging, enabling chemical speciation and diffraction studies of planetary materials.

Brand H. E. A. Martin D. ***POSTER LOCATION #17***
The Allende Meteorite: A Case Study for All the Family? **[#1386]**
The Allende Meteorite is probably the most studied rock in the solar system. What better sample to use to demonstrate the capabilities of a facility.

Brand H. E. A. Kimpton J. A. Gu Q. ***POSTER LOCATION #18***
Shining a Light on Planetary Processes Using Synchrotron Powder Diffraction **[#1121]**
The powder diffraction beamline at the Australian Synchrotron is ideally suited to carrying out time resolved measurements on planetary analogue environments.

McCubbin F. M. Allton J. H. Evans C. A.
Fries M. D. Nakamura-Messenger K. et al. ***POSTER LOCATION #19***
Curating NASA's Past, Present, and Future Extraterrestrial Sample Collections **[#2668]**
The NASA Astromaterials Aquisition and Curation Office at JSC is tasked through NPD 7100.10E to be the past, present, and future home of NASA's astromaterials.

Abe M. Okada T. Yada T. Uesugi M. Karouji Y. et al. ***POSTER LOCATION #20***
Current Status and Future Prospects of JAXA's Astromaterials Science Research Group **[#1438]**
JAXA organized Astromaterials Science Research Group as a new group in last year. We report the activity and current status of this group.

Hutzler A. Ferrière L. Smith C. L. Russell S. Aléon J. et al. ***POSTER LOCATION #21***
EURO-CARES: Project Roadmap of a European Sample Curation Facility **[#1937]**
EURO-CARES is a multinational project to create a roadmap for the implementation of a European Extra-terrestrial Sample Curation Facility.

Bryson K. L. Ostrowski D. R. ***POSTER LOCATION #22***
Asteroid Threat Assessment Project — Meteorite Laboratory **[#2657]**
The Meteorite Laboratory is part of the NASA Ames Asteroid Threat Assessement Project (ATAP). The laboratory measures the physical properties of meteorites.

Hanley J. Grundy W. Tegler S. Dillingham R. Trilling D. et al. ***POSTER LOCATION #23***
Laboratory Studies of Cryogenic Outer Solar System Materials **[#2421]**
NAU hosts a lab devoted to studies of astrophysical ices. Exotic ices can be measured in the lab at temperatures relevant to the coldest planetary bodies.

Mahjoub A. Choukroun M. Sotin C. Hodyss R. Barmatz M. ***POSTER LOCATION #24***
Development of a New Experimental Platform to Constrain the Chemical Composition of Titan's Lakes **[#1748]**
We have developed a new experimental setup to study the composition of Titan's lakes and to test the operation of compounds and instruments in such environment.

Gharib Nezhad E. Lyons J. R. Wright D. P. ***POSTER LOCATION #25***
Simulating Haze Particles in a H_2-Rich Exoplanet Atmosphere with High Temperature Discharge Experiments **[#2565]**
Haze particles in a H_2-rich exoplanet atmosphere are laboratory simulated using a high-temperature plasma discharge method.

Liu Y. Retherford K. D. Davis M. W. Mokashi P. S. Patrick E. L. et al. ***POSTER LOCATION #26***
The SwRI Ultraviolet Reflectance Chamber (SwURC): Progress Toward a Far Ultraviolet Surface Reflectance Library **[#2496]**
We report the status on SwRI Ultraviolet Reflectance Chamber (SwURC) designed to conduct FUV reflectance measurements of broad relevance to planetary science.

Johnson N. M. Kohler E. ***POSTER LOCATION #27***
VICI (Venus In Situ Chamber Investigations): A Small Venus Simulation Chamber **[#2267]**
A description of a small Venus simulation chamber located at NASA Goddard; available for community use.

Burr D. M. Bridges N. T. Smith J. K. Marshall J. R. ***POSTER LOCATION #28***
The Titan Wind Tunnel: Illustrating the Importance of Planetary Wind Tunnels for Understanding Aeolian Processes **[#2356]**
Titan Wind Tunnel data are improving our understanding of aeolian processes, while illustrating the importance of wind tunnels facilities for community use.

Swann C. Ewing R. C. ***POSTER LOCATION #29***
NASA's Planetary Aeolian Laboratory MARtian Surface Wind Tunnel **[#2415]**
This presentation outlines the use of the NASA's Martian Surface Wind Tunnel to better understand aeolian processes on Earth and Mars.

Malespin C. A. Johnson C. Arevalo R. Jr.
Brinckerhoff W. McAdam A. C. et al. ***POSTER LOCATION #30***
Mars Environment Chambers in NASA Goddard's Planetary Environments Lab **[#2615]**
The Planetary Environments Lab (PEL) at NASA's GSFC is home to two Mars environment test facilities used for the SAM and MOMA instruments.

Minafra J. A. Schmidt G. Bailey B. E. ***POSTER LOCATION #31***
SSERVI Analog Regolith Simulant Testbed Facility **[#2365]**
SSERVI manages a regolith testbed facility that leverages ~8 tons of JSC1A to test hardware and conduct research in a large simulant environment.

Parsons A. M. Bodnarik J. McClanahan T. P. Nowicki S. Schweitzer J. et al. ***POSTER LOCATION #32***
An Outdoor Gamma Ray and Neutron Instrumentation Test Facility at NASA/GSFC **[#2476]**
This outdoor Gamma-Neutron Test (GNT) facility is specially equipped for the testing of high energy gamma ray and neutron planetary science instrumentation.

Bleacher J. E. Hamilton C. W. Glavin D. P.
McAdam A. C. Eigenbrode J. L. et al. ***POSTER LOCATION #33***
NASA Goddard Instrument Field Team: A Facility Enabling Planetary Science Field Testing of New Instrument Designs **[#2323]**
The NASA Goddard Instrument Field Team enables field testing and integration of measurement philosophies early in the instrument development cycle.

Lee P. Braham S. Fong T. Glass B. J. Hoffman S. J. et al. ***POSTER LOCATION #34***
Haughton-Mars Project Research Station (HMPRS), Devon Island, High Arctic: A Planetary Science and Exploration Field Research Facility **[#3073]**
The Haughton-Mars Project Research Station on Devon Island, High Arctic, is a field research facility dedicated to supporting analog field research.

Taylor P. A. Nolan M. C. Rivera-Valentin E. G.
Richardson J. E. Rodriguez-Ford L. A. et al. ***POSTER LOCATION #35***
The Arecibo Observatory Planetary Radar System **[#2534]**
Arecibo Observatory houses the largest and most sensitive single-dish radio telescope and the most active and powerful planetary radar facility in the world.

Vodniza A. Q. ***POSTER LOCATION #36***
A Small Observatory with Big Projects **[#1182]**
The Astronomical Observatory of the University of Nariño-Colombia was founded on March 2002. We have participated on several international meetings as speakers.

Milam S. N. Stansberry J. Sonneborn G. ***POSTER LOCATION #37***
Innovative Solar System Science with the James Webb Space Telescope **[#2413]**
The current status of the James Webb Space Telescope as well as planetary science highlights and a mission overview will be presented.

Nelson D. M. Williams D. A. Zink A. E. ***POSTER LOCATION #38***
The Ronald Greeley Center for Planetary Studies: The NASA RPIF at Arizona State University **[#2125]**
The Ronald Greeley Center for Planetary Studies: planetary data archive, GIS training, education outreach, and long-term goals.

Hager M. A. Spudis P. D. Bigwood D. P. Chappell L. S. Cherry S. N. ***POSTER LOCATION #39***
The LPI Regional Planetary Image Facility **[#1205]**
LPI's Regional Planetary Image Facility provides rapid access to planetary data for the science community, educators, and public at large.

Watters T. R. Aiello R. E. Campbell B. A. O'Brien J. A. ***POSTER LOCATION #40***
The Smithsonian Regional Planetary Image Facility **[#1567]**
The Smithsonian Regional Planetary Image Facility provides for the use and dissemination of photographs, digital images, and other data from planetary missions.

Byrne S. Schuchardt M. ***POSTER LOCATION #41***
The Space Imagery Center: A NASA Regional Planetary Image Facility **[#1355]**
The Space Imagery Center is a NASA Regional Planetary Image Facility that provides research services, preserves a data archive, and conducts public engagement.

Portree D. S. F. Hagerty J. J. ***POSTER LOCATION #42***
The USGS Regional Planetary Information Facility: A Summary of Resources, Services, and Plans for the Future **[#2220]**
The USGS RPIF will expand its tradition of service to the planetary science community through adoption of new practices, partnerships, and technologies.

Muller J.-P. Grindrod P. M. ***POSTER LOCATION #43***
The UCL RPIF: A Planetary Data Portal for the UK **[#2318]**
The UK NASA RPIF Node is described including the novel RPIF-3D guest facilities for 3D mapping, visualization, and onscreen digitization of geological features.

Kline R. D. Hayes A. G. Million C. C. Proton J. Sullivan R. et al. ***POSTER LOCATION #44***
The Spacecraft Planetary Imaging Facility (SPIF) at Cornell University **[#2891]**
We present an overview of services provided by the Spacecraft Planetary Imaging Facility at Cornell — Part of the Regional Planetary Image Facility Network.

Spray J. G. ***POSTER LOCATION #45***
The Canadian NASA Regional Planetary Image Facility: Impact Cratering and Shock Processes **[#3069]**
This presentation concerns presenting the research and outreach focuses of the Canadian Regional Planetary Image Facility.

Neivert P. Schultz P. H. ***POSTER LOCATION #46***
Northeast Planetary Data Center **[#2952]**
The Data Center provides images, data, and resources for the northeast region of the U.S. as part of the network of Regional Planetary Image Facilities.

Mouginis-Mark P. J. Peterson C. Nakamura P. Kastner E. ***POSTER LOCATION #47***
Unique Aspects of the NASA Pacific Regional Planetary Data Center **[#1367]**
We describe Hawaii's RPIF, including new data display and video-conferencing capabilities and the concept of Hawaii as a planetary volcanology analog.

Pieth S. Jaumann R. Weiland M. Eichentopf K. ***POSTER LOCATION #48***
The NASA Regional Planetary Image Facility at the German Aerospace Center (DLR) in Berlin, Germany **[#1834]**
This library of planetary photographs and maps keeps on file all the image data transmitted by many NASA and ESA space probes and makes them accessible to the public in Europe.

Schroeder J. Anderson R. C. ***POSTER LOCATION #49***
Overview of the Regional Planetary Image Facility (RPIF) at the Jet Propulsion Laboratory **[#2596]**
The Jet Propulsion Laboratory (JPL) Regional Planetary Image Facility (RPIF) is chartered as a repository for all robotic spacecraft hard-copy data.

Karcz J. S. * Bowling D. Cornelison C. Parrish A. Perez A. et al. ***POSTER LOCATION #50***
The Ames Vertical Gun Range **[#2599]**
The Ames Vertical Gun Range (AVGR) is a national facility for conducting laboratory-scale investigations of high-speed impact processes.

Williams D. A. * Smith J. K.
NASA Facilities Overview: Planetary Aeolian Laboratory **[#1524]** ***POSTER LOCATION #51***
This invited presentation will discuss one of NASA's Planetary Science Division Facilities, the Planetary Aeolian Laboratory.

Kremic T. * Nakley L. Vento D. Balcerski J. Kulis M. et al. ***POSTER LOCATION #52***
GLENN Extreme Environments Rig (GEER) for Planetary Science **[#2146]**
The presentation discusses the NASA Glenn Extreme Environment Rig (GEER) and the potential applications and benefits it offers planetary science.

Milliken R. E. * Hiroi T. Patterson W. ***POSTER LOCATION #53***
The NASA Reflectance Experiment Laboratory (RELAB) Facility: Past, Present, and Future **[#2058]**
Overview of past, current, and future capabilities of RELAB instrumentation and spectral database.

(IS THERE) LIFE ON MARS? MARTIAN EXOBIOLOGY TOOLS, ANALOGS, AND ENVIRONMENTS [R602]

Michalski J. R. Niles P. B. Rogers A. D.
Johnson S. S. Ashley J. W. et al. ***POSTER LOCATION #54***
Geology of McLaughlin Crater, Mars: A Unique Lacustrine Setting with Implications for Astrobiology **[#1292]**
McLaughlin Crater contains ancient carbonate-clay lacustrine deposits with remarkable sedimentary textures and exceptional astrobiological potential.

Caprarelli G. Jones E. Mills F. ***POSTER LOCATION #55***
A Thermophysical Study of Martian Surface Materials in Schiaparelli Crater **[#1284]**
We show the power of our unsupervised classification method applied to the analysis and interpretation of thermophysical data in Schiaparelli Crater, Mars.

Williams J.-P. Pathare A. Dohm J. M. Lopes R. M. C. Buczkowski D. L. ***POSTER LOCATION #56***
Volcanism and Giant Polygons Within Argyre Basin, Mars **[#2423]**
Argyre Mons, a large volcanic structure, and giant polygons have recently been identified on the floor of Argyre and appear to have formed contemporaneously.

Wimmer-Schweingruber R. F. Köhler J. Hassler D. M.
Guo J. Appel J. et al. ***POSTER LOCATION #57***
Initial Determination of the Zenith Angle Dependence of the Martian Radiation Environment at Gale Crater Altitudes **[#1151]**
We report the zenith angle dependence of the radiation environment at Gale Crater on Mars. This is the first determination on another planet than Earth.

Campbell J. Sidiropoulos P. Muller J. P. ***POSTER LOCATION #58***
The Search for Polycyclic Aromatic Hydrocarbons in the Martian South Polar Residual Cap Using CRISM Infrared Spectra **[#2110]**
Using infrared spectral data, sublimation features on the martian south polar cap are being examined for evidence of hydrocarbons.

Belmahdi I. Buch A. Szopa C. Freissinet C. Glavin D. P. et al. ***POSTER LOCATION #59***
Potential Sources of Artifacts and Backgrounds Generated by the Sample Preparation of SAM **[#1952]**
Potential sources of artifacts and backgrounds generated by the sample preparation of SAM.

Noe Dobrea E. Z. McAdam A. C. Freissinet C. Franz H. Belmahdi I. et al. ***POSTER LOCATION #60***
Characterizing the Mechanisms for the Preservation of Organics at the Painted Desert: Lessons for MSL, ExoMars, and Mars 2020 **[#2796]**
Based on field studies performed at the Painted Desert, we find that evaporites such as jarosite may play an important role in the preservation of ancient organics.

Navarro R. Lalla E. A. Sanz Arranz A. López G. Medina J. et al. ***POSTER LOCATION #61***
Raman-XRD Analysis of Selected Samples from Chamorga (Anaga Massif) Tenerife (Spain): Planetary and Astrobiological Implications for Mars **[#1885]**
The Island of Tenerife as a martian analog.

Glamoclija M. Steele A. Starke V. Zeidan M. Potochniak S. et al. ***POSTER LOCATION #62***
Sulfate-Rich Playas: A Microbial Habitat and Terrestrial Analog to Martian Playas **[#2529]**
Playas from the White Sands (New Mexico) are an excellent model system to study habitability parameters and biosignatures in sulfate rich evaporitic settings.

Kelly H. S. Boston P. J. Parness A. J. ***POSTER LOCATION #63***
Diagnostic Characteristics of Macroscopic Biopatterns Detected with Novel Robotic Platform **[#2955]**
Visual detection of distinctive biosignatures via a novel robotic platform to further advance robotic capabilities for missions to Mars.

Harrison T. N. Pontefract A. J. Osinski G. R.
Tornabene L. L. Carr C. E. et al. ***POSTER LOCATION #64***
Hydrogeological Constraints on Gully Formation and the Effects of Microbial Colonization **[#2247]**
We propose to study the effects of substrate properties and gully activity drivers on gully morphology and microbial colonization at three Mars analog locations.

Che C. Parvez S. Glotch T. D. ***POSTER LOCATION #65***
Spectroscopic Study of Biosignatures in Clay-Rich Sediments: Implication for Martian Astrobiological Exploration **[#1692]**
We examine organic matters stored in terrestrial clay-rich sediments using XRD, IR, and Raman spectrascopy, and aid the search for biosignatures on Mars.

Abrevaya X. C. Caneiro A. Horvath J. E.
Galante D. Wilberger D. O. et al. ***POSTER LOCATION #66***
Synthesis of Halite Under Martian Simulated Conditions: A Study with Astrobiological Implications **[#2134]**
We analyze the structure of halite formed under terrestrial and martian conditions and we discuss the possibility of survival of microorganisms.

Bartlett C. L. Hausrath E. M. Adcock C. T. ***POSTER LOCATION #67***
Phosphate Release: The Effect of Prebiotic Organic Compounds on Dissolution of Mars-Relevant Minerals **[#2754]**
Dissolution experiments conducted on Mars-relevant phosphate bearing minerals with implications for early life on Mars.

Mojarro A. Ruvkun G. Zuber M. T. Carr C. E. ***POSTER LOCATION #68***
Methods for Extracting Nucleic Acids from Mars Analog Regolith **[#1643]**
In this study we utilize a miniature two-step cell lysis and nucleic acid extraction module to extract deoxyribonucleic acid (DNA) from Mars analog regolith.

EXOBIOLOGY: ORGANIC DELIVERY, HABITABLE ENVIRONMENTS, ANALOGS, AND TOOLS [R603]

Kashyap S. Sklute E. C. Holden J. F. Dyar M. D. ***POSTER LOCATION #69***
Characterization of Nanophase Iron Oxides Produced Through Bioreduction by Hyperthermophiles **[#2192]**
Mineral signatures may be the only evidence of life left on other planets. Mineral products from bioreduction by hyperthermophiles are spectrally characterized.

Rask J. C. ***POSTER LOCATION #70***
Elevated Radiation Environment at Worswick Hot Springs **[#2835]**
We report on the discovery of radioactivity at Worswick Hot Springs. This work supports companion biochemical and microbial investigations at the field site.

Nuevo M. Sandford S. A. Cooper G. ***POSTER LOCATION #71***
Sugar and Sugar Derivatives in Residues Produced from the UV Irradiation of Astrophysical Ice Analogs **[#1278]**
We present the results of the search for sugars and sugar-like compounds in the organic residues produced by the irradiation of astrophysical laboratory ice analogs.

Locke D. R. Burton A. S. Niles P. B. ***POSTER LOCATION #72***
Conversion and Extraction of Insoluble Organic Materials in Meteorites **[#2730]**
Methods for isolating and converting IOM in meteorites including pyrolysis and oxidation.

Elsila J. E. Burton A. S. Aponte J. C.
Blackmond D. G. Dworkin J. P. et al. ***POSTER LOCATION #73***
The Diversity of Meteoritic Amino Acids: Variations in Abundance and Enantiomeric Composition and Implications for Exobiology **[#1533]**
We summarize recent discoveries of amino acid diversity across meteorite types and the relationship to potential formation and processing histories.

Burton A. S. Elsila J. E. Glavin D. P. Dworkin J. P. Ornek C. Y. et al. ***POSTER LOCATION #74***
Searching for Extraterrestrial Amino Acids in a Contaminated Meteorite: Amino Acid Analyses of the Canakkale L6 Chondrite **[#2961]**
Indigenous amino acids in an L6 chondrite? It appears so.

Steele A. Starke V. Fries M. D. F. Glamoclija M. Needham A. et al. ***POSTER LOCATION #75***
The Extraction, Amplification and Sequencing of DNA from Ordinary Chondrites and the Allende CV Chondrite — Of Course Its Terrestrial But How Did It Get There? **[#2597]**
We have extracted amplified and sequenced eubacterial and eukaryotic DNA from ordinary chondrites and Allende. Speciation reflects handling and point of impact.

Gulick V. C. Ishikawa S. T. Freeman P. M. Johnsen T. Angell J. et al. ***POSTER LOCATION #76***
Building a Biosignature Rock Sample Library and Developing Automated Classifiers **[#2825]**
This abstract summarizes our progress on building a mineral, rock, and biosignature sample library and developing automated classifiers from Raman spectra.

Nie N. X. Dauphas N. Greenwood R. C. ***POSTER LOCATION #77***
Iron and Oxygen Isotope Fractionation During Photo-Oxidation **[#1489]**
High-precision Fe isotope measurements were performed to pinpoint the mass fractionation law during photo-oxidation, and oxygen isotopes were also investigated.

Chen C. C. Tissot F. L. H. T. Dauphas N. D.
Bekker A. B. Halverson G. P. H. et al. ***POSTER LOCATION #78***
$^{238}U/^{235}U$ Ratio in Carbonates as a Global Paleoredox Proxy **[#1677]**
The results obtained from this study will be used to reconstruct the evolution of the marine redox conditions through time.

Yano H. Yamagishi A. Hashimoto H. Yokobori S. Kobayashi K. et al. ***POSTER LOCATION #79***
The First Year Operation and Initial Sample Analysis and Curation Preparation of TANPOPO, the Japanese Astrobiology Experiment Onboard the ISS-JEM-EF **[#3009]**
Japan's first astrobiology experiment TANPOPO is now onboard ISS for meteoroid capture and terrestrial microbe exposure for sample returns every year in 2016–2019.

Craft K. L. Hagedon M. Tiffany J. Bradburne C. ***POSTER LOCATION #80***
DESAL: Reducing Salt Content for In-Situ Automated DNA Extractions **[#3035]**
The DESALination project tackles a challenge in astrobiological life detection: reducing salinity of samples to enable characterization of organisms within.

Acosta-Maeda T. E. Misra A. K. Sharma S. K.
Berlanga G. Muchow D. et al. ***POSTER LOCATION #81***
Remote Raman Measurements of Minerals, Organics, and Inorganics at 430 m Range **[#3053]**
Remote Raman of chemicals at 430 m.

Huang T. Xiao L. Wang H. M. Wang R. C. Chen Z. Y. ***POSTER LOCATION #82***
Microorganism Isolated from Dalangtan Playa (Qaidam Basin, PR China) and Their Amplications for Mars Potential Life **[#1998]**
Microbes isolated from extremely arid and hyper saline Dalangtan Playa (as a Mars analog) provide amplications for Mars potential life styles.

CHONDRITES: IMPACTS AND ORBITS [R604]

Rout S. S. Heck P. R. Schmitz B. ***POSTER LOCATION #83***
A Search for Shocked Chromites in Fossil Meteorites with Raman Spectroscopy **[#3043]**
Chromites from fossil meteorites and shock melt veins and matrix of highly shocked (S6) L chondrites were studied using Raman spectroscopy.

Caplan C. E. Huss G. R. Schmitz B. Nagashima K. ***POSTER LOCATION #84***
Oxygen-Isotope Analysis of Extraterrestrial Chromite Grains from the Lynna River, Russia **[#2269]**
We measured O isotopes in extraterrestrial chromite from sediments along the Lynna River to investigate the types of meteorites falling in the Ordovician.

Heck P. R. Schmitz B. Rout S. S. Tenner T. Villalon K. et al. ***POSTER LOCATION #85***
The Composition of the Flux of Micrometeorites after the L-Chondrite Parent Body Breakup ~470 Ma Ago: ≤1% H Chondritic, ≥99% L Chondritic **[#1191]**
We searched for H-chondritic micrometeorites in ~470 Ma old limestone that is highly abundant in L-chondritic material. We analyzed O isotopes with SIMS.

Schmieder M. Kring D. A. Swindle T. D. Carter-Bond J. C. Moore C. B. ***POSTER LOCATION #86***
The Gao-Guenie (Burkina Faso) Impact Melt Breccia — A Piece of an Impact Melt Injection Dike on an H-Chondrite Asteroid **[#1239]**
The Gao-Guenie impact melt breccia is interpreted in terms of its petrology and cooling rates as a sample from an impact melt dike on a H-chondrite asteroid.

Schmieder M. Shaulis B. J. Kring D. A. ***POSTER LOCATION #87***
Larkman Nunatak 06507 — Insights into the Impact Melting of Carbonaceous Chondrites **[#1646]**
Antarctic meteorite Larkman Nunatak 06507, listed as an LL-impact melt breccia, is here classified as a brecciated and shock-melt-veined CK-chondrite.

Moreau J. Kohout T. Wünnemann K. ***POSTER LOCATION #88***
Shock-Darkening in Ordinary Chondrites: Pressure-Temperature p-T Conditions Study by Impact Modelling **[#1349]**
To study shock-darkening in ordinary chondrites, we use the shock physics code iSALE (Wünnemann, 2006) using mesoscale modelling with appropriate materials.

Phelps P. R. Schmieder M. Kring D. A. ***POSTER LOCATION #89***
LL-Chondrite Dominion Range 10092: A Shock-Metamorphosed Sample from an Impact-Modified Asteroid **[#1698]**
Thought to have undergone impact melting, a different split of the meteorite shows contrasting metamorphic conditions.

Bryson K. L. Ostrowski D. R. ***POSTER LOCATION #90***
Meteorite Fractures and Scaling for Atmospheric Entry **[#2619]**
To model objects entering the atmosphere we must know their internal structure and methods of fragmentation. We work to determine a scaling factor for fracturing.

Welten K. C. Caffee M. W. Nishiizumi K. ***POSTER LOCATION #91***
The Complex Cosmic Ray Exposure History of Jesenice (L6): Possible Evidence for Ejection from Parent Body by Tidal Disruption or YORP Related Effects **[#2924]**
Chondrites with complex CRE histories may provide clues on ejection mechanism, either by impacts on asteroid or by tidal disruption or YORP-related effects.

Meier M. M. M. Bindi L. Busemann H. Heck P. R. Neander A. I. et al. ***POSTER LOCATION #92***
Cosmic-Ray Exposure and Shock Degassing Ages of the Quasicrystal-Bearing Khatyrka Meteorite **[#1226]**
We have measured the He, Ne content of six forsteritic olivine grains from the quasicrystal-bearing CV chondrite Khatyrka to reconstruct its cosmic history.

Delaney J. S. Turrin B. Lindsay F. N. Park J. Herzog G. F. et al. ***POSTER LOCATION #93***
$^{40}Ar/^{39}Ar$ Ages vs. Meteoroid Depth in Murchison (CM2): A Test of the Solar Heating Hypothesis **[#1569]**
^{40}Ar-^{39}Ar 'ages' of Murchison subsamples show depth-age variation inconsistent with simple solar heating and suggest a role for variable interaction with water.

McAdam M. M. Sunshine J. M. Howard K. T.
McCoy T. J. Alexander C. M. O'D. ***POSTER LOCATION #94***
Finding the Most Primitive Asteroids: Spectral Identification of Amorphous Materials in CO Chondrites **[#2291]**
We present MIR spectral evidence for amorphous silicates in mildly heated COs. We propose using this method to find the most primitive asteroids.

Binzel R. P. DeMeo F. E. Burt B. J. Burbine T. H. Polishook D. ***POSTER LOCATION #95***
Where Do H, L, and LL Chondrites Come From? Tracing Their Source Regions Using Astronomical Tools **[#1352]**
We find the ordinary chondrite stratigraphy in the asteroid belt to be LL, H, L (in increasing heliocentric distance) by tracing near-Earth object sources.

CHONDRITES: ORGANICS [R605]

Yesiltas M. Glotch T. D. ***POSTER LOCATION #97***
Chemical Composition of Queen Alexandra Range 97008: An Organic-Rich Unequilibrated Ordinary Chondrite **[#2536]**
Organic-rich grains of the QUE 97008 meteorite have been studied with high spatial resolution micro-FTIR imaging spectroscopy.

Yesiltas M. Glotch T. D. Ebel D. S. ***POSTER LOCATION #98***
Molecular Constituents of the Moss (CO3.6) Chondrite via Micro-Raman Spectroscopic Imaging **[#2507]**
Chemical composition of the Moss meteorite has been studied via high spatial resolution micro-Raman spectroscopic imaging.

Bose M. Root R. ***POSTER LOCATION #99***
Sulfur Speciation in Murchison Using Micro-XRF and Micro-XANES **[#1571]**
Micro-XANES study of CM2 chondrite Murchison matrix shows the localized distribution of different oxidation states of sulfur.

Bose M. Zega T. J. Domanik K. ***POSTER LOCATION #100***
Nitrogen and Carbonaceous Isotopic Variations in Several Carbonaceous Chondrites — A Hunt for the Carrier Phases **[#1671]**
Six chondrites, C-ung Bells, CM2.6 QUE 97990, CM2 Murray, CM2 Murchison, CM2 Cold Bokkeveld, and CV3 Allende were probed for C- and N-anomalous organic matter.

Hashiguchi M. Yurimoto H. ***POSTER LOCATION #101***
Hydrogen Isotopic Compositions and Chemical Structures of Organic Materials in Northwest Africa 801 CR2 Chondrite: Implications for Metamorphism Histories of Extraterrestrial Organic Materials **[#1216]**
We analyzed hydrogen isotopes and Raman spectra of organic materials in NWA 801 CR2 chondrite and discuss alteration histories of the organic materials in early solar nebula.

Cao T. Nakamura-Messenger K. Berger E. L.
Burton A. S. Messenger S. et al. ***POSTER LOCATION #102***
Organic Analysis in Miller Range 090657 and Buckley Island 10933 CR2 Chondrites: Part 1 In-Situ Observation of Carbonaceous Material **[#2427]**
We present the results of the analysis of carbonaceous materials in two CR2 carbonaceous chondrites using SEM and TEM.

Burton A. S. Cao T. Nakamura-Messenger K.
Berger E. L. Messenger S. et al. ***POSTER LOCATION #103***
Organic Analysis in the Miller Range 090657 CR2 Chondrite: Part 2 Amino Acid Analyses **[#2987]**
One part of a consortium study on organic molecules in MIL 090657.

Messenger S. Nakamura-Messenger K. Elsila J. E.
Berger E. L. Burton A. S. et al. ***POSTER LOCATION #104***
Organic Analysis in the Miller Range 090657 CR2 Chondrite: Part 3 C and N Isotopic Imaging **[#2447]**
We have identified abundant ^{15}N-rich micrometer-scale grains within a primitive CR2 chondrite that likely predate the formation of the parent body.

Callahan M. P. ***POSTER LOCATION #105***
Possible Relationship Between Organic Abundance and Aqueous Alteration of CM2 Carbonaceous Chondrites **[#1691]**
Correlations between degree of aqueous alteration and abundance of organic compounds in CM2 chondrites were examined.

Orthous-Daunay F.-R. Thissen R. Vuitton V.
Flandinet L. Moynier F. et al. ***POSTER LOCATION #106***
Toward Molecular Evidences for Presolar Processing of Chondritic Free Organic Matter **[#2861]**
We investigated the molecular complexity of 2500 compounds at a time and identified patterns consistent with saturated aliphatic chain growth on icy grains.

Monroe A. A. Shock E. L. Wadhwa M. ***POSTER LOCATION #107***
Meteoritic Isoleucine Epimerization in the Chronology of Asteroidal Parent Body Fluids **[#2340]**
L-allo-isoleucine to D-isoleucine abundance ratios and reaction kinetics exclude host fluid combinations of duration and temperature.

Battandier M. Bonal L. Quirico E. Beck P. Engrand C. et al. ***POSTER LOCATION #108***
Characterization of the Organic Matter and Hydration State of a Series of Antarctic Micrometeorites **[#1475]**
The IR and Raman studies of Antarctic micrometeorites in comparison to CR/CM chondrites reveal some variability in terms of their organic matter and mineralogy.

Changela H. G. ***POSTER LOCATION #109***
Objective Taxonomy of Solid Organic Material in Chondrites **[#2328]**
The ambiguity in identifying phases in chondritic IOM residues is addressed and an objective classification scheme for OM phases in situ is proposed.

Alexander C. M. O'D. ***POSTER LOCATION #111***
Determining Petrologic Types of CM Chondrites **[#1273]**
The use of serpentine compositions are compared to other methods for classifying CMs.

Greenwood R. C. Franchi I. A. Alexander C. M. O'D. Howard K. T. ***POSTER LOCATION #112***
Continuing the Search for the Most Primitive CO Chondrites: The Oxygen Isotope Perspective **[#2206]**
Primitive Antarctic CO chondrites have oxygen isotope compositions that are distinct from higher grade COs and may represent the elusive CM2 precursor material.

Fujiya W. Fukuda K. Koike M. Ishida A. Sano Y. ***POSTER LOCATION #113***
Oxygen and Carbon Isotopic Ratios of Carbonates in the Nogoya CM Chondrite **[#1712]**
Oxygen and C isotopic ratios of carbonates in Nogoya suggest the Rayleigh-type isotopic fractionation of C in the later stages of aqueous alteration.

Hidaka H. Higuchi T. Yoneda S. ***POSTER LOCATION #114***
Redistribution of Alkaline Elements in Chondrules of the Sayama (CM2) Meteorite: Possible Alteration Effect in Association with Aqueous Activity in the Early Solar System **[#1782]**
SHRIMP analyses were done for the determination of elemental abundances of alkaline elements and of the Ba isotopic ratios of the Sayama meteorite chondrules.

Friedrich J. M. Abreu N. M. Troiano J. M. Wolf S. F. Stanek G. L. ***POSTER LOCATION #115***
Chemical Studies of CM Chondrites: Exploring Potential Compositional Differences Associated with Progressive Aqueous Alteration **[#2162]**
We present an examination of the isochemical nature of progressive aqueous alteration in CM chondrites.

Singerling S. A. Brearley A. J. ***POSTER LOCATION #116***
Altered Primary Sulfides in CR and CM Carbonaceous Chondrites: Formation by Dissolution and Pseudomorphic Replacement **[#1718]**
We present observations of aqueously altered primary iron sulfides in CR and CM chondrites and argue they formed by dissolution or pseudomorphic replacement.

Gilmour C. M. Herd C. D. K. Cloutis E. A. Cuddy M. Mann P. ***POSTER LOCATION #117***
Water Abundance in the Tagish Lake Meteorite from TGA and IR Spectroscopy: Evaluation of Aqueous Alteration **[#1765]**
TGA and IR spectroscopy were used to evaluate whether water abundances among different Tagish Lake samples reflect the previously reported alteration sequence.

Seitz H.-M. Schoelmerich M. O. Gaspers N.
Marco L. Hoefer H. E. et al. ***POSTER LOCATION #118***
Duration of Chondrite Parent Body Peak Metamorphic Conditions Deduced from Lithium Partitioning Between Chondrules and Matrix in Unequilibrated and Equilibrated Carbonaceaous and Ordinary Chondrites **[#1459]**
Lithium can be used as a speedometer to estimate the duration of CPB metamorphic peak conditions, which prolonged over a timescales of 0.5 Ma to 5 Ma years.

Telus M. Alexander C. M. O'D. Hauri E. H. Wang J. ***POSTER LOCATION #119***
H Isotopic Composition of Phosphates in H4 Chondrites **[#1742]**
We analyzed the H isotopic composition of phosphate grains from H4 chondrites Ste. Marguerite and Sena. We find Cl-apatite grains from Sena are enriched in D.

Dunn T. L. Ivanova M. Gross J. ***POSTER LOCATION #120***
Magnetite as an Indicator of Equilibration in the CK Chondrites **[#2101]**
Magnetite says that / Dhofar 015 is CK4 / Despite its texture.

Lewis J. A. Jones R. H. Brearley A. J. ***POSTER LOCATION #121***
Alkali Feldspar Exsolution in Ordinary Chondrites: Alkali Metasomatism, Metamorphism, and Cooling Rates **[#2559]**
We compare the occurrences and textures of K-feldspar exsolution in a range of ordinary chondrites and discuss implications for metasomatism and cooling rates.

CHONDRITES: WHOLE ROCK [R607]

Schrader D. L. Davidson J. ***POSTER LOCATION #123***
Pristine Pre-Accretionary Signatures in CM Chondrite Silicates: A Common Parent-Body with the CO Chondrites? **[#1288]**
We studied CM chondrite chondrules to evaluate if they retain pre-accretionary formation signatures, and if there is a cogenetic link with CO chondrites.

Manzari P. De Angelis S. De Sanctis M. C. Ammannito E. Di Iorio T. ***POSTER LOCATION #124***
Hypespectral Spectroscopy of Carbonaceous Chondrite Mighei in the Visible-Infrared Range **[#1508]**
We show preliminary interpretations of spectral data collected on Mighei chondrite by means of the SPIM facility, spare of the spectrometer on Dawn spacecraft.

Manzari P. De Angelis S. De Sanctis M. C. ***POSTER LOCATION #125***
Hyperspectral Micro-Imaging in the Visible-Infrared Range of Enstatite Chondrite: Preliminary Investigation on Thin Section of Sahara 97072 **[#1107]**
This abstract describe preliminary interpretation of microimaging hyperspectral data collected on a thin section of the enstatite chondrite EH3 Sahara 97072.

Friend P. Hezel D. C. Barrat J.-A. Zipfel J. Palme H. ***POSTER LOCATION #126***
The Chemical Composition of Matrix, Chondrules and Bulk Meteorite of the CM Chondrite Jbilet Winselwan **[#1893]**
We measured chondrules, matrix, and bulk from the CM2 chondrite Jbilet Winselwan and revealed clear chemical complementarities for Fe/Mg, Si/Mg, and Al/Ti.

Shirai N. Vu C. D. Sekimoto S. Ebihara M. Nishiizumi K. ***POSTER LOCATION #127***
Chemical Variations of Miller Range 07710 (L4) and Miller Range 091010 (CV3) Collected in the Ice at Miller Range, Antarctica **[#1850]**
We examine how terrestrial weathering and sampling problem affect chemical classification by using MIL 07710 and 091010 collected in the ice at Miller Range.

Vu C. D. Shirai N. Ebihara M. ***POSTER LOCATION #128***
Chemical Composition Study of Antarctic CI and CM Chondrites in Light of Precise and Accurate Abundances of Rare Earth Elements, Th and U **[#1916]**
Bulk chemical compositions of Y-980115, B-7904, Y-86720, and Y-793321 were determined by using ICP-AES and ICP-MS in order to unravel their formation histories.

Koch T. E. Brenker F. E. Krot A. N. Bizzarro M. ***POSTER LOCATION #129***
Petrography of Quebrada Chimborazo 001 — A New CBa Chondrite **[#1968]**
We will present petrographic data on a new CB chondrite Quebrada Chimborazo 001 including details of its shock pressure history.

Hamilton V. E. Abreu N. M. Bland P. A.
Connolly H. C. Jr. Lauretta D. S. et al. ***POSTER LOCATION #130***
New Insights into Carbonaceous Chondrite Mineralogies Obtained from Microscopic Mineral Mapping **[#1793]**
We map variations in the spatial distribution of OH- in individual meteorites and discover two populations of olivine in a metamorphosed CR2.

Ostrowski D. R. Bryson K. L. ***POSTER LOCATION #131***
Physical Properties of Ordinary Chondrites **[#2642]**
Study of the physical properties of ordinary chondrites. This includes density, porosity, acoustic velocity, emissivity, and thermal conductivity.

Macke R. J. Opeil C. P. Consolmagno G. J. Britt D. T. ***POSTER LOCATION #132***
Ordinary Chondrite Heat Capacities Below 350K **[#1221]**
We measured and modeled low-temperature Cp of OCs from the Vatican collection to inform models of asteroid thermal diffusivity and thermal inertia.

McCausland P. J. A. Flemming R. L. Mazur M. J.
Umoh J. Holdsworth D. W. et al. ***POSTER LOCATION #133***
Famenin, Iran Ordinary Chondrite 2015 Fall: Non-Destructive Analysis **[#3064]**
Non-destructive analysis of fresh Famenin meteorite by micro CT and in situ XRD. Cool mineral textures and 3D features as well as bulk physical properties!

O'Brien T. M. Tarduno J. A. ***POSTER LOCATION #134***
Allende Meteorite Remanence: Evidence for Magnetic Interactions **[#2913]**
The Allende meteorite records magnetic interactions rather than a core dynamo.

COSMOCHEMICAL ORIGINS [R608]

Mayer B. Bermingham K. R. Worsham E. A. Humayun M. Walker R. J. ***POSTER LOCATION #135***
Correlated Nucleosynthetic Anomalies in Mo, Ru, and Pd from Iron Meteorites **[#2055]**
First effort of combined Mo, Ru, and Pd isotopic measurements in meteorites showing the cosmic correlation between these three elements on the exact same specimens.

Dunham E. Wadhwa M. Hervig R. Simon S. Grossman L. ***POSTER LOCATION #136***
Further Evidence of Beryllium-10 Heterogeneity in the Early Solar System Inferred from Be-B Systematics of Refractory Inclusions in a Minimally Altered CR2 Chondrite **[#2723]**
Did Beryllium / Form in solar nebula? / CRs tell us yes.

Yokoyama T. Nakahara M. Fukai R. ***POSTER LOCATION #137***
In Search of Nucleosynthetic Ytterbium Isotope Anomalies in Chondrites **[#2418]**
We report preliminary results on Yb isotope compositions in ordinary and rumuruti chondrites and discuss the origin of nucleosynthetic isotope anomalies.

Bojazi M. J. Meyer B. S. ***POSTER LOCATION #138***
Production of Iron-60 in a Self-Enriching Molecular Cloud **[#3060]**
Production of iron-60 in a self-enriching molecular cloud.

Nakamoto T. Takeishi A. ***POSTER LOCATION #139***
Isotopic Anomalies in Meteorites Generated from Initially Inhomogeneous Molecular Cloud Core **[#2201]**
Isotopic anomalies of some nuclides, such as ^{46}Ti and ^{54}Cr, may be caused by an initially heterogeneous molecular cloud core.

Dominguez G. Christensen E. Boyer C. Park M. Benitez E. ***POSTER LOCATION #140***
Experimental Observation of Large Mass-Independent Fractionation Due to Mass Dependent Diffusion **[#2395]**
We show that a major assumption that underlies geochemical interpretations of shifts in the isotopic composition of compounds requires substantial modification.

Nagahara H. Ozawa K. ***POSTER LOCATION #141***
Temporal and Spatial Evolution of the Proto-Solar Disk: Silicates, Ice, and Oxygen Isotopic Compositions **[#2882]**
Physical and chemical evolution of the proto-solar disk with special interests to bulk chemical and oxygen isotopic composition of chondrites was investigated.

Lyons J. R. Gharib Nezhad E. Ayres T. R. ***POSTER LOCATION #142***
The Oxygen Isotope Composition of the Solar Photosphere Determined from CO Observations **[#2509]**
A new analysis of observations of CO in the solar photosphere yields delta^{18}O = –50 ± 11‰, consistent with the Genesis inferred value from solar wind.

Umurhan O. M. Estrada R. R. Cuzzi J. N. ***POSTER LOCATION #143***
Theoretical Development on Hydrodynamic Activity in Protoplanetary Disk Dead Zones **[#2887]**
Known dynamical activity in protoplanetary disk zones is reviewed. Their impact upon the dust concentration and its back reaction upon the gas, are studied.

Piani L. Tachibana S. Hama T. Sugawara I. Oba Y. et al. ***POSTER LOCATION #144***
Photochemistry in Molecular Cloud and Protoplanetary Disk: Evolution of Ice and Organic Residues Through Warming and UV-Irradiation **[#1715]**
Experimental results obtained with the PICACHU apparatus show morphological changes by heating and UV-photoprocessing of ISM-formed ice and organic compounds.

Miyazaki Y. Korenaga J. ***POSTER LOCATION #145***
Chemical Consequence of Dust Settling in Protoplanetary Disk **[#1420]**
Dust settling in protoplanetary disk is calculated considering both physics and chemistry. Effect of condensation and evaporation on settling is investigated.

King P. L.. Henley R. W. ***POSTER LOCATION #146***
Do Angrite Meteorites Record Processes from a Differentiated Parent Body or Dust-Rich Regions of the Proto-Planetary Disc? **[#2701]**
We provide petrographic evidence and geochemical models to examine scenarios where angrites form in a dust- and gas-rich clump in the proto-planetary disc.

Yamamoto D. Tachibana S. ***POSTER LOCATION #147***
A Kinetic Study on Hydrous Mineral Formation Reaction Between Amorphous Forsterite and Water Vapor in Protoplanetary Disks **[#1733]**
Kinetic studies on hydration of amorphous forsterite and dehydration of serpentine imply that hydrous minerals could form in the solar nebula.

STARDUST MISSION AND INTERPLANETARY DUST COMPONENTS [R609]

Ogliore R. C. Westphal A. J. Nagashima K. Huss G. R. ***POSTER LOCATION #149***
Oxygen Isotope Measurements of Comet Wild 2 Material in the Bulb of Stardust Track 184 **[#1721]**
We report the oxygen isotopic composition of 47 small particles in the bulb of Stardust cometary track 184.

Stroud R. M. De Gregorio B. T. Bassim N. D.
Westphal A. J. Butterworth A. L. et al. ***POSTER LOCATION #150***
Identification of Candidate Interstellar Dust Impact Features on Stardust Foil I1020W,1 **[#2989]**
We report the discovery of four new candidate interstellar impact features on Al Foil I1020W,1.

Westphal A. J. Butterworth A. L. De Gregorio B. T.
Lettieri R. Marchant W. et al. ***POSTER LOCATION #151***
A Massively Distributed Search for Impacts in Aluminum Foil on the Stardust Interstellar Collector **[#2275]**
We describe a new instantiation of Stardust@home, designed for a search for impacts on the aluminum foils of the Stardust Interstellar Dust Collector.

Westphal A. J. Jones S. M. Ogliore R. C.
Nakashima K. Huss G. R. et al. ***POSTER LOCATION #152***
Oxygen Isotope Measurements of Stardust Interstellar Analogs **[#2970]**
We report oxygen isotope measurements of interstellar dust analogs in aerogel, in preparation for analysis of Stardust interstellar dust candidates.

Haas B. A. Croat T. K. Floss C. Kearsley A. T. Burchell M. J. ***POSTER LOCATION #153***
Characterizing Comet 81P/Wild 2 with Acfer 094 Analog Foils **[#1597]**
Analog foils created with material from meteorite Acfer 094 allow us to investigate the violent collection process present in NASA's Stardust mission.

Ishii H. A. Ciston J. Bradley J. P. ***POSTER LOCATION #154***
Advanced Electron Energy Loss Methods for Applications to Stardust and Fine-Grained Meteoritic Materials **[#1805]**
Study of organics, state of Si and presence of H and He in IDPs, Stardust, and other fine-grained materials is advanced by TEM electron energy loss spectroscopy.

Stephan T. Trappitsch R. Davis A. M. Pellin M. J. Rost D. et al. ***POSTER LOCATION #155***
CHILI — Achieving Ultimate Performance for the Analysis of Stardust **[#2793]**
We measured all stable Fe and Ni isotopes in SiC with CHILI. Here, we provide technical background, review recent developments, and outline future improvements.

Villalon K. L. Ishii H. A. Bradley J. P. Stephan T. Davis A. M. ***POSTER LOCATION #156***
Resolving the Ancestry of GEMS with CHILI **[#1796]**
We propose to measure the isotopic composition of GEMS using the recently completed CHILI instrument at the University of Chicago.

PRESOLAR GRAINS [R610]

Leitner J. Hoppe P. Zipfel J. ***POSTER LOCATION #157***
The Presolar Grain Inventory of the CR Chondrite Elephant Moraine 92161 **[#1873]**
Presolar silicates are three times more abundant in FGRs than in the matrix; SiC shows no variation. S and Fe are enhanced in the rims, indicating less alteration.

Meyer B. S. Clayton D. D. ***POSTER LOCATION #158***
Growth of Large Carbonaceous Grains in Oxygen-Rich Supernova Matter **[#2336]**
We compute the size spectrum of carbonaceous dust grains in oxygen-rich supernova ejecta. Break up of CO by radioactivity allows growth of micron-sized dust.

Liu N. Steele A. Nittler L. R. Alexander C. M. O'D. Wang J. ***POSTER LOCATION #159***
Coordinated Micro-Raman and NanoSIMS Analysis of Micron- to Submicron-Sized Presolar SiC Grains from Murchison **[#2107]**
We demonstrate high spectral resolution and long-term stability of the Raman microscope used and report Raman data for 35 classified presolar SiC grains.

Pravdivtseva O. Shatoff E. A. Meshik A. Stroud R. M. ***POSTER LOCATION #160***
Separation of Allende Nanodiamonds by Electrophoresis **[#2996]**
Distribution of Xe-HL, recovered from 12 sections of the electrophoresis column, suggests at least three subpopulations of grains in Allende nanodiamond separate.

Lewis J. B. Isheim D. Floss C. Daulton T. L. Seidman D. N. ***POSTER LOCATION #161***
Analysis of Allende Nanodiamond Residue by Correlated Transmission Electron Microscopy and Atom-Probe Tomography **[#2248]**
Correlated TEM/APT of Allende nanodiamonds demonstrates the technique is effective for studying multi-component meteoritic acid residues.

COMETS RUNNING AMOK AROUND THE SOLAR SYSTEM WITHOUT ANY PANTS [R611]

Hoang M. Garnier P. Lasue J. Rème H. Altwegg K. et al. ***POSTER LOCATION #162***
The Heterogeneities of the Coma of 67P: ROSINA RTOF Measurements and Comparison with COPS and DFMS **[#2133]**
From the analysis of ROSINA data, we will provide a detailed description of the main volatiles dynamics (H_2O, CO_2, CO) and of the heterogeneities in the coma.

Longobardo A. Palomba E. Capaccioni F. Ciarniello M. Tosi F. et al. ***POSTER LOCATION #163***
Photometric Behavior of 67P/CG Spectral Parameters as Inferred from Pre-Landing Data **[#2222]**
We study the photometric behavior of spectral descriptors characterizing the pectra of 67P/CG, such as reflectance, band deths and centers, and spectral slopes.

Krasilnikov S. S. Basilevsky A. T. Demidov N. E.
Artemieva N. A. Mall U. et al. ***POSTER LOCATION #164***
Crater-Like Features on the Surface of Nucleus of the Comet 67P Churyumov-Gerasimenko **[#2495]**
The results of morphological analyses of crater-like features on the surface of comet 67P. Primary modeling conclusions.

DiSanti M. A. Bonev B. P. Gibb E. L.
Paganini L. Villanueva G. L. et al. ***POSTER LOCATION #165***
Measurements of Coma Physics and Ice Composition in Comet D/2012 S1 (ISON) to Small Heliocentric Distances as Revealed at Infrared Wavelengths **[#2149]**
We report production rates for H_2O and trace molecules (CO, C_2H_6, CH_4, CH_3OH, NH_3, H_2CO, HCN, C_2H_2) in ISON using high-resolution IR spectroscopy at Keck and IRTF.

Hirabayashi T. Steckloff J. Graves K. ***POSTER LOCATION #166***
Hartley 2: Landing Sites of Particles Ejected from the Nucleus **[#2465]**
Dust flies, falls, and lands / Dust falling makes smooth terrain / Not for Hartly 2.

Czechowski L. ***POSTER LOCATION #167***
Earthquakes on Comets and Their Consequences **[#2781]**
Vibration of comets resulting from impact are considered as mechanism triggering landslides.

ASTEROID SPECTROSCOPY AND CLASSIFICATION: A STUDY OF LUMPING AND SPLITTING BEHAVIOR IN HUMAN BEINGS [R612]

Fieber-Beyer S. K. Gaffey M. J. Hardersen P. S. ***POSTER LOCATION #169***
Near-Infrared Spectroscopy of Three 3:1 Kirkwood Gap Asteroids **[#1481]**
NIR observations, data reduction, and analysis of asteroids (17) Thetis, (900) Rosalinde, and (2834) Christy Carol will be presented.

Lucas M. P. Emery J. P. Hiroi T. Milliken R. E. ***POSTER LOCATION #170***
Spectral Properties of Primitive Achondrite Meteorites: Establishing S-Type Asteroid-Meteorite Connections **[#3003]**
We present laboratory spectra for 12 partially melted primitive achondrites meteorites; they provide a basis for spectral comparison to S-subtype asteroids.

Roush T. L. Blewett D. T. Cahill J. T. S. ***POSTER LOCATION #171***
Modeling Magnetite Reflectance Spectra Using Hapke Theory and Existing Optical Constants **[#2289]**
Existing magnetite optical constants used in Hapke calculations do not closely reproduce laboratory reflectance spectra of magnetite.

Sklute E. C. Hiroi T. Pieters C. Milliken R. Glotch T. D. et al. ***POSTER LOCATION #172***
Preliminary VNIR Optical Constants of Bytownite Using Radiative Transfer Theory **[#2147]**
Bytownite is a common rock forming mineral on the Earth, Moon, Mars, and Venus. Optical constants for Bytownite are determined using radiative transfer theory.

Kiddell C. B. Cloutis E. A. Reddy V. ***POSTER LOCATION #173***
Grain Size Effects on the Spectral Variabilty of Carbonaceous Meteorites **[#2643]**
Effects of grain size on the spectral variability of dark carbonaceous asteroids. We examined the effects of grains, dust, and slabs on reflectance spectra.

Klima R. L. Barnouin O. Ernst C. M. Izenberg N. R. Kahn E. ***POSTER LOCATION #174***
Visualization of Near-Infrared Spectral Data of Eros Using the Small Bodies Mapping Tool **[#2572]**
We introduce spectral mapping capabilities for visualizing spectral data of Eros in a geological context using the Small Bodies Mapping Tool.

Burbine T. H. ***POSTER LOCATION #175***
How Well Does the Bus-DeMeo Taxonomy Classify Meteorite Spectra? **[#2425]**
This study tests how well the Bus-DeMeo taxonomy classifies meteorite spectra into different asteroid taxonomic classes.

Bertaux J.-L. Montmessin F. Gondet B. Bibring J.-P. Rebérac A. et al. ***POSTER LOCATION #176***
UV-Visible Reflectance of Phobos from SPICAM and OMEGA and Comparison with Deimos **[#2177]**
The UV reflectance spectra of Phobos and Deimos show a still unidentified strong absorption band, as revealed by OMEGA and SPICAM on board Mars Express.

Donaldson Hanna K. L. Warren T. Bowles N. E. ***POSTER LOCATION #177***
Spectral Characterization of Desiccated Phyllosilicate Samples as Analogues for Phobos and Primitive Solar System Bodies **[#2184]**
Spectral characterization of nontronite and desiccated nontronite measured under Earth-like and Phobos-like conditions.

Hong P. K. Miyamoto H. Niihara T. Dohm J. M. ***POSTER LOCATION #178***
Relationship Between Albedo and Reflectance Spectra of Asteroids **[#1809]**
We analyze the relationship between geometric albedo and reflectance spectra of asteroids. We show distinct trends among the various asteroid types.

Arai T. Okada T. Tanaka S. Fukuhara T. Demura H. et al. ***POSTER LOCATION #179***
Earth and Moon Observations with TIR Onboard Hayabusa2 Spacecraft **[#1801]**
TIR is an infrared thermal imager onboard the Hayabusa2 spacecraft. In this study, current performances of TIR are introduced by Earth and Moon observations.

Oszkiewicz D. Skiff B. Moskovitz N. Marciniak A. ***POSTER LOCATION #180***
Photometric Survey of Inner Main Belt V-Type Asteroids **[#1519]**
In this study we focus on determining rotational properties of selected V-type asteroids in the inner main belt to test their links to asteroid (4) Vesta.

Rozitis B. Emery J. Lowry S. Rozek A. Wolters S. et al. ***POSTER LOCATION #181***
Thermal Emission Light-Curves of Rapidly Rotating Asteroids **[#1447]**
Thermal emission light-curves obtained by Spitzer/IRAC are used to characterize asteroid geophysics and the YORP effect on 20 rapidly rotating asteroids.

Palmer E. M. Heggy E. Kofman W. W. Moghaddam M. ***POSTER LOCATION #182***
Characterizing Vesta's Surface Roughness Using High-Incidence Bistatic Radar Observations by the Dawn Communications Antenna **[#3036]**
The first bistatic radar experiment at a small body was conducted by Dawn at asteroid Vesta. Vesta's surface roughness is compared to that of the Moon.

Noll K. S. Grundy W. M. Ryan E. L. Benecchi S. D. ***POSTER LOCATION #183***
Detection of a Resolved Trojan Binary **[#2632]**
We report detection of the third known resolved binary Trojan using the Hubble Space Telescope and a novel technique for identifying close pairs.

Vodniza A. Q. Pereira M. R. ***POSTER LOCATION #184***
The Asteroid 1998 WT24 **[#1138]**
The asteroid 1998 WT24 flew past Earth on Dec. 11, 2015 at a distance of 11 lunar distances. Astrometry was carried out and we calculated the orbital elements.

Hewson K. P. Benedix G. K. Bland P. A. Roberts M. Evans N. et al. ***POSTER LOCATION #185***
Trace Elements in Meteorite Fusion Crust **[#1969]**
We present trace element studies of fusion crusts in four meteorites of different classes.

Senshu H. Kurosawa K. Okamoto T. Matsui T. ***POSTER LOCATION #186***
Laboratory Simulation of Shooting Star by Using a Two-Stage Light Gas Gun **[#2142]**
We conducted a experimental study to simulate shooting stars in the laboratory. We successfully obtained spectroscopic data of the simulated shooting stars.

Gucsik A. Nishido H. Ninagawa K. Kereszturi A. Nakamura T. et al. ***POSTER LOCATION #187***
Micro-Raman Spectroscopy of a Plagioclase Particle from the Hayabusa-1 Sample Return Mission **[#3042]**
This abstract may also apply to future sample-return missions such as Hayabusa2 and its mineralogy.

CORE AND MANTLE DYNAMICS: PLANETARY TUMBLEWEEDS [R613]

Zhao Y. van den Berg A. P. van Westrenen W. ***POSTER LOCATION #188***
Effect of Variable Thermal Conductivity on Lunar Thermal Evolution **[#1477]**
Variable thermal conductivity in the lunar interior, including the low value in the crust, delays its cooling and significantly influences its thermal history.

Chi P. J. Russell C. T. Ma Y. J. Luhmann J. G. Purucker M. E. ***POSTER LOCATION #189***
Modeling Induced Venusian and Martian Magnetospheres for Investigation of Planetary Interiors **[#2382]**
We have developed a magnetic field model inside the induced magnetospheres of Venus and Mars useful for investigating the interiors of these two planets.

Thomas P. Grott M. Morschhauser A. ***POSTER LOCATION #190***
Reinvestigation of the Robustness of Martian Paleopole Reconstructions **[#1963]**
Paleopole reconstruction, using ESD inversion on a martian magnetic field model and evaluation of the results with the associated standard deviations.

Li W. X. Gusev A. Ping J. S. ***POSTER LOCATION #191***
Comparison of Two Methods on Lunar Free Librations Considering Two-Layer Model **[#1810]**
We considered a two-layer model to try to locate the reason for the difference between analytical and numerical results on periods of lunar free librations.

Chantel J. Jing Z. Yu T. Wang Y. ***POSTER LOCATION #192***
Sound Velocity, Density, Phase Diagram and Equation of State of Iron-Phosphorus Liquids Under Planetary Core Conditions **[#2194]**
Phosphorus could be an important light element candidate in planetary cores. We carried out density and sound velocity measurements of liquid Fe-P alloys.

Arkani-Hamed J. ***POSTER LOCATION #193***
Thermal Evolution of Earth's Core During Accretion: A Primordial Solis Inner Core? **[#2077]**
There was probably a solid inner core by the end of Earth's accretion. During the accretion inner part of the core solidified due to increase in pressure.

Rolf T. Zhu M.-H. Wünnemann K. Werner S. C. ***POSTER LOCATION #194***
The Role of Basin-Forming Impacts in the Global Lunar Evolution **[#1423]**
We study the role of basin-forming impacts in the evolution of the Moon by coupling numerical models of basin formation (iSALE) and mantle convection (StagYY).

Roberts J. H. Arkani-Hamed J. ***POSTER LOCATION #195***
Effects of Basin-Forming Impacts on Thermal Evolution of Mars **[#2103]**
A giant impact /Dynamo slowly recov— /Oh no! Not again!

Kankanamge D. G. J. Moore W. B. ***POSTER LOCATION #196***
Heat Transport in the Hadean Mantle: From Heat Pipes to Plates **[#1200]**
In this work, we performed numerical simulations of heat transport in the pre-plate tectonic Earth to understand the transition to plate tectonic behavior.

Plesa A.-C. Grott M. Tosi N. Breuer D. Spohn T. ***POSTER LOCATION #197***
Present-Day Heat Flux Variations Across the Surface of Mars **[#1931]**
We present 3D numerical models of the interior of Mars and estimate the present-day surface heat flux variations.

Genova A. Goossens S. Lemoine F. G.
Mazarico E. Neumann G. A. et al. ***POSTER LOCATION #198***
Global and Local Gravity Field Models of Mars with MGS, Mars Odyssey, and MRO **[#1621]**
We have developed the new Goddard Mars Model (GMM-3) of Mars gravity field using the entire MGS radio tracking data set, and ODY and MRO data until March 2015.

Lewis K. W. Peters S. F. Gonter K. A. ***POSTER LOCATION #199***
First Gravity Traverse on the Martian Surface from the Curiosity Rover **[#2871]**
We report the first gravity measurements from the surface of Mars, from Curiosity rover IMU data, along a 10 km traverse within Gale crater.

Breuer D. Plesa A.-C. ***POSTER LOCATION #200***
The Stability of Lateral Heterogeneities in the Martian Mantle **[#3062]**
We have modelled the mixing of local reservoirs in 2D thermal evolution models using Mars-like parameters to explain the maintenance of early formed reservoirs.

PLANETARY DYNAMICS/TECTONICS: THE TECTONIC FORCE AWAKENS [R614]

Marusiak A. G. Schmerr N. C. Banks M. E. Daubar I. J. ***POSTER LOCATION #201***
Terrestrial Single-Station Analog for the Detection of the Martian Core **[#2010]**
A single-station analog and a Mars-like distribution of earthquakes are used to study the quality and quantity of seismicity needed to resolve the martian CMB.

Lorenz R. D. Nakamura Y. Murphy J. ***POSTER LOCATION #202***
A Bump in the Night: Wind Statistics Point to Viking 2 Sol 80 Seismometer Event as a Real Marsquake **[#1566]**
In the dead of night / seismometer felt a nudge / not the wind, we think.

Dohm J. M. Anderson R. C. Baker V. R.
Miyamoto H. Williams J. -P. et al. ***POSTER LOCATION #203***
Non-Unique Systems of Features on Mars and Earth: Possible Telltale Signatures of Ancient Dynamic Lithospheric Mobility Including Plate Tectonism **[#2135]**
We present non-unique features on Earth and Mars that point to an extremely ancient dynamic mobile lithosphere on Mars including possible plate tectonism.

Ruj T. Komatsu G. Dohm J. M. Miyamoto H. Salese F. ***POSTER LOCATION #204***
Effect of the Hellas Impact on Regional Tectonism: A Case Study from the Noachis-Sabaea Region, Southern Highlands of Mars **[#1512]**
We hypothesize the possible influence of the Hellas impact on tectonic processes of the Noachis-Sabaea region, southern highlands of Mars.

Hedgepeth J. E. Schmidt B. E. ***POSTER LOCATION #205***
The Effect of Existing Geologic Features on the Formation of Europa's Chaotic Terrains **[#2193]**
We hypothesize that the geological units that exist prior to chaos formation on Europa play a significant role in the how the terrain will deform and disrupt.

Ahern A. A. Radebaugh J. Christiansen E. H. Harris R. A. Tass E. S. ***POSTER LOCATION #206***
Global Lineations and Regional Structural Mapping of Io's Paterae and Mountains: Implications for Crustal Stresses and Feature Evolution **[#2355]**
Io's mountains form as a result of stress regimes stemming from global processes and local subsurface structure response.

Okubo C. H. McEwen A. S. Keszthelyi L. P.
Bray V. J. El-Maarry M. R. et al. ***POSTER LOCATION #207***
Rifted Mounds in Utopia Planitia: Possible Origins and Implications **[#1334]**
Europa-like spreading centers are investigated in Utopia Planitia, Mars. The rifts crosscut pitted mounds, offering new constraints on formative processes.

Carey Boden E. A. Dawers N. H. ***POSTER LOCATION #208***
Dike-Related Fault Morphology from Structural Mapping of Sirenum Fossae **[#1858]**
Streams flow from fissures / Coeval faults cross-cutting / Graben formed by dikes.

Peters S. I. Christensen P. R. ***POSTER LOCATION #209***
Investigating the Volcanotectonic Evolution of Olympus Mons Using Flank Vents and Arcuate Graben **[#1634]**
Flank vents and arcuate graben on Olympus Mons, Mars's largest volcano, are used to unravel its developmental history with emphasis on recent activity.

PLANETARY DYNAMICS/TECTONICS: CONTRACTION GIVES YOU WRINKLES [R615]

Clark J. D. van der Bogert C. H. Hiesinger H. ***POSTER LOCATION #210***
An In-Depth Investigation of the Mandel'shtam Lobate Scarp Complex **[#2956]**
The Mandel'shtam scarp complex provides an interesting case study for the timing of fault activity across a series of several scarps.

Clark J. D. van der Bogert C. H. Hiesinger H. ***POSTER LOCATION #211***
The Global Distribution of Absolute Model Ages of Lunar Lobate Scarps **[#1380]**
Investigating the distribution of lunar lobate scarp ages for possible global trends and implications for the Moon's stress state in the last 1 Ga.

Crane K. Klimczak C. ***POSTER LOCATION #212***
Testing the Timing and Rate of Global Contraction on Mercury Against Its Cratering Record **[#1023]**
Global contraction models, the cratering record, and observations were combined to obtain a more complete understanding of Mercury's tectonic history.

Venturino C. S. Gregg T. K. P. ***POSTER LOCATION #213***
Relative Ages of Wrinkle Ridges in Syrtis Major, Mars **[#2437]**
We investigate the relative ages of intersecting wrinkle ridges in Syrtis Major, Mars. Ridges radial to Nili Patera appear younger than circumferential ridges.

Kromuszczyńska O. Dębniak K. T. ***POSTER LOCATION #214***
Comparison of Martian and Terrestrial DSGSD Scarps **[#1902]**
Deep-seated gravitational slope deformation (DSGSD) reshape slopes of Valles Marineris. Comparison of scale of DSGSD features from Mars and Earth is presented.

Kling C. L. Klimczak C. ***POSTER LOCATION #215***
Displacement-Length Scaling Relationships of Large Thrust Faults on Mars **[#2888]**
Mars topography / Study thrust fault displacements / Some are really high.

Nahm A. L. Peterson S. H. ***POSTER LOCATION #216***
Automated Forward Mechanical Modeling of Wrinkle Ridges on Mars **[#1186]**
Free from the GUI / Automation is better / When modeling faults.

DIFFERENTIATED METEORITES (EXCEPT HED) [R616]

Riches A. J. V. Burton K. W. Nowell G. M.
Dale C. W. Irving A. J. et al. ***POSTER LOCATION #217***
Refining Theories of Accretion in the Early Solar System: Petrographic, Major-, Platinum-Group Element, and Osmium Isotope Characteristics of Angrite Metals **[#2858]**
Petrographic and compositional data of metals in distinct portions of coarse-grained metal-bearing angrites NWA 4590, NWA 4801, and 'dunitic' angrite NWA 8535.

Bell A. S. Burger P. V. Shearer C. K. ***POSTER LOCATION #218***
Cr K-Edge XANES Anisotropy and Olivine Orientation: Developing a Technique for the Assessment of the Oxidation State of the Angrite Parent Body **[#1502]**
This abstracts outlines the development of a XANES based technique for measuring the fO_2 of magmatism on the angrite parent body.

Karner J. M. ***POSTER LOCATION #219***
Chromium Partitioning Between Olivine/Melt in Experimental Partial Melts of the Allende and Murchison Chondrites **[#1113]**
Chromium partitioning between olivine/melt is explored in experimental partial melts of the Allende and Murchison chondrites.

van Westrenen W. Steenstra E. S. Knibbe J. S. Lin Y. H. Rai N. et al. ***POSTER LOCATION #220***
Metal-Silicate Partitioning of P, V, Co, Mo, Ge, and W and Core Formation in the Angrite Parent Body **[#1630]**
The Angrite Parent Body formed its core under mildly reducing conditions and is not necessarily devolatilized.

Hwang S. L. Shen P. Chu H. T. Yui T. F. Varela M. E. et al. ***POSTER LOCATION #221***
Tsangpoite: The Unknown Calcium Silico Phosphate Phase in the Angrite D'Orbigny **[#1466]**
We report about the new mineral tsangpoite (2014-110) an hexagonal polymorph of silicocarnotite, described as silica-phosphate in the angrite D'Orbigny.

Rai N. Downes H. Smith C. L. ***POSTER LOCATION #222***
Bulk Compositions of the Ureilite Parent Body and Vesta: Constraints from Oxygen Isotopes **[#1702]**
Using oxygen isotope signatures, we modelled possible building blocks of the ureilite parent body (UPB) and Vesta from a range of known nebular matter.

Hoffmann V. H. Kaliwoda M. Hochleitner R. Funaki M. Decker S. ***POSTER LOCATION #223***
A Real Space Rosetta Stone — The Almahata Sitta Meteorite **[#1874]**
A statistical overview of all classified individuals of Almahata Sitta and magnetic classification of the new sample set MS-MU 001-028 is given.

Inoue M. Mikouchi T. Goodrich C. A. ***POSTER LOCATION #224***
Petrography and Mineralogy of Calama 001, Catalina 037, Northwest Africa 2895: New Augite-Bearing Ureilites **[#2045]**
We studied three augite-bearing ureilites. Calama 001 and NWA 2895 are offset from the Fe-Mn-Mg trend of olivine-low Ca pyroxene ureilites, and similar to Hughes 009.

Wilson L. Goodrich C. A. ***POSTER LOCATION #225***
The Formation Time and Thermal History of the Ureilite Parent Body **[#1557]**
Thermal models for asteroids are very sensitive to bulk Al content and removal of melts from the source. The ureilite parent body accreted ~0.63 Ma after CAI.

Tkalcec B. J. Brenker F. E. ***POSTER LOCATION #226***
Initial Results of Structural Analysis of Ureilites to Investigate the Possible Occurrence of Shear Deformation on the Ureilite Parent Body **[#3029]**
Investigation for signs of plastic deformation on ureilites, to indicate shear deformation on the ureilite parent body as metal-silicate segregation enhancer.

Dunlap D. R. Wadhwa M. Romaiello S. J. ***POSTER LOCATION #227***
^{53}Mn-^{53}Cr Systematics of Brachina Revisited in High Precision **[#3055]**
High-precision ^{53}Mn-^{53}Cr systematics are presented here for the enigmatic achondrite Brachina in an effort to better understand the timing of formation.

Hasegawa H. Mikouchi T. Yamaguchi A. ***POSTER LOCATION #228***
Mineralogical and Petrofabric Study of Brachinite-Like Meteorites Miller Range 090206, 090340 and 090405 **[#2131]**
In MIL 090206/090340/090405, we found the b axis concentration CPO patterns of olivine crystal, which are different from those in NWA 6112.

Srinivasan P. Shearer C. K. McCubbin F. M. Bell A. S. Agee C. B. ***POSTER LOCATION #229***
Examining Metasomatism in Low fO_2 Environments: Exploring Sulfidation Reactions in Various Planetary Bodies **[#1623]**
Examining sulfide-silicate intergrowths in a suite of achondritic meteorites to assess the planetary-wide phenomenon of sulfidation.

Srinivasan P. McCubbin F. M. Agee C. B. ***POSTER LOCATION #230***
Assessing the Formation of Ungrouped Achondrite Northwest Africa 8186: Residue, Crystallization Product, or Recrystallized Chondrite? **[#1620]**
Investigating the origins of CK-like achondrite NWA 8186 from bulk compositional data.

Chen X. Lapen T. J. Andreasen R. Righter M. Irving A. J. et al. ***POSTER LOCATION #231***
Silicon Isotope Composition of Ungrouped Achondrite Northwest Africa 7325 **[#2812]**
Si isotopic compositions of NWA 7325 were measured for the first time to better understand its relation to other planetary materials.

Archer G. J. Walker R. J. Irving A. J. Amelin Y. ***POSTER LOCATION #232***
Highly Siderophile Element and ^{187}Re-^{187}Os Isotopic Systematics of Ungrouped Achondrite Northwest Africa 6704 **[#2578]**
Highly siderophile elements and ^{187}Re-^{187}Os isotope systematics are used to investigate differentiation and late accretion on the NWA 6704 parent body.

Sanborn M. E. Yin Q.-Z. Schmitz B. Amelin Y. ***POSTER LOCATION #233***
Northwest Africa 5400/6077: Deciphering the Origin of the Mysterious Achondrite with a New Look at the Isotopic Composition **[#2309]**
We present a new look at the Cr isotopic composition of NWA 5400/6077 to investigate the composition of its source reservoir, as well as its ^{53}Mn-^{53}Cr age.

Cloutis E. A. Gaffey M. J. Applin D. M. ***POSTER LOCATION #234***
Spectral Reflectance Properties of Aubrites **[#1709]**
Reflectance spectra of aubrites are characterized by spectral slopes and pyroxene absorption band depths that vary as a function of physical state.

Uribe D. D. Izawa M. R. M. McCausland P. J. A. Flemming R. L. ***POSTER LOCATION #235***
Mineralogy, Petrology, and Mineral Chemistry of Northwest Africa 8173: An Anomalous Enstatite Achondrite with Evidence for High-Temperature Silicate Sulphidation **[#2797]**
NWA 8173 has many features unique among enstatite meteorites that may best be explained as the result of high-temperature metal-silicate-sulphide interaction.

Uribe D. D. McCausland P. J. A. Izawa M. R. M. ***POSTER LOCATION #236***
A Comparative Study of the Zaklodzie and Northwest Africa 4301 Anomalous Enstatite Achondrites **[#3071]**
NWA 4301 is an enstatite achondrite similar to Zaklodzie, with mineral and petrographic evidence for melting and extensive annealing of an EL-like precursor.

Righter K. Yang S. Humayun M. ***POSTER LOCATION #237***
Apatite/Melt Partitioning Experiments Reveal Redox Sensitivity to Cr, V, Mn, Ni, Eu, W, Th, and U **[#2168]**
We investigate apatite/melt partitioning for many trace elements at several fO_2 and demonstrate redox sensitivity of elements previously unstudied in detail.

Ward D. Bischoff A. Roszjar J. Whitehouse M. J. ***POSTER LOCATION #238***
Trace Element Inventory of Meteoritic Ca-Phosphates **[#1456]**
Apatite and merrillite are accessory phases and major REE hosts in meteorites. Both show variations in REE enrichment and distinct shapes of their REE-patterns.

Hooper N. Elvis M. ***POSTER LOCATION #239***
A Database of Meteorite Minerals **[#2684]**
Early solar system conditions create ‘meteorite minerals’ not found naturally occurring on Earth. We present a compilation of meteorite minerals and properties.

Hooper N. L. ***POSTER LOCATION #240***
A Database of Fe Meteorite Elemental Abundances **[#3030]**
We have compiled a database of iron meteorite trace element data consisting of Cu, Ga, Ge, As, Sb, W, Re, Au, Pt, It, Os, Pd, Ru and Ru in units of µg/g.

HOWARDITE-EUCRITE-DIOGENITE METEORITES [R617]

Turrin B. D. Lindsay F. N. Park J. Herzog G. F. Delaney J. S. et al. ***POSTER LOCATION #241***
$^{40}Ar/^{39}Ar$ Ages of Carbonaceous Xenoliths in HED Meteorites NWA 6475 and NWA 6695 **[#1592]**
CM inclusions in 2 HED meteorites are younger (Ar/Ar) than nearby host material, but older than most free-range CM chondrites. HED matrix may slow Ar loss.

Cartwright J. A. Hodges K. V. Wadhwa M. Mittlefehldt D. W. ***POSTER LOCATION #242***
Dating Howardite Melt Clasts: Evidence for an Extended Vestan Bombardment? **[#2865]**
Ages of melt clasts / Vesta took quite a beating / Different to Moon...?

Ono H. Takenouchi A. Mikouchi T. ***POSTER LOCATION #243***
Silica Polymorphs in Cumulate Eucrites **[#1929]**
We investigated silica minerals in cumulate eucrites, and discussed their formation conditions and inversion rate of tridymite considering cooling histories.

Ray D. Shukla A. D. Ghosh S. ***POSTER LOCATION #244***
The Cumulate and Basaltic Eucrite: Comparative Geochemistry with Terrestrial MORB and Implications to Igneous History **[#1015]**
The petrogenesis of basaltic eucrite is indeed perplexing. Partial melting or incomplete melting could be a more realistic process yield eucrite magma.

Basu Sarbadhikari A. Mahajan R. R. Sisodia M. S.
Babu E. V. S. K. Vijaya Kumar T. et al. ***POSTER LOCATION #245***
Multiple Stages of Early Evolution of Heterogeneous Type-7 Piplia Kalan Eucrite **[#1841]**
Heterogeneous texture in Piplia Kalan eucrite coupled with mineral chemistry and P-T-fO_2 condition indicates multiple stages of early evolutionary history.

Crossley S. D. Mayne R. G. Lunning N. G.
McCoy T. J. Greenwood R. C. et al. ***POSTER LOCATION #246***
Stannern-Trend Eucrite Petrogenesis: An Assessment of Partial Melt Contamination Models via Experimental Petrology **[#2821]**
Stannern-trend eucrites / Hopefully reproduced through / Melt experiments.

Kagami S. Yokoyama T. Usui T. ***POSTER LOCATION #247***
^{147}Sm-^{143}Nd and ^{146}Sm-^{142}Nd Systematics of Basaltic Eucrites **[#2235]**
We report the ^{147}Sm-^{143}Nd and ^{146}Sm-^{142}Nd ages for bulk rocks of basaltic eucrites and compare the results with the ages obtained in previous studies.

Caves L. R. Hahn T. M. McSween H. Y. Taylor L. A. ***POSTER LOCATION #248***
Northwest Africa 10452, an Unusual Basaltic Eucrite **[#2004]**
This unbrecciated basaltic eucrite contains an unusually large amount of augite and two distinct spinel phases, indicating greater variability in HEDs.

Wu N. Farquhar J. Magalhaes N. Dottin J. III Labidi J. ***POSTER LOCATION #249***
Multiple Sulfur Isotopic Analysis of Eucrites and Angrites **[#2344]**
We report sulfur isotopic data for 7 eucrites and 4 angrites. The data reveal small positive $\Delta^{33}S$ relative to CDT, and subpermil variation of $\delta^{34}S$.

Hahn T. M. Jr. Lunning N. G. McSween H. Y. Bodnar R. J. Taylor L. A. ***POSTER LOCATION #250***
Formation of a Shallow Magma Ocean on Vesta Supported by Mantle Harzburgite Residua in Howardites **[#1140]**
Geochemical characteristics of harzburgites in howardites support an interpretation as mantle residua in a shallow magma ocean during planetary differentiation.

Carli C. Pratesi G. Capaccioni F. Moggi Cecchi V. ***POSTER LOCATION #251***
VNIR Spectral Variability of Northwest Africa 6232 Olivine-Diogenite **[#1840]**
We present spectral characteristics of olivine diogenite NWA 6232. A crossing from outside to inside an olivine grain was measured, analyzing how absorptions change.

Fraeman A. A. Ehlmann B. L. Northwood-Smith G. W. D.
Liu Y. Wadhwa M. et al. ***POSTER LOCATION #252***
Exploring the Mineralogical Diversity of HED Meteorites with Microimaging VSWIR Spectroscopy **[#2237]**
We used VWIR imaging spectroscopy to survey the spectral diversity of the howardite, eucrite, and diogenite meteorite suite at 80-µm/pixel spatial scale.

Lorenz C. A. Brandstäetter F. Starkey N. A. Franchi I. A. ***POSTER LOCATION #253***
Secondary Alteration of a Pyroxenite from the Dhofar 1302 Howardite: A Possible Record of Water Metasomatism **[#1827]**
The secondary alteration of the pyroxenite fragment from the Dho 1302 howardite could be a result of water metasomatism on the HED parent body.

Schneck U. G. Boyce J. W. Treiman A. Eiler J. E. Guan Y. et al. ***POSTER LOCATION #254***
Testing the urKREEP- $\delta^{37}Cl$ Hypothesis with Eucrites **[#2978]**
Eucrites and the Moon / Have high δ^{37}! / "Cool, right?" said the nerd.

Eckley S. A. McSween H. Y. Taylor L. A. Hahn T. M. ***POSTER LOCATION #255***
Uncommon Diogenitic Troilite-Orthopyroxene Melt Texture: Two-Phase Symplectite Found in Diogenite Northwest Africa 10451 **[#2030]**
Troilite-pyroxene symplectites occur in howardites but are uncommon in diogenites. This meteorite documents their diogenitic source.

Irving A. J. Kuehner S. M. Wittke J. H. Tait K. T. ***POSTER LOCATION #256***
Noritic Diogenites and Feldspathic Diogenites: Evolved Ancient Cumulates Potentially Related to Mesosiderites and Not to Any Eucrites **[#2264]**
We describe further examples of plagioclase-bearing diogenites containing notably ferroan orthopyroxene, which may have affinities with mesosiderites.

Martin A. C. Philips M. S. McCarty C. B. Taylor L. A. ***POSTER LOCATION #257***
Vestan Meteorite: Petrography and Geochemistry of a New Howardite Northwest Africa 10459 **[#2028]**
A new howardite, found in North West Africa, is presented here.

Liu Y. Chen Y. Guan Y. ***POSTER LOCATION #258***
Volatiles in a Spherule and Impact Clasts in the Bununu Howardite **[#1280]**
Volatiles in a spherule and impact clasts in the Bununu howardite.

Stephant A. Hervig R. L. Wadhwa M. ***POSTER LOCATION #259***
Water in Nominally Anhydrous Crustal Minerals of Vesta **[#2436]**
We present hydrogen isotopic and water content SIMS measurements in eucrite pyroxenes in order to identify and quantify the water in parent magmas of Vesta.

IRONS AND STONY IRONS [R618]

Matthes M. van Orman J. A. Fischer-Gödde M. Kleine T. ***POSTER LOCATION #262***
Palladium-Silver Closure Temperature and the Cooling History of Iron Meteorites **[#2163]**
We determined the Pd-Ag closure temperature in iron meteorites and present a method to determine cooling rates from Pd-Ag data, using Cape York as an example.

Matthes M. Fischer-Gödde M. Kruijer T. S. Kleine T. ***POSTER LOCATION #263***
Palladium-Silver Isochron for the IVA Iron Muonionalusta: Solar System Initial $^{107}Pd/^{108}Pd$ and the Cooling of Protoplanetary Cores **[#2141]**
A Pd-Ag isochron for Muonionalusta leads to a new solar system initial $^{107}Pd/^{108}Pd$, and allows resolving time differences in the cooling of protoplanetary cores.

Isa J. Ma C. Rubin A. E. ***POSTER LOCATION #264***
Joegoldsteinite: A New Sulfide Mineral ($MnCr_2S_4$) from the IVA Iron Meteorite, Social Circle **[#1813]**
Joegoldsteinite, a new sulfide mineral of endmember formula $MnCr_2S_4$, was discovered in the Social Circle IVA iron meteorite.

Brennecka G. A. Kleine T. ***POSTER LOCATION #265***
Measured $^{238}U/^{235}U$ and a New Absolute Age for the IVA Iron Meteorite Muonionalusta: A Refined Timescale for Planetary Evolution **[#1135]**
We report the first measured $^{238}U/^{235}U$ in planetary core material and discuss the implications of a ~7 Myr age adjustment to the Muonionalusta iron meteorite.

Hopp T. Fischer-Gödde M. Kleine T. ***POSTER LOCATION #266***
Ruthenium Isotope Fractionation During Planetesimal Core Crystallization **[#1231]**
We use Ru stable isotope analyses of iron meteorites (e.g., IIAB, IIIAB) to investigate Rayleigh isotope fractionation during planetesimal core crystallization.

Scott E. R. D. Goldstein J. I. ***POSTER LOCATION #267***
Thermal Histories and Origins of Group IIE and IAB Iron Meteorites and Their Parent Asteroids **[#2685]**
Thermal histories of IIE iron meteorites suggest they are derived from diverse depths in a large asteroid that was disrupted by impact like the IAB parent body.

Hunt A. C. Reger P. M. Cook D. L. Ek M. E. Schönbächler M. ***POSTER LOCATION #268***
Reassessing the Thermal History of the IAB Parent Asteroid Using W and Pt Isotopes **[#1867]**
We present new Pt and W isotope data for the IAB iron meteorites. Our results indicate a global metal-silicate separation event at 5.6 ± 0.6 Ma after CAI.

Fischer-Gödde M. Kruijer T. S. Kleine T. Wasson J. T. ***POSTER LOCATION #269***
W, Pt, Mo, and Ru Isotope Systematics of IIE Iron Meteorites **[#2704]**
We report combined Wo, Pt, Ru, and Mo isotope data for IIE iron meteorites.

Mayne R. G. McCoy T. J. Greenwood R. C. Franchi I. A. Corrigan C. M. ***POSTER LOCATION #270***
Enon and Puente del Zacate: A Duo of Primitive-Silicate-Bearing Magmatic Irons **[#1559]**
Clasts in IIIABs / can test if same parent / to the HEDs.

Kirby R. S. King P. L. Henley R. W. Troitzsch U. Ireland T. R. et al. ***POSTER LOCATION #271***
A New Hypothesis for the Evolution of IIE Iron Meteorites based on Geochronology and Petrology of the Miles Meteorite **[#1938]**
A new proposal based on high-temperature gas-solid-melt reactions that demonstrates that iron meteorites can form through processes other than core-formation.

Boesenberg J. S. Mayne R. G. Humatun M.
Silver A. P. Greenwood R. C. et al. ***POSTER LOCATION #272***
Pyroxene-Plagioclase Pallasite Northwest Africa 10019: Where Does It Belong? **[#2297]**
NWA 10019 is a new pallasite with pyx, plag, and the most fractionated metal. Oxygen isotopes match main group, but petrology indicates no relationship.

Wang L. Y. Hsu W. B. ***POSTER LOCATION #273***
Three Unusual Clasts Within Dong Ujimqin Qi Mesosiderite **[#2573]**
Symplectites of chromite and orthopyroxene in low-Mg olivine ($Fo_{61.4}$), and in high-Mg olivine ($FO_{83.2}$) and olivine-orthopyroxene-troilite-silica aggregate in DWQ.

Baecker B. Cohen B. A. ***POSTER LOCATION #274***
Catching Constraints on the Parent Body Genesis of Mesosiderites and a Possible Link to HED (Howardite-Eucrite-Diogenite) Meteorites — A New Hope? **[#2179]**
Mesosiderites. / Need integrated approach. / Gas, stones and metal.

MARS GEOMORPHOLOGY: FLUVIOLACUSTRINE ACTIVITY [R619]

Horan A. Head J. ***POSTER LOCATION #275***
Late Noachian Valley Network Formation on Mars: An Assessment of the Impact Crater-Related Formation Mechanism **[#1160]**
We explore the mechanism of impact cratering for bringing rainfall and runoff to early Mars and provide hypotheses on the relation to valley network formation.

Grau Galofre A. Jellinek A. M. ***POSTER LOCATION #276***
The Case for a Cold, Dry Early Mars from a Global Map of Valley Network Origin and Distribution **[#2409]**
A novel method to characterize and classify martian valley networks from global DEM and imagery: Results and implications for martian early climate.

O'Shea M. J. Warner N. H. Gupta S. Eckes S. Werynski A. et al. ***POSTER LOCATION #277***
Using the Morphology of Impact Craters as a Relative Age Indicator for Fluvial Activity at Xanthe Terra, Mars **[#1549]**
We constrain the timing of fluvial activity on Xanthe Terra through an analysis of the age relationships between valley networks and large impact basins.

Jacobsen R. E. Burr D. M. ***POSTER LOCATION #278***
Hydraulic Geometry Explains Inaccuracies in Empirical Correlation for Estimating Fluvial Discharge on Mars **[#1139]**
Empirical correlation often used to estimate fluvial discharge on Mars is inconsistent with hydraulic geometry and over-estimates discharge in analog river.

Goudge T. A. Mohrig D. Cardenas B. T. Hughes C. M. Levy J. S. et al. ***POSTER LOCATION #279***
Sedimentology of the Jezero Crater Western Fan Deposit: 2. Secular Changes in the Style of Channelization **[#1656]**
We map three distinct classes of exposed channel-related stratigraphy on the Jezero crater western delta topset: point bars, inverted channels, and a valley.

Singh P. Sarkar R. Ganesh I. Porwal A. ***POSTER LOCATION #280***
Origin of Fluvial Channels in the Walls of Juventae Chasma: Evidences of Groundwater Sapping? **[#1878]**
We report groundwater sapping related flow features from the walls of Juventae Chasma, Mars.

Barton M. L. Skinner J. A. Jr. Fortezzo C. M. ***POSTER LOCATION #281***
Occurrence and Morphology of Channel-Form Features in Stratified Deposits of Hadriacus Cavi, Mars **[#2833]**
We have identified and described four different types of channel-form features within Hadriacus Cavi based on their stratal occurrence and morphology.

Cardenas B. T. Bryk B. A. Goudge T. A. Hughes C. M. Mohrig D. ***POSTER LOCATION #282***
Determining Paleoflow Direction of Martian Channel Belts Using Preserved Channel-Bend Asymmetry: Case Study at Aeolis Dorsa, Mars **[#2367]**
Migrate, time, space, love / Beauty in asymmetry / Flow, mem'ry of flow.

Gullikson A. L. Anderson R. B. Williams R. M. E. ***POSTER LOCATION #283***
Mapping Sinuous Ridges in Northwest Hellas, Mars **[#2376]**
Mapping of sinuous ridges and other fluvial and ridge-like features within the northwestern Hellas region at a scale of ~1:20,000, using 6 m/pixel CTX images.

Chuang F. C. Williams R. M. E. Berman D. C.
Davis J. M. Balme M. R. et al. ***POSTER LOCATION #284***
Mapping of Fine-Scale Valley Networks and Candidate Paleolakes in Greater Meridiani Planum, Mars: Understanding Past Surface Aqueous Activity **[#1490]**
Mapping of fine-scale valley networks and candidate paleolakes indicates episodic aqueous periods and not a monotonic decline in climatic conditions over time.

Peel S. E. Burr D. M. ***POSTER LOCATION #285***
Paleo-Lakes in Central Pit Craters on Mars **[#1024]**
Testing the hypothesis that central pit craters with inlet valleys once hosted paleolakes; extending previous work to include 96 CPCs with inlet valleys. Mars.

Voelker M. Hauber E. Jaumann R. ***POSTER LOCATION #286***
Distribution and Evolution of Lacustrine and Fluvial Features in Hellas Planitia, Mars, Based on Preliminary Results of Grid-Mapping **[#1228]**
Based on preliminary grid-mapping results, we present distribution of fluvial and lacustrine deposits in Hellas, and hypothesize possible formation scenarios.

Rodriguez J. A. P. Fairen A. G. Linares R. Zarrroca M. Platz T. et al. ***POSTER LOCATION #287***
Tsunami Waves Extensively Resurfaced the Shorelines of an Early Martian Ocean **[#1680]**
Tsunami-generated geologic features distributed over a wide range of elevations dominate the coastal geomorphology of a Late Hesperian northern ocean on Mars.

Shover K. R. Goudge T. A. Levy J. S. Holt J. W. Fassett C. I. ***POSTER LOCATION #288***
Unraveling Ancient Martian Hydrological Conditions Through Mass Balance Studies of Sedimentary Fans **[#2057]**
Martian fans, deltas / Their sediment mass balance / Key to ancient past.

Lim Y. Levy J. S. Kim W. Goudge T. A. ***POSTER LOCATION #289***
Experimental Investigation of the Effect of Ice Cover on Delta Morphology: How "Warm and Wet" Were Martian Paleolake Environments? **[#2443]**
We conducted 3D flume experiments to explore the effects of ice cover on delta morphology, and test the hypothesis of a "cold and wet" ancient martian climate.

Hughes C. M. Cardenas B. T. Goudge T. A. Mohrig D. ***POSTER LOCATION #290***
Deltaic Deposits Indicative of a Paleo-Coastline at Aeolis Dorsa, Mars **[#2139]**
Delta Deposits / Paleo-coastline on Mars / Wouldn't that be cool?

Hargitai H. I. Gulick V. C. ***POSTER LOCATION #291***
Morphological Analysis of the Southwestern Drainage System of Hadriacus Mons, Mars **[#1670]**
We describe a channel on the floor of Hellas Basin that is fed by the small channels on the flank of Hadriacus Mons, Mars.

Wagner N. Warner N. H. Gupta S. ***POSTER LOCATION #292***
History of Outflow Channel Flooding from an Integrated Basin System East of Valles Marineris, Mars **[#2214]**
The integrated chaotic terrain basin system east of Valles Marineris exhibits multiple, younger, kilometer-deep outflow channels that drained the basins.

Komatsu G. Okubo C. H. Wray J. J. Ojha L. Cardinale M. et al. ***POSTER LOCATION #293***
Probable Mud Volcanoes in Chyse Planitia, Mars: Updates on Morphological, Sedimentrogical and Spectral Studies **[#1067]**
We update on our study of small edifice features in Chryse Planitia, Mars, which have been proposed to be mud volcanoes.

Weiss D. K. Head J. W. ***POSTER LOCATION #294***
Evaluating the Role of Impact-Induced Basal Melting of Surface Ice Deposits on the Degradation State of Impact Craters on a Cold and Icy Mars **[#1064]**
Impact ejecta can produce basal melting of underlying surface ice deposits. This may contribute to fluvial features associated with impact craters on Mars.

LAVA-ICE INTERACTIONS ON MARS [R620]

Cassanelli J. P. Head J. W. ***POSTER LOCATION #295***
Lava Heating and Loading of Ice Sheets on Early Mars: Predictions for Meltwater Generation, Groundwater Recharge, and Resulting Landforms **[#1176]**
We model the accumulation of lava flows atop Late Noachian ice deposits and test predictions for melting, groundwater recharge, and resulting geomorphology.

Berman D. C. Rodriguez J. A. P. ***POSTER LOCATION #296***
Evidence for Magmatism as a Trigger for Catastrophic Floods in Ravi Vallis, Mars **[#2674]**
Current geologic mapping in Xanthe Terra has produced evidence for lava flows emanating from the same source as the floods forming Ravi Vallis.

Graettinger A. H. ***POSTER LOCATION #297***
A Database of Maar Caters on Earth to Enable Investigation of Maars on Mars **[#1586]**
Quantification of maar crater shape on Earth in a database to identify candidate maar craters on Mars.

Campbell A. Ackiss S. E. Horgan B. ***POSTER LOCATION #298***
Morphology of Possible Subglacial Volcanoes in the Sisyphi Montes Region of Mars **[#1554]**
Sisyphi Montes / Morphologies seemed to form / Far under glaciers.

Voigt J. Hamilton C. W. ***POSTER LOCATION #299***
Investigating the Volcanic or/and Fluvioglacial Origin of Surficial Deposits in Eastern Elysium Planitia, Mars **[#2849]**
Our work examines geologic features and facies relationships to investigate the origin of the surface in eastern Elysium Planitia on Mars.

Sutton S. S. Hamilton C. W. Bleacher J. E. ***POSTER LOCATION #300***
Investigating Channel Morphologies in the Eastern Olympus Mons Region of Mars: Implications for Volcanic and Fluvial Processes **[#2759]**
We analyzed two fissures east of Olympus Mons using high-resolution topography to describe the relationship between fissure geometry and channel morphology.

PLANETARY VOLCANISM: LAVA FLOWS "LAVA" YOU [R621]

Sori M. M. Hamilton C. W. Lev E. Scheidt S. ***POSTER LOCATION #301***
Numerical Modeling of Lava Flow Behavior on Earth and Mars: A Multi-Layer Rheological Approach **[#2909]**
We conduct FEM simulations of basaltic flows in an effort to understand the similarities and differences between lava flow behavior on Earth versus Mars.

Sehlke A. Whittington A. G. ***POSTER LOCATION #302***
The Viscosity of Tholeiitic Planetary Melts: A Configurational Entropy Model **[#1957]**
We are presenting a new viscosity model for planetary tholeiitic melts.

Fagents S. A. Baloga S. M. Glaze L. S. ***POSTER LOCATION #303***
Influences of Topography on Lava Cooling and Flow Dynamics: Application to Mars Lava Flows **[#2802]**
We demonstrate that topographic variability enhances lava flow cooling, producing recognizable rheologic and morphologic consequences for flow development.

Venzke A. C. Zimbelman J. R. ***POSTER LOCATION #304***
Mapping Inflated Lava Flows in CTX Images Near Elysium Mons, Mars **[#1486]**
A continuation of previous research to find more inflated flows in the Elysium Mons region on Mars using CTX images.

Healy B. F. Zimbelman J. R. ***POSTER LOCATION #305***
Mapping and Studying Inflated Lava Flows in Mars' Tharsis Region **[#1613]**
Three inflated lava flows on Mars are mapped and analyzed. The age and slope of each flow are calculated, and unexpected lava tube features are discovered.

Simurda C. M. Ramsey M. S. Crown D. A. ***POSTER LOCATION #306***
Surface Characteristics of the Daedalia Planum Lava Flow Field Derived from Thermophysical and Geological Mapping **[#2594]**
The Daedalia Planum lava flow field contains thermal inertia and temperature variations revealing that individual flows respond differently to diurnal heating.

Cushing G. E. Dundas C. M. Keszthelyi L. P. ***POSTER LOCATION #307***
Mapping a High-Flux Flood Lava in South Kasei Valles **[#2920]**
We have mapped and characterized a 2300-km well-preserved, high-flux, turbulent, platy-ridged martian flood lava through the southern arm of Kasei Valles.

Zanetti M. Neish C. Choe B. H. Heldmann J. L. SSERVI FINESSE Team ***POSTER LOCATION #308***
Mapping Fresh Lava Flows with Multi-Wavelength Radar Imagery in Support of Planetary Analogue Studies **[#2429]**
Lava flows at Craters of the Moon National Park are mapped with AIRSAR L-Band and RADARSAT-2 C-band imagery showing surface roughness differs with wavelength.

Mallonee H. C. Kobs Nawotniak S. E. Hughes S. S.
Neish C. Downs M. et al. ***POSTER LOCATION #309***
Basalt Lava Flow Texture Identification at Different Data Resolutions **[#2403]**
This study examines the roughness (3D:2D surface area ratio) of lava flow types at different scales, suggesting data resolution limits for planetary studies.

Schaefer E. I. Neish C. D. Sori M. M. Hamilton C. W. ***POSTER LOCATION #310***
Mandelbrot's Inferno: Exploring the Fractality of Lava Flow Margins in Iceland and Hawaii **[#2831]**
We explore the potential to infer fine-scale information, like lava flow type and surface roughness, from the fractal margins of lava flows in orbital imagery.

EFFUSIVE AND EXPLOSIVE VOLCANISM [R622]

Li B. Ling Z. C. Xu W. J. Wu Z. C. Zhang J. et al. ***POSTER LOCATION #311***
The Fractal Dimension of Rima Sharp **[#1921]**
In this paper, we studied the fractal dimension of lunar rille (Rima Sharp) using the successive shift divider (SSD)method with nodes =25, 50, and 100.

Cataldo V. Williams D. A. ***POSTER LOCATION #312***
Exploring Meander Development in Planetary Sinuous Rilles **[#1612]**
We combine a model of supraglacial meander generation to a model of thermal erosion by turbulently flowing lava to simulate planetary sinuous rilles formation.

Shmelkina I. Gregg T. K. P. ***POSTER LOCATION #313***
Morphometric Analysis of Valley Networks and Channels on Venus **[#2814]**
We present preliminary results of a quantitative morphometric analysis of Venusian channels as a prelude for comparison with channels on other planetary bodies.

Golder K. B. Burr D. M. ***POSTER LOCATION #314***
Implications for Late Amazonian Magma Migration Derived from New Crater-Count Age Estimates of the Cerberus Channel Flood Lavas, Mars **[#1543]**
The westward migration of magma from the Olympus Mons/Tharsis region is inferred from new age estimates of the Cerberus channel flood lavas.

Maue A. D. Thomson B. J. Withers P. G. ***POSTER LOCATION #315***
A Quantitative Approach to Venus Shield Field Stratigraphy **[#2805]**
We use a MATLAB GUI to determine the alignment of vents within clusters of shield volcanoes on Venus as an indicator of local stratigraphy.

Green J. E. Gregg T. K. P. Sakimoto S. E. H. ***POSTER LOCATION #316***
Distribution of Small (<25 km) Volcanoes in Martian Northern Plains **[#2399]**
Classification and distribution of small (<25 km) volcanoes observed in the martian northern plains using high-resolution MOLA and CTX data.

Gallinger C. G. Ghent R. R. ***POSTER LOCATION #317***
A Pyroclastic Origin for Cones in Isidis Planitia: 2. Estimation of Runout Lengths and Preliminary Thermal Calculations **[#2767]**
We model a large pyroclastic flow to determine if the runout length and heat content of the resulting deposit can provide an origin for thumbprint terrain.

Jozwiak L. M. Head J. W. Wilson L. ***POSTER LOCATION #318***
Pyroclastic Eruptions on Mercury: Insights into Eruption Mechanisms from Vent Morphology **[#1178]**
We assess the range of morphologies associated with mercurian pyroclastic vents, and suggest formation by dike-degassing throughout the history of Mercury.

Thatte D. Greenbaum A. McGruder C. Stansberry J. Sivaramakrishnan A. ***POSTER LOCATION #319***
JWST NIRISS Simulations and Analysis of Vulcanism on Io **[#3005]**
We present simulated JWST observations of volcanic eruptions on Jupiter's innermost moon Io using Aperture Masking Interferometry (AMI) mode of JWST NIRISS.

Veeder G. J. Davies A. G. Matson D. L. Johnson T. V. ***POSTER LOCATION #320***
Infrared Thermal Emission Lightcurve for Hot Spots on Io **[#1361]**
We synthesize an infrared lightcurve of the volcanic thermal emission expected from 242 hot spots for remote disk integrated observations of Io.

CRATERING ON ICY SATELLITES [R623]

Szczeszek J. Hoogenboom T. Scipioni F.
Byrne P. K. Schenk P. M. et al. ***POSTER LOCATION #321***
Characterizing Rayed Craters on Mercury and Ganymede **[#3024]**
What do rays maintain / Close look at Mercury and / Ganymede as well.

Xu L. Y. Miyamoto H. Hirata N. ***POSTER LOCATION #322***
Bright Ray Craters on Ganymede Observed from Galileo and Voyager Images **[#2003]**
We got a revised density distribution of bright ray craters on Ganymede by combined Galileo and Voyager images, and tried to give some explanations.

Wagner R. J. Schmedemann N. Werner S. C.
Ivanov B. A. Stephan K. et al. ***POSTER LOCATION #323***
Reinvestigating Crater Size Distributions on the Galilean Satellite Ganymede, and an Outlook to ESA's JUICE Mission **[#2255]**
Crater distributions on the icy Galilean satellite Ganymede are investigated and potential impactor origins are inferred.

Schmedemann N. Wagner R. J. Michael G.
Ivanov B. A. Kneissl T. et al. ***POSTER LOCATION #324***
Crater Scaling on Weak Targets, from Ceres to Icy Satellites **[#2236]**
We present lunar derived crater production functions for Ganymede and Callisto for two different dynamical cases.

Manchester A. Byers G. Chang V. Do V. Fontenot X. et al. ***POSTER LOCATION #325***
Examining Potential for Similar Subsurface Conditions on Europa and Callisto by Comparing and Contrasting Ring Structures **[#1126]**
On the surfaces of Europa and Callisto, we hope to find correlations that could support the hypothesis that the subsurface conditions on both bodies may relate.

Wood C. A. ***POSTER LOCATION #326***
Morphological Classification of Titan's Impact Craters **[#1978]**
Titan has few impact craters that look like ones elsewhere. Some differences are due to erosion. Are others formational oddities or non-impact origin?

SURFACES OF ICY SATELLITES [R624]

Hibbitts C. A. Paranicas C. ***POSTER LOCATION #327***
Understanding the Space Weathering of the Nonice Material on Europa **[#2790]**
The space weathering of the hydrated nonice material on Europa is likely to result in many interesting products with a potentially large number of spectral signatures.

Sori M. M. Byrne S. Bapst J. N. Becerra P. Bramson A. et al. ***POSTER LOCATION #328***
A Wunda-full World? Testing the Plausibility of Carbon Dioxide Frost on Umbriel **[#1053]**
We evaluate the idea that an observed bright anomaly on Umbriel's surface is CO_2 frost, and discuss implications of our results for the other moons of Uranus.

Nelson R. M. Boryta M. D. Hapke B. W.
Manatt K. S. Nebedum A. et al. ***POSTER LOCATION #329***
Jupiter's Satellite Europa: Polarization Properties Explained by a Sub-Micron, Highly Porous Regolith **[#1686]**
Europa's Regolith is very porous with void space exceeding 90%! This work is the also the first experimental proof of Helmholtz's Reciprocity Principle of 1856.

Scipioni F. Schenk P. Clark R. Tosi F. Combe J.-Ph. et al. ***POSTER LOCATION #330***
Spectral Analysis of Enceladus' South Pole **[#1574]**
We will show analysis spectra returned by the spectrometer VIMS onboard the Cassini mission in the IR range of Enceladus' South Pole.

ICY SATELLITE TECTONICS [R625]

Senske D. A. ***POSTER LOCATION #332***
The Regional Geology of Conamara Chaos, Europa **[#1365]**
Regional stratigraphic relations are established through geologic mapping of Conamara Chaos and its surrounds.

Collins G. C. Cutler B. B. Brenes Coto J. P.
Prockter L. M. Patterson G. W. et al. ***POSTER LOCATION #333***
Plate Motions on Europa from Castalia Macula to Falga Regio **[#2533]**
Plates rotate, subsume / Obscuring their complex paths / Gplates reveals all.

Prockter L. M. Schenk P. M. ***POSTER LOCATION #334***
The Geological Context and History of Thrace Macula, Europa **[#1673]**
Using geological mapping and topographic modeling, we investigate the Thrace Macula chaos area on Europa. (No haiku were harmed in the making of this summary.).

Perkins R. P. Bailey C. M. ***POSTER LOCATION #335***
A Regional Analysis of Strike-Slip Fault Morphologies on Europa **[#1410]**
A study was conducted of faults in six regions of Europa to classify as either ridge-like or band-like, to determine possible local stresses affecting faulting.

Aglyamov Y. S. Schroeder D. M. Haynes M. S. Vance S. ***POSTER LOCATION #336***
An Investigation of Radar Scattering from Fracture in Europa's Upper Ice Shell **[#2588]**
Fractures in Europa's crust are unlikely to be the main obstacle to ice-penetrating radar studies.

Ferguson S. N. Quick L. C. Glaze L. S. Prockter L. M. ***POSTER LOCATION #337***
Survey of Europa's E15 and E17 Regions for Putative Cryovolcanic Domes **[#2819]**
We surveyed the E15 and E17 regional maps of Europa to look for domes that appear to have formed by cryovolcanism. Results will be used to model the domes.

Cameron M. E. Smith-Konter B. R. Burkhard L.
Pappalardo R. T. Collins G. C. ***POSTER LOCATION #338***
Strike-Slip Faulting on Ganymede: Morphological Mapping and Failure Mechanics **[#2630]**
Tidal stress models with detailed mapping efforts answer key questions.

Pizzi A. Di Domenica A. Komatsu G. Cofano A. Mitri G. ***POSTER LOCATION #339***
Style of Extensional Faulting on Ganymede: New Insights from Grooved Terrain Analysis and Comparison with Terrestrial Analogues **[#1949]**
Ganymede grooved terrains can be interpreted as extensional fault systems related to diking processes of over-pressured water in the rifted crust.

Yoda M. Kimura J. Kurita K. ***POSTER LOCATION #340***
Evaluation of Global Expansion of Ganymede During the Course of Thermal Evolution **[#1848]**
Our concern is the surface features of Ganymede. We will discuss thermal evolution and extensional stress due to the volume change on Ganymede.

Johnston S. A. Patthoff D. A. Montési L. G. ***POSTER LOCATION #341***
Combining Stresses from Diurnal Tides and a Pressurized Ocean on Enceladus **[#2092]**
Pressurized ocean / And diurnal tides combine / May change stress story.

Clark C. S. Clark P. E. ***POSTER LOCATION #342***
Constant-Scale Natural Boundary Mapping to Show Enceladan Polar Terrain in Global Context **[#2520]**
Enceladus gets its own projection — tiger stripes in global context.

Becker T. L. Bland M. T. Edmundson K. L.
Soderblom L. A. Takir D. et al. ***POSTER LOCATION #343***
Completed Global Control Network and Basemap of Enceladus **[#2342]**
We report on the completion of a global control network and basemap of Enceladus containing Cassini Imaging Science Subsystem (ISS) images.

Martin E. S. Patthoff D. A. Watters T. R. ***POSTER LOCATION #344***
Mysterious Linear Virgae Across the Icy Satellites **[#2958]**
Long and linear / Virgae on icy bodies / How did they get there?

Hay H. C. F. C. Matsuyama I. ***POSTER LOCATION #345***
Numerically Simulating Ocean Dissipation in the Icy Satellites **[#1234]**
Ocean dissipation is numerically modelled using linear and quadratic friction. Quadratic friction smoothes resonances but does not lead to greater dissipation.

Bellagamba A. W. Grimm A. M. Dombard A. J. White O. L. ***POSTER LOCATION #346***
Evidence of Regional Variations in Heat Flow on Saturn's Moon Tethys **[#2322]**
The heat flow around age sorted, large basins are determined. We find the oldest basin witnessed the lowest heat flow, suggesting regional heat-flow variations.

Mao X. McKinnon W. B. ***POSTER LOCATION #347***
Internal Structures of Ceres and Enceladus: Comparisons and Contrasts **[#1637]**
We construct two-layer models for Ceres and suggest it may have spun faster in the past, whereas reconciling Enceladus' libration and gravity requires more work.

Goodman J. C. ***POSTER LOCATION #348***
Snow, Slush, or Solid? Latent Heat Transfer Through Porous High-Pressure Ice Layers in Icy Satellites and Other Water Worlds **[#2836]**
In the deepest sea / Does snow fall onto the rock / Or water flow up?

Holt T. R. Brown A. J. Nesvorny D. ***POSTER LOCATION #349***
Cladistical Analysis of the Jovian Satellites **[#2676]**
A multivariate analysis of the satellites of Jupiter. The project investigates the taxonomic families with implications for the origin of the satellites.

Carey E. M. Zhong F. Choukroun M. Mitchell K. L. ***POSTER LOCATION #350***
Laboratory Studies on the Rheology of Cryogenic Slurries with Implications for Icy Satellites **[#2702]**
We describe preliminary results of viscosity and thermal properties of methanol-water and ammonia-water cryogenic slurries with implications for icy satellites.

Caswell T. E. Cooper R. F. ***POSTER LOCATION #351***
Convection-Induced Microstructure and Tidal Dissipation in Polycrystalline Ice; an Experimental Approach **[#1129]**
Exploring the relationship between convection-induced microstructure and tidal dissipation through experiments on polycrystalline ice.

Patthoff D. A. Pappalardo R. T. Li J. B. Ayton B. J. Dubois D. et al. ***POSTER LOCATION #352***
Viscoelastic Modeling of Tidal Stresses on Satellites with an Enhanced SatStressGUI **[#1375]**
We highlight recent advancements to SatStressGUI and its ability to calculate stresses resulting from diurnal tides, NSR, ice shell thickening, and obliquity.

OCEANS TO PLUMES OF ICY WORLDS [R626]

Neto-Lima J. Fernández-Sampedro M. Prieto-Ballesteros O. ***POSTER LOCATION #353***
Awaruite, Serpentinization, and Icy Moons **[#2675]**
Serpentinization on icy moons catalyzed by Ni-Fe alloy awaruite and methane formation.

Vu T. H. Hodyss R. Johnson P. V. Choukroun M. ***POSTER LOCATION #354***
Chemistry of Frozen Sodium-Magnesium-Sulfate-Chloride Brines: Implications for Surface Expression of Europa's Ocean Composition **[#2428]**
Experimental data on the freezing of solutions containing sodium, magnesium, sulfate, chloride ions are presented. Sodium sulfates are preferentially formed.

Berg J. J. Goldstein D. B. Varghese P. L. Trafton L. M. ***POSTER LOCATION #355***
Simulation of Possible Europa Plumes Using DSMC **[#2867]**
Water vapor plumes on Europa are simulated using the DSMC method, with a comparison of vent parameters and including photodissociation and coupled ice grains.

Bouquet A. Brockwell T. Waite J. H. Perryman R. S. ***POSTER LOCATION #356***
Modeling the H_2 Production in the Cassini Ion and Neutral Mass Spectrometer at Enceladus: Effect of Ice Grains Impacts in Low Velocity Flybys and Implication for the Identification of Native H_2 in the Plumes **[#2488]**
We model how ice grains impact in Cassini INMS are behind at least part of the H_2 signal at Enceladus. Impacts at low or high velocity create different signals.

Dhingra D. Hedman M. M. Clark R. N. ***POSTER LOCATION #357***
Near Infrared Spectral Systematics of Enceladus' Plume: Links to Formation Conditions and Dominant Controls **[#2638]**
We are probing the near-IR spectral diversity of the plume water-ice particles and seeking insights into the plume's formation conditions in Enceladus' interior.

Nishitani R. Tani A. Sasaki S. ***POSTER LOCATION #358***
Partition of Ammonium Ion Between Water and Clathrate Hydrate in a Subsurface Ocean of Icy Bodies **[#1984]**
We investigated partition coefficient of ammonium ion in formation of tetrahydrofuran (THF) clathrate hydrate.

TITAN [R627]

Royer E. M. Ajello J. M. West R. A. Bradley T. E. Holsclaw G. et al. ***POSTER LOCATION #361***
Variations of the Titan Airglow with the Solar Zenith Angle **[#2875]**
In this work, we focus on the solar XUV photons as a main contribution to the Titan airglow and how they influence its intensity.

Kim J. R. Wan W. H. Kim Y. H. ***POSTER LOCATION #362***
Reconstruction of Titan Topography Using CASSINI Radar Images and Generic Stereo Processor **[#1411]**
In this study, we tried to improve the coverage and the quality of Titan digital terrain model with a semiautomated stereo matcher and the generic sensor model.

Le Mouélic S. Cornet T. Rodriguez S. Sotin C. Barnes J. W. et al. ***POSTER LOCATION #363***
Producing Seamless Global Mosaics of Titan with the VIMS Imaging Spectrometer **[#2011]**
We present global maps of the surface of Titan in several wavelengths, using the merging of 11 years of data acquired by the VIMS imaging spectrometer.

Dougherty A. Morris D. Chumsky R. ***POSTER LOCATION #364***
Freezing of Methanol-Water Mixtures at High Pressure with Applications to Titan **[#2167]**
We report the liquidus and eutectic temperatures for a methanol-watersolution at pressures from 5 to 400 MPa, with implications for Titan's ocean.

Farnsworth K. McMahon Z. Laxton D.
Chevrier V. Luspay-Kuti A. et al. ***POSTER LOCATION #365***
Experimental Study of Nitrogen Dissolution in Methane-Ethane Mixtures Under Titan Surface Conditions **[#2380]**
This study uses experimental analysis to determine the solubility of nitrogen in liquid hydrocarbons under Titan surface, cryogenic conditions.

Vu T. H. Munoz-Iglesias V. Mahjoub A. Choukroun M. ***POSTER LOCATION #366***
Kinetics of Clathrate Hydrate Formation from Liquid Ethane Under Titan-Like Conditions **[#2450]**
Experimental evidence for rapid formation of ethane clathrate from direct contact of liquid ethane with water ice is presented via the use of Raman spectroscopy.

Munoz-Iglesias V. Vu T. H. Smythe W. Sotin C. Hodyss R. et al. ***POSTER LOCATION #367***
Phase Behavior of Tetrahydrofuran Clathrates in Aqueous Ammonia Solutions **[#2890]**
Experimental determination of the effect of ammonia on stability of tetrahydrofuran clathrate hydrates.

Cornet T. Cordier D. Marounina N. Le Bahers T. Altobelli N. ***POSTER LOCATION #368***
Constraining the Sources of Uncertainty of the RST Thermodynamic Model Applied to Titan **[#1932]**
We investigate the predictability of molar volume and solubility data relevant to Titan science in the frame of the Regular Solution Theory model.

Barnett K. N. Chevrier V. F. ***POSTER LOCATION #369***
Solubility and Reactivity of Tholins in Liquid Hydrocarbons on Titan **[#1814]**
Acetonitrile is a chemical in Titan seas and lakes. Tholins produced in the atmosphere that have fallen to the surface may be dissolved by it.

Hollyday G. Malaska M. J. Hodyss R. Mitchell K. Lunine J. I. et al. ***POSTER LOCATION #370***
Fitting Nitrogen Solubility Lab Data for Modeling Titan's Lakes and Seas **[#2292]**
Lab data on solubility of nitrogen in liquid methane and ethane have been compared and fitted to models of liquid solutions for application to Titan's seas.

RINGS AROUND THE OUTER PLANETS [R628]

Esposito L. W. ***POSTER LOCATION #371***
The Case for Massive and Ancient Rings of Saturn **[#2364]**
Ancient, massive rings are possible if we re-interpret data from Voyager, Pioneer, and Cassini.

Aye K.-M. Esposito L. W. ***POSTER LOCATION #372***
Searching for Structure in the Rings of Saturn **[#2974]**
Image statistical analyses are used to identify locations with oscillations or particle aggregations in the rings of Saturn.

Bu C. Dukes C. Baragiola R. A. ***POSTER LOCATION #373***
Charging and Discharging of Amorphous Solid Water Ice: The Effects of Cracking and Implications for E-Ring Grain Surface Potential **[#2917]**
We present laboratory studies of surface potentials of cracked water films during the growth and warming, with applications in the charging of E-ring grains.

Higuchi A. Ida S. ***POSTER LOCATION #374***
Temporary Capture of Asteroids by a Planet: Dependence of Prograde/Retrograde Capture on Asteroids' Semimajor Axes **[#1417]**
We investigate the temporary capture of asteroids by a planet through analytical arguments to discuss the origins of irregular satellites.

VENUS [R629]

Russell C. T. Villarreal M. N. Luhmann J. G. Chi P. J. Xiao S. D. et al. ***POSTER LOCATION #375***
Observations of the Subionospheric Magnetic Field at Venus **[#1271]**
Venus Express crossed the lower boundary of the Venus ionosphere during aerobraking and found a weak quiet magnetic field.

Jessup K.-L. Imamura T. Nakamura M. Mills F. P. Marcq E. et al. ***POSTER LOCATION #376***
Advancing Venus Atmospheric Modeling via Coordinated HST-Akatsuki Observations **[#1818]**
Coordinated HST-Akatsuki observations will enable and expand the science goals of the Akatsuki mission, and improve our understanding of Venus' cloud chemistry.

Peplowski P. N. Lawrence D. J. ***POSTER LOCATION #377***
Nitrogen Content of Venus' Upper Atmosphere from the MESSENGER Neutron Spectrometer **[#1177]**
MESSENGER data reveal the nitrogen content of Venus' upper atmosphere.

Mills F. P. Shunmuga Sundaram M. Allen M. Yung Y. L. ***POSTER LOCATION #378***
Potential Impacts of Heterogeneous Chemistry on Venus' Mesospheric Chemistry **[#1936]**
This work reports on simulations of the effectiveness of heterogeneous chemistry in stabilizing CO_2, the primary constituent of Venus' atmosphere.

Mueller N. Tsang C. Smrekar S. Helbert J. Dyar M. D. ***POSTER LOCATION #379***
Venus Atmosphere Variability as Error Source for Surface Emissivity **[#2260]**
We show that precision of emissivity derived from Venus Express VIRTIS data is mostly limited by instrumental noise, not by unaccounted atmospheric variability.

Tsang C. McGouldrick K. ***POSTER LOCATION #380***
Potential Correlations of Topography with Tropospheric Carbon Monoxide on Venus **[#1002]**
Topographic influence on atmosphere / Venus carbon monoxide / Says it smells, maybe?

Andrews-Hanna J. C. Smrekar S. E. Mazarico E. ***POSTER LOCATION #381***
Venus Gravity Gradiometry: Plateaus, Chasmata, Coronae, and the Need for a Better Global Dataset **[#2907]**
Gravity gradiometry using Magellan data reveals new information as well as the need for better data. The proposed VERITAS mission will meet this need.

Tomlinson S. M. Smrekar S. E. Davaille A. ***POSTER LOCATION #382***
Gravity Modeling of Subduction on Venus **[#1734]**
Unlike Earth, Venus lacks a global system of plate tectonics; a process directly related to heat loss and likely related to planetary habitability.

Bondarenko N. V. Kreslavsky M. A. ***POSTER LOCATION #383***
Venus Surface Normal Reflectance Through the Principal Component Analysis of Magellan Radar Altimeter Data **[#1854]**
Principal component analysis of the Magellan radar altimeter backscattering data provides an independent estimate of surface reflectance at normal incidence.

Rolf T. Steinberger B. Werner S. C. ***POSTER LOCATION #384***
Dynamic Origin and Implications of Venus' Gravity Spectrum **[#1435]**
We use dynamic models of Venus' mantle convection to predict the planetary gravity field and compare it to observations to constrain mantle viscosity structure.

Port S. T. Kohler E. Chevrier V. ***POSTER LOCATION #385***
Bismuth Tellurides and Sulfides Mixtures and Their Relation to Metal Frost on Venus **[#2245]**
The stability of Bi_2S_3, Bi_2Te_3, and Te mixtures were experimentally tested in order to determine the source of the radar anomalies on Venus.

Port S. T. Kohler E. Craig P. I. Chevrier V. ***POSTER LOCATION #386***
Stability of Pyrite Under Venusian Surface Conditions **[#2144]**
The stability of pyrite was experimentally tested in a Venus chamber and a Lindberg oven under either a simulated Venus or a pure carbon dioxide atmosphere.

Baker E. W. Lang N. P. Nypaver C. A. ***POSTER LOCATION #387***
Testing Channel Origin Hypotheses in the Mahuea Tholus Quadrangle (V-49), Venus **[#2711]**
We evaluate possible formation processes for channels in the Mahuea Tholus quadrangle on Venus.

Nypaver C. Lang N. P. Baker E. Thomson B. J. ***POSTER LOCATION #388***
Geologic mapping of the Mahuea Tholus Quadrangle (V-49), Venus — An Initial Progress Report **[#1338]**
We present the initial results of our geologic mapping of the Mahuea Tholus quadrangle (V-49), Venus.

Patterson C. W. Ernst R. E. Samson C. ***POSTER LOCATION #389***
Pit Chains Associated with Radiating Graben-Fissure Systems on Venus: Formation During Lateral Dyke Injection? **[#2097]**
Assessing a genetic link between pit chain formation and lateral dyke propagation associated with radiating graben-fissure systems on Venus.

Kurosawa K. ***POSTER LOCATION #390***
Impact-Driven Water Removal on Steam-Covered Venus-Like Planets **[#1839]**
I proposed a new concept, referred to as impact-driven planetary desiccation, to explain the lack of the surface water on the current Venus.

King S. D. Prunty A. C. ***POSTER LOCATION #391***
Is Evidence for Resurfacing on Venus Buried Deep Within the Interior? **[#2424]**
Venus' young surface / The answer lies deep within / Gravity reveals.

Karimi S. Dombard A. J. Smrekar S. E. ***POSTER LOCATION #392***
The Potential for Crater Relaxation on Venus **[#1385]**
We demonstrate the potential for relaxation of larger Venusian craters under higher surface temperatures, and constrain the rheology of Venus' interior.

Smrekar S. E. Hensley S. Dyar M. D. Helbert J. VERITAS Team ***POSTER LOCATION #393***
VERITAS (Venus Emissivity, Radio Science, InSAR, Topography and Spectroscopy): A Proposed Discovery Mission **[#2439]**
VERITAS answers a key question in planetary evolution: ' How Earth-like is Venus?', using an X-band interferometric SAR, a NIR spectrometer, and gravity science.

Helbert J. Maturilli A. Ferrari S. Dyar M. D. Müller N. et al. ***POSTER LOCATION #394***
Progress on Studying the Surface Composition of Venus in the Near Infrared **[#1947]**
First laboratory high temperature emissivity spectra of Venus analog materials for all atmospheric windows between 0.85 and 1.18 micron.

Helbert J. Wendler D. Walter I. Widemann T. Marcq E. et al. ***POSTER LOCATION #395***
The Venus Emissivity Mapper (VEM) Concept **[#1913]**
VEM is a new instrument concept to study the surface of Venus. In orbit or on an aerial platform will provide new insights into the mineralogy of Venus.

Lee G. Polidan R. Ross F. Sen B. Sokol D. ***POSTER LOCATION #396***
Venus Atmospheric Maneuverable Platform (VAMP) — Pathfinder Concepts **[#1688]**
VAMP is an atmospheric rover that provides a new way to enter the Venus atmosphere and allows sustained in situ exploration of Venus cloud layers.

Trainer M. G. Mahaffy P. R. Brinckerhoff W. B.
Johnson N. M. Glaze L. S. ***POSTER LOCATION #397***
Investigating the Origin and Evolution of Venus with In Situ Mass Spectrometry **[#1741]**
Ancient secrets of / A nascent solar system / Told through noble gas.

Parsons A. M. Grau J. McClanahan T. P. Miles J. Perkins L. et al. ***POSTER LOCATION #398***
Venus Bulk Elemental Composition Measurements with PING **[#2448]**
The Probing In situ with Neutrons and Gamma rays (PING) instrument performs fast bulk elemental composition measurements of the near subsurface of Venus.

Wang Alian. Lambert J. L. Hutchinson I. ***POSTER LOCATION #399***
Fine-Scale, Definitive, and Comprehensive Mineralogy for a Venus Landing Mission **[#2182]**
We demonstrate the measurements and technologies that would enable the fine-Scale definitive mineralogy to be achieved during the next Venus landing mission.

LUNAR PETROLOGY, GEOCHEMISTRY, AND CHRONOLOGY: LITTLE SLICES OF TRUTH AND BEYOND [R630]

Korotev R. L. Irving A. J. ***POSTER LOCATION #401***
Not Quite Keeping Up with the Lunar Meteorites — 2016 **[#1358]**
Moon falls far and wide? / None are found in USA / Most in Africa.

Cato M. J. Fagan A. L. Gross J. ***POSTER LOCATION #402***
Crystal Size Distribution of Low-Ti Lunar Basalt-Northwest Africa 8632 **[#2751]**
We report Crystal Size Distribution (CSD) data for olivine and pyroxene in low-Ti Mare basalt NWA-8632.

Nagurney A. B. Treiman A. H. Spudis P. D. ***POSTER LOCATION #403***
Petrology, Bulk Composition, and Provenance of Meteorite Northwest Africa 5000 **[#1103]**
Here, we present data on the bulk composition, mineral proportions, and potential provenance for meteorite NWA 5000.

Robinson K. L. Smith C. L. Kearsley A. T. Bevan A. W. R. Anand M. ***POSTER LOCATION #404***
The Lynch 002 Lunar Meteorite Revisited **[#1470]**
The regolith breccia Lynch 002 remains largely uncharacterized. We present new mineralogical data for this meteorite, which may contain an exotic lithic clast.

Curran N. C. Joy K. H. Pernet-Fisher J. F. Burgess R. ***POSTER LOCATION #405***
A New Basaltic-Bearing Lunar Meteorite Miller Range 13317 **[#1516]**
MIL 13317 is a new lunar mingled fragmental breccia that is dominated by mare basalt assemblages. Here we present petrology and mineral chemistry data for MIL.

Kuehner S. M. Wittmann A. Korotev R. L. Carpenter P. Macke R. J. et al. ***POSTER LOCATION #406***
Petrologic, Chemical and Physical Characterization of Unique Lunar Vitric Regolith Breccia Northwest Africa 10404 **[#2246]**
We describe a unique lunar feldspathic meteorite containing partly devitrified glass clasts. Could this be evidence for impacts into ice-bearing regolith?

Shaulis B. J. Kring D. A. Lapen T. J. Righter M. ***POSTER LOCATION #407***
Petrology and Distribution of U-Pb Ages in Lunar Meteorite Breccia Miller Range (MIL) 13317 **[#2027]**
We present the petrology and U-Pb ages of baddeleyite and Ca-phosphate in new lunar meteorite MIL 13317.

Shaulis B. J. Kring D. A. Lapen T. J. Treiman A. H. ***POSTER LOCATION #408***
In Situ U-Pb Age Analysis of Apollo 17 Impact Melt Breccias **[#2033]**
U-Pb ages of Apollo 17 impact melt breccias.

Cohen B. A. Frasl B. Jolliff B. L. Korotev R. L. Zeigler R. A. ***POSTER LOCATION #409***
^{40}Ar-^{39}Ar Age of an Impact-Melt Lithology in Dhofar 961 **[#2007]**
Crystallized violence / Marks declining bombardment / On the Moon's farside.

Martin D. J. P. Joy K. H. Pernet-Fisher J. F. Wogelius R. Morlok A. et al. ***POSTER LOCATION #410***
Using Quantitative Micro-FTIR Spectroscopy to Characterise the Shock History of Feldspathic Lunar Meteorites Miller Range 090034, 090070 and 090075 **[#1547]**
The shock history of feldspathic phases in lunar meteorites has been investigated using mid-IR spectra, maps, and band ratios.

Nyquist L. E. Shirai N. Yamaguchi A. Shih C.-Y. Park J. et al. ***POSTER LOCATION #411***
Feldspathic Meteorites Miller Range 090034 and 090070: Late Additions to the Lunar Crust **[#1521]**
Geochemical and Sm-Nd isotopic characteristics of these feldspathic lunar meteorites are consistent with those of a late-stage cumulate from the LMO.

Fagan A. L. Joy K. H. Nagashima K. Huss G. R. Kring D. A. ***POSTER LOCATION #412***
Olivine and Plagioclase Oxygen Isotope Signature of Non-Lunar Material in Apollo Regolith Breccias with Closure Ages ~1.79 to 1.80 Ga **[#2789]**
We report oxygen isotope data for olivine and plagioclase in asteroidal relic clasts within Apollo regolith breccias 10021,35; 10060,33; and 15287,7.

Cronberger K. Neal C. R. ***POSTER LOCATION #413***
Mapping 72275,136: Spatial Relationships Within a Breccia Containing KREEP Basalts of Distinctive Compositions **[#1794]**
Element maps of 72275,136 are presented and interpreted.

Cronberger K. Neal C. R. Roberts S. E. ***POSTER LOCATION #414***
Very High Potassium (VHK) Basalt Petrogenesis at Fra Mauro (Apollo 14) **[#1211]**
Some pyroxenes in 14181,8 are overgrown by high and low Fo olivine. Low Fo olivine formation was enabled by K-rich liquid, accompanied by low silica activity.

Merle R. E. Nemchin A. A. Whitehouse M. J.
Grange M. L. Pidgeon R. T. et al. ***POSTER LOCATION #415***
Origin and Transportation History of Lunar Breccia 14311 **[#1862]**
Breccia 14311 was formed by an impact at 3938 Ma and was transported to the Apollo 14 location by a ~600-Ma-old impact.

Fernandes V. A. S. M. Storey M. Zhu M. -H. ***POSTER LOCATION #416***
Report on Initial Characterization of New Apollo 17 Basaltic Regolith Fragments **[#1020]**
Evolution of the mantle under the Serenitatis basin: preliminary mineralogic and chemical composition data for 4 out of 12 new Apollo 17 basaltic framgnets.

Thiessen F. Nemchin A. A. Whitehouse M. J. Snape J. F. Bellucci J. J. ***POSTER LOCATION #417***
Apollo 12 Breccia 12013: Comparison and Interpretation of U-Pb SIMS Ages of Ca-Phosphates and Zircon **[#1830]**
Zircon U-Pb ages of Apollo 12 breccia 12013 indicate differential Pb loss in a single impact event, which is defined by Ca-phosphate data as 3924 ± 3 Ma.

Gleißner P. Becker H. ***POSTER LOCATION #418***
Highly Siderophile Element Fractionations in Apollo 16 Impact Melt Rocks: Effect of Small-Scale Processes **[#2218]**
Differences in HSE ratios observed in multiple aliquots of lunar impact melt rocks are due to solid-liquid metal partioning in the presence of light elements.

Gleißner P. Becker H. ***POSTER LOCATION #419***
Highly Siderophile Element Fractionations in Apollo 16 Impact Melt Rocks: Large-Scale Fractionation Processes **[#2232]**
HSE in Apollo 16 impact melt display no evidence for igneous differentiation but of accretion of differentiated core metal along with chondrite-like material.

Barker D. C. Snow J. E. ***POSTER LOCATION #420***
Apollo 15 Green Glass Phenocryst Growth and Compositional Inhomogeneity **[#2333]**
Primordial fire / Selenes green jewels, crystal growth / Time frozen glasses.

Mercer C. M. Hodges K. V. van Soest M. C. ***POSTER LOCATION #421***
Exploring Non-Uniform $^{40}Ar^*$ Loss in Apollo 16 Impact Melt Breccias Using a Laser Microprobe **[#2503]**
We analyzed Apollo 16 IMBs that experienced partial Ar loss with a laser microprobe, and obtained spot fusion dates consistent with incremental heating results.

Kelly N. M. Mojzsis S. J. Metcalf J. R. Flowers R. M. ***POSTER LOCATION #422***
Lunar Impact Histories Inferred from Zircon (U-Th)/He Thermochronometry **[#2244]**
We present zircon (U-Th)/He thermochronometry data from lunar sample 14311 that preserve pre-Imbrium ZHe dates, shedding light on the origin of Apollo breccias.

Simonetti A. Neal C. R. ***POSTER LOCATION #423***
In Situ Sr Isotope Analyses of Plagioclase: An Effective Tool in Undertsanding Lunar Magmatic Evolution **[#1743]**
A method for spatially resolving Sr isotopic compositions within plagioclase is described. Replication of TIMs 12038 plagioclase Sr data is presented.

McIntosh E. C. Rapp J. F. Draper D. S. ***POSTER LOCATION #424***
Rare Earth Element Partitioning in Lunar Minerals: An Experimental Study **[#2357]**
Results from high-pressure and temperature experiments investigating REE partitioning between olivine and melt in a composition relevant to lunar magmatism.

Pernet-Fisher J. F. Joy K. H. Martin D. J. P. ***POSTER LOCATION #425***
Plagioclase in Regolith Breccias: Critical Tool for Deciphering the Shock History of the Lunar Highlands **[#1499]**
We report the shock history of clasts within Apollo 16 and lunar-meteorite regolith brreccias to characterize the impact history of the lunar highlands.

Kohl I. E. Warren P. H. Young E. D. ***POSTER LOCATION #426***
State-of-the-Art Laser Fluorination for Oxygen Isotope Ratio Analysis of Extraterrestrial Materials **[#2775]**
We identify, define, and solve problems associated with triple-oxygen isotope ratio measurements via laser fluorination; all in the context of new lunar data.

Calzada-Diaz A. Joy K. H. Crawford I. A. ***POSTER LOCATION #427***
Investigation of Lunar Meteorites Potentially Sourced from Cryptomare Regions **[#2075]**
Investigation of potential source of mingled lunar meteorites using elemental composition and the Lunar Prospector Gamma Ray spectrometer.

Neal C. R. Klima R. L. Plescia J. B. ***POSTER LOCATION #428***
Dating the SPA Impact Event: What Samples Are Needed and Where Are They? **[#2282]**
Sampling SPA impact melt is explored by focusing on basin rim deposits.

SPACE WEATHERING: IRRADIATE 'TIL IT HERTZ [R631]

Stojic A. N. Pavlov S. G. Wirth R. Morlok A. Markus K. et al. ***POSTER LOCATION #431***
Experimental Space Weathering: A Coordinated LIBS, TEM, VIS, and NIR/MIR Study **[#2332]**
We irradiated analog material with a pulsed laser to investigate thermal effects of (micro)meteorite impacts on regolith using VIS/N/MIR spectroscopy and TEM.

Matsuoka M. Nakamura T. Kimura Y. Hiroi T. Nakamura R. et al. ***POSTER LOCATION #432***
Reproducing Space Weathering on C-Type Asteroids with Low-Energy Laser Irradiation Experiments of the Murchison Meteorite **[#1823]**
We perform the lower energy (<5 mJ) laser irradiation experiments to characterize spectral and mineralogical changes of Murchison with laser intensities.

MacLennan E. M. Emery J. P. Lucas M. P. Pinilla-Alonso N. ***POSTER LOCATION #433***
Do Asteroids Exhibit Different Space Weathering Styles? **[#2911]**
Using a large set of spectral data obtained telescopically, we search for and characterize different space weathering styles among silicate-bearing asteroids.

Kohout T. Malina O. Penttilä A. Kröger A. Britt D. et al. ***POSTER LOCATION #434***
Space Weathering Induced Slope Changes in Pyroxene and Howardite Reflectance Spectra **[#2042]**
While reddening with increasing space weathering is observed over 2 μm band, slope reduction is observed at 1 μm band. This can explain Vesta Dawn observations.

Jordan A. P. Stubbs T. J. Wilson J. K. Hayne P. O. Izenberg N. R. et al. ***POSTER LOCATION #435***
Dielectric Breakdown Weathering of Lunar Regolith **[#1272]**
During large solar particle events, the regolith on the Moon's nightside may experience dielectric breakdown weathering.

Shusterman M. L. Izenberg N. R. Hibbitts C. A.
Jordan A. P. Stubbs T. J. et al. ***POSTER LOCATION #436***
Weathering Effects of Dielectric Breakdown in the Lunar Polar Regions **[#2263]**
Examination of grain alteration resulting from dielectric breakdown in lunar soil simulant JSC-1A as an analog for space weathering in PSRs of the Moon.

Noble S. K. Keller L. P. Christoffersen R. Rahman Z. ***POSTER LOCATION #437***
The Microstructure of Lunar Micrometeorite Impact Craters **[#1465]**
TEM analyses of 10–20 μm impact craters in olivine and plagioclase provide insight into the micrometeorite process and ground truth for pulsed laser studies.

Mazrouei S. Ali Lagoa V. Delbo M. Ghent R. R. Wilkerson J. ***POSTER LOCATION #438***
Does Thermal Fatigue Play a Role in Lunar Regolith Formation? **[#1785]**
The study of whether thermal fatigue, diurnal thermal variations, cause enough stress on boulders on the surface of the Moon to break them down or not.

Molaro J. L. Hayne P. O. Byrne S. ***POSTER LOCATION #439***
Thermally Induced Stresses in Boulders on the Moon: Implications for Breakdown **[#2919]**
We model thermally induced stresses within boulders of varying size on the surface of the Moon and other airless bodies.

Kaluna H. M. Bus S. J. Gillis-Davis J. J. Lucey P. G. ***POSTER LOCATION #440***
The Composition and Evolution of Themis and Beagle Asteroids **[#2892]**
A comprehensive look at the Beagle and Themis asteroids using experimental and observational data.

Stockstill-Cahill K. R. Domingue D. L. Cahill J. T. S.
Vilas F. Choo T. et al. ***POSTER LOCATION #441***
Radiative Transfer Modeling of Near-Infrared Reflectance Data of Gaspra **[#2229]**
Hapke modeling / For the asteroid Gaspra / Oh, space weathering!

MERRILY MEASURING MOONLIGHT: INSIGHTS FROM REMOTE LUNAR COMPOSITIONAL ANALYSIS [R632]

Kim K. J. Wöhler C. Hasebe N. van Gasselt S. Berezhnoy A. A. et al. ***POSTER LOCATION #442***
Lunar Silicon Distribution as Observed by the Kaguya Gamma-Ray Spectrometer and Chandrayaan-1 Moon Mineralogy Mapper (M^3) Calibration **[#1473]**
We present an investigation of the global lunar Si-distribution based on Kaguya GRS data using regression-based analysis and M^3 spectral reflectance data.

Moriarty D. P. III Pieters C. M. ***POSTER LOCATION #443***
South Pole — Aitken Basin as a Probe to the Lunar Interior **[#1763]**
Using M^3 data, we identify, characterize, and map sub-crustal materials excavated by the SPA-forming impact. These materials are rich in high-Mg pyroxenes.

Sim C. K. Kim S. S. Lucey P. Garrick-Bethell I. Baek G. ***POSTER LOCATION #444***
Optical Maturity of Inner Walls in Lunar Craters **[#1859]**
We analyze the OMAT differences between the north and south walls as well as the east and west walls of lunar craters in terms of space weathering fluxes.

Martinot M. Besse S. Flahaut J.
Blanchette-Guertin J.-F. Quantin C. et al. ***POSTER LOCATION #445***
Mapping the Lunar Crust/Mantle Boundary with the Moon Mineralogy Mapper Instrument Data **[#1970]**
The final goal of this study is to evaluate the lunar crust organization and compositional variations around the crust-mantle boundary at a global scale.

Wang X. Chen J. P. Xu Y. B. Zheng Y. C. Yan B. K. et al. ***POSTER LOCATION #446***
Inversion of the Main Mineral Compositions and Subdivision of Tectonic Units on Lunar LQ-4 Based on Chang'e Data **[#2102]**
This abstract talks about the distribution of FeO, Al_2O_3, Plagioclase and Pyroxene on LQ-4, Sinus Iridum region, and established a tectonic system.

Grice J. P. Donaldson Hanna K. L. Bowles N. E.
Schultz P. H. Bennett K. A. ***POSTER LOCATION #447***
Investigating Young Irregular Mare Patches on the Moon Using Moon Mineralogy Mapper Observations **[#2106]**
Moon Mineralogy Mapper data is used to determine the maturity of two Irregular Mare Patches and compare their composition with surrounding mare and craters.

Donaldson Hanna K. L. Evans R. Bowles N. E.
Schultz P. H. Greenhagen B. T. et al. ***POSTER LOCATION #448***
Investigating Young (<100 Million Years) Irregular Mare Patches on the Moon Using Diviner Observations **[#2127]**
Irregular mare patches (IMPs) and their surrounding mare materials are investigated using thermal infrared observations from Diviner onboard LRO.

Cohen B. A. Lawrence S. J. Petro N. E. Bart G. D. Clegg-Watkins R. N. et al. ***POSTER LOCATION #449***
Identifying and Characterizing Impact Melt Outcrops in the Nectaris Basin **[#1389]**
A dusty jewel / Witness to cataclysm / tempts us to visit.

Chen J. Ling Z. C. Li B. Zhang J. Sun L. Z. et al. ***POSTER LOCATION #450***
Lunar Global Aluminum Map: Results from Chang'e-2 Gamma Ray Spectrometer **[#3022]**
Lunar Al map from Chang'e-2 gamma ray spectrometer.

Staid M. Sunshine J. Besse S. ***POSTER LOCATION #451***
Mapping Relative Olivine Content in Mare Basalts Using M^3 Data **[#2531]**
The relative olivine content of mare basalts is examined by applying MGM modeling to the reflectance properties of small, optically immature craters.

Coman E. O. Jolliff B. L. Carpenter P. ***POSTER LOCATION #452***
Maturity Effects on UV/VIS Ratio and Implications for TiO_2 Detection Using LROC WAC **[#2497]**
Mature soils exhibit UV/VIS ratios affected more by ilmenite than maturity; when LROC WAC detects these soils, 321/415 ratio and TiO_2 are well correlated.

Livengood T. A. Chin G. Mitrofanov I. G.
Boynton W. V. Bodnarik J. G. et al. ***POSTER LOCATION #453***
Constructing Lunar Neutron Flux Maps with LRO/LEND Natural Resolution **[#3065]**
Wee lunar neutrons / Made by cosmic ray impact / Map the globe, you dig?

Wu Y. Z. Tang X. Zhang X. M. Chen Y. Cai W. ***POSTER LOCATION #454***
An Unusual Geology of Mare Imbrium and Implication to the Global Evolution **[#1406]**
We reported our multi-year research for northern Imbrium, showing unusual geology with mafic highlands, olivine rich basalts, young ridges, ripple, and mounds.

Liu C. Q. Ling Z. C. ***POSTER LOCATION #455***
Distributions of Mineral Assemblages and Rock Types of the Lorentz Basin Revealed by Moon Mineralogy Mapper Data **[#2886]**
Lorentz is an archaic basion of Nectarian age, with anomalies. The mineral assemblages are a key to understand early history of lunar crustal evolution.

Hirata N. Hareyama M. Ishihara Y. Yokota Y. Nakamura R. et al. ***POSTER LOCATION #456***
Spectral Characteristics of Possible Ejecta Deposits on the Antipode and Its Surrounding of Tycho Crater **[#1903]**
Multi spectral data of the Tycho antipode region is examined to describe spectral characteristics and regional extent.

McBride M. J. Horgan B. H. N. Gaddis L. R. ***POSTER LOCATION #457***
Revisiting the Mineralogy of the Aristarchus Regional Pyroclastic Deposit with New M^3 Analysis Techniques **[#3052]**
Mapping minerals / Large volcanic deposit / All about that glass.

Bandfield J. L. Edwards C. S. Poston M. J. Klima R. L. ***POSTER LOCATION #458***
Lunar H_2O/OH– Distributions: Revised Infrared Spectra from Improved Thermal Corrections **[#1594]**
New thermal corrections of M^3 data result in a much more prominent absorption near 3 microns. Initial results show no variation with latitude and local time.

Chen J. P. Wang X. Gao G. D. Yao M. J. ***POSTER LOCATION #459***
On the Methodology of Lunar Lithological Classification Based on Spectral Characteristics as Exemplified from Apollo16 Moon Landing Area **[#1343]**
The Apollo16 landing area was covered by melted anorthosite in the north, breccia in the south, and granitic basalts distributed zonally from north to south.

Antonenko I. ***POSTER LOCATION #460***
Applying Predictive Financial Risk Models to the Identification of Lunar Basalt Spectra **[#2948]**
Bank risk models can help identify basalt spectra in lunar data.

Barker M. K. Sun X. Mazarico E. Neumann G. A. Smith D. E. et al. ***POSTER LOCATION #461***
Mapping the Lunar Phase Function in the Near-Infrared with the Lunar Orbiter Laser Altimeter **[#1999]**
The Lunar Orbiter Laser Altimeter is mapping the near-infrared phase function of the Moon using active and passive radiometry.

Vance A. M. Christoffersen R. Keller L. P. Berger E. L. Noble S. K. ***POSTER LOCATION #462***
Evolution of Shock Melt Compositions in Lunar Regoliths **[#2852]**
High iron content / In agglutinitic glass / Where does it come from?

Schaub D. R. Sinclair A. Lindsley D. H. Nekvasil H. Glotch T. ***POSTER LOCATION #463***
Synthesis of "Large" Pigeonite Crystals for Lunar Spectroscopic and Space Weathering Studies **[#2352]**
We have determined a suitable protocol for synthesizing gram quantities of pigeonites with usable grain sizes for use as standards in remote sensing.

Miura Y. Tanosaki T. ***POSTER LOCATION #464***
Carbon on the Moon: Contribution of Dark Color for Moon Surface Rocks **[#1415]**
Color on the Moon can be caused by carbon contents studied from the Moon and Earth samples with laser experiment. Impacted Moon shows carbon-bearing dark color.

LUNAR GEOPHYSICS USING SOUND AND VISION AND SERIOUS MOONLIGHT [R633]

Guo D. J. Liu J. Z. Zhang F. Q. Sun Y. Ji J. Z. et al. ***POSTER LOCATION #467***
A Lunar Time Scale from Geodynamic Evolution Perspective **[#1744]**
From the geodynamic evolution perspective of the Moon, we propose three Eon geochronological units and advise divide the pre-Necterian into two units.

Siegler M. A. Keane J. T. Laneuville M. Chen Y. Economos R. C. ***POSTER LOCATION #468***
Do Lunar Polar Volatiles Record the Geophysical Evolution of the Moon? **[#2667]**
Moon's geophysics / Recorded in polar ice / It surprised us too.

Williams J. G. Boggs D. H. Ratcliff J. T. ***POSTER LOCATION #469***
Lunar Tidal Recession **[#1096]**
The Moon recedes from the Earth by 38.3 mm/yr due to tidal dissipation, perigee increases 30.4 mm/yr, apogee increases 46.2 mm/yr, and Earth's rotation slows.

Williams J. G. Konopliv A. S. Park R. S.
Boggs D. H. Asmar S. W. et al. ***POSTER LOCATION #470***
Lunar Tidal Distortion from GRAIL and LLR **[#1328]**
Lunar tidal distortion is sensitive to structure. The Love number is determined by GRAIL data analysis and tidal dissipation is given by LLR analysis.

Cuk M. Stewart S. T. Lock S. J. Hamilton D. P. ***POSTER LOCATION #471***
Tidal Evolution of the Moon from a Fast-Spinning High-Obliquity Earth **[#2489]**
Tidal evolution of the Moon from a high-obliquity, high-angular momentum Earth through the Laplace plane transition reduces the system's angular momentum.

Slank R. A. Hurtado J. M. Jr. ***POSTER LOCATION #472***
Discovery of Lunar Subsurface Cavities Using Thermal Inertia **[#3034]**
This research is focusing on using a thermal inertia method to locate, map, and determine dimensions of lunar subsurface cavities.

Durga Prasad K. Rai V. K. Murty S. V. S. ***POSTER LOCATION #473***
A Comprehensive 3D Thermal Model for an Insight into Diurnal and Latitude Variability of Lunar Subsurface Temperatures **[#1290]**
A 3D thermal model was developed to study diurnal and latiudinal variability of lunar subsurface temperatures. Results validated with Apollo and earlier models.

Piqueux S. Hayne P. O. Elder C. M.
Greenhagen B. T. Paige D. A. et al. ***POSTER LOCATION #474***
Depth-Dependency of Lunar Regolith Thermophysical Properties from Transient Shadows Observed by Diviner **[#1762]**
Identify promising locales experiencing topography-induced transient shadows on the Moon, and evaluate their potential for subsurface regolith characterization.

Evans A. J. Andrews-Hanna J. C. ***POSTER LOCATION #475***
Influence of Basin Impact Heating on Viscous Relaxation of Topography and Thermal Interior State **[#2859]**
Regional thermal anomalies generated by early basin-forming impacts may have generated thermal anomalies observable in the present-day physiography.

Fuqua H. A. Fatemi S. Delory G. T. de Pater I. Grimm R. E. ***POSTER LOCATION #476***
Bounding the Validity of Nightside Time Domain Electromagnetic Sounding of the Moon **[#2975]**
We present a summary of our plasma models and discuss the validity of time domain electromagnetic sounding vacuum theory to the nightside lunar wake region.

Goossens S. Lemoine F. G. Sabaka T. J. Nicholas J. B. Mazarico E. et al. ***POSTER LOCATION #477***
A Global Degree and Order 1200 Model of the Lunar Gravity Field Using GRAIL Mission Data **[#1484]**
A new gravity field model of degree and order 1200 in spherical harmonics has been determined using GRAIL mission data.

Urbancic N. Ghent R. Stanley S. Johnson C. L. Carroll K. A. et al. ***POSTER LOCATION #478***
Determining the 3D Subsurface Density Structure of Taurus Littrow Valley Using Apollo 17 Gravity Data **[#1790]**
Using 3D modelling techniques combined with high-resolution image datasets, we investigate the subsurface density structure of Taurus Littrow Valley.

Watters T. R. Weber R. C. Collins G. C. Johnson C. L. ***POSTER LOCATION #479***
The Current Stress State of the Moon: Implications for Lunar Seismic Activity **[#1642]**
Shallow moonquakes possibly generated by slip on young thrust faults are more frequent when the Moon is near apogee or perigee once peak stresses are reached.

Kawamura T. Lognonné P. Blanchette-Guertin J. F. Drilleau M. ***POSTER LOCATION #480***
Seismic Q of the Moon Re-Estimated from Combined Spectrum of Apollo LP and SP Seismometers **[#2293]**
We reevaluate the seismic Q of the Moon with combined spectrum of long and short period seismometer of Apollo.

Gong S. Wieczorek M. A. ***POSTER LOCATION #481***
Is the Lunar Magnetic Field Correlated with Gravity or Topography? **[#2290]**
We test whether the lunar magnetic field is correlated with gravity or topography in both the spatial and spectral domains.

Garrick-Bethell I. ***POSTER LOCATION #482***
A Simple History of Lunar True Polar Wander **[#2874]**
The Procellarum KREEP Terrane may link the Moon's earliest paleopole, inferred from topography, with a more recent one inferred from polar hydrogen deposits.

Baek S.-M. Kim K.-H. Jin H. ***POSTER LOCATION #483***
Small-Scale Magnetic Anomalies: Northeast Regions of Lunar Near Side **[#1149]**
Using the Lunar Prospector Magnetometer (LP-MAG) data, we investigate small-scale magnetic anomalies in the vicinity of Crisium and Marginis basins.

Kim H. R. von Frese R. R. B. Hood L. L. Kim H. G. O'Reilly B. E. ***POSTER LOCATION #484***
Paleomagnetic Pole Constraints Inferred from Kaguya Satellite Magnetic Observations of the Nectaris Basin **[#1914]**
This study investigates Kaguya's magnetometer observations from the central Nectaris basin for Nectarian age properties of the lunar core dynamo.

Li X. Y. Gan H. Mo B. Wang S. J. Wei G. F. et al. ***POSTER LOCATION #485***
Indication of Mineral Work Function in Lunar Dust Electrostatic Migration **[#1993]**
For photoelectric emission charging of lunar dust grains, we measured work function of several common minerals and discussed their charging characteristics.

Miyake Y. Nishino M. N. ***POSTER LOCATION #486***
Full-Particle Simulations on Electrostatic Plasma Environment Near Lunar Vertical Holes **[#1449]**
Electrostatic plasma environment near lunar vertical holes is modeled numerically, and unique surface charging properties are revealed inside the hole.

Hirabayashi T. Minton D. A. Melosh H. J.
Milbury C. Huang Y.-H. et al. ***POSTER LOCATION #487***
Equilibrium State in Impact-Generated Porosity on a Lunar Surface **[#2491]**
Impacts make craters / A surface becomes thicker / But it stops someday.

Piatek J. L. Hapke B. W. Nelson R. M. ***POSTER LOCATION #488***
Scattering Properties of Lunar Regolith Samples Determined by MIMSA Fits **[#2880]**
Lunar soil reflects / Backscatters, polarizes / Model fits we try.

Macke R. J. Kiefer W. S. Irving A. J. Britt D. T. ***POSTER LOCATION #489***
Density and Porosity Measurements of Lunar and Martian Materials **[#1294]**
We add new densities and porosities for 16 Apollo moon rocks, 35 lunar meteorites, and 14 martian meteorites to aid interpretation of gravity data.

Zhang J. Ling Z. Li B. ***POSTER LOCATION #490***
Lunar Soils on Swirls: Their Photometric Properties and Possible Migration in a Non-Uniform Magnetic Field **[#3039]**
We studied the photometric properties of the Reiner Gamma swirl using LROC observations, and proposed a refreshing mechanism to interpret its albedo patterns.

Sato H. Denevi B. W. Hapke B. Robinson M. S. ***POSTER LOCATION #491***
Hapke Parametric Analysis of Reiner Gamma **[#1959]**
We present a result of Hapke parametric analysis of Reiner Gamma in comparison with the highlands, the mare, and immature impact ejecta.

Jeong M. Kim S. S. Choi Y.-J. Garrick-Bethell I. ***POSTER LOCATION #492***
Polarimetric Characteristics of the Reiner Gamma Swirl **[#2548]**
We analyzed the polarimetric behaviors of Reiner Gamma, the lunar swirl. We suggest the regolith characteristics of the Reiner Gamma swirl.

Boyce J. M. Mouginis-Mark P. J. Robinson M. ***POSTER LOCATION #493***
An LROC Update: The Tsiolkovsky Landslide **[#2471]**
LROC data shows the Tsiolkovsky landslide is actually two adjacent slides whose efficiency is similar to slides in Valles Marineris. It formed at 3.6 Ga.

Venturino C. S. Martin D. J. P. McDonald F. E.
Paisarnsombat S. Steenstra E. S. et al. ***POSTER LOCATION #494***
Lunar Pyroclastic Soil Mechanics and Trafficability in the Schrödinger Basin **[#1676]**
We have investigated the soil mechanics of the Schrödinger basin pyroclastic unit by using boulder tracks to calculate bearing capacities.

Cook J. C. Hurley D. M. Retherford K. D.
Feldman P. D. Gladstone G. R. et al. ***POSTER LOCATION #495***
Searching for Variations in H_2 Abundance with Local Time, Magnetotail Crossings, and Meteor Showers **[#2611]**
An examination of the lunar atmosphere focusing on variations in H_2 over local time, during magnetotail crossing and meteor showers.

Szalay J. R. Horányi M. Colaprete A. Saran's M. ***POSTER LOCATION #496***
The Importance of Meteoritic Influx on Neutrals in the Lunar Exosphere **[#2853]**
Here we report on the first coincident measurements of meteoritic influx and the subsequent generation of exospheric neutrals from the LADEE mission.

Kinoshita K. Kojima K. Itoh M. Takashima T. Mitani T. et al. ***POSTER LOCATION #497***
Radon Gas Emanation on the Lunar Surface Observed by Kaguya/ARD **[#3070]**
We report results from Kaguya/ARD. We pinpointed radon emission sites. We directly observed time variation of the radon emission for the first time.

Chi P. J. Wei H. Y. Farrell W. M. Halekas J. S. ***POSTER LOCATION #498***
Excitation of Selenogenic Ion Cyclotron Waves: Implications from ARTEMIS Observations and Dispersion Analysis **[#2564]**
Two processes can excite ion cyclotron waves at the Moon, providing hints to Moon-magnetotail interaction and pickup ions from the lunar exosphere.

LUNAR DATA RESTORATION, ARCHIVING, AND ANALYTICAL TOOL DEVELOPMENT [R634]

Lehnert K. A. Cai Y. Mana S. Todd N. S. Zeigler R. A. et al. ***POSTER LOCATION #501***
MoonDB: Restoration and Synthesis of Lunar Petrological and Geochemical Data **[#2738]**
We report the progress of MoonDB, a NASA-funded project to construct a digitally searchable database of geochemical and petrological data of lunar samples.

Zhang G.-L. Li C.-L. Zuo W. Liu B. Zhou Q. et al. ***POSTER LOCATION #502***
Preparation and Analysis Process for Future Returned Lunar Samples and Verification Results for Simulation Experiment **[#1291]**
How to prepare lunar returned samples and how to avoid Earth environment contamination and oxidation are future directions for studying lunar returned samples.

Todd N. S. Zeigler R. A. Evans C. A. Lehnert K. A. ***POSTER LOCATION #503***
Rescue and Preservation of Sample Data from the Apollo Missions to the Moon **[#2988]**
Discusses challenges involved in managing Apollo sample curation data and the data preservation initiatives implemented by NASA's Astromaterials Curation.

Williams D. R. Hills H. K. Taylor P. T. Grayzeck E. J. Guinness E. A. ***POSTER LOCATION #504***
Restoration of Apollo Data by the Lunar Data Project / PDS Lunar Data Node: An Update **[#2385]**
We report on the progress and status of the Apollo data restorations being undertaken by the Lunar Data Project and the PDS Lunar Data Node at the NSSDCA.

Nagihara S. Nakamura Y. Williams D. R.
Taylor P. T. Kiefer W. S. et al. ***POSTER LOCATION #505***
Availability of Previously Unprocessed ALSEP Raw Instrument Data and Derivative Data and Metadata Products **[#1194]**
We report availability of the ALSEP raw instrument data recovered from the original archival tapes found in 2010 and derivative data and metadata products.

Ito G. Glotch T. D. ***POSTER LOCATION #506***
Exploring the Use of T-Matrix/Radiative Transfer Hybrid Models for Fine Planetary Particulates in the Mid-Infrared **[#1962]**
We compute emissivity spectra of enstatite particulates using T-matrix and radiative transfer hybrid models to better capture particle size effect on spectra.

Shirley K. A. Glotch T. D. ***POSTER LOCATION #507***
Particle Size Effects on Mid-IR Emission Spectra of Silicates in a Simulated Lunar Environment **[#2552]**
Grain size effects on / Simulated Moon spectra / Make shifting features.

Warren T. Thomas I. Arnold J. Donaldson Hanna K. Bowles N. ***POSTER LOCATION #508***
Investigating Surface Roughness Effects on the Directional Emissivity of Surfaces Using the Oxford Space Environment Goniometer **[#2114]**
Measurements of Directional Emissivity in the thermal and far infra-red of rough surfaces.

Greenhagen B. T. Donaldson Hanna K. L. Thomas I. R.
Bowles N. E. Allen C. C. et al. ***POSTER LOCATION #509***
Connecting Simulated Lunar Environment Chamber Measurements to Diviner Lunar Radiometer Observations **[#2363]**
We use Simulated Lunar Environment Chamber measurements of lunar soils to "ground truth" Diviner Lunar Radiometer compositional and thermophysical data.

Temme R. L. Strycker P. D. Chanover N. J. Hamilton R. T. Miller C. ***POSTER LOCATION #510***
Comparisons of Data Reduction Methods for Impact Plume Detection in LCROSS Time Series Observations from MRO **[#1166]**
We apply PCA filtering to two LCROSS time series acquired from MRO to detect plume ejecta and compare data reduction methods through plume brightness curves.

Gyalay S. Aye M. Paige D. A. ***POSTER LOCATION #511***
LRO Diviner Nonlinear Detector Response Correction **[#2641]**
With proper assumptions, we can correct the nonlinear detector response of LRO Diviner to produce more accurate lunar brightness temperature results.

Zhang Z. B. Zuo W. Li C. L. Zou Y. L. Zhang G. L. et al. ***POSTER LOCATION #512***
Detecting Craters on Lunar Surface Using an AdaBoost Method **[#1335]**
A two-stage method detecting craters automatically from optical images, which can be used in dating by crater counting to infer the lunar geological history.

Yang H. W. Zhao W. J. Wu Z. H. ***POSTER LOCATION #513***
Matlab Program to Construct Bouguer Gravity Anomaly Field Using Ultra High Degree Spherical Harmonic Coefficients **[#1400]**
Matlab codes to calculate ultra high degree spherical harmonic expansion of lunar gravity and to construct Bouguer gravity anomaly field of the Moon.

Bondarenko N. V. Dulova I. A. Kornienko Yu. V. ***POSTER LOCATION #514***
Improved Photoclinometry Method: Topography of the Lunar Surface Area in Mare Imbrium from a Set of Images **[#1860]**
The improved photoclinometry method for relief retrieval from images allows reconstruction of the detailed topography for small craters on the lunar surface.

Chang S. Q. Huang Y. Li P. J. Hu X. G. ***POSTER LOCATION #515***
The Use of Laser Altimetry in the Orbit Determination of Chang'e-1 **[#1498]**
Altimetry from the CE-1 laser altimeter has been analyzed in this work. The result will be helpful to recomputed CE-1 ephemeris to improve topography model.

Haruyama J. Tsubouchi A. Shinoda R. Miyake W. ***POSTER LOCATION #516***
Validation of SELENE (Kaguya) Terrain Camera Digital Elevation Model at the Apollo LRRR Locations **[#1819]**
We report validation results for DEM_TCOrtho where Lunar Laser Ranging Retro Reflectors (LRRR) were installed on Apollo missions.

Hareyama M. Ishihara Y. Ohtake M. Honda C. Morota T. et al. ***POSTER LOCATION #517***
Unsupervised Classification of Lunar Surface Spectrum Obtained by Kaguya (SELENE) Spectral Profiler **[#1390]**
A result of automatic classification of lunar reflectance spectra observed by Kaguya SP is presented with the aim of making a global geological map.

Kouyama T. Yokota Y. Ishihara Y. Nakamura R. Yamamoto S. et al. ***POSTER LOCATION #518***
Lunar Calibration for Planetary Explorers Using SELENE/SP Lunar Reflectance Model **[#1723]**
Simulating Moon observations by Hayabusa/AMICA and Hayabusa2/ONC-T using SELENE/SP lunar reflectance model, and comparing observed and simulated irradiance.

Wagner R. V. Robinson M. S. LROC Team ***POSTER LOCATION #519***
Design and Processing of the Lunar North Pole Mosaic **[#1582]**
We are producing two updates to our 681 gigapixel mosaic of the lunar north pole: One with more consistent lighting, and a 2 terapixel extension out to 40°N.

Cisneros E. Paris K. N. Povilaitis R. Z. Robinson M. S. ***POSTER LOCATION #520***
Lunar Reconnaissance Orbiter Camera Permanently Shadowed Region Uncontrolled Mosaic and Atlas **[#1663]**
Abstract describing the generation of LROC NAC mosaic of PSR observations, and an atlas of individual PSR coverage.

Henriksen M. R. Manheim M. R. Speyerer E. J. Boyd A. K. Robinson M. S. ***POSTER LOCATION #521***
LROC NAC Digital Terrain Model (DTM) Production **[#1266]**
DTMs are produced from LROC NAC images. DTMs compared to LOLA tracks have RMSEs less than LOLA uncertainties and precisions better than the DTMs' pixel scales.

Edmundson K. L. Alexandrov O. Archinal B. A.
Becker K. J. Becker T. L. et al. ***POSTER LOCATION #522***
Controlling Oblique Apollo 15 Metric Camera Images: Final Results **[#1376]**
We summarize our recent work to photogrammetrically control oblique photographs acquired by the Metric Camera flown on the Apollo 15 lunar mission in 1971.

Nefian A-V. Wong U. Alexandrov O. Kirk R. ***POSTER LOCATION #523***
Photoclinometric Reconstruction of the Apollo Metric Camera Imagery **[#2706]**
Photoclinometric techniques generate high-resolution terrain models that are more detailed than most advanced stereo reconstruction techniques.

Shirley K. A. McDougall D. S. Greenhagen B. T. Glotch T. D. ***POSTER LOCATION #524***
Photometric Correction for the Thermal Channels for the Diviner Lunar Radiometer Experiment **[#2923]**
Diviner tell me / Your thermal secrets for the / Moon's composition.

Haase I. Wählisch M. Ankenbrand F. Kobrow M. Maslonka C. et al. ***POSTER LOCATION #525***
Large Scale Mapping of the Apollo 17 Landing Site Based on Lunar Reconnaissance Orbiter Camera (LROC) and Apollo Surface Images **[#1433]**
Based on LROC and Apollo 17 surface images, we determined accurate astronaut and equipment positions, and created a Traverse Map, ALSEP, and station maps.

Lemelin M. Lucey P. G. Gaddis L. R. Hare T. Ohtake M. ***POSTER LOCATION #526***
Global Map Products from the Kaguya Multiband Imager at 512 ppd: Minerals, FeO, and OMAT **[#2994]**
Global map products including the abundances of olivine, low-calcium pyroxene, clinopyroxene, plagioclase, FeO, and OMAT are available from the USGS.

Wu Y. Z. Wang Z. C. Tang X. Zhang X. M. Chen Y. et al. ***POSTER LOCATION #527***
Seamless Hyperspectral High Spatial Mosaic Derived from Chang'e-1 IIM **[#1405]**
We showed Chang'E-1 spectral mosaic and absolute reflectance comparison with other mission. The product can be provided to users for various uses.

Lorenz C. A. Kokhanov A. A. Karachevtseva I. A. ***POSTER LOCATION #528***
Morphological Study of Phobos Surface and Mapping of the Grooves **[#1831]**
A new GIS-catalog of the Phobos grooves was created. Using it we plan to perform detailed measurements and morphological analysis of the grooves.

Morgan G. A. Campbell B. A. ***POSTER LOCATION #529***
New Evaluation of SHARAD Martian Surface Roughness Data: Implications for Ice Distribution, Future Landing Sites, and Icy Galilean Moon Studies **[#2561]**
(1) Evaluate the presence of shallow ice; (2) assess landing site safety; (3) apply our analysis of SHARAD data to the optimization of RIME operational parameters.

Tornabene L. L. Seelos F. P. Pommerol A. Hansen K. T. Segal N. et al. ***POSTER LOCATION #530***
Analysis of Colour and Stereo Surface Imaging System (CaSSIS) Colour Capabilities and Simulated Images Generated from MRO Datasets **[#2695]**
We present our analysis of the colour capabilities of the Colour and Stereo Surface Imaging System (CaSSIS) onboard the ExoMars 2016 Trace Grace Orbiter (TGO).

PLANETARY SPATIAL INFRASTRUCTURE: STANDARDS AND METHODS [R636]

Hensley S. Smrekar S. Nunes D. Mueller N. Helbert J. et al. ***POSTER LOCATION #531***
VERITAS: Towards the Next Generation of Cartography for the Planet Venus **[#1965]**
VERITAS, a proposed Discovery mission to Venus uses radar interferometry and near IR spectral imaging to provide a next generation of cartographic products.

Rossi A. P. Hare T. Baumann P. Misev D. Marmo C. et al. ***POSTER LOCATION #532***
Planetary Coordinate Reference Systems for OGC Web Services **[#1422]**
Planetary GIS requires coordinate reference systems. Efforts towards standardization are needed for OGC Web services. We introduce a possible approach.

Archinal B. A. IAU Wkg Gp Cartogr. Coord./Rotnl. Elements ***POSTER LOCATION #533***
Update on the IAU Working Group on Cartographic Coordinates and Rotational Elements and Its Upcoming 2015 Report **[#2963]**
We report on the activities of the IAU Working Group on Cartographic Coordinates and Rotational Elements, and our planned "2015" triennial report.

Hayward R. K. Blue J. Gaddis L. Schulz R. Aksnes K. et al. ***POSTER LOCATION #534***
Planetary Nomenclature: An Overview and Update **[#1141]**
An update for the community on the purpose and rules of planetary nomenclature, the process for submitting name requests, and the IAU approval process.

Hunter M. A. Fortezzo C. M. Hayward R. K. Hare T. M. ***POSTER LOCATION #535***
Feature-Linked Annotation of Lunar and Martian Nomenclature **[#1558]**
Feature-linked annotation in GIS supports custom placement of nomenclature that automatically updates with changes to the source geodatabase.

Gaddis L. R. Weller L. Edmundson K. Kirk R. Archinal B. et al. ***POSTER LOCATION #536***
Improved Geometric Control of Moon Mineralogy Mapper Data **[#1504]**
We report on status of the effort to improve the geometric control of the Chandrayaan-1/NASA Moon Mineralogy Mapper data.

Wilson T. J. Edmundson K. L. Becker T. L. Kestay L. ***POSTER LOCATION #537***
What the Camera Doesn't See: Occlusions and Orthorectification **[#2830]**
A discussion and some solutions to the problem of orthoprojecting in the presence of occlusions are presented.

Willner K. Wählisch M. Matz K.-D. Gwinner K. Oberst J. ***POSTER LOCATION #538***
Where Have All the Pixels Gone? **[#1812]**
Converting referenced planetary image data products from data archives into other file formats we discovered that the geo-reference is translated incorrectly.

Marmo C. Hare T. M. Erard S. Cecconi B. Costard F. et al. ***POSTER LOCATION #539***
FITS Format for Planetary Surfaces: Bridging the Gap Between FITS World Coordinate Systems and Geographical Information Systems **[#1870]**
This abstract describes how the FITS World Coordinate System (WCS) can be translated for the planetary domain to allow FITS to interoperate with GIS applications.

PLANETARY SPATIAL INFRASTRUCTURE: SERVICES AND TOOLS [R637]

Estes N. M. Leland J. Johnson A. J. Miconi C. E. Cisneros E. et al. ***POSTER LOCATION #541***
Lunaserv: Serving the Planetary Science Community **[#1491]**
The Lunaserv WMS server software has been expanded to support new projections, bodies, and uses.

Morgan T. H. McNutt R. L. Jr. ***POSTER LOCATION #542***
Renewing the Planetary Data System — Roadmapping the Needs of the Community 2017–2026 **[#1907]**
We have initiated a PDS Roadmap for 2017–2026. This activity began with the release of an RFI. We report results to date, and outline next steps.

Neakrase L. D. V. Beebe R. F. Chanover N. J.
Huber L. F. Crichton D. J. et al. ***POSTER LOCATION #543***
Planetary Data System: Supporting Archiving of Derived Data **[#2640]**
PDS Atmospheres Node provides a simplified description of the PDS process of submitting derived data for archiving in response to new NASA data requirements.

Palmer E. E. Neese C. ***POSTER LOCATION #544***
OLAF — The Easiest Way to Archive Your Data into the PDS **[#2870]**
OLAF is a tool to help generate archive volumes for the PDS. It simplifies the generation of labels and support files.

Adler J. B. Hill J. R. Mitchell J. L. Christensen P. R. Anwar S. et al. ***POSTER LOCATION #545***
JMARS Software Development for NASA's 2035 Human Landing Site Assessment **[#2981]**
The JMARS team at ASU presents a development outline of new software tools useful for those involved with NASA's planned human missions to Mars in 2035.

Hare T. M. Laura J. R. Gaddis L. R. ***POSTER LOCATION #546***
Interoperable Methods in Planetary Research for Geospatial Data Analysis **[#2889]**
For more than a decade there has been a push in the planetary science community to support interoperable methods of accessing and working with geospatial data.

Bailen M. S. Hare T. M. Bartman E. S. Portree D. S. F. ***POSTER LOCATION #547***
Extended Access to Historical Cartographic Products at the USGS Astrogeology Science Center **[#1494]**
The USGS has made a push to index historical cartographic products on its main website, accessible through the long-term data storage portal Astropedia.

Day B. H. Law E. S. ***POSTER LOCATION #548***
Education and Engagement Applications of NASA Lunar and Planetary Mapping and Modeling **[#1523]**
NASA's Lunar and Planetary Mapping and Modeling Portals' data visualization and analysis tools provide exceptional applicability for education and engagement.

Besse S. B. Barbarisi I. B. Arviset C. A.
De Marchi G. D.M. Barthelemy M. B. et al. ***POSTER LOCATION #549***
The New Planetary Science Archive: A Tool for Exploration and Discovery of Scientific Dataset of ESA Planetary Missions **[#1593]**
The PSA is implementing a number of changes for its web-based interface, and for its database structure. It will be PDS3/PDS4 compliant, and user friendly.

Heyer T. Erkeling G. Hiesinger H. Reiss D. Luesebrink D. et al. ***POSTER LOCATION #550***
The Multi-Temporal Database of Planetary Image Data (MUTED): A Tool to Support the Identification of Surface Changes on Mars **[#1852]**
The Multi-temporal Database of Planetary Image Data (MUTED) is a tool to identify the spatial and temporal coverage of planetary image data from Mars.

Stein T. C. Arvidson R. E. Zhou F. ***POSTER LOCATION #551***
PDS Analyst's Notebook for MSL and MER: Addition of Image Measurement Tools **[#1192]**
The PDS Analyst's Notebook (an.rsl.wustl.edu) provides end to end tracking of archived Mars rover data from the planning stage to the final science product.

Wang J. Scholes D. Zhou F. Slavney S. Guinness E. A. et al. ***POSTER LOCATION #552***
The PDS Orbital Data Explorer Tools and Data Services **[#1244]**
An overview of NASA's PDS Geosciences Node's web-based tool, ODE, for search and access orbital data from multiple planetary missions and instruments.

Blair D. M. Gowanlock M. Li J. D. Rude C. M. Herring T. et al. ***POSTER LOCATION #553***
Improving Spacecraft Site Selection Through Computer-Aided Discovery and Data Fusion **[#1987]**
Many data sets / Infinite possible sites / How do we decide?

Putzig N. E. Phillips R. J. Campbell B. A. Plaut J. J. Holt J. W. et al. ***POSTER LOCATION #554***
Custom SHARAD Processing via the CO-SHARPS Processing Boutique **[#3010]**
The Processing Boutique at CO-SHARPS (Colorado Shallow Radar Processing System) allows team and non-team users to apply custom processing to SHARAD radargrams.

Weirich J. R. Palmer E. E. Gaskell R. W. ***POSTER LOCATION #555***
Testing of Stereophotoclinometry (SPC) Software in Support of the OSIRIS-REx Mission **[#2777]**
We evaluate SPC in support of OSIRIS-REx. RMS accuracy is similar to image resolution, and features smaller than 5x the image resolution are poorly represented.

MARS GEOMORPHOLOGY: METHODS AND TECHNIQUES [R638]

Cohen J. P. Lo H. Z. Lu T. Ding W. ***POSTER LOCATION #557***
Crater Detection via Convolutional Neural Networks **[#1143]**
We present a state of the art automatic crater detection method using advanced machine learning to deal with the large amount of satellite imagery collected.

Smith C. L. Moores J. E. ***POSTER LOCATION #558***
Geometric Shielding of Surface Rocks on Mars **[#1644]**
This abstract details the models and methods used to examine whether geometric shielding could contribute to the orientation bias of surface cracks on Mars.

Mayer D. P. Kite E. S. ***POSTER LOCATION #559***
An Integrated Workflow for Producing Digital Terrain Models of Mars from CTX and HiRISE Stereo Data Using the NASA Ames Stereo Pipeline **[#1241]**
CTX, HiRISE / Make DEMs step-by-step / ASP, we show you how.

Tao Y. Sidiropoulos P. Muller J.-P. ***POSTER LOCATION #560***
Automated DTM Generation and Super-Resolution Restoration from NASA MRO Cameras and in Future from TGO16 CASSIS **[#2074]**
An automated MRO camera DTM production pipeline for planetary mapping and separate pipeline for repeat imaging based super-resolution restoration is introduced.

Allender E. J. Stepinski T. F. ***POSTER LOCATION #561***
Automatic, Exploratory Mineralogical Mapping of CRISM Imagery Containing Gully Features **[#1518]**
We use our automated, exploratory, mineralogical mapping pipeline to preliminarily explore 100 CRISM images containing gully features for deposits of interest.

McGuire P. C. Audouard J. Dumke A. Dunker T. Gross C. et al. ***POSTER LOCATION #562***
True- and False-Color HRSC+OMEGA Image Mosaics of Mars **[#1031]**
We use a new approach for mosaicking RGB/NGB color HRSC images, and present both true-color and false-color versions of the MC11E map-tile around Mawrth Vallis.

Sidiropoulos P. Muller J.-P. ***POSTER LOCATION #563***
Large-Scale Co-Registration of Mars High-Resolution NASA Images to HRSC: A Case-Study of the MC11-E Quadrangle **[#2034]**
In this abstract we present recent work that exploits HRSC MC11-E mosaic as a baseline to co-register all high-resolution NASA images.

Walter S. H. G. Li J.-Y. Kneissl T. van Gasselt S. ***POSTER LOCATION #564***
Photometric Hapke Correction for Global-Scale Mosaicking of HRSC Image Data **[#1633]**
We present Hapke parameter modeling for HRSC data for the purpose of constructing homogeneous image mosaics. The result is compared to a Lambertian correction.

MARS POLAR PROCESSES/CRYOSPHERE [R639]

Brooker L. M. Balme M. R. Conway S. J. Hagermann A. Collins G. S. ***POSTER LOCATION #565***
Morphometric Analysis of Clastic Polygonal Networks Around Lyot Crater, Mars **[#2157]**
Lyot polygons/ Large sized, clastic and cryptic/ Mystery measured.

Stuurman C. M. Holt J. W. Levy J. S. Petersen E. I. ***POSTER LOCATION #566***
Debris-Covered Glaciers on Mars: Investigating the Relationship Between Surface Ridges and Internal Structure Through Comparison to Earth Analogs **[#2732]**
Ridges, debris bands / Analogues and modelling / Could unlock Mars' past.

Baker D. M. H. Carter L. M. ***POSTER LOCATION #567***
Multi-Scale Characterization of Supraglacial Debris in Deuteronilus Mensae, Mars **[#1638]**
SHARAD radar sounding data, imagery, and topography are analyzed to constrain the physical properties of near-surface materials of glacial deposits on Mars.

Petersen E. I. Levy J. S. Holt J. W. McKinnon E. A. Goudge T. A. ***POSTER LOCATION #568***
The Effect of Surface Roughness on Shallow Radar Sounding of Debris-Covered Glaciers in Deuteronilus Mensae, Mars **[#2618]**
It's a hard-knock life, SHARAD / Glacier skin can be so rough / Making sounding very tough / and HiRISE agrees (with a nod).

Koutnik M. R. Pathare A. V. Todd C. E. Waddington E. D. ***POSTER LOCATION #569***
Influence of Debris Cover on Glacier-Surface Evolution **[#1059]**
We are studying the effects of debris cover on glaciers in order to best apply terrestrial flow models to debris-covered martian lobate debris aprons.

Joseph E. C. S. Pathare A. V. Crown D. A. Berman D. C. Chuang F. C. ***POSTER LOCATION #570***
Surface Characteristics of Martian Lobate Debris Aprons: Insights from HiRISE Images and Topography **[#2962]**
We extend surface texture analyses of martian lobate debris aprons to HiRISE resolutions, enabling a more detailed study of LDA surface degradation and evolution.

Kirchoff M. R. Grimm R. E. ***POSTER LOCATION #571***
Evidence for Recent Tropical Subsurface Ice on Mars from Ages of Single-Layered Ejecta Craters **[#1587]**
We find SLE craters with ages <500 Ma implying tropical buried ice is preserved until today and an estimated sublimation loss of 10–20m Global Equivalent Layer.

Pathare A. V. Berman D. C. Crown D. A.
Joseph E. C. S. Chuang F. C. et al. ***POSTER LOCATION #572***
Glacial Flow Timescales of Martian Lobate Debris Aprons in Eastern Hellas **[#2563]**
We model the evolution of debris-covered glaciers in Eastern Hellas to determine whether their flow history is consistent with multiple episodes of glaciation.

Levy J. S. Fassett C. I. Chaffey P. M. White M. ***POSTER LOCATION #573***
Boulder Size Distributions on Martian Debris-Covered Glaciers: Flow History and Timescale **[#1099]**
Boulder size-frequency distributions on debris-covered glacier landforms provide insight into transport timescales, erosion, and climatic processes.

Johnsson A. Reiss D. Hauber E. Johnson M. D. Olvmo M. et al. ***POSTER LOCATION #574***
Veiki-Moraine-Like Landforms in the Nereidum Montes Region on Mars: Insights from Analogues in Northern Sweden **[#1229]**
We have studied irregular ring-shaped landforms on Mars that show striking resemblance to Veiki moraines in northern Sweden.

Sinha R. K. Vijayan S. ***POSTER LOCATION #575***
Geomorphic Signature of Lobate Flow Feature in the Craters of Newton Basin, Mars: Implications for Moderate Debris-Covered Glaciation **[#1800]**
Craters formed on floor of Newton basin preserved lobate flow feature in their interior that resulted from moderate debris-covered glaciation during ~100–10 Ma.

Souness C. J. Brough S. Woodward J. Hubbard B. Davis J. et al. ***POSTER LOCATION #576***
Radar-Based Observations of Variable Thickness Debris Cover on Martian Ice Masses: Evidence of Debris Transfer by Flowing Ice on Mars **[#2215]**
We combine high-resolution imagery, digital elevation models, and shallow radar (SHARAD) to investigate variability in debris cover thickness on martian ice masses.

Scanlon K. E. Head J. W. Wordsworth R. D. ***POSTER LOCATION #577***
Snowmelt Rates in Modeled Early Mars Climate Scenarios **[#1532]**
We used early Mars GCM output as input to an energy balance snowmelt model and compared modeled runoff rates to rates previously calculated for valley networks.

Uceda E. R. Rodriguez J. A. P. Fairen A. G. Woodworth-Lynas C. ***POSTER LOCATION #578***
The Relationship Between Icebergs and Tsunamis in Ancient Oceans on Mars **[#1102]**
Tsunami waves flooded martian glacier valleys and rafted large volumes of glacial ice into the oceans during the backwash retreat phase.

Aye K.-M. Schwamb M. E. Portyankina G. Hansen C. J. ***POSTER LOCATION #579***
Analyis Pipeline and Results from the PlanetFour Citizen Science Project **[#3056]**
Description of the analysis pipeline and first results from the PlanetFour Citizen Science project.

O'Neel-Judy E. A. Titus T. N. ***POSTER LOCATION #580***
Characterizing the Evolution of Mars South Polar Jets and Fans Using CRISM-THEMIS Observations **[#1600]**
We use images from CRISM and THEMIS to measure South Polar springtime seasonal fan lengths, which are then compared to insolation, ice thickness, and wind speed.

Whitten J. L. Campbell B. A. Morgan G. A. ***POSTER LOCATION #581***
Evaluating the Structure of the South Polar Layered Deposits on Mars Using SHARAD Data **[#1487]**
The interior structure of the South Polar Layered Deposits on Mars are analyzed to determine the stratigraphy of layer packets across the cap.

Seelos K. D. Brown A. J. Calvin W. M. Titus T. N. Smith I. B. et al. ***POSTER LOCATION #582***
Exploring Mars' South Polar Residual Cap Units Using CRISM Data: Search for the Signature of Buried Ice Layers **[#2130]**
CRISM data of the south polar residual cap are analyzed for spectral signatures corresponding to the extensive buried CO_2 ice deposit discovered by SHARAD.

Philippe S. Schmitt B. Thollot P. Appéré T. Beck P. ***POSTER LOCATION #583***
First Observation of CO_2 Ice Slab Formation During Autumn in the South Polar Region of Mars **[#2188]**
Observation of CO_2 slab ice formation during autumn has been made with OMEGA. The observation is described and radiative transfer characterize the slab.

Buhler P. B. Ingersoll A. P. Ehlmann B. L. Fassett C. I. Head J. W. III ***POSTER LOCATION #584***
How the Martian South Polar Residual Cap Loses Mass **[#2550]**
We present evidence that internal sublimation in the SPRC's CO_2 frost mesas leads to subsidence and surface cracking, where the SPRC's ubiquitous pits nucleate.

Portyankina G. Hansen C. J. ***POSTER LOCATION #585***
HiRISE Detects New Dendritic Troughs in Southern Polar Regions **[#2189]**
Report on the detection of new dendritic troughs related to the early spring cold jets eruptions in several locations in the martian southern polar areas.

Lalich D. Holt J. W. ***POSTER LOCATION #586***
SHARAD Reflectors and Marker Beds: Unlocking the Climate Record of the North Polar Layered Deposits, Mars **[#2213]**
SHARAD reflectors / May form a climate record / Let's try to read it.

Becerra P. Byrne S. Sori M. M. ***POSTER LOCATION #587***
Searching for a Climate Signal in Mars' North Polar Deposits **[#1732]**
Wavelet analysis of a stratigraphic column of Mars' NPLD shows possible correlations with orbital and rotational signals in its recent insolation history.

Rodriguez J. A. P. Fairen A. G. Miyamoto H. Gulick V. Glines N. et al. ***POSTER LOCATION #588***
North Polar Spiral Trough In-Situ Formation as a Water-Ice Source to Lower Latitude Glacial and Periglacial Environments on Mars **[#2605]**
We propose that martian north polar troughs are not migratory features and that their locations represent the sites where they were originally excavated.

Bramson A. M. Byrne S. ***POSTER LOCATION #589***
Implications of Martian Excess Ground Ice Stability **[#2314]**
We investigate conditions to preserve excess ground ice in the mid-latitudes of Mars and the implications for Amazonian ice distribution and climate.

Bapst J. Byrne S. ***POSTER LOCATION #590***
Louth Crater Water Ice as a Martian Climate Proxy **[#3027]**
We employ a thermal model, constrained by orbital thermal infrared datasets, to estimate the mass balance of a water ice mound in the polar regions of Mars.

Krasilnikov S. S. Kuzmin R. O. Bühler Y. Zubarev A. E. ***POSTER LOCATION #591***
Simulation of Water Ice Glacial Surges in North Polar Craters on Mars **[#1881]**
We represent the results of numerical modeling of lobate moraine-like ridges formation on high latitudes of Mars as results of H_2O ice glacial surges processes.

RECURRING SLOPE LINEAE, BRINES, AND DELIQUESCENCE ON MARS [R640]

Rivera-Valentin E. G. Nuding D. L. Chevrier V. F.
Martin-Torres F. J. Zorzano M.-P. et al. ***POSTER LOCATION #593***
Deliquescence-Induced Hydration of Subsurface Minerals at Gale Crater, Mars **[#2371]**
Martian subsurface / Perchlorate salts deliquesce / Hydration results.

Martinez G. M. McConnochie T. Renno N. O.
Meslin P. Y. Fischer E. et al. ***POSTER LOCATION #594***
Diurnal Variation of Near-Surface Atmospheric Water Vapor at Gale: Analysis from REMS and ChemCam Measurements **[#1761]**
Throughout the martian year, the diurnal amplitude of the near-surface VMR at Gale Crater is maximum in the winter, when its day-to-night ratio is about 6.

Estévez-Galarza C. A. Rivera-Valentín E. G. ***POSTER LOCATION #595***
Thermodynamic Analysis of MSL's REMS Data: Support for Deliquescence During the Martian Night **[#1268]**
We conduct a thermodynamic analysis of MSL's REMS data and find inferred enthalpy changes support liquid water production during the martian night.

Mitchell J. L. Christensen P. R. ***POSTER LOCATION #596***
Recurring Slope Lineae and the Presence of Chlorides on Mars **[#1693]**
Recurring Slope Lineae may be produced by brines. This study assessed whether these brines are chloride-rich, but no evidence of chlorides was found with RSL.

Heydenreich J. A. Dixon J. C. Chevrier V. F. ***POSTER LOCATION #597***
Experimental Simulations of Recurring Slope Lineae Formations **[#1773]**
Experimental laboratory simulations of RSLs on varying slopes and in two different environments; room temperature and a -20 degrees celsius cold room.

Gosset W. S. ***POSTER LOCATION #598***
Comments on the Spectral Evidence for Hydrates Salts in Recurring Slope Lineae on Mars **[#1894]**
Ojha et al. uses the CRISM data to detect hydrated salts. I found a major issue about detector saturation that was not mentioned in the original article.

IN SITU GEOCHEMICAL MEASUREMENTS ON MARS [R641]

Wiens R. C. Mangold N. Maurice S. Gasnault O. Clegg S. M. et al. ***POSTER LOCATION #600***
Major-Element Compositions Seen by ChemCam Along the Curiosity Rover Traverse: The First 8,000 Observations **[#1336]**
Gale crater, Mars, displays highly diverse elemental chemistry representing different sedimentary inputs to the crater basin as well as diagenetic fingerprints.

Sutter B. McAdam A. C. Rample E. B. Ming D. W. Mahaffy P. R. et al. ***POSTER LOCATION #601***
Evolved Gas Analysis of Sedimentary Materials in Gale Crater, Mars: Results of the Curiosity Rover's Sample Analysis at Mars (SAM) Instrument from Yellowknife Bay to the Stimson Formation **[#2048]**
A review along with the implications of the SAM detection of evolved H_2O, SO_2, CO_2, and O_2 from ten Gale Crater sediments will be presented.

Clark J. V. Sutter B. Morris R. V. Archer P. D. Ming D. W. et al. ***POSTER LOCATION #602***
The Investigation of Chlorate/Iron-Phase Mixtures as a Possible Source of Oxygen and Chlorine Detected by the Sample Analysis at Mars (SAM) Instrument in Gale Crater, Mars **[#1537]**
Oxygen and HCl releases from chlorate/iron-phase mineral mixtures were compared with Sample Analysis at Mars (SAM) oxygen and HCl release data.

Thomas N. H. Ehlmann B. L. Clegg S. M. Forni O. Schröder S. et al. ***POSTER LOCATION #603***
Characterization of Hydrogen in Basaltic Materials with Laser-Induced Breakdown Spectroscopy (LIBS) **[#2494]**
Univariate analysis of LIBS H emission from lab mineral+basalt mixtures and altered rocks for measurement of martian rock hydration in ChemCam spectra.

Rapin W. Chauviré B. Meslin P.-Y. Maurice S. Rondeau B. et al. ***POSTER LOCATION #604***
Calibration of the ChemCam Hydrogen Signal from Opals **[#2226]**
Calibration of the LIBS hydrogen signal in order to constrain the water content of high silica deposits at Gale Crater.

Meslin P.-Y. Cicutto L. Forni O. Drouet C. Rapin W. et al. ***POSTER LOCATION #605***
Calibration of the Fluorine, Chlorine, and Hydrogen Content of Apatites with the ChemCam LIBS Instrument **[#1703]**
We present laboratory LIBS analyses aimed at estimating the composition of apatites detected by the ChemCam instrument in Gale Crater, Mars.

Anderson D. E. Ehlmann B. L. Forni O. Clegg S. M. Cousin A. et al. ***POSTER LOCATION #606***
Emission Lines Selected for the Identification of Chlorides, Carbonates, and Sulfates Dispersed in Basaltic Rock Using Laser-Induced Breakdown Spectroscopy (LIBS) **[#2325]**
Preliminary detection limits and sensitivity of Cl, C, and S lines in univariate analysis of LIBS spectra of salt+basalt mixtures with applications to ChemCam.

Tate C. G. Moersch J. Ehresmann B. Jun I. Hardgrove C. et al. ***POSTER LOCATION #607***
Water Equivalent Hydrogen Abundances from Bradbury Landing to Amargosa Valley Using Passive Mode Data from the MSL Dynamic ALbedo of Neutrons Experiment **[#1032]**
WEH estimates derived from data taken over the traverse route of MSL over the Gale crater floor from Bradbury Landing to Amargosa Valley are shown.

Farris H. N. Conner M. B. Chevrier V. F. Rivera-Valentin E. G. ***POSTER LOCATION #608***
Adsorption Driven Regolith-Atmospheric Water Vapor Transfer on Mars: Analysis of Phoenix TECP and MSL REMS Data **[#2445]**
Small amounts of adsorbed water at the surface of Mars explained by BET adsorption and regolith-centric parameters such as specific surface area.

Hood D. R. Karunatillake S. Susko D. ***POSTER LOCATION #609***
Assessing Martian Bulk Soil Hydration through Principal Component Analysis of Regional Chemical Data **[#2124]**
Martian regional chemical data is analyzed to assess covariations in bulk soil. Our results suggest that sulfates play an important role in bulk soil hydration.

Beck P. Forni O. Lasue J. Lewin E. Cousin A. et al. ***POSTER LOCATION #610***
Carbon Detection with ChemCam: Laboratory Studies and Mars Results **[#1826]**
We discuss a laboratory approach to assess the detectability of carbon with ChemCam and present a possible detection in Hidden Valley soils.

Goetz W. Wiens R. C. Gasnault O. Gellert R. Newsom H. et al. ***POSTER LOCATION #611***
Strong Enrichment in Copper in the Kimberley Area, Gale Crater, Mars **[#2942]**
We show ChemCam, APXS, and image data of Cu-rich rocks at Kimberley. The goal is that Cu becomes a useful geochemical tracer on the surface of Mars.

Payré V. Fabre C. Cousin A. Forni O. Gasnault O. et al. ***POSTER LOCATION #612***
Copper Abundances in Gale Crater: First Chemcam Calibration and Quantification **[#1347]**
This abstract presents the first ChemCam copper calibration and quantification in the Mars Science Laboratory Mission.

Payré V. Fabre C. Cousin A. Forni O. Gasnault O. et al. ***POSTER LOCATION #613***
Trace Elements in Gale Crater: Li, Sr, Rb, and Ba Abundances Using Chemcam Data **[#1348]**
This is a review of trace elements calibration and quantification using ChemCam (MSL) and geological implications in Gale Crater, Mars.

Perrett G. M. Squyres S. W. Schmidt M. E.
Thompson L. M. Fisk M. et al. ***POSTER LOCATION #614***
Evidence for a Volatile-Rich Layer on the Windjana Rock Target, the Kimberley, Gale Crater, Mars **[#2145]**
A Br, Cl, and Mn-rich layer is evident in MSL APXS data on the Windjana target. It was likely deposited as fracture fill by low-temperature secondary fluids.

Tesselaar D. Perrett G. M. Gellert R. Campbell J. L. ***POSTER LOCATION #615***
A Semi-Qualitative Analysis of Big Sky APXS Scatter Peaks **[#2190]**
Using the scatter-peaks from the MSL APXS, it was seen that Big Sky has elevated amounts of some, as of yet, undetermined low Z component(s).

Stein N. T. Arvidson R. E. O'Sullivan J. A.
Politte D. V. Finkel J. et al. ***POSTER LOCATION #616***
Retrieval of Compositional Endmembers from Mars Exploration Rover Alpha Particle X-Ray Spectrometer Observations **[#1539]**
A log-likelihood function is implemented to determine endmember oxide abundances using combined APXS and Pancam observations from the Mars Exploration Rover.

Cavanagh P. D. Bish D. L. ***POSTER LOCATION #617***
Linear Programming Approach to Quantitative Mineralogy on Mars **[#2670]**
Linear programming has been applied to CheMin and APXS data to constrain Rocknest phase abundances. Amorphous component abundance is estimated to be 29-33 wt %.

Mangold N. Thompson L. M. Forni O. Fabre C. Le Deit L. et al. ***POSTER LOCATION #618***
Chemistry of Conglomerates Analyzed by the Curiosity Rover **[#1614]**
Conglomerates analyzed by Curiosity display two distinct chemical end-members. Conglomerates chemistry can be used as a proxy for Gale crater crust composition..

VanBommel S. J. Gellert R. Thompson L. M.
Berger J. A. Campbell J. L. et al. ***POSTER LOCATION #619***
Chemistry of Millimeter-Scale Petrographic Endmembers Determined by the Mars Science Laboratory Alpha Particle X-Ray Spectrometer and Mars Hand Lens Imager **[#2023]**
APXS rasters complemented by MAHLI images facilitate the chemical deconvolution of mm-scale features via 3D modeling and mathematical minimization.

TECHNICAL ADVANCES IN MEASUREMENTS AND ANALYSIS [R642]

Pravdivtseva O. Meshik A. Hohenberg C. M. ***POSTER LOCATION #620***
Re-Evaluation of the Absolute Closure Age of the I-Xe Standard Shallowater: Implications for the ^{129}I Half-Life Value **[#1711]**
The absolute closure age of Shallowater is reevaluated with the addition of the new data and U-ratio adjusted Pb-Pb ages, suggested value is 4562.4+/–0.2 Ma.

Papanastassiou D. A. Chen J. H. ***POSTER LOCATION #621***
Initial $^{87}Sr/^{86}Sr$ Chronology in the Solar System **[#2650]**
$^{87}Sr/^{86}Sr$ and $^{84}Sr/^{86}Sr$ ratios in meteorites address the question of potential ^{84}Sr anomalies invalidate a fine resolution chronology based on initial $^{87}Sr/^{86}Sr$.

Chen X. Lapen T. J. Andreasen R. Chafetz H. S. ***POSTER LOCATION #622***
Silicon Isotope Analysis in Sulfur and Iron-Rich Samples by MC-ICP-MS **[#2869]**
A new sample preparation and analytical methods in Si isotope measurements is proposed to address the potential issues with S and Fe-rich samples.

Hu J. Dauphas N. ***POSTER LOCATION #623***
Double-Spike Data Reduction in the Presence of Isotopic Anomalies **[#1282]**
This work corrects the double-spike data reduction for isotopic anomalies and is especially helpful for people who are interested in cosmochemical origins.

Isa J. Kohl I. E. Wasson J. T. Young E. D. McKeegan K. D. ***POSTER LOCATION #624***
Quantification of Oxygen Isotope SIMS Matrix Effects in Olivine Samples: Correlation with Sputter Rate **[#3004]**
We found that O-isotope SIMS matrix effects in olivine samples are correlated with their sputter rate.

Mercer C. M. Hodges K. V. ***POSTER LOCATION #625***
ArAR — A Software Tool to Promote the Robust Comparison of K-Ar and $^{40}Ar/^{39}Ar$ Dates Published with Different Decay, Isotopic, and Monitor-Age Parameters **[#2302]**
We have created a software tool to aid in the comparison of K-Ar and $^{40}Ar/^{39}Ar$ dates published with different decay, isotopic, and monitor-age parameters.

Lepore K. H. Giguere S. Boucher T. Byrne S. Fassett C. I. et al. ***POSTER LOCATION #626***
Univariate vs. Multivariate Models for Predictions of Major and Trace Elements from LIBS Spectra With and Without Masking **[#2191]**
Wavelength masks are applied to univariate and multivariate models in order to improve the accuracy of predictions of elemental concentrations using LIBS spectra.

Groopman E. E. Fahey A. J. Grabowski K. S. Fazel K. C. ***POSTER LOCATION #627***
First U-Th-Pb Measurements with the New NRL SIMS-SSAMS **[#2031]**
U-Th-Pb / A new instrument online / NRL SIMS-SSAMS.

Groopman E. E. Fahey A. J. Grabowski K. S. Fazel K. C. ***POSTER LOCATION #628***
The NRL SIMS-SSAMS: A Unique Instrument for Cosmo- and Geochemistry **[#2035]**
NRL SIMS-SSAMS / Molecule isobars gone / It destroys them well.

Huyskens M. H. Yin Q.-Z. Li Q.-L. Li X.-H. Liu Y. et al. ***POSTER LOCATION #629***
In Search of New Monazite and Titanite Standard Minerals for In Situ U-Pb Geochronology **[#2369]**
New mineral standards for U-Pb geochronology of monazite and titanite.

Jeffery C. A. Henderson B. ***POSTER LOCATION #630***
A Phenomenological Theory of the Reflectance of Particulate Media: Scattering Regimes and Lorentz Band Features **[#2710]**
The effects of morphology can confound the detection of minerals. We present a phenomenological theory that demarcates volume and surface scattering regimes.

Xu W. J. Li B. Wu Zh. Ch. Ling Z. Ch. Zhang J. ***POSTER LOCATION #631***
The Spatial Fractal Dimension of Craters on Lunar and Martian Surfaces **[#2251]**
Fractal dimension (FD) was proposed by Mandelbrot. FD can be used to describe the lunar and martian surfaces.

Caswell T. E. Peters G. H. Carey E. M.
Shiraishi L. R. Milliken R. E. et al. ***POSTER LOCATION #632***
The Mechanical Attributes Characterization (MAC) Instrument: Linking Rock Properties to In-Situ Drill Data **[#2084]**
The M2020 drill separates rock cores from the bottom of the core base; in effect, the drilling operation includes a shear strength test on the rock in question.

Davey S. C. Samson C. ***POSTER LOCATION #633***
Measuring the Bulk Density of Very Small Meteorite Fragments (volume < 0.5 cm^3) Using 3D Laser Imaging **[#1007]**
We determine the lower volume limit of the laser imaging method for bulk density calculations (0.09 cm^3), this is then applied to small meteorite fragments.

McMahon Z. Ahrens C. Chevrier V. ***POSTER LOCATION #634***
Development of a New Pluto Surface Simulation Chamber **[#1728]**
Details of the development of a chamber used to simulate the conditions found on the surface of Pluto in order to run related experiments.

INSTRUMENT CONCEPTS: CAMERAS AND IMAGERY [R643]

Wiens R. C. Maurice S. McCabe K. Cais P. Anderson R. B. et al. ***POSTER LOCATION #637***
The SuperCam Remote Sensing Instrument Suite for Mars 2020 **[#1322]**
SuperCam combines co-boresighted LIBS, VISIR, and Raman spectroscopy with high-resolution color imaging. This is an update on its development for Mars 2020.

Cook A. M. Colaprete A. Roush T. L. Thompson S. J. Benton J. E. et al. ***POSTER LOCATION #638***
Multicolor Imagery and NIR Spectroscopy Instrumentation for Planetary Surface Volatile Prospecting **[#2462]**
Demonstration of an instrument system built at NASA Ames Research Center for near-infrared spectral observations and visible imagery of planetary surfaces.

Paar G. Koeberl C. Hesina G. Huber B. Traxler C. ***POSTER LOCATION #639***
3D Vision for Mars 2020 Mastcam-Z: Pre-Assessment of Processing Techniques and Geologic Use Cases **[#2810]**
The use of software for 3D visualization of images from the Mastcam-Z instrument on the Mars-2020 rover for geological studies is described.

Veto M. S. Christensen P. R. Spencer D. A. ***POSTER LOCATION #640***
The Thermal-Camera for Exploration, Science, and Imaging Spacecraft (THESIS) for the Prox-1 Microsat Mission **[#2877]**
THESIS is a payload on the Prox-1 Microsat Mission that plans to image LightSail-B, assist proximity operations, and conduct Earth remote sensing. Launch ~2017.

Sugita S. Yamada M. Sawada H. Kameda S. Kouyama T. et al. ***POSTER LOCATION #641***
Earth-Moon Imaging with Hayabusa2 Optical Navigation Camera (ONC) During the Earth Swing-By **[#2826]**
We obtained a variety of images of Earth and Moon using ONC on Hayabusa2 during its Earth swing-by for inflight calibrations.

Okada T. Fukuhara T. Tanaka S. Taguchi M. Imamura T. et al. ***POSTER LOCATION #642***
Thermal-Infrared Imager TIR on Hayabusa2 and Its In-Flight Performance and Calibration Using Earth and Moon Thermal Images **[#1407]**
The Earth-Moon thermal infrared images will promise the future determination of thermo-physical properties of the surface of asteroid Ryugu by TIR on Hayabusa2.

Riu L. Bibring J.-P. Hamm V. Pilorget C. Poulet F. ***POSTER LOCATION #643***
Calibration of MicrOmega Hayabusa-2 Flight Model — First Results **[#2109]**
Presentation of the first results for the calibration of imaging spectrometer MicrOmega flight model on board Hayabusa2 mission.

Virmontois C. Gasnault O. Maurice S. Dupieux M. Toulemont A. et al. ***POSTER LOCATION #644***
Color CMOS-Based Microcamera for Space Exploration **[#2862]**
Space exploration missions require compact imaging systems that are able to provide high quality images in harsh environments.

Thomas N. Cremonese G. McEwen A. S. Ziethe R. Gerber M. et al. ***POSTER LOCATION #645***
The Colour and Stereo Surface Imaging System for ESA's Trace Gas Orbiter **[#1306]**
The Colour and Stereo Surface Imaging System (CaSSIS) is a 4.5 m/px imager to be launched on ESA's Trace Gas Orbiter on 14/3/2016. CaSSIS will be described.

Turtle E. P. McEwen A. S. Collins G. C. Fletcher L. Hansen C. J. et al. ***POSTER LOCATION #646***
The Europa Imaging System (EIS): High-Resolution Imaging and Topography to Investigate Europa's Geology, Ice Shell, and Potential for Current Activity **[#1626]**
Cameras to reveal / Europa's fractured landscapes / Ice shell mysteries.

INSTRUMENT CONCEPTS: RAMAN SPECTROSCOPY [R644]

Abedin M. N. Bradley A. T. Misra A. K. Sharma S. K. Osmundsen J. ***POSTER LOCATION #648***
Ultra-Compact Raman Spectrograph for Planetary Surface Inspection **[#1085]**
Discussed the limitations of the traditional micro-Raman systems; and needs for a greater sensitivity and faster equipment for NASA exploration programs.

Yan Y. Wang A. Wei J. ***POSTER LOCATION #649***
Shifted Excitation Raman Differentiated Spectroscopy (SERDS) for Planetary Surface Exploration **[#2210]**
We conducted a set of successful SERDS tests on ten natural rocks that suggests a data process in geo-applications should be different from standard SERDS.

Dyar M. D. Breitenfeld L. B. Carey CJ.
Bartholomew P. Tague T. J. et al. ***POSTER LOCATION #650***
Interlaboratory and Cross-Instrument Comparison of Raman Spectra of 96 Minerals **[#2240]**
We compare Raman spectra of a suite of 96 pure mineral powders acquired on 11 different Raman instruments using an array of geometries and laser energies.

Breitenfeld L. B. Dyar M. D. Tague T. J. Wang P. Mertzman S. et al. ***POSTER LOCATION #651***
Quantifying Mineral Abundances in Mixtures Using Raman Spectroscopy: Calculating Raman Coefficient Using a Diamond Reference **[#2186]**
Binary mixtures of minerals with diamond are used to calculate Raman Coefficients that permit quantitative estimates of mineral modes from Raman spectra.

Breitenfeld L. B. Dyar M. D. Crowley M. C. Leight C. Watts E. ***POSTER LOCATION #652***
Quantifying Mineral Abundances in Mixtures Using Raman Spectroscopy: Creating Mineral Mixtures **[#2430]**
Binary mixtures of minerals have been created to test unmixing models for Raman spectroscopy.

Carrier B. L. Beegle L. W. Bhartia R. Abbey W. J. ***POSTER LOCATION #653***
Measurement of UV Fluorescence and Raman Signatures of Organic Compounds in the Subsurface of Mars Relevant Minerals to Constrain Detection Depth for the SHERLOC Mars 2020 Instrument **[#2660]**
Using UV fluorescence and Raman spectroscopy to detect organics in mineral subsurfaces to determine detection depths for the SHERLOC Mars 2020 instrument.

Clegg S. M. Wiens R. C. Newell R. Maurice S. Gasnault O. et al. ***POSTER LOCATION #654***
Integrated Geochemical and Mineralogical Analysis by Remote LIBS, Raman and Time Resolved Fluorescence Spectroscopy **[#2037]**
The integrated geochemistry and mineralogy that is determined by Raman, TRF, and LIBS is discussed.

Sobron P. ***POSTER LOCATION #655***
Exploring Europa with Raman and LIBS **[#1745]**
The elemental/molecular features of water ice mixed with salts and organics relevant to Europa can be determined using Raman and LIBS.

Misra A. K. Sharma S. K. Berlanga G.
Acosta-Maeda T. E. Clegg S. M. et al. ***POSTER LOCATION #656***
Remote Raman Detection of Feldspars Under Daylight Condition Using a Compact Remote Raman+LIBS+Fluorescence System **[#1408]**
We demonstrate the remote Raman capability to detect various types of feldspars, e.g., microcline, orthoclase, and plagioclase from a distance of 5 m.

Lamsal N. Barnett P. Angel S. M. Sharma S. K. Acosta T. E. ***POSTER LOCATION #657***
Remote UV Raman Spectroscopy for Planetary Exploration Using a Miniature Spatial Heterodyne Raman Spectrometer **[#1500]**
A new type of miniature Fourier transform (FT) Raman spectrometer is being developed for planetary exploration and stand-off measurements.

Berlanga G. Misra A. K. Acosta-Maeda T.
Sharma S. K. Clegg S. M. et al. ***POSTER LOCATION #658***
Remote Raman Detection of Natural Rocks **[#2895]**
Remote Raman detection of natural rocks at 5 m distances using Compact Remote Raman+LIBS+Fluorescence System (CRRLFS) for planetary surface chemical analysis.

INSTRUMENT CONCEPTS: NIR, GAMMA-RAY, MASS, AND LIBS SPECTROMETERS [R645]

Hadnott B. H. Hodyss R. Cable M. L. Vu T. H. Hayes A. H. ***POSTER LOCATION #659***
Near Infrared Spectroscopy of Liquid Hydrocarbon Mixtures: Application for In-Situ Titan Lake Mission **[#2051]**
Near-infrared spectra of liquid hydrocarbons collected using a prototype fiber optic probe instrument are presented as a proof-of-concept for Titan missions.

Uckert K. Chanover N. J. Voelz D. G. Xiao X. Hull R. et al. ***POSTER LOCATION #660***
Near-IR Reflectance Spectroscopy in a Lava Tube Cave from a Robotic Platform **[#2671]**
We describe a pilot effort to integrate a near-infrared point spectrometer developed for operation on a robotic platform with the LEMUR rock climbing robot.

Peplowski P. N. Lawrence D. J. Goldsten J. O.
Burks M. Beck A. W. et al. ***POSTER LOCATION #661***
Gamma-Ray Spectroscopy of Asteroid 16 Psyche: Expected Performance of the Psyche Gamma-Ray Spectrometer **[#1394]**
We present the expected performance of the gamma-ray spectrometer on the Psyche mission to asteroid 16 Psyche.

Lawrence D. J. Peplowski P. N. Goldsten J. O.
Burks M. Beck A. W. et al. ***POSTER LOCATION #662***
The Psyche Gamma-Ray and Neutron Spectrometer: Characterizing the Composition of a Metal-Rich Body Using Nuclear Spectroscopy **[#1622]**
The Psyche Gamma-Ray and Neutron Spectrometer will measure elemental and metal-to-silicate compositions at the metal-rich asteroid 16 Psyche.

Southard A. E. Getty S. A. Ferrance J. P. Balvin M. A. Elsila J. E. et al. ***POSTER LOCATION #663***
OASIS: A Liquid Chromatograph-Mass Spectrometer for Detection of Organics on Icy Surfaces **[#2606]**
The OASIS instrument is designed to use LCMS to inventory organic molecules on icy bodies including Europa and Enceladus, the Moon's South Pole, and comets.

Li X. Grubisic A. Getty S. A. Brinckerhoff W. B. van Amerom F. et al. ***POSTER LOCATION #664***
Development of the Switchable Ion Polarity on Linear Ion Trap Mass Spectrometry (LITMS) **[#2707]**
The miniature linear ion trap mass spectrometer (LITMS) features substantial analytical enhancements like dual polarity ion mode and evolved gas analysis.

Pinnick V. T. Danell R. M. van Amerom F. H. W.
Arevalo R. D. Jr. Grubisic A. et al. ***POSTER LOCATION #665***
Mars Organic Molecule Analyzer (MOMA) Mass Spectrometer Flight Model Integration and Test **[#2770]**
We describe progress in the development and testing of the flight mass spectrometer subsystem of the Mars Organic Molecule Analyzer (MOMA) experiment ExoMars.

Terada K. Kawai Y. Toyoda M. Ishihara M. Aoki J. et al. ***POSTER LOCATION #666***
Development on Multi-Turned TOF SIMS with a Femto-Second Laser for Post-Ionization: First Application to Extraterrestrial Materials **[#1958]**
We report on a development of multi-turned TOF-SIMS with a femto-second laser for post-ionization that is suitable for presolar SiC grains.

Getty S. A. Grubisic A. Uckert K. Li X. Cornish T. et al. ***POSTER LOCATION #667***
Two-Step Resonance-Enhanced Desorption Laser Mass Spectrometry for In Situ Analysis of Organic-Rich Environments **[#2693]**
Two-step laser mass spectrometry exhibits resonance enhancements through desorption-laser coupling to vibrational modes of molecules or hydrated minerals.

Goetz W. Arevalo R. Jr. Pinnick V. Danell R. Getty S. et al. ***POSTER LOCATION #668***
Characterization of Mineral Targets by Laser Desorption and Ionization in Preparation of the MOMA Investigation Onboard the ExoMars-2018 Rover **[#2614]**
The MOMA instrument aboard the ExoMars-2018 rover shall search for organic molecules on Mars. Here we explore its capability to characterize inorganic minerals.

Foster S. B. Levine J. Anderson F. S. Whitaker T. J. ***POSTER LOCATION #669***
Using Laser Ablation Mass Spectrometry to Aid Resonance Ionization for Spaceflight Dating **[#2070]**
Tools share same hardware.One for dating isotopes, Other adds context.

Breves E. A. Lepore K. Dyar M. D. Bender S. C. Tokar R. L. ***POSTER LOCATION #670***
Laser-Induced Breakdown Spectra of Rock Powders at Variable Ablation and Collection Angles Under a Mars-Analog Atmosphere **[#1206]**
Quantifies ablation/collection geometry-dependent variation in LIBS signal return for rocks of basaltic to rhyolitic composition under Mars-analog atmosphere.

Maurice S. Wiens R. C. Rapin W. Mimoun D. Jacob X. et al. ***POSTER LOCATION #671***
A Microphone Supporting LIBS Investigation on Mars **[#3044]**
Concept of a microphone for a Mars rover to support Laser Induced Breakdown Spectrocopy (LIBS) studies.

Devismes D. Cohen B. A. ***POSTER LOCATION #672***
Continued Development of In Situ Geochronology for Planetary Using KArLE (Potassium-Argon Laser Experiment) **[#2046]**
The development of KArLE has led to investigate some new protocols to measure the ablated volume/mass based on the LIBS spectra and on the plasma deposits.

INSTRUMENT CONCEPTS: XRF AND IN SITU DEVICES [R646]

Nagaoka H. Hasebe N. Kusano H. Naito M. Shibamura E. et al. ***POSTER LOCATION #673***
Active X-Ray Fluorescence Spectrometer On-Board Landing Rover for Future Lunar and Planetary Landing Missions **[#1837]**
The present model of active X-ray spectrometer for future lunar and planetary landing missions and the specifications are reproted.

Sarrazin P. Blake D. Thompson K. Gailhanou M. Chen J. et al. ***POSTER LOCATION #674***
The Map-X μ-XRF Imaging Spectrometer **[#2883]**
MapX is a mapping X-ray fluorescence spectrometer concept for deployment on a rover/lander robotic arm.

Thompson K. A. Blake D. F. Sarrazin P. Bristow T. ***POSTER LOCATION #675***
Radioisotope Source Modeling for the Map-X µ-XRF Imaging Instrument **[#1829]**
Map-X is a µ-XRF imager that maps compositional (elemental) features. We report empirical/modeling results to determine Map-X engineering requirements.

Schmeling M. Davidson J. ***POSTER LOCATION #676***
A Laboratory Based Grazing Incidence X-Ray Fluorescence Instrument to Study Genesis Solar Wind Samples **[#1540]**
Development of a laboratory based grazing incidence X-ray fluorescence instrument to study Genesis solar wind samples.

Turner S. M. R. Hansford G. M. Bridges J. C. ***POSTER LOCATION #677***
X-Ray Diffraction on Unprepared Rock Samples: A Study of Sulphate Minerals **[#2274]**
A novel energy dispersive XRD instrument with back-reflection geometry enables unprepared whole rock analysis, which we apply to sulphate minerals.

Edmunson J. Gaskin J. A. Jerman G. A. Harvey R. P. Doloboff I. J. et al. ***POSTER LOCATION #678***
A Miniaturized Variable Pressure Scanning Electron Microscope (MVP-SEM) for In-Situ Mars Surface Sample Analysis **[#2301]**
Science requirements and initial testing to define operational constraints for a miniaturized variable pressure SEM for Mars surface sample analysis presented.

Miyamoto H. Tanaka H. Yoshimitsu T. Otsuki M. Taguchi M. et al. ***POSTER LOCATION #679***
Muography for Future Phobos Landing Mission **[#1684]**
Subsurface structure of Phobos can be observed by Muography instrument, which utilizes muons generated from martian atmosphere.

Lim L. F. Southard A. E. Hess L. A. Getty S. A. Hagopian J. G. ***POSTER LOCATION #680***
A Miniature Electron Probe for In Situ Elemental Microanalysis **[#1701]**
The Mini-EPMA will achieve efficient sub-millimeter compositional mapping via an array of individually addressable carbon nanotube microscale emitters.

INSTRUMENT CONCEPTS: DRILLING AND SAMPLING [R647]

Zacny K. Paulsen G. Wang A. Yaggi B. Quinn J. et al. ***POSTER LOCATION #681***
Lunar Resource Prospector Drill **[#1076]**
We are developing a one meter class drill for acquisition and delivery of volatile rich samples to instruments on the Lunar Resource Prospector Rover.

Paulsen G. Shara M. Zacny K. Mellerowicz B. Spring J. et al. ***POSTER LOCATION #682***
Planetary Deep Drill for Mars, Europa, and Enceladus **[#1077]**
We developed a planetary deep drill for penetrating 100s of meters to kilometers in ices of Mars, Europa, and Enceladus. The drill was tested to 13.5 m depth.

Glass B. Bergman D. Yaggi B. Dave A. Parro V. et al. ***POSTER LOCATION #683***
Dirt-to-Data Integrated Drilling Tests at Rio Tinto **[#2656]**
Mars lander drilling mockup / Spain site sampling / Life signs detected.

Furutani K. Kamiishi H. ***POSTER LOCATION #684***
Rock Surface Crusher Driven with Solenoid by Planer Motion for Lunar Exploration **[#1232]**
This report demonstrates the performance of two-dimensional feeding in percussive crushing to decrease the ridges on basalt samples for lunar exploration.

Davê A. Glass B. Bergman D. Modi H. Smith H. D. et al. ***POSTER LOCATION #685***
Granular Flow in Low Gravity and Vacuum for Icebreaker Sample Processing Tests **[#3072]**
The granular flow of icy sample in low gravity poses a challenge to Icebreaker's search for biomarkers and signs of extant life on Mars near the Phoenix site.

Nagihara S. Zacny K. Kim D. Hedlund M. Paulsen G. ***POSTER LOCATION #686***
Options for Heat Flow Probe Deployment on Robotic Lunar Missions **[#1132]**
We discuss pros and cons of two approaches for deploying a heat flow probe into lunar subsurface (percussive penetration and pneumatic excavation).

Hood A. D. Naids A. J. Graff T. Abell P. ***POSTER LOCATION #687***
A Geology Sampling System for Small Bodies **[#1249]**
NASA JSC has been working to gain experience in how to safely obtain geological samples from Small Bodies.

Willson D. Stoker C. R. Lemke L. G. Duncan A. ***POSTER LOCATION #688***
A Sample Delivery System for Planetary Missions, that Excavates, Filters and Dispenses Sample **[#3011]**
A sample delivery system consisting of a Phoenix mission ISAD type scoop that can excavate, filter and dispense icy and dry sample at a definable rates.

INSTRUMENT CONCEPTS: ISRU, REGOLITH, AND MICROGRAVITY EXPERIMENTS [R648]

Fries M. Abell P. Brisset J. Britt D. Colwell J. et al. ***POSTER LOCATION #689***
Strata-1: An International Space Station Experiment into Fundamental Regolith Properties in Microgravity **[#2799]**
Regolith movement / On asteroids mystifies / Test on I.S.S.

Anderson R. C. Calle C. Shoop S. Sullivan R. Buehler M. et al. ***POSTER LOCATION #690***
Soil Shear Properties Assessment, Resistance, Thermal, and Triboelectric Analysis (SPARTTA) Tool: A New Multitool Instrument for Identifying the Physical Properties of In-Situ Soils on Planetary Surfaces **[#2478]**
SPARTTA is a deployable rover-arm mounted contact instrument that will provide a new capability for measurements of the physical properties of in-situ soils.

Pike W. T. McClean J. B. ***POSTER LOCATION #691***
Potential for Characterization of the Dust Threat for In-Situ Resource Utilization **[#2620]**
Dust is a threat to ISRU of CO_2 on Mars. Micromachined devices may offer a way to characterize the PSD and flux with very low power and mass requirements.

Pabari J. P. Bhalodi P. J. Patel D. K. ***POSTER LOCATION #692***
Mars Orbit Dust Experiment (MODEX) for Future Mars Orbiter **[#1419]**
A MODEX is proposed for future Mars orbiter to measure the martian dust. Modelling results show existence of dust around Mars at high altitudes.

Nørnberg P. Bak E. Finster K. Gunnlaugsson H. P. Jensen S. K. ***POSTER LOCATION #693***
Suggestion for a Simple Mars Rover Instrumentation Development for Future Missions **[#2523]**
This paper suggests development of future instruments with the purpose of providing further information on the structure and mineralogy of martian dust grains.

John K. K. Botkin D. J. Burton A. S.
Castro-Wallace S. L. Chaput J. D. et al. ***POSTER LOCATION #694***
The Biomolecule Sequencer Project: Nanopore Sequencing as a Dual-Use Tool for Crew Health and Astrobiology Investigations **[#2982]**
Nucleic acids / Important for human health / Alien life too?

New J. S. O. Price M. C. Cole M. J. ***POSTER LOCATION #695***
ODIN: A Concept for an Orbital Debris Impact Detection Network **[#2054]**
ODIN is a concept for a series of large area impact detectors for in situ measurements of micrometeoroids and orbital debris in the millimetre size regime.

INSTRUMENT CONCEPTS: PROPULSION, SEISMOLOGY, GPR, AND LIDAR [R649]

Dolloff M. D. Jackson J. ***POSTER LOCATION #696***
Current Status of NASA Evolutionary Xenon Thruster — Commercial (NEXT-C) **[#1786]**
NASA is currently developing and building a high efficiency ion electric propulsion system for use in planetary science missions.

Woerner D. F. ***POSTER LOCATION #697***
An Enhanced MMRTG **[#2742]**
This poster will discuss the status and potential of the eMMRTG, including projected gains over the MMRTG; the eMMRTG can power deep space exploration.

Bairstow B. K. Lee Y. H. Smythe W. D. Zakrajsek J. F. ***POSTER LOCATION #698***
Radioisotope Power System Effects on Science Instruments and Measurements **[#2628]**
An assessment of RPS potential effects (radiation, thermal, vibration, EMI, and magnetic-fields) on representative science instruments and science measurements.

Pike W. T. Calcutt S. Standley I. M. Mukherjee A. G. Temple J. et al. ***POSTER LOCATION #699***
A Silicon Seismic Package (SSP) for Planetary Geophysics **[#2081]**
Development of the microseismometers delivered for the InSight mission is presented, to extend the noise performance to 0.1 ng/rtHz in a compact robust package.

Schmerr N. C. Banks M. E. Daubar I. J. ***POSTER LOCATION #700***
The Seismic Signatures of Impact Events on Mars: Implications for the InSight Lander **[#1320]**
Impacts will be a key source of seismicity in future seismic missions. We use a database of recent craters on Mars to model the seismic amplitudes of impacts.

Miljkovič K. Sansom E. K. Daubar I. J. Karakostas F. Lognonné P. ***POSTER LOCATION #701***
Fate of Meteoroid Impacts on Mars Detectable by the InSight Mission **[#1768]**
This work investigates fate of meteoroids on Mars capable of making seismic signatures recordable by the InSight mission.

Persaud D. M. Wu T. S. Tarnas J. Preudhomme M. Jurg M. et al. ***POSTER LOCATION #702***
HOMER: A Smallsat Ground Penetrating Radar Sounding Fleet to Map Planetary Surfaces at High Resolution **[#3051]**
A novel compact system called the High-resolution Orbiter for Mapping gEology by Radar (HOMER) is presented here with mission design and proposed hardware.

Guzewich S. D. Abshire J. B. Smith M. D. Riris H. Sun X. et al. ***POSTER LOCATION #703***
MARLI: MARs LIdar for Global Wind Profiles from Orbit **[#1497]**
The MARLI lidar is being developed by NASA Goddard Space Flight Center to measure martian global winds from a future polar-orbiting satellite.

Noda H. Mizuno T. Kunimori H. Takeuchi H. Senshu H. et al. ***POSTER LOCATION #704***
Establishment of Laser Link Between Ground Station and Hayabusa2 LIDAR **[#1289]**
Laser link experiment between ground SLR stations and a laser altimeter named LIDAR on Hayabusa2 was carried out, and the uplink laser pulses were detected.

INSTRUMENT CONCEPTS: METHODS AND TECHNIQUES FOR ANALYSIS [R650]

Setera J. B. Turrin B. VanTongeren J. A. Lindsay F. N. Herzog G. F. et al. ***POSTER LOCATION #705***
$^{40}Ar/^{39}Ar$ Thermochronology: A Method for Precise Age Dating and Closure Temperatures with Implications for Meteoritic and Terrestrial Samples **[#3017]**
We present a step-heating method for precise measurement of $^{40}Ar/^{39}Ar$ plateau ages and diffusion parameters for small terrestrial and meteorite samples.

Sears D. W. G. Hughes S. S. ***POSTER LOCATION #706***
A New Method — Potentially Suitable for Spacecraft Instrumentation — for Dating Volcanism on Planetary Surfaces **[#1369]**
The induced thermoluminescence intensity of 23 basalts from Idaho is dependent on their age and thus is a dating technique suitable to robotic spacecraft.

Treiman A. H. Filiberto J. ***POSTER LOCATION #707***
How Good is Good Enough? Major Element Chemical Analyses of Basalt by Spacecraft Instruments **[#1029]**
Connections between analytical uncertainties on chemical analyses of basalt and the utility of those analyses are shown via Monte Carlo methods.

Carey C. M. Jr. Breitenfeld L. B. Dyar M. D.
Crowley M. C. Leight C. et al. ***POSTER LOCATION #708***
Quantifying Mineral Abundances in Mixtures Using Raman Spectroscopy: Toward a Method for Spectral Unmixing **[#2626]**
Automated unmixing of Raman spectra is demonstrated on binary mineral mixtures using a simple algorithm built upon existing whole-spectrum matching techniques.

Naito M. Hasebe N. Nagaoka H. Yoshida K. Ishii J. et al. ***POSTER LOCATION #709***
Numerical Investigation of the Leakage Gamma-Ray and Neutron Fluxes from Martian Moons **[#1791]**
Numerical simulations of gamma-ray and neutron fluxes from Shergotty and CI chondrite were performed for future mission to the martian moons.

Boucher T. F. Dyar M. D. Carey C. Giguere S. Mahadevan S. ***POSTER LOCATION #710***
Calibration Transfer for Spectroscopy in Space Science **[#2784]**
Improving the predictive performance of space instruments using both on-board and lab-base calibration standards through the use of calibration transfer.

Mann P. Cloutis E. A. Bell J. F. III Wiens R. C. Johnson J. R. et al. ***POSTER LOCATION #711***
The Stability of Spectralon; a Potential Calibration Reference for Mars 2020 **[#2362]**
Assessing the optical and mechanical stability of Spectralon under deep space and Mars surface conditions.

Francis R. Estlin T. Gaines D. Doran G. Gasnault O. et al. ***POSTER LOCATION #712***
AEGIS Intelligent Targeting Deployed for the Curiosity Rover's ChemCam Instrument **[#2487]**
Rover picks, zaps rocks / Without Earth-in-the-loop wait / More mission science.

Jakobsen S. J. Kinch K. M. Madsen M. B. Bell J. F. Wellington D. et al. ***POSTER LOCATION #713***
An Excess Signal in the Tail of the PSF Observed in the Pancam R7 Filter on Board the Mars Exploration Rovers: Characterisation and Correction **[#2631]**
In order to correct for an excess signal effect, we construct an algorithm and use it in an iterative process.

Giguere S. Dyar M. D. Carey C. Boucher T. Mahadevan S. ***POSTER LOCATION #714***
Fully-Customized Baseline Removal Applied to LIBS Spectroscopy Under Mars Conditions **[#1318]**
To explore the effect of applying customized baseline removal, we compare results against several existing methods when used in LIBS prediction tasks.

Giguere S. Dyar M. D. Boucher T. Carey C. Mahadevan S. ***POSTER LOCATION #715***
A Fully-Customized Baseline Removal Framework for Spectroscopic Applications **[#1321]**
We present a system for automatically constructing baseline removal methods and tuning them to a user's task, making full optimization of BLR accessible.

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