

AUSTRALASIAN GROUNDWATER CONFERENCE



NATIONAL CENTRE FOR
GROUNDWATER
RESEARCH AND TRAINING



GROUNDWATER FUTURES
SCIENCE TO PRACTICE

11-13TH JULY 2017
UNSW, SYDNEY

PROGRAM

#agc17sydney

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SPONSORS



Networking Drinks



Early Career Awards



Government of South Australia
Department of Environment,
Water and Natural Resources

Career Scientist Awards



Energy Futures
Panel



Australian Government
Geoscience Australia

Future Directions
Panel



Climate Change
Panel



ICEWaRM
International Centre of Excellence
in Water Resources Management

Modelling Outlook
Panel



General



Morning Tea



WELCOME

On behalf of the Organising Committee, we would like to welcome you to the Australasian Groundwater Conference 2017 in Sydney.

We are proud to present a fantastic line up of over 200 oral presentations, over 50 posters and 6 panel discussions showcasing the latest research, innovations and industry practices in groundwater.

The Australasian Groundwater Conference is a cornerstone for our industry's continual ability to learn from the experience of others to advance our capacity as professionals to solve the current groundwater challenges. It is essential that industry, researchers, policy makers and managers work together as a community to address current and future issues and we hope the conference can be a vehicle for such collaborations.

This year we have reached out to the wider Australasian region and we hope the conference can help strengthen networks and foster new ones across New Zealand, the Pacific and Asia.

This conference is a great opportunity to network with your colleagues and peers and to share our experiences and knowledge. We hope you seize the opportunity to be a part of the conference activities including networking drinks, conference dinner at Coogee Rooftop Pavilion by the ocean, and our trivia night at the UNSW Whitehouse.

We would like to extend a special welcome and thank you to our sponsors, whose generous support makes this event possible.

We thank you for being part of the Australasian Groundwater conference and sincerely hope that you enjoy the event.



Dr. Martin Andersen
Chair, Australasian Groundwater Conference 2017

Australasian Groundwater Conference Committee 2017

Martin Andersen IAH NSW
Conference Chair

Wendy Timms IAH NSW

Andrea McCarthy NCGRT

Fiona Adamson NCGRT

Katarina David IAH NSW

Lange Jorstad IAH NSW

Graham Hawkes IAH NSW

Anna Greve IAH NSW

Ellen Kwantes IAH NSW

Theo Sarris IAH NZ

Makoto Taniguchi IAH Asia



NATIONAL CENTRE FOR
GROUNDWATER
RESEARCH AND TRAINING



CONFERENCE INFORMATION

ABSTRACTS

A copy of all abstracts has been emailed to all conference delegates and can be found on the AGC2017 website.

AWARDS

At the conclusion of the Conference on Thursday, awards will be given to best oral presentation and poster presentation in two categories: early career research scientist and career scientist.

BANKS / ATMS

Commonwealth Bank, Westpac and RediATM's are located on campus. Please refer to the campus maps (at information desk) for locations.

BUSINESS HUB

Access to a business hub for delegates will be on the mezzanine level of Leighton Hall.

CONFERENCE DINNER & BUS TRANSPORT

The Conference dinner will be held on Wednesday evening, 12 July, at the Coogee Rooftop Pavilion. Bus shuttles will depart outside Gate 11 shortly after the last session of the day. If you miss the buses you will need to arrange your own transport.

DISABLED ACCESS

The Scientia building is equipped with ramps and lifts for disabled access to all rooms. Disabled toilets are to the left of the main entry to the foyer.

FIELD TRIPS

All bookings to the field trips on Friday must have been made at registration. Information departure points have been emailed to delegates. No late inclusions allowed. Please visit the information desk for a field trip itinerary.

FIRE EVACUATION

The fire evacuation safety point is out the front of the Scientia building on the lawn.

LUGGAGE

A large luggage room is located outside the gallery rooms (refer to ground floor map on page 5).

MEDICAL SERVICES

For general practitioners and specialist doctors, visit the University Health Service East Quadrangle Building. A pharmacy is off the Quadrangle Building. Refer to campus map at information desk.

PARKING

Botany Street in multi-level parking station (Gate 11).

POST OFFICE

Australia Post offices are located on Anzac Parade Kensington, at the Spot in Randwick (50 Perouse Rd).

PUBLIC TRANSPORT

Please refer to campus map at information desk for public transport access points.

REGISTRATION

Registration will be open by 8am each day in the Scientia foyer. The information desk will be open for the duration of the conference.

SAFETY ON CAMPUS

Keep to well-lit areas and use paths such as University Walk, which is patrolled by Campus Security Officers. The StaySafe@UNSW security app provides you with direct access to a number of security services. Safety escorts are available all hours. Tel: 9385 6000 for emergencies.

TAXI BOOKING

A taxi booking form will be located at the registration desk on Thursday if you require a taxi to the airport. The booking form will be available until 3.00pm. Alternatively, call 131 001 to book a cab or ride with Uber.

TOURIST INFORMATION

Visit www.sydneyguide.net.au for tourist information.

TWITTER

Join in the bigger conversation and tweet your good experiences from the Conference. Use the hash tag **#agc17sydney**.

WI-FI

Wireless internet access is available throughout the Scientia building. Instructions have been emailed to all delegates. UNSW is part of the global *eduroam* network. Please go to the information desk for any assistance.

VENUE INFORMATION

Venue: John Niland Scientia Building

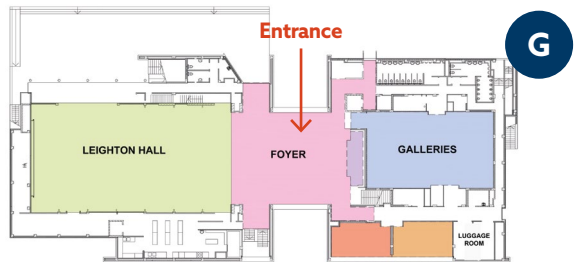


Parking: **Botany Street Parking Station** Gate 11: **Bus departure for Conference dinner**

VENUE FLOORPLAN

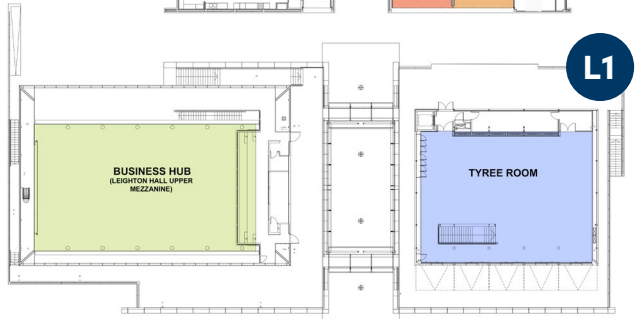
GROUND FLOOR (entrance level)

Leighton Hall
presentation and panel sessions
Galleries
posters and exhibitors
Foyer
catering



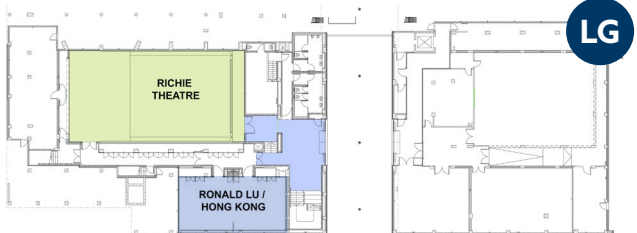
LEVEL ONE

Business Hub
Tyree Room
presentation sessions



LOWER GROUND FLOOR

Richie Theatre
presentation sessions
Ronald Lu / Hong Kong Rooms
presentation sessions



SOCIAL FUNCTIONS



Networking Drinks

Date: Tuesday 11 July 2017

Time: 5.45pm - 6.45pm

Location: Scientia Foyer



Early Career Hydrogeology Network (ECHN) Trivia Night

Tickets are \$20 – paid at registration – strictly limited spaces.

Date: Tuesday 11 July 2017

Time: 7.00pm - late

Location:

The Whitehouse (UNSW Campus)
4 High St, Kensington NSW 2033



Conference Dinner

Date: Wednesday 12 July 2017

Time: From approximately 6.00pm

Location: Coogee Rooftop Pavilion
169 Dolphin Street
Coogee NSW 2034

GETTING TO THE VENUE: Buses will depart from Gate 11 (map on page 5). This is a **one way only** service. Delegates will need to arrange own transport after dinner.

PLENARY SPEAKERS



**The Hon.
Luke Hartsuyker MP**
**Assistant Minister
to the Deputy Prime
Minister**



**Professor
Craig Simmons**
Director
National Centre
for Groundwater
Research and Training



Dr. Mark Cuthbert
**Research Fellow
& BGS Lecturer in
Environmental Geoscience**
School of Earth
& Ocean Sciences,
Cardiff University, UK



Mr. Chris McCombe
**Senior Adviser -
Environment**
Minerals Council
of Australia



Mr. Saul Holt QC
Barrister
'8 Petrie Terrace'
Chambers



Dr. Catherine Moore
**Senior
Groundwater Modeller**
GNS Science, NZ

DAY 1: Tuesday, 11 July 2017

7:30 **Registrations Open**

8:15 **Conference Opening / Housekeeping** Dr Martin Andersen, Senior Lecturer, UNSW

8:20 **Welcome to Country** Uncle Peter McKenzie, La Perouse Local Aboriginal Land Council

8:30 **Welcome Address** The Hon Luke Hartsuyker MP, Assistant Minister to the Deputy Prime Minister

8:45 Opening Plenary Grand Challenges for Groundwater. Prof Craig Simmons, Director, NCGRT

9:30 Panel Discussion: The Australasian Groundwater Stocktake

Chair: Peter Hyde (MDBA). Panellists: Narelle Neumann (Geoscience Australia), Neil Power (DEWNR SA), Chris McAuley (Past-President, IAH Australia), Stewart Cameron (GNS NZ), Peter Sinclair (Pacific Community)

10:30 Morning Tea Networking Sponsored by Novorem

	Leighton Hall	Tyree Room	Richie Theatre
	Investigations	Management	MAR/Stormwater Management
11:00	Keynote: Exploring for the future: new approaches to groundwater system mapping and characterisation. Narelle Neumann, GA.	Keynote: Implementation of the Murray-Darling Basin Plan: adaptive management and Plan amendments MDBA. Kristanne Mahony, MDBA.	Keynote: Utilising a fractured aquifer for storm water management at the Ernest Henry Underground Mine. Anna Greve, Glencore.
11:12	Statewide space-time water table mapping: Victoria's water table over 30 years. Tim Peterson, University of Melbourne.	Reporting groundwater use under the Murray-Darling Basin Plan. Tariq Rana, MDBA.	Implementing a successful managed aquifer recharge system. Russell Martin, Aqueon.
11:24	SMART aquifer characterisation. Stewart Cameron, GNS Science.	Australian aquifer boundary alignment with National Aquifer Framework. Liam Murphy, BOM.	Factors affecting managed aquifer recharge scheme costs. Sunail Hasnain, ANU.
11:36	Groundwater resource analysis using the information contained in sub-diel hydraulic head variation. Ian Acworth, UNSW.	Accounting for and managing the impacts of plantation fortanuests on regional groundwater resources. Darryl Harvey, DEWNR SA.	Feasibility of MAR and CWU for irrigation in the Pilbara. Greg Hoxley, Jacobs.
11:48	Novel methods in groundwater assessment and monitoring through an efficient integration of remote sensing (RS) techniques. Olga Barron, CSIRO.	Fisherman's Bend: Regional-scale groundwater assessment and regulatory considerations. Anne Northway, EPA Vic.	Fortescue Metals Group's Papa Waringka: dewatering and managed aquifer recharge scheme. Andrew Jackson, FMGL.
12:00	Hydrogeology of West Ambae, Vanuatu as inferred by geo-electrical resistivity survey. Peter Sinclair, Pacific Community.	A comparison of French and Australian policies for sustainable groundwater management. Steve Barnett, DEWNR SA.	Bayesian framework for benefit-cost analysis of clogging investigations at ASR sites. Peter Dillon.
12:12	National and consistent daily deep drainage data from the Australian Water Resources Assessment (AWRA) model. Andrew Frost, BOM.	Managing groundwater resources in the absence of numerical models. Saskia Noorduijn, Flinders University.	Fluoride and phosphate release from insitu carbonate-fluorapatite during trial managed aquifer recharge injection of recycled deionised wastewater. David Schafer, UWA.

12:30 Networking Luncheon

13:30 Plenary Groundwater & Climate Change in Drylands: From Hominin Evolution to Future Human Resilience.

Dr Mark Cuthbert, Research Fellow & BGS Lecturer in Environmental Geoscience, School of Earth & Ocean Sciences, Cardiff University, UK

DAY 1: Tuesday, 11 July 2017

14:00 Panel Discussion - Climate Change and Groundwater Resource Challenges

Panel sponsored by Goyder Institute. Panel to be opened by Michele Akeroyd.

Chair: Andy Baker (UNSW). Panellists: Jason Evans (UNSW), Olga Barron (CSIRO), Derek Eamus (UTS), Glen Walker (Grounded in Water)

14:57 Launch: Updated Atlas of Groundwater Dependent Ecosystems Bureau of Meteorology

15:00 Afternoon Tea Networking

	Leighton Hall	Tyree Room	Richie Theatre
	Water Quality	Climate Change	Surface Water - Groundwater
15:20	<p>Keynote: The presence of magmatic CO₂ in central Victorian basalt groundwater and its influence on hydrogeochemistry. John Webb, Latrobe University.</p>	<p>Keynote: Sustainable management of the Gascoyne River alluvial aquifer through a period of climate variability. Lazarus Leonhard, DoW WA.</p>	<p>Keynote: Addressing groundwater inflows to rivers during high flow events (the "old water paradox") using tritium. Ian Cartwright, Monash University.</p>
15:32	<p>Assessing aquifer effectiveness as a natural treatment barrier for recycled water. Michael Donn, CSIRO.</p>	<p>Improving our understanding of groundwater resources in the Albany groundwater area to meet the challenges of a drying climate. Sheryl Ryan, DoW WA.</p>	<p>Remapping and validation of gaining steams in the Surat Basin: an integral part of understanding impacts on environmental values. Jit Khor, OGIA QLD.</p>
15:44	<p>Are we over-analysing water when assessing project related impacts? Carolina Sardella, EMM Consulting.</p>	<p>Increased groundwater salinity resulting from pyrite oxidation exacerbated by climate change in an aquifer used for irrigation at Myalup, Western Australia. Adam Lillicrap, DoAF WA.</p>	<p>The mode of occurrence of small surface water bodies in the Pilbara Region, Western Australia. Shane Trott, Rio Tinto.</p>
15:56	<p>Use of control charts for groundwater quality monitoring and assessment: the Queensland (Australia) experience. John Broughton, NRA Environmental Consultants.</p>	<p>The role of agreed resource condition limits in communicating the implications of climate change for groundwater resources. Graham Green, DEWNR SA.</p>	<p>A simple Excel tool for quantifying groundwater-surface water exchange using temperature. Dylan Irvine, Flinders University.</p>
16:08	<p>Where do the methanogens live? New insights into the origin of methane in the Condamine River alluvial aquifer. Charlotte Iverach, UNSW.</p>	<p>A framework of simulation coupled optimisation model incorporating climate change and landscape dynamics for sustainable groundwater development. Ashok Keshari, Indian Institute of Technology.</p>	<p>The role of surface-groundwater interactions in salt delivery from a small upland salt scald in Central west NSW. David Mitchell, DPI NSW.</p>
16:20	<p>Interdisciplinary insights into the Lake Eyre Basin. Mark Keppel, DEWNR SA.</p>	<p>Quantifying recharge from ephemeral stream check dams in a hard rock area with sparse data. Peter Dillon.</p>	<p>Using stable isotope with hydrometric data to understand river-aquifer interactions in a semi-arid environment stressed by groundwater abstraction. Andrew McCallum, CWI.</p>
16:32	<p>A systems integration approach to estimating water quality: letting the water tell the story. Alexandra Badenhop, University of Canterbury / Lincoln University.</p>	<p>Groundwater organic matter: carbon source or sink? Helen Rutledge, UNSW.</p>	<p>Seasonality of groundwater discharge to streams: implications for water management in Australia. Erin Telfer, Geoscience Australia.</p>

16:45 Dedicated Poster Session

17:45 to Networking Drinks Welcome Reception @ Scientia

18:45 Sponsored by Symbio Laboratories

19:00 Early Career Researcher Trivia Night @ White House UNSW

DAY 2: Wednesday, 12 July 2017

8:00 Delegates arrive

8:25 Housekeeping

8:30 Plenary Groundwater and Energy: Perspectives from the Mining Industry
Mr Chris McCombe, Senior Adviser – Environment, Minerals Council of Australia

9.00 Panel Discussion – Energy Futures

Panel sponsored by Australian Centre for Sustainable Mining Practices. Panel to be opened by Wendy Timms.
Chair: Wendy Timms (UNSW). Panellists: Gabriel Rau (UNSW), Ryan Morris (Origin Energy), Chris McCombe (Minerals Council of Australia), Jim Underschultz (UQ)

10.00 Morning Tea Networking Sponsored by Aquanty

	Leighton Hall	Tyree Room	Richie Theatre	Ronald Lu / Hong Kong
	Modelling	Coal Seam Gas	Tracers/Isotopes	Coastal/Recharge
10:30	<p>Keynote: Empowering the flexibility and solution efficiency of an overland model and a groundwater model into a new integrated modelling tool. Fabien Cornaton, DHI WASY.</p>	<p>Keynote: Evaluating the deep groundwater attenuation potential for chemicals associated with coal seam gas extraction: a generic methodology. Dirk Mallants, CSIRO.</p>	<p>Keynote: Evolution of chemical and isotopic composition of inorganic carbon in the unsaturated and saturated zones of a semi-arid zone environment. Karina Meredith, ANSTO.</p>	<p>Keynote: Continental shelf-scale aquifer-ocean interactions: The impact of geological heterogeneity. Holly Michael, University of Delaware.</p>
10:42	<p>Worth of radon, electrical conductivity, and carbon-14 for the estimation of stream-aquifer exchange using a regional-scale groundwater model (Campaspe River). Daniel Partington, Flinders University.</p>	<p>A qualitative assessment of the potential impacts of coal seam gas development on water-dependent assets in the Richmond river basin. David Rassam, CSIRO.</p>	<p>The impact of wildfire on the geochemistry and hydrology the vadose zone. Katie Coleborn, UNSW.</p>	<p>Interdisciplinary research for sustainable groundwater management in conjunction with geodesy, geothermic and coastal oceanography. Makoto Taniguchi, Research Institute for Humanity and Nature.</p>
10:54	<p>Accounting for conceptual and parametric contributions to the total uncertainty of streamflow depletion predictions in Northern Australia. Chris Turnadge, CSIRO.</p>	<p>Multi-disciplinary GISERA research to inform risk assessment and management of water impacts of onshore gas development in New South Wales. Sreekanth Janardhanan CSIRO.</p>	<p>Integrated analysis to improve conceptualisation and characterisation of faults for use in regional groundwater models: hydrochemical and hydraulic analysis. Alexandra Wolhuter, University of QLD.</p>	<p>Modelling offshore fresh groundwater in the Perth Basin. Leanne Morgan, University of Canterbury.</p>
11:06	<p>Does resolution in surface water representation in groundwater models affect nitrate transport and removal in a coupled groundwater: surface water system? Trine Enemark, CSIRO.</p>	<p>How much water is CSG development actually producing compared with early predictions? Jim Underschultz, University of Qld.</p>	<p>A new diffusion method for heterogeneous drill cores using radioactive bromide or iodide. Mark Peterson, UNSW.</p>	<p>Estimating groundwater recharge to the lower Tertiary Aquifer near Barwon Downs. Louise Lennon, Jacobs.</p>

DAY 2: Wednesday, 12 July 2017

	Leighton Hall	Tyree Room	Richie Theatre	Ronald Lu / Hong Kong
	Modelling	Coal Seam Gas	Tracers/Isotopes	Coastal/Recharge
11:18	Does macroscopic dispersion exist in heterogeneous Darcy Flow? Daniel Lester, RMIT University.	Reinterpretation of wireline log data in the eastern Galilee Basin: stratigraphical and hydrogeological implications. James Hansen, DSITI QLD.	The CSIRO Noble Gas Facility: new technology and first applications in QLD, NT and WA. Axel Suckow, CSIRO.	Quantifying surface water – groundwater exchanges in the Campaspe Catchment (MDB) from geochemical tracers. Camille Bouchez, Flinders University.
11:30	A new way to model non local constituent transport in subsurface: rate of mass exchange between mobile and immobile zones depends on immobile-age. Kaveh Zamani, UNSW.	Proposed methodology to quantify methane in coal seam gas aquifers. Grazia Gargiulo, Symbiolabs.	Understanding recharge and mixing on floodplains in the Murray Basin. Ian Cartwright, Monash University.	The value of groundwater age in identifying temporal variability of recharge in the Pilbara region. James McCallum, Flinders University.
11:42	Effect of turbulent flow on heat transfer in a real fracture. Hamid Roshan, UNSW.	Injection of treated coal seam gas co-produced water into deep aquifers: predicting long-term groundwater quality impacts. Bhasker Rathi, CSIRO/UWA.	Ecohydrologic functioning of ephemeral streams. Shawan Dogramaci, Rio Tinto.	Estimates of site-scale groundwater recharge variability across a legacy low-level radioactive waste disposal facility in the Sydney Basin. Doug Anderson, UNSW.
11:54	A family of calibrated models. Roger Cranswick, DEWNR SA.	Characterisation of fluid migration in aquitards using helium concentrations in quartz. Dirk Mallants, CSIRO.	Environmental tracers and hydrogeophysical techniques to characterise sw-gw interactions in a heavily faulted sedimentary basin. Eddie Banks, Flinders University.	Spatial and temporal variation in recharge and its influence on scenario modelling Western Cape York Regional Groundwater flow model. Leon Leach, DSITI SA.
12:06	Is model calibration alone good enough? A case study of the Chowilla Floodplain modelling demonstrates the benefits of model post-audits. Chris Li, DEWNR.	Spatial and temporal scale influences on conceptual model development – examples from CSG water injection studies. Ryan Morris, Origin Energy. (presentation will be over two time slots)	Physical and chemical controls on apparent groundwater age discrepancies inferred from multiple environmental tracers. Stacey Underwood, UWA.	The Lamington and Main Range Volcanics in Qld and NSW: their significance as preferential recharge areas in the Clarence-Moreton Basin. Matthias Raiber, CSIRO.
12:18	Transferring regional calibrated groundwater model to local model for engineering design using MODFLOW USG. Xuyan Wang, Klohn.		Stable isotopes as indicators of dissolved methane sources and cycling in the Gippsland Basin, Victoria. Matthew Currell, RMIT University.	Estimating shallow groundwater take in the Shepparton Irrigation Region: technical approach. Tara Taylor, Jacobs.
12.30	Networking Luncheon			

DAY 2: Wednesday, 12 July 2017

	Leighton Hall	Tyree Room	Richie Theatre	Ronald Lu / Hong Kong
	Modelling	Water Quality and Contamination	Investigations	Management / Investigations
13:30	<p>Keynote: River basin-scale integrated surface-subsurface hydrologic modelling to support agricultural risk management. Steven Berg, Aquanty.</p>	<p>Keynote: Per- and poly- fluoroalkyl substances (PFAS) investigation. Vicki Pearce, Department of Defence.</p>	<p>Keynote: Using atmospheric and Earth tides as a natural tracer to hydraulically characterise groundwater systems. Gabriel Rau, UNSW.</p>	<p>Keynote: Speeding the transition to conjunctive water management in Australia. Andrew Ross, ANU.</p>
13:42	<p>Simulating complex surface water/ groundwater interactions during flood events with a fully-integrated physics based hydrologic model. Steven Berg, Aquanty.</p>	<p>Understanding emerging pollutants in a connected system. William Glamore, UNSW.</p>	<p>Accumulative evidence highlighting that the Narrabri and Gunnedah Formations are Mythical. Bryce Kelly, UNSW.</p>	<p>Understanding aquifer type transition in the Dumaresq River Alluvium, Queensland/ NSW Border Rivers. Dawit Berhane, DSITI QLD.</p>
13:54	<p>MIKE SHE modelling of an ephemeral catchment water balance. Hossein Daneshmandi, Monash University.</p>	<p>Simulation of PFAS transport in coastal sands aquifers at Williamtown, NSW. Cassie Turvey, Hydro Simulations.</p>	<p>GAB aquifer attribution process. Claire Kent, Klohn Crippen Berger.</p>	<p>Smart water science? Using the internet-of-things to collect hydrological data. Daniel Pierce, DEWNR SA.</p>
14:06	<p>Groundwater in catchment hydrology: getting the signposts right. Douglas Graham, DYI.</p>	<p>Assessing health risks for groundwater contaminated with Per and Polyfluoroalkyl Substances (PFAS): lessons learned. Therese Manning, EnRiskS.</p>	<p>Borehole magnetic resonance logging tools & hydrogeological study in the Illawarra Coal Measures and Hawkesbury Sandstone of the Sydney Basin. Thomas Neville, NMR Services.</p>	<p>Characterising groundwater development opportunities and constraints in northern Australia as part of the northern Australia Water Resource Assessment. Andrew Taylor, CSIRO.</p>
14:18	<p>Qualitative uncertainty analysis: why we need to slow our thinking about groundwater models. Luk Peeters, CSIRO.</p>	<p>Impact of PFAS chemicals on insitu microbial communities. Denis O'Carroll, UNSW.</p>	<p>Analysis of aquifer parameters in the Triassic Sydney Basin during the WestConnex hydrogeological investigations. Graham Hawkes, AECOM.</p>	<p>Groundwater tinder: a guide for water dating techniques. Nicola Fry, Emm Consulting.</p>
14:30	<p>The importance of being uncertain (for groundwater modellers). Kate Holland, CSIRO.</p>	<p>Predicting the potential recovery of petroleum fuels from impacted aquifers. Robert Lenhard, CSIRO.</p>	<p>Detecting groundwater flow using time series ground temperature measurements. Graeme Beardsmore, Hot Dry Rocks.</p>	<p>Groundwater investigations to support irrigated agriculture at La Grange, Western Australia. Adam Lillicrap, DoAF WA.</p>

DAY 2: Wednesday, 12 July 2017

	Leighton Hall	Tyree Room	Richie Theatre	Ronald Lu / Hong Kong
	Modelling	Water Quality and Contamination	Investigations	Management / Investigations
14:42	AlgoCompute: large-scale calibration and uncertainty analysis made easy in the cloud. Damian Merrick, HydroAlgorithms.	Microbial technologies for bioremediation and biogas production in subsurface environments Mike Manefield, UNSW.	Optimising of Greater Wellington Regional Council's groundwater monitoring networks using multi-correlational & Kriging based methods. Doug Mzila, GWRC.	Seasonal groundwater storage fluctuation in Sukhuma district of Southern Laos by field assessment and remote sensing. Sinxay Vongphachanh, UTS.
14:54	Cloud computing for groundwater model calibration and uncertainty analysis. Kevin Hayley, Groundwater Solutions.	Resurrect plan and balancing of groundwater resources in Iran. Abdollah Fazeli Farsani, Iran Water Resources Management.	Effects of intraborehole flow on purging and sampling long-screened or open wells. David Poulsen, Flinders University.	Managing groundwater for ecological response. Virginia Riches, DEWNR SA.
15:06	Bayesian uncertainty quantification in practical groundwater modelling with the aid of Gaussian process emulator. Tao Cui, CSIRO.	LNAPL dynamics in the subsurface: linking multi-phase and multi-component processes. Kaveh Sookhak Lari, CSIRO.	CT imaging and centrifugation to characterise dual porosity fluid flow and solute transport. Wendy Timms, UNSW.	Solute transport model of the Pike Floodplain, South Australia. Carl Purczel, DEWNR.
15:18	Using heat and rhodamine as groundwater tracers in a strongly heterogeneous aquifer: flow & transport insights using inversion modelling. Theo Sarris, IESR.	A numerical model incorporating nonlinear decay and sorption isotherms for simulating transport of contaminants emanating from instantaneous spill. Amarsinh Landage, Institute of Technology, India.	Groundwater dynamics in upland catchments of NSW. Tony Bernardi, NSW DPI.	How conductivity structure controls fluid missing in Heterogenous Darcy Flow. Daniel Lester, RMIT University.
15:30	Networking Afternoon Tea			
16:00	Interactive Panel Discussion Future Directions and Innovations in Groundwater Panel sponsored by Geoscience Australia. Panel to be opened by Narelle Neumann. Chair: Steven Cork (Ecolnsights). Panellists: Richard McLoughlin (Dept. Ag & Water Resources), Karen Villhohth (International Water Management Institute), Jane Coram (Geoscience Australia), Jonathan McKeown (AWA), Nicholas Schofield (Australian Water Partnership)			
17:45	Buses depart for Coogee Rooftop Pavilion			
18:00	Conference Dinner @ Coogee Rooftop Pavilion			

DAY 3: Thursday, 13 July 2017

8:00 Delegates arrive

8:25 Housekeeping

8:30 Plenary Groundwater and the Law. Mr Saul Holt QC, 8 Petrie Terrace Chambers

9:00 Panel Discussion - Social Licence to Operate

Chair: Cameron Holley (UNSW). Panellists: Jim McDonald, Justine Lacey (CSIRO), Saul Holt QC, John Williams (ANU/CSU)

10:00 Morning Tea Networking

	Leighton Hall	Tyree Room	Richie Theatre	Ronald Lu / Hong Kong
	Mining/Bioregional Assessments	Management	Social Management & Policy	Contamination
10:20	Keynote: Bioregional Assessments: using groundwater, surface water and ecological models to determine the impacts of coal resource development on water resources. David Post, CSIRO.	Keynote: GRIPP: promoting policies and practices for sustainable groundwater management. Karen Villholth, IWMI (South Africa).	Keynote: Design, integration and implementation of a regional groundwater monitoring network in the Surat Basin: key challenges and opportunities. Ben Cairns, OGIA.	Keynote: Waituna Lagoon nutrient loads: a surface water or groundwater issue? Alexandra Badenhop, University of Canterbury/ Lincoln University.
10:32	Lessons learned from modelling the changes in groundwater due to large coal mines and CSG in the Bioregional Assessments Programme. Russell Crosbie, CSIRO.	Reimagining River Murray SIS groundwater pumping to achieve ecological outcomes in SARFIIP. Craig Flavel, Australian Water Environments.	Making groundwater impacts from the CSG industry more transparent in Queensland. Ross Carruthers, DRNM QLD.	Groundwater quality assessment due to geomorphological impacts along north coastal districts of Bay of Bengal of AP, India. Krishna Kotra. The University of South Pacific.
10:44	New methods for modelling the impacts of CSG development activities in the Surat Cumulative Management Area. Daan Herckenrath, OGIA QLD.	Dynamics of lower-salinity lenses along the South Australian River Murray. Juliette Woods, Flinders University.	Addressing local concerns using regional context. Sean Cassidy, EMM Consulting.	Field experiences with nanoiron for contaminated land remediation. Denis O'Carroll, UNSW.
10:56	Permeability modelling in the Surat Basin using artificial neural networks. Gerhard Schoning, DNRM QLD.	Drought decision support tool. Louise Lennon, Jacobs.	Global food-water nexus requires regional humanitarian groundwater innovations. Okke Batelaan, Flinders University.	How bacteria will help the New Zealand dairy industry. Richard Cresswell, Eco Logical.
11:08	Use of geophysical log signatures to define regionally consistent lithostratigraphic boundaries for the Surat and southern Bowen basins. Linda Foster, DNRM QLD.	Can we manage groundwater? Statistical evaluation of the effectiveness of groundwater management for resource management and environmental protection during drought. Emma White, University of Melbourne.	A cultural and hydrogeological assessment of Hookina Springs. Lauren Houthuysen, DEWNR SA.	Strain DCMF: a novel bacterium for remediation of dichloromethane-contaminated groundwater. Sophie Holland, UNSW.

DAY 3: Thursday, 13 July 2017

11:20	Comparison of predictive uncertainty methods to quantify iron ore dewatering impacts. Vahid Shapoori, AGE.	Water resource effects of varying land use in southeastern Australia. P. Evan Drese, DEDJTR VIC.	The benefit of early planning and stakeholder engagement in groundwater monitoring. Carly Waterhouse, Klohn Crippen Berger.	FVPDM: a practical approach to assess groundwater and contaminant mass flux under variable hydraulic conditions. Alex Savaglia, Golder.
11:32	Using analytical models as the platform for managing large scale mine dewatering operations. Keith Brown, Rio Tinto.	Challenges in considering cumulative impacts: a Survey of Australian Groundwater Practitioners. Rebecca Nelson, University Melbourne.	Mekong Delta's groundwater resources: perception, practices and coping strategies of smallholder farmers in Khmer village. Van Kien Nguyen, AGU/ANU.	Microbial chloroform respiration - breathing life into toxic environments. Matthew Lee, UNSW.
11:44	A water balance model for the prediction of groundwater levels adjacent to Fortescue Marsh, Jinquan Wu. FMGL.	Cape York Peninsula stratigraphic and monitoring bore drilling: new insights into the hydrogeology of the GAB in the Carpentaria Basin. James Hansen DSITI, QLD.	Managing artesian concerns near managed aquifer recharge operations in Adelaide, South Australia. Craig Flavel, Australian Water Environments.	Analysing temporal variability in shallow groundwater quality in southwest Sydney: a multivariate statistical analysis approach. Sarah Taylor, DoEE.
11:56	Does specific storage change in time and how? Katarina David, UNSW.	Monitoring of river/estuary/aquifer system shows need for integrated management. Rebecca Morris, Otago Regional Council.	Fusing modelling and engagement practices to support assessment of conjunctive water use opportunities. Baihua Fu, ANU.	Genesis and occurrence of high fluoride groundwater in the Thar Desert, Pakistan. Tahir Rafique, PCSIR Laboratories Complex.
12:08	Modelling inter-aquifer leakage associated with compromised well integrity. Rebecca Doble, CSIRO.	A comparison of over-pumping control methods in Heihe river basin and North China Plain. Haijing Wang, Hydrosolutions.	Modelling the impacts of plantation forestry on groundwater: science and policy. Cameron Wood, DEWNR SA.	Use of electrokinetics for enhanced contaminant site remediation. Denis O'Carroll, UNSW.
12:20 Networking Luncheon				
	Leighton Hall	Tyres Room	Richie Theatre	Ronald Lu / Hong Kong
	Modelling/Data	Investigations	Social	Ecology
13:05	Keynote: Monitoring and modelling groundwater extractions over a data-sparse region of Australia. Neil McIntyre, University of Queensland.	Keynote: Groundwater salinity hotspot in the Mt Lofty Ranges (SA): connection to an intermittent stream and origin from land-clearing. Thomas Anderson, Flinders University.	Keynote: The groundwater commons game: social tipping points in global groundwater management. Juan Castilla, CSIRO.	Keynote: Updating Australia's Atlas of groundwater dependent ecosystems. Lacey Elsum, BOM.
13:17	3D Modelling of aquifers in South Australia. Steve Barnett, DEWNR SA.	Salinity forecast via groundwater age simulations. Giovanni Firmani, DHI.	Changing the debate: using facts not fear to discuss groundwater science. Liz Webb, EMM.	What happens to groundwater ecosystems when you take out the groundwater? Grant Hose, Macquarie University.
13:29	How groundwater models can evolve over decades: SA models of groundwater salinity and the River Murray. Kittiya Bushaway, DEWNR SA.	Estimating groundwater salinity (EC and Cl-) from direct-push EC logs: soil science vs oil and gas. Sarah Bourke, UWA.	Regulatory flexibility, illegal bores and the drilling industry: examining the practice and potential of NSW water bore drillers. Cameron Holley, UNSW.	Influences of agricultural practices on ecosystem services provided by groundwater microbes and stygofauna. Kathryn Korbel, Macquarie University.

DAY 3: Thursday, 13 July 2017

13:41	A technique for estimating optimal constant extraction rates for water levels to remain above pre-specified minimums in the model domain. Kiran Bajracharya, DSITI QLD.	Anisotropy in hydraulic conductivity of jointed rocks: analytical and numerical interpretation of field measurements. Mahdi Zoorabadi, SCT Operations.	Our knowledge of groundwater is imperfect. Regulatory and legislative structures are more effective when they acknowledge that. Simone Stewart, DEWNR SA.	A contemporary approach to groundwater system conceptualisation. Sanjeev Pandey, OGIA.
13:53	Towards data democracy in groundwater science. Peter Dahlhaus, Federation University.	Determining the effective hydraulic conductivity of a rock mass for modelling purposes. Stephen Parsons, Jacobs.	How hydrogeologists can contribute to effective stakeholder engagement in groundwater resource management. Daniel Pierce, DEWNR.	Groundwater drawdown: biogeochemical implications for streambed water quality. Martin Andersen, UNSW.
14:05	Statistical analysis and Interpolation of water level data at the Bureau of Meteorology. Brendan Dimech, BOM.	Reliability of spatial patterns of groundwater recharge. Yueqing Xie, Flinders University/ NCGRT.	Collective action in groundwater management in practice: lessons learnt from the Angas Bremer irrigation district in SA. Sarah Shalsi, University College London.	Impact of groundwater drawdown on stygofauna in the hyporheic zone. Martin Andersen, UNSW.
14:17	Accurate groundwater flow modelling closely linked to constrained 3D geology: a case study from Tunisia. Helen Gibson, Intrepid Geophysics.	Hydrogeological investigation and conceptual model development of the Esperance groundwater area, Western Australia. Aine Patterson, PSM.	Breaking the hydro-illogical cycle & applying socio-hydrogeology to GW management: the real-world example of Angas-Bremer irrigation district (SA) Carlos Miraldo Orden, UCL.	Biogeochemical trends within calccrete aquifers recharge processes: preliminary results based on historical data. Mattia Sacco, Curtin University.
14:29	Transient seepage in anisotropic plane by multiple conjugate boundary element method. Guoqing Li, Huazhong University of Science and Technology.	Groundwater abstraction, heat exchange and reinjection at the University of Auckland Newmarket Campus Innovation Centre. James Botting, BECA.	Assessment of Polar and Non-polar Material in the Groundwater of Raudhatain and Umm Al-Aish Fresh Groundwater Fields of Kuwait. Tariq Rashid, KISR	Compound specific isotope analysis: a new tool to assess groundwater ecosystem function. Alison Blyth. Curtin University.
14:41	Peering into groundwater models - a transparency wish-list. Pete Dupen, Water NSW.	Integrated hydrogeological characterization of a groundwater-fed lake and wetland, Manitoba, Canada. David Toop, Manitoba Sustainable Development.	Property rights in underground waters in South Australia. Hossein Esmaeili, Flinders Uni.	Adaptive management applied to assessment of potential impacts of CSG to GDEs distal to operations. Chris Jones, Arrow Energy.

14:53 Afternoon Tea Networking and Award Presentation
Sponsored by DEWNR and CSIRO

15:30 Plenary When a Simple Model is Better. Dr Catherine Moore, Senior Groundwater Modeller, GNS Science

16:00 Panel Discussion (Position Paper) - Modelling Outlook

Panel sponsored by ICE WarM. Panel to be opened by Trevor Pillar.

Chair: Hugh Middlemis (HydroGeoLogic). Panellists: Glen Walker, Luk Peeters (CSIRO), Catherine Moore (GNS), Phil Hayes (Jacobs), Stuart Richardson (CDM Smith), Peter Baker (Department of the Environment and Energy)

17:00 Conference Close

Poster Title	Presenter	Organisation
A comparative examination of microbial activity in the hyporheic zone and boreholes at Maules Creek, NSW.	Helen Rutledge	UNSW
A new approach method for groundwater quality management using background concentration.	Young-do Yea	Korea Environment Corporation
Age and nature of calcrete accumulations in fluvial sediments: implications for regional groundwater dynamics and landscape evolution.	Chris Harris-Pascal	Geoscience Australia
An aquifer becomes an aquitard: centrifuge measurement of desaturating sandstone from the constrained zone above an underground mine.	Wendy Timms	UNSW
Assessing suitability of groundwater for drinking purpose - a study of Ahmadabad city.	Hemixa Patel	Pandit Deendayal Petroleum University
Broken Hill emergency water supply borefield investigations and production optimisation, Menindee, NSW.	Nicholas Coulson	Golder Associates
Calcrete mapping and verification in the Murchison Palaeochannel system.	Lazarus Leonhard	Department of Water (WA)
Can land management intervention ameliorate the affect of geological impediments to groundwater flow in an upland NSW catchment?	Leah Moore	NSW Department of Primary Industries
Carbon source and sink investigations in a Late Quaternary-age coastal limestone aquifer using radiocarbon of dissolved inorganic and organic carbon.	Eliza Bryan	UNSW
Characterisation and transformation of organic carbon in a connected river: groundwater system: an example from the Murray Darling Basin.	Mohammadreza Keshavarzi	UNSW
Characterisation of terrestrial ecosystem reliance on groundwater.	Garry Straughton	Eco Logical Australia
Climate and groundwater recharge: the story from Australian caves.	Andy Baker	UNSW
Combining geoelectrical and hydrochemical methods for dominant groundwater process determination: a saltwater intrusion study of a coastal aquifer in NZ.	Eva Sutter	Victoria University of Wellington, New Zealand
Combining quantitative microbial risk assessment and groundwater modelling to investigate the risks of treated wastewater discharges to shellfish and bathers.	Steve McAleer	Hunter Water Corporation
Concepts for groundwater level and storage condition reporting on a state-wide scale.	Tony Cauchi	GHD
Conceptualising groundwater processes of Willochra Basin, SA.	Moji Karbasi	DEWNR (SA)
Current and historical water use estimation for the GAB, Queensland.	Claire Kent	Klohn Crippen Berger
Development of an updated Meteoric Water Line for Tehran, Iran.	Fatemeh Jafari	University of Newcastle
Drilling and bore construction leading to false arsenic and molybdenum positives.	Ilka Wallis	Flinders University
Economic, social and resource management factors influencing groundwater trade: findings from Victoria.	Bruce Gill	Agriculture Research Victoria
Emerging contaminants and the science-policy nexus: a PFAS case study from Williamstown, NSW.	Kyle Horner	NSW Environment Protection Authority
Factors affecting dissolved organic carbon in coastal groundwater systems	Liza McDonough	UNSW
Fecal indicator bacteria near the shoreline at freshwater beaches.	Denis O'Carroll	UNSW
Geochemical characteristics of arsenic contaminated groundwater in hydrothermal alteration zone.	Hyeon-Jin Kim	Korea Environment Corporation

Poster Title	Presenter	Organisation
Groundwater residence time in the Condamine River alluvial aquifer (SE-QLD).	Dioni Cendón	ANSTO
How much does improved aquitard characterisation matter when predicting groundwater impacts from unconventional gas extraction?	Chris Turnadge	CSIRO
Hydrogeochemistry applied to mineral exploration: a new initiative in northern Australia.	Ivan Schroder	Geoscience Australia
Impact of fire on hydrological and chemical signatures in Karst Vadose Zone Water, Wombeyan Caves, New South Wales, Australia.	Fang Bian	UNSW
Implementing an alternative to metering in the Shepparton Irrigation Region.	Karina Joy	Goulburn-Murray Water
Improved unsaturated zone conceptualisation for more robust modelling of groundwater recharge and evapotranspiration.	Simone Gelsinari	Monash University
Increased application of the Resource Condition Limit approach to managing groundwater extraction in South Australia.	Daniel Pierce	DEWNR (SA)
Measuring multi-directional 3D-flow fields using active heat pulse sensing in the streambed.	Eddie Banks	Flinders University
Modelling of groundwater flow and geomechanical stresses near rock bolts in an underground mine.	Hamed Lamei Ramandi	UNSW
More than just a 'tick the box' exercise: why geology is the key to hydrogeological and hydrochemical investigations.	Matthias Raiber	CSIRO Land and Water
Natural Sequence Farming: reconnecting the stream to its flood plain aquifer, what have we learnt so far?	Tony Bernardi	NSW Department of Primary Industries
Pesticide residues in groundwater from rice, cotton and vegetable growing areas and its impact on human health.	Tanu Jindal	Amity Institute of Env. Sciences
Qualitative and quantitative imaging analysis of fines induced permeability damage during water flow.	Furqan Hussain	UNSW
Quantifying impacts of groundwater pumping using a nonlinear transfer function time-series model in the southwest Victoria.	Xiang Cheng	Dept. Economic Dev., Jobs, Transport & Resources
Queensland aquifer framework: 2016 version.	James Hansen	Queensland Gov
Seasonal dynamics of residence times in a perennial, wastewater impacted stream.	Eddie Banks	Flinders University
Stable isotope composition of precipitation and groundwater in a wet-dry tropics karst area (East Sumba, Indonesia).	Penelope Godwin	Charles Darwin University
The groundwater commons game (Part II): unravelling the evolution and dynamics of compliance with groundwater conservation.	Juan Castilla	CSIRO
The nature and origin of groundwater salinity in the Muttama Catchment, NSW, Australia.	Farzina Akter	The University of Sydney
The role of dissolved organic matter and groundwater biogeophysical processes in the carbon budget.	Phetdala Oudone	UNSW
The use of airborne EM/3d modelling to reinterpret the Carbonate Aquifer, and its relationship to seawater intrusion/sustainable yield in Exmouth.	Mal McGivern	Water Corporation
Using packers to improve loading/barometric efficiency estimates in low permeability formations.	Wendy Timms	UNSW
Water & mining: the importance of good geological data.	Mark Armstrong	Dept. of Industry
Why do soil scientists and hydrogeologists so often have completely different groundwater recharge estimates? How to resolve the discrepancy.	Brenton Nichol	KBR

AGC17 EXHIBITORS



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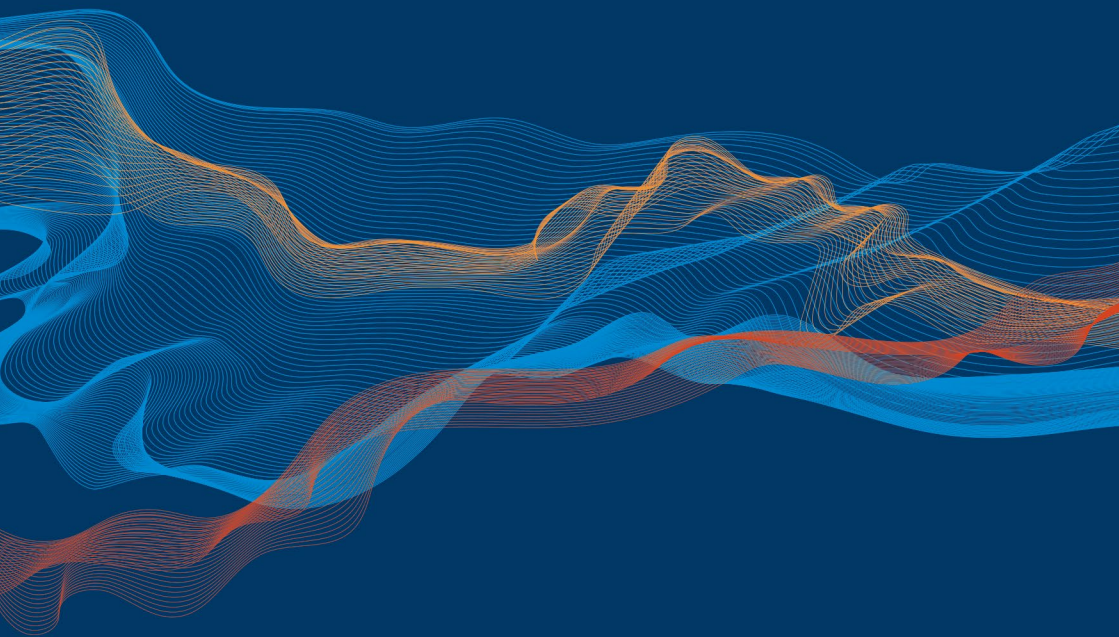
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