EGU2020-21027
https://doi.org/10.5194/egusphere-egu2020-21027
EGU General Assembly 2020
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

# Holocene 'megadroughts' in south-eastern Australia: deciphering regional patterns from lake sediment archives

**Jonathan Tyler**[1], Cameron Barr[2], John Tibby[2], Asika Dhar[1], Chapman Andrew[1], Chloe Dean[1], Patricia Gadd[3], Atun Zawadzki[3], David Child[3], and Geraldine Jacobsen[3]

[1]Department of Earth Sciences and Sprigg Geobiology Centre, University of Adelaide, Adelaide, Australia
[2]Department of Geography, Environment and Population and Sprigg Geobiology Centre, University of Adelaide, Adelaide, Australia
[3]Australian Nuclear Science and Technology Organisation (ANSTO), Lucas Heights, Australia

Documenting and understanding centennial scale hydroclimatic variability in Australia is significant both to global climate science and to regional efforts to predict and manage water resources. In particular, multidecadal to centennial periods of low rainfall – 'megadroughts' – have been observed in semi-arid climates worldwide, however they are poorly constrained in Australia. Here, we bring together multiple, sub-decadally resolved records of hydrological change inferred from lake sediments in western Victoria, Australia. Our analyses incorporate new elemental (ITRAX µXRF) and stable isotope (oxygen, carbon isotopes) geochemical data from West Basin and Lake Surprise, both augmented by high quality radiometric chronologies based on radiocarbon, $^{210}$Pb and $^{239/240}$Pu analyses. Collectively, the records document a transition towards a more arid and variable climate since the mid-late Holocene, which is comparable to reports of an intensification of the El Nino Southern Oscillation (ENSO) through this period. Furthermore, during the last 2000 years, the records exhibit marked periods of reduced effective moisture which contrast with records of Australian hydroclimate inferred from distal archives, as well those predicted by climate model hindcasts. Our analyses indicate that megadroughts are a natural phenomenon in south-eastern Australia, requiring greater attention in efforts to predict and mitigate future climatic change.