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Late Quaternary mega-lakes of central Australia: evidence of varying moisture sources

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Optically stimulated (OSL) and thermoluminescence (TL) ages from relict shorelines, along with accelerator mass spectrometer (AMS) 14C ages from freshwater molluscs reveal a record of mega-lake phases over the late Quaternary for Lake Mega-Frome, situated around the eastern and northern margin of the Flinders Ranges in South Australia. Additional lacustrine, palynological and terrestrial proxies are used to reconstruct a record that extends as far back as 95 ka and demonstrates that Mega-Frome was joined to the adjacent mega-Eyre at 50 – 47 ka forming the largest palaeolake on the Australian continent. Since then, Mega-Frome has filled independently at 33 – 31 ka (Heinrich event 3) and at the termination of the Last Glacial Maximum (LGM) to depths far in excess of those seen today. Further evidence of subsequent lake-filling episodes are recorded in the late Pleistocene, the mid Holocene and the medieval warm period. We present evidence for multiple moisture sources over this time period with lake phases being driven by either an enhanced southern ocean circulation or an enhanced Australian Summer Monsoon or a combination of both. This is the first palaeohydrological record for a large area of southern central semi-arid Australia indicating a progressive shift to more arid conditions throughout the last glacial cycle.