Ancient times of a wetter Australia as recorded by speleothems of the Flinders Range, South Australia

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Australia is known as the driest continent on Earth. However, much wetter conditions have prevailed in the past. In what is today such an arid continent, it is challenging to find archives that have recorded the palaeoclimatic conditions of the region. The Flinders Range in South Australia has a large number of rock shelters with fossil speleothems. The aim of this study is to (i) establish a chronology of when conditions were wet enough for speleothem growth (using U-Th dating) and (ii) assess changes in water availability during period of speleothem growth (using the initial $^{234}U/^{238}U$).

Our results show that intervals of conditions wetter than today have occurred repeatedly until 100-200 AD [1]. A semi-continuous and composite record of speleothem growth for the period 2-30 ka suggests that while water availability has varied, conditions were repeatedly wet enough to allow speleothem growth. Using the initial $^{234}U/^{238}U$, we show that between 20 and 4 ka conditions have been steadily increasingly wetter. In contrast, between 4 and 2 ka water availability has sharply decreased, before reaching present-day semi-arid conditions at 2 ka. While our approach deviates from classical speleothem studies, it provides a versatile way to derive palaeo-envrionmental information, as illustrated here for southern Australia.

[1] Gliganic, L., et al. (2014) The Holocene, 2014. **24**(1): p. 104-117.