Constraints on the Antarctic hydrological cycle during the Neogene

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The East Antarctic Ice Sheet (EAIS) is an important driver of global climate, playing a particular role in governing albedo and atmospheric circulation (eg. Singh *et al*, 2013). Recent evidence from marine sediment and terrestrial glaciovolcanic sequences suggests that the EAIS underwent periodic retreat and collapse in response to warmer climates during the late Neogene (14 to 3 million years ago).

Mummified prostrate trees recovered from palaeosols at Oliver Bluffs in the Beardmore Glacier region, Transantarctic Mountains (85° S), represent a rare insight into the terrestrial palaeoclimate during one of these periods of retreat. Prostrate trees are an understudied but useful tool for interrogating endmember (e.g. periglacial) environments at high altitudes and latitudes. We present data from a modern analogue study, in which we calibrate plant isotope models for use on both fossilised and modern prostrate trees.

We then present exciting new palaeoclimate data from the sequence at Oliver Bluffs. The MBT/CBT palaeothermometer gives a summer temperature of 3-6ºC, consistent with other palaeobotanical climate indices. $\delta^{18}O$ analysis of tree ring cellulose suggests that Antarctic summer palaeoprecipitation was enriched relative to today (-25 to -5‰ for ancient, -35 to -20‰ for modern); consistent with our state-of-the-art, isotope-enabled general circulation model simulations.

These geological and model data have wide-ranging implications for our understanding of the hydrological cycle during this time period, implying that atmospheric circulation and moisture delivery patterns were markedly different.