

## Exploring the controls on glacial-interglacial oceanic ( $^{234}\text{U}/^{238}\text{U}$ ) variation

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Investigation of the controls on glacial-interglacial oceanic ( $^{234}\text{U}/^{238}\text{U}$ ) variation is important for our understanding of continental weathering processes and also U-Th dating methods, which provide chronological control for Quaternary climate records from the marine realm. When dating marine carbonates, the initial ( $^{234}\text{U}/^{238}\text{U}$ ) of a sample is commonly used as a test of diagenetic alteration. The basis of this test is the long-standing assumption that seawater ( $^{234}\text{U}/^{238}\text{U}$ ) has remained mostly unchanged for the past 600,000 years. However, coral data suggest that seawater ( $^{234}\text{U}/^{238}\text{U}$ ) varied by  $\sim 7\%$  between the last glacial period and the Holocene. Open questions remain with regards to the controls on the oceanic  $^{234}\text{U}$  budget on glacial-interglacial timescales.

Using published speleothem records, we have explored the possibility that ( $^{234}\text{U}/^{238}\text{U}$ ) in vadose waters might exhibit changes that can explain glacial to interglacial shifts. Results so far are equivocal, but are biased to mid- and low-latitude regions. We suspect physical glacial erosion in higher latitude regions to play a dominant role and for this reason we have analysed glacial meltwater from a Greenland catchment. Early results do not indicate elevated ( $^{234}\text{U}/^{238}\text{U}$ ), but this may be because the water was sampled at the peak of the summer melt, potentially representative of ( $^{234}\text{U}/^{238}\text{U}$ ) in melting ice alone rather than the effects of release of  $^{234}\text{U}$  from glacial grinding early in the season. To capture the evolution of ( $^{234}\text{U}/^{238}\text{U}$ ) during glacial-interglacial cycles, we analysed ( $^{234}\text{U}/^{238}\text{U}$ ) at high temporal resolution using laser ablation in a speleothem from 51°N (Ogof Draenen, South Wales, UK). Growth appears to be restricted to interglacial periods only, but shows a shift in ( $^{234}\text{U}/^{238}\text{U}$ ) between interglacials. Future work will include analyses of riverine inputs at different times of the year and leaching experiments on glacial tills to help constrain models of oceanic  $^{234}\text{U}$ .