Testing the Milankovitch–climate connection with U-series chronology of carbonates

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The first U-series decay chain was published by Rutherford in 1903, with refinements by Fajans and Soddy leading to three recognisable decay chains by 1913. It took another 40 years before the first use of U-series isotopes to date natural minerals: work that Wally pioneered with his first ever papers, published in 1953, investigating ^{210}Pb dating. Ten years later, Wally was the first to publish U-Th ages for marine carbonates (Broecker 1963) and by 1968 he used this technique in a seminal paper establishing a clear role for the Milankovitch theory in driving climate change (Broecker 1968).

Since then, the use of U-Th dating of carbonates to assess the timing and hence the mechanisms of climate change has led to a huge range of discovery, and continued to shed light on the relationship between climate and orbital changes. Marine carbonates allow assessment of sea-level change, identifying differences in phasing and amplitude of change between glacial cycles. And dating of speleothems has enabled the timing of other aspects of the climate system – particularly those controlling regional precpitation – to be compared without reliance on “wiggle matching”.

This talk will recognise Wally’s huge contribution in developing U-series dating of carbonates, and illustrate the continuing utility of this approach with new results from across Asia (from Siberia to Iran to Laos) that provide further insight into the links between orbital cycles and climate change.

W.S. Broecker, W S. "A Preliminary Evaluation of Uranium Series Inequilibrium As a Tool for Absolute Age Measurement on Marine Carbonates." *Journal of Geophysical Research* 68 (1963).

W.S. Broecker, D L Thurber, J Goddard, T L Ku, R K Matthews, and K J Mesollela. "Milankovitch Hypothesis Supported by Precise Dating of Coral Reefs and Deep Sea Seiments." *Science* 159 (1968).