

## **Quantitative PalaeoEnvironments from SpeleoThems (QUEST): a new approach to Australasian hydroclimate reconstruction**

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Speleothems are rapidly gaining prominence as palaeoclimate archives due to their high resolution, ease of dating, and low potential for diagenetic alteration. While the Northern Hemisphere has seen a boost in speleothem-based climate studies in recent years, giving us detailed insights into past climate dynamics in Europe, Asia, and America, there is a disproportionate lack of data from the Southern Hemisphere. In recent years, Australasia's ecosystems and societies have proven highly vulnerable to regional climate change, and especially ENSO variability, with increased occurrence of heat waves, drought and floods. Rainfall projections are highly uncertain, creating stark challenges for adaptation and mitigation plans in the Australasian region. Well-dated quantitative high resolution climate reconstructions are the best means to evaluate natural climate variability in this region.

QUEST (Quantitative PalaeoEnvironments from SpeleoThems) is a new multidisciplinary project which brings together international expertise in isotope and trace-metal geochemistry, environmental magnetism, cave monitoring, cave modelling, and non-linear statistics to develop new techniques for quantitative climate reconstruction from speleothems. QUEST focuses on speleothems from Australasia (and particularly New Zealand), and aims to produce a high-resolution, quantitative reconstruction of hydroclimate and ENSO variability in this region over the last 10,000 years. Our initial focus for palaeoenvironmental reconstruction has been Waipuna Cave (Waitomo region), with detailed precipitation and drip-water measurements and studies of the pathways for magnetic particles to enter the cave carbonate system. Here we present an overview of the QUEST project along with preliminary results.