



Fossil corals and speleothems as markers of past sea levels: towards a consistent global repository

Fiona Hibbert (1), Eelco Rohling (1,2), Peter Chutcharavan (3), Andrea Dutton (3), Cheng Zhao (1), and Felicity Williams (1)

(1) University of Southampton, Ocean and Earth Sciences, Southampton, United Kingdom (f.hibbert@noc.soton.ac.uk), (2) Research School of Earth Sciences, The Australian National University, Canberra, Australia, (3) Department of Geological Sciences, University of Florida, Gainesville, Florida, USA

Coral benchmarks and speleothem records are valuable markers of past sea level. They are however, heterogeneous in both their geographic location and occurrence in time. Additionally, methodological (e.g. open system behaviour within $^{230}\text{Th}/^{238}\text{U}$ -series dating), local tectonic (i.e. site specific subsidence/uplift), and isostatic influences complicate their interpretation as markers of past sea level. In the fossil record, additional processes can affect corals (taphonomy, diagenesis etc.), which in tandem with a limited 2-D (section) or 1-D (drill-core) perspective may not capture the heterogeneous reef structure evident in most modern coral reefs. In addition, the relationship between the elevation of the fossil coral and former sea levels often remains insufficiently constrained. Nonetheless, they remain a preeminent method for reconstructing and evaluating former sea levels during the Late Quaternary.

Our compilation of U-series dated corals is unique as we use modern ecological depth habitat constraints to refine our reconstructions. To support the growing awareness within the palaeoclimate community of the importance of coral habitat, we provide both global and regional depth habitat ranges for each species in our reconstruction of past sea levels. As such we present an internally consistent global compilation of coral benchmarks (building on the compilations of Medina-Elizalde, 2012 and Dutton and Lambeck, 2012) containing >100 studies. We include a rigorous consideration of each error term associated with these records, such as: age, depth habitat, elevation measurement, and uplift correction. We apply commonly employed age screening methods ($\delta^{234}\text{U}$ initial and detrital ^{230}Th concentrations). This includes consideration of stratigraphic integrity, replication (and any concordant age determinations) and validation of assumptions (e.g. uplift rates), where possible. We also present a new compilation of speleothem sea level markers (both U-series and radiocarbon dated; 34 studies, 470 datapoints) This presentation will show both datasets as currently compiled (>3,000 datapoints), and initial evaluations on a site-specific basis.