Detecting biogenic diagenesis in tropical corals

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Tropical corals represent one of the most versatile archives recording environmental conditions during their formation. In addition, abandoned skeleton parts of living corals act as habitats harbouring a range of endolithic organisms spanning from prokaryotic microbes to eukaryotic multicellular organisms.

As corals constitute of the meta-stable mineral phase aragonite, they are prone to diagenesis involving dissolution and reprecipitation. During these processes original environment and climate information archived as geochemical proxies can be biased or even lost due to secondary modulations of isotope and trace element incorporation systematics. In addition to burial diagenesis also pre-burial, biological activity can significantly alter mineral properties inducing early diagenetic processes already starting during a coral's life span.

Here we present a combination of innovative and cutting edge approaches aiming to detect localities of biogenic diagenesis within coral skeletons and quantify the physico-chemical impact of metabolic activities on mineral stability and multi-proxy approaches, including U-Th dating and sea surface temperature (SST) reconstruction. The applied strategy involves a combination of Raman-Microscopy, scanning electron microscopy, Nano-SIMS mapping, micro-sensor measurements, and a novel analytical approach to discriminate individual carbonate phases from computed-tomography data sets.