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Influence of endolithic algae on coral carbonate chemistry

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Coral carbonates represent one of the most important geological archives for the reconstruction of sea surface temperatures. The reliability of these temperature records is largely dependent on the degree of experienced diagenesis. While the main impact of physico-chemical carbonate mineral alteration is ascribed to post-mortem processes and intensely studied, the geochemical impact of biological driven diagenesis during reef build-up still requires identification and quantification.
Here we show that endolithic organisms, as green algae, have the potential to induce considerable carbonate mineral alteration already during the coral's life span and shortly after its decay. Pore space widening and secondary carbonate mineral ingrowth into pore space voids is frequently correlated with the near-by presence of siphonal algae, indicating biological facilitation of this process.
After removal of organic components internal coral skeleton previously inhabited by algae showed systematically higher δ13C values than parts devoid of algae. To lesser extend a similar trend is observed for δ18O. In addition, areas inhabited by algae also differed in Sr/Ca molar ratios from the remaining skeleton. We present recent progress in the field of combined approaches applying Raman mineral and element mapping, micro computed tomography imaging of pore space heterogeneity, scanning electron microscopy of organic remnants in the coral skeleton pores pace, and epi-fluorescence microscopy constraining the boring mechanism of endolithic algae.