

# Nutrient and pH dynamics in the surface to mid-depth ocean

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**Funding:** in house  
**Start:** November 2017    **End:** October 2021

This project utilizes two types of material: cold water corals (*Demosphyllum dianthus*) and foraminifera. Their geochemistry is used to reconstruct seawater parameters such as nutrients (P/Ca, Ba/Ca in corals) and seawater pH (B isotopes in corals and foraminifera).

The goal of this study has been both on analytical development and on paleo-reconstructions. Micro-sampling techniques are applied on corals, and multi-specimen analyses on single species foraminifera. At GEOMAR the P/Ca laser ablation method was refined to improve both accuracy and precision, something that has been a challenge for a decade due to plasma related fractionation issues. This methodology is being applied to cold water corals from the Southern Ocean, the North Atlantic, and the Mediterranean. The boron purification and analytical facility was further optimised for ultra low B samples (< 5ng).

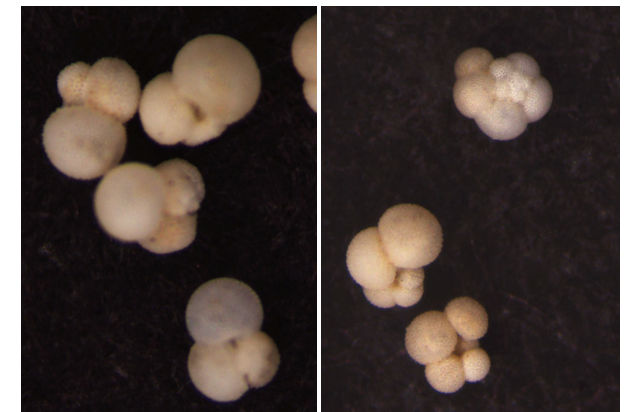
The main results of this project so far showcase the tight coupling between nutrient concentrations and seawater pH over the Quaternary, their relationship to coral proliferation, the importance of the biological pump in atmospheric CO<sub>2</sub> variations during glacial/interglacial transitions, and the (in)stability of the mid-depth Southern Ocean during glacial periods.



Laser view of a sectioned coral during analysis



Cold water coral *D. dianthus*



Planktonic foraminifera