

Sedimentation and biological export production in the glacial Southern Ocean

Contact persons

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Context

During ice age cycles of the Quaternary, carbon was transferred from the atmosphere into the ocean interior by marine biological production and released back into the atmosphere by ocean circulation. These changes in the marine carbon cycle modulated the timing and extent of changes in atmospheric CO₂ concentrations, as CO₂ acts as a greenhouse gas and affects global climate.

The Southern Ocean is believed to have been of particular importance because it is a region of both intense ocean – atmosphere exchange and marine biological productivity pumping carbon into the deep ocean. Two sediment cores from the Crozet Plateau in the Indian sector of the Southern Ocean are being investigated for their geochemical and sedimentological changes in the Laboratory for Biogeochemical Oceanography Across Time (BOAT) at UNIL.

Aims and Methods

In this project the student will sample one of these deep sea sediment core at the core repository of the University of Bordeaux. The marine sediment samples will then be investigated at UNIL on their general sedimentology including biogenic carbonate and opal as well as organic carbon content to assess changes in the strength of the biological carbon pump in the past, combined with analyses of uranium and thorium isotopes. Further analyses of sediment grain size will yield information about deep ocean circulation. With these comprehensive investigations the student will correlate past climate variability with Southern Ocean changes and get a detailed insight into geochemical methods in paleoceanography.

References

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- Pollard, R., Sanders, R., Lucas, M., Statham, P., 2007. **The Crozet Natural Iron Bloom and Export Experiment (CROZEX).** *Deep Sea Research Part II: Topical Studies in Oceanography* 54, 1905–1914.
- Marsh, R., Mills, R.A., Green, D.R.H., Salter, I., Taylor, S., 2007. **Controls on sediment geochemistry in the Crozet region.** *Deep Sea Research Part II: Topical Studies in Oceanography* 54, 2260–2274.



Fig. 1: Sediment core MD19-3575CQ from the western Crozet Plateau with visible changes in sedimentology.

Website

<https://wp.unil.ch/boat/>

Prerequisites

None. We can fit the scientific program and training to your individual knowledge and skills.