Understanding Modern Biogeochemical Cycles in the context of the international GEOTRACES project – Lead, cadmium, neodymium

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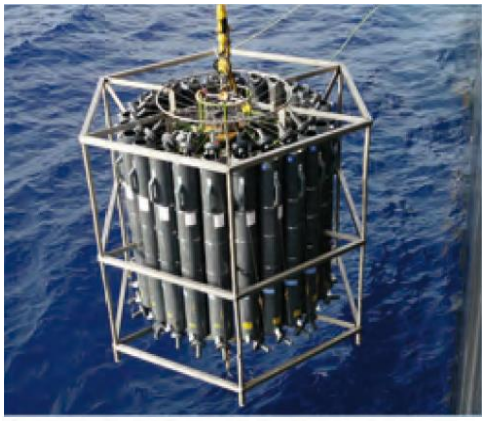
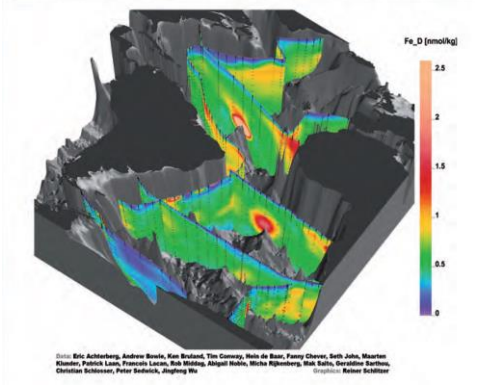
Background: One of the key targets in current environmental research is an advanced understanding of Earth's climate, in particular the complex feed-back mechanisms between climate, oceanic and atmospheric circulation patterns, and the carbon cycle. It is clear that the ocean can affect climate through its high heat capacity, its ability to distribute heat (ocean currents, sea ice), and its biogeochemical cycling (exchange of gases with the atmosphere, biological uptake and remineralisation). **Documenting and understanding modern biogeochemical cycles in the ocean is critical for evaluting threats put on the marine environment by anthropogenic climate change and for unravelling the ocean's role in past climate change.**





GEOTRACES equipment at sea and visualisation of Atlantic dissolved Fe data (https://www.egeotraces.org).

The project: This project will target **seawater, marine particulate, sediments and aerosol samples** collected from a range of GEOTRACES cruises in the global ocean. **GEOTRACES** (www.geotraces.org) is an international study of the global marine biogeochemical cycles of trace elements and their isotopes. Its mission is to identify processes and quantify fluxes that control the distributions of key trace elements and isotopes in the ocean, and to establish the sensitivity of these distributions to changing environmental conditions.

You will be **part of a large international project** and work on samples that will be characterized for other trace elements and isotopes in many laboratories around the world. The project is deliberately described in very broad terms. Dependent on your interest, specific targets can address a range of topics from tracing water masses and exchange with continental margins (Nd isotopes), to biological fractionation of trace metals (Cd isotopes), to **anthropogenic inputs to the ocean (Pb isotopes)**. The latter is a focus due to number of *upcoming expeditions in the Indian and Pacific Oceans*. Computer modelling can also be part of the project if desired.

The sample processing and analyses that form part of this project will be carried out in the **MAGIC Laboratories** at the Department of Earth Science and Engineering at Imperial College (https://www.imperial.ac.uk/earth-science/research/research-groups/magic/). The project may also include participation in a cruise to collect seawater samples.

The project is suitable for a student with a background in chemistry, geology or an equivalent qualification. Further information can be obtained directly from Tina van de Flierdt (tina.vandeflierdt@imperial.ac.uk), Yves Plancherel (y.plancherel@imperial.ac.uk) or Mark Rehkämper (markrehk@imperial.ac.uk. Don't hesitate to get in touch if you are interested.