

2024_24_ESE_MR: Understanding modern biogeochemical cycles in the context of the international GEOTRACES project – Lead, zinc, cadmium and neodymium isotopes

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One of the key targets in current environmental research is an advanced understanding of Earth's climate, in particular the complex feedback mechanisms between climate, oceanic and atmospheric circulation patterns, and the carbon cycle. It is clear that the oceans affect climate through their high heat capacity, the ability to distribute heat (through ocean currents, sea ice), and biogeochemical cycling (exchange of gases with the atmosphere, biological uptake and remineralisation). Documenting and understanding modern biogeochemical cycles in the ocean is therefore critical for unravelling the ocean's role in past climate change and understanding potential threats to the marine environment by anthropogenic global warming.

The project will target seawater, marine particulate and aerosol samples from various GEOTRACES cruises in the Atlantic, Southern and Pacific 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.

By joining this project, you will be part of a large international project and work on samples that will be characterized for other trace elements & isotopes in laboratories around the world. The project is deliberately described in broad terms. Depending on your interest, the PhD research can address topics such as tracing water masses (Nd isotopes), anthropogenic inputs to the ocean (Pb isotopes) and biological cycling of trace metals (Zn and Cd isotopes).

The sample processing and analyses that form part of this project will be carried out in the clean room and mass spectrometry facilities of the MAGIC Laboratories at the Department of Earth Science & Engineering, Imperial College London (<http://www.imperial.ac.uk/earth-science/research/research-groups/magic/>). The project may also include participation in a research cruise to collect samples.

The project is suitable for a student with a background in marine sciences, earth sciences/geology, chemistry or an equivalent qualification. Further information on the research can be obtained from Mark Rehkämper (markrehk@imperial.ac.uk). Don't hesitate to get in touch if you are interested.

For more information on how to apply to us please visit: <https://www.imperial.ac.uk/grantham/education>