

CALL FOR APPLICATIONS

Expedition 399: Building Blocks of Life, Atlantis Massif

7 April to 7 June 2023

DEADLINE to apply: 1 February 2022

The European Consortium for Ocean Research Drilling (ECORD) offers you the unique opportunity to sail on Expedition 398 on-board the JOIDES Resolution in the framework of the International Ocean Discovery Program (IODP), an international research program for drilling at sea.

The Atlantis Massif (AM) Oceanic Core Complex (30N, Mid-Atlantic Ridge) is one of the earliest sites recognized for the extensive exposure of ultramafic and mafic rocks at the seafloor caused by an oceanic detachment fault, and has been the focus of four IODP Expeditions (304, 305, 340T, and 357). The Lost City Hydrothermal Field (LCHF) is hosted in peridotite on its southern wall and vents alkaline fluids rich in H₂ as a by-product of serpentinization. The AM is therefore an ideal natural laboratory for studying tectonics, magmatism, and the interaction between the ocean and lithosphere, as well as their combined influence on ocean chemistry and the subseafloor biosphere.

Expedition 399 has three main scientific objectives:

1. Characterizing the life-cycle of an oceanic core complex including links among igneous, metamorphic, structural, and fluid flow processes.
2. Accessing the chemical kitchen preceding the appearance of life on Earth, including the formation of organic molecules of prebiotic interest at high and low temperatures.
3. Identifying the extent of the deep biosphere and limits for life, including how they are influenced by lithological substrate, porosity and permeability, temperature, fluid chemistry, and reactive gradients

A principle aim of the expedition is to sample fluids and rocks in a stable regime where active serpentinization may be occurring, creating the conditions where the building blocks for life (H₂, CH₄, and more complex organic compounds form abiotically. IODP Hole U1309D, located 5 km north of the LCHF, is the deepest (1415 m) hole drilled so far in young (<2 Ma) ocean crust, and recovered a primitive series of gabbroic rocks interpreted in part to be metasomatised peridotite. Expedition 399 will sample fluids in the existing Hole U1309D using newly developed temperature-sensitive sampling tools. It will also deepen Hole U1309D to ~2060 mbsf, where temperatures up to 220°C are predicted, and leave it available for future logging and fluid sampling once thermal equilibrium has returned. The proportion of ultramafic rocks is expected to increase with depth, and at these temperatures serpentinization and hydrogen generation by redox reactions should be actively occurring. Volatiles and organic molecules will be sampled in fluid inclusions to identify the physicochemical conditions that lead to their formation.

A second shallow (~200 mbsf) hole will be cored close to the LCHF to obtain a complete section through a detachment fault zone in serpentinized peridotite, extending the findings of Expedition 357. It targets zones of higher porosity that may facilitate geochemical and microbial processes. A re-entry system will be installed to allow for future deeper drilling, logging, fluid sampling, and a borehole observatory. The thermal structure of this Hole will place important constraints on the Lost City circulation system, and there is a possibility of intersecting Lost City fluids pathways

For more information on the expedition science objectives and the JOIDES Resolution expedition schedule, see <http://iodp.tamu.edu/scienceops/>. This site includes links to individual expedition web pages with the original IODP proposals and expedition planning information.

WHO SHOULD APPLY: We encourage applications from all qualified scientists. The JOIDES Resolution Science Operator (JRSO) is committed to a policy of broad participation and inclusion, and to providing a safe, productive, and welcoming environment for all program participants. Opportunities exist for researchers (including graduate students) in all shipboard specialties, including petrologists, structural geologists, geochemists interested in igneous processes, fluid-rock interaction, gases and organic geochemistry, microbiologists, physical properties specialists, paleomagnetists, and borehole geophysicists. Good working knowledge of the English language is required.

The Application Process is open to scientists in all ECORD member countries. Please download the Apply to Sail general application forms from the ESSAC webpage:

<http://www.ecord.org/expeditions/apply-to-sail/>

Please, fill out all applicable fields and send it to the ESSAC office by email (essac@plymouth.ac.uk) with the following additional documents by the deadline of **1 February 2022***:

* be aware that the ESSAC Office will move to the National Institute of Oceanography and Applied Geophysics - OGS Trieste on January 2022. After this date please use the email address: essac@inogs.it

- A letter of interest outlining your specific expertise, previous involvement in DSDP/ ODP/ IODP expeditions, research interests, primary research goals of your proposed participation.
- CV and publication list.
- Early career researchers must additionally provide a letter of support from their host institution, including information on post-cruise science support.

All applications should state how you intend to achieve your proposed scientific objectives, with information on the funding scheme and support from your institution or national funding agencies. More information can be found under: <http://www.ecord.org/expeditions/apply-to-sail/>

In addition to the ESSAC application, all applicants must inform their national office or national delegate and send them a copy of their application documents. The national offices or national delegates can also provide information regarding travel support, post-cruise funding opportunities, etc.

See <http://www.ecord.org/about-ecord/about-us/> for a list of the national contact persons.

For further information or questions, please contact the ESSAC Office:

ECORD Science Support & Advisory Committee

Antony Morris (ESSAC Chair)

Hanno Kinkel (ESSAC Science Coordinator)

School of Geography, Earth and Environmental Sciences,
Plymouth University, UK

Drake Circus, Plymouth PL4 8AA, UK

e-mail: essac@plymouth.ac.uk

website: www.ecord.org

