Universität Bremen

Carl von Ossietzky Universität Oldenburg

Fact-Sheet

Ocean Floor

The Ocean Floor – Earth‘s Uncharted Interface

Applicant universities
University of Bremen (Managing University), University of Oldenburg

Participating institutions
Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI) in Bremerhaven; Constructor University in Bremen; Hanse-Wissenschaftskolleg Institute for Advanced Study (HWK) in Delmenhorst; Helmholtz Institute for Functional Marine Biodiversity (HIFMB) at the University of Oldenburg; Leibniz Centre for Tropical Marine Research (ZMT) in Bremen; Max Planck Institute for Marine Microbiology (MPI-MM) in Bremen

Research field
2026 – 2032 / 54.2 million euros

Funding period and total amount requested
2026 – 2032 / 54,2 Mio. Euro

Spokespersons
Prof. Dr. Heiko Pälike (MARUM – Center for Marine Environmental Sciences, University of Bremen); Prof. Dr. Helmut Hillebrand (Institute for Chemistry and Biology of the Marine Environment (ICBM) & HIFMB; University of Oldenburg); Prof. Dr. Gesine Mollenhauer (AWI, University of Bremen)

Number of principal investigators
The individual research topics in the Cluster will be led by 25 principal investigators, of whom 18 conduct research at the University of Bremen, six at the University of Oldenburg and one at Constructor University.

Number of participating researchers
The scientific team will also include ten internationally renowned leading researchers (EXC Key Collaborators) as well as other researchers from the applicant universities and participating institutions who will be involved in the management of individual projects. In total, around 160 scientists from all career levels and various disciplines, such as marine and geosciences, palaeoclimatology, palaeoceanography, micropalaeontology, marine (bio) geochemistry, geobiology, palaeoecology, petrology, hydrology, data science and statistics, will conduct research in the Cluster.

Background/Preliminary work

Since its founding in 2001, the MARUM – Center for Marine Environmental Sciences at the University of Bremen has established itself as an internationally renowned hub for marine research. The current Cluster "The Ocean Floor – Earth's Uncharted Interface" has been based at MARUM since 2019. The preceding Cluster "The Ocean in the Earth System" received funding from 2012 to 2018. For the upcoming second funding phase, a cross-location team is applying together with the University of Oldenburg, whose expertise in biodiversity research, biogeochemistry, modelling and microbiology will contribute to achieving the Cluster's objectives.

A key focus at MARUM is the development and refinement of technologies that are used in the deep sea. These include remotely operated and autonomous underwater robotic systems and mobile seafloor drill rigs. The infrastructure also includes one of the three core repositories worldwide for the international Ocean Drilling Programme as well as the PANGAEA research data library.

What it's all about

The scientists investigate the exchange processes on the ocean floor as an important and dynamic interface that fulfils far-reaching functions for the entire planet and climate system.

Scientific objectives to be addressed over the next seven years:

1. To understand the processes that transform the properties and fluxes of biogenic particles on their transit to the ocean floor, we are investigating how the chemical composition of organic matter and biological processes influence the biological carbon pump.
2. New insights into lateral transport will enable us to quantify fluxes of carbon and other elements to and from the ocean floor under current and past Earth system conditions.
3. Analyses of environmental conditions across spatial and temporal transformations will help to identify the ways in which biodiversity and biogeochemistry are coupled.
4. Comprehensive decoding of environmental and biodiversity signals from current and previous warm climate states will facilitate the development of warmer world scenarios.
5. A new SYNTHESIS HUB invites (inter)national researchers to work with the Cluster in order to implement the integration of data and modelling results required for exchange between science and policy makers.
6. The Cluster will exploit the full research potential of partner institutions and establish new structures to advance equal opportunities, inclusion and integration as well as the training and recruitment of outstanding researchers among the partners in the region.

At the scientific level, the Cluster is divided into three Research Units: RECEIVER, which studies water-column processes; REACTOR, which analyses processes on and beneath the ocean floor; RECORDER, which uses the ocean floor as a continuous record of record of environmental and climatic conditions from the Earth's past.

Research in the Cluster is based on sea-going expeditions, in-situ experiments and underwater technologies developed at MARUM, as well as chemical analysis methods and comprehensive modelling systems.

Transfer potential and significance for the region

In the upcoming second phase of the Cluster, the existing disciplinary strengths in the marine sciences in North-West Germany will be integrated to form a region of excellence with potential for major scientific breakthroughs. Findings from basic research are of vital importance for understanding and comprehending "warmer world" scenarios.

Transfer and scientific communication take place in a context of dialogue, and we develop participative formats for specific interaction groups. MARUM offers UNI school lab courses for school classes and curriculum projects such as "Climate – I'm changing", researchers exchange ideas at the "Ocean Floor Symposium", local politicians, associations and NGOs discuss at "MARUM in dialogue" events, and families can experiment at "Explore Science" events.

The marine technology team cooperates closely with regional and national industrial partners, particularly in the area of technology development.

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Cooperation partner
Royal Netherlands Institute for Sea Research Texel (Netherlands), University of Copenhagen (Denmark)

Press release, images and video material
uol.de/exzellenz/presse

Contact
Prof. Heiko Pälike, University of Bremen
phone: (0421) 218 65980
email: hpaelike@marum.de
website: www.marum.de

Prof. Dr. Helmut Hillebrand, HIFMB and University of Oldenburg phone: (04421) 944 102 or (0471) 4831 2542 email: helmut.hillebrand@uol.de
website: https://hifmb.de/de/; uol.de/icbm