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## BIOACID – Biological Impacts of Ocean Acidification - coordinated national research programme launched in Germany

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Uptake of anthropogenic CO<sub>2</sub> by the surface ocean has caused a measurable increase in ocean acidity over the past two decades. This process, termed ocean acidification, is bound to aggravate as CO<sub>2</sub> emissions continue. The magnitude of future changes in seawater chemistry can be predicted with reasonable certainty for a given CO<sub>2</sub> emission scenario. Much less is known, however, about the biological impacts of ocean acidification.

- What effects does ocean acidification have on marine organisms and ecosystems and how are they modulated by other environmental stressors?
- What are the underlying mechanisms of biological responses to ocean acidification and do organisms have the potential to adapt?
- What are the consequences for marine ecosystems and biogeochemical cycles and how do these feed back to the climate system?
- What are critical thresholds beyond which marine ecosystem function and services start to collapse?

These are the questions which BIOACID, a coordinated national project funded by the German Ministry for Education and Research (BMBF), will address.

Launched in September 2009, BIOACID combines the expertise of research groups from 14 marine science institutes, universities and SMEs<sup>2</sup>. Aiming towards a holistic understanding of the impacts of ocean change on marine biodiversity, ecosystem function and services and a systems-based assessment of the associated risks and possible tipping points, BIOACID will take an integrated approach combining the expertise of molecular biologists, physiologists and medical scientists, ecologists, biogeochemists, ecosystem and biogeochemical modelers, paleo-oceanographers, and economists. Research activities will focus on the North and Baltic Seas, as well as on regions with ecosystems considered most vulnerable to ocean acidification, such as the Polar Regions and the Tropics. BIOACID is funded with €8.9 Mio. for an initial three-years period.

The interaction between BIOACID scientists across disciplines and research topics will be strengthened through joint experiments,

collaborative use of equipment and measurement capacity, data sharing and coordinated data management. These activities will be complemented by training workshops on “Best Practices in Ocean Acidification Research and Data Reporting” (<http://www.epoca-project.eu/index.php/Home/Guide-to-OA-Research/>) and specialized courses in carbonate chemistry measurements and manipulations, microsensor approaches, isotope geochemistry and laser-ablation techniques, and physiological approaches to body fluid physicochemistry and acid-base regulation.

BIOACID activities will be closely coordinated with those in complementary programmes. This includes the UK Project on Ocean Acidification and the EU projects EPOCA (European Project on Ocean Acidification), CalMarO (Calcification by Marine Organisms), MESOAQUA (Network of leading MESOCOSM facilities to advance studies in AQUATIC ecosystems) and the German SOLAS project SOPRAN (Surface Ocean PROCESSES in the ANthropocene). Coordinated activities with other projects include joint field and lab-based CO<sub>2</sub> perturbation experiments and sea-going activities, compatible data management and archiving, joint training workshops and annual meetings.

<sup>2</sup>The BIOACID consortium: Alfred-Wegener-Institute for Polar and Marine Research, Bremerhaven - Christian-Albrechts-University, Kiel - Heinrich-Heine-University, Düsseldorf - Jacobs-University, Bremen – Leibniz Institute for Freshwater Ecology and Inland Fisheries, Berlin - Leibniz Institute for Baltic Sea Research, Warnemünde – Leibniz Institute of Marine Sciences IFM-GEOMAR, Kiel - Max-Planck-Institute for Marine Mikrobiology, Bremen - PreSens Precision Sensing GmbH, Regensburg - Ruhr-University Bochum – University of Bremen - University of Hamburg - University of Rostock - Westfälische Wilhelms University Münster

<http://bioacid.ifm-geomar.de>



▲ Figure 1 Participants at the BIOACID kick-off meeting in Kiel, Germany, 27-29 September 2009.