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BIOACID: Cooperation across disciplines brings important new insights Research network on ocean acidification BIOACID met in Warnemünde

08.10.2013/Warnemünde, Kiel. One year after the start of the second phase, the members of the German research network BIOACID (Biological Impacts of Ocean Acidification) informed each other about the current status of their work. Their preliminary results suggest important insights into the impacts of ocean acidification on marine life and their consequences both for society and economy. The meeting was held on October 1 and 2, 2013 at the Leibniz Institute for Baltic Sea Research, Warnemünde (IOW).

From microscopic plankton to species' interactions in the marine ecosystem and from elemental biogeochemical cycling to the consequences for economy and society: The German project BIOACID (Biological Impacts of Ocean Acidification) analyses the problem of ocean acidification in its entire spectrum. At their annual meeting at the Leibniz Institute for Baltic Sea Research Warnemünde (IOW), 110 researchers discussed the status of their work. "The level of oral and poster presentations is consistently high. Our international scientific advisory board was impressed", says Prof. Ulf Riebesell. The professor of Biological Oceanography at GEOMAR Helmholtz Centre for Ocean Research Kiel coordinates BIOACID. "The close cooperation between the various disciplines is especially positive. Biologists, chemists and physicists are working jointly with economists and sociologists. This is important to better understand the complex reactions of communities to ocean change and anticipate their consequences for us humans."

The most elaborate experiment since the beginning of the second phase took almost half a year: From January to June 2013, the KOSMOS mesocosms from Kiel were deployed in the Gullmarfjord at the west coast of Sweden. With this unique seagoing experimental system, the researchers investigated how the plankton community responds to ocean acidification and whether it is able to adapt to new environmental conditions in the long run. Numerous BIOACID partners from Sweden, Finland, the United Kingdom and the Netherlands took part in the study coordinated by GEOMAR. The host institute IOW dedicated its work to the effects on cyanobacteria in the Baltic Sea. These planktonic organisms seem to benefit from ocean acidification.

In permanently installed benthocosms, a research group investigates responses of bottom-dwelling communities of the Baltic and North Sea when exposed to future temperature and carbon dioxide levels. The platforms are located at GEOMAR in Kiel and at the Wadden Sea Station Sylt of the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI). The long-term experiments are designed to account for complex interactions between individual organisms. Because in nature, where the organisms' life cycles are closely interlinked, the effects of different environmental changes can enhance or mitigate each other.

At the same time, laboratory experiments are carried out with isolated organisms under controlled conditions to better understand the physiology of key species. The focus here ranges from the sea butterfly *Limacina helicina*, an important link in the food chain in the North Atlantic and the Arctic, to the blue mussel *Mytilus edulis* and the cold-water coral *Lophelia pertusa*.

Regions where the sea naturally contains very high concentrations of carbon dioxide serve as "windows to the future." "A study of coral reefs in the vicinity of carbon dioxide sources in Papua

New Guinea suggests that there are indeed both winners and losers of acidification. But biodiversity as a whole will decrease substantially," says consortium leader Dr. Dirk de Beer from the Max Planck Institute for Marine Microbiology in Bremen.

Several groups investigate effects of ocean acidification and warming on commercially important fish species such as cod, herring or tuna. "The early stages turn out to be most sensitive to acidification and increasing water temperatures," said Dr. Mark Felix from AWI who leads this research focus of BIOACID. Simultaneously, economists develop models that examine how fisheries management could compensate for declining populations. Specific surveys and interviews will show how local communities, fishermen and fishing companies are going to deal with effects of ocean acidification.

"Although we still have two years to go, it becomes obvious that BIOACID researchers will provide new important insights into the effects of ocean acidification," Riebesell summarizes. "Some results are already considered in the latest climate assessment report of the United Nations and are available for national decision-makers and the public in a varied and comprehensive form."

BIOACID in brief:

Under the umbrella of BIOACID (Biological Impacts of Ocean Acidification) 14 institutions examine how marine ecosystems react to ocean acidification, how this affects the food web and the exchange of material and energy in the ocean and how the changes influence the socio-economic sector. The project started in 2009 and entered its second three-year funding period in September 2012. The Federal Ministry of Education and Research (BMBF) supports the current work with 8.77 million Euros. The work is coordinated by GEOMAR Helmholtz Centre for Ocean Research Kiel. A list of member institutions, information on the scientific programme and the BIOACID committees as well as facts about ocean acidification can be found on the website www.bioacid.de.

Links:

www.bioacid.de BIOACID Homepage

www.facebook.com/BIOACID.project BIOACID on Facebook

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Images:

High resolution images can be downloaded at www.geomar.de/n1542.

Video footage is available on request.

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