

IOW press release, June 16, 2016

## IOW expedition studies eddies in the Baltic Sea to collect data for improving climate modelling

*On June 18, 2016, a research team under the lead of the Leibniz Institute for Baltic Sea Research Warnemünde (IOW) set out from Rostock port aboard the research vessel ELISABETH MANN BORGESE for a 9-day cruise into a sea area south of Bornholm island. The expedition focuses on the oceanographic analysis of eddy structures in the surface layer of the Baltic Sea and their impact on marine currents as well as on microorganisms. IOW's expedition contributes to the project "Clockwork Ocean" of the Helmholtz-Zentrum Geesthacht – Centre for Materials and Coastal Research (HZG), which for the first time employs a manned zeppelin that cooperates with research vessels for the study of marine eddies.*

Marine currents consist of a great number of eddies that vary in dimension from a few millimetres to several hundred kilometres. Even the smallest of them can influence huge ocean currents like the Gulf Stream along a causal chain and thereby can noticeably impact our climate. Details of the underlying mechanisms, however, are only poorly understood. The current expedition of the ELISABETH MANN BORGESE aims at contributing to our understanding of ocean eddies in general and their role as climate impact factors in particular. "The Baltic Sea is an ideal research area, because it is much easier to study these processes in great detail in an inland sea than under the harsh conditions of the open ocean," explains IOW physicist and chief scientist Lars Umlauf, who coordinates the expedition's international 12-person research team.

Together with HZG colleagues, the IOW team focuses on eddy structures in the sea's surface layer. There, the eddies are in constant contact with the atmosphere. This is why it is presumed that they have a significant influence on the thermal exchange between the atmosphere and the ocean and on how much of the greenhouse gas CO<sub>2</sub> the latter can absorb. Therefore, the researchers will analyse the structure of the water column in the top 30 to 40 metres very thoroughly by measuring standard parameters such as temperature and salinity as well as by employing specialized probes that register tiny turbulences in the size range of millimetres and centimetres. These probes are mounted on two ocean gliders, which cruise autonomously through the water like underwater sailplanes, and on a measuring platform that is attached to a mooring on the seafloor and ascends and descends through the water column at predefined intervals.

The collected data will be used for the development of models, which will allow for a better understanding of mixing processes in the water and processes between the atmosphere and the sea.

"For us, the expedition is a kick-off for our work within the collaborative research center 'Energy Transfers in Atmosphere and Ocean', which is funded by the German Research Association



(DFG) with 9 million Euros in total. It officially starts on July 1 and is intended to ultimately improve the predictive accuracy of our climate models,” says so Lars Umlauf.

Scientists from the Alfred-Wegener-Institute, Helmholtz Centre for Polar and Marine Research (AWI), who also participate in the current expedition of the ELISABETH MANN BORGESE, will take water samples to analyse by means of molecular biological methods, whether the eddies provide a suitable habitat for certain microorganisms.

IOW’s research cruise is integrated into the extensive measuring campaign “Clockwork Ocean”, which takes place simultaneously and is coordinated by the HZG. As a premiere in marine research, a manned zeppelin is used to constantly provide highly precise infra-red camera aerial photos of surface eddies to the scientists on board of the ELISABETH MANN BORGESE and several other, smaller research vessels. Therefore, smooth teamwork between the various working groups will be as crucial to the expedition’s success as the employed technology: “For us, HZG’s big ‘Clockwork Ocean’ initiative is very important. The zeppelin will help us to quickly identify and reach interesting eddy structures within the research area. In turn, the zeppelin’s infrared measurements, which only analyse the top millimetres of the water column, are very well supplemented by our measurements, which cover the whole depth of the surface layer. By pooling their resources, all participating institutions have gained a lot more than what they would have achieved on their own,” Lars Umlauf concludes.

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**Further information on the HZG project “Clockwork Ocean”:**

<http://www.uhrwerk-ozean.de/index.html.en>

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