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## Uncharted territory: 50th MERIAN expedition focuses on seafloor processes in winter

*The North and Baltic Sea face environmental changes resulting from climate change, increasing utilization pressure as well as changes in the catchment area. These changes and their effect on coastal ecosystems are the focus of the German research consortium Küstenerforschung Nordsee-Ostsee (KüNO) that aims at providing knowledge and data for a sustainable coastal management. One KüNO research field is the analysis of processes in the sediment water transition zone, which have a major influence on marine matter cycles, especially on releasing nutrients and pollutants. On January 6, 2016, the MARIA S. MERIAN embarked on her 50th expedition to study these processes in winter for the first time.*

12 of the 16 scientific participants are researchers from the Leibniz Institute for Baltic Sea Research Warnemünde (IOW); another 4 come from the Helmholtz-Zentrum Geesthacht – Centre for Materials and Coastal Research. The research cruise, which started in the port of Bremerhaven and ends in Rostock Port on January 29, 2016, is headed by chief scientist and IOW director Prof. Dr. Ulrich Bathmann. “For almost three years we have been intensively researching the seafloor of the North and Baltic Sea, its different habitats and their respective ecosystem services within the KüNO programme. What happens down there in winter, however, is largely unknown,” the institute director explains the research focus of the MERIAN expedition. Yet, adequate modelling of the processes in the sediment water transition zone, which is especially active with regards to marine matter cycles, requires a complete set of seasonal data, Bathmann continues. “Winter is not the easiest season to embark on a research cruise, but our scientists are well prepared in every respect,” he adds.

The expedition’s scientific program includes an extensive sampling campaign at 30 stations in the North and Baltic Sea as well as in the Skagerrak / Kattegat strait that connects the two seas. Seafloor samples will be analysed with regards to sediment properties as well as to the presence and activity of zoobenthos populations during winter conditions as bioturbation plays a crucial role in sediment mixing and matter exchange between water and seabed. This concerns important ecological factors such as oxygen, hydrogen sulfide, or nitrous oxide, as well as organic and inorganic particulate matter sedimenting from the water column. Furthermore, sediment cores will be examined for their content of heavy metals, microplastic particles and organic pollutants; experiments directly on board will be conducted to determine, whether microbial activity contributes to the bioavailability of these harmful substances also under winter conditions. Physical effects on sediment resuspension by small-scale turbulences as a crucial component of sediment transport processes that enable the release of nutrients and other substances into the water column are monitored with vessel-mounted current profilers and a shear-microstructure profiler. Specialized sea bottom landers will be deployed for the in-situ analysis of near-bottom turbulence and suspended particulate matter.

The investigations in the boundary layer of water to sediment will be complemented with the classical repertoire of oceanographic analyses of the upper water column at all cruise stations to study the effect of the winter conditions on the deep water environments.

“The ultimate objective of the KüNO research on sediments in the North and Baltic Sea is to develop an atlas for the coastal region that provides a functional assessment of the different sediment provinces and habitats in terms of their ecological service for the coastal ecosystems as a basis for a sustainable management that protects especially important areas,” Ulrich Bathmann explains. “We believe that our winter expedition, which is the last practical step of this phase in our sediment research, will provide significant progress in the understanding of matter cycle processes at the seafloor. Our findings therefore will be a valuable input for the KüNO sediment/habitat atlas,” the chief scientist concludes on the scientific programme of the current MERIAN cruise.

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**Further information on the research consortium “Küstenforschung Nordsee-Ostsee” (KüNO)** with the projects “SECOS” and “NOAH” for characterizing sediments and habitats in the North and Baltic Sea: [www.deutsche-kuestenforschung.de/home.html](http://www.deutsche-kuestenforschung.de/home.html)

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