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Methane in coastal seas' sediments: Are they an additional peril for global climate or in a stable equilibrium

Research Vessel Maria S. Merian is launching for a research cruise dedicated to potential sources of methane in the Baltic Sea from July 31 to August 22, 2010.

An international group of marine chemists, microbiologists and geologists coordinated by the marine chemist Gregor Rehder from the Leibniz Institute of Baltic Sea Research in Warnemünde will put to sea on board of r/v Maria S. Merian on July 31, 2010. The cruise will focus on methane deposits in sediments of the Baltic Sea.

Methane is a dangerous greenhouse gas and, considering a period of 100 years, it is 23-times more effective than carbon dioxide. Thus, scientists all over the world are searching for current and potential sources of methane. The Merian expedition MSM 16/1 will concentrate on methane emissions from Baltic Sea sediments. Beside the detection of current methane emissions into water and atmosphere, the main issue on the agenda is to investigate potential changes within the methane deposits due to an increase in water temperature and ongoing eutrophication.

The seafloor of the Baltic Sea is an ideal place for methane production. There is a continuous snow of organic matter reaching the floor where its decomposition causes oxygen consumption. In the layered water body of the Baltic Sea, this leads nearly permanently to oxygen deficiency in the bottom water and constant anoxia within the sediments (anaerobic conditions). These are most favourable conditions for methane producing bacteria. Major parts of their methane production will be stored and accumulated in the sediments. Other bacterial communities, which are specialised in using methane for generating energy, provide a barrier which keeps the methane effectively scavenged in the sediments: On a global scale it is estimated that less than 10 % of the methane produced in the sediments is released from the seafloor.

This bacterially directed interaction between methane production and methane oxidation – well known from anaerobic sediments all over the world – can be studied in the Baltic Sea in an ideal way. The hypothesis: if global warming causes



changes in the bacterial interaction leading to an increased release of methane from the seafloor into the water and the atmosphere, a feedback reinforcing the greenhouse effect might be expected.

In the Baltic Sea, numerous methane deposits are already known due to earlier studies. The investigations during the Merian cruise will focus on these regions. By means of a multibeam echosounder detecting gas bubbles within the water column, of various acoustic systems which virtually can look into the sediments and with innovative sensors analysing the methane concentration in the water, key areas within the Arkona, Bornholm, Gothland and Bothnian Basins will be analysed in detail. In parallel, gravity corer and a variety of other coring devices will be deployed, for the purpose of sediment sampling in these regions.

The Merian cruise is part of the international research project Baltic Gas, which is jointly funded by BONUS – the Baltic Organisations Network for Funding Sciences EEIG. It is co-ordinated by the Danish microbiologist Bo Barker Joergensen, Center for Geomicrobiology at the University of Aarhus.

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