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Anaerobic oxidation of methane and its impact on metal cycling in European continental shelf settings.

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The process of AOM in continental shelf settings has been addressed only in a small number of studies. To investigate the role of AOM as a gas sink in such settings and to gain insight into the micro-organisms mediating this process in low-methane flux environments, we conducted geochemical studies on sediments from sites within the South Eastern Kattegat and the Baltic Sea. In each case we determined pore water concentrations of methane, sulphate and sulphide, rates of AOM and sulphate reduction (SR) and the distributions of various lipid biomarkers. We also set out to evaluate the effect of AOM on the surrounding sediment, in particular its effect on the cycling of redox-sensitive metals such as iron and manganese by measuring solid-phase metal concentrations and investigating the mineralogy using X-ray diffraction and scanning electron microscopy. Geochemical data strongly suggest that microbial communities similar to those that mediate AOM in cold seeps exist at the sulphate-methane transition zone of these low-methane flux settings. Furthermore, lower abundances of lipid biomarkers at the low methane settings – up to more than one order of magnitude lower – are indicative of smaller/less active communities mediating AOM.