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Changes of biogeochemical activities before and after significant mud displacement at the Håkon Mosby Mud Volcano (HMMV)

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The Håkon Mosby Mud Volcano (72°N, 14° 43' E, 1250 m water depth) was studied for a period of a year by the Long-term Observatory On Mud-volcano Eruptions (LOOME) in 2009-2010, to investigate temporal variations of mud volcanism and consequences for biogeochemical processes. The HMMV is a highly active methane cold seep ecosystem characterized by high rates of methane efflux. It hosts different chemosynthetic communities such as thiotrophic bacterial mats and siboglinid tubeworm assemblages. This study focuses on changes in community composition and biogeochemical activity such as methane emission, total benthic oxygen uptake, microbial methane and sulfate consumption before and after a major mud displacement recorded by LOOME. The sensor-enabled long-term observations of the HMMV habitats were combined with short-term analyses before and after the displacement events by ROVs QUEST (MARUM) and GENESIS (University of Gent), the AUV Sentry (WHOI) equipped with a multibeam and subbottom profiler, CTD and photographic unit as well as with a mass spectrometer. We found shifts in the distribution patterns of chemosynthetic communities and also substantial changes in their activity, consistent with changes in temperature gradients. This study was sponsored by the EU-Projects HERMIONE "Hotspot Ecosystem Research and Man's Impact on European Seas", and ESONET "European Seas Observatory Network" (Demonstration Mission LOOME "Long term observations on mud volcano eruptions").