



Microbial turnover of sulfide in combination with iron precipitation at the HMosby Mud Volcano

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The Anaerobic Oxidation of Methane (AOM) coupled to Sulfate Reduction (SR) is one of the key biogeochemical processes at the Håkon Mosby Mud Volcano (HMMV), which was investigated during a cruise (RV L'Atalante, ROV VICTOR6000; chief scientist Michael Klages; AWI) of the EU 6th FP HERMES in September 2005. The HMMV is an active cold seep located in the Barents Sea on the continental slope northwest of Norway at about 1250 m water depth. It can be subdivided in 3 concentric habitats: The centre consists of freshly expelled mud where methane is oxidised aerobically at the sediment surface. The outer rim of the volcano is densely colonised by methane-depending, chemosynthetic tube worms (*Pogonophora*). These two habitats are separated by a ca. 100 m wide belt of blackish, highly reduced sediments, which are covered by bacterial mats. Our investigations focused on this sulfidic habitat. The bacterial mats can visually be divided in white and grey mats of which the white mats cover most of the habitat. Previous studies showed that the white mats are dominated by the giant sulfide-oxidizing bacteria (*Beggiatoa*) whereas a higher diversity of thiotrophic bacteria including *Beggiatoa*, *Thioploca* and *Thiomargarita* was encountered in the grey mats (deBeer, unpub.). During video surveys with the ROV Victor 6000, patches consisting of both white and grey mats were observed.

The main process fuelling the grey-white mat-habitat is AOM coupled to SR producing an equivalent amount of sulfide. This may precipitate with iron or be scavenged by the thiotrophic bacteria and removed from the system. The bacterial metabolism is fuelled by the oxidation of sulfide with oxygen or nitrate as the terminal electron ac-

ceptor. Insights in the microscale processes of the different mat types were gained by microsensor measurements of pH, H₂S and O₂. First results show differences between the mats in the penetrations depth of oxygen and sulfide. Additionally the role of nitrate as the terminal electron acceptor was determined by nitrate uptake measurements in combination with microsensor measurements of O₂, H₂S and pH. Furthermore, the ratio of iron-sulfide precipitation relative to the sulfide uptake by thiotrophs was evaluated. Analyses of sulfur and iron species show the role of iron-oxy-hydroxides and sulfur binding iron in the precipitation and oxidation of sulfide. Our investigations give further insights into the co-occurrence of abiotic and biologically mediated sulfide oxidation processes in hotspot ecosystems of continental margins.