



Budget on spatial distribution of biological communities affecting the CH₄ cycle at Håkon Mosby Mud Volcano

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In high latitudes, currently the only well-known mud volcano is the Haakon Mosby Mud Volcano (HMMV) which was discovered in 1995 and is located in the deep sea at the continental slope of the western Barents Sea fan. Its sediments are rich in CH₄ and molecular and geochemical techniques have been used to detect the presence of anaerobic oxidation of methane (AOM). Specifically adapted to mud-volcano environments as sulphur-oxidizing bacteria (dominant genus *Beggiatoa*) and tube worms (*Pogonophora*) which rely on endosymbiotic bacteria have been recorded from this site. They benefit from the product sulphide and settle at the sediment/water interface.

The activity of these various microbial communities thus act as an effective biological filter for methane seepage at mud volcanoes as HMMV: high methane concentrations in surface sediments are found in areas of uncovered mud, whereas CH₄ is considerably lower in regions covered by mats of *Beggiatoa* or dense population of *Pogonophora*. The spatial analysis and quantification of the areas using *Pogonophora*, *Beggiatoa* and uncovered mud as "indicators for methane release" and their relation to temperature data and topography for HMMV is objective of this study.

During several dives by the remotely operated vehicle (ROV) Victor6000 a micro-bathymetric map was generated and more than 2300 geo-referenced video mosaics, covering an area of 46160m² along a transect of more than 17km length, were analyzed with application of a habitat indicator classification within a GIS. Considering the area of HMMV of ca. 1.2x1.2km the data allows spatial extrapolations by Indicator Kriging. This provides an estimate about the distribution of benthic habitats for the

entire mud volcano. Divided into the indicator classification the examined surface, the area of the video mosaics, is covered to 47.1% by Pogonophora, to 5% by Beggiatoa and to 47.9% by mud. After the interpolation the entire mud volcano is covered to 34.3% by Pogonophora, to 4.8% by Beggiatoa and to 60.9% by mud.