Geophysical Research Abstracts
Vol. 13, EGU2011-7308-1, 2011
EGU General Assembly 2011

Long-term observation suggests tidal forcing of mud volcanic activity at Håkon Mosby mud volcano, Barents Sea slope

Tomas Feseker (1,2), Dirk de Beer (3), Jean-Paul Foucher (4), François Harmegnies (4), Julien Legrand (4), Jerome Blandin (4), Frank Wenzhöfer (5), and Antje Boetius (5)

(1) IFM-GEOMAR, Kiel, Germany, (2) University of Bremen, Geosciences, Marine Technology / Sensors, Bremen, Germany (feseker@uni-bremen.de, +49 421 218 65369), (3) MPI for Marine Microbiology, Bremen, Germany, (4) Ifremer, Brest, France, (5) HGF MPG Joint Research Group on Deep Sea Ecology and Technology, AWI, Bremerhaven, Germany

Håkon Mosby mud volcano is located at 1250 m water depth on the Barents Sea slope. As previous investigations provided evidence of persistent high activity of this mud volcano, it was selected as target for detailed long-term observation in the framework of the ESONET demonstration mission LOOME.

As a first step to investigate temporal dynamics of the HMMV, a temperature lance equipped with autonomous temperature loggers was deployed north of the active center of the mud volcano in an area with high abundance of gas hydrates. The data show a stepwise temperature increase from 8 to 9.5 °C at about 3.8 m below the seafloor between January and July 2009. The average time between two steps is approximately 14 days, which matches the fortnightly tidal cycle. These observations were succeeded by the deployment of the main LOOME observatory from July 2009 until September 2010, which included further sensors for pressure, temperature, current speed and direction, pH, and oxygen in the bottom water, as well as additional temperature sensors in the sediment and at the seabed. The temperature lance was re-deployed south of the active center of the mud volcano.

On 2009-09-27, two independent pressure sensors registered an uplift of the seafloor of nearly 0.5 m within less than four hours in the gas hydrate area north of the active center. The uplift was accompanied by temperature changes in bottom water temperature and pH, which point to widespread release of liquid and gaseous mud volcano fluids. During the following month, the seabed temperatures at 24 locations across the central area were unusually similar, until abrupt and drastic temperature increases around 2009-10-26 indicate the occurrence of a large mud eruption. The temperature lance south of the central area also recorded this eruption. It appears to have moved approximately 160 m southwards along with the mud during the observational period of 14 months.

In this presentation, we present a timeline of the observed events along with a conceptual model of how earth tides and gas hydrate dynamics control the activity of Håkon Mosby mud volcano. This work was supported by the EU-Projects ESONET "European Seas Observatory Network" (Demonstration Mission LOOME "Long term observations on mud volcano eruptions"), and HERMIONE "Hotspot Ecosystem Research and Man's Impact on European Seas".