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Fluid flow, gas hydrates and geothermal gradients of the Håkon Mosby mud volcano, western Barents Sea

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The Håkon Mosby Mud Volcano (HMMV) is located on the Barents Sea margin at 72N; in water depth of about 1270 m. It is one of the few examples of mud volcanoes outside a compressional tectonic setting. Several investigations show that HMMV is the site of a unique ecosystem that is fuelled by chemosynthesis of gas released from the mud volcano. Therefore, HMMV was included in the study of ecosystem hotspot studies under the HERMES project. Since it was discovered in 1989 using the SEAMARC system, it is considered as one of the strongest fluid flow and heat flow anomalies on Europe's passive margin. A high-resolution 3-D seismic cube has been collected across HMMV on board R/V Jan Mayen in July 2005. The data reveal several insights into a deep-seated focussed fluid flow system that is controlling both shallow gas hydrate distribution and methane release from the seabed. On the seabed, a patchy distribution of higher heat flow values prevents gas hydrate formation. The high heat flow areas coincide with elevated gas flow and the presence of chemosynthetic bacteria populations. Echosounder data show bubble plumes that consist most likely of methane and have strong temporal variation both in diameter and height in the water column. The data collected suggest a highly dynamic focused fluid flow system, which requests a long-term seabed observatory on the HMMV for monitoring potential changes in fluid composition and flux rates and how these influence the ecosystem on the seabed and the methane plume in the water column. This would improve our understanding of this kind of methane vent system and it would constrain the focused methane transport to the ocean and possibly to the atmosphere by quantitative measurements.