



## **Gas bubbles and gas hydrates sampling from Hakon Mosby Mud Volcano – Preliminary results – VICKING cruise (2006).**

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Gas bubbles are released from the seafloor in many areas from hydrothermal sites on ridges or submarine volcanic areas and from cold seeps on continental margins. When rising to the surface, these features create physical and chemical anomalies in the seawater column and sometimes strong backscatter signals with a flare-like shape detected with single-beam echosounders. These gas ( $\text{CH}_4$ ) bubbles may form gas hydrates if thermodynamical conditions are respected, but the process of formation/dissociation of gas hydrates is not well understood. PEGAZ is a new efficient tool manipulated by submersibles and/or ROVs to collect gas bubbles issued from the seafloor. It has been used for the first time on Hakon Mosby mud volcano with success during the Vicking cruise. The release of gas bubbles through vent conduits and fissures is observed at a free ascent rate of 20-25 cm/second and the size of bubbles is estimated to be 0.8 cm in diameter. At 1270 m depth, the formation of a gas-hydrate coating is observed on the gas bubbles progressively trapped in the funnel of the PEGAZ sampler. Hydrates are crystallizing near the seafloor where the necessary pressure and temperature conditions are met and where the abundance of methane is sufficient to exceed the local solubility. On board the ship, the cell containing the gas at the depth pressure was connected to an extraction line permitting to obtain very quickly the gas composition. The 2003 and 2006 ROV surveys on Hakon Mosby show a continuous high venting of free gas bubbles, indicative of high saturation values in the upper sediment layer and in deep bottom water. The stable carbon and hydrogen isotope compositions of hydrate-bound gases and gas bubbles are reported. The molecular composition of gas hydrates and the isotopic composition of the different gases do

not differ from that of free gas bubbles issued from sediments, except for C<sub>3</sub>, C<sub>4</sub>, C<sub>5</sub> hydrocarbons which are depleted in gas hydrates. PEGAZ sampler is a very efficient system to sample gas bubbles, to study the evolution of gas bubbles through the Gas Hydrate Stability Zone, to know the origin of gases and understand the mechanisms involved in gas hydrate formation on margins.