



Active gas chimneys on the Storegga slope. New observations from the Vicking expedition.

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The Vicking cruise (N/O Pourquoi-Pas? May-June 2006), conducted in the framework of the EU-supported Project HERMES, was a multidisciplinary (geology, geophysics, geotechnics, geochemistry, biology and microbiology) study of focused fluid escape features on the Norwegian margin. The objectives of the cruise were to assess the impact of these fluid escape features on methane release to the atmosphere, to determine their relevance to slope stability and their importance for the development of benthic ecosystems. We focus here on the northern flank of the Storegga slides study area, in a water depth of about 700 m. This area was selected mainly from previous geophysical data collected during the Hydratech cruise of Le Suroît in the summer of 2002. It is characterized by the occurrence of numerous fluid escape structures, large slides and gas hydrates in the slope sediments. The Ifremer ROV Victor 6000 and a set of specific tools were used to determine the current strength of fluid emissions and the nature and functioning of the associated ecosystem. A dozen of gas chimneys were explored along an east-west transect, about 8 miles long. In addition, previously described pockmarks G11 and G12 (Hovland et al., 2005) were surveyed. Bacterial mats, usually associated with gastropods (alive and dead), large pogonophorans fields or pogonophorans gathered in pillows (pingoes) indicate active methane expulsion. Free gas bubbles were not detected but methane anomalies were measured in the bottom sea water. Most of the chimneys are found to be associated with carbonate massifs of various shapes (layered, soufflé like) and dimensions (metric to decametric), with abundant macrofauna fixed on the carbonates. The grey, generally porous crusts have very high carbonate contents (64 to 78 wt%). Isotopic analysis indicate carbonate

precipitation in water either similar in chemistry to the present day bottom water or enriched in ^{18}O where the major source of carbon is methane issued from the venting fluids. These first results suggest that the investigated gas chimneys diffuse methane slowly through vast areas of the seafloor, with a few spots with increased activity mostly located in the central areas of the chimneys.