



Geochemistry of pore waters and natural gas hydrates collected from the Norwegian margin - preliminary results from the Vicking cruise (2006) on Storegga slide and Håkon Mosby Mud Volcano.

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Shallow sediments on continental slopes hold enormous quantities of low molecular weight hydrocarbons, particularly methane (CH_4) as free gas, dissolved gas or gas hydrates. As a part of the EU project HERMES (Hotspot Ecosystem Research on the Margins of European Seas), the Vicking cruise (2006) was conducted on the Norwegian slope to study methane seeps and associated biological and microbiological communities on the Storegga slide and the Håkon Mosby Mud Volcano (HMMV). We present here the preliminary results on the geochemistry of pore waters collected from gravity cores and the physical and geochemical characteristics of gas hydrates recovered from the HMMV. Major elements (Cl^- , SO_4^{2-} , Na^+ , Ca^{2+} , Mg^{2+} and K^+) were analyzed on board by ion chromatography. From SO_4^{2-} profile, areas of anaerobic oxidation of methane (AOM) are clearly identified at depths varying between 1 and more than 5 meters below sea floor on Storegga slide and similar profiles are found for Ca^{2+} and Mg^{2+} . On HMMV, the Mg/Cl ratios suggest that the pore waters samples are a mixing of sea water, mud volcano fluid and pure water, whereas the same ratios are characteristic of sea water on Storegga slide. Trace elements in pore waters and in gas hydrates were studied by ICP-MS, with evidence of an enrichment in Ba, Br or I and depletion in elements as Ag or Co.

In addition, natural methane hydrates samples collected from HMMV at ~ 1260 m depth in 4 m long cores were analyzed by Raman spectroscopy. In agreement with previous works conducted on natural hydrates collected from this area, the new recovered samples exhibit a preponderance of structure I (sI), composed of two pentagonal-dodecahedral D cavities (a 12-face polyhedron constituted by regular pentagons) and six tetrakaidecahedral T cavities (a 14-face polyhedron having 12 regular pentagons and two regular hexagons) with a methane concentration more than 98 %. The degradation kinetics was studied by measuring the hydrate fraction versus the temperature, in order to know the dissociation temperature under atmospheric pressure which depends on the particle size of the studied samples. These studies are necessary to understand the process governing the origin, the formation and the stability of methane hydrates, and to establish their thermodynamic properties and develop technologies to extract this energy resource from the sea floor.