Geophysical Research Abstracts, Vol. 8, 07005, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07005

Pressurized near-surface sediment cores of Anaximander mud volcanoes, Eastern Mediterranean

K. U. Heeschen (1), A. Dählmann (2), H.-J. Hohnberg (3), V. Lykousis (4), C. Perissoratis (5), G. de Lange (2), H. Amann (6), and G. Bohrmann (3)

(1) National Oceanography Centre, Southampton, (2) Utrecht University, Faculty of Geosciences, Utrecht, NL, (3) Research Center Ocean Margins, University of Bremen, GER, (4) Hellenic Centre for Marine Research, Anavyssos, Greece, (5) Institute of Geology and Mineral Exploration, Athens, Greece, (6) Maritime Technology, TU-Berlin, Berlin, GER (kyh@noc.soton.ac.uk / phone: +442380599005)

One primary goal of continental margin research is to more accurately determine the amount of methane that is stored in the sediments either as free, dissolved or gas hydrate-bound methane. The current estimates vary widely due to the difficulties in directly quantifying the gas as a result of decompression of the sediments during recovery. The Autoclave Piston Corer Anaximander (APCA) is a coring tool equipped with a pressure chamber for sampling near-surface sediments at water depth of up to 2000 m. As such it enables the retrieval of sediment cores (up to 2.3 m) under ambient pressure and allows the determination of the in-situ methane (C_1) concentration and gas hydrate volumes in sediment depths that are most easily affected by temperature and pressure changes and are very important in terms of microbial activity. The APCA was deployed in autumn 2004 (R/V Aegaeo) in the Eastern Mediterranean, in the Anaximander Mountains, a field of mud volcanoes (MVs) located between the Cyprus and Hellenic arcs. Two of the MVs were known to contain shallow gas hydrates. The work was carried out within the framework of the EU Project ANAXIMANDER (Grant: EVK3-CT-2002-00068).

In the Anaximander Mountains in situ methane concentrations were successfully determined on four APCA cores, originating from three different mud volcanoes: Amsterdam MV (2233 mbsf), Kazan MV (1692 mbsf), and the newly recovered Thessaloniki MV (1236 mbsf). At all sites gas hydrates were recovered at various sediment depths within the operational range of the piston corer. The gas hydrates could only

be sampled at Amsterdam MV where they occurred in pieces of a few centimeters in width whereas at Kazan MV they were small widely dispersed flakes. In situ methane concentrations were highest at Amsterdam MV and lowest in the shallow Thessaloniki MV, which is located just within the stability field for gas hydrates (also see Perissoratis et al., this volume). However, methane concentrations of all cores were above the equilibrium concentration of methane in the presence of gas hydrates, and gas hydrates occupied 1 to 5% of pore space. Concentration and occupancy vary considerably within one site showing the importance of repeated coring.

The hydrocarbon composition of the collected gas differs between the three sampling sites. The Amsterdam MV, the site with the highest methane concentration, differs significantly from the two other sites where hydrocarbons other than methane are much less abundant. To a lesser degree similar variations in hydrocarbon composition were observed during the controlled degassing of the pressurized cores from Amsterdam MV indicating different sources for the released gas.