Geophysical Research Abstracts, Vol. 8, 03874, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03874

Characteristics of the Thessaloniki Mud Volcano, a recently discovered gas hydrate bearing area in the Anaximander Mountains, Eastern Mediterranean.

C. Perissoratis (1), C. Ioakim (1), V. Lykousis (2), M Alexandri, (2), E. Nomikou (2), J. Woodside, (3), A. Daehlmann (4), K. Heeschen (5), D. Casas (6) and the Anaximander shipboard scientific parties *.

(1) Institute of Geology and Mineral Exploration of Greece (prs@igme.gr)

(2) Hellenic Genter for Marine Researches, Greece

(3) Vrije Universiteit of Amsterdam, The Netherlands

(4) Utrecht University, The Netherlands

(5) National Oceanography Centre, UK

(6) Instituto de Siencias del Mar, Barcelona, Spain

* Technische Universitaet Berlin, Germany, and Technical University of Crete, Greece

The only area in the Eastern Mediterranean where gas hydrates (GH) have been located up to now is the Anaximander Mountains (Mts) where GH have been sampled from four mud volcanoes (MV). Lately the area has been studied by the EU funded ANAXIMANDER (2003-2005) and the on going HERMES (2005-2009) projects. The most recently discovered Thessaloniki MV is the shallowest GH bearing area in the Anaximander Mts . This submarine hill was identified during the earlier Anaximander expedition (May 2003) on the basis of its back scattering characteristics and sampled during the project‘s second expedition in November 2004. It is located in the south-central part of the Anaximander Mts (35?, 28.728 N - 30?, 15.060 E, between water depth of 1320 and 1260m), is oval in shape, as defined by the of 1315 m isobath, has steep northern and eastern slopes and has an areal extent of about 3500 m^2 with its long axis about 1500 m. In the inner part near the summit it becomes rather circular where three peaks are distinguished, two in the west outlined by the 1260 m contour

one in the east at 1265 m.

Four conventional (gravity) cores with length of 110 to 228 cm and one autoclave (pressure) core of 70 cm length were retrieved from the western highs at water depths of 1263 to 1265 m. In all cores the sediment is gray mud with occasional clasts (xenoliths) of up to 3cm in size and in only one core that did not contain GH was an oxidized layer observed in the upper 3 cm . GH were found in two gravity cores in the form of visible GH spheroidal or flaky crystals up to cm scale, dispersed throughout the soupy core sediment. The other two gravity cores had no GH present but exhibited many local volumes of mud dewatering features and abundant free methane. All these characteristics support a very recent activity of this MV. The autoclave core indicated a sea bottom pressure of 105 atm and during controlled depressuration provided 3.1 lt of gas equivalent to 2% coverage of the pore volume with GH. The ambient temperature at the summit of the MV was 13,8 C˚ and the sediment temperature measured on board in GH bearing upon opening the cores was 8.4 to 14.4 C˚. The clasts included in the core sediments consist of fossiliferous micrites and mudstones derived from deeper rock formations. The study of the fossils indicated a Lower to Upper Miocene age and a calm open sea environment of deposition for these sediments.

The particular importance of Thessaloniki MV is that the GH are formed under pressure (depth) and temperature conditions (1260m, 13.8 C˚) that place this GH bearing sector near the upper boundary of the GH stability field. In the other three GH bearing MVs of the Anaximander Mts , namely Amsterdam, Kazan and Kula , the respective minimal depths are 2025 , 1750, and 1650 m with similar sea bottom temperature (from 12 to 13.5 C˚). This indicates that the GH in Thessaloniki MV will be dissociated with the slightest changes of these parameters, either in increase of the ambient sea bottom temperature or decrease of the hydrostatic pressure.