



MUD VOLCANOES AND GAS HYDRATES IN THE BLACK SEA - RESULTS FROM METEOR CRUISE MARGASCH M52/1

G. Bohrmann (1) J. Bialas (2) J.-P. Foucher (3) M. Ivanov (4) V. Spiess (1) W. Weinrebe (2) and the M52/1 Shipboard Scientific Party

(1) Fachbereich Geowissenschaften der Uni Bremen, Germany,(2) GEOMAR, Forschungszentrum Kiel, Germany,(3) IFREMER, Plouzané, France,(4) UNESCO-Center for Marine Geosciences MSU, Moscow, Russia

METEOR Cruise M52/1 (January 2 to February 1, 2002; Istanbul - Sevastopol- Istanbul) was dedicated to research on gas hydrates in the Black Sea. The leg focused on the distribution, composition, and the structure of gas hydrate deposits, and their relationship to fluid migration through the sediments and to gas venting at mud volcanoes. Mud volcanoes occur in the central Black Sea and Sorokin Trough in a great variety of sizes (up to 2,5 km in diameter). The volcanoes rise above the seafloor as high as 200 m. In the Sorokin Trough the roots of such mud volcanoes are connected to deeper diapiric structures that evolved in the compressional tectonic regime between the Tetyaev and Shatskiy Rises in the south and the Crimean Peninsula in the north. The diapiric folds are mainly formed by clay deposits of the Maikopian Formation (Oligocene- Lower Miocene) which enables fluids and gases to migrate upwards to the seafloor. Gaseous methane either forms gas hydrate or emanates to the water column producing acoustic plumes. Near-surface gas hydrates were sampled during the cruise from several mud volcanoes known as Yalta, Dvurechenskii, Odessa and an unnamed mud volcano. The Dvurechenskii mud volcano in particular is a seepage area with high fluxes. While the normal water temperatures at the seafloor were about 9° C, the uppermost 6 m of sediment in the central part of Dvurechenskii mud volcano showed temperatures of up to 16° C. A temperature anomaly was measured in the bottom water with the CTD mounted on the TV-sled. These temperature anomalies suggest that the mud is currently rising. In spite of the high temperature, the pressure is sufficiently high at 2000 m water depth to allow the formation of gas hydrates. Six

sediment cores from Dvurechenskii mud volcano contained large amounts of finely dispersed gas hydrate that dissociated quickly on board of the research vessel. The pore water profiles indicated a strong fluid and/or gas flux from the sediment to the water column. The CTD and water sampling stations at Dvurechenskii mud volcano were the only sites where higher methane concentrations were detected in the bottom water, indicating a strong methane flux from an active mud volcano.