

Research Vessel METEOR

M142:

Varna - Varna

4th Weekly Report: 20 – 26 November 2017



Sunday night, a few minutes to midnight, when MeBo200 drill rig was back on deck, the scientists were busy all night until Monday morning, in handling the sediment cores appropriately. In total 36 core segments from this almost 144m deep drilling were processed (Fig. 1 + 2). Although we had reached the bottom simulating seismic reflector (BSR), we could not trace any direct hint on methane hydrate. This might be caused by the very fine-grained sediment substrate in the deepest 40 drill meters. In the section from 60-100m meters below sea floor we had signs for methane hydrate appearance, but no undissolved gas hydrate so far. By means of the infrared camera we could see clear temperature anomalies in a core of this depth, which doubtlessly indicated the endothermal decomposition process of methane hydrate. Further indicators were soupy textures in some core sections that most probably resulted from water release of decomposing gas hydrates. Generally, this 60-100m section in the drilling seems to be more coarse-grained so that in some layers the pore space possibly had been cemented by methane hydrates. The outstanding sonic log covering the entire bore hole shows a clearly higher P-wave velocity in this section, which terrifically correlates with the changes in lithology.



Fig. 1: MeBo200 sediment core had just been pulled out of the core barrel by the scientists and is carried to the lab for further treatment (© C. Rohleder).



Fig. 2: In the Geo lab the 3.8m long sediment core being cut into shorter segments and labeled before being longitudinally cut in archive- and work half (© C. Rohleder).

During Monday, we performed hydro-acoustic mapping up to the Romanian-Ukrainian border in the East. At the evening, we steamed to Varna, where on Tuesday, 21st November at 9 o'clock, we berthed at the well-known pier of Odessos Shipyards. Before part of the scientific and MeBo teams disembarked, we took a photograph of the group (Fig. 3). On forenoon, the new participants embarked so that there was enough time for a handing-over of labs on deck. Many colleagues took the opportunity to visit Varna in the evening, before METEOR punctually left in the morning of 22 November at 9 o'clock for the 2nd leg of the cruise. On Thursday, before the evening operation of MeBo, several gravity cores were taken. We sampled two locations with active gas emissions at the sea floor, who contained clearly thinner gas hydrate layers (Fig. 5) which were intercalated in glacial lacustrine sediments. Hydrate layers were oriented parallel to the bedding structures. During glacial times, the water level of the Black Sea was 150m lower than nowadays, so that no salty Mediterranean water could enter across the 35m deep Bosphorus sill, and the former saltwater sea changed to freshwater due to freshwater influx.

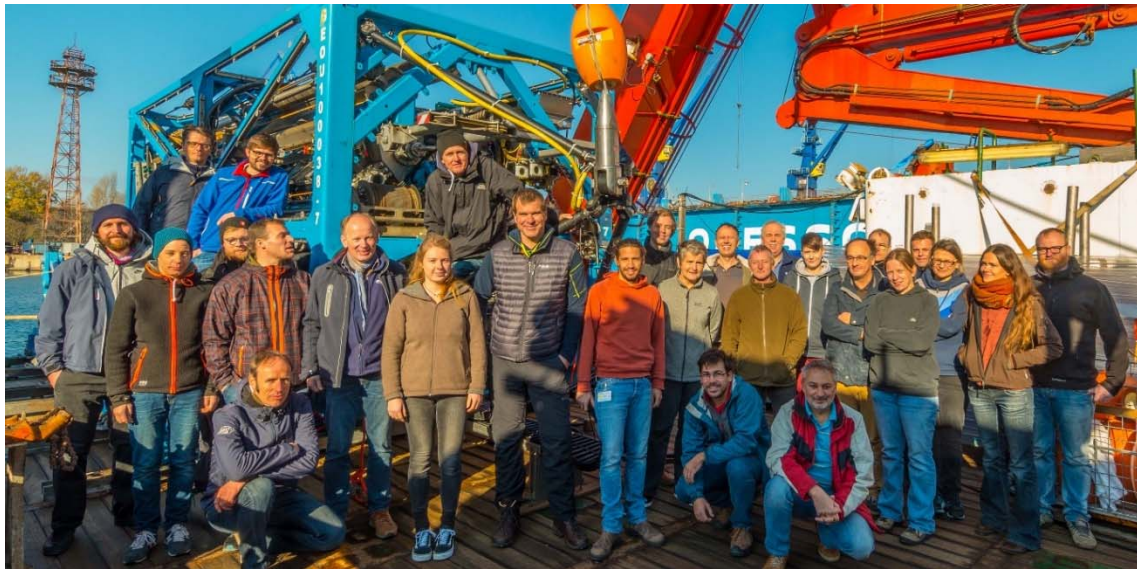


Fig. 3: Scientific crew of the first leg of M142 in front of MeBo200 in the port (© T. Klein).

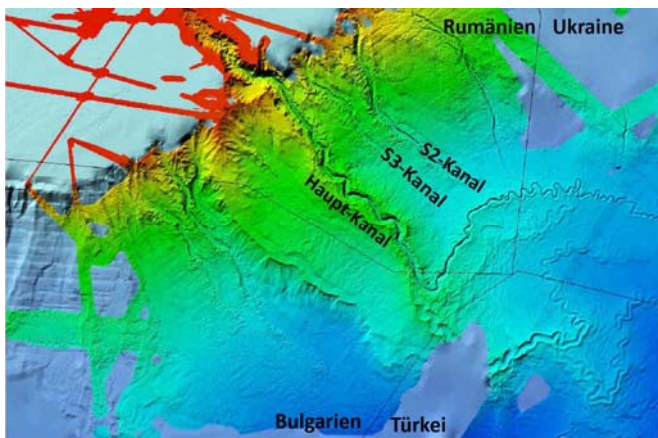


Fig. 4: Sea floor topography of the shelf (above left) across the continental slope to the deep-sea fan (below right). Parallel to the Danube main channel numerous further channels are mapped, whom the canyons S2 and S3 are important in our Romanian work area.

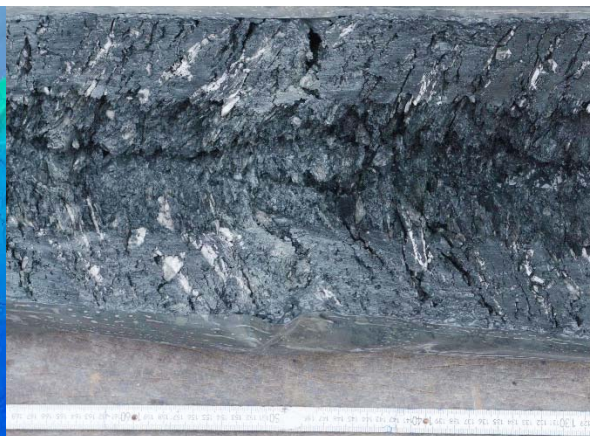


Fig. 5: Core section of gravity core GeoB22606 showing the glacial sea sediments that had been colored dark to black due to iron reduction and precipitation of iron mono sulfides. White gas hydrate layers are interlayered concordantly.

As all glacial rivers drained to the Black Sea, also Danube went across the wide Romanian shelf up to the shelf edge and cut several steep canyons into the upper continental slope (Fig. 4). Transport of the sediment freight was downslopes via turbidity currents through the channels, whereat the fine suspension material mostly floated up, and very massive levee deposits built up on both sides of the canyons. Besides suspension deposits, also numerous slides transported the former river material to the deep sea during glacial time. This is how a very massive deep sea fan was deposit in the cross of four country borders during the past 900,000 years (Fig. 4). The gravity cores we recovered so far, show recent layers of the past 8,000 years, which lead to more and more strong marine conditions due to influx of saline water from the Mediterranean. However, we also see much slumping and sliding material.

Our following MeBo drilling had to be interrupted due to technical failure in 20m sediment depth. Towards the weekend, we concentrated on sampling the water column and sediments with gravity corer. Furthermore, extensive mapping of the sea floor was done during the night. Doing so we discovered two mud volcanoes that had been unknown so far. Certainly, we would like to sample them, but they are situated outside our approved research area in Romania.

The weather is still well disposed. All of us are healthy.

Best regards on behalf of all cruise participants,
Gerhard Bohrmann

RV METEOR, Sunday 26 November 2017