

Research Vessel METEOR

M142:

Varna - Varna

6th Weekly Report: 4 Dec. – 9. Dec. 2017



MeBo drilling started again on Sunday, 26 November for completion of our data set at Site MeBo17. This drilling three weeks ago intersected the bottom simulating seismic reflector (BSR) in 143 m depth, until free gas released in small quantities from the borehole. We did not encounter considerable quantities of methane hydrate above the BSR as expected.



Fig 1: Two operators control the MeBo system from the control container. By means of data and video transmission from the drill rig, Werner Schmidt und Adrian Stachowski control the drilling procedure at the sea floor (© M. Beims).



Fig 2: In the METEOR rough-wet lab David Wunsch and Tobias Rothenwänder work on the very complicated autoclave samplers before and after their deployment with MeBo drilling system. (© M. Beims).



Fig 3: While the drill rig is in action, the vessel stays on the same position for 2-4 days. Only the cable, which is managed via the A-frame into the water and the launching system of MeBo is visible (© M. Beims).



Fig 4: For a precise underwater navigation of positioning all devices on the sea floor, we use the ship's owned Posidonia system. For this, Thomas Pape mounts the Posidonia transponder on the ship's wire above the gravity corer, together with ship's mechanic Henry Schabeck (© M. Beims).

However, there were different indicators for small methane hydrate concentrations between 60-100 m sediment depths. The new drilling was performed to again core this depth interval for comparison. The drill segments below and above were washed through for time reason, so that enough time was left to deploy four autoclave cores, so-called MDPs (Fig. 2), for sampling of the sediments under *in situ* conditions. As bad weather was forecast, we had to decide on Tuesday, 5 December, to stop drilling in 134 m depth and to dismantle the drill string until the evening. While ascending, the borehole was measured with two probes that are registering the electric resistivity and the natural Gamma rays of the formation. The natural Gamma

radiation is used to characterize the lithological composition, and with the electric resistance we can calculate the gas hydrate saturation, which means a very valuable measurement for achieving our scientific aim. One further short drill that we had planned in an area with surface-near methane hydrates, could not be effected due to several reasons, and so we used the time until Thursday to close the gaps in our large-scale mapping of the upper continental slope (Fig. 5). Doing so, we found the widely distributed dewatering structures with numerous, very differently dimensioned tidal channels who characterize a submarine landscape that certainly had developed earlier when the sea level had been considerably lower. Furthermore, circular pockmarks of 100-200 m in diameter and with 5-15 m depth are considerably numerous (Fig. 5). Beneath single pockmarks, also lines of those funnels were found, most of them were aligned along morphologic ridges. Many pockmarks are characterized by recent gas emissions that actively contribute to the pockmark creation. In the frame of those mappings we could map the entire shelf edge west and east of the Danube channel. In the East, at the Romanian-Ukrainian border, we recognized many dewatering gorges that do not belong to the Danube, but to the Dnjepr fan. The river Dnjepr is the third longest river in Europe and dewateres larges areas in Belarus, Russia and Ukraine, flowing west of Cherson across a big estuary into Black Sea.

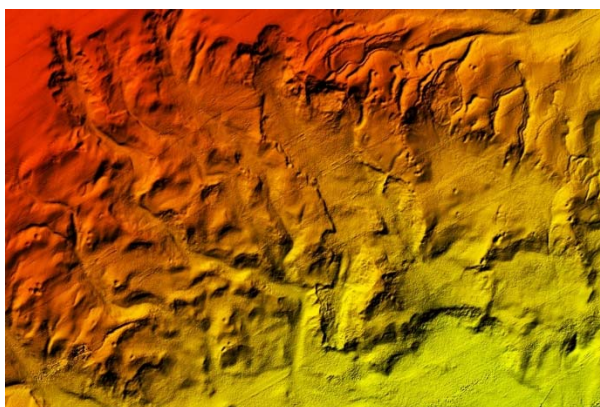


Fig 5: Below the shelf edge, on the upper continental slope in 200-500 m water depth, is a wide dewatering landscape with many tidal channels (horizontal edge length = 12 km).



Fig 6: The scientific crew of the second leg of cruise M142, Black Sea, with the most important research device MeBo200 during RV METEOR Expedition (© M. Beims).

Due to forecast higher wind speed on Saturday, and due to a possible closure of Varna port, advised by the ship's agent in Varna, we had decided to advance the port stay to Friday. R/V METEOR arrived on Friday, 8 December, for the last time at the already known Pier No. 4 of Odessos Shipyards. The earlier arrival of course also had a positive influence on the packing activities, as we have packing pieces for 9 containers, and one 18.6 m long tractor trailer had to be packed and loaded.

The leg M142 will finish today, Saturday, 9 December, and after one last stay at night on the ship, most of the scientists will return to Germany. This cruise was quite successful for us: Within 30 days at sea we deployed four drillings with MeBo200, did many measuring, sampling, new discoveries and ideas that in the future will be presented in scientific talks and publications. We owe this success in scientific work also to the outstanding and friendly support by the ship's crew. For this, we thank Captain Rainer Hammacher and the entire crew very much.

Best regards, a last time on behalf of the cruise participants,
Gerhard Bohrmann, RV METEOR, Saturday, 9 December 2017