

SO265
SHATSKY EVOLUTION
Weekly Report No. 2
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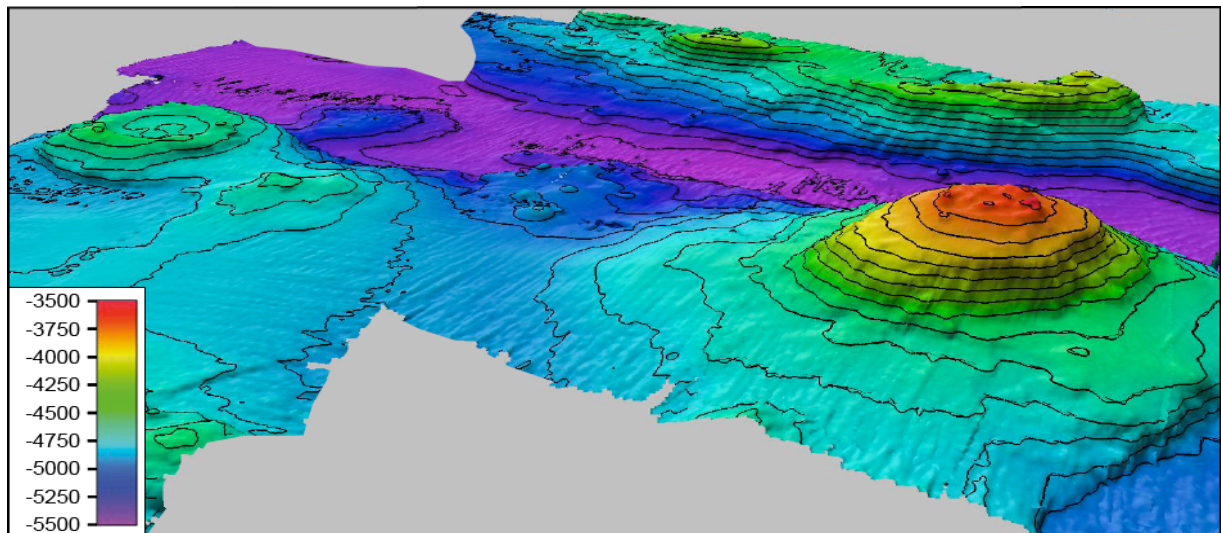
During the second week of the R/V SONNE cruise SO265 everyone on board became accustomed to the constant alternation between searching for new sampling sites (i.e. mapping of the seafloor) and sampling (dredging). Furthermore, the sample preparation in the labs became routine.



Retrieving the CTD probe at night time.

The selection of our sampling sites is based on the best possible knowledge of the seafloor relief, the bathymetry (from the Greek "bathys" (deep) and "metron" (measure), meaning the surveying of the topographic shape). Until the beginning of the last century the water depth could only be determined by means of plumb lining. This method, however, is only viable for relatively shallow water depths (e.g. nearshore) and provides only single-point information. From time immemorial, the open ocean was

therefore considered as "unfathomably deep" and its floor as monotonously flat and lifeless. With the invention of the echo-sounder by Alexander Behm (1880-1952) this view dramatically changed. This method uses the transit time of sound waves that are transmitted from a ship and reflected at the sea floor. State-of-the-art research vessels, like the SONNE, are nowadays equipped with multi-beam sonar systems, which transmit (and receive) a large number of sound waves with different frequencies in staged angles to survey a wide stripe of seafloor (at right angle to the ship's heading). The width of the covered area is thereby proportional to the water depth. If the ship is moving, a computer assembles the individual stripes and produces a three-dimensional map of the seafloor's bathymetry in real time, which is immediately displayed on a screen. Since the speed of sound waves in water depends on temperature, pressure and salinity, these parameters need to be determined every time the ship arrives at a new working area (where the parameters in the water masses might differ) to calibrate the echo sounder. The required data are obtained by lowering a CTD probe ("Conductivity, Temperature, Depth") down to 2000 m water depth. During the last week, changing water conditions forced us to conduct two CTD profiles.



Multi-beam echo sounder (EM 122 system) data from "Thompson Trough", a 10 km wide canyon that separates Papanin Ridge (upper right side) from the main Shatsky plateau (in the foreground). The large cone in the right was named "Earthwatch Seamount" by a previous expedition. The three dimensional presentation was processed with "Fledermaus" software and is shown with 4-times exaggeration.

In this week our mapping and sampling efforts focused first on the transition between northern Shatsky Rise and its less pronounced northerly extension, Papanin Ridge, which could represent the beginning of a hotspot track. By the end of the week, we had sampled the Papanin Ridge up to a latitude of 42°30' N which roughly corresponds to one half of its North-South extension. We are very pleased that we have recovered at least one or two volcanic samples (that are suitable for geochemical analyses) from each major structure (often collecting much more). If only the number of dredge hauls returning the desired volcanic rocks are counted, we reach a success rate of nearly 75% so far, which is unusually high for sampling such an old volcanic province. Also, the quality of the obtained sample material has been satisfying. Despite their apparently old age, several samples contain well-preserved feldspar crystals or show only moderate groundmass alteration making them suitable for a range of geochemical analyses, including radiometric age determination. In addition, we often recovered large numbers of manganese nodules as a "by-catch". Although sampling manganese nodules was not in the objectives of this expedition, we cut all larger nodules open because they often include volcanic rocks in their cores. More on this topic in the next report.

Fortunately, the influence of the little high-pressure zone, that accompanied us since we arrived on Papanin Ridge, lasted until the end of this week, allowing smooth operations with little swell and moderate winds. By the end of our second week at sea (after 9 working days in total) we have conducted 31 dredge hauls and 3 CTD stations.

All cruise participants are doing well and send greetings to everybody at home.

Jörg Geldmacher and the scientific party of SO265