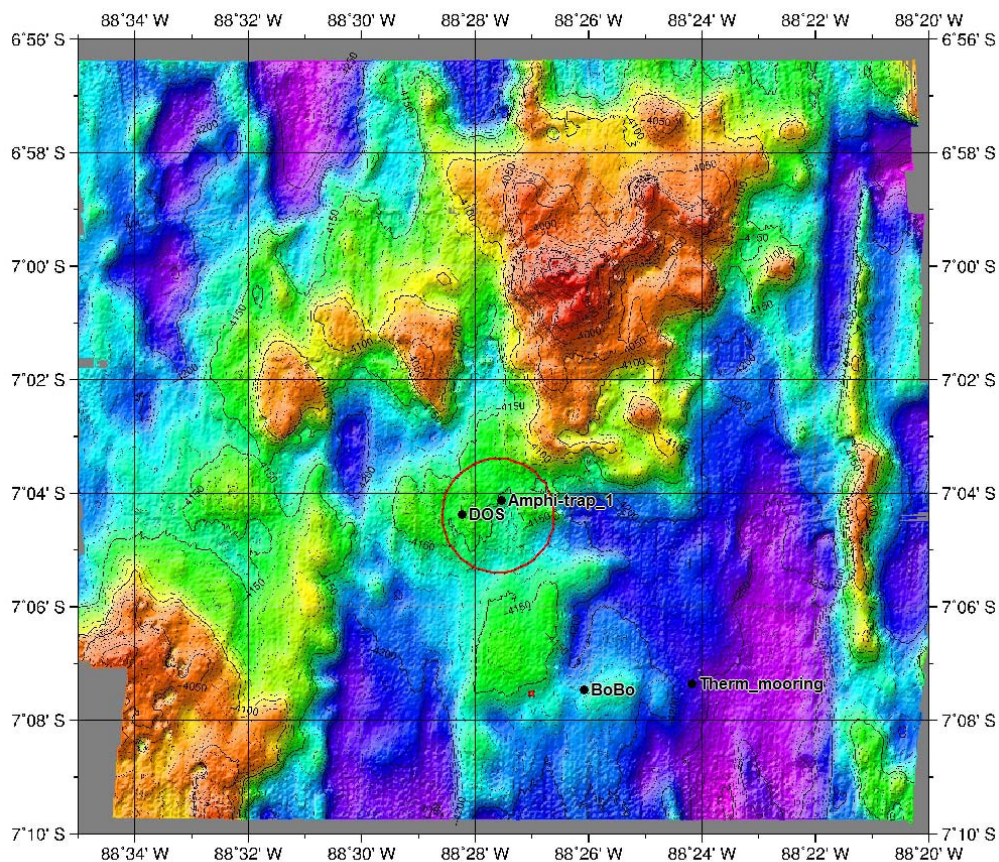


# Weekly Report SO242-1 DISCOL REVISITED

28<sup>th</sup> July – 4<sup>th</sup> August 2015

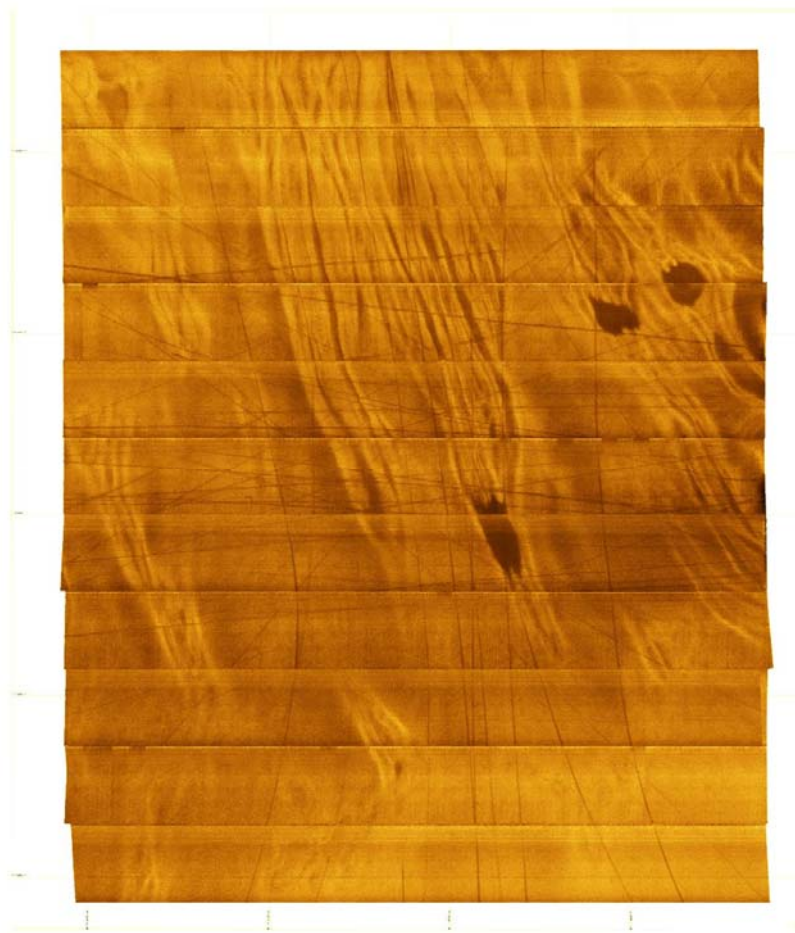
*„Here we are again“*

“Here we are again” was a phrase used by several people when we embarked on the ‘new’ SONNE in Guayaquil, Ecuador on 27<sup>th</sup> July 2015. Some of the 40 scientists had already spent eight weeks or even more on RV SONNE this year to work in the CCZ (SO239 & SO240). A few others were looking forward to going back to an area that they last had studied 19 years ago. SO242-1 and the following leg 242-2 will investigate the long-term impact of deep sea disturbances that were made in the DISCOL Experimental Area (DEA) in 1989 using a plough of 8m width. This plough was towed over the seafloor 78 times to simulate Mn-nodules mining. Consecutive studies with the ‘old’ RV SONNE (SO64, 77, 106) investigated the recolonization of the disturbed area, studied natural geochemical variations in the sediment and those introduced by the disturbance. The release of metals, geotechnical properties of the sediment and plume dispersal were also studied.



*Regional map of the working area with the DEA in the centre (red circle), the reference area of 100x100m (very small red square) and the lander positions.*

During SO 242-1 we use partly comparable technology for sediment sampling (multi corer MUC, box corer BC, gravity corer GC) and physical studies of the water column (CTD), but we also employ the latest technology and additional tools. We have a large epi-benthic sledge (EBS) with two camera systems (video and stills), we use two landers (DOS and BoBo) for physical water column measurements and a mooring that is 400m long and has 200 thermistors. A small baited trap is used to catch amphipods and other animals. In addition, we brought the autonomous underwater vehicle (AUV) ABYSS for mapping the seafloor hydroacoustically (multibeam and sidescan sonar) and for taking photos. The photos will be used to make a large 2 X 2 miles image with 5mm resolution. The ship's multibeam system has already been used to map the working region. Compared to the 'old days', the equipment we use has much higher resolution and can be positioned very precisely thanks to the dynamic positioning system of the ship and underwater navigation. As often on research cruises, some additional equipment is improvised, this time we are working on an Ocean Floor Observation System (OFOS) for taking videos and stereographic images using the DOS launcher as a frame.

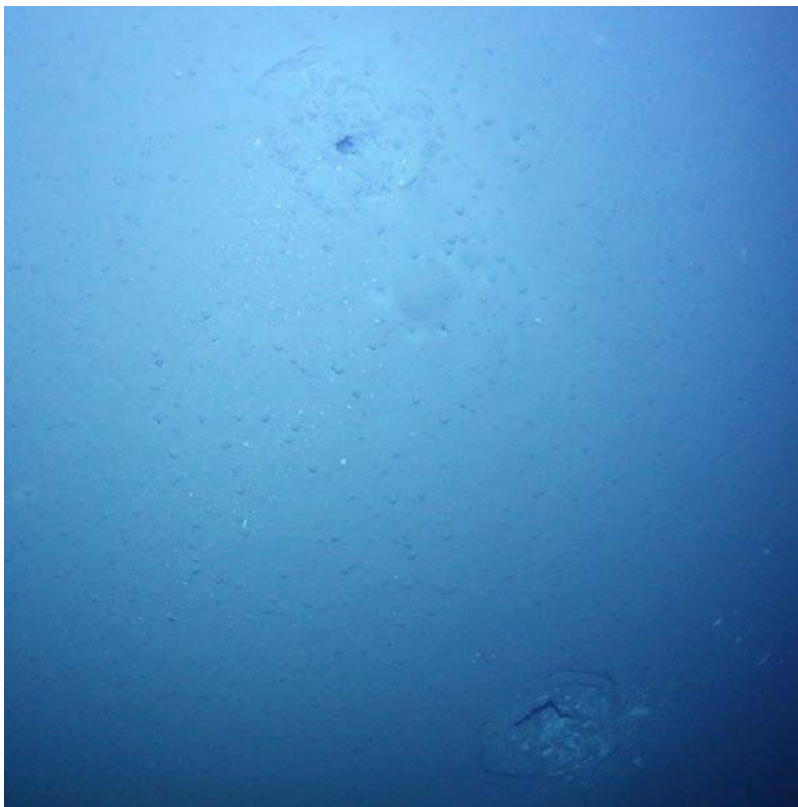


*Sidescan map of the DEA area. In total, 78 crossings with the plough were made, most of them can still be identified here. This map will be our guide for the next 3 weeks to sample the area.*

Today we are one week into the cruise. We arrived on 29<sup>th</sup> June at around 10am in the working area two days after leaving Guayaquil. We started deploying Long Base Line transponders (LBL) for the AUV navigation, dropped both our landers, the thermistor mooring as well as a baited trap. After triangulating the LBL transponders, the AUV was dropped to map the 78 plough marks in the DEA area using the sidescan sonar. At the same time, the ship-acquired multibeam data of the region were processed immediately to have a good bathymetric map as the basis for further planning. To our surprise, the region was not as flat as assumed and the DEA area showed a relief of 30m. After the multibeam survey, the AUV was picked up and sidescan data were processed. They clearly show

the plough marks and the areas with the densest disturbance. Featuring in some further side scan surveys and camera tests by the AUV in the DEA area, we started sampling the same reference site as before, 3 miles south of the DEA. Five box corers and one gravity corers were taken and have already partly been analysed. After some trouble with the MUC when deployed over the stern of the vessel we shifted the deployment to the side, from where it now works properly, recovering sediments used by biologists and geochemists for their analyses. From 1<sup>st</sup> to 4<sup>th</sup> August, a total of 1 GC, 5 BCs, 9 MUCs (including the failed ones) were taken, landers were deployed 3 times (2 x DOS, 1 x BoBo), and 1 EBS was towed over the seafloor. In addition the AUV went into the water 4 times for mapping and camera testing surveys. Particularly the sidescan mapping provided very important results for analysing the plough mark distribution.

In the morning of 4<sup>th</sup> August, we investigated the seafloor with a 12-hour OFOS deployment and mapped the distribution of plough marks along the way. These observations have now been used to geo-rectify the sidescan map and exactly locate the area of a strongly disturbed part inside the DEA. The sampling of this area will start during the morning of 5<sup>th</sup> August with a series of BC and GC deployments. At this time we will have finished sampling the reference area; we plan to investigate one of 5 sub-areas during SO242-1.



*Image of the seafloor taken by the AUV in the reference area. The lower mark was made by a box corer, while the upper 'impact' is from the gravity corer. This GC recovered 9.8m of sediment, the geochemists were very happy. A few Mn-nodules can be seen in this image, taken from 7m above the seafloor.*

The sea and the weather have been very good to us so far, some more wind is expected for the coming days, but nothing we have to worry about. All participants send greetings and, I have the feeling, are looking forward to the next week of DISCOL-REVISTIED. All the best,

Jens Greinert, chief scientist SO242-1