

SO268/2

1. Weekly Report

30 March – 6 April 2019



During the port call of RV SONNE from 27-30 March in Manzanillo, 25 new scientific participants joined the 2nd leg of the research expedition SO268, while 27 persons disembarked the vessel. A couple of days of overlap between the two groups were used to exchange information about the achieved tasks and gear deployments. 13 colleagues stay onboard for the entire cruise. On 29 March RV SONNE was allowed by Mexican customs to move to a container pier to receive the container shipments. This time the harbour call went quite smooth and hence, after receiving the last airfreight package, a multibeam echosounder for the ROV Kiel6000, RV SONNE set sail towards the open ocean at 14:00 local time.



Photo (Steffen Niemann): Benthic lander systems and the multicorer on deck of RV SONNE.

The first destination of our voyage was an eddy, located about 700 nautical miles southwest of Manzanillo. This ocean gyre has a diameter of about 200 kilometres and was formed at the coast of Central America some six months ago. Currently, it is moving with roughly 13 kilometres per day towards the Clarion-Clipperton Zone. Such eddies can increase the

current velocities in the entire water column by a factor of two to three, which may cause suspension of the fine-grained seafloor sediments in water depths of 4000 meters. In the context of deep-sea mining, such an eddy poses an additional threat to the benthic fauna as it could re-suspend and distribute the fresh particle aggregates that have settled out of the sediment plume produced by the mining activities. To our knowledge, sediment resuspension by eddies passing through the Clarion-Clipperton Zone has not been measured directly so far. During SO268 we will distribute sixty different sensors at the seafloor to quantify turbidity and sediment concentration in the suspended sediment plume in space and time.

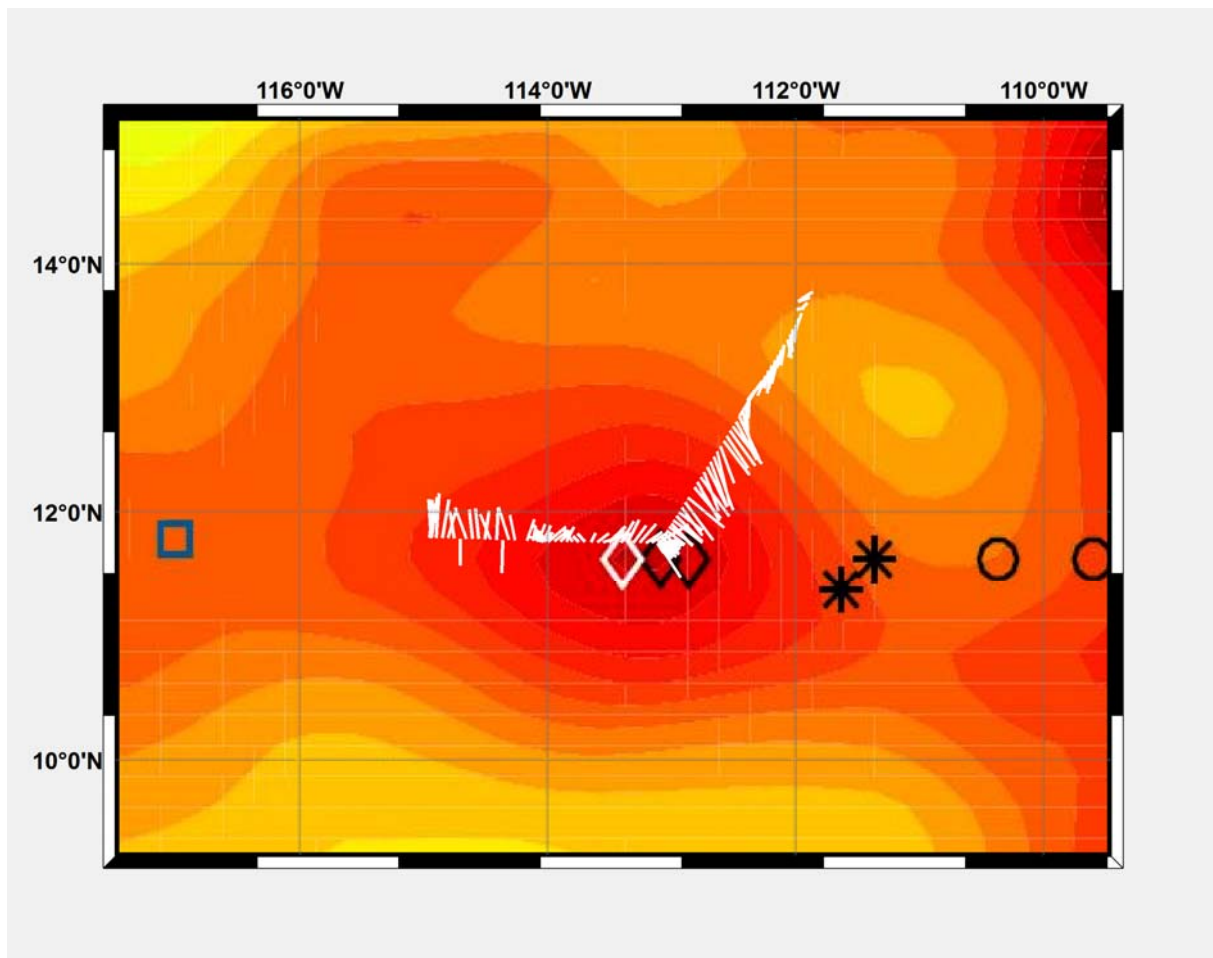


Figure: Current velocity and direction (white lines) in the upper 56 m of the surface ocean while moving with the vessel across the eddy – imaged by the anomaly in sea surface height (dark red colour indicates a relative elevation of about 20 cm). The location of our current working area is marked by the square, whereas the other symbols indicate the westerly movement of the eddy since early March.

Vertical profiles of oxygen and salt concentrations, temperature as well as current velocities and directions in the eddy were recorded during CTD casts from the sea surface to the seafloor. These nicely match the geographic location of the eddy as imaged in maps of sea surface height anomalies, which are sent to us by colleagues at MARUM in Bremen every day. Our investigations show that it is an anti-cyclonic eddy, meaning that the currents

circulate clockwise. On average, bottom water velocities are increased to 10 cm/s in the eddy.

On April 4th, we arrived in the German exploration contract area for manganese nodules, where we are now preparing a small-scale sediment plume experiment. We expect the eddy to arrive at this location in early May and to re-suspend the freshly settled sediment aggregates. First of all, we now need to document the current state of the abyssal ecosystem of the existing nodule habitat by determining the composition of the different faunal classes (megafauna to bacteria) and characterizing its biogeochemical processes. To do so, we sample the surface sediment with a box corer, a multiple corer, and a gravity corer, we photograph the seafloor with a towed camera sled (OFOS) and use our diving robot ROV Kiel6000 to conduct, for example, in situ measurements of microbial oxygen consumption in the seabed.

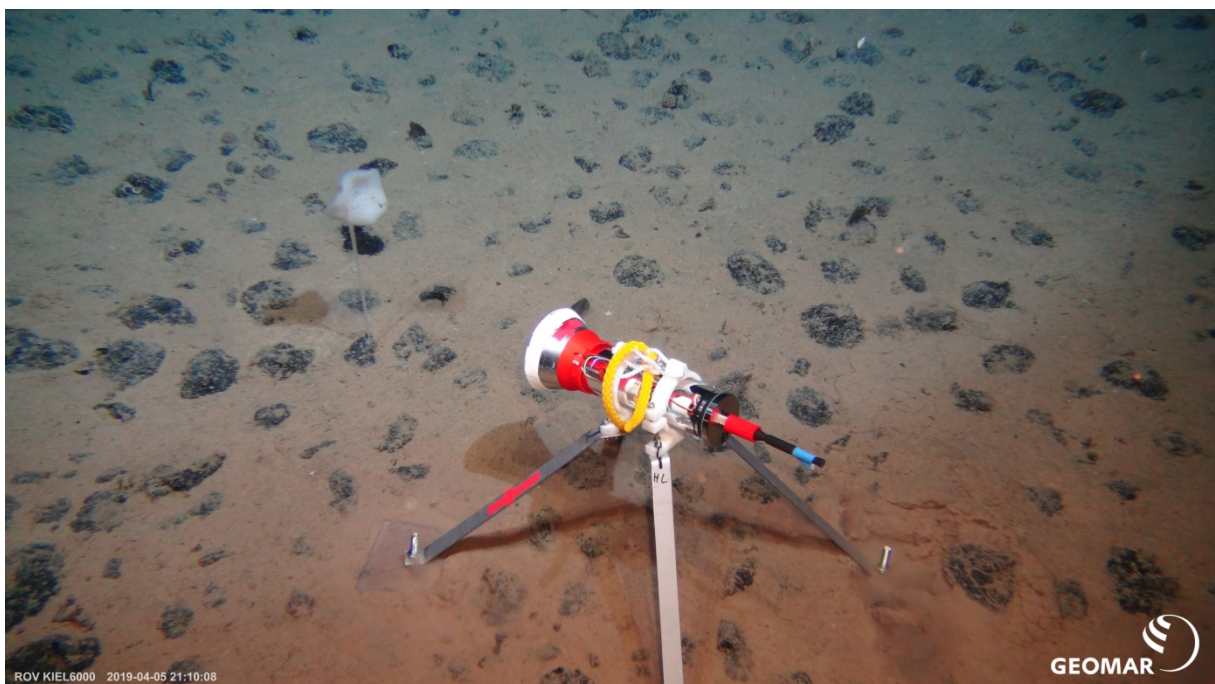


Photo (ROV Kiel6000): Deep-sea camera positioned by our ROV for observing a stalked sponge growing on a manganese nodule in a water depth of 4121 m.

Luckily, deploying our gear is running very smoothly. Everyone's spirit on board is very good and we are eagerly looking forward to new samples and discoveries.

On behalf of all SO268 participants,

Matthias Haeckel