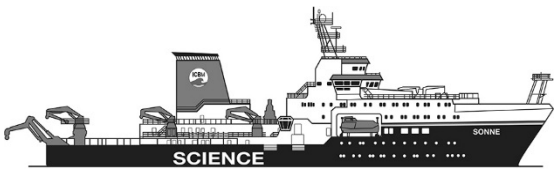


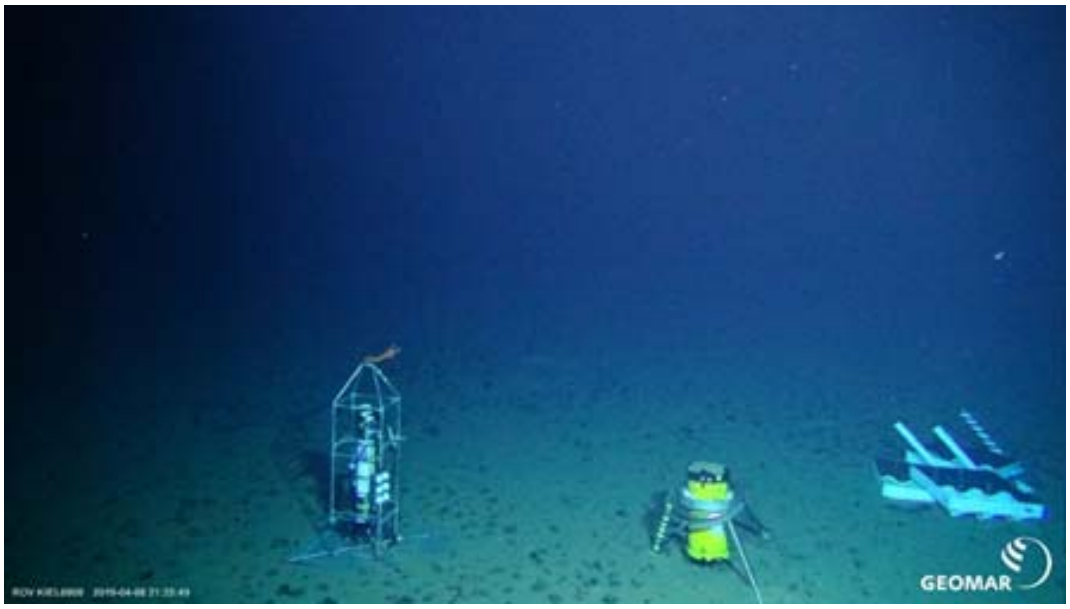
SO268/2

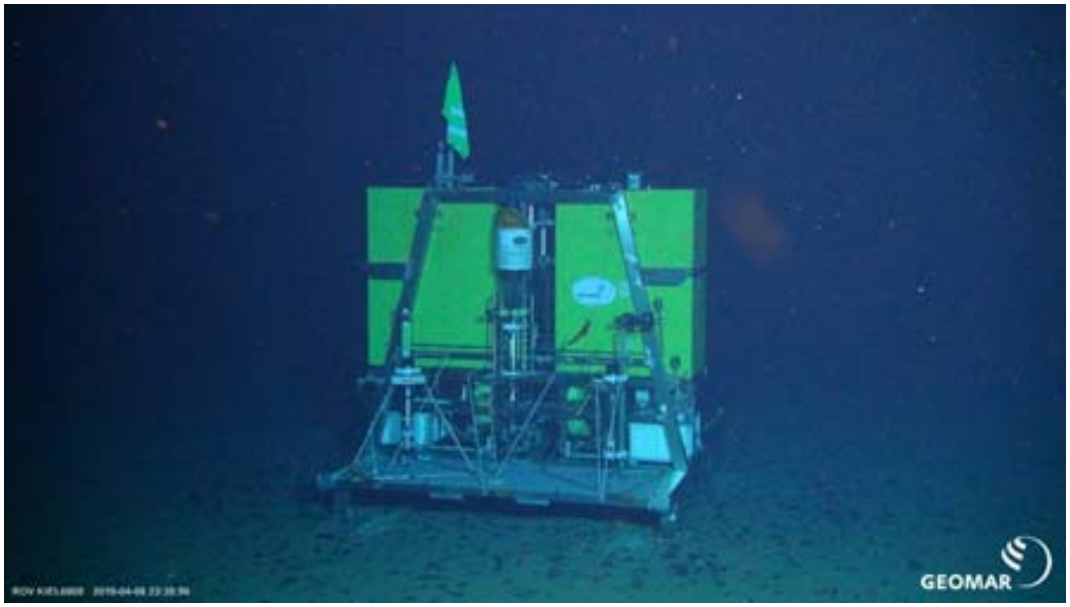
7th Weekly Report

12 – 18 May 2019

During our final week of station work, we sampled the seafloor along a gradient of impact of the dredge experiment from removed surface sediments in the tracks, deposition of a thick sediment layer in dredge tracks and next to the tracks towards thinning sediment coverage on the seabed further away from the tracks. While box coring has to be conducted without precise positioning, the multiple corer was deployed with online video control. For more precise sampling the ROV was used. Visual inspection of the impact area using OFOS video sled transects criss-crossing the dredge tracks provided information to identify possible sampling sites. In addition, we retrieved the plume sensor array that we had deployed at the seafloor prior to the dredge experiment as well as the Bobo lander of NIOZ and the five moorings of BGR that observed the passage of the eddy over the German working area.

The plume sensor work onboard is conducted by colleagues from NIOZ, BGR and GEOMAR, who operate a diverse set of optical and acoustic backscatter sensors that MiningImpact project partners provided for this cruise. These sensors determine so-called turbidity, which is a measure of the concentration of particles in the water, by measuring the intensity of backscatter of emitted light or acoustic waves, respectively. The acoustic sensors, which are so-called Acoustic Doppler Current Profilers (ADCP's), are actually meant to record the current velocity and direction using the Doppler shift in frequency of sound emitted and backscattered from moving particles in the water. We used different ADCP's operating at different frequencies, each with its own resolutions, ranges and sensitivity for different particle sizes. Together, all these sensors should give us a good insight in how the created sediment cloud disperses in our study area – and first analyses of the data indicate that this is the case. After the first set of sensor platforms had been picked-up from the seabed by the ROV and had been brought up on deck by the elevator, we immediately started downloading and working on the data. The first results look very promising, both the optical and the acoustic sensors, recorded a decreasing gradient of sediment particles in the bottom water away from the dredge tracks that seems to fit the measured southern current regime at the time of the dredge experiment. Even the sensors in a distance of 200-300 m picked up a clear signal of increased acoustic backscatter from the dispersing sediment plume. Two days later a second elevator with the remaining sensor platforms returned safely back on board. The next weeks and months we will keep on processing the recorded data to produce a preliminary model of how the sediment plume of the dredge experiment was dispersed in the area. This will also provide the desired information on how to optimize our sensor array layout for the postponed collector trial.





Photos (ROV Kiel6000): (top) Part of the sensor array at the seafloor showing from left to right a RBINS CTD platform equipped with optical backscatter sensors, a 300 kHz ADCP of GEOMAR and a pile of SLIC boxes that were deployed to collect sediment settling out of the suspended dredge plume. (bottom) One of the Elevators carrying some of the recovered sensors prior to being released from the seafloor.

On Wednesday, the four moorings of BGR equipped with current meters, turbidity sensors and sediment traps were redeployed at their designated positions for further monitoring of possible sediment resuspension of the dredge experiment by passing eddies as well as the general hydrodynamic time-series in the German contract area. On Thursday night after having secured the ROV safely on deck and retrieving the last elevator with in situ equipment, we started our 2400 nautical miles long voyage towards Vancouver. Maintenance and unmounting of the large equipment, such as Bobo or the ROV system, as well as packing of equipment and further data analyses will keep us occupied during the transit.

On behalf of all SO268 participants, Matthias Haeckel