

1. Weekly Report FS Sonne So261  
Expedition „HADES“  
01.03. – 04.03.2018



The cruise So261 started on the 2nd of March 2018 in San Antonio (Chile) with the goal to investigate the Atacama Trench, located off the coasts of Peru and Chile. It is one of the deepest ocean trenches in the world and has a maximum depth of 8065m. An international team of 40 scientist from 15 different nations is on board to study the biogeochemical processes and biology from the water surface down to the seafloor of the trench system. The cruise is part of the project HADES-ERC let by Ronnie Glud (SDU, Denmark). HADES aims at understanding bio-geo-chemical processes and microbiology at the bottom of hadal areas of the oceans. Trenches only account for less than 2% of the global seabed area, but could via sediment focusing act as traps for organic material. Consequently, the mineralization efficiency at these great depths could play a crucial role for the global carbon (and O<sub>2</sub>) cycle. The benthic mineralization is mainly driven by vast numbers of Bacteria and Archaea. Currently even the most basic information on abundance and distribution of microbes in trench sediments are missing. We want to quantify the carbon mineralization efficiency in the eutrophic Atacama Trench and compare it to conditions at the neighboring abyssal plain. The result will add to our growing database on microbial carbon mineralization in hadal settings and allow for comparison between hadal environments experiencing different regimes of vertical carbon export. Using this multidisciplinary, concerted and quantitative approach in comparing the carbon and nutrient fluxes, the connection, composition and structure of benthic communities using up-to-date methods and technologies, we will be able to improve our knowledge on trench ecosystems and deep sea ecosystems in general.

Sonne cruise So261 is the second of a series of cruises exploring selected trenches of the Pacific Ocean in different biogeographical regions. During this cruise, we plan to address the ecosystem functions such as benthic respiration, remineralization and nutrient transport, bacterial productivity, microbial as well meio- and macrofauna biodiversity in the eutrophic Atacama Trench and adjacent abyssal and bathyal sediments. Already in harbor we started to build up our instruments as we brought may different lander systems for in situ measurements (Fig. 1) and photo and video documentation. We will also use a multi- and gravity corer to collect sediment from the trench bottom. Nets and water sampler are used to retrieve samples from the water column.

The journey to the first sampling site was used to become familiar with life on board and also for preparation of the different units and instruments for their first deployments. In the evening of March 4 we reached our first site at 2550m water depth, which we use as reference to compare to the later deep trench sites. We started the research program with the deployment of a bottom lander system ('Riever') capable to take images of the seafloor. We use this information to get a fist impression of the seafloor and to decide if our other instruments can be deployed there. Images from this 2500-site showed a nice plain seafloor ideal to perform our further measurements. We therefore continued with the deployment of the towed imaging and bathymetry system OFOBS. We then had to interrupt our research

program to go to Mejillones to collect the last parts of our equipment which did not arrive in time in San Antonio.

With warm regards from the crew and the scientific party of So261,  
Frank Wenzhöfer



Figure 1: Three different Lander systems for abyssal and hadal in situ measurements are prepared for their first deployment