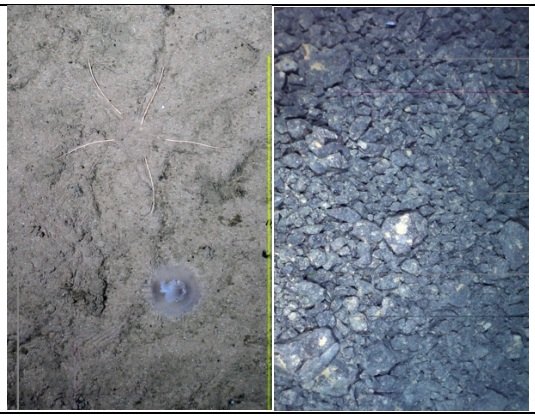
2. Weekly Report FS Sonne So261
Expedition „HADES“
05.03. – 11.03.2018

At the beginning of the second week we finished our station work at the shallow site 1 (2550m) with sediment sampling and in situ flux measurements. We then moved to the first trench site (site 6; S 24° 15.96’ W 71° 25.38’at 7830m water depth) at the southern end of our working area. At March 6 we started the sampling program with a camera-lander (Riever) deployment to get some pictures of the sediment structure. We use this “fast” inspection, one deployment takes 6 hours, to select if this site is suitable for our other instrumentation. During the lander deployment we collected water samples down to 6000m at intervals of 1000m for various analyses of geochemical and biological parameter. During the night, an OFOBS (Ocean Floor Observation and Bathymetry System) transect of the seaward trench slope was performed to get some impressions of the change in seafloor structure, habitats and fauna with depth. We observed several cliffs and areas of bare rock seafloor but also basins with sediment cover and abundant benthic organisms. The most abundant animal types included various holothurians, commonly known as ‘sea cucumbers’, some of which were very colourful and also surprisingly good at rock climbing, with several spotted on narrow ledges on the sides of steep cliffs. During a second transect further north similar geological structures were observed, but also large fields of broken rock boulders were flown over, and sediments which were quite brown in appearance, perhaps indicting a different composition to those observed during the first dive. During the second dive the most observed animals were upside down jellyfish – these creatures look much like the jellyfish encountered in shallow waters, but here in the Atacama trench most we observed upside down, pressed against the seafloor, with their stinging tentacles exposed upward in the water column to catch unaware prey.

OFOBS images site 6 showing a giant isopod (Foto: OFOBS_AWI)



OFOBS images site 5 showing a upsidedown jellyfiah and a boulder field (Foto: OFOBS_AWI)

Our trench program was then continued with the deployment of several lander systems: Nano-Lander, Profiler-Lander and 2 Camera- /fish trap-Lander. During the time the lander systems performed their measurements at the trench bottom an intensive sediment sampling program was accomplished followed by water sampling from hadal depth (>6000m) using the Hadal-Rosette system, which is winched down to the trench bottom. The mounted Niskin bottles are triggered autonomously by a pressure sensor at defined water depth.

One of the main user of these water samples are our scientists from Chile. The objectives of the Chilean group are *i*) to assess the physical and geochemical properties of the deep-water masses associated with the Atacama Trench, *ii*) to characterize the zooplankton community in the upper 6000 meters of the water column, *iii*) and to investigate the abundance, diversity, and genetic characteristics of the microbial communities inhabiting the waters of the Atacama Trench.
The scientists rely thereby on several oceanographic instruments to carry out the work. The conductivity-temperature-depth-dissolved oxygen (*CTD-O*) probe (salinity is determined from conductivity), which is mounted on the *Rosette* of SONNE, a carousel system that is lowered with a conducting cable down to 6000 m carrying 24 Niskin bottles of 10 litres volume each, which can collect water samples at different depths on demand. For hadal waters (> 6000 metres) they use their *Nano-lander*, an untethered free vehicle, meaning once it is over the side, all physical connection to the ship is severed. The Nano-lander has another CTD incorporated, as well as 2 Niskin bottles of 30 litres volume each to collect seawater samples from near the bottom. Amphipods from the bottom of the trench are collected with a baited trap mounted on the Nano-Lander. Also, videos of the activity around the trap during the deployment were registered. To complement water sampling, they use the *Hadal-Rosette*, which can be pre-programmed to sample at the required depths, in our case below 6000 metres.

Nano-Lander for collecting water samples at the trench bottom (Foto: M. Schlösser)

MOCNESS net for collecting zooplankton at different water depth (Foto: M. Schlösser)

For collecting zooplankton, they use the multi-opening-closing-net with an environmental sensing system (*MOCNESS*), a large plankton net with different compartments that open and close through an electroacoustic mechanism, permitting the collection of samples at different depths. The MOCNESS net was deployed during our transit from site 6 to site 5 (S 23° 49.02' W 71° 22.32'), our second trench site at 7890m water depth. It collected a depth-integrated zooplankton and fish sample on its way down to a maximum depth of 4200m, but it failed to open and close on its way up.
After arriving at site 5 on March 10 our general set up of instrument operations was performed: Riever-Camera-Lander , CTD/Rosette water sampling 6000m, Nano-Lander, Profiler-Lander, Sediment-Lander, Camera/fish trap-Lander 1 & 2, Hadal-Rosette, MUC and gravity corer. Due to the great water depth this entire program keeps us busy for roughly 34 hours. This requires a lot of patciences for everybody but so far sampling and in situ measurements worked very well at all sites. Our station work is excellently supported by the ships crew.

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

(with support of Osvaldo Ulloa and Autun Purser)

You can also follow our cruise at https://www.mpi-bremen.de/en/Blogpost-3-SO261.html