

**"Gardening" under extreme conditions**

Last week's work was seriously influenced by the weather conditions in the area. The extension of a low pressure system in the Svalbard area prohibited the use of more complex equipment, so that for example our autonomous underwater vehicle (AUV) "PAUL" could only be used for short deployments. Wind forces of 7-8 Beaufort and waves up to four meters in height forced us to limit our activities to the use of more robust, cabled equipment, e.g. water samplers, camera systems, sediment corer. Hence, the coastal stations off the Kongsfjord and north of Spitsbergen could successfully be sampled despite the adverse conditions with temperatures below zero degrees and light snow drift. Since last Friday, the weather has increasingly calmed down, so that we hope to be able to resume our research activities in the next days.

On Saturday morning, we recovered a free-falling system which we deployed towards the end of last week in 1500 m water depth on the so-called Vestnesa Ridge west of Spitsbergen. The bottom-lander (Fig. 1) developed within the framework of the EU project "INTAROS" (Integrated Arctic Observing System) was build in order to investigate the effects of the progressive acidification of the oceans on seafloor-inhabiting organisms in an experimental approach. Such investigations have so far mainly been carried out in laboratory experiments and in-situ only in shallow water areas. With the technically sophisticated, autonomous experimental set-up for carbon dioxide enrichment of seawater at the bottom of the deep sea, we are breaking new ground. If we could approve that the entire system is working perfectly, we will deploy the so-called "arcFOCE" (Arctic Free Ocean Carbon Enrichment) system for long-term deployment towards the end of the expedition. Sampling of the experiment and the recovery of the entire device is scheduled for summer 2019.

We are now eagerly awaiting the return of our second "Benthic Crawler". The autonomous benthic crawler "NOMAD" (Fig. 2) is the big brother of TRAMPER, which was already mentioned in the last weekly report. NOMAD is equipped with two small incubation chambers in addition to a microprofiler system measuring dissolved oxygen in surface sediments. The chambers are smoothly placed on the sediment. Subsequently, the decrease of oxygen caused by remineralization processes at the sediment-water interface is continuously measured in the water body enclosed by the chambers. In addition, NOMAD carries a special camera system that scans the surface sediments to detect sunken organic material (dead phytoplankton that has settled to the seafloor). This organic matter is the main food source for all animals living on the seabed and in the sediments.

In fact, by far the largest part of the organic matter produced at the sea surface is already degraded by zooplankton and bacteria on its way into the deep sea - on average only about 2% of this material reaches the bottom of the deep sea. An exception is the so-called "Molloy Deep" in the central Fram Strait, with a water depth of about 5600 m probably the deepest depression of the Arctic Ocean. At the bottom of the Molloy Deep, actually the deepest station of the HAUSGARTEN observatory, we found unusually high concentrations of organic matter. The topography of the Molloy Deep is reminiscent of a huge funnel-shaped trap. Local hydrographic conditions, which might favour the rapid sinking of particulate organic matter in the area, as well as slope slides, which transport surface sediments to greater depths, cause an accumulation of this material at the bottom of the depression, which is about 2 km in diameter. In order to quantify remineralization processes at the bottom of the Molloy Deep, we deployed one of our free-falling systems ("bottom lander") by the end of last week. In the HAUSGARTEN area, this is only the second use of such a system in this great water depth. The recovery of the bottom lander is planned for next Monday.

During the next week we will mainly operate in the vicinity of the ice edge in the western and northern parts of the Fram Strait. We also plan to use our AUV in these areas - as long as the weather condition allow....

Despite the occasionally adverse conditions during the last week, we are still in a good mood.

Greetings to our beloved ones at home,

Thomas Soltwedel



Fig. 1: Recovery of the “arcFOCE” (arctic Free Ocean Carbon Enrichment) system after its first test deployment west off Svalbard.

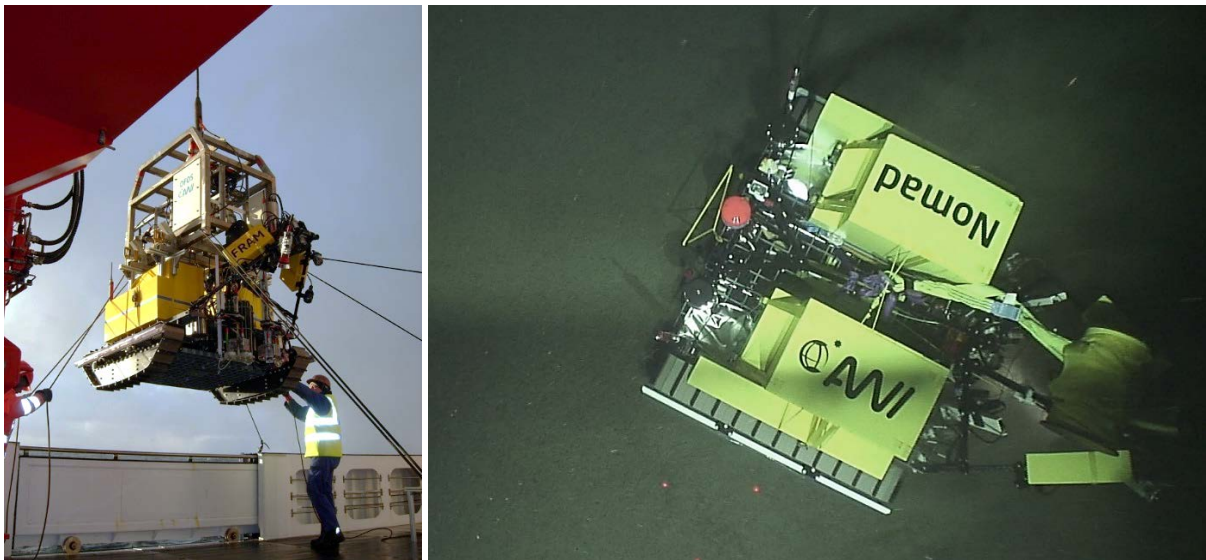


Fig. 2: Launching of the benthic crawler NOMAD (left) and arrival of the system at the seafloor(right).