

The main purpose of the cruise POS 525 with RV POSEIDON are investigations of cold-water coral ecosystems along the Norwegian coasts and margins from northern-most cold-water coral occurrences to the mid-Norwegian reefs in the North Atlantic with regard to differences in the physiological condition of the organisms of different reef sites. This cruise is involved the project 'FATE', which aims at identifying drivers of environmental changes of cold-water coral ecosystems in collaboration with the Norwegian Institute of Marine Research (IMR) funded through the Research Council of Norway.

The scientific crew boarded the RV POSEIDON on 28th of June and 29th of June early morning before heading off from Bergen, Norway, with one exception: Tina Kutti from IMR was not able to embark the vessel due to illness. We arranged boarding on the 4th of July together with scientists that were supposed to come on board that day in exchange with 2 media persons from Nord Leksa in the outer Trondheim fjord. Due to quite rough weather conditions during the first two days of transit, we arrived at the first station (Sula Reef, offshore Trondheim fjord) a little bit later than estimated and started with our research programme on 1st of July. We started immediately with one of our main tasks for this cruise, the deployment of *in situ* incubation chambers to investigate community oxygen

consumption rates as well as nitrogen and carbon fluxes of an intact coral fragment of live and dead *Lophelia pertusa* and associated organisms. Before CUBE deployment, the operation with JAGO was practiced for the ship's crew to get a feeling for deployment and recovery of the submersible. Afterwards, two CUBEs were deployed one after another by means of hanging them below the CTD frame (see picture) and releasing them above the seafloor with an acoustic releaser unit attached to the frame of the CTD as well. This could be done without exploration dive with JAGO before since we know the area quite well and were sure to deploy the CUBEs onto sediment underground. With the research submersible JAGO we searched for the two deployed CUBEs, set them up in the right position and placed a coral fragment into one CUBE that we collected before in the closest reef structures. The CUBEs were

then started by moving a handle and the stirrers inside were rotating, which was a good indication that the programme has started. The following day we used the first dive as a sampling dive to collect corals for on-board incubation experiments and samples to be preserved for later analyses such as population genetic, reproduction, and lipids in the laboratories of different collaborators. The second dive was conducted to recover the CUBE systems again and collect the incubated coral sample. The CUBEs were successfully retrieved from the seafloor with JAGO and brought carefully to the vessel's wire of the



Fig. 1 Deployment of one CUBE with the CTD / water sampling instrument. (Picture: Janina Büscher)

crane and hooked into the CUBE cord to lift them one by one on deck. On the 3rd of July we accomplished another two dives for last sampling purposes at that station as well as a transect dive to document reef communities via video records and GoPro still imaging from different angles.

After finishing with the station work in Sula in the evening of the 3rd we headed towards the inshore counterpart in the mid-Norwegian area, the reef site near the island Nord Leksa in the outer Trondheim fjord. There we conducted a first dive in the morning for exploration purposes and video surveys. Afterwards, a crew exchange took place via the tender and dropped a camera team consisting of two persons off and picked three scientists, including Tina Kutti who was supposed to be on board already, up. In this first few days of the cruise we had the opportunity to be followed by two camera operators who documented our research with a new 360°, 3D camera system with the purpose to give little children an understanding of how a JAGO dive and science on board a research vessel is being conducted through virtual reality visualisation. In the afternoon, the weather conditions did not allow for another JAGO dive and so we conducted a CTD cast instead. CTD casts were done at all stations each day to characterise the water column oceanographically by means of physical parameters and water sampling for carbonate chemistry, nutrient, and isotope analyses as well as trace elements. The coming two days followed a routine of a CTD cast in the morning before a first JAGO dive followed by one or several CTDs after lunch and another JAGO dive in the afternoon.

On the 6th of July we finished our work at the second station 'Nord Leksa' and started heading towards the northern reef sites. We passed the Lofoten in the evening of the 7th July and approached first the coastal reef location 'Steinavaer' in the northern chosen positions due to relatively turbulent weather in the offshore area, where we arrived in the morning of the 8th, enabling us to start our routine work with CTD and JAGO again in our third research area. Also this day was successfully carried out with two dives for exploration and sampling.

Unfortunately, the some units from our CUBE systems did not function according to trials beforehand, which led to limited data of the first deployment. Moreover, we now explored the seafloor topography of the two coastal sites and found out that the bottom is too hard and too intensively covered with gravel and boulders to be a suitable habitat for CUBE incubations. However, we hope to be able to deploy the CUBE systems again in our fourth station, the Hola reefs.

The Poseidon crew is very supportive including engineers, deck crew, and the bridge! We are very happy with our rewarding cruise achievements so far. Short delays due to bad weather conditions or technical issues did only minimally affect our scientific programme and we can claim it a successful expedition already now.

Janina Büscher (Chief scientist)