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After the departure of the chief scientist Eberhard Fahrbach and the Deep-Sea Group early Sunday morning Polarstern set course northwest towards the mooring array in Fram Strait to continue the recovery and re-deployment of the remaining moorings.

Moorings are an important element for studying the role of the ocean in climate. The oceans store and transport large amounts of heat. The heat transport of the Gulf Stream and its extensions in the North Atlantic is as much as that of one million large power plants. While the ocean surface currents are driven by the wind, the deeper parts of the oceans are affected through cooling at high latitudes. In this regard Fram Strait plays a major role since it provides the main communication link between the Arctic Ocean and the North Atlantic.

In order to measure the inflow of warm Atlantic water and the outflow of cold polar water, as well as their variability, our oceanographers have established a row of stationary sensor moorings across Fram Strait at 79°N that are renewed at yearly intervals. These moorings consist of a weight (usually three railroad train-wheels) and a long Kevlar rope, which is buoyed up and kept straight by a big balloon at the top. A variety of devices like velocity-, temperature- or salinity sensors are mounted along the rope at certain depths. Data from these moorings are important to determine the freshwater and heat budgets of the Greenland Sea and to understand its variability. The target is to obtain an overall picture of the Arctic Ocean/north Atlantic water exchange and its impact on the global ocean circulation.

Moorings play a similar role as weather stations on the continents, with the difference that its data can only be obtained after one year when the mooring is replaced. For the recovery of a mooring an acoustic signal is sent from the ship, which causes a device at the bottom of each mooring to release the anchor rope. The top buoy and smaller floats next to each instrument then pull the anchor rope up to the water surface including all sensors for an easy retrieval. Under good weather conditions and calm sea the recovery usually takes two hours. Bad weather, rough seas and sea ice may cause a severe delay.

Although the visibility was occasionally less than optimal we achieved – through an excellent collaboration between the crew and the scientists – a faster recovery than expected. This gave use some extra time for the difficult transition to the geological research sites further north in the dense pack ice. We have now recovered all 12 moorings and re-deployed 11 of them. Out of 69 instruments 67 provided excellent data. One instrument got lost and one was defect. This year’s 97% success rate was the highest since the beginning of these measurements in 1997.

Besides the mooring work we have continued to measure the vertical

struc---ture of temperature and salinity and to take water samples at different depths in Fram Strait to determine its bio-geo-chemical proper--ties. The main tool of the oceanographers for this work is the so-called CTD-rosette, which consists of a cylindrical frame with sensors for temperature, salinity, oxygen, turbidity and chlorophyll-a in its centre. At its rim, a carrousel of water samplers is fixed, consisting of 24 plastic tubes of 1m length and 10 cm diameter, which can be remotely closed at top and bottom. Through lowering the CTD-rosette to the ocean floor and closing the water samplers at certain depths upon lifting we were able capturing the dif-fer--ent water masses, which are then analysed for various tracer concen-trations and other physical and bio-geo-chemical properties. Subsequently, these data are compared to measurements from previous cruises. A prelimi-nary comparison to data from the previous year indicates a slight cooling of the intermediate layers in the West Spits-ber-gen Current. The Return Atlantic Water in the middle of Fram Strait, on the other hand, was characterized by higher temperatures (up to 0.5°C) and slightly higher salinities.

After finishing the mooring work, we steamed north into dense pack ice towards two geological sites at 81°36'N to take sediment samples. The transit was difficult since at these latitudes winter has already set in. At -9°C we were able to observe the different stages of sea ice formation in full detail. The geological work finished successfully Sunday morning. The aim of this study is to investigate the climatic history of the Arctic Ocean from marine sediment cores, which were taken by two different de-----vices, a box corer and a gravity corer.

The box corer resembles a big cube of 50cm size with an open base. After penetration into the sediment, the box is closed at the bottom, yielding about an eighth of a cubic metre of sediments with information about the recent history of climate. Information from further back in time is ob-----tained with the help of the gravity corer. The gravity corer is a metal tube of approximately 10m length, which is pushed into the sediment by a top weight of 1.5 tonnes. Fourteen cores have been taken with an average length of 6m, providing information about the history of climate back to approximately 100 000 years. Details about these records will be obtained from specific investigations at home.

Currently we are steaming south to continue the hydrographic section at 79N towards Greenland. With best wishes from all participants of this cruise for all family members and friends at home from the Yermak Plateau north of Spitzbergen

Yours Peter Lemke