MERIAN MSM76 – Weekly Report 5

After R/V "MARIA S. MERIAN" sailed along larger areas covered by fast ice on the shelf of Northeast Greenland, we reached the entry to the embayment of the 79°N Glacier on 3rd of September. The day before, strong northerly winds had set the sea ice in motion and had moved large ice floes into the bay, thus there was no possibility for us to move further onshore.

One of our goals had been to recover a mooring deployed a year ago right at the calving front of the glacier. With good visibility of the rocky shores of Greenland we repeated a hydrographic survey across Westwind Trough (located just outside of the bay) instead that had been covered two years ago by R/V Polarstern. First analyses showed a marked temperature increase within the subsurface layer of relatively warm Atlantic Water. It is this water mass that flows into the 80 km-long cavity underneath the floating ice tongue of the 79°N glacier, causing large meltrates at the ice base.

Over the course of the day, the winds calmed down. Yet, no improvement of the sea ice conditions in the bay were seen, thus we had to give up our ambition to get closer to the glacier. We deployed a mooring at the entry to Westwind Trough, that shall observe continuously the circulation changes of the Atlantic Water for the duration of one year.

Fig. 1: View of the Greenland coast close to the 79°N Glacier (Photo: Dragonfly Leathrum-Simons).

Subsequently, we sailed across the shallow shelf in an easterly direction toward the shelf edge. The latter was clearly visible as a narrow belt of ice floes, that moved southward out of the Arctic Ocean, carried along by the East Greenland Current. This current represents the most important export pathway of sea ice and low-salinity ocean waters from the Arctic Ocean. Swell and poor visibility due to snowfall forced us to steam southward along the ice belt on the shelf until favorable sea ice condition on 5 September allowed us to conduct a survey of the strength and hydrographic structure of the East Greenland Current.

In the afternoon of 6th of September we began our work on the eastern side of Fram Strait in the area of the West Spitsbergen Current. The latter represents the northward extension of the Gulf Stream-North Atlantic Current pathway, along which warm, saline waters from the subtropical North Atlantic are carried towards the Arctic Ocean. Since 1997 the Alfred-Wegener-Institute has been operating a long-term observatory in the West Spitsbergen Current based on a moored array running along 79°N latitude line across the continental slope of Spitsbergen.

In the following days, moorings were serviced during daytime and hydrographic measurements were conducted during nighttime. We succeeded in recovering three moorings that had been sampling the strength and structure of the West Spitsbergen Current at an hourly resolution continuously for two years. Regrettably, a fourth mooring at the shelf break could not be recovered. In order to maintain the observatory, in the following four moorings were re-deployed which shall be serviced again in two year's time.

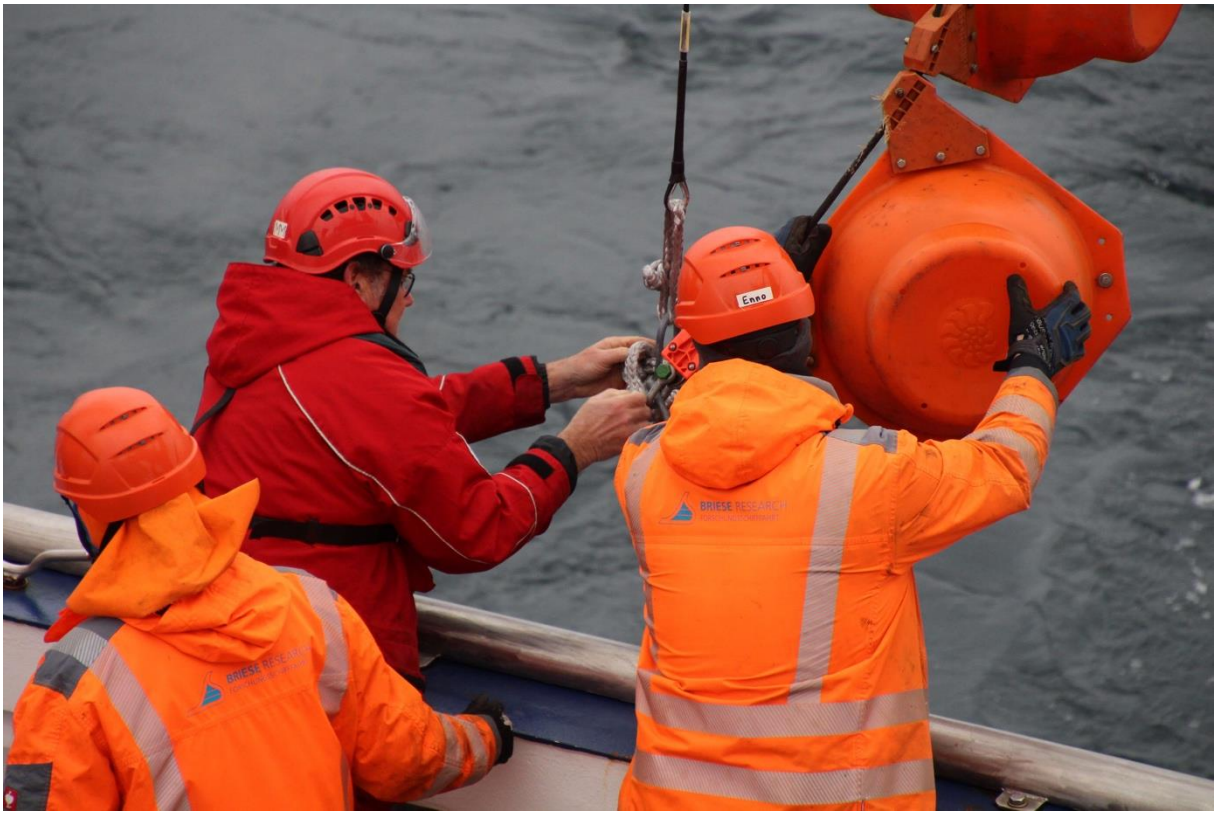

Fig. 2: Deployment of a mooring in the West Spitsbergen Current over the stern of Merian (Photo: Dragonfly Leathrum-Simons).

After completion of the mooring and hydrographic work along the 79°N section we are now on a transit to 80°00’ N and 002°45’E. It is along this meridian where we will conduct a hydrographic survey in the center of Fram Strait in a southerly direction over a distance of 120 nautical miles as the last work package of the expedition. Our aim is to capture the part of the warm waters that – coming from the West Spitsbergen Current – do not flow further to the north into the Arctic Ocean but instead recirculate within Fram Strait, only to move back southward along the shelf edge of Greenland. We are thus targeting the main supply pathway of the warm Atlantic Water, that over the course of this expedition we repeatedly encountered on the shelf of Greenland, in Scoresby Sound and near the 79°N Glacier.

On 11th of September, our expedition will end in the port of Longyearbyen. I am looking back with joy on a successful expedition. Our time on board has been highly enjoyable owing to both the spirit and professionalism of all parts of the crew of R/V Maria S. Merian and to the impressive engagement and solidarity among the scientific participants.

Kind greetings on behalf of the science party,

Torsten Kanzow