MSM93 Emden-Emden

Weekly report 4

13. – 19.07.2020

We spent the entirety of the first part of the week at the front which we had found on July 8th and which we had been surveying intensively since July 9th. From July 9th to July 16th we spent 7 intense days in an area of barely more than 20km by 20km. The progression of stations was very quick with among others CTD and in-situ camera profiles of max. 500m depth and a distance between stations of max. half an hour. We attempted to do station work during day-time and to survey the horizontal structure of the front throughout the water column during night-time. Since the Triaxus had various software and hardware issues, we could only use it during a few nights. Therefore, we often used the underway CTD and together with the ship's ADCP it helped us to gain an understanding of the ocean dynamic.

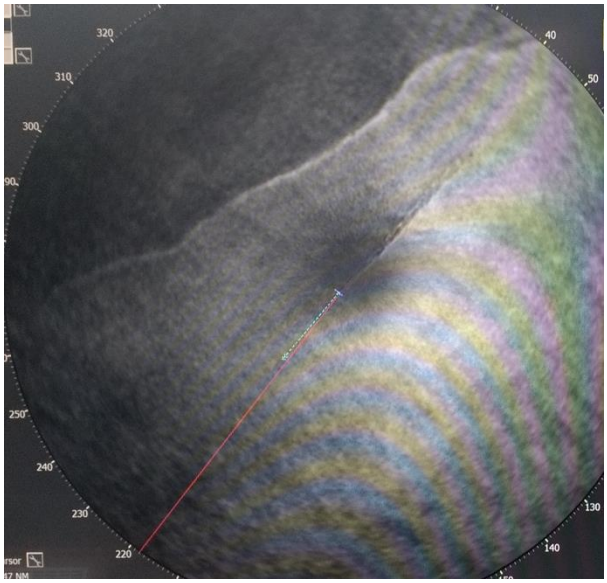

Photo 1: Ice-radar image of the front which is located on starboard at a small angle to the ship's course. After this transect, we changed the orientation of the transects by 90°. (Photo: S. Schilling)

A few special moments of the frontal study were when we realized that the frontal axis had turned by almost 90° within the first 3 days of the survey. Therefore, the orientation of our transects was almost parallel to the frontal axis (Photo 1) and we rotated our transects for the following days by 90°. The subsequent vessel mounted ADCP transect then directly showed that water at the surface was moving toward the frontal axis and then dove down. That was a clear signal that our measurements were on the scientific target. A few days later we then achieved measurements of particle concentrations below the upper part of the water column which will hopefully also show that the water is diving down. In the east of Fram Strait warm Atlantic Water (water which originates in lower latitudes) is at the surface and in the west it lies below cold Polar Water (water from the Arctic Ocean). That much we knew before, but these are likely the first measurements which directly show how the Atlantic Water pushes itself below the Polar Water.

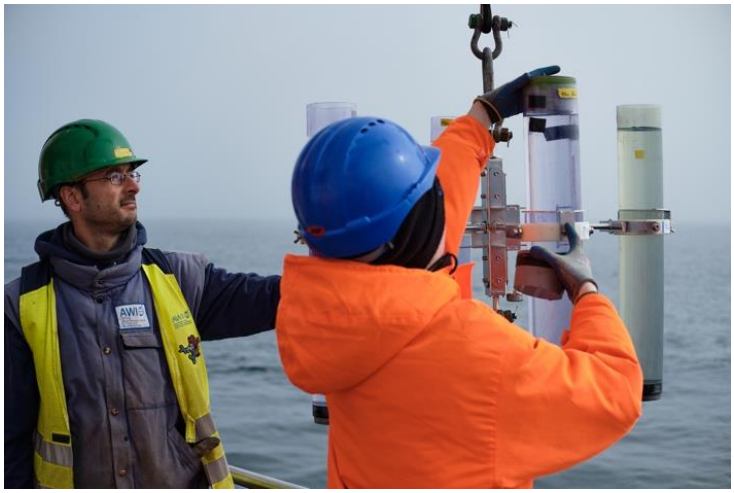

Photo 2 top left: The CTD rosette is coming back on deck. Photo 3 top right: A drifting sediment trap is being prepared for deployment. Photo 4 bottom left: A package with three different but complementary camera systems is being lowered into the water. Photo 5 bottom right: A package which measured optical properties of the water and of the algae in the water is being prepared for deployment. (Photos: T. Kalvelage)

In addition to core parameters of the physical oceanography (Photo 2) we also covered many parameters of the biological oceanography (Photos 3/4) and also collected measurements and samples for water chemistry, for optical properties of the water (Photo 5) and for gas concentrations (noble gases and chlorofluorocarbons). Our cruise is also followed by a journalist (T. Kalvelage).

After we had finished the measurements at the front more than successfully, we had our hump day party. Since then we are on the way to Scoresby Sund. That is the largest fjord in the world and it is located on the eastern coast of Greenland roughly half way between northern and southern Greenland. Moorings are located in the fjord which measure the Atlantic Water while it flows down a steep slope at great depth in the fjord. Directly afterwards it reaches the glaciers and participates in melting of the glaciers. After we had observed the Atlantic Water during its dive down from the surface at the front in Fram Strait, it would be a great connection, if we could also observe it during its descent directly in front of the glaciers. Whether we can achieve that remains to be seen, since at this point there is still sea ice between us and the fjord.

Let’s see and until then, best wishes,

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