



***RV Meteor***  
***Cruise M164 (GPF-19-1-105)***  
***23.06.-31.07.2020***  
***Emden – Emden***



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**4. Weekly Report**  
**13.07.-19.07.2020**

In the fourth week of our *M164 (GPF-19-1-105)* expedition we continued our cruise westwards and completed an intensive work program. On the night of Monday, July 16<sup>th</sup>, 2020, we had recovered the PIES *BP-30/2*. Acoustic telemetry on three other devices followed during the week, i.e. data transmission with an underwater microphone, the hydrophone. After the end of each telemetric data transmission, all devices in the western Atlantic were recovered on various nights. The emerging sea fog, which is a frequent and persistent guest in the Newfoundland Basin, always made the recovery operations exciting. However, the radio transmitters and flashers installed in the PIES worked reliably in all cases, so that we were able to locate and collect the devices after their ascent from the sea floor to the surface, even with visibility of only up to a few hundred meters. This means that seven out of eight PIES are already on deck. We will collect the last remaining PIES, *BP-34*, on our way back to Emden.

On the westward course towards the Flemish Cap, we also deployed all remaining *Deep Argo* floats provided by the French *Ifremer* institute. All devices have already reported successfully via satellite and are now recording vertical profiles of the temperature as well as the salinity and oxygen content for the upper 4000m of the ocean at intervals of 10 days.


On Thursday, July 16<sup>th</sup>, 2020, the recovery of the boundary current mooring *BM-22* was on the work schedule. Equipped with currentmeters and temperature and salinity sensors, this mooring serves the purpose of measuring the strength and variability of the western boundary current. Coming from the north, the Labrador Sea, this current carries cold and fresh North Atlantic Deep Water southwards into subtropical regions. Where water flows off, water must flow back again. Among others, this is the task of the North Atlantic Current, the northern continuation of the Gulf Stream, which brings warm, saline water to the north at 47°N. At this latitude, it is located somewhat to the east of the western boundary current. Together, these two currents are part of the so-called Atlantic Meridional Overturning Circulation (AMOC), which we want to investigate using the measurement data we obtain during the cruise. The mooring *BM-22* lies exactly in the core of the western boundary current and forms the western end of the NOAC deep-sea observatory

deployed along 47°/48°N. On its way south at around 47°N, the boundary current must circumnavigate the Flemish Cap, a large, shallow underwater plateau. This is a region where dense sea fog is often to be expected, which suddenly comes and goes. The conditions at the beginning of the recovery of *BM-22* were therefore not optimal. But there was a greater likelihood that the conditions would get worse and the sea could get rough. We therefore gave the acoustic release device attached to the mooring the command to detach itself from the bottom weight and were able to follow its ascent towards the surface. Unfortunately, both radio beacons and an Iridium satellite transmitter installed on the mooring failed. Therefore, we were solely dependent on an optical sighting and were initially unable to find the mooring in the fog. We then carried out a search pattern taking into account the current and wind conditions and were indeed able to locate the mooring floating on the surface and get it on board. All mooring devices were thus successfully recovered and most of the stored measurement was already downloaded from the devices.

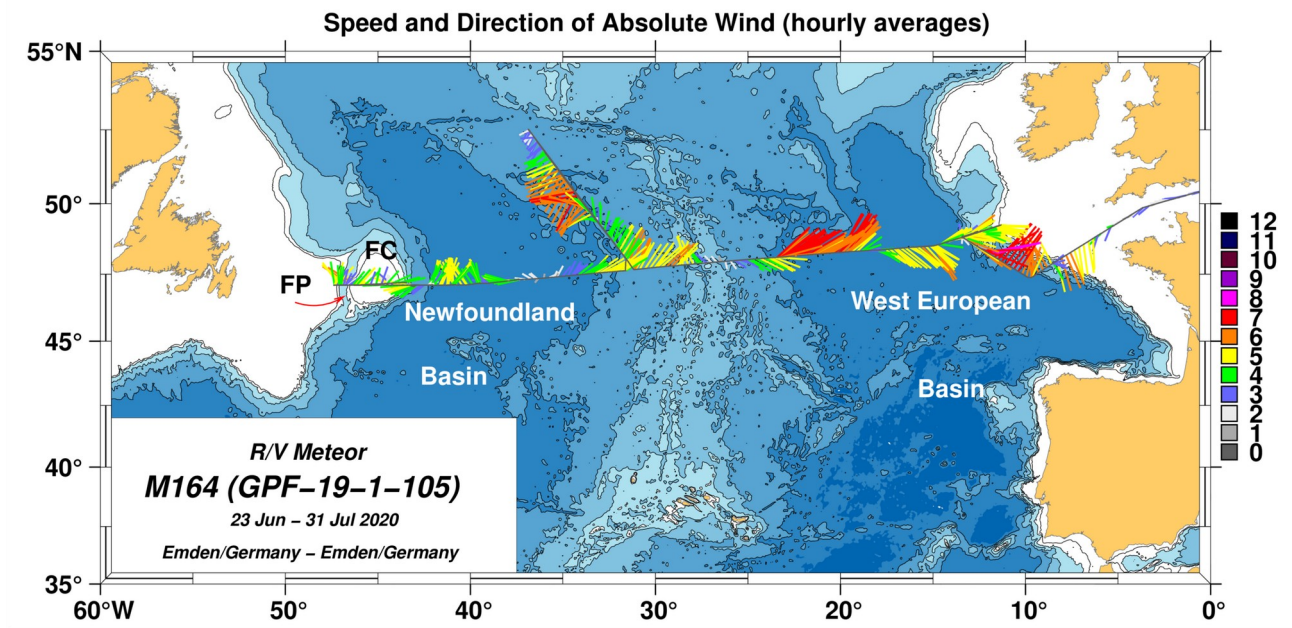
After the successful mooring recovery, we made a very densely spaced hydrographic section coming from the deep Newfoundland Basin towards the Flemish Cap. After we reached the shallow water depths on the east side of the cap, we moved into the Flemish Pass located west of the cap. This passage has a water depth of about 1200 m. Part of the western boundary current takes this short-cut to the south. Here too, a densely spaced section was made to measure the water masses and flow conditions in the passage.

Now, on Sunday, July 19<sup>th</sup>, 2020, we are back on the way to the east and resume our measurements in the Newfoundland Basin.

Best wishes on behalf of all cruise participants.



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*So far recorded hourly mean values of wind speeds and directions on the Beaufort scale (0: no wind, 12: hurricane) during the M164 (GPF-19-1-105) expedition. FC: Flemish Cap; FP: Flemish Pass.*