

MSM121

Nuuk – Ponta Delgada

September 23 – October 16, 2023

Weekly Report No. 2

(September 25 – October 1, 2023)



During the past week we reached our first working area south of the Grand Banks of Newfoundland where we deployed an array of four moorings in water depths ranging from 1500 to 4300 meters. Each individual mooring consists of a number of acoustic current meters and temperature and conductivity recorders, so-called MicroCATs. Current meters measure the speed of the water that passes the mooring, while the MicroCATs provide temperature and salinity of the water column. The instruments are connected by long ropes, floatations keep the mooring upright in the water column. A weight of several hundred kilograms holds the mooring on position. The weight can be released upon an acoustic signal during mooring recovery.

Deployment of the first mooring (GB4) began on the afternoon of September 28 with the large top floatation. Subsequently, all other instruments were attached one by one, while the ship towed the lengthening mooring behind it. About 4 hours later, the anchor was dropped, and the mooring sank to its designated position. The mooring work proceeded smoothly over the next two days under ideal weather conditions. Additionally, and primarily during the night, CTD and ADCP measurements were carried out at and between the moorings to determine the horizontal distribution of temperature, salinity and current velocity. Tracers samples were collected from water samples at a number of these CTD stations.

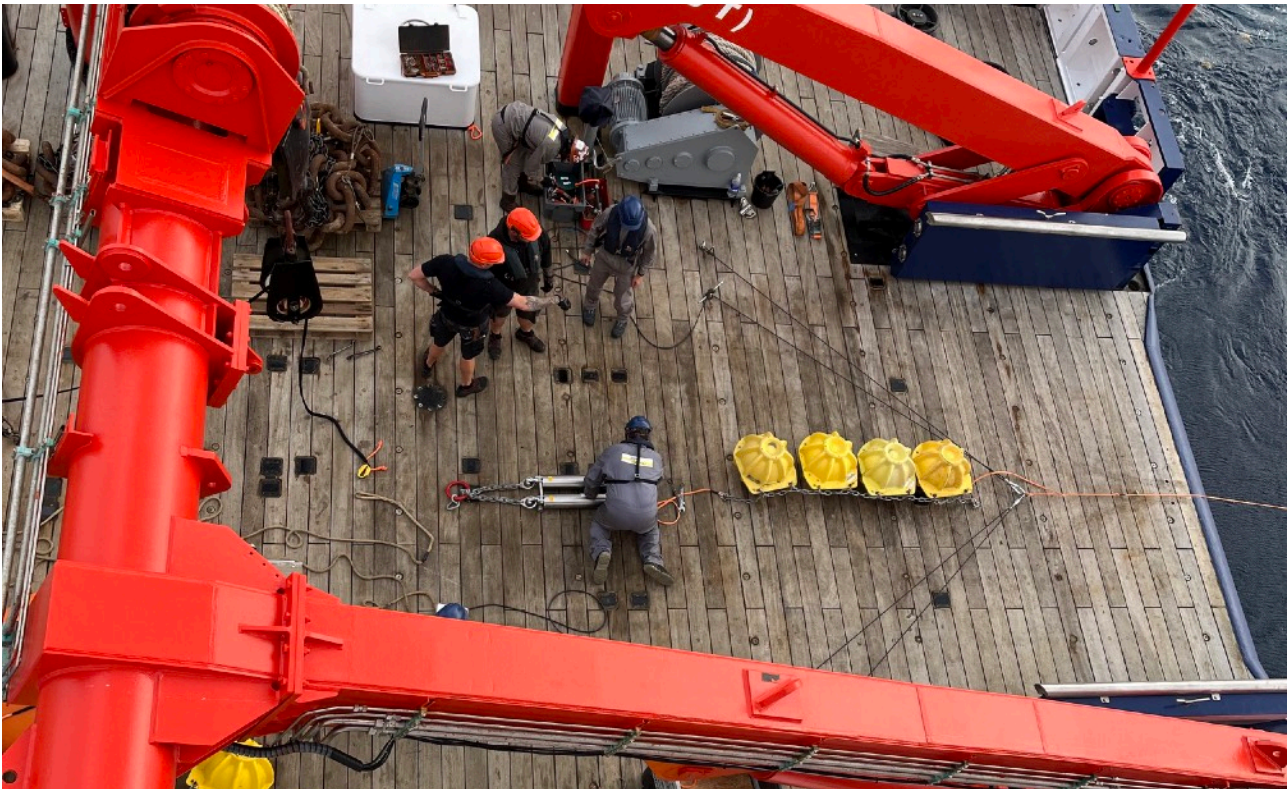
Three landers, PIES and bottom pressure recorders, were deployed close to the moorings. All of them measure bottom pressure with



Deployment of mooring GB4 on research vessel Maria S. Merian south of the Grand Banks of Newfoundland (photo: Eleanor Frajka-Williams).



Top float with ADCP towed behind Maria S. Merian shortly after the start of the mooring deployment (photo: Christian Mertens).



Preparation of acoustic releases and floatations for mooring deployment (photo: Eleanor Frajka-Williams).



Lander (PIES) deployed close to mooring GB4. The instrument measures pressure at the seafloor and the travel time of acoustic signals from the seafloor to the surface and back (photo: Eleanor Frajka-Williams).

high accuracy and PIES (inverted echo sounders with pressure sensors) additionally measure the travel time of an acoustic signal from the seafloor to the surface and back. Horizontal differences in bottom pressure are directly proportional to the geostrophic current between the instruments, which makes them quite useful to study the variability of ocean transports. However, the requirements for the accuracy of pressure measurements to detect small long-term changes of geostrophic currents are very high, which is why two of the landers are equipped with particularly accurate pressure sensors. To improve their ability to measure slow long-term changes, reference measurements inside the pressure sensors are used to correct their long-term drift. This internal calibration makes it easier to study multi-annual trends of the ocean circulation.

On Saturday evening we completed our work along the Grand Banks section with the deployment of the fourth mooring and a subsequent CTD cast. We then headed about 240 nm to the east for the deployment of the next PIES that is located southeast of the Grand Banks.

More information about our research activities and life on board can be found in the blog posts at <https://epoc.blogs.uni-hamburg.de/our-work/expeditions/msm121/>. Best wishes from the scientific party of MSM121.

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