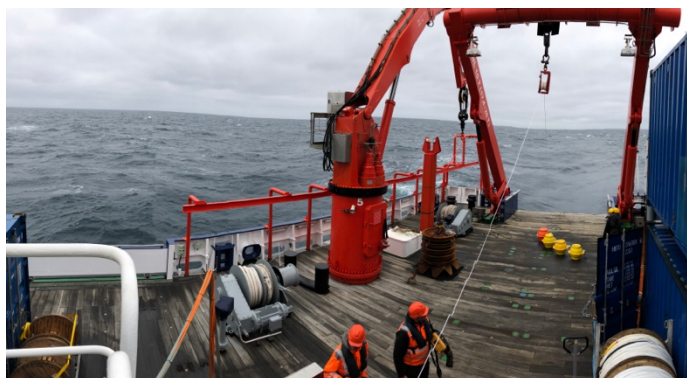


4. Weekly Report - Maria S Merian MSM94

The past week was dominated by the re-deployment of moorings. The "53°N Array" consists of 7 moorings extending over a distance of about 200km from the Labrador shelf break into the central Labrador Sea, and the "K1 mooring" is in the central Labrador Sea. The instruments are distributed in the water column in such a way that the current velocities and the temperatures and salinity of the water are measured at representative points.



Mooring work using the A-frame (Photo: P. Handmann)

Measurements are collected and stored about every hour, and even more frequently in some devices. Since June 2018, when we deployed the devices during the MSM74 expedition, about 20.000 observations (hours) per device have been recorded. The first assessment of the data here on board showed that there have only been a few short failures of the instruments. We are more than happy about this and it shows that the months of careful preparation have been worthwhile. The next step is now to carry out a quality control before the scientific analysis of the data, in order to make all data from individual devices comparable with each other.

From our partner institutes we have installed further devices at the moorings. Sound receivers for fish detectors were provided to us by the Ocean Tracking Network in Canada. The data are used to study the migration of fish (oceantrackingnetwork.org; website in ENGLISH). The University of Rhode Island, USA, and Dalhousie University, Canada, provided us with equipment to install on the moorings to measure the oxygen and carbon dioxide content of seawater. Oxygen is of central importance to the ocean ecosystem. In the case of carbon dioxide, one aim is to understand which processes control the gigantic absorption capacity of the ocean for the greenhouse gas introduced into the atmosphere by humans.



Preparing the launch of 50 surface drifter (Photo: H. Olbricht)

The corona pandemic has also put ocean observations at risk. This applies in particular to the central role played by research vessels, even in modern times. Despite the great progress that has been made in the field of self-registering devices and robots over the last 20 years, ships are needed for a wide range of tasks. This is also evident on this voyage. For example, we are laying out 9 profiling drifters of the Argo array in the Labrador Sea. One of these robots was entrusted to us by the

Federal Maritime and Hydrographic Agency (BSH, Hamburg), the other 8 were given to us by the French institute IFREMER. The robots are sent on their journey, which will

last many years. Float observations, in conjunction with the mooring sensors, will also help to determine the input and transport of oxygen and carbon dioxide. Yesterday afternoon, 50 surface drifters started to be deployed for our colleagues from the National Oceanography Centre, UK. These drifters measure air pressure and air and sea temperature and follow surface currents. The data will contribute to the TERIFIC project (projects.noc.ac.uk/terific/funding), which studies time scales and dispersion paths of melt water from the Greenland ice sheet. The meltwater may possibly penetrate into the central Labrador Sea, which in turn may possibly have an influence on the overturning circulation. The data from the drifters are sent to land via satellites. Besides its scientific value, the data from the drifter is also used to improve our weather forecasts. Since all these devices are designed while the ship is moving, there is no loss of time for the voyage.



Mooring elements (yellow dots) viewed from a drone (Photo: T. Ederleh)

Mooring operations always demonstrate how well the interplay between ship's crew and scientists is working. This is the 7th time we exchange Labrador Sea moorings with Merian and many crew members and scientists know each other since more than a decade. A challenge that requires many helpers on the bridge with binoculars is the sighting of a surfaced mooring. On this voyage, it has been shown that the use of a drone can be very helpful to first spot and then get an overview of the alignment of the mooring after surfacing. This information is important for the ship's officers and the crew on deck to be able to recover the equipment safely. In international waters and in calm weather this worked very well.



School of Pilot whales encircling the Merian (Photo: J. Karstensen)

From time to time we also encounter whales - mostly schools of pilot whales. Whale sightings are always something special and word gets around quickly on the ship.

The coming week will be dominated by work on the West Greenland side of the Labrador Sea. Here too, moorings will be used to sample the water masses near the bottom.

With greetings now from the Labrador Sea, Johannes Karstensen (GEOMAR) for the participants of the MSM94