

# 1. Weekly Report MSM74

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The MSM 74 cruise aboard Maria S. Merian started at 2:30 pm on the afternoon of May 25, 2018, after we had bunkered 320 tons of fuel in the morning and carried out a compass calibration. Already half an hour after departure, we were at the "Station 27", a long-term coastal station from our Canadian colleagues, sampling here regularly since 1947. Through our measurement, we like to contribute to this time series and can also carry out a first test of our instrumentation. All systems ran smoothly and we made our way to the first working area off the coast of Labrador.



The work on board the Maria S. Merian aims to improve our understanding of the role of the North Atlantic in the global climate system.

*The Pilot boat turns back to St. Johns. In the back Signal Hill, where the first ever transatlantic radio communication was received in 1901 (transmitted from Cornwell, UK) (Foto: A. Barboni)*

In the northern North Atlantic, warm surface water is transformed into cold deep water - a phenomenon that is coupled to many individual processes. We are interested in identifying the processes in more detail and, at best, also about their long-term fluctuations (several years to decades). In terms of methodology, we proceed as follows: From individual vertical profile measurements from the ship, in which a probe is lowered to the seabed and back to the surface about every 10 to 20 km or so, we create maps of water velocity, salinity, temperature and oxygen. These "sections" show us the vertical structure of the Labrador Sea at the respective time of the cruise and are interpreted as a single realization but also in comparison to previous surveys. In addition, we have installed devices in the water column by fixing a wire to an anchor on the seabed. The wire is held vertically up with the help of floatation elements, so that devices mounted on the wire will measure at different depths. The devices we want to recover on this trip were "anchored" 2 years ago, in May 2016. The changes in the different water depths are examined for possible causes, which we usually derive from our theoretical understanding.

A simple example of this is the cooling of the water in winter and warming in summer - the so-called "seasonal cycle". In the time series recorded near the surface, the annual cycle can be seen as the most obvious signal of high



temperatures at the end of the summer and low temperatures at the end of the winter. With the

***Installation of equipment at the deck of Maria S Merian in the harbor of St. Johns, Canada. The ship is handed over "empty" to subsequent teams. The installation of the equipment often takes a few days (Photo: J. Karstensen)***

help of long-term measurements, systematic changes, such as a general warming or an annual cycle shift, can be detected despite a strong seasonal cycle is masking them.

Our work is a contribution to the BMBF project *Regional Atlantic Circulation and Global Change* (RACE; [www.marum.de/Forschung/RACE.html](http://www.marum.de/Forschung/RACE.html)), in which virtually all marine research institutes in Germany are working together. Internationally, the work is embedded in the OSNAP project ([www.o-snap.org](http://www.o-snap.org)) where Canadian, American, Dutch, British, French and German researchers collaborate to investigate the subpolar North Atlantic circulation variability – from Canada to the British Isles.

The team on board consists of technicians, scientists and students from Germany, Great Britain, Canada and France. One objective is to measure the vertical structure of the Labrador Sea. First results of the previous cruise (MSM73) by Dr. Dagmar Kieke (MARUM) and also part of the RACE program, showed very exciting large-scale changes in the western subpolar gyre region. We now will map the areas that have not been probed by MSM 73 in order to complete this year's survey. In total, we will also perform 27 mooring operations - reading out data, calibrate and reinstall devices. A lot of work is ahead of us.

The mood on board is very good, everyone has now “sea legs” and Sebastian, the “chef de cuisine” spoils us with delicious dishes. It is good to know that the ship's crew of the shipping company Briese under the direction of Captain Ralf Schmitt will support us professionally in every respect.

Greetings from the Labrador Sea,

Johannes Karstensen for the cruise participants of the MSM74