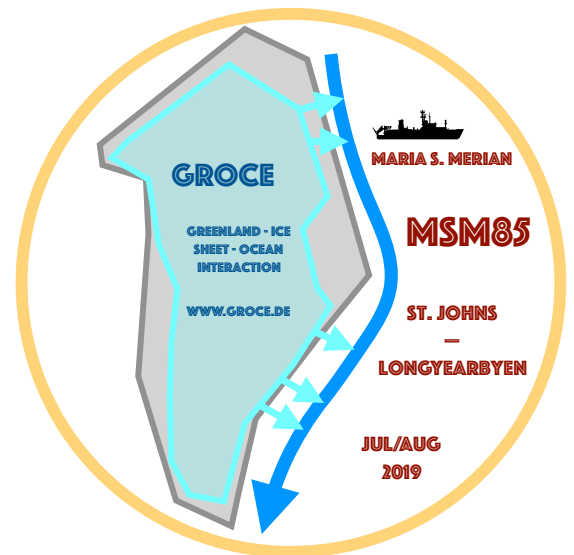


MSM 85

St. John's – Longyearbyen

July 23 to August 13, 2019



Weekly Report No. 1

(July 23 to 28, 2019)

On Tuesday the 23rd of July RV Maria S. Merian left the harbor of St. John's, Canada for cruise MSM85. The cruise is part of the multidisciplinary research project GROCE (www.groce.de). GROCE stands for *Greenland Ice Sheet Ocean Interaction*, and is a collaborative effort of several German universities and research institutions to investigate the interaction of melting Greenland glaciers with the atmosphere and the ocean. The shipboard party is formed by 19 scientist from the Universities of Bremen, Hamburg, Oldenburg, and Montréal, and from the GEOMAR in Kiel, as well as two journalists. The objective of this cruise is to carry out physical and chemical oceanographic measurements along the eastern coast of Greenland.

The accelerated melting of the Greenland Ice Sheet in the last two decades is mainly attributed to the inflow of warmer water into the fjords of the outlet glaciers, but it is still unknown how much of the surface and basal melt water leaves the fjords and enters the East Greenland Current. This question is of much more than local interest, because additional freshwater in the key regions of the formation of North Atlantic Deep Water could alter the vertical density stratification, modify the amount of deep water formed, and have consequences for the strength of the climate relevant Atlantic meridional overturning circulation. From the results of this cruise we want to estimate the amounts of surface and basal melt water on seven hydrographic sections across the East Greenland Current using the spatial distribution of helium and neon isotopes. The parallel analysis of CFCs and SF6 provides an estimate of the ventilation time and thus together with the melt water fractions an integral melting rate.

Additionally continuous measurements of nitrous oxide (and other trace gases) in the surface waters are carried out along the cruise track, as the eastern coast of Greenland is a greatly under-sampled region for this gas. Nitrous oxide is a potent greenhouse gas and



Tow fish hung from a crane on Maria S. Merian to collect samples of surface water for measurements of trace elements and nutrients.

the most important ozone-depleting compound in the stratosphere. In the ocean, N_2O is produced in intermediate waters via microbially-driven organic matter degradation, and it is exchanged with the atmosphere in surface waters. Further, to collect uncontaminated samples of the surface water, a tow fish is dragged alongside the ship to study the supply of (micro-) nutrients by melting glaciers and the limitation of phytoplankton growth that depends on the supply of key nutrients.

After a four-day transit we arrived in our working area on Saturday the 27th, close to the coast of Greenland at about $63^\circ N$. From there we started to first hydrographic section toward the southeast. The weather conditions are excellent and all instruments are running without problems.

Best wishes to all friends, families and colleagues on shore,
Christian Mertens and the scientific party of MSM85

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