

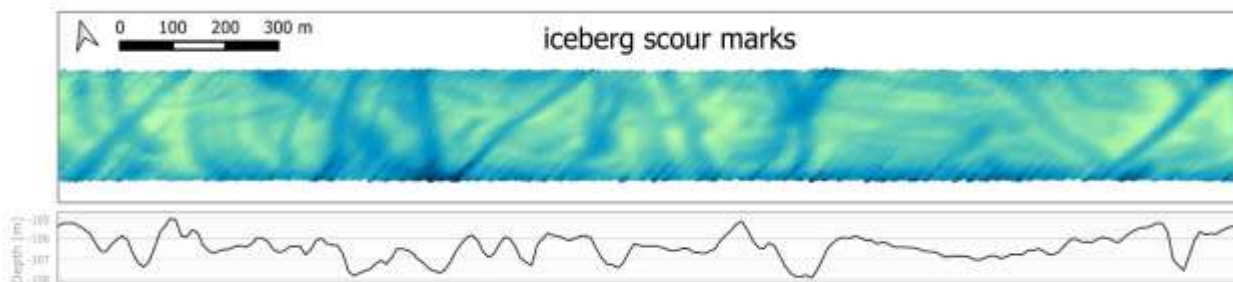


FS MARIA S. MERIAN
Reise MSM120, St. John's - Nuuk
5. Weekly Report, 11.09. - 17.09.2023



Hudson Bay System (HuBS)

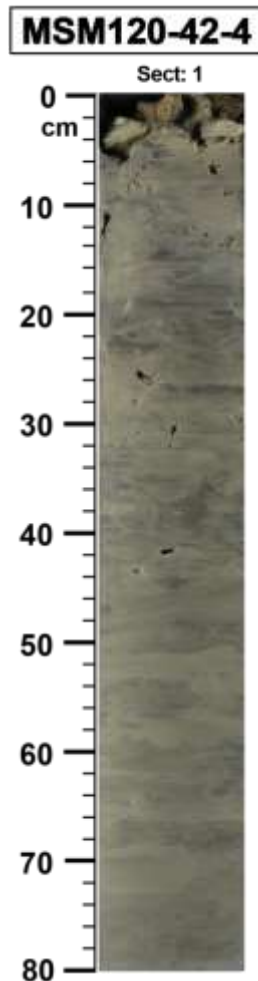
The last week was dedicated to extensive hydroacoustic mapping and sampling of the water column and near-surface sediments in the Foxe Basin. Based on several N-S sediment echosounder surveys across the E-W stretching deeper part of the basin, different sedimentary facies from glacial tills at the base, superimposed by glaciomarine clays, silts, and sands could be identified. In the deepest parts of the basins (~ 400 m water depth) the latter are covered by Mid to Late Holocene hemipelagic, strongly bioturbated, soft muds. Along the basin fringes (~ 200-300 m water depth), the thickness of the Holocene muds is either strongly reduced or they are completely missing, due to strong erosion by bottom currents. In even shallower areas (~ 70 bis 200 m), also the glaciomarine sediment layers are missing. Here, the glacial tills reach the sea-floor surface which is marked by many scours of drifting icebergs and sea-ice and covered by many ice-rafted fragments scraped from the surrounding Paleozoic and Proterozoic basement rocks.



Iceberg scours carved into the sea-floor reaching till layers deposited during the retreat of the ice sheet scours in water depths of about 100 m in the central Foxe Basin. The upper graph shows a section from multibeam EM712 mapping of the sea-floor. The lower graph indicates the respective depth profile with up to 3 m deep scours 3 m (Fig. S. Papenmeier).

In these shallow regions the sediment cores retrieved by multicorer and gravity corer deployments were often covered by gravel-sized rock fragments with a diameter of about 5-8 cm. These gravely surfaces on top of Holocene muds are taken as evidence for the first fragmentation of the winter sea-ice cover and ice drift during summer. Instead, during the winter season, full sea-ice cover caused the formation of high-density bottom waters and currents, eroding all fine sediments and their transport into the deeper parts of the basin and leaving the rocky layers as relict sediment facies in the shallow regions.

Nonetheless, we succeeded to core a 4m thick sequence of Holocene muds in the shallow region of the Foxe Basin near the Polar Circle. This, for the first time will offer the opportunity to perform paleoclimate reconstructions for the youngest geological time period well into the Anthropocene.



Upper meter of a sediment core containing olive-green, strongly bioturbated Holocene muds, typically found superimposed on the glaciomarine sediments and glacial tills. This core was retrieved in small depression at a shallow site in the central Foxe Basin. At the surface the fine muds are eroded by strong bottom currents and are covered by a layer of rock fragments as a relict of the sorting by the currents (Fig. P. Matzerath).

The work program in the Foxe Basin was terminated Saturday morning, September, 16th north of Southampton Island, at the western entrance into Hudson Strait. During the following night and until Sunday afternoon, September, 17th, we executed further hydroacoustic surveying of the sea floor and sediments in the remaining work area of MSM120 within Hudson Strait. There the entire work program of MSM120 was finished with a final CTD and Water bottle sampling, as well as with multicorer deployments.

Despite the missing work licenses at the beginning of the cruise we were able to conduct most of the planned work in a very successful manner and to reach the essential goals identified for MSM120 beforehand. Since Sunday afternoon, September 17th, the vessel is on transit to its final destination, that is Nuuk Harbor at the west coast of Greenland. As planned, the arrival will take place Wednesday morning, September 20th.

Faced still by wintertime conditions with air and water temperatures between 2 and 3°C, the remaining tasks, e.g. the documentation and archiving of all shipboard data and samples are performed and the equipment prepared and stored for the transport back to the Canadian and German laboratories.

With best regards RV MARIA S. MERIAN,

Ralph Schneider

September, 17th, 2023