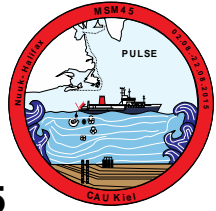




FS MARIA S. MERIAN Cruise 45 Nuuk, Greenland – Halifax, Canada Weekly report Nr. 1, August 2, - August 9, 2015



After departing Nuuk, Greenland, on August 2, 2015, the 21-day research expedition MSM45 (PULSE) will explore the western Greenland and Canadian shelf areas of the Labrador Sea, using its hydro-acoustic systems. From these echo soundings, detailed maps and profiles of the uppermost sediment column will be generated that will guide deployments of gravity and piston cores. The aim is to identify and recover sedimentary sequences of sufficient thickness to allow for high resolution climate reconstructions of the youngest period in Earth's history, the Holocene interglacial. There are only few regions along the shelves and continental slopes off W Greenland and NE Canada where the much thicker sediments from the glacial period and the time of deglacial melting of the massive glacial ice sheets are overlain by a significant Holocene sediment cover. The biggest challenge of the MSM45 expedition is thus to identify and sample the few spots with undisturbed sediments of the present interglacial. Only from such sediments, and their records of past surface ocean temperatures, productivity, and ice extent, will it be possible to reconstruct in detail the ocean and climate conditions of the Labrador Sea during the last 10.000 years.

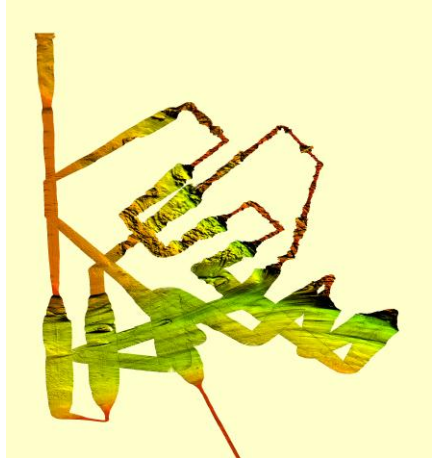
Following the breathtaking flight across the terminal glaciers of W Greenland, the expedition participants arrived in sunny Nuuk on the Godthaabs fjord. Even before the departure of FS Maria S. Merian, a number of ambitious hikers scaled Mount Ukkusissaq, the peak next to Nuuk, to sample 3 billion year old metamorphic rocks of the Greenland craton for the petrographic collection of the Institute for Geosciences in Kiel.



*Hand-picked metamorphous rock samples of the Itsaq formation (Age about 3 billion years) close to Nuuk.
Photo F. Groß).*

On the day of the arrival of the gear for the MSM45 expedition, laboratories and echo sounding systems aboard the ship were set up for an immediate beginning of research activities upon departure. Already during the first three days, two glacial troughs on the upper slope off W Greenland were charted and explored at water depths of around 500 m. Small depressions in this area contained Holocene sedimentary sequences in excess of 10 m. Much to our surprise, these dark green, hemipelagic sediments contained high concentrations of hydrogen sulfide. This is a clear indication of degradation of high amounts of organic matter, which would have

been delivered during high surface ocean productivity and export flux during the spring bloom.



Track of the Multibeam EM122 swath bathymetry der survey on the upperslope and shelf of W Greenland southwest to the Godthaabsfjord near Nuuk. The central part shows rough surface topography, resembling the structures of Precambrian basement. The lower part is characterized by a polished basement surface carved by downslope scars tracing the former paths of advancing terminal lobes of Greenland glaciers. Spots of Holocene sediments were found at the flanks of these scars.

Following the sampling of sandy glacial sediments in 2900 m water depth, covered by only 30 cm of Holocene mud, we also sampled the entire water column with CTD, water sampling rosette and plankton nets. From these samples, we will be able to characterize the biological diversity as well as the nutrient concentrations and isotopic and trace elemental composition of the water column. This information will form the basis of our interpretation of the sedimentary record in terms of past variations of water column structure of the Labrador Sea.

On the fourth day of our journey, and passing icebergs on the way, we traversed the northern Labrador Sea along 61 degrees latitude to the entrance of the Hudson Strait. Following mapping and echo sounding, we sampled the water column and the sea floor sediments at three more sites in the eastern basin of Hudson Strait, at water depths between 300 and 900 m. Most of the up to 12 m long sedimentary sequences contained predominantly grey glacial clayey mud, interlayered with more sandy sections that also contained pebble-sized material transported by icebergs. The thickness of Holocene sediment cover in the Hudson Strait of ca. 2 m is much less than on the Greenland slope, unfortunately. After further mapping and echo sounding along the shelf and upper slope off Labrador close to Saglek Bank, today we reached a deep sea station at 3000 m water depth. Here, we aim to recover sediments that record high frequency climate variations of the last glacial period, known as Heinrich events, when armadas of icebergs were released from the mighty Canadian ice sheet. Tonight, we will return to shallower waters on the shelf, with the aim of sampling 10 m Holocene sequences in the Karsfelni Trough, at water depths around 300 m.

Since the weather has treated us very well thus far, with calm seas and sunny skies during the day and northern lights at night, everyone on board is of good spirits, looking forward to the next week at sea.

Best regards from FS MARIA S. MERIAN

Ralph Schneider

August 9, 2015