

FS Maria S. Merian

Reise MSM102 (GPF 20-1-31)

23.07. – 09.09.21, Emden – St. John's - Emden

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Sediment Transport in the Northwest Atlantic Mid-Ocean Channel (NAMOC), Labrador Sea



The week began with a short port call in St. John's. In the morning shortly after 08:00h we passed 'The Narrows' in beautiful weather, to moor at a berth directly in the city center for provisioning and embarkation of a Canadian cooperation partner. A short time later we moved on to the bunker pier on the other side of the harbor. After finishing the bunkering, we left port at 16:00h and headed back to the working area. Fortunately, the quite strong wind (gusts 9-10) blew from astern, so that we made good progress and reached NAMOC at 50°40'N on August 4 in the morning. From now on, we will try to unravel the secrets of this not well explored channel.



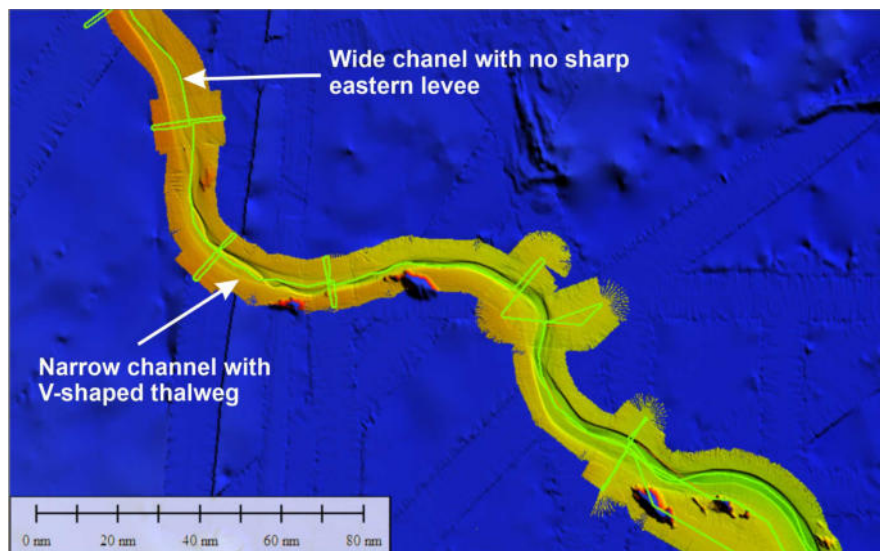
Arriving at St. John's
(Photo: S. Krastel)

In a first step, we map the NAMOC, because the morphology of the channel is mostly unknown, but detailed knowledge of the morphology is important to understand the transport processes in the NAMOC. To do this, we follow the channel with the ship using the live display of the bathymetric multibeam echosounder. Approximately every 30 miles, we collect a cross profile primarily to record sediment echosounder data in order to image the sediment architecture of the channel and its levees. We managed to record high-quality data despite the continued strong winds of up to 9 Beaufort.

On August 5 we collected cores along one of the cross profiles. The goal of the coring profiles is to sample turbidites at different heights above the channel in order to reconstruct the turbidity currents that formed the NAMOC. The first two cores were located approximately 180 and 140 m above the channel thalweg on the levees. Although the cores

are only up to 5 m long, they show a variety of turbidites and in this respect exactly what we hope to find. Unfortunately, the attempt to take a core on a terrace 50 m above the channel thalweg was not successful. A bit of gravel and sand was found in the core catcher; such a coarse-grained layer directly at the sea floor prevents the penetration of the gravity corer. We were also unsuccessful with the giant box corer at this location. Instead, we were able to recover a good 1 m long core directly from the channel thalweg with the gravity corer.

The hydroacoustic surveys of NAMOC were continued in a northwesterly direction in much calmer weather during the night. We recorded two seismic profiles across the NAMOC on the afternoon of August 6. The seismic data clearly shows a completely different evolution of the sedimentary structures on either side of the channel. On the one hand, the NAMOC represents a barrier to sediment transport. On the other hand, the turbidity currents through the NAMOC are preferentially deflected to the right by the Coriolis force, so that the western levee is almost always significantly higher than the eastern levee. Since August 6 we are now continuously following the NAMOC to the northwest, and are fascinated by the ever new structures we find in the channel. Parts of the NAMOC tend to be straight, while other areas are more meandering. In some areas, terraces are found at different levels; the channel cross-section alternates between v-shaped and u-shaped. In parts, the channel is well confined, while in other areas the boundaries of the channel are not clearly visible.



Example of a mapped section of the NAMOC. The reddish-greenish colors show the new bathymetric data.

Tomorrow we will reach a first area that we want to study in more detail. This area includes the confluence of the NAMOC and the Imarsuaq Mid-Ocean Channel (IMOC). The IMOC is the only known major eastern tributary of the entire system allowing to investigate the influence of the Greenland margin. In addition, there is a large detached sediment drift in this area landward of the NAMOC and another objective is to investigate the interplay between the growth of the drift and the NAMOC.

Everyone is well onboard. With best regards from RV Maria S. Merian

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At sea, 54°40'N, 048°30'W