

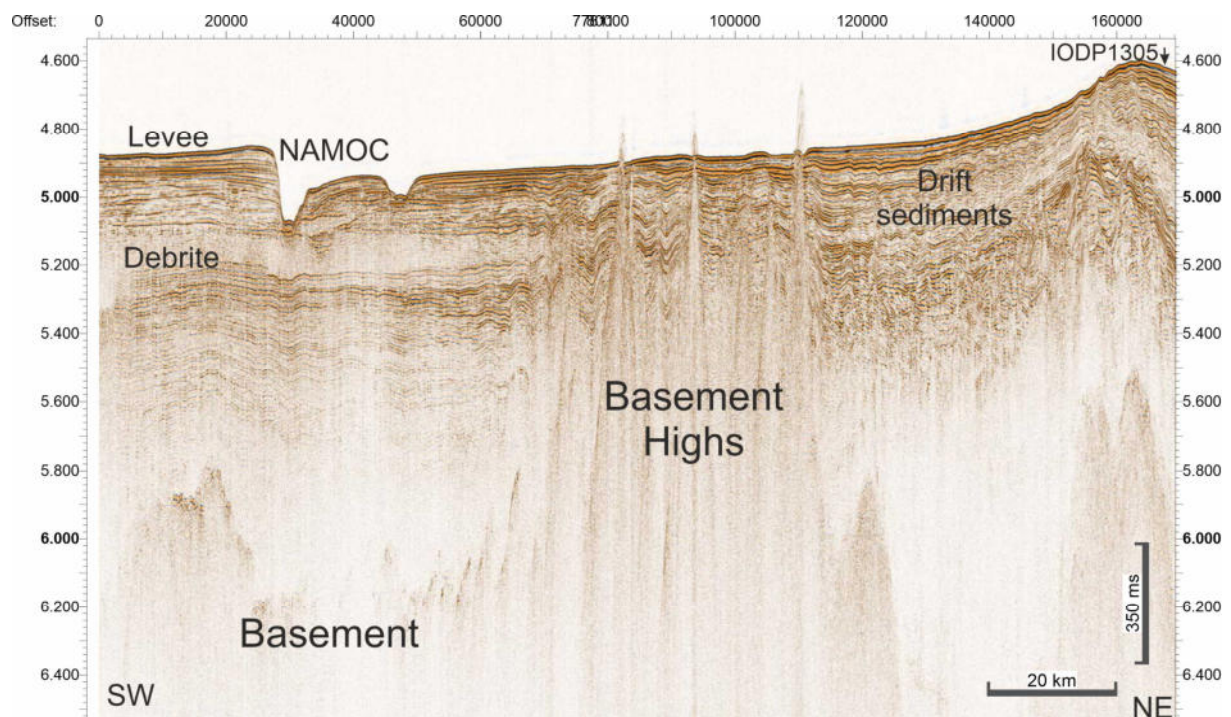
**RV MARIA S. MERIAN
MSM102 (GPF 20-1-31)**

**23.07. – 09.09.21, Emden – St. John's - Emden
Weekly Report No. 7, 30.08. – 05.09.2021**

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



We used the last days in the working area to complete our work. In the afternoon of Aug. 30, we finished the last seismic survey that we had already started on Aug. 28. The goal of this survey was to tie our seismic lines to a well drilled in 2004 as part of the Integrated Ocean Drilling Program during Expedition 303. The age information from the well is important to interpret our data. The well is located approximately 90 km east of the NAMOC. Two long seismic profiles were acquired to tie two of our focus areas to the IODP site. The seismic data show that the IODP well is located in an area with different sediment characteristics, and some basement outcrops are located between the NAMOC and the well. Nevertheless, it is possible to correlate individual reflectors from the well to the NAMOC.

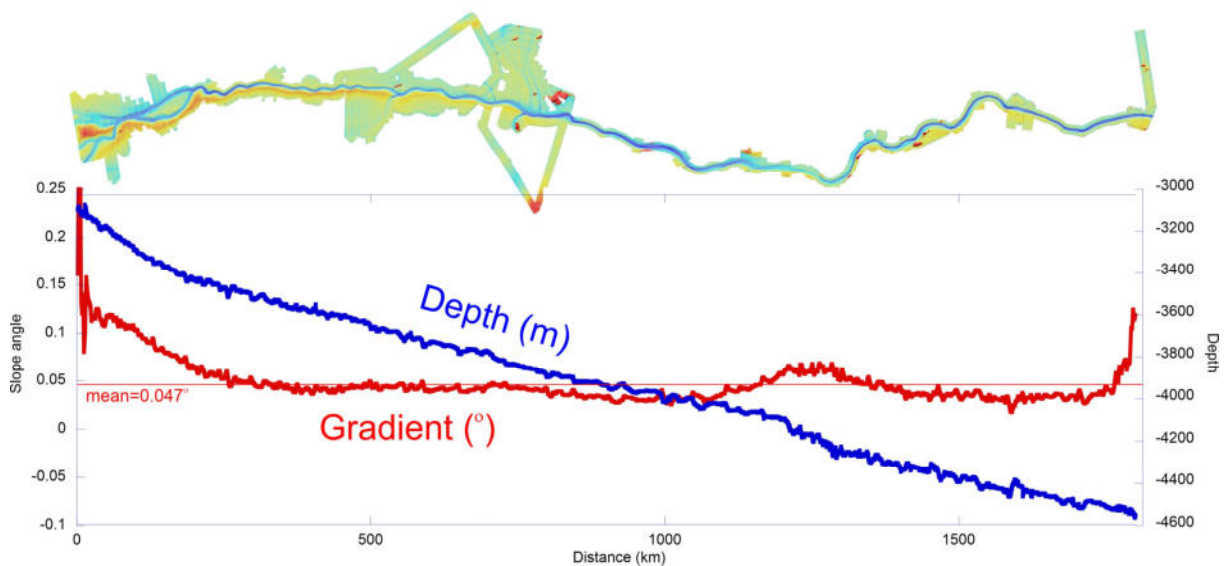


Seismic profile between IODP Site 1305 and the NAMOC in the area of the IMOC confluence.

After completing the seismic survey, the night of Aug. 31 was used to map an area of the western levee in detail. We identified a widespread transparent layer with an erosional base on the western levee over much of the NAMOC. This indicates an extremely large slide that has reached large parts of our working area. The new data show that the transparent layer is indeed a continuous structure. We were able to sample this layer on Aug. 31 at a final gravity core station. We had already obtained cores of this layer at two locations during the previous week, although only one of these cores was long enough to sample the base of the

transparent layer. Based on the acoustic profiles, we located a site for the last core where the transparent layer thinned significantly at a small morphological high (about 1 m thickness compared to up to 10 m at other locations). With over 7 m of core recovery, we surely sampled the base of the transparent layer and, as with the previous core, were able to identify a coarse sand layer at the base of the transparent layer.

We continued to map the area of the confluence between the IMOC and NAMOC until we had to start the transit to Emden. The IMOC (Imarssuaq Mid-Ocean Channel) is the only major eastern tributary to the NAMOC and is believed to originate from the Greenland continental margin. This tributary forms a braided system that we have traced in full extent for over 100 km to the east in the new data. The braided system of the IMOC contrasts with the confined NAMOC, and the combined analysis of the data will aim to understand the cause of this difference.



Morphological profiles along the NAMOC. Red curve: Water depth; Blue curve: Slope gradient of the channel thalweg. The slope gradient along the channel thalweg is only about 0.05°.

We started the long transit back to Emden on September 2 shortly after midnight. We continued to collect underway data until reaching the exclusive economic zone of Iceland on the evening of September 4. We have already learned a lot about the NAMOC in the past weeks and mapped this fascinating deep-sea channel in detail over a length of about 2000 km by means of the vessel's hydroacoustic systems. The slope gradient of the system is in large parts only about 0.05°. Thus, over a length of one kilometer, the increase in water depth is only about one meter. Despite this very low slope gradient, turbidity currents flow down this channel for several 1000 km, originally building the channel, still changing its morphology, and forming pronounced levees. We have recorded about 1600 km of seismic lines that will allow us to study the influence of the deeper sedimentary structures on the evolution of the NAMOC. We sampled the seafloor at 34 stations. These samples will allow us to determine the temporal variations in the activity of the NAMOC as well as to reconstruct the flow characteristics of individual turbidity currents. In addition, we have deployed floats at 5 locations for the international ARGO program. Already now we can say that this cruise was a great success, and now a lot of work is waiting for us to decipher further secrets of the NAMOC from the data.

We will arrive in Emden on September 9. After the long time at sea, we are all looking forward to seeing our families and friends, but will (unfortunately) also leave the Corona-free bubble at sea. The Maria S. Merian has served as an excellent platform for our work. Smaller and larger requests were always fulfilled very quickly and to our complete satisfaction. We

would like to express our sincere thanks to Captain Maaß and the entire crew for their great support and the very good working atmosphere on board. You are a great team and we will be very happy to come back! We all enjoyed our time on the Maria S. Merian very much.

Best regards

Sebastian Krastel

(Christian-Albrechts-Universität zu Kiel)

At Sea, 60°50'N, 017°30'W



Scientific Crew of Cruise MSM102.