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NOVA SCOTIA MARGIN

(*NOVAMAR)*

After leaving the shelf we conducted further detailed hydroacoustic surveying and core stations on the continental slope in water depths between 2,700 and 3,700 m from early Monday morning (June 28) until late in the evening of Tuesday (June 29). As in the previous week, the identification of promising sediment sampling sites proved difficult at the continental margin dominated by landslides and turbidites, in part also because the planned survey lines had to be altered briefly to avoid fishing boats with longline deployments. Nevertheless, three sampling stations with CTD, MUC and gravity corer were successfully conducted at the deeper water depths. On Wednesday and Thursday, (June 30 and July 1) the Emerald Basin, the largest shelf basin off Nova Scotia in terms of extent, was mapped densely with multibeam and sediment echosounders to find locations with the thickest Holocene deposits, the LaHave Clay, and then was sampled at 5 stations. First, the CTD was deployed at each station to profile the water column for temperature, salinity, oxygen content, and turbidity. Together with the CTD profiles of the southern basins, Figure 1 shows the expected stratification of cold, low salinity water near the surface, underlain by warmer but saltier water over the shelf.

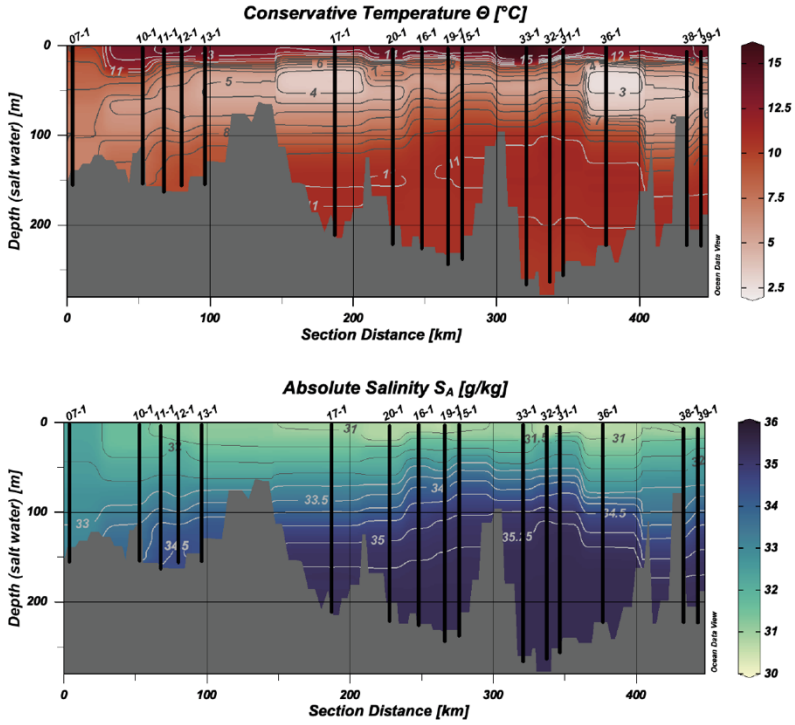

Fig. 1: S-N section of CTD profiles for temperature and salinity of water masses on the shelf between Roseway (Stat. MSM101-07-1) and Emerald Basin (Stat. MSM101-039-1). The cold and low-salinity water masses of the Labrador Current and the outflow from the Gulf of St. Lawrence near the surface can easily be identified. These are underlain by warm and salty water masses from the Gulf Stream (graphics P. Matzerath and P. Gößling).

At the selected stations the thickness of the LaHave Clay, that was identified in the echosounder profiles, exceeded up to 20 m. Holocene hemipelagic clayey muds were then recovered by the MUC and gravity corer in water depths between 200 and 300 m. Fig. 2 shows examples of late Holocene dark brownish grey sediments near the seafloor. Among them are greenish-black clays from the early Holocene. These clays are already strongly dewatered and consolidated by diagenetic remineralization, so that, despite the use of 20 m long gravity core barrels, only a sediment core recovery of a maximum of 9 m was achieved at all coring stations.

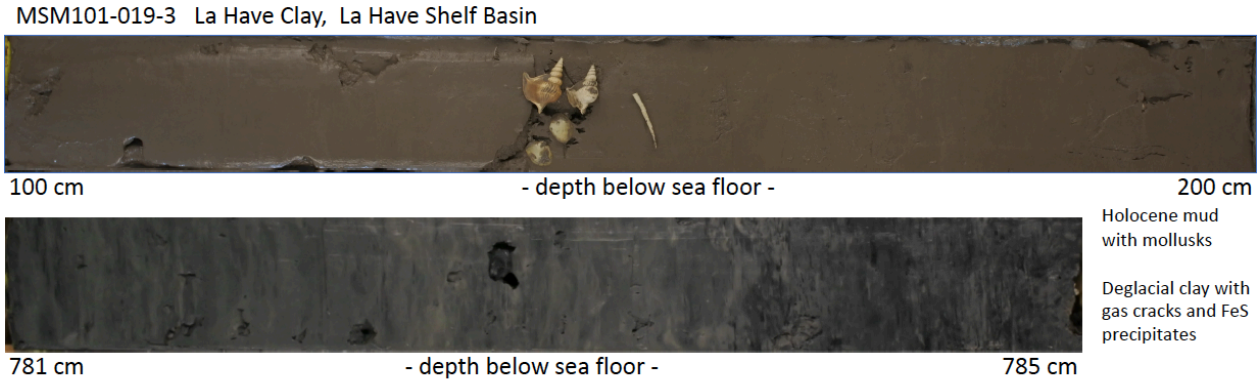

Fig. 2: The two core photos show examples of Holocene sediments from the basins on the Nova Scotian shelf, the so-called LaHave Clay, the youngest deposit. The upper image shows the typical monotonous brown-gray clayey muds that sometimes contain mollusks. Radiocarbon dating can be used on these to determine an initial absolute age of the sediments immediately after return. The lower image also shows clayey muds of dark olive-green to black color, which can also assigned to the early Holocene. However, these are already strongly consolidated by new mineral formations, probably iron monosulfides.

Thursday morning (July 1) the work program was briefly interrupted to bunker fuel and fresh provisions at Halifax harbor, but then continued in the afternoon and on Friday and Saturday (July 2 and 3) with surveys and 4 geological stations in the northern Emerald Basin. Since yesterday evening, Saturday (July 3), we have continued the work program on the shelf under increasingly bad weather conditions. Unfortunately, we could not complete the station work planned for today, Sunday (July 4), in the Canso Basin due to the difficult wind and wave conditions that hampered ship positioning. Therefore, we are continuing with further hydroacoustic surveys to the Scatarie shelf basin further to the East, where we plan to continue station work on Monday (July 5).

With best regards from the science and ship crew on board R/V MARIA S. MERIAN near Cape Breton.

Ralph Schneider
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04. Juli 2021