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Holocene chronostratigraphy and evolution of sedimentary processes on the deglaciated margins of Quebec and Labrador, Canada.

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Ice sheet retreat following the Last Glacial Maximum triggered significant sediment transport and delivery on the formerly glaciated continental margins of NE North America. This involved several sedimentary processes that are crucial to better understand and reconstruct past ice-sheet dynamics and identify the associated climatic and environmental forcing. However, the influence of some of these processes on shelf sedimentation is poorly constrained, such as paraglacial processes delivering sediment on the continental shelf while the ice-margin is located on land. By combining acoustic sub-bottom profiles and sediment core data, this project aims to study Holocene chronostratigraphy and sedimentology of the Eastern Canadian margin in order to better understand the evolution of sedimentary processes during the retreat and complete ablation of the Québec-Labrador Sector of the Laurentide Ice Sheet.

During the R/V Maria S. Merian research cruise MSM46 in the summer of 2015, several gravity cores were collected on the continental margin around Quebec and Labrador in basins and troughs that contain several meters of Holocene sediments. Sub-bottom profiles (Parasound) were also obtained in these areas. In this study, 4 cores ranging from 8 to 14 m in length have been investigated: two in the western Hudson Strait, one in Lake Melville (a fjord-type estuary in Labrador), and one in the Honguedo Strait between Quebec and Newfoundland. Preliminary age-models derived from AMS 14C ages and completed using paleomagnetic secular variations indicate that the cores cover most or all of the Holocene with sedimentation rates varying between 70 and 150 cm/ka. In cores from Hudson and Honguedo Straits, two main units are identified with physical, magnetic and XRF properties, along with core pictures and CT-scan data. The lowermost unit, which corresponds to deglacial sediments, is made of clayey to sandy silt and often contains ice-rafted debris (IRDs). Some layers marking deglaciation events are also part of this unit, such as layers with higher detrital carbonate contents and the well-known red, hematite-rich layer deposited throughout Hudson Bay and Strait during the last Lake Agassiz-Ojibway outburst flood (8.47 ka cal BP). The uppermost unit corresponds to postglacial sediments that are finer and more homogeneous with rare IRDs. The bottom of this unit shows particularly low magnetic susceptibility and high coercivity, which may indicate that variations of sediment source or oceanographic conditions after deglaciation have influenced the magnetic assemblages. The core from Lake Melville is composed by two equivalent units with physical properties highlighting a progressive retreat of the ice-margin. This core is covered by abundant sulphidic laminae except for a 50 cm thick layer at the base of the postglacial unit. This layer also shows different magnetic properties that may be influenced by local variations in oceanographic conditions. Grain-size, magnetic and mineralogical analyses will be also presented and will help constraining the variations in sediment provenance and the processes that affect these high-sedimentation rate areas on the continental shelf. This project will complement ongoing micropaleontological studies to reconstruct Late Holocene environmental variations in the different areas.