

Holocene sedimentary dynamics of the Belcher Glacier (Devon Ice Cap, Nunavut, Canada)

Jade Brossard (1,2,3), Jean-Carlos Montero-Serrano (1,2,3), Guillaume St-Onge (1,2,3)

(1) Institut des sciences de la mer de Rimouski (ISMER), Université du Québec à Rimouski (UQAR), Rimouski, Québec, Canada, (2) Canada Research Chair in Marine Geology, Institut des sciences de la mer de Rimouski (ISMER), Université du Québec à Rimouski (UQAR), Rimouski, Québec, Canada, (3) GEOTOP Research Center, Montréal, Québec, Canada

The Devon Ice Cap on the Devon Island in the Canadian Arctic has an area of 15 000 km². Over the last decades, instrumental data have demonstrated that the surface of the ice cap has diminished by 600 km² (4%) as a result of climate warming. However, to place this reduction of the ice cap into perspective, it is necessary to know its past variability and dynamics. Thus, sedimentary sequences extending beyond instrumental records could provide a critical link to study the long-term natural glacier variability. In this context, the purpose of this study is to compare the sedimentological, mineralogical, geochemical (elemental and isotopic), and magnetic properties of a short (box core, ~43 cm) and longer (piston core, ~7.5 m) sedimentary sequences sampled in the proximity of the Belcher Glacier in order to document the glacier's dynamics on two time scales: the last 1000 years and the last 10000 years (Holocene). The Belcher Glacier is the principal tidewater outlet glacier calving up to 30% of the total iceberg volume from the Devon Ice Cap. Here, we will focus on the results obtained from the box core. ²¹⁰Pb chronology of this short record indicates that the sediment core extends back to ca. AD 1300, with sedimentation rates ranging between 0.062 cm.yr⁻¹ at the base and 0.145 cm.yr⁻¹ in the uppermost part of the core (last 8 cm). Sedimentation rates and most of the detrital proxies (notably, plagioclase, magnetite, total clays, Ti/K and Al/Ca) show an increase since the mid-19th century compared to the pre-industrial period (1300 to 1800 AD), likely related to a greater retreat of the Belcher Glacier. The variations observed in almost all detrital proxies measured in the box core are synchronous with other regional records from the northern Baffin Bay, supporting the hypothesis that the recent retreat observed in the Belcher Glacier is mainly driven by changes in the intensity of the West Greenland Current. Analysis of the piston core is ongoing and will be used to extend the observations through the Holocene.