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Ice stream dynamics of the northeastern Laurentide, western Greenland and southern Innuitian ice sheets during the last glacial cycle

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Precise relationships between high-frequency ice sheet margin dynamics and late Quaternary climate and sea-level changes are still largely open to debate, notably with regard to the relative timing and causal mechanisms. In this view, Baffin Bay presents a special interest due to its sedimentary recording of ice streaming activities along the northeastern Laurentide, southern Innuitian and western Greenland ice margins. Here, an exhaustive sedimentological analysis of a piston core from the central Baffin Bay is used to document the timing and amplitude of such ice margin dynamics during the last 115 ka. Lithofacies analysis and mineralogical assemblages are used to reconstruct sediment sources (using the SedUnMix program) and depositional mechanisms, while the study of foraminera assemblages enables the identification of Atlantic water incursions into the bay. Coarse detrital carbonate (dolomite-rich) layers are attributed to either northeastern Laurentide and Innuitian ice streaming pulses or pervasive ice rafted debris (IRD) delivery processes. Interbedded fine-grained glaciomarine sediments that depict a mineralogical signature from western Greenland are linked to ice streaming activity in the Uummannaq area. These results indicate that the northeastern Laurentide and southern Innuitian ice streams were sensitive to high frequency climate fluctuations such as the Dansgaard-Oeschger events, while the western Greenland margin was more sensitive to large-scale climatic/oceanic reorganizations such as relative sea-level changes and the advection of warmer Atlantic waters into the bay during specific time intervals.