# Spatial and temporal changes in sedimentary processes at proglacial Bear Lake, Devon Island, Nunavut

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## ABSTRACT

Lacustrine sedimentary processes are identified on an intrannual scale at proglacial Bear Lake, Devon Island. Hydrographs, recording thermistors, sediment traps and underflow monitoring equipment were deployed during the 1999 melt season. Episodic proximal turbidity currents were measured as positive near-bottom temperature anomalies and currents. The timing of individual positive temperature anomalies was clearly associated with diurnal peaks of discharge into the lake, while their magnitude was weakly associated with warm air temperatures of the preceding afternoon. From July 23-25 a period of continuous underflow occurred on the rising limb of a large discharge event, preceding peak inflow by about 24 hours. An extremely large precipitation event occurred on June 29, when coarse, carbonate-rich sediment was deposited in front of the northeast tributary by spatially limited turbidity currents. A niveo-aeolian deposit was observed on the ice of the south basin, and a sediment trap was deployed under this area. Mass accumulation rates (MARs) from this trap generally decreased with depth, and locally overwhelmed fluvially generated sedimentation. The sandy sediment quickly melted through the lake ice and hastened the date of localized break-up. This is the first study of its kind from a high arctic glacial lake; the results presented here will be used to more confidently interpret Holocene environmental change using the sedimentary archive of Bear Lake.