Rapid early Holocene basin fill of Manitounouk Strait, Hudson Bay: proglacial, prodelta or neotectonics?

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A seismostratigraphic study of Manitounouk Strait on the east coast of Hudson Bay provides some new information on the postglacial history of this region where relative sea level is falling at approximately 1 cm/a. The basal unit of the succession is interpreted as bedrock which forms a series of linear basins parallel to the length of the strait. The thickness of overlying sediments is greater than 40 m in the central basin, decreasing to zero along the northwestern coast.

Five seismic units have been identified. Unit 1 is conformable with the bedrock surface, forming a well-stratified, draped interval with a constant thickness of 7 to 8 m, except in the central parts of the basins where it thickens locally, or along bedrock highs where it is eroded. Unit 2 is 3 to 4 m thick and is also conformable with Unit 1 and the bedrock, but is transparent except for a single internal reflector. In shallow water, the upper surface of this unit is characterized by strong reflectors. Tracing these reflectors into the basins, they are observed to correspond to Unit 3 which is typically transparent and reaches up to 7 m in thickness. Unit 4 is also only found in the deeper basins where it shows an onlapping relationship with the underlying unit. Unit 5

has a thickness varying from 0 to 11 m as a result, largely, of erosion along the basin margins. The base of this unit is well-stratified, but the unit becomes transparent upwards. This unit shows a downlapping relation with unit 4.

Units 1 and 2 are interpreted through correlation with previous work to be glaciolacustrine deposits laid down in glacial lake Ojibway. Unit 5 is clearly postglacial, representing sedimentation similar to the present, but influenced by the falling relative sea level. However, Units 3 and 4 represent a period when sedimentation was limited to the basins and gravity processes such as turbidity currents and debris flows predominated. This caused a rapid infilling of the basins which may have corresponded to paraglacial conditions when meltwaters could have constructed proglacial deltas along the margins of the strait. Earthquakes related to rapid isostatic rebound during early postglacial time may also have contributed to the failure of prodelta slopes or basin margins with the subsequent generation of debris flows and turbidity currents.