Deep-water Sedimentation Patterns Seaward of Shelf-crossing Glaciations, Eastern Canadian Margin

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Studies of the Late Quaternary of the eastern Canadian continental margin show a distinctive style of deep-water sedimentation that is directly related to inputs of sediment and water from shelf-crossing glaciation. Principal sediment input was through transverse troughs occupied by ice streams. This study proposes a synthesis of sediment depositional facies and architecture resulting from proglacial sediment supply through transverse troughs. Coarse sediment is principally transferred across the slope, but a high proportion of fine-grained sediment is transported along slope in meltwater plumes. The high rates of deposition from such plumes favour sediment instability on the down-current side of transverse troughs. Three end-member processes are recognised on submarine fans seaward of transverse troughs: (1) glacigenic debris flows; (2) turbidity current deposition of channel-levee complexes; and (3) blocky mass-transport deposits resulting from debris avalanches. High meltwater discharge appears responsible for increased supply of fluid glacial diamict (till) that on gentler slopes (<2.5 degrees) creates glacigenic debris flows but on steeper slopes breaks up, entrains water, and transforms to create erosive turbidity currents. The relative importance of hyperpycnal meltwater appears greater at lower than at higher latitudes. Meltwater cuts broad flat-floored valleys and sculpts residual buttes. Based on erosional morphology, a wide range of scales of deposition from meltwater discharge may take place. Discharge of abundant hyperpycnal and hypopycnal muds leads to prominent asymmetric leveed channels in some systems. Basin-floor turbidites are principally the result of hyperpycnal meltwater flows producing sheet like deposits with a braided morphology. Some slump-generated turbidites deposit on the basin floor, but others deposit most of the load near the base of slope.