

Sedimentary record of sub-glacial outburst floods at Laurentian Fan

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Large-scale glacial meltwater discharge could be widely recognized off the eastern Canadian continental margin. At Laurentian Fan, sub-glacial outburst floods eroded Permian-Carboniferous redbeds at Gulf of St. Lawrence and then delivered the reddish sediments by Laurentian Channel. Sedimentary record from four gravity cores (GeoB18514-2, 18515-1, 18516-2 and 18517-1) at the SW slope of the Grand Banks of Newfoundland revealed the major depositional processes since Heinrich event 2 (ca. 22 ka). In the cores, the upper thick Holocene olive-grey silty mud units overly IRD-rich Heinrich 1 layer, five reddish units are distinguished in the lower part. Reddish units get proportionally thinner along the SW slope at higher and more distal positions; instead, separating olive-grey layers get thicker with height and distance. Reddish and olive grey units have sharp boundaries and no signs of erosion.

Mean grain size changes abruptly from coarse in grey layers to fine in reddish layers, terrigenous elements (as Al, K, Ti, Fe) and clays (Al/Si) are highly elevated in reddish layers and low in Heinrich layers, which are instead enriched in detrital continental carbonates. Both Heinrich layers and reddish layers have enhanced magnetic susceptibility, but Heinrich layer have higher ferromagnetic (SIRM) content (mafic rocks), while reddish layers have more hematite (HIRM). These five reddish layers differ from event to event, which seems to reflect different mixing ratios of event-related and background sedimentation. This mixing will allow estimating event-specific sedimentation rates. Using mixing ratio combined with ^{14}C dating data could contribute to estimate the sedimentation rate and duration of outburst floods, which could help to build ice sheet retreat history and find the connection with paleoclimate changes.