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Investigating the internal lithological structure and rock magnetic signature of Heinrich Event layers at SE Grand Banks Slope, Newfoundland

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Periodic mass discharges of icebergs from the Laurentide ice-sheet into the North Atlantic Ocean during the last glacial period deposited abundant ice-rafted detritus (IRD) accumulated in sequences of typically six major Heinrich Event layers, each with some tens of cm thickness, at all eastern slopes of the Grand Banks submarine platform of Newfoundland. Compositionally, it is well established that these IRD layers consist of varied rock contents emanating from distinct, but not yet clearly defined bedrock provinces of the Canadian Shield. The, most prominently reported constituent is detrital dolomite, but the entire lithological range of the IRD is much broader. Rock magnetic records, e.g. magnetic susceptibility logs of SE Grand Banks cores, therefore depict complex and partly repeating internal substructures across the Heinrich Event layers owing to distinct successions in IRD lithology over the course of every mass calving event.

We investigated IRD sieve fractions (1mm – 4cm) of the entire glacial section (550–1054 cm) of SE Grand Banks slope gravity core GeoB 18530-1, sampled in 2.3 cm steps. Therefrom, we identified and classified distinct IRD rock types as well as monocrystalline rock-forming mineral particles, for which we established so far 24 well-defined lithological categories of sedimentary, igneous and metamorphic origin. This initial identification of IRD lithology was performed based on all available visual criteria including texture (crystallinity, grain-size), color and translucency (mineralogy), hardness and surface structures (e.g., cleavage) using a binocular microscope. This rock type classification is now being substantiated by polarized light microscopy of exemplary thin sections created from larger IRD clasts.

To established cumulative rock magnetic fingerprints of all IRD magnetic mineral assemblages, isothermal remanent magnetization acquisition curves of all sieve fractions as well as individual specimens of all the classified rock types have been measured. These records systematically revealed higher concentrations of magnetic minerals at the tops and bottoms of most Heinrich Event layers and also clear variations in coercivity spectra. This finding is mirrored by the IRD rock count records, where magmatic rock types predominate mostly at Heinrich Event layer boundaries. Preferred deposition of these IRD rock types during the initiation and ending of

events and their variation from older to younger events,- highlight repetitive patterns in the cyclic Laurentide ice-sheet collapses to be further explored.