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**Clastic loaded Arctic icebergs as potential threats  
to northern exploration**

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The density of icebergs (pure ice) is 0.917 and thus they float in seawater (density of 1.026), with about 10% of their volume exposed. However, if icebergs can be loaded with rocks (ice-rafted debris, IRD), whereby their bulk density increases, they may sink deeper or totally, making them invisible to radar.

During the Canadian-German Nares Strait Geo-Cruise August 17, 2001, expedition such a near-neutral buoyancy, rock-loaded, iceberg was encountered (Kane Basin, Lat. 80°N; Long. 69°W; Zentilli & Harrison, 2002, GSC Open File Report, #4828). The large, roughly 70 by 50 m, iceberg was significantly weighed down by IRD, floating only 5 to 15 m above sea level. The coverage of dark debris gave no contrast with the dark sea, and the submerged nature of the iceberg made it otherwise invisible to radar. The ice surface was dark with boulders, gravel, sand and silt. Blocks were generally less than 1 m, with one impressive large limestone block (2 × 2 × 3 m). The iceberg was boarded to collect samples with the intent of ascertaining its potential source glacier, and its significance in terms of glacial processes and northern navigation, the subject of my study.

In addition to scarce rounded fragments of gneiss and granitoid rocks, the predominant sedimentary rock fragments are angular, in part fossiliferous and petroliferous, and do not have any indication of foliation. Their characteristics match those of Cambrian, Ordovician, and Silurian strata mapped in valley outcrops of the enormous Petermann and Humbolt glaciers in NW Greenland (e.g., Cape Webster, Cape Storm and/or Goose Fiord formations). Similar rock types also exist in Dobbin Bay, Richardson Bay, and Rawlings Bay tidewater glaciers on Ellesmere Island (e.g., Allen Bay Formation) but the glaciers are small in comparison and rocks there have been affected by Eureka deformation.

My study investigates whether or not the iceberg sediment load is the consequence of rock fall and landslide activity onto the most probable source glacier prior to calving, the possible path of the iceberg since calving, and its likely fate. Archival air photographs and recent satellite image of some representative

glaciers are being studied. It is important to know whether this activity is on the increase as a result of climate change, because rock-loaded icebergs could pose a threat to exploration and development in northern waters, and may require improved detection methods.