
Preliminary assessment of marine geological hazards in
Baffin Bay, eastern Canadian Arctic

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Resource assessments of the Baffin Bay region suggest hydrocarbon resource potential similar to or greater than the Beaufort-Mackenzie and Jeanne d'Arc basins. Although currently no exploration plans are proposed for the Canadian portion of the bay, industry interest will likely put pressure on regulators to open this area. Before determining if exploration will proceed, scientific understanding of geological hazards is essential. Recently, the Geological Survey of Canada initiated a study of marine geological hazards in Baffin Bay with the goals of providing a predictive framework for the geological and engineering properties of the seabed, and determining the regional distribution and severity of seabed hazards. This presentation provides some preliminary results from this research.

The most significant hazards in Baffin Bay are seismicity, seabed instability, iceberg scour, and natural fluid (including hydrocarbon) seeps. One of the largest passive margin earthquakes ever recorded occurred in Baffin Bay in 1933 (M 7.3). Sparse data collected in 2008 showed no evidence for slope failure near the 1933 epicentre, but legacy data shows widespread sediment failure on the Baffin Slope. Studies from the late 1980s also identified a large scale bank-edge slip related to deeply penetrating faults. Re-assessment of legacy data has revealed that this instability zone is much more extensive than originally reported, continuing more than 800 km from the slope off Home Bay in the south to the slope off Scott Inlet in the north. Natural hydrocarbon seeps with widespread surface slicks occur along the northern Baffin Shelf. The seeps represent natural hydrocarbon contamination of the environment, but it is not known whether they are episodic or continuous phenomena. As yet, repetitive multibeam bathymetry surveys are insufficient to assess rates of modern iceberg scour on the shelf. It is clear that there are significant knowledge gaps about geological hazards in the area.