Iceberg scouring and sediment dynamics: seabed processes in the Hibernia area, Grand Banks of Newfoundland

C.F.M. Lewis, J.V. Barrie, G.B. Fader, L.H. King and C.L. Amos*
Geological Survey of Canada, Atlantic Geoscience Centre
Dartmouth, N.S. B2Y 4A2

**C-CORE, Memorial University of Newfoundland*
St. John's, Newfoundland A1B 3X5

The Hibernia area of northeastern Grand Banks in 80 m of water depth is subject to iceberg scouring and intermittent hydrodynamic sediment transport, according to evidence on high resolution seismic reflection profiles, sidescan sonar records, bottom photographs, current meter data, sediment analyses, borehole results and submersible observations. Thin discontinuous sand and gravel deposits unconformably overlie eastward-dipping silts and sands of Tertiary age. The sediment at the Tertiary unconformity appears to be overconsolidated, possibly due to erosion, subaerial exposure and desiccation during periods of glacial low sea levels. A minor terrace occurs between 100 and

110 metres below sea level on the gently sloping northeast Grand Banks margin. Bedforms on and above the terrace, comprising sand ribbons, sand waves, megaripples and wave-induced ripples suggest intermittent sand transport under storm conditions. Below the terrace a thin continuous fine sand facies partially buries a degraded, relic, iceberg-furrowed surface.

A sparse population of relatively fresh iceberg scours comprising linear and curvi-linear furrows and circular pits is superimposed on the relic furrowed surface and the bank margin. This population probably represents the cumulated record of iceberg impacts within the past 10,000 years after late Wisconsin low sea level had risen sufficiently to allow icebergs to drift onto the Banks. The frequency of groundings deduced from seabed and geological evidence is compared with that inferred from historical iceberg observations. Between 140 and 70 metres of water depth, there is an upslope decrease in iceberg scour depth, width, abundance and in the degree of ice-related seabed distrubance. This is thought to result from a decrease in iceberg size and flux toward the Grand Banks margin away from the major iceberg source — the main branch of the Labrador current flowing around the northeast corner of the Grand Banks. Scour depths may be limited in shoaler water also by strong sediments at the Tertiary surface and by intermittent sedimentary infilling.