

# Oceanographic Observations Pertinent to the Petermann Glacier

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A 2003 Icebreaker Healy mission in August of 2003 that was part of the Canadian Archipelago Throughflow Study (CATS) program allowed the first in a series of four opportunistic ocean sampling efforts in the vicinity of the floating tongue of the Petermann Glacier in northern Greenland. Our most recent sampling effort was just completed in August 2009. Measurements include bottom mapping, CTD profiles, ADCP measurements and chemical tracer hydrography. This poster summarizes our findings to date.

Our bathymetric measurements establish that the 70 km long about 15 km wide glacial tongue floats over a 1000-m deep, near vertically walled fjord. The fjord basin is separated from the adjacent 800-m deep Hall Basin in Nares Strait by a sill depth of 480-m. It has been established by others that Petermann Glacier is grounded at about 600 m below sea level. Others have concluded from indirect evidence that ocean driven melting concentrated in front of the grounding line is the dominant loss term in the mass balance of this glacier. We have observed freshwater plumes emanating seaward from the underside of the seaward end of the glacial tongue. These plumes are relatively small in scale (near surface and less than a km in width) and correspond to the scale of undulations mapped in recent radar studies by others. We also have observed fluxes of relatively warm (1 °C) salty water into the fjord at the sill below about 100 meters. Chemical evidence shows that waters below sill depth within the fjord are renewed more slowly than in the adjacent Hall Basin (timescale on the order a few decades) but not so slowly that oxygen contents are more than 20% depleted from saturation. Rigorous melting flux estimations based on ocean measurements would require better spatial and temporal scale sampling than we have achieved to date.