Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

The melting and dissolving of icebergs ANDREW WELLS, M. GRAE WORSTER, Institute of Theoretical Geophysics, DAMTP, University of Cambridge — The rate of ablation of polar icebergs depends on both the temperature and salinity of the ocean. If the ablation rate is controlled by the supply of heat to the interface, we say that the ice is *melting*. Alternatively, the supply of salt may control the ablation rate, in which case the ice *dissolves* into the salty ocean. We study the transition between melting and dissolving of a vertical ice surface under the influence of buoyancy-driven convection. We use an asymptotic analysis of laminar flow, deriving the detailed structure of the boundary layer in each case. We also consider the impact of turbulent convection on this transition. Melting gives faster ablation rates and larger vertical mass fluxes than are obtained for dissolving. This raises the possibility that a small increase in ocean temperature could be responsible for a rapid acceleration in iceberg disintegration by causing a transition from dissolving to melting.

Andrew Wells
Institute of Theoretical Geophysics, DAMTP, University of Cambridge

Date submitted: 29 Jul 2007 Electronic form version 1.4