1070-74-26 **Mark D Behn*** (mbehn@whoi.edu), Woods Hole Oceanographic Institution, Department of Geology and Geophysics, 360 Woods Hole Road – Mail Stop 22, Woods Hole, MA 02543, and **Michael J Krawczynski**, **Sarah B Das** and **Ian Joughin**. *The role of supra-glacial lakes in supplying meltwater to the base of the Greenland Ice Sheet.*

A major unknown in assessing the response of ice sheets to climate change is the availability of meltwater to the bed in space and time. The formation of water-filled cracks beneath supra-glacial lakes is an effective mechanism to drive hydro-fractures through thick ice sheets and supply melt water to the bed. I will present both observational constraints on hydro-fracture formation beneath lakes in the Jakobshavn-Isbrae region of the Greenland Ice Sheet and theoretical calculations for the propagation of water-filled cracks. Specifically, I will show that supra-glacial lakes are required in order to store the volume of water necessary to maintain a water-filled crack until it reaches the bed. Once formed these fractures evolve into meltwater conduits (moulins) that remain open for the remainder of the summer melt season. Hydro-fracture events beneath supra-glacial lakes are correlated with transient ($\sim$24 hr) horizontal acceleration and uplift of the ice sheet as the rapid influx of water overwhelms the basal hydrologic network, increasing water pressure, and reducing the shear stress at the bed. These transients place important constraints on the ability of the basal hydrologic system to evolve in response to changes in melt water supply. (Received December 15, 2010)