Fjord – Glacier Ice Interactions: Nuup Kangerlua (Godthåbsfjord) Southwest Greenland

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Ocean water circulation into fjords has been hypothesized to play an important role in modulating ice discharge from outlet glaciers, but details on the physical processes remain sparse. To help fill this gap, we conducted hydrographic surveys over a six-day period in August 2011 in the proglacial fjord Kangersuneq near Nuuk in southwest Greenland. Most measurements were conducted about 22 km from Kangiata Nunata Sermia (KNS) over its Little Ice Age moraine, a 170 m deep sill that separates two 300 m deep basins. The CTD and ADCP measurements revealed a highly stratified water column capped by a 5 m freshwater layer. The warmest (3 °C) and most saline water (32 psu) lies near the bottom of the fjord. The freshwater fraction at 20 m is 7.6%: 6.0% from subglacial freshwater discharge and 1.6% from ice melting. Two Lagrangian drifters released in the inner fjord recorded surface motion as well as temperature and salinity at depths of 0, 7, and 15 m.

While surveys were conducted at neap tide to minimize tidal complexities, our current measurements still reveal a highly variable flow regime, influenced by the tidal cycle but also by rotational circulation patterns and events within the inner basin. The latter were monitored using time-lapse cameras and a ground-based radar interferometer. Preliminary estimates show relatively low heat and mass fluxes across the LIA sill, compared to measurements reported elsewhere in Greenland and Alaska. We hypothesize that an unusually cool summer lead to low subglacial discharge, an agent that is necessary to drive convection and submarine melting.