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Title: Simulating the Effect of Accelerated Freshwater Discharge from the Antarctic and Greenland Ice Sheets on the Ocean Circulation

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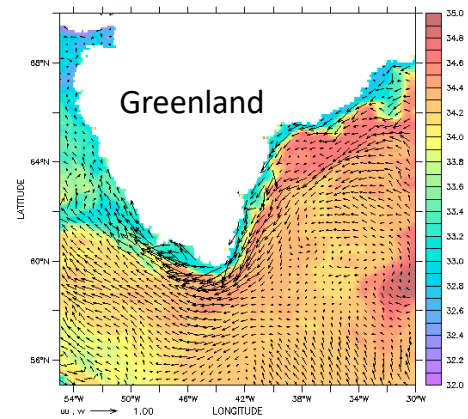
Simulating the Effect of Accelerated Freshwater Discharge from the Antarctic and Greenland Ice Sheets on the Ocean Circulation (w19_icesheetfreshwater)

Matthew Hoffman (T-3) and Mathew Maltrud (T-3)

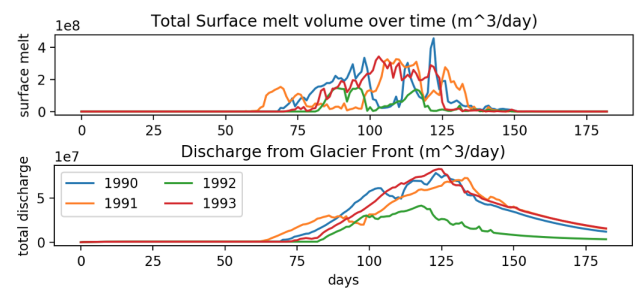
- Fresh water discharge from the largest ice sheets (Antarctica and Greenland) is accelerating as the Earth warms, resulting in sea level rise and changes in ocean circulation. Understanding the relevant ocean and ice processes will help project possible future climate states

- Performed century-scale Energy Exascale Earth System Model (E3SM) simulations of the global ocean using a high-resolution mesh to focus on mesoscale (10km to 100km) effects of changing Greenland discharge on regional ocean circulation.

- Used the MPAS-Albany Land Ice (MALI) component of the E3SM to run simulations of Greenland's Humboldt Glacier to understand the dynamics of subglacial hydrology and its importance in transporting melt water to the ocean.



Near surface ocean salinity (grams salt/kilograms water) and current vectors (m/s) near southern Greenland from year 110 of the E3SMv1 control simulation. Note the low salinity water near the coast that gets transported away by the strong, narrow current.



Time series of surface melt input to Humboldt Glacier (top) and the modeled subglacial discharge into the ocean at the glacier terminus (bottom). The subglacial drainage system greatly attenuates and delays surface melt fluxes, modulating the freshwater fluxes received by the ocean.