

Shelf-forced fjord circulation and heat transport at the terminus of a major outlet glacier

Rebecca H. Jackson¹, Fiamma Straneo¹, David A. Sutherland²

1. Woods Hole Oceanographic Institution 2. University of Oregon

Driving questions:

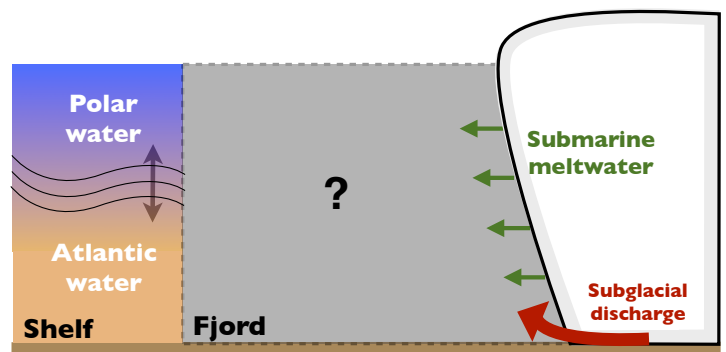
What controls ocean properties near the glacier and over what timescales do they vary?

How does variability on the shelf translate to variability at the ocean-glacier interface?

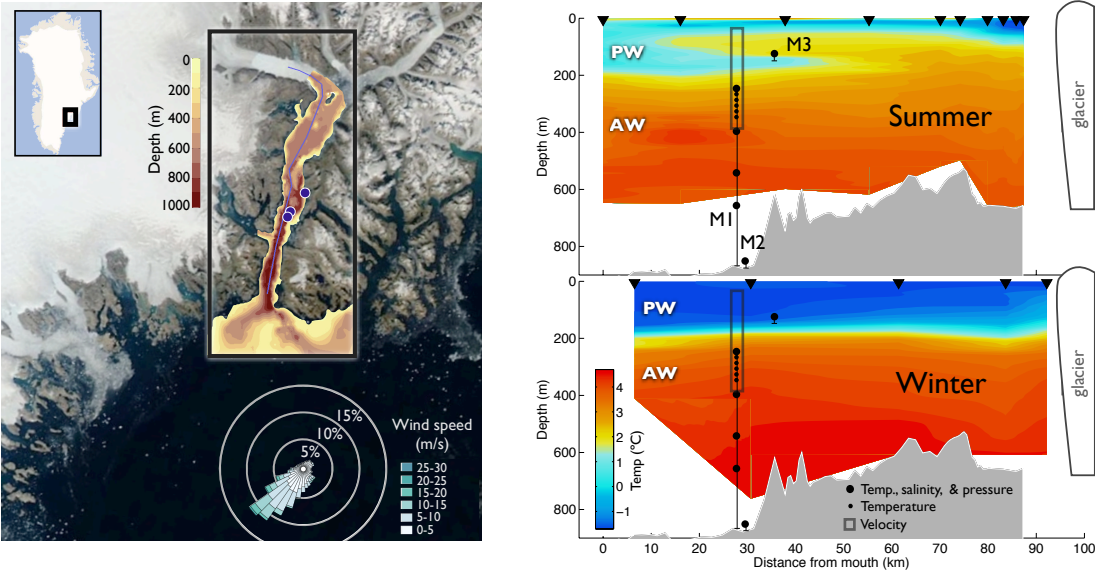
→ need to understand fjord dynamics and circulation

Processes (potentially) affecting ocean properties and exchange with shelf

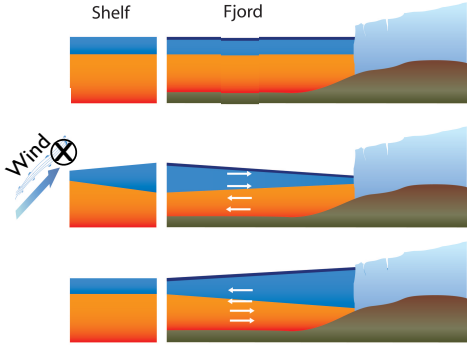
- glacier buoyancy-driven flow
- local mixing, wind, air-sea fluxes
- remote forcing from shelf



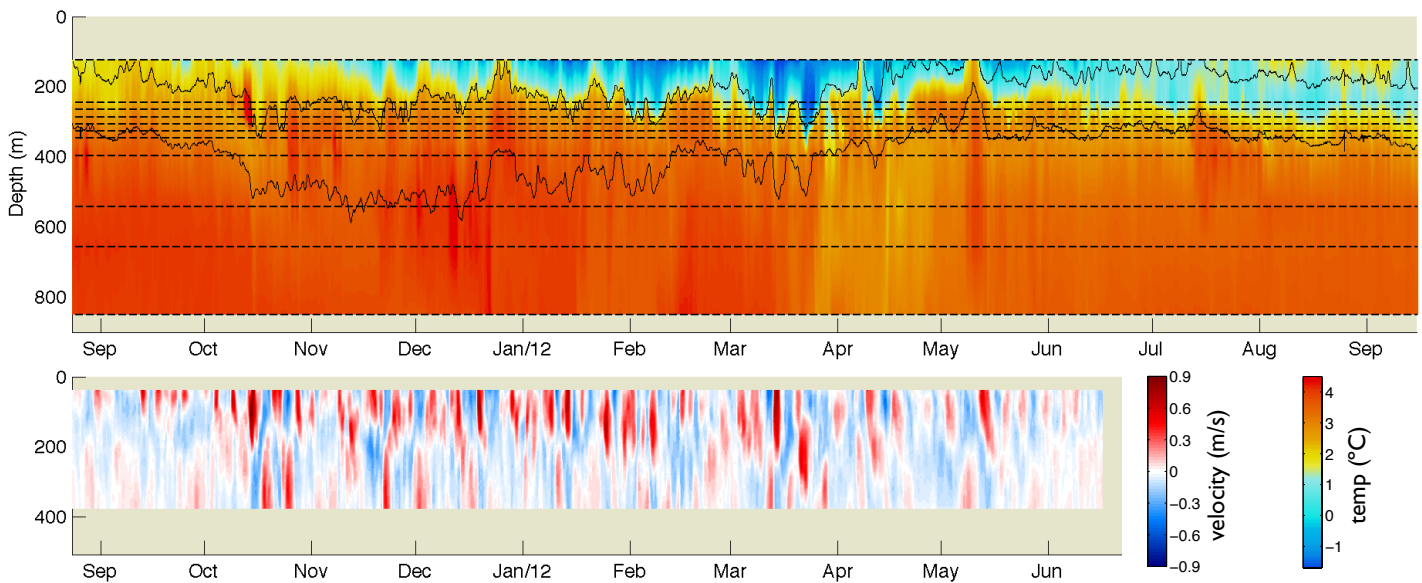
Moorings in Sermilik Fjord



Mechanism of remote forcing from shelf



Mid-fjord temperature variability & velocity pulses



- fast, reversing two-layer flow pattern; primarily shelf-driven
- large volume fluxes mid-fjord linked to significant heat content fluctuations

Implications

- pulses can rapidly translate signals from shelf to the upper fjord
- shelf-forced flow drives much more exchange than glacier-driven circulation
 - Atlantic layer variability likely not controlled by glacial inputs
- measurements of heat transport must account for large fluctuations in heat content