

Connections between continental shelf circulation and fjord circulation: does it matter to Greenland's glaciers?

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Abstract

The circulation and hydrographic properties of continental shelf waters surrounding Greenland are by definition the seaward boundary condition for Greenland's outlet glacial fjord systems. In this sense, then, it is implied that shelf conditions are the drivers of changes in fjord circulation, and potentially heat transport to the glacier face. However, observations on the Greenland shelf are sorely lacking and we cannot make definite connections between the shelf, the fjord, and the upwelling plume region next to the glacier itself. Here, we will discuss potential mechanisms that connect the shelf circulation with the fjord, and interestingly, show how the fjord can have major impacts on the shelf circulation. Our focus is observational, using shipboard data taken over five summers in two southeast Greenland fjords, moored data covering multiple years, and remotely-sensed data obtained by tagged marine mammals and icebergs. Integrating these observations allows us to identify data gaps and understanding gaps where future studies should focus—either observationally or through a process modeling approach.