

Multi-year ocean observations at the margins of Greenland Glaciers

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Increasing evidence suggests that ice-ocean interactions play a significant role in the variability of the mass balance of Greenland's marine-terminating glaciers. Yet, the chain of events linking glacier and ocean variability is still unclear – in part because of the limited measurements from the fjords and continental shelves. Here, I summarize what we know about the circulation and properties in Greenland's glacial fjords based on previous studies and, also, present a new 4 (3) year record of variability in ocean properties from Helheim/Sermilik (Kangerdlugssuaq) – two major glacier/fjord systems in SE Greenland. The ensemble of these data indicates that fjord properties are largely controlled by ocean properties on the continental shelves, with weekly to monthly renewal timescales. This, combined with recent modeling studies indicating that glacial runoff exerts a major control on submarine melt rates, indicate that glacier forcing by the ocean is strongly influenced both by ocean properties on the shelves and by the glacial runoff. While a lot remains to be done to clarify the dynamics, the implication is that both the runoff and the shelf/large scale ocean variability must be known in order to provide appropriate boundary conditions to the glacier and ice sheet models.