

Impact of katabatic wind events on the sea ice, icebergs and ice mélange in a large glacial fjord in southeast Greenland

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Southeast Greenland is known for strong wind events that result from the interaction of the atmospheric flow with the high topography. Amongst these are intense down-slope winds with a significant katabatic component ('katabatic' hereafter). These winds are exceptionally strong in Sermilik Fjord, where Helheim Glacier discharges, and limited visible images suggest that they may have a strong impact on the fjord and its sea-ice and iceberg cover. By affecting the ice mélange at the edge of Helheim Glacier, these winds can therefore potentially impact glacier stability and may have played a role in the most recent acceleration and retreat of Helheim.

In this presentation we identify strong katabatic wind events in Sermilik Fjord using data from two meteorological stations and the reanalysis product ERA-Interim. By combining these data and products, we are able to build a composite of their local and regional characteristics. Next, using photographs of the Helheim ice mélange from a local time lapse camera, direct and indirect velocity measurements from Sermilik Fjord as well as remote sensing data, we investigate their impact on the fjord circulation and the ice cover near Helheim glacier, inside the fjord and on the shelf. Our results show that these winds tend to shift and remove ice from the fjord, and break up the ice mélange near Helheim Glacier.