

The Supply of Warm Atlantic Water to Nioghalvfjærdsbræen in North East Greenland

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Nioghalvfjærdsbræen is a floating tongue glacier in North East Greenland that drains approximately 8% of the area of the Greenland ice sheet.

We are concerned about the supply of warm Atlantic water to the subglacial cavity, which may interact with the 60 km long floating ice tongue. In September 2011 and August 2012 we completed CTD and $\delta^{18}\text{O}$ sections across the 300-400 m deep Belgica-Norske-Westwind trough system on the East Greenland shelf. This u-shaped trough system may allow warm Atlantic water found below 150 m in the Greenland Sea to cross the shallow (100-200 m) continental shelf and enter the subglacial cavity beneath Nioghalvfjærdsbræen. In August 2012 Dijnphna sound (a sound connected to Nioghalvfjærdsfjord) was ice free and we were able to complete a section of CTD and $\delta^{18}\text{O}$ measurements from the mouth of the sound up to the Nioghalvfjærdsbræ ice tongue. Our 2012 measurements from Dijnphna sound show warmer, fresher water at the bottom of the sound and a thicker, fresher, warmer layer at the surface compared with similar measurements collected in August 1997.

A large area of semi-permanent fast ice known as the Norske Øer Ice Barrier extends 75-150 km from the end of Nioghalvfjærdsbræen. This fast-ice is pinned by grounded icebergs and may play a role in keeping the disintegrating frontal region of the Nioghalvfjærdsbræ ice tongue together. AVHRR satellite images show a correlation between the breakup of this ice barrier and the retreat of the Nioghalvfjærdsbræ ice tongue. In 2012 we deployed an ice mass-balance buoy at the western edge of the Norske Øer Ice Barrier to investigate processes controlling the ice growth and melt.