



Sub-ice shelf circulation and basal melting of the Fimbul Ice Shelf

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The Fimbul Ice Shelf is the largest of the ice shelves in Dronning Maud Land. Due to a narrow and some places non-existent continental shelf, the ice shelves in Dronning Maud Land are situated close to the Warm Deep Water. The Antarctic Slope Front separates the Warm Deep Water from the ice shelves and complicated exchange processes working across this front controls the melting of the Fimbul Ice Shelf and the other ice shelves in Dronning Maud Land. Here we will present analysis of unique data from the Dronning Maud Land coastal zone, as well as preliminary results from the 2009/2010 field work on the Fimbul Ice Shelf.

In 2008 eight elephant seals equipped with CTD data loggers collected hydrographic data in the Dronning Maud Land coastal zone from February through October. Analysis of these data shows that overturning of the Antarctic Slope Front is the main process exchanging heat into the ice shelf cavities. This overturning together with an onshore surface Ekman flow leads to a seasonal cycle in the salinity of the coastal water masses, while glacial melting sea ice formation has little influence.

During the 2009/2010 field season on the Fimbul Ice Shelf glaciological and oceanographic data were collected. We will show preliminary results of ice flow, ice thickness and basal melting measured using stake nets and phase sensitive radar. Oceanographic data were collected through three hot water drilled access holes in the ice shelf. These data show a water column with temperatures close to the surface freezing point over most of the water column. Relatively warmer water was observed near the bottom on one of the CTD stations. Maximum observed temperature is -1.57°C . We compare the sub iceshelf hydrography with the hydrography observed by the elephant seals near the ice front in an attempt to reveal the sub ice shelf circulation. We also compare estimated melt rates from the oceanographic data with melt rates estimated with the phase sensitive radar and stake nets. Our primary goal for the project is to estimate the mass balance of the Fimbul Ice Shelf, and preliminary mass balance estimates will be presented.