



The change in surface accumulation-rate pattern along the ridge from GRIP to NEEM during the Holocene.

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Internal layers can be detected in ice sheets using ice-penetrating radar. These internal layers are interpreted as isochrones, and they among other things hold information about the surface accumulation-rate and basal melt-rate. Knowledge about the history of the surface accumulation-rate and basal melt-rate for an ice sheet is essential when determining the current state of the ice sheet. We present here a method to recover this information from the depth and shape of the internal layers, and show results for the area between GRIP and NEEM.

In order to obtain the surface accumulation-rate and basal melt-rate pattern, a model based on Glen's flow law and the shallow ice approximation has been developed to track particles through the ice in a curvilinear coordinate system. The calculated internal layers can then be compared to observed internal layers along the flow line. The surface accumulation-rate and basal melt-rate along the flow line constitute the unknown model parameters of this problem. Estimating the values of the unknown model parameters from the depth of several internal layers is an inverse problem. We solve this inverse problem using a Monte Carlo method.

We have estimated the surface accumulation-rate pattern as well as the changes during the Holocene along the ridge going from GRIP to NEEM, but this procedure can be applied to other regions of the Greenlandic Ice Sheet and to the Antarctic Ice Sheet. The results reveal information about changes in the climate system during the Holocene.