



Basal melt rates in northern Greenland inferred from internal layers

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Large parts of the Greenland Ice Sheet have been investigated with air borne radio echo sounders. The obtained radio echo sounding (RES) images reveal internal layers in the ice. These layers are isochrones and many of them can be followed over hundreds of kilometres. The isochrones can be dated from their depths at the NorthGRIP ice core drill site. The shapes of the layers contain information on ice flow dynamics and especially on the basal melt rate. Studies of the RES data have revealed a large area in the northern part of the ice sheet where the ice is melting at the base. In this work we use ice flow modelling and inverse Monte Carlo analysis to estimate the basal melt rates in this area. A one-dimensional Dansgaard-Johnsen model is used to simulate the flow of the ice, and by tracing internal layers in the RES images a data set is constructed that can be used to constrain a Monte Carlo solution to the inverse problem thus producing basal melt rate estimates.