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An Ice Flow Model of Hans Tausen Ice Cap, North Greenland

A. M. Solgaard (1), C. S. Hvidberg (1), H. B. Clausen (1) and N. Reeh (2)

(1) Niels Bohr Institute, University of Copenhagen, Denmark, (2) Ørsted-DTU, Technical University of Denmark, Denmark (solgaard@fys.ku.dk)

Hans Tausen Ice Cap (82.5° N, 38° W) is a local ice cap in Peary Land, North Greenland. The ice cap has a length of about 75 km from North to South, and a maximum width of about 50 km. It is divided into a northern and a southern part by a 15 km wide saddle. The large southern part has several local domes with an elevation of 1200-1300 m.

In 1995, a 345 m deep ice core was drilled to the bedrock at the south-eastern dome. Volcanic horizons in the ice core have been used to date the ice core and to determine the annual layer thickness. These data suggest that the ice cap started building up around 3500 years BP (Clausen et al., 2001). The annual layer thickness is constant with depth suggesting that the ice cap is not in a steady state. A surface strain rate survey around the drill site showed that the ice cap is currently building up with a rate of about a third of the annual accumulation rate. Mass balance parametrizations, however, suggest that the marginal areas are experiencing a retreat. Hence, at present the ice cap appears to be thickening in the central areas, and thinning at the lower elevation outlet glaciers. Overall, the mass balance may be negative (Reeh et al., 2001), and the ice cap may be steepening.

We have calculated balance velocities, and used an ice sheet flow model to investigate the current overall mass balance of the ice cap. It will be discussed how sensitive the ice cap is to climate changes, and whether or not Hans Tausen Ice Cap will be able to reach a steady state.