

The last deglaciation of Fennoscandia: comparisons with the Laurentide/Cordilleran region

Johan Kleman¹, Arjen P. Stroeven¹, Clas Hättestrand¹, Bo Strömberg¹, Jakob Heyman¹, Ola Fredin²

(1) Bolin Centre for Climate Research, Department of Physical Geography and Quaternary Geology, Stockholm University, Stockholm, SE-10691, Sweden, johan.kleman@natgeo.su.se

(2) Quaternary Geology, Geological Survey of Norway, P.O. box 6315 Sluppen, Trondheim, NO-7491, Norway

We present an overview of the pattern, dynamics and chronology of the last deglaciation of Fennoscandia, and compare with corresponding aspects of the last deglaciation in the Laurentide/Cordilleran region of North America. The deglaciation of Fennoscandia started with slow retreat from the lobate margin and maximum-stage moraines in northern Germany and Poland and ended with the rapid decay of a largely cold-based ice sheet remnant in the northern Swedish mountains. The spatial pattern of deglaciation was highly asymmetrical, with rapid marginal retreat in the southern and southeastern sectors, but only slow and repeatedly interrupted retreat in the west. Ice streaming was important in the deglaciation of the Norwegian shelf and the southern margin in Denmark and Germany, and in later stages in the Baltic depression and in Finland. The retreat pattern is generally well-constrained by a coherent set of eskers and youngest striae directions. Only north-central Fennoscandia lacks this clear deglacial imprint due to persistent cold-based Late Weichselian conditions and a dominance of landforms formed by older ice sheets. The chronological constraints are complex. In particular, the “absolutely calibrated” clay-varve chronology, while internally of high quality, is known to be “floating” and in need of a correction. Based on the use of the climatically controlled Younger Dryas end moraine zone as a spatial marker, we correlate the retreat in the western (radio-carbon dated) and eastern (clay-varve dating) sectors. Clay varve ages north of the Younger Dryas zone were corrected by adding 875 years to the clay varve time scale. Our recent cosmogenic dating in the northern interior indicates that final deglaciation was earlier than previously thought, with Fennoscandia becoming fully ice-free at 9.9 kyr BP. In contrast to the situation in North America, the major interior water body of the Baltic did not split the decaying ice sheets into separate parts. In terms of final ice sheet dynamics, Fennoscandia displays the same vast range of conditions as North America, including lobate highly-dynamic sectors (Denmark – Great Lakes), terrestrial wet-based sheet flow (central Sweden – Keewatin and Quebec), and cold-based deglaciation with minimal landscape imprint (north-central Fennoscandia – Canadian High Arctic).