



Cool deltas. Sedimentary environments of Salpausselka I and II moraine ridges near Lahti, Finland

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Two large “moraine” ridges (Salpausselka I and Salpausselka II), extending to over 600 km in length, delineate two major stillstand/readvance positions of the Fennoscandian ice sheet during the last deglaciation, inferred to be chronologically related to the cool climate event known as the Younger Dryas (age). During this time the Baltic ice lobe and the Finnish Lake District ice lobe, constituting a part of the southern margin of the Fennoscandian ice sheet, were grounded in a large proglacial lake, the Baltic ice lake, a predecessor to the modern-day Baltic Sea. Most of the sediments were delivered to the ice margin by meltwater and deposited in the form of ice-contact deltas, over a very short period (230 and 250 years respectively for Salpausselka I and II). As a result, the “moraine” ridge is mostly composed of glaciofluvial sands, gravels and boulders rather than diamicton which is more typical of moraine sedimentology.

In this study, high resolution LIDAR data (2m horizontal, 0.3m vertical), provided courtesy of the National Land Survey of Finland and processed by the Geological Survey of Finland, ground penetrating radar profiles and outcrops were analyzed and interpreted. These provide a record of rapid sedimentation from high-magnitude meltwater discharge, through subglacial channels, resulting in rapid buildup of ice contact fans to the water surface and subsequent progradation of deltaic forests. Renewed retreat of the ice margin lead to abandonment of the Salpausselka I and deposition of the Salpausselka II ridge, 25 km to the north. In the Lahti region, where the two ice lobes were confluent, the largest deltaic complex developed. Sediments of Salpausselkas in Finland are a world class example of a sedimentary environment which records, with great detail, the processes of the formation of ice-contact, Gilbert-type, deltas marking stillstand positions of the southern margin of the Fennoscandian Ice Sheet during the Younger Dryas.