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Late Weichselian cirque-glacier fluctuations on Andøya, northern Norway

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Andøya in northern Norway has among the longest records of lacustrine sediments in Norway. Previously, emphasis has been put on records reflecting the Scandinavian Ice Sheet and climate change inferred from biological proxies. As part of the ARCTREC (ARCTic REcords of past Climate change – dynamics, feedbacks and processes) project, we here explore the sedimentary archives of four distal-fed glacial lakes and the related glacial landforms in order to reconstruct cirque-glacier fluctuations during the Late Weichselian at the NE part of Andøya, northern Norway. By quantifying physical properties of glacial and extra-glacial sediments deposited in catchments, and in downstream lakes it is possible to isolate and identify past glacier activity that subsequently can be used to reconstruct changing environmental shifts and trends. Three cirques with individual lakes and moraine chronologies all drain into the larger lake Sverigedalsvatn. X-Ray Fluorescence (XRF), Magnetic parameters, pollen, plant macrofossils, organic content and grain-size analysis have been conducted on the lake cores.

The Saksunarvatn tephra (10.347 b2k) and Vedde ash (12.171 b2k) have been identified in the cores, wheras two other micro-tephra layers are located but not yet identified between 14.4 and13.9 ka b2k. Along with ten AMS radiocarbon dates we have been able to produce a reliable age-depth model between 14.5-10 ka b2k from lake Sverigedalsvatn.

The sedimentary record indicates several cirque glacier fluctuations during the Bølling (14.69-14.07 ka b2k) and Allerød (14.07-12.89 ka b2k) substages whereas the Younger Dryas (12.9-11.07 ka b2k) became progressively more stable. These results contradict results from southern Norway concerning timing and magnitude of glacier events during the last deglaciation.

The moraine chronology shows several large advances suggested to have taken place prior to 17 ka b2k when the cirque glaciers coalesced. This indicates that the continental ice sheet in the nearby Andfjord was situated below a local bedrock threshold at c. 80 m a.s.l. during this period. Prior to or at the onset of the Bølling substage, large parts of the coalesced cirque glaciers melted away and resulted in three individual cirque glaciers. Exposure dating from the moraine chronology is in progress.

The ongoing project will give new insight on the climate dynamics and variability related to the inflow of Atlantic water, sea-ice cover and moisture supply to coastal northern Norway during the Late Weichselian.