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A 14.000-year History of the Helheim Glacier – a record of Long-term Ice Dynamics in Relation to Climate

Anders Bjørk (1), Kurt Kjær (1), Nicolaj Larsen (2), Jesper Olsen (3), Shfaqat Khan (4), Anne Goldsack (5), Thorbjørn Andersen (6), Norman Schreiber (6), Camilla Andresen (3), Niels Korsgaard (1), Kristian Kjeldsen (1), and Leigh Stearns (7)

(1) Centre for GeoGenetics, Natural History Museum of Denmark, University of Copenhagen, Denmark (andersb@snm.ku.dk), (2) Department of Geoscience, Aarhus University, Denmark, (3) GEUS Geological Survey of Denmark and Greenland, Copenhagen, Denmark, (4) DTU Space, Copenhagen Denmark, (5) Department of Geography, Swansea University, UK, (6) Department of Geosciences and Natural Resource Management, University of Copenhagen, Denmark, (7) Department of Geology, University of Kansas, USA

Situated on the southeast coast of Greenland, the Helheim glacier is a major contributor of ice discharge and a milestone glacier in regards to understanding ice sheet dynamics to climate forcing. Within the last decade, the glacier has responded rapidly with retreat and increased calving to rising temperatures and inflow of warm oceanic water. Evidence from marine cores show that this has also occurred in warming periods during the last century. In this study we present lake core data revealing a 14.000 yr record of the dynamic behavior of the Helheim glacier.

By targeting threshold lakes at the ice sheet margin upstream of the glacier, we receive a signal of glacial advance and retreat. The threshold lakes only receive glacial sediment when the ice margin is at an advanced position, similar to that of the present. As our cores penetrate into the deglaciation we have dated the onset of lake formation to ca 13.5 kyr bp – this suggests a much earlier deglaciation than what has previously been presented. Furthermore, our results reveal that the lakes have received glacial sediment several times throughout the Holocene.