



The sedimentary response of a rockglacier to changing climate conditions

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The environmental history of a talus-derived rockglacier located in northern Norway has been reconstructed through the last glacial–interglacial transition based on two cores retrieved from an adjacent lake. The methods used to quantify sedimentary properties include rock magnetism, grain-size analyses, loss-on-ignition (LOI) and bulk density (BD), which when combined has enabled an unmixing of the various sediment components and their corresponding sources. Rockglaciers signify mean annual air temperatures (MAAT) of ~ 4 °C or colder, but little is known about their dynamical response to changing thermal regimes. We document here for the first time that a permafrost regime did exist in northern Norway during the lateglacial period, and that it required a lowering equivalent of at least 7 °C compared to present-day MAAT. The lake sediments suggest that the rockglacier existed prior to the local deglaciation of the Fennoscandian Ice Sheet ($\sim 14\,800$ cal yr BP), and continued its expansion until the end of the Younger Dryas whereupon it became fossil. The cool climate of the lateglacial was intersected by brief warming spells that caused a systematic release of sedimentladen meltwater from the rockglacier, documenting a close coupling between an active rockglacier and the surrounding environment.