

Ages of rock-avalanche deposits allow tracing the decay of the Scandinavian ice sheet

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We have mapped rock-avalanche deposits in western and northern Norway and dated several by means of cosmogenic nuclide dating. Rock avalanches that deposited in ice-free valleys have pristine morphologies with a lobate form and a carapace of large angular boulders comprising only the lithology of the failed slope. The deposits of rock avalanches on decaying ice bodies are more difficult to recognize as the typical lobate form is missing deposits are only preserved in end moraines or on valley slopes higher than the ice body at time of failure. However, those deposits have similar sedimentologic characteristics, with angular boulders comprising only lithology of the failed slope. Rock-avalanche deposits in moaines are characterized by boulder accumulations with a small amount of fines as those got washed out by the melting ice (Schleier et al. 2015). Our results indicate that valleys on islands in the Barents sea have been ice-free by 13.5 kyr, slopes were ice-free in outer fjord regions in northern Norway by 12 kyr, and slopes in inner fjord regions by 10-11 kyr. In western Norway, the Innerdalen valley still had a 350-m-thick valley glacier at 14.1 kyr while a first age suggests that the Innfjorddalen valley was ice free at that time. Muliple rock avalanches with pristine morphology distributed throughout the inner fjords and valleys in western Norway indicate that most valleys became essential ice free between 12 and 10 kyr. This includes valleys like Bøyadalen in Fjærlandsfjord that are close to todays existing ice fields. Our data match well with models of the Scandinavian ice sheet (Hughes et al., 2015) and show the fast reply of rock slopes on decaying ice sheets.

References:

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