Early Holocene deglaciation of eastern Iceland constrained by cosmogenic ^{36}Cl exposure ages and tephrochronology

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The Iceland Ice Sheet (IIS) is thought to have extended to the shelf break around Iceland at the Last Glacial Maximum and then collapsed and retreated to a position inside the present-day coast during the Bølling-Allerød. Following the Younger Dryas (YD) and Preboreal readvances to coastal areas, the IIS retreated inland and deposited a number of end moraines of unknown age. Several records suggest that remnants of the IIS were smaller than present glaciers by ~9 ka BP. However, the rate of retreat from the Preboreal position (just inside the YD position) to the interior highlands remains unresolved. Recent studies in NE-Iceland revealed the tracks of palaeo-ice streams, one of which extended from the highland interior north of the present Vatnajökull to the coast in Vopnafjörður. Several end moraines are preserved along the center flow line of this former ice stream, indicating periodic stillstands or readvances that punctuated its overall retreat. In this project, roughly 30 samples were collected for cosmogenic 36Cl surface exposure dating of glacially scoured bedrock and end moraines along a ~120 km long transect from the coast in Vopnafjörður to near the northern margin of Vatnajökull. We expect exposure ages to decrease from the coast towards the highlands and reveal a rapid deglaciation of the IIS during the early Holocene.

Preliminary 36Cl ages from the Skessugarður bouldery end moraine, approximately mid-way along the transect between the coast and present Vatnajökull, suggest that it was formed between 10.8 and 9.5 ka BP. A continuous Holocene tephra sequence at the upglacier end of the transect reveals a potential G10 ka tephra series resting directly on till, possibly indicating completely deglaciated highlands by 10.3-9.8 ka BP.

More ^{36}Cl dates and tephra analyses from the transect are expected in 2024, providing a unique dataset in Iceland. The outcome of these dating efforts has important implications for our understanding of the rates and pattern of IIS decay and serves as a critical constraint for palaeoglaciological modelling of the IIS.