

Ribbed moraines formed during deglaciation of the Iceland Ice Sheet

Nína Aradóttir^a, Ívar Örn Benediktsson^a, Erla Guðný Helgadóttir^a, Ólafur Ingólfsson^a, Skafti Brynjólfsson^b, Wesley R. Farnsworth^a

^aInstitute of Earth Science, University of Iceland, Reykjavík, Iceland, nia1@hi.is, ivarben@hi.is, erlagudny@gmail.com, oi@hi.is, wesleyf@hi.is

^bIcelandic Institute of Natural History, Akureyri, Iceland, skafti.brynjolfsson@ni.is

Understanding the geomorphological fingerprints of palaeo-ice streams is essential for our perception of the ice-stream behaviour, as the formation of bedforms provides a window into processes at the ice/bed interface. Cross-cutting flow-sets of palaeo-ice streams, during and following the Last Glacial Maximum (LGM), have been suggested in northeast Iceland based on mapping of streamlined subglacial bedforms (SSBs; drumlins and MSGs) and crevasse-squeezed ridges. Here we map transverse ridges, together with glaciofluvial and ice-marginal bedforms, within the Vopnafjörður-Jökuldalsheiði flow-set. The main emphasis is on the transverse ridges, that are primarily interpreted as ribbed moraines - the first to be described in Iceland. Morphological data is combined with sedimentological analyses of the ribbed moraines to increase our understanding of their formation and dynamics of the IIS in northeast Iceland during deglaciation. The ribbed moraines are composed of pre-existing material, a base of glaciofluvial sediments draped with subglacial till. Deformation within both units suggests compressional flow during the formation of the ridges. Ribbed moraines are often considered to form at the transition zone between fast and slow ice flow and their distribution upstream from drumlin fields agrees with that. Furthermore, they have been linked to ice stream onset zones and their shutdown. Based on ridges superimposed on drumlins and „ribbed” drumlins, the ribbed moraines are considered to post-date the SSBs and signify the waning stage of ice streaming. Correlating the formation of the ribbed moraines with the known glacial history in this region we suppose that the ridges formed during the Younger Dryas deglaciation. Eskers superimposed on ribbed moraines indicate channelized water drainage during the deglaciation. The eskers frequently terminate at ice-marginal positions on Jökuldalsheiði, implying stillstands or small readvances during the deglaciation. This study has implications for the deglaciation behavior of ice streaming in the northeastern part of the IIS and sheds light on the formation of ribbed moraines under palaeo- and modern ice sheets.