



## The deglaciation of the Tröllaskagi Peninsula, Northern Iceland, based on cosmogenic datings

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The Tröllaskagi Peninsula is a mountainous area in central northern Iceland. Deep valleys have dissected the Tertiary plateau basalts which form the peninsula, ranging in altitude from sea level to 1500 m.

The aim of this work is to provide an initial approach to the deglaciation process in some valleys in the Tröllaskagi Peninsula, mainly by dating polished thresholds and some moraine boulders using cosmic radiation exposure and production of isotope  $^{36}\text{Cl}$ .

The results obtained lead to the following conclusions:

- a) In the outermost coastal areas, i.e. the peninsular capes and the mouths of the great fjords, the dating of polished thresholds situated at present around 100-150 m a.s.l. obtains ages immediately after Heinrich Event 1: thus two thresholds located at the end point of the Skagi Peninsula give ages of  $16.9 \pm 1.5$  ka and  $17.1 \pm 1.6$  ka. At the entrance to the Eyjafjörður, fjord near the town of Dalvík, another polished threshold has been dated to  $16.3 \pm 1.4$  ka.
- b) In the intermediate areas of the fjords, deglaciation occurred just at the end of the Oldest Dryas: two thresholds, one on each side of the Skagafjörður fjord at around 150 m a.s.l. obtain minimum ages of  $12.6 \pm 1.2$  ka on the edge of the Skagi Peninsula and  $13.8 \pm 1.3$  ka on the island of Þórðarhöfði, at a similar altitude.
- c) The bottoms of the great valleys which originate in the central highlands of the island and which currently drain the proglacial waters from the inland ice caps were deglaciated very early in the Holocene. Dates ranging from 11.5 to 10.00 ka were obtained from 7 polished thresholds at altitudes of between 120 and 700 m a.s.l. in the valley of the Eystri and Vestri Jökulsár Rivers which flows into the Skagafjörður fjord, with no clear altitude-related differences observed in the chronology. Taking into account the margin of error, these results may in fact show that the deglaciation of these thresholds was practically simultaneous. A similar date of  $11.6 \pm 1.5$  ka was obtained on a polished threshold in the Eyjafjafjörður valley, 3 km south of the town of Akureyri.
- d) The behavior of the inland valleys in the Tröllaskagi Peninsula is very different from that of the great fjords and valleys which drain the interior of the island. The most significant feature, limiting the application of cosmogenic dating methods, is the total absence of polished thresholds, probably because they are composed of easily fragmented tertiary lavas. The summits are completely covered with block fields and periglacial pattern ground. The valley slopes are extremely unstable and affected by different types of mass movements. Cosmogenic methods can only be applied to moraine blocks located very near the Little Ice Age (LIA) moraines, on stable platforms. These dating methods have been applied in two valleys: in the Hóladalur valley, north of the Hólar farm, and in the Vatnsdalur valley, an affluent of the Svarfaðardalur valley, NW of the town of Dalvík. The results were very similar in both cases: the outermost moraines can be linked to the Oldest Dryas with minimum dates of  $16.9 \pm 1.4$  ka, demonstrating a much more limited glaciation in the interior of this peninsula than in the rest of the island. Some fossil rock glaciers remained inactive at the end of the Oldest Dryas, with ages for the front termini of around 14 ka. There are also moraines from the Younger Dryas, dating between 12 and 11.3 ka. The only moraines completely within the Holocene are found in the Vatnsdalur valley, of 9 ka. Ablation moraines in this same valley, which appear to be much more recent, obtained ages of 1.4 and 0.8 ka. All these formations are found in a belt of 500 m wide which surrounds the snout of the present glaciers. Thus, it can be concluded that in the inner Tröllaskagi Peninsula, the glaciers had already retreated to their headwalls before the Oldest Dryas. Glacial advances have occurred since then, although these are very limited with a maximum magnitude only slightly greater than that of the maximum LIA advance.

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