



## Dating of a rock avalanche in Skagafjörður, Northern Iceland: pieces of evidence of a paraglacial origin

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The Skagafjörður area counts several large slope mass movements especially on the eastern side of the fjord. They are initiated from the top of the rockwall where a more or less developed scars are still observed. A significant number of those landforms have been described by Jónsson (1957), who interpreted those landforms as a result of post-glacial rockwall debuttressing, following the shrinking of the large ice bodies in the early Holocene. However, no attempt of dating has yet been carried out on the debris masses. The aims of this research are to discuss its possible paraglacial origin by combining four dating benchmarks:

(i) the dating of a succession of raised beaches on which the rock avalanche material lies. The higher beaches, exceeding 65 m a.s.l., have been dated older than 12000 BP. Beaches between 43 and 50 m a.s.l. have been dated older than 11300 and 9900 BP and beaches at 22-31 m a.s.l. between 9900 and 9600 BP. Regression below the present sea level occurred about 9000 BP (Rundgren et al., 1997). As the rock avalanche deposit does not display visible evidence of being impacted by the glacio-isostatic rebound (no inherited sea cliffs are seen at higher elevation than the actual sea level), we estimate the rock avalanche occurred later than 9000 BP.

(ii) the tephrochronological dating from the excavations made in the upper part of the mass, where peat areas developed since the setting of the rock avalanche goes back to 4500 years BP, with the H4 Hekla acid white thick layer found at 140 cm depth. The deposits from Hekla are well known in the area, and the five most common ash layers were discovered in the opened section, providing a significant time marker.

(iii) 14C dating of birches (*Betula* sp.) trunk and branches pieces found 80 cm below the H4 layer. The results are not yet available, but the period around 8000 BP is considered at those latitudes as a warm period, favourable to tree development.

(iv) basalt samples were collected on the rock avalanche deposit, at various elevations and settings on the deposit, to provide Cosmic Ray Exposure ages. To specify the age of the landslide, we will measure  $^{10}\text{Be}$  within the pyroxene minerals constituting the basalt. Beryllium isotopic ratios will be measured at the laboratory of CEREGE by Accelerator Mass Spectrometry. The results are in progress.

Collectively, those chronological benchmarks constrain the triggering of the rock avalanche event between 9000 BP (present-day sea-level) and 4500 BP (tephrochronology oldest dating). The finding of a large amount of wood long before the H4 tephra layer suggests that the occurrence of the rock avalanche was closer to the oldest extremity of this time period (so-called early birch period, just around 9000 BP, according to Einarsson 1991, and Óladóttir et al. 2001). Such results comfort the Ólafur Jónsson idea, proposing the occurrence of such mass movement as the result of a rapid paraglacial crisis following the deglaciation period, due to the combined effects of rockwall debuttressing and glacio-isostatic uplift. The cosmogenic and 14C results will provide a more accurate data for the chronological scenario.

### References

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