



Regional scale climatic trends derived from Younger Dryas glaciers in Britain.

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In Britain, the glacial geomorphological record has been utilised to infer palaeo-glacier geometries and ice dynamics, with much of this work focussing on the Younger Dryas (YD; c. 12.9 – 11.7 ka BP). During the YD the West Highlands ice-cap covered the majority of the Scottish Highlands, which is thought to have affected accumulation rates beyond the ice-cap margins, resulting in a steep (c. 80%) easterly decline in precipitation and smaller ice-masses.

We present multi-proxy data investigating YD glaciation in the Tweedsmuir Hills, Southern Uplands, Scotland (55°46' N, 03°34' W). The area forms the most easterly upland region in the Southern Uplands and south of the West Highlands ice-cap, reaching an altitude of 840 m and covering c. 300 km². Results of air-photo interpretation and field mapping, which utilised a morphostratigraphic approach, have demonstrated a more extensive glaciation than previously mapped, suggesting conditions were less arid than previously thought. The reconstruction consists of two separate icefields covering an area c. 60 km² and new ¹⁴C dates of basal contact organics place the ice-mass within the context of the YD but new Cosmogenic Nuclide Analysis (CNA) of bedrock and in situ boulders, imply limited erosion and resetting occurred during the YD.

Equilibrium Line Altitudes are calculated to have ranged from c. 419 - 634 m. Palaeo-precipitation values were derived using two precipitation-temperature relationships and suggest slightly lower totals than YD ice-masses located on the west coast of Britain but do not support a significant easterly reduction in precipitation. Analysis of present-day (c. 30 year) meteorological data across Britain demonstrates a pronounced reduction in precipitation of c. 50% on the east coast. This disparity between present-day and glacier-based YD precipitation patterns is partly attributable to the methodology employed in glacier reconstruction and questions the steep precipitation gradients thought to have been present. This data is placed within a Europe-wide context to elucidate glacier-climate patterns during the YD.