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Lateglacial geomorphology in the Tweedsmuir Hills, Scotland - Implications for retreat patterns, glacier reconstruction and chronology.

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The Tweedsmuir Hills, Southern Uplands, Scotland, contain excellent assemblages of glacial landforms, including hummocky moraine, classically associated with a Lateglacial deglaciation (c. 14.7 – 11.7 cal. ka BP) in the UK. Although initially documented in 1855, a detailed systematic geomorphological investigation has never been undertaken in the region, meaning reconstructions are patchy, outdated and lacking chronological control. This has resulted in conflicting styles of glaciation being inferred, with both plateau icefield and valley glaciers reconstructed in the Tweedsmuir Hills. Importantly, comprehensive numerical modelling experiments for the period, c. 38 -10.4 ka BP, predict a significant body of ice for the Tweedsmuir Hills at the onset and throughout the Younger Dryas (c. 12.9 – 11.7 cal. ka. BP). Field data, which at present, are missing means that the numerical modelling remains untested. Given the emerging evidence that ice-masses survived, during or throughout the Lateglacial in a number of regions in Scotland, the glacial geomorphology and reconstructions for this area will provide a key input of palaeo-glacier data for subsequent investigation of wider patterns of Lateglacial ice-mass distribution and climate gradients across the UK and NW Europe.

Geomorphological mapping followed a morphostratigraphic approach using a combination of aerial photos, NEXTMapTM and mapping in the field using a ruggedized tablet PC, with built in GPS and ArcGIS 9.3.

The glacial landforms indicate two separate landsystems. The first is characterised by elongate subglacial bedforms overriding the topography, trending SW to NE, suggested to be attributable to the Devensian glaciation. The second landsystem is characterised by closely spaced sharp crested moraines, oblique to the valley axis and confined by the topography, meltwater channels and single terrace systems, which are likely to have formed in a subsequent period of renewed glaciation i.e. Lateglacial. The Lateglacial landform assemblage indicates more extensive glaciation than previously envisaged, with both a transection ice-mass and icefield coexisting, reflecting different topographic controls. Interestingly, a geomorphic pattern is observable in more than one valley, which is interpreted as a synchronous recession of the outlet glaciers and a rapid deglaciation towards the summits. Whilst two landsystems have been mapped the second poses interesting problems regarding extent and timing of glaciation. The Loch Skene site has been traditionally associated with a small valley glacier. However, it appears to feed ice into a lower valley which exhibits a landform assemblage typical of Lateglacial deglaciation in Scotland. It is tentatively proposed that the Loch Skene glacier represents a retreat phase prior to complete deglaciation rather than the Younger Dryas maximum.