



The subglacial characteristics of the Tweed Palaeo Ice Stream, British Ice Sheet

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The landforms and sediments of palaeo ice stream beds can provide important data on the basal characteristics and flow mechanisms pertaining to rapid flow. The Tweed Ice Stream drained a substantial sector of the last (LGM) British Ice Sheet, flowing eastwards from the Southern Uplands to the present day coastline where it was deflected and became confluent with the southerly-flowing North Sea ice. This study applies a range of techniques to present a comprehensive depiction of the Tweed Ice Stream subglacial environment at multiple scales. Subglacial bedforms were mapped from a high resolution (5 m) digital elevation model and variations in their morphometry were analysed both along and across the ice stream bed. Sedimentological studies were conducted at sites within the ice stream bed and directly outside the ice stream bed and include lithofacies analysis, clast fabric, particle size distribution, clast morphology analysis, geotechnical measurements and micromorphological sampling and analysis.

This analysis shows that the ice stream bed is characterised by an isochronous swarm of elongated drumlins and subglacial meltwater channels. A lack of landforms related to slow or punctuated ice retreat (e.g. major moraine systems or glaciofluvial outwash) implies rapid retreat of the ice stream. Sub ice stream sediments are highly consolidated and deformed whilst the sediments outside the ice stream are less consolidated and very different in character. These differences appear to reflect the broad contrast in strain. Clast fabrics are highly variable over short distances and reasons for this are considered.