

Micromorphological analysis of polyphase deformation in subglacial and proglacial tills

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Introduction

There has been little study on the relation between applied stresses and the microstructures that form within deformed subglacial and proglacial tills. These are determined by variations in glacier dynamics as well as by variations in lithology and texture, which are both highly variable in terms of space and time. Deformation is a key process to be studied in glacial environments as the intensity of deformation will determine the grain size distribution, density, porosity and permeability (van der Meer, 1993; van der Meer *et al.*, 2003; Kilfeather and van der Meer, 2008) of tills. Thus an understanding of the micromorphology and the processes which formed down the sediments will allow us to determine the dynamics of the glacial system.

Múlajökull is a surging glacier to the south of Hofsjökull in central Iceland. There have been no studies at Múlajökull before as it is one of Iceland's more inaccessible glaciers. The aim of this study was to gain a greater understanding to the structures formed by polyphase deformation in subglacial and proglacial tills at Múlajökull. This fieldwork will produce the results needed to identify the glacial dynamics in a modern glacier foreland, which will improve understanding on the effects lithology, mineralogy, water content and grain size have on the movement of the ice. The outcome of this will provide the knowledge to further understanding of the micro-processes that occur beneath and in front of glaciers, which can then be applied to all glacial deposits of all ages. Having evidence of micro-structures from a modern glacial environment is key in understanding ancient glacial environments in the UK.



Methods

On arrival at Múlajökull we carried out a reconnaissance of the glacial foreland in order to find exposures which indicated deposition of the sediments had occurred subglacially or proglacially. Detailed descriptions of the glacial deposits for each site were taken, these were achieved using techniques including logging sedimentary structures, texture, colour, clast provenance, and clast orientation analysis. Twelve micromorphology samples were taken from sites that provided the most comprehensive deformation history for the sediments deposited subglacially and proglacially as the ice retreated.

Since returning from Iceland these samples are being processed into thin sections and will be ready by January 2010. The thin sections will then be analysed for micro-structures using a low powered microscope and a Metripol birefringence microscope. In addition microtomography will be used on impregnated block samples to analyse these micro-structures in 3D.

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Expenditure

Field Expenses	ISK	GBP	EUR
Accommodation	11000	53.88	61.06
Travel	126591	620.06	702.67
Maintenance	23728	116.22	131.7
Total	161319	790.16	895.43

References

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