Geophysical Research Abstracts
Vol. 14, EGU2012-1539, 2012
EGU General Assembly 2012

Lithological and fluvial influences on clast shape measurements in a temperate alpine environment: a case study from Fox Glacier, New Zealand

M. Brook (1) and S. Lukas (2)

(1) Massey University, Institute of Natural Resources, Soil & Earth Sciences, Palmerston North, New Zealand (m.s.brook@massey.ac.nz), (2) School of Geography, Queen Mary University of London, Mile End Road, London

Over the last 15 years, clast shape measurements have developed into a standard method for reconstructing the transport histories of sediments in glacial environments. Indeed, the combined use of form and roundness indices has been applied to clasts in temperate, polythermal, and cold-based glacier systems. The technique has also been extended to paleoenvironments, where assumptions are routinely made about: (a) passive versus active debris-transfer mechanisms; and (b), the volume and origin of debris provision for moraine formation. The majority of these studies use the 'RA-C40' approach developed in Benn and Ballantyne (1994), but often researchers include clasts of varying lithologies within their samples of 50 clasts. The implication is that variable lithological properties may control clast form and roundness, rather than debris-transport mechanisms. Despite this, the role of lithology on clast shape in glacial environments has rarely been analysed. Furthermore, some studies found difficulties in using the RA-C40 co-variance plot in discriminating between clasts that have undergone subglacial transport, and clasts that have been modified by fluvial activity. Here, an analysis of the effect of lithology on clast form and roundness is reported from a temperate alpine glacier. Clasts were sampled from slopes, ice marginal positions, and the foreland of Fox Glacier valley, where metamorphic grade increases down-valley. Argillite, greywacke and schist clasts were sampled to: assess the utility of established clast shape indices in distinguishing different transport pathways; to evaluate the effect of lithology on clast shape; and, to explore the discriminatory power of a different clast shape index. Results indicate that detailed analysis of clast shape with respect to lithology, although time consuming, is a useful tool in the investigation of deposits in glaciated environments. With respect to the RA-C40 technique, the suggested form-roundness relationships may not be valid and that more rigorous approaches may be required.