Geophysical Research Abstracts
Vol. 13, EGU2011-10874, 2011
EGU General Assembly 2011

What do glacial moraine chronologies really tell us about climate?

Martin Kirkbride
University of Dundee, Geography, Dundee, United Kingdom (m.p.kirkbride@dundee.ac.uk)

Moraine-based approaches to palaeoclimatic reconstructions are reviewed in the light of recent technical developments. Since the 1970s, geomorphologists have routinely made climate reconstructions by mapping and dating moraines and reconstructing palaeoglacier morphology. The approach provides low-resolution but useful place-specific estimatation of former summer temperatures. Regional patterns of reconstructed ELAs indicate palaeowind directions and therefore elements of synoptic climatology. Over the last decade, the conceptual and practical bases of this approach have been improved by (i) better understanding of the validity of different ELA reconstructions; (ii) ELA estimation based on mass balance principles; and (iii) solution to the previously intractable problem of systematic dating of boulder moraines, by using cosmogenic radionuclides. The latter in particular is creating a need to re-examine many existing moraine chronologies based on widely-employed "low-tech" dating methods. In spite of these advances, basic conceptual issues remain. The essential three-step assumption that cold "event" = glacier advance = moraine formation is the foundation for all such studies. This review examines the validity of this logic, drawing on recently published examples of moraine-based reconstructions. It raises questions about whether the leap forward in dating techniques has encouraged us to over-reach our interpretive limits. It also emphasises that however good the dating control, interpretive complexity remains, including varied glacier response characteristics which filter complex climate signals, representativeness of the preserved moraine record, and the climatic significance of reconstructed glacier advances. Research focused on each of these issues would potentially enhance the information we can extract from preserved glacial deposits.