Geophysical Research Abstracts, Vol. 7, 02091, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02091

Structure and behaviour of temperate valley glaciers: challenges for numerical modelling

B. Hubbard (1), D. Chandler (1), O. Bayley (1), T Murray (2), D. Rippin (2)

(1) Centre for Glaciology, Institute of Geography and Earth Sciences, University of Wales, Aberystwyth, UK, (2) School of Geography, University of Leeds, Woodhouse Lane, Leeds, UK,

byh@aber.ac.uk / Fax: / +44-1970-622659

With the development of higher-order numerical codes, computer-based models have improved markedly in terms of their ability to reproduce spatial patterns of stress transfer at valley glaciers. However, a variety of discrepancies still exists between the models used to recreate and predict the behaviour of valley glaciers and field evidence of the nature of those glaciers. Here, we compare numerical models of glacier motion with empirical data from valley glaciers to identify and investigate the extent to which various aspects of glacier structure and behaviour are adequately constrained by the current generation of computer models. We use field data relating to the spatial distribution of individual motion components at Upper Arolla and Tsanfleuron Glaciers, Switzerland, along with the physical structure of these glaciers, to evaluate and improve the performance of first order models of their stress and velocity fields. Large-scale physical characteristics that are partially incorporated into these models include spatial and temporal variations basal zones of low traction (so-called slippery spots and slippery axes) and spatial variations in ice softness, controlled by the layered facies comprising these glaciers. We then evaluate the potential impact of currently unconstrained physical processes and properties, including structural controls over ice temperature, basal heat fluxes associated with subglacial drainage, the role of ice motion by brittle fracture, and complex patterns of ice motion as revealed in structural glaciological studies.