Geophysical Research Abstracts,
Vol. 10, EGU2008-A-00757, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-00757
EGU General Assembly 2008

Hydrogeological implications of glacial landscape evolution

Z.P. Robinson (1), Fairchild, I.J. (2) and Russell, A.J. (3)

(1) Institute of the Environment, Physical Sciences and Applied Mathematics, Keele University, UK (z.p.robinson@keele.ac.uk), (2) School of Geography, Earth and Environmental Sciences, University of Birmingham, UK, (3) School of Geography, Politics and Sociology, University of Newcastle-upon-Tyne, UK

Groundwater in glacial environments has been described as being in a 'no-man's land' area of scientific research, therefore there is currently a paucity of systematic baseline data necessary for a complete understanding of these systems. However, a consideration of hydrogeological processes in glacial environments is imperative in light of the aim of understanding and predicting the effects of climate-driven glacial retreat on water resources, which are relied upon by both human and ecosystem users alike. This study uses high spatial and temporal resolution water table measurements, and stable isotope (δ^{18}O, δD) tracers to investigate the dynamic responses of a proglacial groundwater system to seasonal and event-scale recharge events, and to determine the temporal and spatial distribution of different sources of recharge within a proglacial outwash plain aquifer. In particular the paper focuses on the links between the geomorphology and sub-surface sedimentology and the patterns of groundwater recharge and flow in an ice marginal landsystem. This paper develops a conceptual model of glacial landscape evolution and hydrogeological interaction from the ice-marginal zone of Skeiðarársandur, SE Iceland, an example of a temperate, actively-receding glacier landsystem that is affected by both surging behaviour and periodic glacier outburst floods (jökulhlaups).

Glacial landscape evolution affects the hydrogeological system in a number of ways, including: the development of localised moraine/precipitation-fed groundwater systems in areas of morainic relief superimposed on the intermediate/regional scale

groundwater systems dominated by the more geomorphologically-uniform, gently sloping outwash plain; spatial heterogeneity in hydraulic conductivity associated with transient events such as jökulhlaups; spatial variations in the seasonal and event-scale response of the groundwater table, with a greater response in ice marginal and perched aquifer locations; and development of ecological niches in groundwater-fed kettle hole lakes resulting from jökulhlaup activity.