Geophysical Research Abstracts,
Vol. 11, EGU2009-6554-1, 2009
EGU General Assembly 2009

The effect of sediment deposition timing on meltwater generation on the Wright Lower Glacier, McMurdo Dry Valleys, Antarctica

S. MacDonell and S. Fitzsimons

University of Otago, Geography, Geography, Dunedin, New Zealand (shelley.macdonell@geography.otago.ac.nz)

Sediment has an important influence on meltwater generation patterns on the surface of glaciers and snowpacks. In the McMurdo Dry Valleys, the amount of research into the impact of sediment on hydrological processes on glaciers has dramatically increased recently, due to an increase in research into the role of cryoconite holes in drainage systems. In this study, the role of sediment in driving the temporal variability of melt on a cold-based glacier was investigated. This study integrated field, laboratory and numerical analyses to evaluate the role of sediment in meltwater generation on the Wright Lower Glacier, McMurdo Dry Valleys, Antarctica, during the 2005/06 ablation season. The findings showed that sediment on the glacier surface caused 16 times more melt to occur under sediment cover than for the clean ice surface over the three month measurement period. More importantly, the study found that sediment cover affected the timing of melt occurring through the season. Specifically, as westerly katabatic winds transported sediment onto the glacier during the winter, sediment was available for melt in the early ablation season. The presence of sediment on the glacier surface then caused melt to start several weeks before equivalent clean ice surfaces melted. The impact of this differential ablation has implications for the development of cryoconite holes, nutrient fluxes across the glacier surface and meltwater delivery timing to the glacier outlet.