Geophysical Research Abstracts,
Vol. 11, EGU2009-5415, 2009
EGU General Assembly 2009

Recent Progress in Mountain Permafrost Modelling using BTS in North America

P.P. Bonnaventure (1) and A.G. Lewkowicz (2)

(1) Department of Geography, University of Ottawa, Ottawa, Canada (pbonn075@uottawa.ca), (2) Department of Geography, University of Ottawa, Ottawa, Canada (alewkowi@uottawa.ca)

This presentation reports on progress in mapping and modelling mountain permafrost in North America over the past 5 years using the Basal Temperature of Snow (BTS) technique. It describes the methodology and some of the challenges in our current study aimed at modelling permafrost at a resolution of 30 x 30 m, for the entire southern half of the Yukon Territory, an area of 250 x 10^3 km^2. This mountainous region differs from those in Europe and Asia by having a sparse population, very limited base-line information (such as climate data) and relatively low levels of infrastructure. However, major infrastructure projects, such as pipelines, roads, railways and mines are being proposed and climate change is expected to affect permafrost distribution and characteristics, including potentially triggering landslides and other natural hazards. The research involves developing BTS-based models validated using late-summer ground-truthing. Models have been created for three areas and work is currently underway in five other locations in the Yukon with possible future sites in northern British Columbia. Work to date has examined the suitability of the method in differing climatic zones, the interchangeability of models between areas, and the potential effects of climatic change. Current data collection is focused on the potential impact of atmospheric temperature inversions on permafrost distribution: each of the study areas has been equipped with a network of air, ground surface and permafrost surface temperature sensors as well as snow-depth monitoring devices, located within different topographic situations. Another challenge is the interpolation of permafrost probabilities between distant study areas: information developed from a data-base of more than 1500 rock glaciers is expected to help in this regard. The project, which is scheduled for completion within the next 12 months, will provide essential information relating to the spatial attributes and sensitivities of mountain permafrost for infrastructure planning, natural hazard mapping, and climate change impact studies.