Geophysical Research Abstracts
Vol. 16, EGU2014-10837, 2014
EGU General Assembly 2014

Modelling permafrost-induced hydrological change and associated changes in solute transport across scales

Andrew Frampton (1,2) and Georgia Destouni (1,2)

(1) Dept. of Physical Geography and Quaternary Geology, Stockholm University, Sweden (andrew.frampton@natgeo.su.se),
(2) The Bolin Centre for Climate Research, Stockholm University, Sweden

Physically based models for permafrost-hydrological interactions can contribute to improved process understanding and aid in bridging the gap between limited field observations and large scale heat, water and material/solute transport effects. Previous studies have demonstrated the importance of including coupled heat and multiphase flow processes in order to better understand and describe the dynamics of permafrost change and its interactions with temperature and subsurface water conditions in partially frozen ground. In particular, long-term simulation results show that warming trends reduce the temporal and seasonal variability characteristics of groundwater and its discharges into surface waters. Also, previous studies have linked different water indicators with permafrost change using remote sensing analysis. This contribution addresses means by which physically-based models for permafrost change and its interactions with hydrology can help bridge the gap between point/small-scale ground-based measurements and large scale remote sensing efforts, by capturing permafrost-related hydrological changes and associated changes in water/solute transport at catchment scales. In addition, data and on-site field observation usage and needs for constraining process based models for partially frozen ground are discussed.