Geophysical Research Abstracts
Vol. 18, EGU2016-16212, 2016
EGU General Assembly 2016

Runoff Modelling of the Khumbu Glacier, Nepal: Incorporating Debris Cover and Retreat Dynamics.

James Douglas (1), Matthias Huss (2,3), Julie Jones (1), Darrel Swift (1), Franco Salerno (4,5)

(1) University of Sheffield, Department of Geography, Sheffield, United Kingdom, (2) Department of Geosciences, University of Fribourg, Fribourg, Switzerland, (3) Laboratory of Hydraulics, Hydrology and Glaciology (VAW), ETH Zürich, Zürich, Switzerland, (4) National Research Council, Water Research Institute, Brugherio (IRSA-CNR), Italy, (5) Ev-K2-CNR Committee, Via San Bernardino, 145, Bergamo 24126, Italy

Detailed studies on the future evolution and runoff of glaciers in high mountain Asia are scarce considering the region is so reliant on on this essential water source. This study adapts a model well-proven in the European Alps, the Glacier Evolution and Runoff Model (GERM), to simulate the behaviour of the Khumbu glacier, Nepal. GERM calculates glacier mass balance and runoff using a distributed temperature index model which has been modified such that the unique dynamics of debris covered glaciers, namely stagnation, thinning, and melt-inhibiting debris surfaces, are incorporated. Debris thickness is derived from both remote sensing and model based approaches allowing a suite of experiments to be conducted using various levels of debris cover. The model is driven by CORDEX-South Asia regional climate model (RCM) simulations, bias corrected using a quantile mapping technique based on in-situ data from the Pyramid meteorological station. Here, results are presented showing the retreat of the Khumbu glacier and the corresponding changes for annual and seasonal discharge until 2100, using varying melt parameters and debris thicknesses to assess the impact of debris cover on glacier evolution and runoff.