Geophysical Research Abstracts
Vol. 21, EGU2019-11432, 2019
EGU General Assembly 2019

Morphometric Controls on Rock-Glacier Surface Kinematics in the Kaunertal Catchment, Austrian Alps

Till Groh (1), Jan Henrik Blöthe (1), Sabine Kraushaar (2), and Jakob Müller (2)

(1) Department of Geography, University of Bonn, Bonn, Germany (correspondence to: groh@uni-bonn.de), (2) Department of Geography and Regional Research, University of Vienna, Vienna, Austria

Rock glaciers are prevalent features of creeping mountain permafrost in the periglacial zones of central Alpine valleys, such as the Kaunertal in western Austria. A compiled inventory of previous studies identified 104 intact rock glaciers, covering a total surface area of 6.96 km^2. While earlier studies have measured surface displacement of singular features in the catchment, a comprehensive assessment of rock glacier activity along with a quantification of surface kinematics of the entire inventory is still lacking. We aim to close this gap by integrating data on rock-glacier activity and surface velocities during the past decades and adding linkages to their morphometric controls.

Spatio-temporal motion fields are derived from automated motion tracking of high-resolution orthoimagery (0.2 m and 0.05 m ground resolution) in three resp. four subsequent periods (2001 to 2015). With an average limit of detection between image pairs of 0.39 $\pm$0.19 m, the approach achieves sub-pixel quantification limits in a third of all cases. We detect significant surface movement for 27 of the 104 intact rock glaciers in the catchment, averaging to 0.25 $\pm$0.17 m a^{-1}, with maximum velocities of up to 4.87 m a^{-1}. For most rock glaciers, surface velocities slightly increased during the observed period, which is in good agreement with studies from other parts of the Alps.

Using the inventory and high-resolution digital elevation models, we compute a series of morphometric parameters and analyse their potential control on rock glacier surface kinematics applying logistic and nonlinear regression models to a stratified sample of tracked point locations. Preliminary results point towards a strong dependence of surface velocities on local conditions, such as slope, aspect and incoming solar radiation.