



Assessing rock glacier activity in the Austrian Alps using radar interferometry and image correlation techniques

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Rock glaciers serve as crucial indicators of climate change impacts, offering valuable insights into environmental consequences. Assessing the activity rate of these landforms is essential for understanding their vitality, yet recent activity remains largely undocumented, particularly across extensive regions. In this study, we present an innovative methodology for categorizing rock glacier activity, leveraging state-of-the-art remote sensing technologies and adhering to the latest guidelines established by the IPA Action Group on rock glaciers.

In this work, we use SqueeSAR[®] processed Sentinel-1 data over two years (2020-2022) and digital image correlation (DIC) of repeated airborne imagery and digital elevation models using SAGA IMCORR tool to classify rock glaciers in Austria. DIC techniques were used in several local test sites to calibrate a model of SqueeSAR classification for rock glacier activity based on a threshold approach. The approach was verified using existing local rock glacier kinematic data from across the country.

Our results show that around 10% of the almost 5800 rock glaciers in Austria can be considered active, showing motion rates above a 10 cm/yr threshold within more than 40% of their total area. Another 350 rock glaciers (6%) have been categorised a transient status characterised by low movement rates at limited parts of the landforms. Furthermore, we identified about 1100 rock glaciers relict that have been classified intact in the original inventory. This increases the number of relict rock glaciers in Austria from 60% to 77%. Active rock glaciers are located mainly in the Ötztal, Zillertal and Hohe Tauern ranges.

This new categorisation enables to identify rock glaciers in motion that may react sensitive to increasing ground temperatures and may contribute to a local hazard potential.