Creating a rock glacier inventory of the northern Nyainqêntanglha range (Tibetan Plateau) based on InSAR time-series analysis

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The northern Nyainqêntanglha range on the southern Tibetan Plateau features an elevation of 4280 to 7150 m. Large parts of the mountain range are considered permafrost [1] due to the high altitude and the associated low air temperature. Rock glaciers (bodies of ice-rich debris) are a typical landform. We are in the process of creating an inventory of actively moving landforms in this area with a focus on rock glaciers based on Sentinel-1 data. There are over 500 rock glaciers in our study area, with up to 90 ha surface area.

References

Methods
We performed an InSAR time-series analysis of Sentinel-1 data (2015-2019) to determine the surface displacement of landforms in this mountain range [4]. We isolated landforms with a downslope velocity greater than 4 cm/yr and used their surface roughness (slope variability and aspect variability) to categorize them as either rock glaciers, moraines or slope instabilities (e.g. rock slides).

Rock glacier: High aspect and slope variability
Moraine: Medium aspect but high slope variability
Slope instability: Low aspect and slope variability

Open question
Which other parameters besides surface roughness can be used to distinguish between the landform types (shape, surface velocity, elevation etc.)?