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Occurrence and characteristics of ice-debris landforms in Poiqu basin (central Himalaya)

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Rock glaciers and other ice-debris landforms (I-DLs) are an important part of the debris-transport system in high mountains and their internal ice could provide a relevant contribution to water supply especially in dry regions. Recent research has shown that I-DLs are abundant in High Mountain Asia, but knowledge about their occurrence and characteristics is still limited.

We are therefore investigating I-DLs in the Poiqu basin (~28°17' N, 85°58' E) – central Himalaya/southern Tibetan Plateau using remote sensing aided by field observations. We use very high-resolution stereo Pleiades data from the contemporary period and stereo Corona and Hexagon data from the 1970s to generate digital elevation models, applied satellite radar interferometry based on ALOS-1 PALSAR and Sentinel-1 SAR data and feature tracking using Sentinel-2 and the Pleiades data. Generated DEMs allowed us to create a hillshade to support identification, to derive their topographical parameters and to investigate surface elevation changes. I-DLs were identified and classified based on their characteristic shape, their surface structure and surface movement. Field observations supported the identification of the landforms.

We found abundant occurrence of rock glaciers (with typical characteristics like lobate-shaped forms, ridges and furrows as well as steep fronts) but also significant movements of both former lateral moraines and debris-slopes in permafrost area. Preliminary results revealed the occurrence of more than 350 rock glaciers covering an area of about 21 km². About 150 of them are active. The largest rock glacier has an area of 0.5 km² and three have an area of more than 0.3 km². The rock glaciers are located between ~3715 m and ~5850 m with a mean altitude of ~5075 m a.s.l.. The mean slope of all rock glaciers is close to 17.5° (min. 6.8°, max. 37.6°). Most of the rock glaciers face towards the Northeast (19%) and West (18.5%). Surface elevation changes between the 1970s and 2018 show no significant changes but indicate slight elevation gain at the front of active rock glaciers caused by their downward movements.

Work will be continued to generate an inventory of all I-DLs in the study area including information

about their activity and surface elevation changes.