



## **A glacial geomorphological map of the northeastern Tibetan plateau**

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The extent and chronology of Quaternary glaciations on the Tibetan plateau are still elusive, and reconstructions range from an ice sheet covering the entire plateau to local valley glaciers restricted to the highest mountain areas. Glacial landforms and deposits constitute the primary data set used for reconstructing the extent of former glaciers. However, this data has rarely been systematically mapped over large areas, making it problematic to evaluate proposed palaeoglaciological reconstructions. Today, detailed maps of the glacial geomorphology, such as those which form the basis for reconstructions of the North American and European ice sheets, only exist for restricted areas on the Tibetan plateau. Hence, in order to evaluate existing palaeoglaciological reconstructions, and to be able to propose alternative reconstructions, regional-scale or plateau-wide scale mapping efforts are required.

We here present the first detailed map of the glacial geomorphology covering a large area of the northeastern Tibetan plateau, encompassing the location of a previously suggested regional-scale ice sheet – the Huang He ice sheet. The map covers an area of  $\sim 135.000$  km<sup>2</sup>, is centered around the Bayan Har Mountains, and is constrained in the southwest by Chang Jiang (Yangtze River). The map is based on an interpretation of satellite images (Landsat ETM+, Landsat TM, ASTER), a digital elevation model (SRTM 90 m resolution) and Google Earth imagery. Field checks of mapped landforms have been performed during two field seasons, 2005 and 2006. Identified glacial landforms are marginal moraines, marginal moraine remnants, glacial hummocky terrain, glacial lineations and glacial meltwater channels.

There is a clear pattern of numerous glacial landforms distributed in and around higher mountain areas, whereas glacial landforms are absent on surfaces in-between the

higher mountain blocks. Upland areas such as the Bayan Har Mountains display a consistent pattern of glacial lineations in the higher central parts of the mountains, series of end moraines across glacially eroded valleys, and glacial hummocky terrain and meltwater channels mainly in the lower slopes of the mountains. The mapped glacial landforms reveal evidence of glacial advances of varying extent in and around several separate mountain areas. The presented map will be used for reconstructing the outline of former glaciation, which, together with chronological constraints from cosmogenic nuclide- and optically stimulated luminescence samples, will eventually form a new paleoglaciological reconstruction for the northeastern Tibetan plateau.