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A glacier inventory for western Nyainqentanglha Mountains and Nam Co Basin, Tibet, and glacier changes 1976-2009

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The western Nyainqentanglha range is located in the south-eastern centre of the Tibetan Plateau. Its western slope drains into Lake Nam Co. The area is of special interest for glacio-climatological research as this region is influenced by both the continental climate of central Asia and the Indian Monsoon system and it is situated at the transition zone between temperate and subcontinental glaciers. A glacier inventory for the whole mountain range for the year ∼2000 was generated using automated remote sensing and GIS techniques based on Landsat ETM+ and SRTM3 DEM data. Change analysis is based on data from Hexagon KH-9 and Landsat MSS (year 1976), Metric Camera (year 1984), and Landsat TM/ETM+ (1991, 2001, 2005, 2009). Manual adjustment was especially necessary for the panchromatic Hexagon data and for debris covered glaciers.

The whole mountain range contains about 960 glaciers covering an area of 795.6 ± 22.3 km^2 while the catchment area of Nam Co covers 198.1 ± 5.6 km^2. The median elevation of the glaciers is ∼5800 m a.s.l. with the majority terminating around 5600 m. Five glaciers with debris-covered tongues terminate lower than 5200 m. The glacier area decreased between 1976 and 2001 by about 6 ± 3%, which is less than presented in previous studies based on topographic maps from the 1970s and Landsat data from 2000. The shrinkage rate increased in the period 2001 – 2009. No advancing glaciers were detected. Detailed length measurements for five glaciers indicate a retreat of the tongues of around 10 m per year (1976-2009) with higher absolute but lower relative values for the larger glaciers. No consistent trend was found for the rate of change within the investigation period which might indicate different response times of individual glaciers.