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Changes of high altitude glaciers in the Trans-Himalaya of Ladakh between 1969 and 2015

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Climatic differences between monsoonal and cold-arid parts of the South Asian mountain arc account for the uncertainty about regional differences in glacier retreat. In this context, the Upper Indus Basin of Ladakh (NW-India), sandwiched between the Himalaya and Karakoram ranges, is of particular interest. The aims of the present study are threefold: to map the glaciers of central Ladakh, to describe their regional distribution and characteristics in relation to size and topography, and to analyze glacier changes in selected tributaries and ranges between 1969 and 2015. The study is based on multi-temporal remote sensing data (CORONA and Landsat), supported and validated by ground truth from several field campaigns carried out between 2007 and 2015. Using a threshold approach, a complete inventory was developed for nine sub-regions. The glaciers of Ladakh are generally characterized by their high altitude, as 92 % terminate above 5200 m a.s.l., and their relatively small size, as 79 % of them are smaller than 0.75 km^2 and only 4 % are larger than 2 km^2. The total glaciated area of central Ladakh was 955 km^2 in 2002.