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Recent Glacier Dynamics on a Himalayan Scale: Evidence from Re-Photographic Surveys

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Interest in Himalayan glaciers began to spread in the era of "scientist exploration" of the South Asian high mountain belts when the three Schlagintweit brothers investigated them in 1854-1857. Their detailed records along the Himalayan arc in the form of paintings and sketch maps continue to be useful today. In later decades the glaciers of specific regions received more systematic scientific attention in the context of topographic surveys and mountaineering expeditions to the highest summits. These multipurpose missions included photogrammetrical measuring of ice movement, mapping of glaciated areas and assessments of glacier dynamics. Generally, photographic documentations were regular and integral parts of these research programs.
A comprehensive collection of historical glacier photographs, taken by members of several expeditions forms a valuable baseline data set and the starting point of the present study. Our investigations seek to depict regional differences in glacier change over the last century using matched pairs of terrestrial photographs from several case studies located in the northwestern, central and eastern Himalayas: Own fieldwork between 1992 and 2012 made it possible to repeat a large number of historical glacier photographs from viewpoints identical to the earlier ones. This extensive bi-, and multi-temporal image base allows for temporal and spatial comparisons and serves to illustrate glacier dynamics, including changes in debris cover, glacier lengths, down-wasting and ice facets. Furthermore, multi-temporal and multi-scale remote sensing data were used to quantify changes of glacier lengths and glaciated areas since the 1960s.