Geophysical Research Abstracts
Vol. 14, EGU2012-8947, 2012
EGU General Assembly 2012

Changes in small glaciers of the Trans-Himalaya of Ladakh, India

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This study deals with changes in small blank-ice glaciers in the Trans-Himalayan Kang Yatze Massif, Ladakh, Northwest India, between 1969 and 2010. Due to the semi-arid conditions and comparatively high temperatures, glaciers in Ladakh are characterized by their high altitude positions above 5200 m above sea level, and their relatively small size (<0.75 km^2). Despite their small size, these water storages determine the potential and constraints on irrigated crop cultivation. The aims of our study are to map the glaciers of the Kang Yatze Massif, Ladkah and Stok Range along the Indus Valley and to detect and analyze their changes over a time period of four decades using multi-temporal remote sensing data (CORONA, Spot, and Landsat). Additionally, these remote sensing results were validated by four field campaigns which were carried out between 2007 and 2011. Preliminary results show that in the Kang Yatze Massif, covering an area of about 1000 km^2, the glaciated area decreased from 96.4 to 82.6 km^2 by about 14 % (0.3 % per yr) between 1969 and 2010. The ice cover loss shows a high decadal variability with the maximum shrinkage between 1991 and 2002 (0.6 % per yr), followed by a lower decrease rate since then (0.2 % per yr). Due to the high variability of glacier change, with a general trend of decreasing glaciated area, and a few stable glaciers; it becomes obvious that any extrapolation, even on a regional scale, is problematic. Therefore, a consideration of the differing responses of various glacier types and glacier sizes, is of the utmost importance.