



## **Estimation of mass change rates of surge-type glaciers in the Karakoram derived from TanDEM-X and SRTM Digital Elevation Models**

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Glaciers in the Karakoram region exhibit stable and advancing termini positions accompanied by less negative or even positive surface mass balances in comparison to the adjacent Greater Himalaya Range and the Hindu Kush mountains. Moreover, a large number of surge-type glaciers is found in the Karakoram. During the active phase of a surge, ice masses are shifted from the reservoir area towards the receiving area of a glacier. Remote sensing based methods provide various possibilities to identify surge-type glaciers (termini position changes, surface velocity variations, mass changes), where in-situ measurements are hardly available.

The present study focuses on glacier mass changes in the Karakoram between 2000 and 2013 derived from DEM differencing. We used the C-band SRTM DEM (February, 2000) and high resolution TanDEM-X data (2011-2013). Due to quasi bi-static image acquisitions, TanDEM-X data is very suitable for interferometric elevation generation minimizing decorrelation impacts. However, influences of different penetration depths of X- and C-band have to be considered.

We quantified glacier volume and mass changes for the central part of the Karakoram for a twelve year period. For a surge-type glacier in the Shimshal Valley we observed a mass relocation of  $2.96 \pm 2.52$  m/a w.e. close to its snout between 2000 and 2012. Further case studies will be presented including annual mass changes (2011-2013) determined using repeat TanDEM-X acquisitions. In addition to interannual surface velocity changes, mass change observations can help to observe the propagation of the surge front down-glacier and quantify the relocation of mass during an active surge phase.