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ELEVATION CHANGE OF THE INYLCHEK GLACIER (CENTRAL ASIA) ANALYSED BY TANDEM–X DATA

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ABSTRACT:

Close monitoring of the tributary glaciers' mass balance is important in order to estimate future water discharge availability. Because of the vast area glaciers cover and the remoteness of these regions, a cost effective remote sensing observation is usually required to assess elevation changes. TanDEM–X, the first bistatic SAR mission in space, provides a valuable tool to investigate elevation change and mass balance of glaciers with unprecedented resolution and accuracy.

In this study we focus on Inylcheck glacier in Kyrgyzstan, which is the largest glacier of the Tien Shan mountain range. We analysed its height change between 2000 and 2013 using the combination of digital elevation data obtained from SRTM and eight pairs of TanDEM-X data. A crucial part of DEM differencing is the registration process of related datasets. Close attention needs to be paid on areas having a possible elevation bias due to the radar's ability to penetrate into snow and ice. These areas need to be eliminated from the registration process: on the one hand penetration properties vary due the different bands of the original radar data (SRTM: C–band and TanDEM–X: X–band), and on the other hand the depth of snow and ice-covered areas is likely to have changed during the observed time period.

Our results show for the last decade a remarkable mass loss distributed over the entire glacier area. Most of the elevation changes occur over Inylchek's two heavily debris-covered ablation branches, where we observe height difference values with a magnitude of some tenth of metres. In order to evaluate ongoing mass balance changes in the Tien Shan, the analysis will be extended to several other glaciers located in different areas of the mountain range. The results will be presented in the full paper.

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