

Inter-annual modulation of seasonal glacial velocity changes in the Eastern Karakorum detected by ALOS-1/2 data

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Whereas the ice sheets all over the world are receding, the glaciers in Karakoram are either stagnant or advancing, which is known as 'Karakoram anomaly'. The surging dynamics and mass balance have been extensively studied in this area. However, in the Eastern Karakorum Range, the spatial and temporal changes in glacial velocity have been so far poorly understood. We have analyzed nearly all the available ALOS-1/2 data in this area and have examined the inter-annual modulation of five glaciers. The glaciers with size >30km, i.e. Siachen, Baltoro and Eastern tributary of Kundos, are mostly showing a considerable velocity change in their various parts, accompanying clear seasonal changes both in ALOS-1/2 data. However, this change mostly depends upon the individual glacier and is variable in space and time. On the other hand, the smaller glaciers (<30km), i.e. Singkhu, Gasherbrum and Western tributary of Kundos glaciers, are showing a slowdown in ALOS-2 data. Analysis of the local air surface temperature data at five observatories indicates that during the same season, the temperature trend in the study area is uneven and probably varies significantly between different glaciers. It can result in localized warming/cooling that can affect the availability of melt-water for an individual glacier. The excess surface melt-water at each individual glacier may undergo a variety of en/sub-glacial hydraulic and hydrological processes that are further different at each glacier. Thus, it will result in a complex velocity behavior in this region.

Keywords: Eastern Karakorum, Pixel offset, Glacier velocity, Inter-annual modulation