Seasonal and inter-annual dynamics of Siachen Glacier (Eastern Karakorum) observed by L-Band data, using feature tracking and backscatter intensity

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Detailed SAR observations on glacial surface velocity/feature variations not only help to understand glacial dynamics but can also provide clues about location and generation mechanism related to ‘ice-quakes’ on seasonal and inter-annual scale. The glacial surface velocity variations give indication about the variability of basal water pressure. The basal sliding, due to basal water pressure changes, is itself quite analogous to the mechanism of fault slip due to reduced effective pressure.

To fully understand the dynamics of a glacier, it is important to examine velocity variability along the entire length of a glacier. The feature tracking is a technique to study glacial velocities. It gives a relative displacement between two images. However, this technique depends upon the ‘preservation’ of features in a slave image, in a given time span. In the summer seasons, especially in the upstream part of Siachen Glacier (with the elevation of around 5000 meters or higher), it has been observed that ‘non-preservation’ of features in slave images cause de-correlation thus it results in the loss of data. There can be numerous causes for the de-correlation: summer snowfall, high speed and/or summer surface melt. To understand the velocity behavior of the areas with missing data, we will use Backscatter Intensity (BI) data. The assumption is that the high speed, in a given time span, and will produce more rough features on the glacier’s surface thus it can result in a relatively higher BI value, in a slave image. On the other hand, if there is no significant change in the glacial surface velocity, same surface roughness or even surface smoothness is expected after a given time and it can cause either nearly constant or comparatively low BI value, in a slave image. In other words, there should be an indirect correlation between speed and BI value. In the upcoming presentation, we will discuss that how these assumptions collaborate with the analyzed data.

Keywords: Siachen Glacier, L-Band Data, Feature Tracking, Backscatter Intensity

