Ice Velocity of Gangotri Glacier
# Using Feature Tracking Algorithm

The mass transport of snow and ice is a key characteristic for glaciers. The mass surplus accumulated in the accumulation area of glaciers is transported down to the ablation area due to the gravitational force. Thus, ice velocity of glaciers is an important parameter in glaciology. Variations observed in ice velocities are the results of changes in mass balance of glaciers. Ice velocity can be measured by i) visually on multi-temporal images by observing movement of any visible feature, ii) D-InSAR technique and iii) by image correlation techniques.

A latest feature tracking technique based on Orientation Image Correlation, is used to extract the velocity of ice for Gangotri glacier using image pairs from IRS P6 LISS-3 and RISAT -1 MRS sensors. Gangotri glacier is one of the largest glaciers in the Himalaya with an estimated volume of over 27 cubic kilometers. It is about 30 km long, has a mean width of 1.5 km. The surface elevation ranges from 4000 to 7000 m and the surface area is $140 km^2$.

The advantage of using SAR data in image correlation is that it can be processed even for cloud covered regions in glaciated terrains. Though there are some studies which have been carried out using other datasets, this is the first attempt of using Indian Remote Sensing data from optical and SAR sensors. The LISS III image pairs acquired in Sep 2012 and Oct 2014 and SAR image pairs of March 2013 and Feb 2015 were used.

Similarly, Ice velocities of Siachen (largest in Himalayan –Karakoram region) and Bara Shigri (largest in Himachal Pradesh) glaciers have been estimated. It is planned to expand this activity with validation for glaciers covering Himalayan-Karakoram region.

VELOCITY DERIVED USING RISAT1 MRS DATA (m/year)
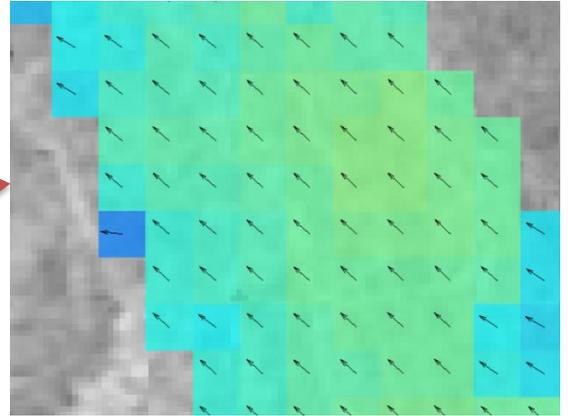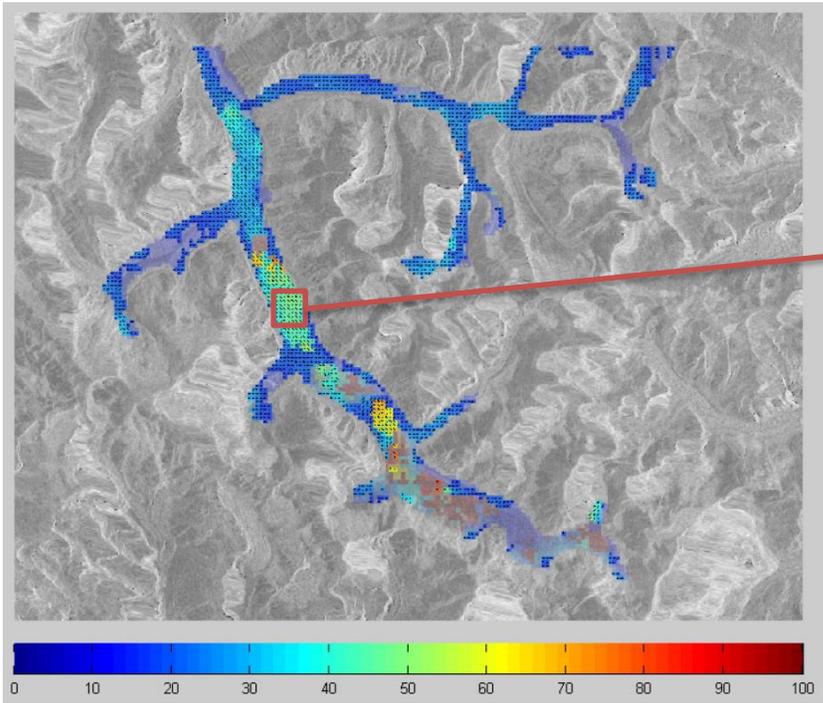
VELOCITY DERIVED USING LISS-III DATA (m/year)