

Monitoring Glacier Flow Velocity by SAR Interferometry and Texture Tracking Method Using ALOS PALSAR Data Around Mt. Everest Region

Nikhil R. Poudyal*, Ryutaro Tateishi, Bambang Setiadi

*Center for Environmental Remote Sensing, Chiba University
1-33 Yayoi-cho, Inage-ku, Chiba-shi, Japan*

Nikhil R. Poudyal <nikhil@chiba-u.jp>, Ryutaro Tateishi <tateishi@faculty.chiba-u.jp>
Bambang Setiadi <bambang@chiba-u.jp>

Glacial lake outburst flood (GLOF) is one of the potential hazard that has been alarming due to recent climate changes around the Himalayan Regions of Nepal. The consequence could bring destruction to downhill communities, hydropower stations and other natural settlement of plants and animals. Nepal has experienced more than 30 GLOF since 1964. Additionally, glaciers are important natural sensors to detect climate change. The GLOF potential threats and the detection of climate change both depends upon on the dynamics of glaciers such as volume, area, morphometry, its morine and valley, and the glacier velocity.

PALSAR images provide high resolution and precise mapping capabilities which can even detect slight changes or movement on the ground. This research exploits the SAR interferometry and feature tracking techniques in and around the Mt. Everest region. The research uses six ALOS PALSAR scene (2007-2011) with three interferometric pair. Shuttle Radar Topography Mission (SRTM -4, Void Filled SRTM Data set) elevation data were used for digital elevation information of the area which has a spatial resolution of 90m.

From the preliminary research results, it can be seen that glaciers area has a good correlation as compared to the surrounding mountains and hills. The average of two pairs of two pass differential over Imja glacier and Khumbu glacier at the glacier head shows movement of 9 cm/day in the radar look direction represented by 3 fringes. The glaciers on the southern side of Mt. Everest (Tibet, China) shows 2 fringes along the long path of low slope angle and is measured to be about 6 cm/day. Further analysis on the output is required with input of some ground truth data, if available. It is also required to have some input from expert for the explanation of de-correlation on some part of active glaciers.

Keywords: SAR Interferometry, Texture Tracking, Glacier, Glacier Lake, Velocity