Geophysical Research Abstracts,
Vol. 11, EGU2009-7116-1, 2009
EGU General Assembly 2009

Climate change effects on Glacier recession in Himalayas using Multitemporal SAR data and Automatic Weather Station observations

V. Kumar (1), S. K. Singh (2), and G. Venkataraman (1)

(1) Indian Institute of Technology Bombay, CSRE, Mumbai, India (vksacisro@gmail.com, 91-22 2572 3190), (2) nstitut für Wasserbau der Universität Stuttgart, Lehrstuhl für Hydrologie und Geohydrologie,Pfaffenwaldring 61,D-70550 Stuttgart (shailesh.singh@iws.uni-stuttgart.de)

The Himalaya is the highest but the youngest mountain belt (20 to 60 million years B.P.) of the earth running in arc shape for about 2500 km. It has more than 90 peaks above 6000 m and contains about 50% of all glaciers outside of the polar environments (Bahadur, 1993). All glaciers in this region are in general recession since last 150 years (Paul et al.,1979). Gangotri, Siachen, Bara Shigri and Patsio are major glaciers in this region which are showing retreat with different rates and their respective tributary glaciers are completely disconnected from main body of glaciers. Spaceborne synthetic aperture radar data provide an important tool for monitoring the fluctuation of the glaciers. In this paper attempt has been made for quantifying the glacier retreat using multitemporal synthetic aperture radar (SAR) data. SAR intensity and phase information will be exploited separately under SAR intensity tracking and interferometric SAR (InSAR) coherence tracking (Strozzi et al., 2002) respectively. Glacier retreat study have been done using time series coregistered multi temporal SAR images. Simultaneously InSAR coherence thresholding is applied for tracking the snout of Gangotri glacier. It is observed that glacier is retreating at the rate of 21 m/a. Availability of high resolution spotlight mode TerraSAR-X SAR data will supplement the ENVISAT ASAR and ERS-1/2 based observations.
The observatory in the proximity of Gangotri glacier has been made functional at Bhojbasa and all weather parameters viz. Snow fall, temperature, pressure, air vector, column water vapor and humidity are recorded twice a day as per WMO standards manually and automatically. Three Automatic Weather Stations (AWS) have been established in the glacier area at Bhojbasa , Kalindipass and Nandaban. Since Himalayan environment is presently under great stress of decay and degeneration, AWS data will be analyzed in the context of climate change effects on fluctuation of glaciers.

References

1.Jagdish Hahadur, The Himalayas: A Third Polar Region, Snow and Glacier Hydrology (Proceedings of the Kathmandu Symposium, November 1992). IAHSPubl.no. 218,1993.

2.A. Paul, Mayewski and Peter, Jeschke A., Himalayan and Trans-Himalayan Glacier Fluctuations Since AD 1812, Arctic and Alpine Research, Vol. 11, No. 3, pp. 267-287 1979)

3.Tazio Strozzi, Adrian Luckman, Tavi Murray, Urs Wegmüller, and Charles L. Werner, IEEE Transaction on Geoscience and Remote Sensing, Vol. 40, NO. 11, November 2002

4.Vijay Kumar, Y.S.Rao, Gulab Singh G.Venkataraman, Snehmani , “Spaceborne InSAR technique for study of Himalayan glaciers using ENVISAT ASAR and ERS data”, Proc. IGARSS 2008, July 6-11, 2008 Bostan, USA,2008.