

Partners

ICIMOD (lead partner); Bangladesh – Water Development Board and Meteorological Department; Bhutan – Hydro-meteorological Services Division (Department of Energy, Ministry of Trade and Industry); China – China Meteorological Administration, China Bureau of Hydrology, Tibet Meteorological Bureau, Tibet Bureau of Hydrology; India – National Centre for Medium Range Weather Forecasting, India Meteorological Department; Nepal – Department of Hydrology and Meteorology, Tribhuvan University Department of Meteorology; Pakistan – Flood Forecasting Division (Pakistan Meteorological Department); observers from Afghanistan and Myanmar.

Expected outcomes

The use of **satellite-based rainfall estimates** in the HKH region will enable a more **thorough, accurate, and timely analysis of rainfall estimates**. Specific outcomes include:

- facilitation of easy access to satellite-based rainfall estimation and forecasting data and information;
- trained people and enhanced capability of regional institutions will enable timely and accurate estimation of rainfall, which will contribute to the development of effective early warning systems and thus help reduce the risk of water induced disasters;
- exploration of potential applications of satellite rainfall estimation such as floods and river forecasting, crop monitoring, and drought monitoring leading to added value in agricultural and hydrological applications; and
- provision of a common platform to assess knowledge, data and information through contributions of all partners

For further information contact

Ms. Mandira Shrestha, email: mshrestha@icimod.org

Mr. Pradeep Mool, email: pmool@icimod.org

International Centre for Integrated Mountain Development (ICIMOD)

P.O. Box 3226, Kathmandu, Nepal

Tel: +977 1 5525313

www.icimod.org

www.southasianfloods.org

Photos: Mandira Shrestha

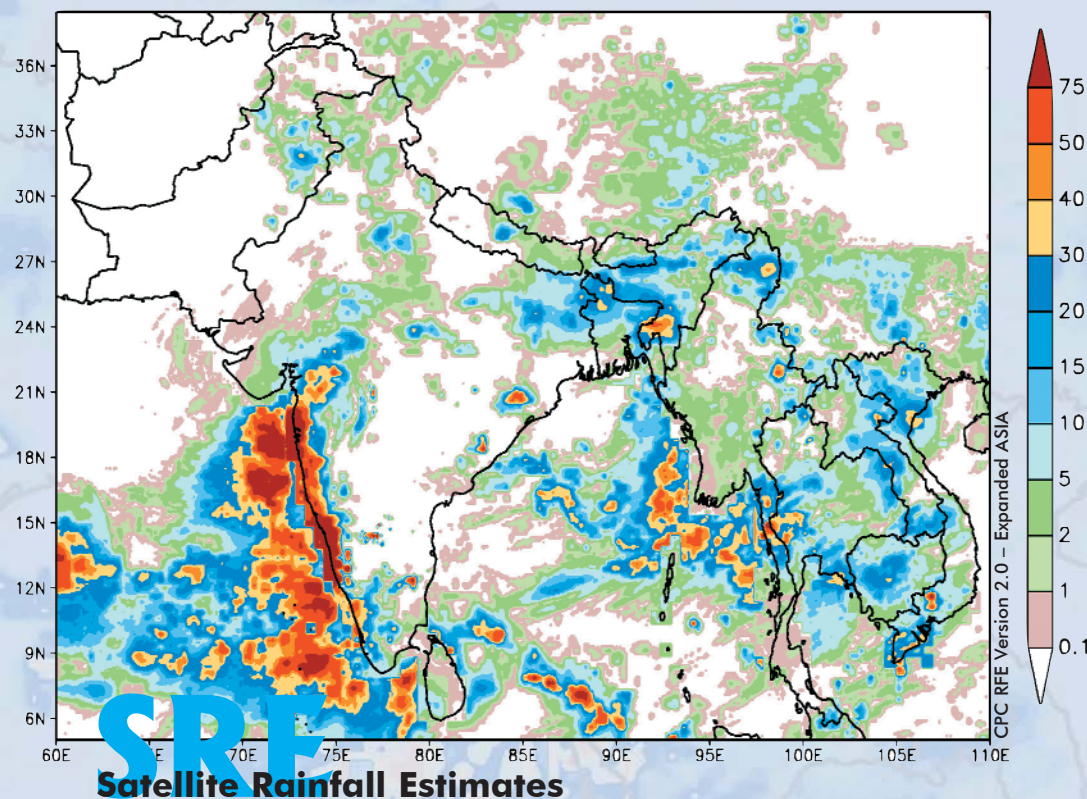
Map: NOAA/CPC Precipitation Estimate (mm); based on GPI, SSM/I, AMSUB & GTS 05/31/2006, Tim Love

Prepared by ICIMOD Publications Unit, June 2006

Printed in Nepal



Satellite Rainfall Estimates in the Hindu Kush-Himalayan Region



- for
- flood forecasts
 - drought monitoring

Why satellite rainfall estimation?

Floods and droughts are common natural hazards in the Hindu Kush-Himalayan (HKH) region. Accurate estimates of rainfall are needed in order to minimise the impacts of floods and droughts. Until recently, the main method used to estimate the amount of rain falling in an area was interpolation of measurements from a network of hydro-meteorological stations. The closer the spacing between the stations, the more accurate the total rainfall estimate. In mountainous areas, however, measuring stations are often sparse, and the rainfall information is too unreliable for predicting floods with any certainty. In the Himalayan region, which contains the headwaters of eight major Asian rivers, this is a major obstacle to accurate flood forecasting.

Recently it has become possible to make more accurate estimates of rainfall using satellite-enhanced rainfall estimation, in which precipitation information derived from an array of space-borne meteorological sensors is used to enhance rainfall measurements from surface-based conventional rain gauges. The conventional gauge data is first used to calibrate the satellite-based information, which increases the accuracy. Once calibrated, this is one of the easiest ways to estimate total rainfall over a large region or watershed. Satellite-enhanced rainfall estimation is especially appropriate for areas like the Himalayas, with few rain gauges and difficult access. Improved satellite-based rainfall estimates for the HKH delivered in a timely fashion will enable the operation and use of regional flood forecasting systems. The satellite data can also be used in weather prediction models to estimate future rainfall.



Obtaining accurate rainfall data from remote and poorly accessible areas in the upper part of river watersheds can be problematic

The ICIMOD project

The 'Application of Satellite Rainfall Estimates in the Hindu Kush-Himalayan Region' project aims to develop a satellite rainfall estimate model specifically for the Himalayan region by refining a system developed by the National Oceanic and Atmospheric Administration (NOAA) Climate Prediction Center, and to test a streamflow model (GeoSFM) developed by the United States Geological Survey (USGS) for flood hazard monitoring. The CPC RFE 2.0 produces an automatic daily rainfall analysis for southern and western Asia using satellite images. The results are updated three times daily and cover a 24-hour period of accumulated rainfall. The model has been expanded to cover the HKH region, but needs to be validated to improve its accuracy and usability. The software will be made available to all HKH countries. The GeoSFM is a spatially distributed, physically-based hydrological model used for wide-area flood risk monitoring that employs remote sensing data together with parameters related to topography, soils, and land cover.

The project has been designed to support country implementation plans developed during a regional workshop on satellite rainfall estimation organised by ICIMOD in 2005. It will use archived rain gauge data to validate selected satellite rainfall estimates made at the same time as the gauge measurements were taken. The results will be used to strengthen and improve the RFE-2.0 algorithm so that the satellite rainfall estimates prepared for the region can be used with confidence in stream flow models and flood forecasting systems. The results will also be tested for use in other applications like rainfall prediction, and drought and flood monitoring in partnership with NOAA and the USGS.

The overall goal of the Project is to strengthen regional cooperation in flood forecasting and information exchange and build the capacity of partner institutions for satellite rainfall estimation and its application. The project is funded by the United States Agency for International Development, Office of US Foreign Disaster Assistance (USAID/OFDA) and will run from June 2006 to June 2007.



Precipitation information from space-borne sensors can be used to enhance measurements from conventional rain gauges to obtain more accurate rainfall estimates in remote areas