



Integrated use of forecasted, ground and space based rainfall data with hydrological models for flash flood peak estimation in Beas river basin, India

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One of the major natural disasters in recent history of our country is flood. Different regions respond differently to the responsible factors of such disasters as flood and droughts. Normally, Himalayan region is prone to hazards due to extreme rainfall and cloudbursts. Flash floods and cloudburst occurs because of intense downpour within a short duration. Catchment of River Beas, having outlet in Pong Dam, extends over Himachal Pradesh having an overall area of 12,609 sq. km. Here, in this study, hydrological simulation is executed for the period of 11 to 18 August 2014 in Beas river basin, to detect the peak runoff owing to the heavy cloudburst event which occurred on 15th August in Hamirpur area of Himachal Pradesh, during which more than 100mm rainfall occurred in both Bhota, Nadaun and Sujampur Tira stations within 1-hour i.e. 3 to 4 AM IST in early morning. Simulation is performed by both Hydrologic Engineering Center Hydrologic Modelling System (HEC-HMS) and Variable Infiltration Capacity (VIC) models. Present study used 3-day advance weather forecast in this region using double nested domain of Weather Research and Forecasting (WRF) model (9 km for outer domain and 3 km for inner domain). The WRF model was simulated using National Centre for Environmental Prediction (NCEP) Global Forecasting System (GFS) 0.50 degree data as initialization state. The WRF outputs were taken at 3 hourly time scale. Tropical Rainfall Measuring Mission (TRMM 3B42) and Global Precipitation Measurement (GPM) precipitation data are also used to prepare meteorological inputs for the model. Apart from these, ground observation data from precipitation gages by IIRS and Bhakra Beas Management Board are used. Soil data is acquired from Soil Grids-1km produced by ISRIC-World Soil Information and land use land cover is taken from ISRO-GBP project at scale of 1:2,50,000. Being, a sub-grid scale model, output from simulations in VIC was able to point out the flood peak on 15 August 2014 and the HMS model due to its sub-daily and event based flood simulation scenario, was able to capture the peak flow during this time with better accuracy as compared to VIC model. The ground based river flow data from Nadaun and Sujampur Tira sites of BBMB also showed that peak flow value reached to 7500 cumec and 6050 cumec at 8:00 Am in morning of 15 August 2014 at later reduced to 2500 and 1050 cumec respectively at end of day.