

Improved river discharge combining precipitation from satellite products and local rain gauges at basin scale

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To simulate river discharge using the governing physics, distributed hydrological models (DHM) depend mainly on the terrain geo-morphology and precipitation patterns. Particularly, the spatial and temporal variation of the precipitation is crucial to obtain reasonable results. However, there are many basins which have poor observation network in developing countries. In the present study the satellite precipitation was obtained from the Tropical Rainfall Measuring Mission (TRMM). This is a joint mission between NASA and the Japan Aerospace Exploration Agency (JAXA) to monitor and study tropical rainfall and energy exchange at 0.25° spatial resolution and quasi-global coverage. The 3B42 version 6 product was chosen which includes calibration with monthly merged rainfall from Global Precipitation Climatology Project (GPCP). The TRMM raw data was improved using available rain gauges over Bangladesh using correcting factors. These correction factors were then also extended over India where rain gauge data was not available. The simulated discharge was evaluated during pre-monsoon and monsoon seasons at two stations: Zhakiganj at the intake of the upper Meghna River and at Bhairab Bazar, the outlet of the model. The simulated discharge using the improved TRMM data set got closer to the observed river discharge. Therefore, the procedure here shows the feasibility of further improvement of satellite precipitation at basin scale using local rain gauges. The obtained results are promising for the simulation of other river basins of the world.

Keywords: satellite precipitation, distributed hydrological model, river discharge, Bangladesh, Meghna basin, global data set