



On using TRMM data and rainfall forecasts from meteorological models in data-scarce transboundary catchments - an example of Bangladesh

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This research focuses on the flood risk of the Haor region in the north-eastern part of Bangladesh. The prediction of the hydrological variables at different spatial and temporal scales in the Haor region is dependent on the influence of several upstream rivers in the Meghalaya catchment in India. Limitation in hydro-meteorological data collection and data sharing issues between the two countries dominate the feasibility of hydrological studies, particularly for near-realtime predictions. One of the possible solutions seems to be in making use of the variety of satellite based and meteorological model products for rainfall. The abundance of a variety of rainfall products provides a good basis of hydrological modelling of a part of the Ganges and Brahmaputra basin.

In this research the TRMM data and rainfall forecasts from ECMWF have been compared with the scarce rain gauge data from the upstream Meghalaya catchment. Subsequently, the TRMM data and rainfall forecasts from ECMWF have been used as the meteorological input to a rainfall-runoff model of the Meghalaya catchment. The rainfall-runoff model of Meghalaya has been developed using the DEM data from SRTM. The generated runoff at the outlet of Meghalaya has been used as the upstream boundary condition in the existing rainfall-runoff model of the Haor region. The simulation results have been compared with the existing results based on simulations without any information of the rainfall-runoff in the upstream Meghalaya catchment. The comparison showed that the forecasting lead time has been substantially increased. As per the existing results the forecasting lead time at a number of locations in the catchment was about 6 to 8 hours. With the new results the forecasting lead time has gone up, with different levels of accuracy, to about 24 hours. This additional lead time will be highly beneficial in managing flood risk of the Haor region of Bangladesh.

The research shows that satellite based rainfall products and rainfall forecasts from meteorological models can be very useful in flood risk management, particularly for data scarce regions and/or transboundary regions with data sharing issues.

Keywords: flood risk management, TRMM, ECMWF, flood forecasting, Haor, Bangladesh.

Abbreviations:

TRMM: Tropical Rainfall Measuring Mission

ECMWF: European Centre for Medium-Range Weather Forecasts

DEM: Digital Elevation Model

SRTM: Shuttle Radar Topography Mission