



Application of satellite-based rainfall and medium range meteorological forecast in real-time flood forecasting in the Mahanadi River basin

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Increasing frequency of hydrologic extremes in a warming climate call for the development of reliable flood forecasting systems. The unavailability of meteorological parameters in real-time, especially in the developing parts of the world, makes it a challenging task to accurately predict flood, even at short lead times. The satellite-based Tropical Rainfall Measuring Mission (TRMM) provides an alternative to the real-time precipitation data scarcity. Moreover, rainfall forecasts by the numerical weather prediction models such as the medium term forecasts issued by the European Center for Medium range Weather Forecasts (ECMWF) are promising for multistep-ahead flow forecasts. We systematically evaluate these rainfall products over a large catchment in Eastern India (Mahanadi River basin). We found spatially coherent trends, with both the real-time TRMM rainfall and ECMWF rainfall forecast products overestimating low rainfall events and underestimating high rainfall events. However, no significant bias was found for the medium rainfall events. Another key finding was that these rainfall products captured the phase of the storms pretty well, but suffered from consistent under-prediction. The utility of the real-time TRMM and ECMWF forecast products are evaluated by rainfall-runoff modeling using different artificial neural network (ANN)-based models up to 3-days ahead.

Keywords: TRMM; ECMWF; forecast; ANN; rainfall-runoff modeling