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An alternative scheme in generating the precipitation ensemble from remotely sensed satellite products used for Ensemble Streamflow Prediction (ESP)

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The explicit characterization of precipitation uncertainty and analyzing its impact on watershed models' calibration and hydrologic fluxes including streamflow and soil moisture are well-known problems in hydrologic literature. Estimate of precipitation using ground-based rain gages are subject to sampling errors in particular in remote locations which create considerable uncertainty in streamflow forecast. Remotely sensed precipitation products may overcome spatial coverage limitations; however these products are limited to coarse spatial and temporal resolution and retrieval errors. In this study we demonstrate a procedure to estimate the multiplicative error associated with satellite-based precipitation estimate accounting for spatial and temporal resolution of estimated rainfall and also rainfall intensity through a power law function. Using this error function provides the capability to generate the ensemble of precipitation required for ensemble streamflow forecasting. In fact the precipitation uncertainty addressed through the ensemble is propagated through an operational hydrologic model to examine its impact on streamflow forecasting. This procedure is compared with some other currently available methods for precipitation ensemble generation in particular with US National Weather Service (NWS) Ensemble Streamflow Prediction procedure (ESP) which relies on historical precipitation data based on the basin initial condition imposed on the hydrologic model.