Quantify the Error Propagation of Satellite Precipitation by a Hydrologic Analytical Framework

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Abstract

This study introduces the use of a hydrologic analytical framework to investigate the error propagation processes of satellite precipitation products in hydrologic simulations. Specifically, the proposed investigation focuses on the decomposition of error in hydrograph properties (i.e. cumulative volume, centroid and dispersion) into terms representing the differences in space and time characteristics of precipitation, runoff generation and routing. Results show that under the smooth topographic setup of the study area, the bias in spatial and temporal correlation between rainfall and runoff generation are insignificant to the error in cumulative volume of flood event; contributions to error in arrival of flood event centroid due to differences in delay from the rainfall excess generation and runoff routing stage are of equal importance; error in dispersion of flood event hydrograph is mainly controlled by the difference in the variability of rainfall excess generation time. Sensitivity tests show that the error in hydrograph properties are able to be reproduced by the differences in space-time characteristics of precipitation, runoff

generation and routing but with slight underestimations. Random components are the main error sources of the estimations especially for the cases of flood event centroid and dispersion.