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Characteristics and dependencies of error in satellite-based flood event simulations

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The error in satellite precipitation driven complex terrain flood simulations is characterized in this study for eight different global satellite products and 128 flood events over the Eastern Italian Alps. The flood events are grouped according to two flood types: rain floods and flash floods. The satellite precipitation products and runoff simulations are evaluated based on systematic and random error metrics applied on the matched event pairs and basin scale event properties (i.e. rainfall and runoff cumulative depth and time series shape). Overall, error characteristics exhibit dependency on the flood type. Generally, timing of the event precipitation mass center and dispersion of the time series derived from satellite-precipitation exhibits good agreement with reference; the cumulative depth is mostly underestimated. The study shows a dampening effect in both systematic and random error components of the satellite-driven hydrograph relative to the satellite-retrieved hyetograph. The systematic error in shape of time series shows significant dampening effect. The random error dampening effect is less pronounced for the flash flood events, and the rain flood events with high runoff coefficient. This event-based analysis of the satellite precipitation error propagation in flood modeling sheds light on the application of satellite precipitation in mountain flood hydrology.