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# Simulation based investigation of the effects of radar-rainfall on scaling of floods in the Whitewater basin, Kansas

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Idealized model studies have shown that space-time rainfall intermittency and its statistical scaling properties have a significant impact on statistical scaling of flood peaks with respect to drainage area. In this study, simulation is used as a methodological tool to explore and separate the effects of rainfall as opposed to those of other factors such as estimation uncertainty, runoff generation, channel network topology and hydraulic geometry on the observed scaling of flood peaks. Two scenarios are considered, where the scaling properties of peak discharges are obtained for the 1100 km2 Whitewater basin in Kansas, U.S. under: 1) error-free rainfall fields with varying power spectrum structure and 2) rainfall fields with an imposed error structure that mimics that of radar-based estimates. A space-time rainfall model that can generate stationary lognormal rainfall fields for a given spatio-temporal scale dependent structure and intermittency is used. A hillslope and channel link based GIS simulation environment called CUENCAS is used to simulate flood peaks from physical processes, and to investigate presence or absence of scaling in floods. The parameters for the rainfall model are obtained by analyzing customized high-resolution radar-rainfall products based on NEXRAD Level II data for Kansas. To obtain the error-corrupted rainfall fields, radar-rainfall error structure that is based on substantial empirical evidence is modeled independently, and then imposed on simulations from the error-free model.