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Effect of radar-rainfall errors on the scaling behavior of event-based peak flows

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It is widely recognized that the radar-rainfall (RR) estimates are affected by errors from various sources. Recent studies have developed empirically based models for RR uncertainties, which can be employed to investigate the effect of RR errors on the hydrologic fluxes. In this study we used one such error model to evaluate the effect of conditional (on intensity) dependence, and spatial correlation structure of RR estimation uncertainties on the statistical scaling structure of peak flows. We selected a rainfall event over a study area of 1100 km2 Whitewater River basin and generated an ensemble of 200 probable true rainfall events using the error model. The probable rainfall fields were then propagated through a hillslope-channel link based hydrologic model to obtain streamflow hydrographs for all the channel links within the basin and for different scenarios of hillslope and channel routing. The scaling laws corresponding to peak flows from each of these 200 probable rainfall events were then compared with the scaling behavior of the peak flows from the radar-rainfall fields to quantify the effect of errors.