Geophysical Research Abstracts,
Vol. 11, EGU2009-10964, 2009
EGU General Assembly 2009

Effects of Radar-Rainfall Uncertainties on Statistical Structure of Floods

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Peak flows in a basin are a result of complex nonlinear interactions among rainfall and various processes in the landscape. Studies based on simulations and data have explored the role of rainfall characteristics on the statistical structure of peak flows. However, it is widely acknowledged that the rainfall products are affected by uncertainties from various sources. In this study, we investigated the role of radar-rainfall errors on the peak flow scaling structure. For this purpose, we selected several radar-rainfall events over the 1100 km2 study area of Whitewater River basin in Kansas. We employed recently proposed product-error-driven rainfall generator to obtain an ensemble of probable true rainfall events conditional on selected radar-rainfall event. We obtained the hydrographs for all the channel links in the basin using hillslope and channel network based hydrologic model. The role of radar-rainfall errors is then investigated by comparing the statistical structure of peak flows from radar-rainfall fields and probable true rainfall events.