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Multi-scale Analysis of Extreme Flooding in Iowa, USA

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The state of Iowa in central US has been experiencing frequent flooding in the past 20 years. The authors explore the interplay between heavy rainfall and the hydrologic response across multiple scales. The analysis is enabled by the availability of high resolution space-time radar rainfall data from seven radars covering the state, high resolution topography data and the satellite remote sensing based data on land cover and use. A hydrologic model that "connects" the rainfall and the runoff response is based on the landscape conceptualization into a drainage network and the associated hillslopes. Soil dynamics, hillslope scale runoff production, and the transport of water throughout the stream network are parameterized in the model. Scaling analysis of rainfall vs. peak flows provides insight into the respective roles of rainfall characteristics vs. river water transport in the genesis of floods at different scales.