



Flood Risk Characterization for the Eastern United States

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Tropical cyclones landfalling in the eastern United States pose a major risk for insured property and can lead to extensive damage through storm surge flooding, inland flooding or extreme windspeeds. Current hurricane cat-models do not include calculations of inland flooding from the outer rainfall bands of tropical cyclones but the issue is becoming increasingly important for commercial insurance risk assessment. The results of this study could be used to feed into the next generation of hurricane cat-models and assist in the calculation of damages from inland hurricane flood damage.

Annual maximum peak discharge records from more than 400 stations in the eastern United States with at least 75 years of record to examine the role of landfalling tropical cyclones in controlling the upper tail of inland flood risk for the eastern United States. In addition to examining tropical cyclone inland flood risk at specific locations, the spatial extent of extreme flooding from landfalling tropical cyclones is analyzed. Analyses of temporal trends and abrupt changes in the mean and variance of annual flood peaks are performed. Change-point analysis is performed using the non-parametric Pettitt test. Two non-parametric (Mann-Kendall and Spearman) tests and one parametric (Pearson) test are applied to detect the presence of temporal trends. Flood risk characterization centers on assessments of the spatial variation in “upper tail” properties of annual flood peak distributions. The modeling framework for flood frequency analysis is provided by the Generalized Additive Models for Location Scale and Shape (GAMLSS).