Title: Rainfall Depth-Duration-Frequency Relationships for South Carolina, North Carolina, and Georgia

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Abstract: The depth-duration-frequency curves and isopluvial maps for the region encompassing South Carolina, North Carolina, and Georgia were developed using the available rainfall data. The aim was to update the existing intensity-duration-frequency curves in the region and obtain these curves at ungauged sites throughout the region using the newly developed rainfall frequency analysis techniques. A total of 17 durations ranging from 15 minutes to 120 hours for return periods of 2, 10, 25, 50, and 100 years were analyzed. The L-moment method with X-10 test was used to search for homogeneous regions within the study area. It was found that the method was either unable to homogeneous regions that were geographically contiguous or too many stations had to be eliminated before a region could be considered homogenous. Finally, at-site statistics were calculated to develop frequency relationships. Normal, lognormal, generalized extreme value, Pearson type III, and log Pearson type III probability distribution functions were used to fit the maximum annual precipitation data at each gauging site for each duration. The chi-squared goodness-of-fit test was used to determine the best fit probability distribution. The new intensity-duration-frequency curves were found to be lower than the existing curves developed in 1986. The difference between the two set of curves was found to be due to the removal of the outliers in the present study and the existence of the post 1986 drought conditions in the region. The spatial interpolation of the rainfall intensity from the depth-duration-frequency curves was found to yield accurate intensity-duration-frequency curves and could be used to develop these curves at ungauged sites in the study area.