

Extreme Precipitation Trends over the Continental United States

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Abstract

In recent years there has been much climatological literature devoted to the apparent increase in extreme precipitation events that may be a consequence of broader trends in climate due to increased greenhouse gases. However, most current papers (for example, Groisman et al, Journal of Climate, 2005) still use rather simple statistical methods to study this phenomenon. Here, we apply state of the art extreme value methods based on exceedances over high thresholds, including covariates to represent trend and seasonality, to estimate 25-year return levels, and trends in those return levels over 1970-1999. This is done separately for nearly 5,000 stations in the US climatological network, then the results are combined across stations using spatial statistics. The results provide a detailed picture of how trends in rainfall extremes have varied across the United States, as well as summary statistics computed for 19 regions. They indeed confirm an overall increase in extreme rainfall levels, but it is by no mean homogeneous across the whole country. Separate analysis based on model runs from NCAR's Community Climate System Model provide a first insight into how such changes may project into the future.