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What history tells us about daily precipitation extremes

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As described in Wolter et al. (BAMS 2016), we utilize 987 meteorological stations in the contiguous US with at least 100 years of non-missing daily observations during 1901–2014, as well as mostly complete data in 2015 and 2016. The "RX1day" index (maximum 1-day precipitation) is computed at each station for all annual and bimonthly cases (base period 1901–80). We apply the generalized extreme value (GEV) distribution, known as the block or annual maxima approach for analysis of 20-yr precipitation events at each station. The lower confidence bounds (2.5th percentile) of the GEV-estimated return level for such events are used in order to include all cases that might be considered of that intensity. We validated results against the empirical estimates of the 20-yr events by ranking the annual and seasonal maxima at each station.

In both 2015 and 2016, we found an unusually high frequency of 20-yr rainfall events, consistent with a national upward trend thought to be related to climate change forcing. We examine to what extent the most extreme regional events were foreshadowed by antecedent trends. We also discuss to what extent the major El Niño event of 2015-16 might have played a role in the regional clustering of 20-yr events.

We would love to expand this type of analysis to other countries around the World, but have been handicapped by lack of accessible daily data.