Globally estimated precipitation extremes

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Understanding the magnitude and frequency of extreme precipitation events is a core component of translating climate observations to planning and engineering design. This research aims to capture extreme precipitation return levels at the global scale. A benchmark of the current climate is created using the global Multi-Source Weighted-Ensemble Precipitation (MSWEP-V2, coverage 1979-2017 at 0.1 arc degree resolution) data, by using both classical and novel extreme value distributions. Traditional extreme value distributions, such as the Generalized Extreme Value (GEV) distribution use annual maxima to estimate precipitation extremes, whereas the novel Metastatistical Extreme Value (MEV) distribution also includes the ordinary precipitation events. Due to this inclusion the MEV is less sensitive to local extremes and thus provides a more reliable and smoothened spatial pattern. The global scale application of methods allows analysis of the complete spatial patterns of the extremes. The generated database of precipitation extremes for high return periods is particularly relevant in otherwise data-sparse regions to provide a benchmark for local engineers and planners.