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Topical area: statistics and analysis in regards to extreme precipitation events.

The impact of data paucity and handling techniques on intense precipitation analyses

1. A fuzzy scale of intense precipitation types will be presented: "moderately heavy", "heavy", "very heavy", "extreme" rain events. For each definition, we shall show their climatology for different parts of the contiguous US (CONUS).
2. Area-averaging and gridding of precipitation fields change the spatial covariance function of resulting field and in each grid cell reduces the variance of resulting precipitation time series. However, when gridded fields are used to further study very rare, strongest precipitation events; their major characteristics will already be distorted unless special procedures of area-averaging/gridding are used. These procedures will be described.
3. The observing network density controls the size of precipitation extremes, which changes with time can be explored. The sparser the network the less will be the rainfall intensity for which statistically significant trends (if they exist) can be received.
4. Non-parametric estimates of changes in intense precipitation over most of North America will be presented for various intense precipitation types. We shall show when and where these estimates corroborate well with estimates of changes in "extremes" based upon parameter-based distributions. We shall also show examples where these two approaches deliver opposite results and describe why this happened.
5. Radius of correlation of a strong thunderstorm can be as little as 10 km. For large scale meteorological patterns (LSMPs) this radius can be higher but the spatial inhomogeneity of such patterns is also high and without proper referencing (i.e., point gauge measurements) can be left unaccounted. The consequences of this can be missing an extreme event within the LSMP boundaries or a severe miscalculation of its intensity. Examples of such case will be presented.
6. For the regions with frequent prolonged precipitation events (e.g., western US, Europe), our analyses show that the changes in occurrence of intense daily and prolonged multi-day rain events may have opposite signs.
7. Analyses of extreme precipitation changes should be partitioned by the mechanisms causing these extremes. For example in the southeastern US, we found opposite changes in extreme rainfall totals and frequency related to tropical cyclones (increase) and to other synoptic causes (decrease).