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Daily extreme precipitation events in different datasets in Southeastern South America

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Southeastern South America (SESA) covers central-northeastern Argentina, Uruguay and southern portions of Brazil and Paraguay (20–40° S, 45–65° W). It is a highly populated region with large urban settlements where socio-economic activities are mainly based on rainfed agriculture and cattle rising. SESA has been characterized by a remarkable increment in the frequency and intensity of heavy precipitation events, particularly during the late 20th century. The region is particularly vulnerable to extreme events which have high hydrologic and socio-economic impacts. However, it is still a challenge to better identify the factors and mechanisms that determine the location, intensity and frequency of the precipitation extremes and their large impacts. To carry out climate studies of spatial and temporal variability of daily precipitation extremes, it is necessary to count on long records of high-quality and high-resolution observational datasets. In some areas of SESA, the density of rain gauges may be very low and/or their temporal coverage may also be limited. Therefore, the characterization and study of extreme precipitation events over the region should consider as much available information as possible. Taking into account these drawbacks, in this work, we compare and evaluate different daily precipitation datasets in order to establish criteria to define and characterize extreme precipitation events in time and space over SESA. To this end, different daily precipitation datasets are used: daily precipitation from meteorological stations of Argentina, Brazil, Uruguay and Paraguay covering the period 1961-2017; and daily gridded precipitation data from CLARIS-LPB (1961-2000), CPC (1979-2017) and TRMM (2000-2017). Daily extremes are defined and compared among the different datasets. Precipitation extremes are identified considering different thresholds defined by the 75th, 90th and 95th percentiles, and their different spatial coverage. This evaluation is performed in the framework of the CORDEX Flagship Pilot Study initiative in southeastern South America “Extreme precipitation events in Southeastern South America: a proposal for a better understanding and modeling”, whose main goal is to study multi-scale processes and interactions (convection, local, regional and remote processes, including the co-behaviour of processes) that result in extreme precipitation events using both dynamical and statistical downscaling approaches to provide high-resolution information over the region.