

Data selection and regionalization for climate studies in Mexico

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The production of improved datasets is considered in WCRP Priority Task 8: Strengthen our Climate Information Systems. It contributes as a key element towards the improvement of climate services. Climate variations are observed at multiple scales, and regional applications constantly demand improvements in data-quality, which in turn, improve accuracy in diagnoses and predictions. Based on instrumental climate records provided by the National Meteorological Service of Mexico (SMN) we present an updated selection of Mexican temperature and precipitation time-series for the last five decades. Previous data selection efforts for Mexico enabled studies at the national scale. However, high-resolution assessments along with climate services for planning and applications require revisiting available datasets in terms of quality, homogeneity and continuity. A widely used regionalization of the Mexican climate by A.V. Douglas (AVD) and the methods and illustrations for calculating regional time series by Jones and Hulme, were both used to identify an updated subset of observed time-series suitable for climate analyses. Historically, observation of precipitation and surface maximum and minimum temperature in Mexico has been made in a total of nearly 5000 stations. Such observations have variable amounts of missing data both in space and time, with an important decrease in the number of observation stations in recent years. The most reliable station records were selected through several steps. Initially, observations were filtered according to their record completeness within a given base period (e.g. 1961-1990), resulting in two subsets of 975 and 838 stations for precipitation and temperature, figures that are further reduced by refinement criteria. From these two station subsets we identified groups of core stations for each of the 18 AVD's climate regions and a regional time-series was determined for each core. Then, using anomaly or standardized anomaly values, regional series were correlated with other surrounding stations in order to select additional stations for each core, resulting in 18 extended groups of stations that form our updated reference dataset proposal. A major challenge about Mexican climate data is that temporal change points in time-series are undocumented. This is because comprehensive metadata are either unavailable or not compiled into a country-wide repository. Therefore only simple homogeneity assessments based on anomalies were carried out, leaving application of more complex homogenization tests or methods as a potential improvement in future sub-national datasets. Resulting sets of climatic stations have proven useful as inputs for updating assessment of changes in the climate extremes derived from daily observations as for other analyses from instrumental data. Periodical updates are required to assure continuity in the reference time-series. Interaction between academia and operational communities proved to be positive during this work.