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Climate change and variability detection for the Mexican territory

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Due to its geographical location and abrupt orography, Mexico has a variety of climates, this is derived from the combination with high frequency processes as: mesoscale convective systems, easterly waves, hurricanes, cold fronts, and low frequency processes as: migration of the intertropical convergence zone, seasonal variability of jet streams, the Eastern Pacific warm pool and El Niño Southern Oscillation.

The goal of this study is to calculate the regional variability and climate change of three consecutive periods of 30 years (1924-2013) of precipitation and temperature and to identify extremes values estimating its changes in the probability of occurrence.

Using the 50kms. resolution CRU data base (Climatic Research Unit, University of East Anglia), of monthly maximum temperature, minimum temperature and precipitation in three consecutive periods (1924-1953, 1954-1983 and 1984-2013) we calculated the seasonal climatology, the percentage change, the annual cycle, the probability distribution changes and maps of extreme values (percentiles 5 and 95).

The spatial and temporal distribution of precipitation shows a great variability associated to atmospheric events that cause rainfall (high and low frequency), and to the terrain. The seasonal cycle of precipitation shows that in summer - autumn is the period of greatest values and is associated with the tropical. The region with the highest values are in the south and southeast, and the Gulf of Mexico and the northwesterly (the Monsoonal region). The region with the lowest values are the central plains. In winter - spring rainfall decreases, it is associated with the activity of cold fronts.

The period 1924-1953 is the coldest and dry, while the intermediate: 1954-1983 is a transition period. The period 1984-2013 is the warmer and wetter and both maximum and minimum extreme values of precipitation and temperature shifted to higher values. This is observed in the shift in the average occurrence probability distribution