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Extremes events under climate change scenarios for the Mexican zone

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The General Circulation Models (GCMs) are a useful tool to reproduce the global circulation and to regionalize climate change scenarios for the following decades. The resolution of GCMs is adequate to describe global circulation patterns, but it is inadequate to describe local processes that may be important, such as the effects of the abrupt orography or small-scale atmospheric processes within 100 km. Dynamical downscaling requires regional models, which can be executed at higher spatial resolutions.
Due to its geographical location and abrupt orography, Mexico has a variety of climates, this is derived from the combination of high and low frequency processes. The aim of this study is to estimate the capabilities of the RegCM model to reproduce those processes for the Mexican zone (tropical and extratropical) and adjacent seas. The study was applied for one historical period 1980-2009 and two future periods: 2015-2039 and 2070-2099 under the RCP8.5 scenario, identifying possible changes of 5 climatic indices (Expert Team on Climate Change Detection and Indices: ETCCDI), based on percentiles: frequency of cold nights, frequency of cool days, frequency of warm nights, frequency of hot days, total annual precipitation. In all cases the regional model was forced by the global models GFDL-ESM2M and CSIRO-MK36.
The potential changes (spatial and temporal) of precipitation and surface temperature shows a great variability associated with atmospheric high frequency events that cause rainfall. The seasonal cycle of precipitation shows that summer - autumn is the period of greatest changes and is associated with the tropical processes. The region with the highest changes in the climatic indices is the south and southeast of Mexico and the northwesterly (the Monsoonal region). The implications of these potential changes are discussed in terms of the observed atmospheric regional processes.