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Tropical cyclones and climate change at the Yucatan Peninsula

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Mexico is a country exposed to tropical cyclones generated in the northeastern Pacific and the North Atlantic. The risk from such events has increased as the population grows and infrastructure increases, which increase the vulnerability towards extreme events. Added to this, there is the uncertainty on the possible exposure increase to tropical cyclones as s result of global warming. Considering that the Yucatan Peninsula has the highest landfall rates in Mexico for major category hurricanes, characterizing tropical cyclones for the present and the future climate is essential for strategic planning. Here we assess the effect of climate change to landfalling tropical cyclones in the Yucatan Peninsula. The study uses synthetic events which are based on the physics of tropical cyclones and driven by atmospheric models. The present climate is characterized by synthetic events driven by the NCEP reanalysis, which is used as the reference to assess the performance of synthetic events driven by five different General Circulation Models (GCMs). Based on the performance of the synthetic events for each GCM, we selected the MPI-ESM-MR model to characterize the future climate of tropical cyclones under the RCP 8.5 scenario. The results show that the landfall frequency of tropical cyclones will increase in the Yucatan Peninsula, increasing the risk from such events. The implications for strategic planning in the area are critical, particularly when considering the uncontrolled development of the coastal zone in this area during the last decade.