

Changes to Tropical Eastern North Pacific Intraseasonal Variability under Global Warming – Implications for Tropical Cyclogenesis

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November 24, 2022

Abstract

Changes to the eastern North Pacific tropical intraseasonal oscillation (ISO) at the end of the 21st Century and implications for tropical cyclone (TC) genesis are examined in the Shared Socioeconomic Pathways (SSP585) scenario of the Coupled Model Intercomparison Project phase 6 (CMIP6) data set. Multimodel mean composite low-level wind and precipitation anomalies associated with the leading intraseasonal mode indicate that precipitation amplitude increases while wind amplitude weakens under global warming, consistent with previous studies for the Indo-Pacific warm pool. The eastern North Pacific intraseasonal precipitation/wind pattern also tends to shift southwestward in a warmer climate, associated with weaker positive precipitation anomalies near the coast of Mexico and Central America during the enhanced convection/westerly wind phase. Implications for the modulation of TC genesis by the leading intraseasonal mode are then explored using an empirical genesis potential index (GPI). In the historical simulation, GPI shows positive anomalies in the eastern North Pacific in the convectively enhanced phase of the ISO. The ISO's modulation of GPI weakens near the coast of Mexico and Central America with warming, associated with a southward shift of GPI anomalies. Further examination of the contribution from individual environmental variables that enter the GPI shows that relative humidity and vorticity changes during ISO events weaken positive GPI anomalies near the Mexican coast with warming and make genesis more favorable to the southwest. The impact of vertical shear anomaly changes is also to favor genesis away from the coast. These results suggest a weaker modulation of TCs near the Mexican Coast by the ISO in a warmer climate.

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