

Effect of Global Warming on Genesis and Dissipation of Tropical Cyclones using High-Resolution CESM Simulations

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Abstract

Tropical cyclones (TCs) are high-impact weather systems that form over the warm tropical ocean and bring catastrophic damage to coastal areas. When a TC moves to the mid-latitudes, it undergoes landfalls and/or transformation known as extratropical transition, affecting larger areas and populations. In our study, we used a high-resolution Community Earth System Model to examine the changes in the genesis, landfall, and extratropical transition of TCs in response to increased concentrations of carbon dioxide (CO₂) in the atmosphere.

We found that the global frequency of TCs is expected to decrease, whereas their rainfall strength and rainfall area will increase. Furthermore, ET events under increased CO₂ concentrations remain similar to those in the climate with the current CO₂ level. However, we observe more intense storms upon the completion of the transition, with a more pronounced increase in near-surface wind speeds in the CO₂ quadrupling simulation.