EMS Annual Meeting Abstracts
Vol. 14, EMS2017-116, 2017

Enhanced intensity of global tropical cyclones during the mid-Pliocene warm period

Qing Yan (1), Ting Wei (2), Robert Korty (3), James Kossin (4), Zhongshi Zhang (5), and Huijun Wang (6)

(1) Nansen-Zhu International Research Centre, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China, (2) State Key Laboratory of Severe Weather, Chinese Academy of Meteorological Sciences, Beijing, China, (3) Department of Atmospheric Sciences, Texas A&M University, College Station, Texas, USA, (4) NOAA National Centers for Environmental Information, Center for Weather and Climate, Madison, WI, USA, (5) Department of Atmospheric Science, School of Environmental Studies, China University of Geosciences, Wuhan, China, (6) Key Laboratory of Meteorological Disaster/Collaborative Innovation Center on Forecast and Evaluation of Meteorological Disasters, Nanjing University of Information Science and Technology, Nanjing, China

Given the threats that tropical cyclones (TC) pose to people and infrastructure, there is significant interest in how the climatology of these storms may change with climate. The global historical record has been extensively examined, but it is short and plagued with recurring questions about its homogeneity, limiting its effectiveness at assessing how TCs vary with climate. Past warm intervals provide an opportunity to quantify TC behavior in a warmer-than-present world. Here we use a TC-resolving (∼25 km) global atmospheric model to investigate TC activity during the mid-Pliocene warm period (∼3 Ma) that shares similarities with projections of future climate. Two experiments, one driven by the reconstructed sea surface temperatures (SSTs) and the other by the SSTs from an ensemble of mid-Pliocene simulations, consistently predict enhanced global-average peak TC intensity during the mid-Pliocene coupled with longer duration, increased power dissipation, and a poleward migration of the location of peak intensity. The simulations are similar to global TC changes observed during recent global warming, as well as those of many future projections, providing a window into the potential TC activity that may be expected in a warmer world. Changes to power dissipation and TC frequency, especially in the Pacific, are sensitive to the different SST patterns, which could affect the viability of the role of TCs as a factor for maintaining a reduced zonal SST gradient during the Pliocene, as recently hypothesized.