EGU21-13948
https://doi.org/10.5194/egusphere-egu21-13948
EGU General Assembly 2021

Quantifying the impact of climate change on tropical cyclone rainfall using a model hierarchy

Kevin Reed, Alyssa Stansfield, and Erica Bower
School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, USA (kevin.a.reed@stonybrook.edu)

Changes in extreme events, such as the recent devastating tropical cyclones (TC), are a visible way in which climate change can directly impact society and coastal communities. This work presents the results of a model hierarchy within the Community Earth System Model (CESM), that spans idealized radiative convective equilibrium to realistic decadal projections of future climate change configurations, to explore how TC rainfall characteristics change with surface warming. The Community Atmosphere Model (CAM) component of CESM is forced with prescribed sea-surface temperatures (SSTs) and greenhouse gas concentrations for idealized and realistic representations of past, present, and future climates using global and variable-resolution setups with high-resolution horizontal grid spacing equal to 28 km. An analysis framework that allows for the extraction of TC-related rainfall throughout the full storm lifecycle is utilized. This analysis includes the evaluation of conventional (AMIP-style) decadal simulations typical of climate models, short 7-day ensemble hindcasts of recent devastating events, and reduced complexity simulations of idealized states of the climate system. Through this hierarchical modeling approach the impact of climate change on the characteristics (rainfall, structure, intensity, etc.) of TCs can be quantified This work is part of a growing effort in the scientific community to quantify the impact of climate change on recent and future extreme weather events.