

ASSESSING TROPICAL CYCLONES' CONTRIBUTION TO PRECIPITATION OVER THE EASTERN UNITED STATES AND SENSITIVITY TO THE VARIABLE-RESOLUTION DOMAIN EXTENT

Scientific Achievement

Three variable-resolution configurations of the Community Atmosphere Model version 5 are used to explore the sensitivity of North Atlantic tropical cyclone (TC) climatology, focusing on precipitation over the eastern United States, to the high-resolution domain extent.

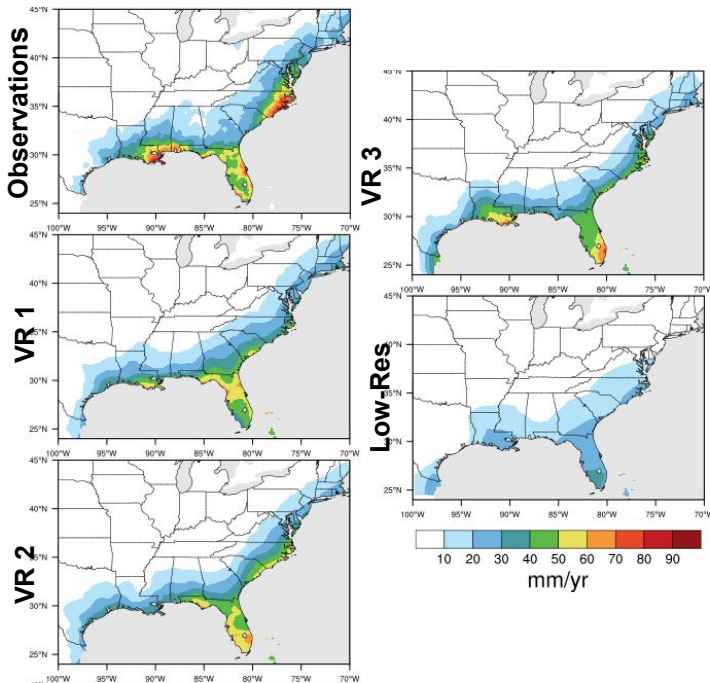
Significance and Impact

- Novel methodology is developed to track TCs and extract TC-related precipitation using a dynamic estimate of their outer sizes within model output.
- Variable-resolution model configurations can reasonably represent observed North Atlantic TC climatology at a fraction of the computational cost of a global high-resolution configuration.

Research Details

- Four model simulations, three variable-resolution configurations with the high-resolution (~28 km grid spacing) domain extending over different extents of the North Atlantic and one global low-resolution (~111 km grid spacing) configuration, are compared using AMIP-style historical forcing.
- The variable-resolution simulations have a low bias in landfalling TCs over the eastern US compared to observations, resulting in the TC-related precipitation also underestimating observations.
- All variable-resolution configurations outperform the global low-resolution configuration in all metrics.

Annual Mean TC-related Precipitation



Annual mean precipitation from TCs for observations, the three variable-resolution models, and the low-resolution model.

Stansfield, A. M., K. A. Reed, C. M. Zarzycki, P. A. Ullrich, and D. R. Chavas, 2020: Assessing Tropical Cyclones' Contribution to Precipitation over the Eastern United States and Sensitivity to the Variable-Resolution Domain Extent. *J. Hydrometeor.*, **21**, 1425–1445, <https://doi.org/10.1175/JHM-D-19-0240.1>.