Response of Downscaled Tropical Cyclones to Climate Forcing:

Results and Interpretation

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We apply the tropical cyclone downscaling technique of Emanuel et al. (2008) to all four climate scenarios in four of the climate models run in support of Hurricane Working Group (HWG) activities, and to five CMIP5 models run under historical conditions and under radiative forcing scenario RCP8.5. Global tropical cyclone activity downscaled from the CMIP5 models shows substantial increases in activity, in contrast to that downscaled from the CMIP3 generation of climate models. We interpret these results using both single-column models and the specialized HWG simulations. We will demonstrate that tropical cyclone activity cannot be considered to be a unique function of local and/or global SST, and that AGCM experiments with specified SST may give misleading indications of the response of TC activity to climate change. We recommend that future direct or downscaled simulations of tropical cyclone response to climate change be performed using at least slab ocean models (possibly with specified lateral ocean enthalpy fluxes) if not fully coupled models.