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Do high-resolution global climate models simulate climate extremes better? A validation.

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Recent developments in climate modeling have led to advances in the ability to integrate global climate models at unprecedented high resolutions for longer simulation periods. Here, we present comparisons of Generalized Extreme Value (GEV) distribution estimated parameters for daily temperature and precipitation extremes over the globe for high-resolution (0.25-degrees) and low-resolution (1-degree) global pre-industrial and present day simulations with the Community Earth System Model (CESM). We capture the non-stationary behavior of extremes by building suitable linear models of GEV distribution and estimate trends and dependence of extremes on natural modes of variability, namely the North Atlantic Oscillation and El Nino Southern Oscillation. Further, a correlation based moving window regionalization method is also designed to improve the poor sampling of extremes associated with grid point analysis. Preliminary results indicate that while the high-resolution models can better simulate the variability and extremes of daily precipitation, particularly over areas with varied topography - similar to previous findings, there are also gains in the simulation of the trends and impact of low-frequency natural variability on extremes based on comparisons with NASA MERRA reanalysis data.