



Improved simulation of extreme precipitation in a high-resolution atmosphere model

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Climate models often underestimate the magnitude of extreme precipitation. We compare the performance of a high-resolution ($\sim 0.25^\circ$) time-slice atmospheric simulation (1979–2005) of the Community Earth System Model 1.0 in representing daily extreme precipitation events against those of the same model at lower resolutions ($\sim 1^\circ$ and 2°). We find significant increases in the simulated levels of daily extreme precipitation over Europe, the United States, and Australia. In many cases the increase in high percentiles (> 95 th) of daily precipitation leads to better agreement with observational data sets. For lower percentiles, we find that increasing resolution does not significantly increase values of simulated precipitation. We argue that the reduced biases mainly result from the higher resolution models resolving more key physical processes controlling heavy precipitation. We conclude that while high resolution is vital for accurately simulating extreme precipitation, considerable biases remain at the highest available model resolutions.