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Multi-thousand member ensemble atmospheric simulations with global 60km resolution using climateprediction.net

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Multi-thousand member climate model simulations are highly valuable for showing how extreme weather events will change as the climate changes, using a physically-based approach. However, until now, studies using such an approach have been limited to using models with a resolution much coarser than the most modern systems. We have developed a global atmospheric model with 5/6°x5/9° resolution (~60km in middle latitudes) that can be run in the climateprediction.net distributed computing system to produce such large datasets. This resolution is finer than that of many current global climate models and sufficient for good simulation of extratropical synoptic features such as storms. It will also allow many extratropical extreme weather events to be simulated without requiring regional downscaling. We will show that this model's simulation of extratropical weather is competitive with that in other current models. We will also present results from the first multi-thousand member ensembles produced at this resolution, showing the impact of 1.5°C and 2°C global warming on extreme winter rainfall and extratropical cyclones in Europe.