10.5 Global convection-allowing ensemble forecasts with MPAS.

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Two sets of 132-h, global, 10-member ensemble forecasts were produced with MPAS for 35 cases over April and May 2017. One ensemble had 15-km horizontal grid spacing over the globe, while the second had a similar mesh except for a 3-km refinement region spanning the conterminous United States (CONUS). All forecasts were initialized from 0.5-degree Global Ensemble Forecast System (GEFS) analyses.

Probabilistic precipitation forecasts were objectively verified over the CONUS against corresponding Stage IV observations, while probabilistic forecasts of severe weather surrogates, such as updraft helicity, were compared to observed severe weather reports. Skill and reliability of both the 15- and 3-km ensembles steadily decreased as forecast length increased. The 3-km ensemble was generally more skillful and reliable than the 15-km ensemble at early forecast ranges, but by 72-h, differences between the 15- and 3-km ensembles were much smaller. Additionally, the 3-km MPAS ensemble performed comparably to or better than limited-area, 3-km, WRF-based ensembles.

Overall, these results suggest promise for global convection-allowing ensembles, but questions remain regarding whether 3-km ensemble forecasts extending beyond approximately 3 days are sufficiently skillful and reliable to warrant the cost.