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Ensemble Kalman filter data assimilation for the MPAS system

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The Model for Prediction Across Scales (MPAS; http://mpas-dev.github.io/) is a global non-hydrostatic numerical atmospheric model based on unstructured centroidal Voronoi meshes that allow both uniform and variable resolutions. The variable resolution allows locally high-resolution meshes that transition smoothly to coarser resolution over the rest of the globe, avoiding the need to drive a limited-area model with lateral boundary conditions from a separate global model.
The nonhydrostatic MPAS solver (for both atmospheric and oceanic components) is now coupled to the Data Assimilation Research Testbed (DART; http://www.image.ucar.edu/ DAReS/DART) system with a full capability of ensemble Kalman filter data assimilation. The analysis/forecast cycling experiments using MPAS/DART is successfully tested with real observations for different retrospective cases. Assimilated observations are all conventional data as well as satellite winds and GPS radio occultation refractivity data.
Testing on different grid mesh, we examine issues specific to the MPAS grid, such as smoothing in the interpolation and the update of horizontal wind fields, and show their impact on the Ensemble Kalman Filter (EnKF) analysis and the following short-range forecast. Up to 5-day forecasts for a month-long cycle period are verified against observations and compared to the NCEP GFS (Global Forecast System) forecasts.