Evaluation of Real-time, Medium-range, Convection-allowing Ensemble Forecasts Produced with MPAS for NOAA's Hazardous Weather Testbed Spring Forecasting Experiments

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Coincident with NOAA's Hazardous Weather Testbed (HWT) Spring Forecasting Experiments (SFEs) in May 2023 and 2024, 132-h (5.5-day), real-time, 5-member ensemble forecasts were produced with a global variable-resolution configuration of NSF NCAR's Model for Prediction Across Scales (MPAS) that had ~3-km horizontal cell spacing over the conterminous United States. Forecasts were initialized daily at 0000 UTC from Global Ensemble Forecast System (GEFS) initial conditions, and identical MPAS configurations were used across the two years. The 2023 effort represented the first time convection-allowing ensemble guidance at medium-range forecast periods had been produced in real-time with a variable-resolution global model.

The MPAS ensemble forecasts were skillful and appeared to have value. For example, 2023 HWT SFE participants found that the medium-range ensemble forecasts often successfully highlighted areas where severe weather occurred 5 days in advance. Moreover, objective verification of surrogate severe weather diagnostics from the 2023 forecasts indicated skill relative to climatology through 5 days. Additionally, 3-h accumulated precipitation forecasts from the 2023 dataset were more skillful than corresponding forecasts from NCEP's much

coarser operational GEFS through 5 days, further indicating the potential value of MPAS-based convection-allowing ensembles at medium-range forecast periods.

This presentation will discuss these findings, focusing on the 2023 forecasts, but initial results from the recently-completed 2024 forecasts will also be briefly described.