

## NOAA/GSL Model Prediction Development with MPAS

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The Global Systems Laboratory (GSL) in NOAA seeks to improve earth system prediction across all weather hazards including severe convective weather, intense rainfall, winter storms, landfalling tropical systems and other small-scale phenomena such as smoke from wildfires. Historically NOAA/GSL has focused on developing modeling systems such as the WRF-based Rapid Refresh and High-Resolution Rapid Refresh and more recently to collaborations of Research-to-Operations applications within the Unified Forecast System (UFS) including the Global Forecast System and Rapid Refresh Forecast System. As these predictive needs continue to blur the boundaries between regional and global applications, as well as drive interests towards finer convection-allowing and even convection-resolving to urban spatial scales, GSL is engaging with use of MPAS to meet these scientific forecast challenges.

This presentation will provide an overview of the various research and development efforts that GSL is participating in, and in some cases leading, with MPAS. For the purpose of this presentation, these efforts will be highlighted and organized through the use of both the global and limited-area versions of MPAS to (1) test initial global rapid-refresh designs as part of GSL's grand scientific challenge, (2) explore the model's resolution sensitivities for extreme precipitation and convective-scale applications as well as help inform future designs of the Rapid Refresh Forecast System, (3) evaluate model physics performance including forecast ensemble designs and (4) interface with new data assimilation (JEDI), physics and workflow infrastructure capabilities (e.g. stochastics, CCpp). Results and progress in these areas will be presented along with a preview of future plans with MPAS including both research and operational opportunities within the UFS.