
Building a JEDI- and FV3-based Rapid Refresh Forecast System (RRFS) upon Decade of Development and Implementation of the High Resolution Rapid Refresh (HRRR)

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Abstract

The Rapid Refresh Forecast System (RRFS) is NOAA's next generation rapidly-updating regional/storm scale operational NWP system under development collaboratively by many partners. It will replace current regional and storm scale operational NWP systems, including RAP/HRRR, HREF, and NAM.

In the past ten years, NOAA has worked with the research community to develop HRRR for operational storm forecasts. Many data assimilation and physical schemes used in HRRR are still valuable for RRFS development.

The RRFS uses a limited area model version of the FV3 (FV3LAM), but retains the majority of the HRRR physics, hourly cycling, and data assimilation capabilities. The data analysis engine is transitioning from the Gridpoint Statistical Interpolation (GSI) to the Joint Effort for Data assimilation Integration (JEDI). We are currently evaluating various data assimilation capabilities using the GSI coupled with the FV3LAM inside the UFS Short-Range Weather Application. These include 3D hybrid EnVar, non-variational cloud analysis, soil adjustment, and the use of radar reflectivity via a derived temperature tendency. We are also conducting tests of these analysis capabilities using JEDI coupled with the FV3LAM, benchmarking them against similar GSI-FV3LAM capabilities.

To effectively couple the RRFS with the FV3-based Global Forecast System (GFS), we are running a single large 3-km RRFS domain covering North America and adjacent oceanic regions to assess the need for a 13-km resolution intermediate RAP-like domain between GFS

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and 3-km CONUS domain as was done with RAP/HRRR. In this talk, we will summarize the latest RRFS retrospective and real-time tests results with comparisons against the HRRR and other systems.

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