

2.4 Recent improvements in the WRF-based Rapid Refresh and HRRR forecast systems and transition to NCEP operations

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In February 2014, a major upgrade was made to the National Centers for Environmental Prediction (NCEP) operational version of the Rapid Refresh (RAP) model system and an initial NCEP implementation of the High Resolution Rapid Refresh (HRRR) is planned for late summer 2014. The 13-km RAP and 3-km HRRR are WRF-based hourly-cycled weather prediction systems that are used extensively by National Weather Service and other forecasters for a variety of short-range forecast applications. In addition to these operational implementations, ESRL runs real-time experimental versions of these models with our latest updates and enhancements. The purpose of this talk is report on the recent improvements to the experimental RAP and HRRR versions running at ESRL and the NCEP versions.

The ESRL RAP and HRRR are both using version 3.5.1 of the Advanced Research WRF (ARW) model with an updated Thompson microphysical scheme and use of the new Grell-Freitas (GF) convective parameterization in the RAP. Additional improvements were made to the RUC LSM and MYNN PBL scheme, and a switch was made to the RRTMG radiation scheme. The NCEP versions use WRF v3.4.1 and correspondingly older versions of the various physics packages.

Data assimilation changes for the ESRL RAP and HRRR include enhancements to the hybrid data assimilation (in the RAP), the cycled snow cover field in the RAP, and the non-variational cloud building and the soil temperature and moisture adjustment, in both models. In additional, improved satellite radiance assimilation (with cycled bias correction) was introduced in the ESRL RAP and hybrid assimilation was introduced for the HRRR.

At the workshop, we will describe the RAP and HRRR enhancements and document the analysis and forecast improvements with retrospective and real-time verification statistics and case studies from 2013-2014.