

A Status Update for the NAMRR, an Hourly-Updated Version of NAM Forecast System

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Hourly-Updated NAM Forecast System

How does this fit within NCEP production suite?

- NAM North American Mesoscale forecast system
 - Runs 4x daily at 00, 06, 12, 18Z
 - Short-range mesoscale NWP system for the U.S. which provides guidance to day 3.5
- NAMRR: NAM Rapid Refresh
 - Hourly updates
 - Important step toward North American and Hi-Res Rapid Refresh Ensemble system (NARRE and HRRRE)
 - NAMRR + RAP/HRRR Foundation
 - Consistent with 2014 Annual Report of the UCAR Community Advisory Committee for NCEP
- Development of *hourly* NAM cycling capabilities on NOAA R&D machine Zeus
 - Part of DOE-funded wind energy projects
 - WFIP/POWER
 - Cycling 12 km NAM <u>and</u> 3 km CONUS nest



Upcoming Changes Not exhaustive!

- Upgrades to NMMB prediction model
 - CONUS (4 km) and Alaska (6 km) nests \rightarrow 3 km
 - Microphysics changes to address locally heavy QPF and increase stratiform QPF
 - Test shallow convection in NAM nests \rightarrow improved convective initiation
 - Radiation changes \rightarrow improve 2 m temperatures
- New observations
 - SEVIRI, NOAA17-18 SSMIS
 - Metop_B (IASI, HIRS4, AMSUA, MHS)
 - NPP (ATMS, CRIS)
 - Tall tower + wind turbine nacelles (result of WFIP project)
- Data assimilation
 - Move to an hourly cycle (NAM Rapid Refresh)
 - Tropical cyclone relocation
 - 4DEnVar (tentative)
 - Direct analysis of hydrometeors (tentative)
 - Improve use of Doppler radial wind observations for 3 km domains
 - Digital filter with radar-derived temperature tendencies
- Improve / enhance output products
 - Convert all output to GRIB2
 - Remove legacy output grids/products (TBD)



Parent dimensions: Nx = 954 Ny = 835 dx = 0.1260 dy = 0.1080 center lat = 54.00 center lon = -106.00

(See 13A.1 by S. Liu)

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NAMRR Overview

Current, example, NAM Data Assimilation System (NDAS) configuration for a single, arbitrary cycle:

Example NAMRR configuration for 12, hourly cycles:

Both systems assimilate a wide range of conventional (e.g. surface, profiler, mesonets, Doppler radar radial velocities, etc.) and satellite observations (e.g. radiances)



95th AMS Ann. Meeting: - 19th Conference on IOAS-AOLS

4.4

POWER:Position of Offshore Wind Energy Resources July + August Periods, 2004: 0.1-2km AGL vs. Shipborne *Ron Brown* Profiler



Ship tracks during two study periods: (left) August 6-12, (right) July. 95th AMS Ann. Meeting: - 19th Conference on TOAS-AOLS 4.4

Assimilation of SEVIRI data in NAMRR

March 1-31, 2012 → Covering Atlantic, portions of Europe, and Africa

Satellite Radiances include:

Two Experiments:



June 29-30, 2012 Derecho - 27 Hr Forecast NAMRR Test with 3 km CONUSnest



May 20th, 2013 OK Severe Weather Event



Microphysics

- Current Ferrier-Aligo scheme improves vertical storm structure
 - Implemented in NAM, Aug. 2014
 - Advection of individual hydrometeors
 - Max N_{LI} a function of rime factor and temperature
 - Higher reflectivities from mixed-phase ice

- Ongoing efforts
 - Improve stratiform and/or anvil region (SPC)
 - Improve issues with localized, high QPF amounts (WPC)



Shallow Convection in 3km CONUS nest (ongoing) See presentation 6.4 by D. Lippi for more



Both forecasts are 'overdone'.

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Shallow conv. introduces daytime 2 m T warm bias

"Grand Scheme": Where is this all going? NARRE + SREF HRRRE + NCASE

12 km Continental

NARRE [North America Rapid Refresh Ensemble]

- Hourly
- 18-24 hr forecast range
- Subsumes RAP + NAMRR

SREF [Short Range Ensemble Forecast]

- 6 hourly
- 84-96 hr forecast range with extensions of NARRE members 00Z, 06Z, 12Z, and 18Z
- Subsumes NAM

3 km CONUS, AK, HI, PR

HRRRE [High Resolution Rapid Refresh Ensemble]

- Hourly
- 15-18 hr forecast range
- Subsumes HRRR + NAMRRnests

NCASE [Convection Allowing Scale Ensemble]

- 6 hourly
- 48-60 hr forecast range with extensions of HRRRE members at 00Z, 06Z, 12Z, and 18Z
- Subsumes HiResWin + NAMnests

4.4

"Grand Scheme": Where is this all going?

This is possible - maybe even probable, at some point in future

12 km Continental

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- H
- 18-24, / rar
- Subsun
 Y + NAMRR

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Closing/Thoughts

Thank You! Contact: jacob.carley@noaa.gov

- NAMRR establishment in production will be a significant step toward the realization rapid update ensembles
 - NAMRR/RAP+HRRR Foundation → NARRE and HRRRE
 - Multi-model, convection-allowing (HRRRE), rapid update ensemble
 - Subsumes SREF and current HiRes Windows
- As development matures will seek input/engagement from the community
- Late FY15 or early FY16 implementation





N Member Ensemble

N Member Ensemble