

# NCEP Synergy Meeting Highlights: January 26, 2015

*This meeting was led by Mark Klein (WPC) and attended by Kathy Gilbert and Tony Fracasso (WPC); Carissa Klemmer (NCO); Mark Iredell, Geoff DiMego and Mary Hart (EMC); Dave Zelinsky (NHC); Israel Jirak (SPC); Joe Sienkiewicz (OPC); Phil Shaffer (MDL); Jeff Waldstreicher (ER); Jeff Craven (CR); Mike Staudenmaier (WR); Ernie Wells and Mark Fresch (OHD)*

## 1. NOTES FROM NCO (*Carissa Klemmer*)

The Great Lakes Wave model upgrade slated for implementation on Tuesday, January 27, was postponed to January 28 due to Critical Weather Day.

The CMAQ/AQM upgrade slated for implementation on Tuesday, January 27, was postponed to January 29 due to Critical Weather Day.

Parallel runs of the upgraded RTMA (v2.3.0) are scheduled to start next week (week of February 2), with implementation scheduled for early-mid March.

Upcoming toward the end of Q2 and through Q3 will be upgrades to the SREF, GEFS, and Hires Window

## 2. NOTES FROM EMC

### **2a. Global Climate and Weather Modeling Branch (GCWMB) (*Mark Iredell*):**

- GEFS upgrade (v11.0.0)
  - Targeted for implementation ~ April-May 2015
  - Change from GFS Euler to Semi-Lagrangian model
  - Horizontal resolution - increase from 55km to 34km from F000-F192, and from 73km to 55km from F192-F384
  - Vertical resolution increase from 42 to 64 levels
  - Data available at 3-hour time steps through F192
  - Initial perturbations based of EnKF to promote increased spread.
  - Legacy GEFS to run at 00Z only to support reforecasts
- CFS upgrade (v2.1 )
  - Targeted for implementation after GEFS - (Q3)
  - Will use modern GSI assimilation scheme
  - Aerosol component (chemistry from NASA)
- Looking ahead...the next GFS upgrade will be during winter (2015-16)
  - Include 4D data assimilation
  - NEMS infrastructure
  - A few physics changes planned

## **2b. Mesoscale Modeling Branch (MMB) (Geoff DiMego)**

- SREF upgrade (v7.0.0)
  - Targeted for implementation - FY15 Q3
  - Horizontal resolution will remain at 16-km, but membership increases to twenty-six (13 NEMS-NMMB, 13 WRF-ARW)
  - Increase from 35 to 40 levels
  - More physics diversity and stochastic physics parameters
  - Initial conditions diversity is enhanced: (a) mix use of multiple analyses (NDAS, GFS and RAP) for each model core, and (b) blending of GEFS and SREF IC perturbations for all members
  - Uses bred vectors and global EnKF to perturb initial conditions
  - Physics diversity is enhanced: (a) more variety of physics schemes, and (b) stochastic flavor in physics parameters (GWD and soil moisture)
  - Add variables at 80m AGL
  - Add TKE, wind chill, heat index, wind gust fields
  - Will be running retrospective runs for SPC for testing
  
- RTMA/URMA upgrade (v2.4.0)
  - Targeted for implementation - FY15 Q4
  - Wind downscaling enhancements
  - Add ceiling heights, 10m wind, and significant wave height
  - Use EMC/GFE common topography and land/sea masks
  - Enhanced variational observation quality control within the GSI
  - Westward extension of 2.5km CONUS grid for OPC
  - Implement URMA for Alaska
  - Add GLERL-type coastal observation adjustment to improve wind analysis over the Great Lakes
  - Grids extending to HI, Puerto Rico, and Guam
  
- HiresWindow upgrade (v6.1.0)
  - Targeted for implementation - FY15 Q3
  - Moves toward the NARRE/HRRR-E era
  - Will increase vertical resolution from 40 to 50 levels
  - Hourly data assimilation
  - Horizontal resolution will remain ~3-4 km depending on the domain
  - Improved simulated reflectivity, but need to tune it to avoid degrading the QPF
  - Addition of lightning and ceiling height
  
- RAP (v3.0.0) and HRRR (v2.0.0)
  - Targeted for implementation - FY15 Q3
  - Will implement as a single package

- Upgrade to WRF-ARW v3.6 core
  - RRTMG radiation scheme
  - Upgrade to Thompson microphysics, MYNN PBL, and RUC land surface model and cumulus parameterization (RAP)
  - Introduce shallow cumulus parameterization to HRRR (Grell-Freitas)
  - HRRR will use hybrid data assimilation
  - Improvements to 2m temperature and dewpoint background estimate
- Upgrade to assimilation of radar reflectivity
- Next NAM upgrade is scheduled for FY15 Q4 or early FY16
  - Nests for both CONUS and AK will increase to 3km resolution (from 6km and 4km, respectively)
  - Physics upgrades to reduce warm season high QPF bias in CONUS nest
  - LSM upgrades to reduce winter afternoon cool bias over the CONUS
  - Upgrades to GSI analysis and data assimilation
    - Replace NDAS' 3 hr update frequency with RAP-like hourly cycle of NAM Rapid Refresh (NAMRR)
    - Continue NDAS-like reach-back to GDAS with catch-up cycle every 6-h or 12-h
    - 4-d version of hybrid ensemble variational analysis
    - Diabatic digital filter radar-derived temp. tend. & cloud analysis
    - Tropical cyclone relocation [Sandy Supplemental]
  - Hourly updated analysis, which will incorporate reflectivity to improve precip
  - Upgrade observation processing
    - Accommodate TAC –to–BUFR conversion of international transmissions including high density radiosondes with thousands of levels in vertical
    - Use Doppler obs from MRMS ingest on IDP with 3 new Caribbean sites [SS]
    - Improve radial wind qc and start moving MRMS into GSI [NextGen]
  - New observations in analysis and data assimilation
    - SEVIRI, NOAA17-18 SSMIS, Metop\_B (IASI, HIRS4, AMSUA, MHS), Himawari, NPP (ATMS, CRIS), ...
    - New sources of aircraft observations [Sandy Supplemental]
    - Tower & nacelle obs from wind power producers
  - Moving toward future hi-res ensembles (NARRE/HRRRE). May not have enough members to run an ensemble, but it will have the baseline capability

Also, Geoff led a discussion regarding the threshold of precipitation that must be reached for the models to output a precipitation type. This value is somewhere between >0 and 0.01” and basically represents a trace. I don't have specific numbers, but Geoff

noted that this threshold is higher in the NAM Nest than parent grid, RAP, and HRRR, so the precipitation type output will tend to appear spottier in regions with low precipitation values. The NAM nest threshold may be lowered in the next upgrade.

**2c. Marine Modeling and Analysis Branch (MMAB)** *(No representative. Information below from December 2014 NCEP Production Suite Review presentation and December 2014 WCOSS Implementation Briefing)*

- RTOFS Global ocean model (v1.1.0)
  - Targeted for implementation - FY15 Q3
  - Increase from 32 to 41 layers
    - Improved atmospheric forcing
    - Finer resolution for mixed layer (9 new near-surface layers)
    - Improved vertical coastal resolution
  - Coupled with Los Alamos Community ICE code (CICE)
    - 1-hour coupling frequency
    - Additional forecasts (ice thickness, concentration, drift and speed)
  
- RTOFS Atlantic (v 3.0.0)
  - Targeted for implementation - FY15 Q3
  - Update codes to unify with RTOFS Global
  - Improved basin geometry
  - Updates to data assimilation algorithm with new surface data sets
  
- Sea-ice modeling - changes coming for FY15
  - Ice concentration analysis
    - Adding AMSR2 and SSMI/S
    - Update weather filter
  - Ice drift model - Updating for new GEFS
  
- Real-Time Global SST - changes coming for FY15
  - Adding GOES, VIIRS, METOP-B, and AMSR2 data sources
  - Updated land treatment and climatology reference
  
- Global Wave model grids
  - Upgrades planned for FY15 Q3
  - Upgraded physics package: More wave energy in previous regions of negative bias
  - Extend grid domain to North Pole

**3. NATIONAL OCEAN SERVICE** *(From December 2014 NCEP Production Suite Review presentation):*

## NOS Operational Forecast System transitioning to NCEP

- Lake Erie upgrade FY15 Q4 - Resolution will be increased to 2.5km and forecasts will be available out to 120 hours.
- Future planned upgrades
  - FY 16 - Cook Inlet (AK), Lake Michigan
  - FY17 - Gulf of Maine OFS, Huron-Erie Corridor
  - FY18 - West Coast OFS, Lake Superior OFS
  - FY19 - Lake Ontario OFS

## 4. FEEDBACK FROM MDL/OPERATIONAL CENTERS/REGIONS

### 4a. MDL (*Phil Shaffer*)

- Q2 FY15
  - Probabilistic Storm Surge (PSURGE) upgrade.
    - Increase temporal resolution from 6-hourly to 1-hourly time steps for “incremental exceedance above datum” products.
    - Output will be on 2.5km grid
    - Expected implementation in early March
  - Extratropical Storm Surge (ETSS) upgrade. (March 2015)
    - Nest coarse extratropical basins with fine-scale tropical basins for East Coast and Gulf of Mexico
    - Implement inundation code for storm surge
    - Operationalize post processing methods for computing total water level at stations
  - Refresh of GFS MOS for warm season equations delivered around mid-March
  - Extend GFS-based gridded MOS for CONUS and Alaska to Day 10
- Q3 FY15
  - Gridded LAMP upgrade v1.1.0 - improves temperature/dew point/ceiling height and visibility. Add winds and sky cover
  - ECMWF-based MOS implementation for 00Z and 12Z - May
  - NAM MOS upgrade expected in June

### 4b. NCEP Centers and NWS Regions

- Weather Prediction Center (WPC) (*Kathy Gilbert, Tony Fracasso*): Nothing to report.
- Storm Prediction Center (SPC) (*Israel Jirak*): Nothing to report.
- National Hurricane Center (NHC) (*Dave Zelinsky*): Nothing to report.
- Space Weather Prediction Center (SWPC) (No representative)
- Ocean Prediction Center (OPC) (*Joe Sienkiewicz*): Nothing to report.
- Aviation Weather Center: (No representative)
- Pacific Region (PR): (No representative)
- Alaska Region (AR): (No representative)

- Western Region (WR) (*Mike Staudenmaier*): Nothing to report.
- Southern Region (SR): (No representative)
- Eastern Region (ER) (*Jeff Waldstreicher*):
  - Noted to MDL a low wind bias with the NAM MOS in the mid-Atlantic, specifically mentioning Blacksburg, VA. Phil mentioned that the latest NAM upgrade did NOT include an upgrade to the NAM MOS
- Central Region (CR) (*Jeff Craven*): Nothing to report.
- OHD (*Mark Fresch, Ernie Wells*): Nothing to report.

#### **5. NESDIS (no representative)**

**The next Synergy Meeting is scheduled for February 23, 2015 at 2:30 pm EST in NCWCP conference room 2890, with remote teleconferencing capability.**

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