NCEP Synergy Meeting Highlights: July 31, 2017

This meeting was led by Mark Klein (WPC) and attended by Carissa Klemmer (NCO), Glenn White (EMC); Jeff Waldstreicher (ER); Jack Settelmaier (SR); Bill Ward (PR); Curtis Alexander (ESRL), Jason Taylor (NESDIS), and Brian Cosgrove (OWP).

1. NOTES FROM NCO (*Carissa Klemmer*)

HWRF - Implementation delayed - rescheduled for August 2
> http://www.nws.noaa.gov/os/notification/scn17-80hwrf.htm

HMON - Implementation planned for August 15
> http://www.nws.noaa.gov/os/notification/scn17-83hmon.htm

ETSS/PETSS - Issues continue… may need to restart again. Implementation is TBD at this point
> http://www.nws.noaa.gov/os/notification/scn17-63etss_petss.htm

NCO has begun work on HIRESW/HREF, LMP/GLMP, SWMF, RTMA/URMA. All of which are expected to be implemented in October.

2. NOTES FROM EMC

2a. Global Modeling (*Glenn White*):

<u>FV3:</u>

EMC is running a full resolution test of data assimilation with a static background error covariance but without stochastic physics or NSST. The non-hydrostatic FV3 model has stability issues when the stochastic physics is activated. Verification is transitioning to MET and METViewer. There are still many diagnostic variables missing in FV3GFS that are in the operational GFS. Tests of advanced physics schemes in FV3GFS are underway as is the tuning of stochastic physics parameters. Work on incremental analysis update has started.

<u>Problems in hurricane relocation in GFS16 and 17:</u>

There were problems in the hurricane relocation code in both GFS16 and 17 related to interpolations and conversions between hybrid and constant pressure vertical coordinates, especially near mountains and in the hurricane inner core area, particularly

for strong storms. A new, much more accurate calculation has been tested and improves hurricane track and intensity forecasts in all basins in the 2017 NEMS GFS/GDAS, negating the short-term loss of skill in the Atlantic compared to the GFS 2016 found in the scientific evaluation of GFS17. The changes in the relocation code were implemented when the GFS17 went into operations. A new version of the relocation code with further upgrades is being tested.

The operational GFS17 also assimilates Global Hawk dropsonde observations, which improve GFS forecasts of hurricane tracks and intensity.

GEFS diurnal oscillation in divergent circulation, tropical cyclones:

A diurnal fluctuation in the divergent circulation has been noted in the GEFS since the GFS2017 was implemented as well as a tendency for more tropical cyclones to form in the Atlantic in runs initialized at 1800 GMT. This may reflect initializing the GEFS with NSST which is warmer at 1800 GMT than for other cycles in the Atlantic; since the GEFS does not include NSST , it does not have the cooling part of the diurnal cycle in SST. The problem is being investigated and an emergency implementation may be considered.

GFS17 warm bias:

Some forecasters have reported too high forecast 2 m temperatures this summer. The land surface changes in the GFS17 introduced an urban classification into the land surface fields; too high 2 m temperatures are associated with urban areas in the GFS17. MOS for the new GFS does not show the same problem. Too high 2m temperatures are also seen in other areas; the GFS17 did in general raise 2m temperatures, more so at 1200 GMT and not so much at the diurnal maximum. The problem is thought to have existed before the GFS17; it is being investigated.

2b. Mesoscale Modeling

RTMA/URMA v2.6 Upgrade : Implementation approved by NCEP Director at June 26th briefing. Implementation scheduled for early fall 2017 (probably October)

Highlights include min/max RH analysis, analysis of significant wave height, ceiling height improvements over Alaska, new WFO-adjusted terrain, GLERL adjusted obs over the Great Lakes, and relaxed QC criteria for temperature and moisture observations. We are also introducing RU-RTMA which updates every 15 minutes.

For details, go to http://www.emc.ncep.noaa.gov/mmb/mmbpll/misc/upcoming.html (RTMA/URMA v2.6/PCPANL v3.0 entry) and RTMA/URMA/RURTMA v2.6 Overview

RAPv4/HRRRv3: Code delivered to EMC in late June. Parallel files from EMC will become available by later in August or September. Changes include extending

the 00/06/12/18z cycles to 36 hours and add in a HRRR-Alaska.   The HRRR-AK will be run every 3 hours. Further details are presumably listed in the ESRL section below.

HiResW/HREFv2 : Science Briefing to NCEP Director was on June 15th, code has been handed off to NCO and implementation is scheduled for October 2017

Changes : Increase horizontal resolution of existing members from 4.2 km to 3.2 km; add "NSSL" WRF-ARW member (to operationalize Storm-scale Ensemble of Opportunity (SSEO); enhance HREF ensemble products, add OCONUS product generation.

2c. Marine Modeling

Ocean: HWRF 2017 upgrade and HMON operational implementation planned in August 2017.
Waves:
Great Lakes:
- NCEP/NOAA has implemented on July 25th 2017 NWS's first operational wave model using the unstructured grid technology.
- The new Great Lakes Wave Unstructured (GLWU) system, with 250m resolution near the coast, extends operational wave guidance in the region to nearshore areas.
- The upgrade adds 20 short-range hourly forecast cycles (forecasts out to 48h) to the existing 4-times daily long-range cycles (forecasts out to 149h), providing better availability of wave guidance for small craft advisories in the Great Lakes.
- The new system provides a more adequate framework for development of nearshore and beach hazard products.

Upcoming upgrades: RTOFS and wave multi_1

3. EARTH SYSTEM RESEARCH LAB *(Curtis Alexander)*

Experimental real-time RAPv4/HRRRv3 development
- Currently producing experimental extended-length RAPv4/HRRRv3 forecasts
  - RAPv4/HRRRv3 operational plan:
    - RAP 39hr fcsts at 03z, 09z, 15z, 21z
    - HRRR 36hr fcsts at 00z, 06z, 12z, 18z
    - 21/18 hrs otherwise
- FFaIR special experimental runs: RAP 09/21z 51hr, HRRR 00/12z 48hr
  - https://rapidrefresh.noaa.gov/RAP
  - https://rapidrefresh.noaa.gov/hrrr/HRRR

Future status of these 48 hr extended runs TBD

- Currently producing experimental OCONUS HRRRv3 runs
  - HRRR-Alaska, 36 hr forecasts, every 3 hrs (operational plan TBD)
  - HRRR-Hawaii, 24 hr forecasts, every 3 hrs (operational plan TBD)
- June 2017 code delivery to EMC, Feb 2018 implementation

Experimental real-time HRRR-TLE

- Uses multiple consecutive runs of experimental HRRRv3 with time/space filters
  - Currently producing 24 hr forecasts, updated hourly
  - Probabilistic products for QPF, winter weather, severe weather, aviation
  - Added probability of significant hail, wind and critical fire weather
  - https://rapidrefresh.noaa.gov/hrrr/hrrrtle
- NCO implementation as ensemble post-processor possible sometime 2018-19

Experimental real-time HRRRE

- Real-time runs resumed 01 March 2017 for VORTEX-SE and HWT
  - Nine forecast members produce 18 hr fcsts every three hours from 12-18z each day
  - 55% CONUS HRRR domain (central and eastern US)
- FFaIR special 00z CONUS HRRRE domain runs now ended
- AWC testbed 09z/21z nine-member ensemble 55% CONUS HRRR 36 hr fcsts
  - Added HRRR-TLE ensemble post-processing capability including aviation products
  - https://rapidrefresh.noaa.gov/hrrr/HRRRE

Experimental real-time HRRR-Smoke

- Development continues for CONUS and Alaska smoke forecasts
  - Run every six hours out to 36 hrs over CONUS and Alaska ○ Produces smoke plume estimates from VIIRS fire data
  - Plan to merge with experimental HRRR later this year
  - https://rapidrefresh.noaa.gov/hrrr/HRRRsmoke/

4. NATIONAL OCEAN SERVICE:

No report

5. FEEDBACK FROM MDL/OPERATIONAL CENTERS/REGIONS

5a. MDL (*Scott Scallion*)

- NBM V3.0 was implemented Thursday, July 27, 2017. There are a few

lingering issues with ingesting and displaying all NBM cycles in AWIPS (D2D and GFE). There will be ongoing coordinated efforts between MDL, NCO, AWIPS program, and WFO ITOs in the coming weeks/months to ensure that this product can be utilized at all WFOs and National Centers.
   This major update includes:
- Hourly updates based on any new model inputs
- Blend short-term models (HRRR, LAMP, SREF, etc.) over the CONUS
- Expand CONUS and Alaska domains to support marine/NWPS
- Ceiling, lowest cloud base, and visibility over the CONUS
- Add PoP12 and QPF over Alaska, Hawaii and Puerto Rico
  - Also includes CONUS PoP/QPF improvements that were previously part of Blend V2.1 update which not implemented, due to NCO resources and MDL's reprioritization.
- Create blended inputs to support production of Weather, Snow Amount and Ice Accumulation grids

- NBM V3.1 is scheduled to become operational in July of 2018. We are continually filling in NWS Service Program gaps. The primary development period is August through October 2017. Here is a listing of weather elements being addressed in NBM V3.1.
  - **Hydrology:** Leverage OAR Stochastic Quantile Mapping technique. Add QPF01 to OCONUS sectors. Add QPF01 to OCONUS sectors. Add 1 and 6 hour snow, sleet, and ice accumulations to weather grid inputs.
  - **Marine:** Add NAVGEME to Oceanic Winds. Add significant wave heights to all 5 sectors. Add 30-m and 80-m winds, 10-m gusts, and PMSL.
  - **Aviation Weather:** Add Echo Tops (18 dBZ) (1-36h)) and Low Level Wind Shear (LLWS). Add ceiling, visibility, lowest cloud base to OCONUS sectors.
  - **Fire Weather:** Add Mixing layer, Transport Wind (i.e., average wind speed in the mixing layer), and Haines Index.
  - **Tropical:** Add HWRF and HMON to improve background field for Tropical TCM forecasts.
  - **Thunderstorms:** Increase ProbThunder temporal resolution to 1 hour through 36 hours.
  - **Additional Models**: Add REPS, RDPS, ACCESS-G, NAVGEMD

- GMOS 5km dissemination has been terminated (7/17/17) and 2.5 km GMOS is now in operational NDGD

- GFS-MOS and EKD-MOS - handed off to NCO, but on hold
  - Science briefing 5/30 - Approved for handoff.
  - To include expanded CONUS domain for NBM input (EKD-MOS

only)
- ○ Includes updated Ceiling/Sky Cover Equations

- New GFS/NAM visibility/obstruction to vision equations are nearing completion by developers.
  - ○ Neither development contains data from absolute latest versions of the models (i.e. no NAM v4 or GFS v14). Nonetheless, tests suggest significant improvement over existing systems.
  - ○ Expected handoff to NCO at approximately the end of September.
  - ○ Scheduled implementation on WCOSS January 2018
  - ○ Implementation likely to be "bundled" with other lingering NAM items (PoP/QPF, cig/sky) that were completed some time ago.

- EKDMOS V2.2
  - ○ Add other MOS forecasts to EKDMOS (GFSMOS, NAMMOS, ECMMOS, EMCEMOS, LAMP)
  - ○ Expand the Alaska domain to match the NDFD domain
    - ■ Continue to disseminate clipped grids
  - ○ Add forecasts for apparent temperature, PQPF, and wind speed
  - ○ Operationalize text products
  - ○ Update CONUS unified terrain and land/water mask
  - ○ Code freeze is set for January 30, 2018
  - ○ Code handoff to NCO is set for March 14, 2018
- GMOS
  - ○ Add new stations to CONUS analysis
  - ○ Expand CONUS and Alaska domains to match the NBM domains
    - ■ Continue to disseminate clipped grids
  - ○ Update CONUS unified terrain and land/water mask
  - ○ GMOS update code freeze is set for January 30, 2018
  - ○ GMOS update code handoff to NCO is set for March 14, 2018
  - ○ 5km GMOS was removed from the operational jobstream on July 18; 2.5km GMOS replaces that product in all applications going forward.

- P-ETSS 1.0 / ETSS 2.2 30-day evaluation possibly to restarted as MDL works through some recent issues that have been encountered (brought up by ER 7/26).

- P-Surge 2.6 patch due to a compiler version issue was implemented on 7/24/2017. NHC is happy with the result.

- LAMP/Gridded LAMP (updates in blue)
  - ○ Implementations:
    - ■ The next LAMP/GLMP implementation (v2.1.0) will include the following changes:

- new LAMP 1-hr convection and lightning guidance,
- modifying LAMP to use the most recent METAR observation including SPECIal observations,
- adding stations to the LAMP forecasts to match the stations available in GFS MOS,
- running LAMP/GLMP every 15 minutes for ceiling and visibility guidance out to 3 hours in time for AWC
    - The codes for the above changes were handed off in June and will be implemented in September or October 2017.

- Experimental Data:
    - MDL continues to produce hourly experimental updated LAMP convection and lightning guidance which uses HRRR, MRMS, and Total Lightning inputs and which covers 1-hr valid periods instead of the current operational 2-hr valid periods. Images of this guidance are available at: http://www.weather.gov/mdl/lamp_experimental
    - MDL is producing updated LAMP/GLMP ceiling and visibility guidance every 15 minutes out to 3 hours using the most recent hourly observations, including "Special" observations. The experimental 15-minute LAMP and GLMP data and images are also available at the LAMP experimental website: http://www.weather.gov/mdl/lamp_experimental

5b. NCEP Centers
- Weather Prediction Center (WPC):

- Storm Prediction Center (SPC):

- National Hurricane Center (NHC):

- Ocean Prediction Center (OPC):

- Aviation Weather Center (AWC):

- Climate Prediction Center (CPC):

- Space Weather Prediction Center (SWPC):

5c. NWS Regions

- Pacific Region (PR):

- Alaska Region (AR):

- Western Region (WR):

- Southern Region (SR):

- Central Region (CR):

- Eastern Region (ER): Regarding HREF output for SBN - from what I understand the plan is hourly for the 00/12z runs and 3-hourly for the 06/18z runs. Any reason why all cycles could not be hourly?

    - Answer: Primary issue is volume of data on the SBN. Would need to get approval to include hourly output for the 06Z/18Z runs.

6. Office of Water Prediction

- NWM V1.2 science evaluation ended on 7/13. Based on concerns which emerged from assessment, DA will be rolled back to the approach used in V1.1 and 30-day V1.2 science evaluation will be performed again in 1-2 months.

7. NESDIS

Resumption of Operational Jason-2 Products:
Operational Jason-2 product processing resumed on Monday July 24, first at EUMETSAT and then NOAA through near real-time operational production and distribution (via DDS and PDA). Jason-2 was moved in early July to a new LRO (Long Repeat Orbit) orbit 27 kilometers below its previous altitude. The new orbit was reached on July 8 and the onboard instruments resumed nominal operations on July 11. The ground processing resumed and the analysis of the instrument calibrations and Operational and Interim Geophysical Data Record (OGDR and IGDR) products demonstrate that everything is nominal on the spacecraft. The Jason-2 Sea Surface Height Anomalies are important inputs for the generation of Satellite Derived Ocean Heat Content used to predict tropical cyclone intensity. (Contact: David Donahue, 301-683- 3236)

Global Hydro-Estimator (GHE) Updated to Include Meteosat-8 IODC Data:
In response to a request from the NWS International Affairs Office to maintain continued support of its critical international mission under a multi-agency signed Memorandum of Understanding, on July 11, 2017, GHE products were updated by NESDIS/OSPO to include the rainfall estimate derived from Meteosat-8 IODC (Indian Ocean Data Coverage) data. Inclusion of Meteosat-8 IODC data fills the GHE product coverage gap over the Indian Ocean and surrounding land areas prompted by the decommissioning of Meteosat-7. (Limin Zhao, 301-683-3240)

The next Synergy Meeting is scheduled for Monday, September 25 at 2:30 pm EDT in NCWCP conference room 2890, with remote teleconferencing capability.

Telecon**: 1-866-763-1213**
Passcode**: 524234#**