

# NCEP Synergy Meeting Highlights: October 31, 2016

*This meeting was led by Mark Klein (WPC) and attended by Eric Rogers (MMB); Glenn White (GCWMB); Israel Jirak and Andy Dean (SPC); Scott Scallion (MDL); Mike Staudenmaier (WR); Jeff Craven (CR); Jeff Waldstreicher and Brian Miretsky (ER); Jack Settelmaier (SR); Curtis Alexander (ESRL); ; Bill Bua (COMET); and Mark Fresch, Ernie Wells, and Brian Cosgrove (OWP).*

## 1. NOTES FROM NCO (Steven Earle)

National Blend of Models (NBM), GFS-MOS and EKD-MOS... Science signed off on last week. IT stability test needed be restarted again. Target implementation is Nov 15.

<http://www.nws.noaa.gov/os/notification/tin16-33nbmv2aaa.htm>

<http://www.nws.noaa.gov/os/notification/tin16-31mosupgradeaab.htm>

<http://www.nws.noaa.gov/os/notification/tin16-32kdmosaaa.htm>

Near-Shore Wave Prediction (NWPS): Technical stability test needed to be restarted. Target implementation is Nov 17.

<http://www.nws.noaa.gov/os/notification/tin16-32kdmosaaa.htm>

North American Mesoscale Forecast System (NAM): NCO received code and we're expecting to start the evaluation in mid-late November with an implementation in early January

ECMWF-MOS: NCO received the code last week and are planning to start the evaluation in December.

## 2. NOTES FROM EMC

### ***2a. Global Climate and Weather Modeling Branch (GCWMB) (Glenn White):***

The global branch has started real time and retrospective testing of the GFS 2017.

The experimental GFS implements:

- a) the NEMS software superstructure and infrastructure,
- b) upgraded land parameterizations and fields that should improve near-surface fields and reduce patchiness seen in some cases,
- c) a fix to excessive cooling of 2m temperature during sunset,
- d) changes to cumulus convection parameterization that is expected to improve summertime precipitation forecasts,
- e) Near-Sea Surface Temperature that describes oceanic vertical temperature

structure near surface due to diurnal warming and sub-layer cooling physics processes and that will improve SST, data assimilation and tropical weather forecasts, and

f) Assimilation of additional data.

Current retrospectives will cover 5/20/2015-10/30/2016. The real time began 10/1/2016.

If necessary, the summer of 2014 will be done as well. Current plans are to complete the tests and the evaluation by the end of January and brief the NCEP Director on February 1. If approved, there would be a separate 30 day evaluation for IT purposes only in April 2017 and the GFS2017 would be implemented May 10, 2017.

The global branch would like to produce 1/8th degree files for the first 36 hours and make them available via ftp and to stop distributing 2.5 degree files.

The global branch plans to involve the field as in the last GFS2016 implementation. Real time maps will be made available via Fanglin Yang's VSDB web site and the parallel MAG and hopefully via Western Region. 1 degree fields will be available on WCOSS for the realtime and retrospective tests and the global branch will work with others to ensure they get the data they wish for their evaluations. EMC will again run case studies requested by NCEP centers and NWS regional headquarters and field offices. Please notify [Glenn.White@noaa.gov](mailto:Glenn.White@noaa.gov) on what cases you would like to see. The global branch will again do statistical verification of forecast fields against analyses and observations, precipitation, 2m temperatures and dewpoints, and 10 m winds over CONUS and Alaska, and hurricane tracks.

The global branch requests the active involvement of the rest of the national Weather Service in evaluating the GFS2017. The global branch plans to establish a web page and a VLAB forum for the GFS 2017 evaluation. The parallel GFS is plotted as the PRX on the main verification page: [http://www.emc.ncep.noaa.gov/gmb/STATS\\_vsdb/](http://www.emc.ncep.noaa.gov/gmb/STATS_vsdb/). Daily precipitation verification maps for CONUS and other regions can be found by clicking PRECIP QPF on the upper left of the main page; Synoptic maps for different regions can be found on the lower left under 2-D Maps. An archive of such maps can be found by clicking Archive or at [http://www.emc.ncep.noaa.gov/gmb/STATS\\_vsdb/allmodel/daily/2Dgfsfcst/arch/](http://www.emc.ncep.noaa.gov/gmb/STATS_vsdb/allmodel/daily/2Dgfsfcst/arch/). The current parallel is available from Oct. 25, 2016 on. The verification page of the real time parallel is available at <http://www.emc.ncep.noaa.gov/gmb/emc.glopara/vsdb/prnemsrn/> The verification of the 2015 summer parallel is available at [http://www.emc.ncep.noaa.gov/gmb/emc.glopara/vsdb/pr4rn\\_1505/](http://www.emc.ncep.noaa.gov/gmb/emc.glopara/vsdb/pr4rn_1505/)

## **2b. Mesoscale Modeling Branch (MMB) (Eric Rogers)**

NAM V4 October update : Delivered to NCO on 9 September; tentative implementation is in early January 2017

- Increase resolution of CONUS nest from 4 km to 3 km; CONUS nest output grid will be the same as that from the HRRR. 3 km nest has improved QPF bias over 4 km CONUS nest at higher thresholds.
- Increase resolution of Alaska nest from 6 km to 3 km
- Increase frequency in calls to model physics for all domains; for the 12 km parent, call the radiation scheme every 20 min instead of once an hour
- Physics changes
  - Convection changes → higher (i.e., closer to one) 12 km NAM QPF bias, improved 12 km NAM equitable threat score during cool season .
  - Land surface model changed to increase canopy resistance, reduce plant transpiration, and reduce direct evaporation from frozen soil, targeting low 2m Td bias during cool season.
  - PBL changes to address maritime shallow cloudiness.
  - Radiation/microphysics changes to address 2m T warm bias during warm season.
  - Use of radar-derived temperature tendencies in model's diabatic digital filter initialization; call digital filter at start of NAM forecast (now only done at start of 3h NDAS forecasts).
  - Replace 12-h NDAS with 3-h analysis/forecast updates for the 12 km domain with 6-h hourly assimilation "catch-up" cycle with hourly analysis updates for 12km parent/3 km CONUS and 3 km Alaska nest
  - Parallel NAM graphics for parent 12 km and 3 km CONUS/Alaska nests are at [www.emc.ncep.noaa.gov/mmb/mmbpll/namtest/nam/NAMX](http://www.emc.ncep.noaa.gov/mmb/mmbpll/namtest/nam/NAMX)
  - New observations assimilated :
    - i. New satellite winds:
      1. MTSAT2 IMAGER WVct AMVs (JMA)
      2. 254 54 M7 IMAGER WVct AMVs
      3. M10 IMAGER WVct AMVs
      4. NOAA 15 AVHRR IR AMVs
      5. NOAA 18 AVHRR IR AMVs
      6. NOAA 19 AVHRR IR AMVs
      7. METOPA AVHRR IR AMVs
      8. METOPB AVHRR IR AMVs
    - ii. New GPS Radio Occultation Data
      1. METOPB 3 (subtype)

- iii. New Satellite radiance data
  1. M10 Seviri
  2. metopb hirs4, amsua, mhs, iasi
  3. npp atms, cris
  4. f17 ssmis
- iv. Resume use of AFWA snow depth product using envelope adjustment
- v. For CONUS/Alaska/Fire Weather nest: Land-sea mask changed to add all lakes resolved by the new fresh water lake (FLAKE) climatology. Water temperatures at "FLAKE" lake points are a blend using a Cressman analysis of the FLAKE climatology and temperatures at nearby water points resolved by the RTG\_SST\_HR analysis.
- vi. Use NESDIS burned area data in the NAM fire weather nest. Two "accumulation" burned area files are used: 2-day and 30-day. The greenness fraction and albedo is adjusted according to the 30 day data and the top layer soil moisture according to the 2-day data

Also presented by Eric Rogers during the meeting was the following presentation on possible next steps over the next couple of years regarding mesoscale modeling.

#### [A potential way forward for Mesoscale modeling](#)

#### ***2c. Marine Modeling and Analysis Branch (MMAB)***

Wave Modelling: The NWPS is scheduled to be fully operational by mid-November, 2016

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

- **RAPv4/HRRRv3 -- Development underway with data assimilation, model physics and numerics enhancements anticipated**
  - Scheduled implementation in February 2018
- **Installed in real-time experimental RAPX/HRRRX**
  - Assimilation of TAMDAR (aircraft) data
  - Improved cloud analysis with consistent treatment of METAR and satellite

- More accurate terrain specification in the RAP with improved upper-level □wind forecasts
- More effective assimilation of surface observations
- Satcast (cloud-top cooling) and lightning assimilation in HRRR
- **Pending install in real-time experimental RAPX/HRRRX**
  - Assimilation of cloud-drift winds over land
  - Improved sub-grid scale cloud representation and eddy diffusivity mass □flux (PBL) for more accurate 2-m temperature, dewpoint and 10-m wind □
  - Higher resolution land use data and variable greenness fraction (LSM)
  - Improved upper-level cloud forecasts with refined Thompson microphysics □
  - New hybrid vertical coordinate system (sigma-pressure) for improved □upper-level forecasts, especially near model terrain
  - Cycled HRRR forecasts using previous cycle forecast as first-guess in □next cycle with improved retention and evolution of convection, especially □in the first few forecast hours
- **Other implementation candidates pending science and/or resource evaluations**
  - Larger CONUS HRRR domain to cover NDFD grid
  - Forecast extension to 39 (RAP)/36 hrs (HRRR) every three to six hours?
  - Storm-scale ensemble data assimilation in the HRRR for improved PBL and related convective forecasts
  - Storm-scale ensemble forecast (HRRRE)?
  - OCONUS HRRR domains including Alaska and Hawaii
  - Real-time experimental grids and graphics available at <http://rapidrefresh.noaa.gov/RAP/>  
<http://rapidrefresh.noaa.gov/HRRR/>
- **HRRR Time-Lagged Ensemble (HRRR-TLE) -- Development continues with post-processing of HRRR forecasts into a time-lagged ensemble**
  - Scheduled IDP onboarding in 2018
- **Installed in real-time experimental HRRR-TLE**
  - Hourly-updating 0-24 hr probabilistic forecasts for heavy precipitation, winter weather, severe weather and aviation hazards using experimental HRRR as input
  - Bias corrected PQPF products for statistically reliable probabilities
- **Additional product development underway**
  - Feature-based identification (snow bands etc...)
  - Calibrated total-severe probability
  - Real-time experimental grids and graphics available at <http://rapidrefresh.noaa.gov/hrrrtle/>
- **HRRR Ensemble (HRRRE) -- Development continues with restart of sub-CONUS real-time experimental runs this fall 2016**
  - Upgrade to 70% CONUS HRRR domain (eastern 2/3 US)

- Use 36-member hourly-cycling 3-km data assimilation HRRR ensemble
- Produce 12-member 18 hr forecast every three hours
- Produce 1-member 36 hr forecast every three hours
- Plan to install radar reflectivity and cloud analysis data assimilation
- Plan to install stochastic physics (parameter estimation, tendencies) for increased spread/skill
- Plan to install HRRR-TLE post-processing products
- Real-time experimental grids and graphics available at <http://rapidrefresh.noaa.gov/HRRRE/>
- **HRRR-Alaska (HRRR-AK) -- Development continues**
  - Run once every three hours to 36 hrs over Alaska
  - Installed finer 15" MODIS land use dataset
- **Additional development underway**
  - Plan to assimilate radar reflectivity and lightning data with new MRMS feed for Alaska
  - Developing plan to assimilate cloud information from all-sky cameras for cloud analysis
  - Real-time experimental grids and graphics available at <http://rapidrefresh.noaa.gov/alaska/>
- **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
- **Additional development underway**
  - Plan to couple physics (radiation etc...) with prognostic smoke variables
  - Real-time experimental grids and graphics available at <http://rapidrefresh.noaa.gov/HRRRsmoke/>  
<http://rapidrefresh.noaa.gov/HRRR-AKsmoke/>

#### 4. NATIONAL OCEAN SERVICE:

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

##### 5a. MDL (*Scott Scallion*)

- GFS-MOS, EKD-MOS, and National Blend of Models are progressing through 30-day stability test after a 10/14/16 restart. If all continues to go well, the implementation should occur 11/15/16.
- ECMWF-MOS handoff to NCO on 10/7/16 for updated temperature

equations and new snowfall forecasts

- We are in process of assessing the impact of the upcoming model changes on the current and new versions of ECMWF-MOS.
- [http://www.mdl.nws.noaa.gov/~ecmwf/moscomp\\_eval.php](http://www.mdl.nws.noaa.gov/~ecmwf/moscomp_eval.php)  
(experimental site, NOAA internal only)
- MDL is working with Tom Hamill (OAR) on an update (v2.1) to the NBM PoP12/QPF guidance (code delivery = mid Nov, target for implementation = late winter/spring 2017).
  - Tom briefed the NBM PoP12/QPF guidance during the WCOSS Science Quarterly July 29th.
- LAMP/Gridded LAMP
  - MDL is now producing 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. The guidance covers a 25-hour period and indicates the probability and potential of the occurrence of the event. For convection, the event is defined to be at least one total lightning strike and/or radar reflectivity of at least 40 dBZ in a 20-km gridbox over a 1 hour period. For lightning, the event is defined to be at least one total lightning strike in a 20-km gridbox over a 1-hr period.  
(<http://www.nws.noaa.gov/mdl/lamp/cnv1h.php>)
  - In addition, we continue to produce experimental LAMP/HRRR "Meld" gridded forecasts of ceiling and visibility.  
([http://www.mdl.nws.noaa.gov/~rlamp/gimp\\_expr\\_viewer\\_meld.php](http://www.mdl.nws.noaa.gov/~rlamp/gimp_expr_viewer_meld.php)) - Requires LDAP credentials  
Soon to be available to public at:  
[http://www.weather.gov/mdl/lamp\\_experimental](http://www.weather.gov/mdl/lamp_experimental)
  - These products are planned to be implemented into NWS operations in late March of 2017.

## 5b. NCEP Centers

- Weather Prediction Center (WPC):
  - 2017 Winter Weather Experiment
    - Jan 17-20 (remote)
    - Jan 30 - Feb 3
    - Feb 6-10
    - Feb 13-17
  - Due to the travel cap, WPC can support paying for only one participant per Region.

- 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)
  - We can set up the parallel GFS comparison page as soon as WR can access the appropriate files. Mark Loeffelbein is the POC.
- Southern Region (SR):

- Central Region (CR): Jeff Craven: Helping out with planning in V3.0 of NBM, with frozen code by end of January 2017. As I spin up, I was surprised to learn that many of the model components are not available on WCOSS at native resolution. Examples are GFS at 0.25 degree, CMCE at 1.0 degree, CMC deterministic at 1.0 degree, FNMOC at 1.0 degree, and SREF at 40km. To emulate the process of regional blends in CR, it will be difficult to achieve the level of detail we need with NBM V3.0 with such coarse grids. In CR, we use DMO in our blends, but will be tough to do this with NBM until we have native model resolution on WCOSS.
- Eastern Region (ER):

## 6. Office of Water Prediction (*Brian Cosgrove*)

-Development activities on track for Version 1.1 of the NWM. The expected implementation date is April 2017. Real-time science evaluation will begin November 15th.

- Refinements to hydrologic parameters to reduce streamflow biases
- Refinements to forcing pre-processing parameters to improve analysis precip blending
- Minor science upgrades (snowpack evolution, soil water infiltration)
- Corrections to stream network connectivity, inclusion of border oCONUS regions
- Improvements to restart file format
- An increase in medium range cycling frequency from 1/day to 4/day
- An increase in short range forecast length from 15 to 18 hrs to match HRRR
- Changes to address NCO bugzilla tickets
- Switch to scaled NetCDF4 format files....large reduction in file size

## 7. NESDIS

### **Operational Implementation of the Redesigned Hazard Mapping System (HMS)**

On October 20th, the redesigned HMS was put into operations. The redesign eliminates inefficiencies and increases the accuracy of the fire/smoke analysis detection for NESDIS' Satellite Analysis Branch (SAB) in support of the NWS Fire Weather Operations. The new system has the capability to display higher resolution data available from VIIRS while maintaining individual pixel integrity, which improves the representation of fire size. The redesigned HMS also provides greater analysis control

of layers and display properties, which will allow for the display of all GOES images, even when in Rapid Scan Operations (RSO) mode. In order to enhance the efficiency and accuracy of the fire and smoke product, the display of the new HMS eliminates the sector boundaries to depict the full analysis domain (North and Central America, Caribbean and Hawaii). Additionally, functionality has been added within HMS to edit plumes on a finer scale. HMS products can be accessed through the following link: (<http://satepsanone.nesdis.noaa.gov/FIRE/fire.html>).

**The Impact of Metop-B AMSU-A channel-15 anomaly to MIRS:**

Metop-B AMSU-A channel 15 became unusable starting with sensing time at 00:53:00 UTC, October 17, 2016. The anomaly causes degradation to the MIRS (Microwave Integrated Retrieval System) Metop-B products. Users were notified about the degradation while OSPO was working with STAR to develop a possible mitigation for the anomaly. On October 21, a solution was tested and implemented to mitigate the impact of the AMSU-A channel-15 anomaly. The MHS (Microwave Humidity Sounder) channel-1, which has the same frequency (89GHz) as AMSU-A channel-15, is now used to replace AMSU-A channel-15 in the MIRS Metop-B retrievals. The impact assessment indicates that the mitigation solution has restored the MIRS retrieval quality. The first orbit with the fix starts at 1612UTC, October 21, 2016. (Limin Zhao, 301-683-3240)

**Temporary Exclusion of Jason-2 Sea Surface Height Anomalies as input to the Satellite Ocean Heat Content Suite:**

The Jason-2 Satellite left its repetitive exact repeat orbit October 2 and completed its transfer to the interleaved orbit on October 13. Since October 2 there have been no new Jason-2 Sea Surface Height Anomalies (SSHAs) available over the Data Acquisition Processing and Exchange (DAPE) as input in the generation of the operational Satellite Ocean Heat Content (OHC) Suite of products. The Naval Oceanographic Office (NAVO) is successfully generating and delivering Jason-2 wind and wave products and is currently working on the Jason-2 Sea Surface Height Anomaly (SSHa) software changes and updates for the interleaved orbit. NAVO is on schedule for the operational release of the Jason-2 SSHa interleaved products by early November. Input from the SARAL AltiKa and Cryosat-2 SSHa to the OHC product processing continue. (David Donahue, 301-683-3236)

**Impacts of ATMS Data Outage on NUCAPS Data Products Generation:**

On Oct 4, 2016, the NOAA Unique CrIS/ATMS Processing System (NUCAPS) sounding data production including the Crosstrack Infrared Sounder (CrIS) radiances in BUFR format was halted. The CrIS BUFR data are used in the model forecast by the NCEP. The Advanced Technology Microwave Sounder (ATMS) instrument was placed in the safe hold mode without science data generation for more than 15 hours. This outage was due to the ATMS instrument's temperature and scan drive motor current which were flagged out of range. The ATMS outage impacted the CrIS radiances generation

because the current NOAA Data Exploitation (NDE) system depends on the ATMS via production rules. On October 19, 2016, sounding product area lead worked with STAR scientists to modify the current NUCAPS (NOAA Unique Combine Atmospheric Processing System) enterprise algorithm running on NDE configuration that will allow generation of the CrIS BUFR and the CrIS Outgoing Longwave Radiation (OLR) products in the event of an ATMS outage. NDE tested the “no ATMS mode” configuration with new productions rules and is keeping it inactive until needed due to a future ATMS failure. Once the ATMS is placed in safe mode, this configuration will be activated. (Dr. Awdhesh Sharma, 301-683- 3229)

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## **8. Offline Discussions**

**Topic:**

**Lead:**

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**The next Synergy Meeting is scheduled for Monday, November 28, 2016 at 2:30 pm EST in NCWCP conference room 2890, with remote teleconferencing capability.**

Telecon: **1-866-763-1213**

Passcode: **524234#**