Technical Implementation Notice 12-30 Amended
National Weather Service Headquarters Washington DC
1110 AM EDT Tue Jul 31 2012

To:       Subscribers:
          -Family of Services
          -NOAA Weather Wire Service
          -Emergency Managers Weather Information Network
          -NOAAPort
          Other NWS Partners, Users and Employees

From:     Timothy McClung
          Chief, Science Plans Branch
          Office of Science and Technology

Subject: Amended: Upgrade to Short-Range Ensemble Forecast System:
Effective August 21, 2012

Amended to reschedule the implementation to Tuesday, August 21, 2012, to
allow for additional testing.  Corrected erroneous quotation marks in
filename for new NMMB output files.  Also added specifics about addition
of 1-hourly output to the NWS FTP server.

On or about Tuesday, August 21, 2012, beginning with the 1500 Coordinated
Universal Time (UTC) run, the National Centers for Environmental
Prediction (NCEP) will update its Short-Range Ensemble Forecast system
(SREF).

SREF Modeling System Changes:

1.  Remove two of the four models currently used in the SREF: the Eta and
the Regional Spectral Model (RSM).  A new model will be added: the Non-
hydrostatic Multiscale Meteorological Model on the B grid (NMMB).

2.  Upgrade two Weather Research and Forecasting (WRF) model cores in
model version from WRF v2.2 to WRF v3.3: Non-hydrostatic Multiscale
Meteorological Model (NMM) and Advanced Research WRF (ARW).

3. Increase the NMM and ARW horizontal resolution from 32/35km to 16km.
The NMMB will also have a 16km horizontal resolution.

4.  Increase the number of WRF members for NMM and ARW from five to seven.
There will be seven members for the new NMMB model.  The naming convention
of all the files will follow the pattern:
sref_MODEL.tCCz.pgrb???.PERT.fxx, where MODEL is nmm, em, nmb for the NMM,
ARW and NMMB, respectively, CC is the model cycle (03, 09, 15, 21), ??? is
the number of the grid the data are on,PERT is the perturbation,
represented by ctl, n1, p1, n2, p2, n3, p3, and fxx is the forecast hour.

5.  Increase diversity by selecting physics schemes used in existing
models: North American Model (NAM), Global Forecast System (GFS), National

Centers for Atmospheric Research (NCAR), Hurricane Weather Research and Forecast (HWRF) and Rapid Refresh (RAP).

6.  Increase Initial Condition (IC) diversity by:
- Using RAP analysis as a control analysis for the ARW, NAM analysis used for the NMMB, and GFS analysis used for the NMM.
- Mixing IC perturbation schemes by using a mix of the Global Ensemble Transform with Rescaling (ETR), regional Breeding and blending between the two.
- Increasing the Land Surface Initial States (LSIS) diversity by using the LSIS from the NAM, GFS, and RAP.

7. New capabilities will be added in post-processing SREF data:
- Bias correction (by frequency matching) of the precipitation forecasts for both individual members and the ensemble mean.
- Clustering with two methods, NCEP and University of Oklahoma, with output including a text table about each cluster's membership and size, a gridded binary (GRIB) output of probability of each cluster, and a GRIB output of cluster products for the mean and spread of thirty-nine fields, as well as the probabilities for 2-meter temperature and 3-hour-accumulated precipitation.
- Performance ranking of each ensemble member, providing different weights for different members in both text and GRIB format.
- Statistical surface down-scaling from 16km SREF to 5km National Digital Graphical Database (NDGD) grid using the 5km Real-Time Mesoscale Analysis (RTMA) fields.

8.  Modified the snow liquid ratio from being fixed at 10:1 to a surface temperature dependency method.

Change to Current Product Delivery Schedule:

Due to the current high resource usage on the supercomputers run by NCEP, this updated SREF system can be run only in its defined time window.  In the event the NCEP production suite is delayed, the SREF may not be run for a given cycle to preserve the timeliness of other NCEP models.  In this situation, no SREF output products will be disseminated, and that cycle will not be rerun later.  NCEP does not anticipate this situation occurring often, but wanted to alert customers of the slight possibility of missing one cycle of SREF output.  This SREF susceptibility to cancellation will remain until NCEP's upgrade to new supercomputers in late 2013.  We apologize for any inconvenience this causes our users.

Current Product Output Changes:

1.  Change to product generating process ID in the GRIB encoding of individual SREF members output products on the NCEP server.  Currently all SREF members are labeled with process ID 84.  Now, the IDs will be:

- NMB 111
- NMM 112
- ARW 116

The generating process ID of the SREF ensemble products, currently 113,

will stay the same.

2.  Additions to several probability to the ensemble products:

- Probability of Convective Available Potential Energy (CAPE) > 250
- Probability of visibility < 9,654 feet
- Probability of ceiling < 1,830 ft
- Probability of lower-level wind shear > 20kt/2,000 feet
- Probability of light fog
- Probability of moderate fog
- Probability of dense fog

3.  Addition of 600hPa U, V, ABSV, HGT, T and RH to the ensemble mean and
spread.

4.  Addition of bias corrected precipitation fields to individual members
and the ensemble mean.

New Product Outputs:

1. The temporal resolution for the contiguous U.S. (CONUS) (grid 212)
domain will increase from 3-hourly to hourly for forecast hours 0-39.  Due
to the new 1-hourly temporal resolution files, all ensemble output
products will be renamed to reflect that they are 3-hourly.

- NCEP server:
ensprod/sref.tCCz.pgrb212.(spread|mean|prob)_1hrly.grib2
ensprod/sref.tCCz.pgrb???.(spread|mean|prob)_3hrly.grib2
ensprod_biasc/sref.tCCz.pgrb212.(spread|mean|prob)_3hrly.grib2

- NWS server:
Current filenames in -
SL.us008001/ST.opnl/MT.sref_CY.YY/RD.YYYYMMDD/PT.grid_DF.gr2/fh.x
xxx_pt.*_gr.212 contain 3-hourly forecast hours.

With this implementation:
fh.3hrly_pt.*_gr.212 -- new name for 3-hourly forecast hours
fh.1hrly_pt.*_gr.212 -- new 1-hourly forecast hours

2.  Probability products from the Storm Prediction Center (SPC) for severe
thunderstorm, lightning, dry lightning and fire weather parameters.

- NCEP server: ensprod/sref.tCCz.pgrb212_SPC.prob_1hrly.grib2
ensprod/sref.tCCz.pgrb???_SPC.prob_3hrly.grib2

3.  Forecast uncertainty/confidence information for forty fields for all
grids:

- max, min, mode, 10-25-50-75-90% (ZZZ in filename below)

- NCEP server: ensprod/sref.tCCz.pgrb212.ZZZ_1hrly.grib2
ensprod/sref.tCCz.pgrb???.ZZZ_3hrly.grib2
ensprod_biasc/sref.tCCz.pgrb212.ZZZ_3hrly.grib2

4.   Ensemble mean Binary Universal Form for the Representation of
meteorological data (BUFR) sounding products:

- NCEP server:
bufr/srefmean.tCCz.bufrsnd.tar.gz
bufr/srefmean.tCCz.class1.bufr.tm00

5.   NMB ctl, n1, n2, n3, p1, p2, p3 members will be added:

- NCEP server:
pgrb/sref_nmb.tCCz.pgrb???.PERT.fxx.grib2
pgrb_biasc/sref_nmb.tCCz.pgrb212.PERT.fxx.grib2
bufr/nmb_PERT.tCCz.bufrsnd.tar.gz bufr/nmb_PERT.tCCz.class1.bufr.tm00

6.  Addition of a 16km North American domain (grid 132).  Due to the
increased resources required to generate them, the ensemble files will be
outputted approximately one hour later than the current SREF output.

- NCEP server:
pgrb/sref_MODEL.tCCz.pgrb132.PERT.fxx.grib2
pgrb/sref_MODEL.tCCz.pgrb132.PERT.grib2
ensprod/sref.tCCz.pgrb132.ZZZ_3hrly.grib2

7.  Addition of a National Digital Forecast Database (NDFD) 5km CONUS
domain (grid 197):

-NCEP server: ensprod_ndgd/sref.tCCz.pgrb197.ZZZ_ds_3hrly.grib2

Current Product Output Removals:

1.  All Eta and RSM members will be removed:

-NCEP server:
pgrb/sref_eta.tCCz.prgb???.???.fxx.grib2
pgrb/sref_eta.tCCz.prgb???.???.grib2
pgrb/sref_rsm.tCCz.prgb???.???.fxx.grib2
pgrb/sref_rsm.tCCz.prgb???.???.grib2
pgrb_biasc/sref_eta.tCCz.prgb212.???.grib2
pgrb_biasc/sref_rsm.tCCz.prgb212.???.grib2
bufr/eta_???.tCCz.bufrsnd.tar.gz bufr/eta_???.tCCz.class1.bufr.tm00
bufr/rsm_???.tCCz.bufrsnd.tar.gz bufr/rsm_???.tCCz.class1.bufr.tm00

2.  As part of this implementation, the NWS will remove the SREF GEMPAK
data sets from the NCEP server.

- NCEP servers:
ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/sref/prod/sref.YYYYMMDD/CC/gempa
k/*

There will be a few changes in the SREF product data files.  With the
addition of new levels/parameters, the order of placement within each GRIB
file may change.  The products delivered over NOAAPort will not change in
format or content.  The products disseminated via the NWS and NCEP servers
will have some changes in content with no expected delay of delivery time.

Due to the expected temporal changes, there will be a significant increase in data volume.  A slight increase in file size should be noted for the bias corrected members and mean product.

These products are available at the following locations:

NOAAPort/Advanced Weather Interactive Processing System (AWIPS): The following domains will be disseminated: CONUS grid 212, Alaska grid 216 and Eastern North Pacific grid 243.

NCEP server: The following domains will be disseminated: CONUS grid 212, Alaska grid 216, Eastern North Pacific grid 243, High Resolution North America grid 221, North American grid 132 and NDFD CONUS grid 197:

ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/sref/prod/sref.YYYYMMDD/CC or
http://www.ftp.ncep.noaa.gov/data/nccf/com/sref/prod/sref.YYYYMMDD/CC

NWS server:
The following domains will be disseminated: CONUS grid 212:

ftp://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/MT.sref_CY.CC/RD.YYYYMMDD

where YYYYMMDD is the date and CC is the model cycle (03, 09, 15, 21).

Please reference NCEP's products information page for more detail on current file outputs and format:

http://www.nco.ncep.noaa.gov/pmb/products/sref/

For more information on the generating process ID, see:

http://www.nco.ncep.noaa.gov/pmb/docs/on388/tablea.html

A consistent parallel feed of data is currently available on the NCEP ftp server, which can be accessed via the following URLs:

ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/sref/para or
http://www.ftp.ncep.noaa.gov/data/nccf/com/sref/para

The Environmental Modeling Center (EMC) Mesoscale Modeling Branch (MMB) has a publicly available website which can provide users more information concerning the SREF modeling system as well as other NCEP regional modeling systems:

http://www.emc.ncep.noaa.gov/mmb/mesoscale.html

All users should ensure their decoders are flexible and are able to adequately handle changes in content, parameter fields changing order, changes in the scaling factor component within the Product Definition Section of the GRIB files and any volume changes which may be forthcoming. These elements may change with future NCEP model implementations.  NCEP will make every attempt to alert users to these changes prior to any implementations.

For questions regarding the scientific content of the modeling system, please contact:

Geoff Dimego
NCEP/EMC
Camp Springs, MD
Phone: 301-763-8000, x 7221
Email: geoff.dimego@noaa.gov

or

Jun Du
NCEP/EMC
Camp Springs, MD
Phone: 301-763-8000, x 7593
Email: jun.du@noaa.gov

For questions regarding the dataflow aspects of these data sets, please contact:

NCEP/NCO Dataflow Team
Camp Springs, MD
Phone: 301-763-8000, x 7198
Email: ncep.list.pmb-dataflow@noaa.gov

National Technical Implementation Notices are online at:

https://www.weather.gov/notification/archive

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