

NOUS41 KWBC 201434 AAE
PNSWSH

Technical Implementation Notice 15-32: Amended
National Weather Service Headquarters Washington DC
1034 AM EDT Tue Oct 20 2015

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From: Timothy McClung
 Chief Operating Officer
 NWS Office of Science and Technology Integration

Subject: Amended: Upgrade the Short Range Ensemble Forecast (SREF) System:
Effective October 21, 2015

Amended to change the implementation date from September 29, 2015 to
October 21, 2015 and to expand the explanation of the 2m dewpoint cap.

The SREF model upgrades include the following:

The seven Weather Research and Forecast (WRF) Nonhydrostatic Mesoscale
Model (NMM) members will be eliminated. This includes the following
members: ctl, n1, p1, n2, p2, n3, p3.

The Nonhydrostatic Multiscale Model on B-Grid (NMMB) model members will be
increased from seven to 13 members. The new NMMB members will be: n4, p4,
n5, p5, n6, p6.

The Advanced Research WRF (WRF-ARW) members will also be increased from
seven to 13 members. The new ARW members will be n4, p4, n5, p5, n6, p6.

Each ensemble member ID will be encoded in the gridded binary (GRIB) data
for the 26 individual raw SREF members.

Cloud ceiling height will change from Above Ground Level (AGL) to Above
Sea Level (ASL) as requested by the aviation user community. At the same
time, a bug has been fixed in the mode calculation of cloud ceiling.

Science changes include more diversity in model initial conditions (IC),
IC perturbations and physics. The vertical resolution of the model will
increase from 35 to 40 vertical levels.

Several SREF ARW members (p01, n03, n05 and p06 in particular)
occasionally produce dew point (Td) temperature values at the 2m level (2m
Td) that are erroneously high, with some values exceeding 90F. These
spikes in the 2m Td occur in environments in which actual values are
usually near or exceeding 80F. Three methods to eliminate these errors
were tested by the Environmental Modeling Center (EMC) and the Storm

Prediction Center (SPC). It was decided that simply capping 2m Td values at 28C (82.4F) was the best approach, and this cap has been added to the SREF code. The cap preserves good domain-averaged performance (i.e., no impact on the overall performance of 2m Td) and corrects the spatial structure of the 2m Td field while taking care of these occasional high value spikes. The results of the tests were presented at the EMC implementation briefing to the NCEP director on September 25, 2015, and can be viewed at the following location (after the actual implementation date):

<http://www.emc.ncep.noaa.gov/mmb/mmbp11/eric.html#TAB4>

The 2m Td is strictly a diagnostic parameter computed in the model post processor, and these erroneous spikes do not impact any other forecast parameters. In other words, the issue is only pertinent to the 2m Td; there is no effect on the boundary layer or, more specifically, on any model level. The impact of the spikes on the 2m Td ensemble products, such as mean and probability is expected to be minimal, since the majority of the 26 members do not have this issue. The newest version of the ARW model addresses this issue with a new way of computing 2m Td and will be used in the next SREF upgrade.

As a uniform measure across all NCEP regional models (see BUFR Station change Technical Implementation Notice (TIN) 15-30):

https://www.weather.gov/media/notification/tins/tin15-30bufr_staidsaab.pdf

There were 138 new stations added in the bufr/sounding output. See the [above-mentioned TIN](#) for the detail changes.

All SREF-based downstream jobs, such as cyclone track, will not be impacted in their formats and file names but are calculated based on new 26 members instead of 21 members, where new members are n4, n5, n6, p4, p5 and p6.

Graphical data is viewable here:

<http://www.emc.ncep.noaa.gov/mmb/gplou/emchurr/glblgen/>

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

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

Advanced Weather Interactive Processing System (AWIPS) Product Changes:

The total number of ensemble members in this upgrade will increase from 21 to 26 due to the discontinuation of the NMM members and the increase of both the NMMB and ARW members from seven to 13 members. The increase in ensemble membership will be reflected in the following Advanced Weather Interactive Processing System (AWIPS) products:

- For 2-meter Temperature and 3-hourly Precipitation products on Grid #221 (32 km North American Lambert Conformal Grid), the gridded binary version two (GRIB2) Product Definition Template (PDT) will be modified to identify the individual ensemble members.

- For the Mean, Probability, and Spread products on Grids #212 (40 km Contiguous United States (CONUS) Lambert Conformal Grid), #216 (45 km Alaska Polar Stereographic Grid), and #243 (Eastern North Pacific Grid), the GRIB2 encoding will reflect the total increase in ensemble members from 21 to 26.

File Name Changes:

There will be no changes in the file naming convention for the NMMB files, where the model core in file names is represented with the string "nmb"; however, the file naming convention for all ARW files will be modified by replacing the previous em string with the arw string.

Also, the file naming convention for the mean, probability and spread cluster files on the National Centers for Environmental Prediction (NCEP) File Transfer Protocol (FTP) server and NOAA Operational Model Archive and Distribution System (NOMADS) will change to lead with "sref" and the model cycle:

```
[mean|prob|spread].sref.cluster[1-6].fHH.grib2 ->
sref.tCCz.[mean|prob|spread]_cluster[1-6].fHH.grib2
```

where CC is the model cycle (03, 09, 15, 21), HH is the 2-digit forecast hour (00, 03, 06, ..., 81, 84, 87).

Data Delivery Timing/Volume/Content Changes:

With this upgrade, no changes in delivery time are expected. The GRIB2 product definition section (PDS) will be modified to identify the individual SREF members. In combination with the model ID (111=NMMB and 116=ARW), users will be able to identify each of the unique SREF members as follows: ct1, p1 (+1), n1 (-1), p2 (+2), n2 (-2), ..., p6 (+6), n6 (-6). Due to the increase in SREF members from 21 to 26 and the addition of the member ID to each member's GRIB2 file, users can expect approximately a 10 percent increase in the data volume for each of the raw individual ensemble member's files.

Output from the SREF is available for North America, the CONUS, Alaska and Eastern Pacific domains on NOAA Operational Model Archive Distribution System (NOMADS) and NOAAPort. NOMADS data is available via the following URL:

<http://nomads.ncep.noaa.gov/pub/data/nccf/com/sref>

Output from the SREF is available for the CONUS domain on the NWS FTP server at the following location:

<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/MT.sref CY.CC/RD.YYYYMMDD>

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

A consistent parallel feed of data will be made available on the NCEP HTTP server at the following URL:

<http://para.nomads.ncep.noaa.gov/pub/data/nccf/com/sref/para>

NCEP encourages all users to ensure their decoders are flexible and are able to adequately handle changes in content order, changes in the scaling factor component within the PDS of the GRIB files, and also any volume changes which may occur. 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
College Park, MD
Phone: 301-683-3764
geoff.dimego@noaa.gov

or

Jun Du
NCEP/EMC
College Park, MD
Phone: 301-763-3704
jun.du@noaa.gov

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

Justin Cooke
NCEP/NCO Dataflow Team
College Park, MD
Phone: 301-683-0567
ncep.list.pmb-dataflow@noaa.gov

National Technical Implementation Notices are online at:

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

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