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PNSWSH

Technical Implementation Notice 16-11 Amended
National Weather Service Headquarters Washington DC
950 AM EDT Thu Apr 21 2016

To: Subscribers:
          -NOAA Weather Wire Service
          -Emergency Managers Weather Information Network
          -NOAAPORT
          Other NWS Partners, Users and Employees

From: Timothy McClung
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Subject: Amended Global Forecast Systems (GFS) Upgrade:
           Effective May 11, 2016

Amended to add the Pacific Region 20km grid to NOAAPORT and the
hourly 0.25 deg in NOMADS

Effective on or about Wednesday May 11, 2016, beginning with the
1200 Coordinated Universal Time (UTC) run, the National Centers
for Environmental Prediction (NCEP) will upgrade the GFS
Analysis and Forecast System as follows:

  - Changes to the data assimilation components
  - Changes to the model components
  - Addition of hourly gridded output through 120 hours
- Addition of five layers in the upper stratosphere in gridded
output
  - Addition of new product fields
  - Product removals

1) Changes to the Global Data Assimilation System (GDAS):
- Upgrade the 3D Hybrid Ensemble-Variational to 4D Hybrid
Ensemble-Variational Data Assimilation System
4D increments are constructed by figuring out the best
combination of 4D ensemble perturbations. The weights for
ensemble members are kept constant throughout the assimilation
window. 4D-Hybrid uses 50 outer and 150 inner iterations with
variational quality control turned on after 25 iterations.
Tangent Linear Normal Mode Constraint (TLNMC) and Digital Filter
Initialization (DFI) are used in the ensembles while additive
error inflation is removed. Ozone cross covariances are in the
4D-Hybrid. Localization is reduced to 50% in the troposphere and
the weights for static and ensemble are kept at 12.5% and 87.5%
respectively.
- Assimilate all sky Advanced Microwave Sounding Unit (AMSU-A)
Radiances
- Assimilate Advanced Very High Resolution Radiometer (AVHRR)

winds and monitor Visible Infrared Imaging Radiometer Suite (VIIRS) winds
- Implement Geostationary Operational Environmental Satellites - R series (GOES-R) data read ability
- Update Community Radiative Transfer Model (CRTM) to v2.2.1 with bug fixes in wind direction, use of FAST Microwave Emissivity Models (FASTEM-6 and FASTEM-X) reflection correction for cloudy situations
- Improve bias correction for aircraft observations
- Modify relocation and storm tracking to allow hourly tropical cyclone relocation

- Modify thinning/weight in time for Atmospheric Motion Vectors (AMVs) and radiances
- Upgrade data assimilation monitoring package

2) Model changes to the GFS Global Spectral Model and post-processing software:
- Correct the land surface characteristics for grassland and cropland categories to reduce summertime warm and dry biases over Great Plains
- Upgrade convective gravity wave drag
- Upgrade tracer adjustment in the semi-Lagrangian dynamic core
- Upgrade the NCEP Unified Post Processing (UPP) software to v7.0
- Implement Global Current Icing Potential analysis (G-CIP) products

3) Output product changes
All operational products below can be found on any of following NCEP or NWS servers:
ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/gfs/prod
http://www.ftp.ncep.noaa.gov/data/nccf/com/gfs/prod
http://nomads.ncep.noaa.gov
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/
http://weather.noaa.gov/pub/SL.us008001/ST.opnl/

- Add new Global Forecast Icing Severity (G-FIS) icing severity parameter (ICSEV Icing Severity)
  gfs.tCCs.pgrb2.0p25.fFFF
  gfs.tCCs.pgrb2.0p50.fFFF
  gfs.tCCs.pgrb2.1p00.fFFF
    Where CC is 00, 06, 12 and 18
    Where FFF is 000 to 384

- Improve Global Forecast Icing Potential (ICIP) products
  WAFS_blended_YYYYMMDDCCfFF.grib2
    Where FF is 06 to 36

- Include hourly forecasts out to 120 hr
  gfs.tCCz.pgrb2.0p25.fFFF
  gfs.tCCz.pgrb2b.0p25.fFFF
    Where FFF is 000, 001, 002, 003, 004...120

- Add grib filter and GDS/OpenDAP availability of the 0.25 deg
hourly forecasts in NOMADS.
  - filter_gfs_0p25_1hr.pl (grib filter link)
  - gfs_0p25_1hr (OpenDAP-alt link)
At this time data will not be available for testing until it
goes into operations.

- Add five more vertical levels (7, 5, 3, 2, and 1 hPa) for the
variables geopotential height (HGT), temperature (TMP), relative
humidity (RH), U- and V- components of wind (UGRD and VGRD) and
ozone mixing ratio (O3MR)
  gfs.tCCz.pgrb2.0p25.fFFF, gfs.tCCz.pgrb2b.0p25.fFFF
  gfs.tCCz.pgrb2.0p50.fFFF, gfs.tCCz.pgrb2b.0p50.fFFF
  gfs.tCCz.pgrb2.1p00.fFFF, gfs.tCCz.pgrb2b.1p00.fFFF
  gfs.tCCz.pgrb2.2p50.fFFF
    Where FFF is forecast hours from 000 to 384

- Replace 775 hPa state variables with 750 hPa in the GFS WAFS
grids 37-44 for UGRD, VGRD, TMP, RH, HGT
  On NCEP Servers:
  wafsgfs_L_tCCz_intdskFFF.grib2
  wafsgfs_P_tCCz_intdskFFF.grib2
  On NWS Servers:
  fh.0FFF_tl.press_ar.octant(ijklmno)
    Where FFF is 000-120

- Addition of GDAS ABIAS air BUFR file
  gdas1.tCCz.abias_air

- Modify the list of stations on NOAAPORT and NCEP servers, for
which BUFR data are generated for the GFS. The changes will
also modify the lists of stations in the GFS BUFR sounding
collectives disseminated on NOAAPORT. For the full list please
reference this page:
http://www.nco.ncep.noaa.gov/pmb/changes/gfs_upgrade_2016.shtml

The following changes to NOAAPORT are detailed below with the
following WMO headers for each grid:
http://www.nco.ncep.noaa.gov/pmb/changes/gfs_20kmAWIPS_grids.sht
ml

- Alaska region grid 217 (20km) has been modified to expand
latitude from 30N to 35N and longitude from 173W to 170W.

- The Maximum and Minimum Temperatures (TMAX, TMIN) Product
Definition Template 4.8 will correct a mistake in the second
fixed surface from "255 0 2" to "255 0 0" for the following
grids:
  Alaska region 20km
  Pacific region 20km
  Puerto Rico 0.25deg
  CONUS 20km

- The Water Equivalent of Accumulated Snow Depth (WEASD) WMO

headers were incorrectly labeled for forecast hours 186, 198, 210, 222 and 234. The following changes will be applied to each grid below:
  CONUS 20km: LSRU98 -> ZSNZ98
  Alaska 20km: LSRU98 -> ZSBZ98
  Pacific Region 20km: LSRU98 -> ZSEZ98
  Puerto Rico 0.25deg: LSRU98 -> ZSFZ98

- The Alaska Region, grid 217 (20km), had some incorrectly labeled forecast hours in the grid identifier WMO header. This will be addressed so all Alaska WMO products have A1 = B

- Addition of GRIB2 20 km gridded product over Pacific Region (Mercator) to NOAAPORT
  Runs 4 times per day at 00z, 06z, 12z and 18z
  WMO headers will be as follows:

 T1 = Y for forecast hours: 00, 06, 12, 15, 18, 24, 30, 36,
    42, 48, 60, 72, 84, 96, 108,120, 132, 144, 156, 168, 180,
    192, 204, 216, 228, 240
 T1 = Z for forecast hours: 03, 09, 15, 21, 27, 33, 39, 45,
    51, 54, 57, 63, 66, 69, 75, 78, 81, 90, 102, 114, 126,
    138, 150, 162, 174, 186, 198, 210, 222, 234

 T2 specifies the parameters as follows:
   T = Temperature, TMIN, TMAX; H = Height;
   5-wave geopotential height; O = Vertical velocity;
   R = Relative humidity; C = Absolute vorticity;
   U = u-component of wind; V = v-component of wind;
   P = Pressure; Pressure reduce to Mean Sea level;
   B = Vertical speed shear; E = Total precipitation;
   G = Convective precipitation; Q = Best Lifted Index;
   W = Convective Available Potential Energy;
   Y = Convective Inhibition; X = Surface Lifted Index;
   F = Precipitable Water; M = Precipitable Water
   S = Water Equivalent of Accumulated Snow Depth;

 A1 = E* Grid 20 km, Pacific Region
 *Was incorrectly labeled "F" in the previous advertised TIN
14-54

 A2 specifies the forecast hours as follows:
   A=00; B=06; C=12; D=18; E=24; F=30; G=36; H=42;
   I=48; J=60; K=72; L=84; M=96; N=108; O=120;
   P=132; Q=144; R=156; S=168; T=180; U=192; V=204;
   W=216; X=228; Y=240 (Note: T1 is Y)

   B=03; E=09; H=15; K=21; L=27; O=33; P=39; Q=45;
   R=51; M=54; S=57; Z=63; N=66; Z=69; Z=75; T=78;
   Z=81; U=90; V=102; W=114;
   Z=126; 138; 150; 162; 174; 186; 198; 210; 222;
   234 (Note: T1 is Z)

  ii specifies level as follows:

99=1000mb; 93=975 mb; 95=950 mb; 92=925 mb; 90=900mb;
91=875 mb; 85=850mb; 82=825 mb; 80=800 mb; 77=775 mb;
75=750mb; 72=725mb; 70=700mb; 67=675 mb; 65=650 mb;
62=625 mb; 60=600mb; 57=575 mb; 55=550mb; 52=525 mb;
50=500mb; 45=450mb;40=400mb; 35=350mb; 30=300mb;
25=250mb; 20=200mb; 15=150mb; 10=100mb;
73=High, Mid, Low cloud bottom level; 86=Boundary Layer;
89=Reduced to Sea Level; 94=Level of the 0 deg. C isotherm;
96=Maximum wind level;
97=Level of the Tropopause, potential vorticity surface;
98=Surface of Earth; 00=Entire Atmosphere

See the following link for a full list of WMO headers:
http://www.nco.ncep.noaa.gov/pmb/changes/gfs_pac_wmo.txt

4) Output product removals
NCEP has been working to remove low resolution legacy products
and replace them with higher resolution grids. Last year NCEP
added new higher resolution grids to NOAAPORT in preparation for
removing the legacy grids. Due to the positive responses
received from the NCEP Public Information Statement 16-04,
Removal of Legacy Global Forecast System (GFS) Gridded Output,
the following products will be removed with this upgrade:

- Remove the GFS grid 212, 40km Regional CONUS from NOAAPORT
  WMO Headers:
http://www.nco.ncep.noaa.gov/pmb/changes/gfs_AWIPS_grids.shtml

To find the replacement products please reference this TIN:
http://www.nws.noaa.gov/os/notification/tin14-54gfs_noaaport.htm

- Removal Vessel Sea Ice and Fog on grid 232, 1 deg Northern
Hemisphere from NOAAPORT
  WMO Headers:
http://www.nco.ncep.noaa.gov/pmb/changes/omb_AWIPS_grids.shtml

- Removal of 1.25 deg GRIB1 GFS WAFS products from the NWS
http/ftp server:

weather.noaa.gov/pub/SL.us008001/ST.opnl/MT.gfs_CY.CYCLE/RD.YYYY
MMDD/PT.grid_DF.gr1/fh.FFF_tl.press_ar.octant[ijklmnop]
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/MT.gfs_CY.CYCLE/RD.
YYYYMMDD/PT.grid_DF.gr1/fh.FFF_tl.press_ar.octant[ijklmnop]
  where CYCLE is 00, 06, 12, 18
  where YYYYMMDD is Year, Month, Day
  where FFF is forecast hour from 000-120

To find the replacement product please reference this TIN:
http://www.nws.noaa.gov/os/notification/pns16-04gfs_removal.htm

- Removal of 1.25 deg GRIB1 GFS WAFS products from the NCEP
http/ftp server:

http://nomads.ncep.noaa.gov/pub/data/nccf/pcom/gfs/xtrn.wfsgfs*

ftp://ftp.ncep.noaa.gov/pub/data/nccf/pcom/gfs/xtrn.wfsgfs*

To find the replacement product please reference this TIN:
http://www.nws.noaa.gov/os/notification/pns16-04gfs_removal.htm

5) Parallel data available
Starting in April 1, 2016 all parallel data sets will be
available on the following servers:
  http://para.nomads.ncep.noaa.gov/pub/data/nccf/com/gfs/para

For more information on this GFS upgrade, please see EMC real-
time and retrospective parallels and verification pages:
http://www.emc.ncep.noaa.gov/gmb/noor/4dGFS/synergy%20announceme
ntjan08.htm

NCEP urges all users to ensure their decoders can handle changes
in content order, changes in the scaling factor component within
the product definition section (PDS) of the GRIB files, and
volume changes. These elements may change with future NCEP model
implementations. NCEP will make every attempt to alert users to
these changes before implementation.

For questions regarding these changes, please contact:

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

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NWS National Technical Implementation Notices are online at:

http://www.nws.noaa.gov/os/notif.htm

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