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PNSWSH

Service Change Notice 19-38  
National Weather Service Headquarters Silver Spring MD  
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To:           Subscribers:  
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From:         Bob Maxson  
              Acting Director  
              National Centers for Environmental Prediction

Subject: HYSPLIT Model Update: Effective June 12, 2019

Effective on or about Wednesday, June 12, 2019, beginning with the 1200 Coordinated Universal Time (UTC) run, the National Centers for Environmental Prediction (NCEP) will upgrade the Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) modeling system that produces operational predictions of wildfire smoke, dust from dust storms and as needed volcanic ash converted into a format for input to HYSPLIT. Major components include:

- Adding High-Resolution Rapid Refresh (HRRR) Model and removing Rapid Refresh (RAP)
- Changing to quarter-degree hybrid-level Global Forecast System (GFS) HYSPLIT-format meteorology from half-degree
- Adding volcano trajectories to NCEP Web Services.

#### Science Upgrades:

For volcanic ash, added the option to use the Ganser fall velocity algorithm, which can have a slight impact on the largest ash particles. No scientific enhancements to the smoke and dust products were made.

#### Output changes:

The HYSPLIT is available on both the NWS and NCEP Web Services. There are no changes to the contiguous U.S. (CONUS), Alaska and Hawaii output on the NWS Web Services here:

<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/DF.gr2/DC.ndgd/GT.aq>  
<https://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/DF.gr2/DC.ndgd/GT.aq>

The following changes will be applied to data on the NCEP Web Services here:

<https://nomads.ncep.noaa.gov/pub/data/nccf/com/hysplit/prod/>  
<ftp://ftpprd.ncep.noaa.gov/pub/data/nccf/com/hysplit/prod/>

1. Add HRRR sigma-level forecasts formatted for HYSPLIT, with filename convention:

hysplit.tCCz.hrrrf00 - forecast hours 0-5  
hysplit.tCCz.hrrrf06 - forecast hours 6-11  
hysplit.tCCz.hrrrf12 - forecast hours 12-17  
hysplit.tCCz.hrrrf18 - forecast hour 18,

where CC = cycle hour (00, 01, ..., 22, 23)

2. Replace the half-degree resolution hybrid-level GFS file formatted for HYSPLIT with a quarter-degree resolution file.

Remove:

hysplit.tCCz.gfs0p5f

Add:

hysplit.tCCz.gfs0p25f000, forecast hours 0-21  
hysplit.tCCz.gfs0p25f024, forecast hours 24-45  
hysplit.tCCz.gfs0p25f048, forecast hours 48-69  
hysplit.tCCz.gfs0p25f072, forecast hours 72-84

where CC = cycle hour (00, 06, 12, 18)

3. Change of fields in the quarter-degree hybrid-level GFS file formatted for HYSPLIT. Add:

surface height (SHGT)  
relative humidity on hybrid levels (RELH)  
pressure vertical velocity (WWND)  
total accumulated precipitation (TPPA)

Remove:

specific humidity on hybrid levels (SPHU)  
6-hour accumulated precipitation (TPP6)

Note that vertical velocity was removed from the then half-degree HYSPLIT-formatted GFS hybrid-level file in July 2017 with the GFS upgrade to v14.0. Coincident with the GFS v15.1 upgrade, the post-processing enables vertical velocity in the HYSPLIT-formatted quarter-degree files.

4. Change a field in the one-degree GFS files formatted for HYSPLIT:

```
hysplit.tCCz.gfs[f|a]
where CC = cycle hour (00, 06, 12, 18)
```

Remove: 6-hour accumulated precipitation (TPP6)

Add: total accumulated precipitation (TPPA)

5. Change of fields in the NAM hybrid-level HYSPLIT-formatted files:

```
hysplit.tCCz.nams[f|a]
hysplit.tCCz.nams[f|a].AK
hysplit.tCCz.nams[f|a].HI
hysplit.tCCz.namsf??.CONUS
hysplit.tCCz.namsf.FW
where CC = cycle hour (00, 06, 12, 18)
```

Add: convective available potential energy (CAPE)

Remove: low, middle, and high cloud cover (LCLD, MCLD, HCLD)

6. Remove RAP pressure-level forecasts formatted for HYSPLIT. Users should begin using the HRRR output as a replacement:

```
hysplit.tCCz.rap[f|a]
```

7. Remove NAM 12 km regional tiles which were extracted from:

```
hysplit.tCCz.namsf:
hysplit.tCCz.namsf.NEtile
hysplit.tCCz.namsf.SETile
hysplit.tCCz.namsf.SWtile
hysplit.tCCz.namsf.NWtile
where CC = cycle hour (00, 06, 12, 18)
```

- Begin disseminating volcano trajectory files in the following formats: gif, kmz and txt

The trajectories have a duration of 6 hours and begin 6, 12, 18 and 24-hours into the forecast. Products will be available under the hysplit directory on the NCEP Web services.

Sub-directory: /traj.YYYYMMDD/

where YYYYMMDD is: 4-digit year, 2-digit month and 2-digit day

Files: hysplit.CCz.traj.volc[N|NN].fHHH.[gif|kmz|txt]

where CC is cycle hour (00,06,12,18), N, NN is an integer from 1 to 34 that identifies the volcano and HHH is 006, 012, 018, 024

The text file that associates the volcano name with the N, NN integer is:

```
hysplit.tCCz.traj.volc[N|NN].txt
```

Users are encouraged to always read the volcano filename file because volcanoes may be added and the N, NN integer for a given volcano may change at any time.

8. The following will have product output timing changes

- The following will be available 10-15 minutes earlier:

hysplit.tCCz.gfsa  
hysplit.tCCz.gfsf  
hysplit.tCCz.namsf??.CONUS

- The long-range products will be up to 20 minutes later:

hysplit.tCCz.gfslrf

- The new quarter-degree GFS files are generated 15 minutes later than the half-degree due to the increased resolution and GFS FV3 files.

More details about the HYSPLIT are available at:

<https://www.ready.noaa.gov/HYSPLIT.php>

Operational graphical display for smoke and dust at:

<https://airquality.weather.gov/>

Operational display for volcanic ash at:

<https://tgftp.nws.noaa.gov/fax/wafsash.shtml>

Users can find output from the updated HYSPLIT model available through a parallel feed:

<https://para.nomads.ncep.noaa.gov>  
<https://www.emc.ncep.noaa.gov/mmb/aq/hysplit/web/html/>

NCEP will evaluate any comments and decide whether to proceed. For questions regarding these updated predictions, please contact:

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National Service Change Notices are online at:

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

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