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Technical Implementation Notice 14-40
National Weather Service Headquarters Washington DC
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From: Timothy McClung
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Office of Science and Technology

Subject: Changes to the Hurricane (multi_2) and the Global
(multi_1) wave models Effective December 2, 2014

Effective Tuesday, December 2, 2014, beginning with the 1200 Coordinated Universal Time (UTC) run, the National Centers for Environmental Prediction (NCEP) will upgrade the Hurricane and Global wave models to WAVEWATCH III v4.15.1 and change the underlying grids.

The Hurricane wave model (multi_2) uses a blend of GFS winds and hurricane winds at 10 m above Mean Sea Level (MSL) as forcing conditions. The Global wave model (multi_1) uses just the GFS forcings and is run side by side with the GFS forcing. Both models use the same set of grids with the exceptions that the multi_2 system has two additional regional grids (for blended hurricane winds) and the multi_1 system has an Arctic grid (that is not needed for propagating hurricane driven winds). Also the multi_1 system provides wave guidance out to 180 hours while the multi_2 system only goes out to 126 hours (which is the extent of the hurricane guidance). It is useful to think of multi_1 as an early guidance and multi_2 as a late guidance that includes the effects of hurricane wind forcings.

The implications of the changes are highlighted below.

HURRICANE WAVE MODEL (multi_2):

1. The Hurricane Wave model has been upgraded to the new physics package that the Global Wave model uses. With this change both the Global and Hurricane wave models now use the same physics. The advantages of the new physics packages are:
 - a. Better swell dissipation characteristics (this has implications for storms in the Pacific that have a strong swell component)
 - b. Better wave growth and decay properties as the storm

passes

- c. A much better representation of the wave spectra, leading to a more accurate estimate of peak frequency and consequently storm arrival times
2. Update of the bathymetry of the various grids to be ETOPO1 based. ETOPO1 is a 1 arc-min global relief model of the Earth that is provided by the National Geophysical Data Center

<http://www.ngdc.noaa.gov/mgg/global/global.html>

The bathymetry used to be based on the ETOPO2 bathymetric set which was an earlier 2 arc-min global relief model.

3. Hurricane winds are now forced by the HWRF model as opposed to the GFDL model.
4. Wave products are being delayed by an hour. Due to the timing of the products the hurricane wave model was being run using the previous cycle hurricane winds. Thus a 12Z wave model would use 06Z hurricane winds. By delaying the wave product delivery by an hour the 12Z cycle wave model would use the 12Z cycle hurricane winds. Thus, the wave products are actually being delivered earlier.

GLOBAL WAVE MODEL (multi_1):

1. The grids of the wave model are updated to be ETOPO1 based (as opposed to ETOPO2 based)
2. The masks for the regional grids (wc_10m, at_10m and ep_10m) are updated as per requests of Ocean Prediction Center and Guam Weather Forecasting Office
3. There has been a change to a sub-section of output points that were requested by the Ocean Prediction Center. They have now requested a smaller set of output points. The list of current and new points is listed here:

http://www.nco.ncep.noaa.gov/pmb/changes/wave_multi_bndry.shtml

The output data from these models are disseminated on the NCEP server at

<http://www.ftp.ncep.noaa.gov/data/nccf/com/wave/prod/>

and

<ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/wave/prod/>

Sample output files from the new physics are available at

<ftp://polar.ncep.noaa.gov/pub/waves/develop/>

Details about the NCEP Multi-grid Wave Model are online at:

<http://polar.ncep.noaa.gov/waves/index2.shtml>

A consistent parallel feed of data will be available on the NCEP

server by mid October via the following URLs:

<http://www.ftp.ncep.noaa.gov/data/nccf/com/wave/para>

<ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/wave/para>

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, changes to the GRIB Bit Map Section (BMS), 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 model changes, 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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