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Service Change Notice 23-35
National Weather Service Headquarters Silver Spring MD
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From: Mike Farrar, Director
 National Centers for Environmental Prediction

Subject: Upgrade of the Great Lakes Waves-Unstructured Forecast System
(GLWU) to Version 2.0.0: Effective April 18, 2023

Effective on or about April 18, 2023, beginning with the 1200 Coordinated Universal Time (UTC) cycle, the National Centers for Environmental Prediction (NCEP) Central Operations (NCO) will upgrade the Great Lakes Waves-Unstructured Forecast System (GLWU) to Version 2.0.0. This implementation may be delayed if there is declaration of either an Enhanced Weather situation or Critical Weather Day.

Background:

The upgrade will provide improved forecast guidance over the existing model domain of the five Great Lakes, as well as extend this capability to Lake Champlain in the Weather Forecast Office (WFO) Burlington, VT region.

Model upgrades include:

- Expansion of the model to include Lake Champlain. Lake Champlain will be added to the existing GLWU model configuration as an unstructured mesh component with horizontal resolution ranging from 400 m to 50 m. Wind forcing will be provided by the 1-hourly High-Resolution Rapid Refresh (HRRR) out to 18z and the Global Forecast System (GFS) out to 144 hours. Sea ice concentration analysis data will be provided by the WFO Burlington Ice Desk.

- Increase in Sea Ice Concentration Resolution. The horizontal resolution of daily sea ice concentration data will increase from 5 km to 500 m. This is expected to improve the accuracy of modeled wave-ice interactions in the Great Lakes' coastal regions.

- Upgrade to Wave Model Core. GLWUv2 will also introduce a new version of the WAVEWATCH III wave model core. This version features improvements in the physics, new capabilities for pre- and post-processing utilities, increased efficiency on high- performance computing platforms, and includes multiple bug fixes.

- Output changes for NCEP National Operational Model Archive and Distribution System (NOMADS) and Advanced Weather Interactive Processing System (AWIPS) web services. An additional level will be added to the following variables in AWIPS files:

SWDIR, SWELL and SWPER

The gridded binary version two (GRIB2) packing has switched from jpeg to complex in addition to an upgrade in the netCDF file formats from netCDF-3 to netCDF-4. These two changes have resulted in smaller grib2 and netCDF file sizes.

The following three forecast products will be added for Lake Champlain on NOMADS:

glwu.glwu_lc.tCCz.nc: Output on model's native unstructured mesh (netcdf).

glwu.grlc_2p5km_lc.tCCz.grib2: Integrated output on a 2.5 km Lambert Conformal grid (GRIB2).

glwu.grlr_500m_lc.tCCz.grib2: Integrated output on a latitude/longitude regular grid at 500 m resolution (GRIB2).

where CC is the forecast cycle.

In addition to the new outputs on NOMADS, an AWIPS file would be made available via the Satellite Broadcast Network (SBN) for Lake Champlain with this WMO header:

E*J*88. KWBJ

A consistent parallel feed of data is available on the NCEP sites at the following URLs:

<https://nomads.ncep.noaa.gov/pub/data/nccf/com/glwu/para>
<https://para.nomads.ncep.noaa.gov/pub/data/nccf/oaaport/glwu>

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.

Any questions, comments or requests regarding this implementation should be directed to the contacts below.

For questions concerning science changes, please contact:

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NCEP/Environmental Modeling Center
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For questions regarding the data flow aspects of these datasets, contact:

Margaret Curtis
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National Service Change Notices are online at:

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

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