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Service Change Notice 22-108 Updated
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From: Shachak Pe'eri
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Subject: Updated: Upgrade of the Surge and Tide Operational Forecast System (STOFS, formerly ESTOFS) to Version 1.1.0: Effective January 10, 2023

Updated to reflect the new implementation date of January 10, 2023.

Effective on or about January 10, 2023, beginning with the 1200 Coordinated Universal Time (UTC) cycle, the National Centers for Environmental Prediction (NCEP) Central Operations (NCO) will upgrade the Surge and Tide Operational Forecast System (STOFS, formerly ESTOFS) to Version 1.1.0. This implementation may be delayed if there is declaration of either an Enhanced Weather situation or Critical Weather Day.

STOFS V1.1.0 represents a major upgrade of the ESTOFS modeling system, last upgraded in July 2021. STOFS V1.1.0 contains several enhancements improving model performance, resolution, and coverage, including a name change to STOFS, an addition of a three-dimensional (3D) component for the Atlantic basin, and upgrades to the global modeling system.

Model upgrades include:

- Renaming Extratropical Surge and Tide Operational Forecast System (ESTOFS) to STOFS, as global forecast guidance is provided by the system. Please be prepared to rename scripts, URLs, etc. with this name change from ESTOFS to STOFS.
- Addition of a 3D modeling component, called STOFS-3D-Atlantic, to support 3D coastal flooding for the Atlantic basin (i.e., U.S. East Coast, Gulf of Mexico, and Puerto Rico). STOFS-3D-Atlantic will use input from the National Water Model to include inland hydrology and extreme precipitation effects on coastal flooding, and will also provide surface currents for marine navigation use. This modeling component will use the Semi-implicit Cross-scale Hydroscience Integrated System Model (SCHISM) model core.
- Upgrades to the global modeling component, now called STOFS-2D- Global, which uses the ADvanced CIRCulation (ADCIRC) model core.

- Improved spatial resolution for the U.S. East Coast, U.S. West Coast, Alaska, and Iceland. For the U.S. West Coast, the improved resolution especially in small inlets and near jetties will provide better resolved depth-integrated currents for the Nearshore Wave Prediction System (NWPS), which hopes to resolve wave-current interactions, e.g., steepening waves, important for weather/wave forecasters in small/large inlets.
- Additional station output for NWS Eastern and Alaska Regions, and for satellite altimetry use.
- Upgrade of bottom friction representation by the use of spatially-varying Manning's N, for improved tide and surge prediction.
- Removal of the water level bias correction "offset" script to remediate high water spots observed to occur in some coastal areas partly as a result of this script. The bias correction will be revisited for a possible future model upgrade.

Output changes for NCEP National Operational Model Archive and Distribution System (NOMADS) and FTPPRD web services:

The overall directory structure for the model will move on NOMADS and FTPPRD to reflect the new model name. On implementation day, data will go under:

<https://nomads.ncep.noaa.gov/pub/data/nccf/com/stofs/prod/>
<https://nomads.ncep.noaa.gov/pub/data/nccf/com/stofs/v1.1/>
<ftp://ftpprd.ncep.noaa.gov/pub/data/nccf/com/stofs/prod/>
<ftp://ftpprd.ncep.noaa.gov/pub/data/nccf/com/stofs/v1.1/>

The gridded binary (grib) filter and OpenDAP locations on NOMADS will also change to reflect the new model name as well as distinguish between the two-dimensional (2D) global and 3D Atlantic regions:

https://nomads.ncep.noaa.gov/cgi-bin/filter_stofs_2d_glo.pl
https://nomads.ncep.noaa.gov/cgi-bin/filter_stofs_3d_atl.pl
https://nomads.ncep.noaa.gov/dods/stofs_2d_glo
https://nomads.ncep.noaa.gov/dods/stofs_3d_atl

File additions and file name changes:

These are the additional files for STOFS-3D-Atlantic:

```
stofs_3d_atl.t12z.{n001_024,f001_024,f025_048}.field2d.nc
stofs_3d_atl.t12z.fields.out2d_{nowcast,forecast_day1,forecast_day2}.nc
stofs_3d_atl.t12z.{ncast,fcst}.station.profile.nc
stofs_3d_atl.t12z.points.cwl.temp.salt.vel.nc
stofs_3d_atl.t12z.points.cwl.shof stofs_3d_atl.t12z.fields.cwl.maxele.nc
stofs_3d_atl.t12z.conus.east.f{hour}.grib2 (where {hour}={000-048})
stofs_3d_atl.t12z.conus.east.cwl.grib2
stofs_3d_atl.t12z.puertori.f{hour}.grib2 (where {hour}={000-048})
stofs_3d_atl.t12z.puertori.cwl.grib2
```

The following are file name changes for STOFS-2D-Global:

```
stofs_2d_glo.tCCz.points.{cwl,htp,swl}.nc
stofs_2d_glo.tCCz.points.{cwl,htp,swl}.shf
stofs_2d_glo.tCCz.fields.{cwl,htp,swl}.nc
stofs_2d_glo.tCCz.alaska.{cwl,htp,swl}.grib2
stofs_2d_glo.tCCz.alaska.f{hour}.grib2 (where {hour}={000-180})
stofs_2d_glo.tCCz.conus.east.{cwl,htp,swl}.grib2
stofs_2d_glo.tCCz.conus.east.f{hour}.grib2 (where {hour}={000-180})
stofs_2d_glo.tCCz.conus.west.{cwl,htp,swl}.grib2
stofs_2d_glo.tCCz.conus.west.f{hour}.grib2 (where {hour}={000-180})
stofs_2d_glo.tCCz.guam.{cwl,htp,swl}.grib2
stofs_2d_glo.tCCz.guam.f{hour}.grib2 (where {hour}={000-180})
stofs_2d_glo.tCCz.hawaii.{cwl,htp,swl}.grib2
stofs_2d_glo.tCCz.hawaii.f{hour}.grib2 (where {hour}={000-180})
stofs_2d_glo.tCCz.northpacific.{cwl,htp,swl}.grib2
stofs_2d_glo.tCCz.northpacific.f{hour}.grib2 (where {hour}={000-180})
stofs_2d_glo.tCCz.puertori.{cwl,htp,swl}.grib2
stofs_2d_glo.tCCz.puertori.f{hour}.grib2 (where {hour}={000-180})
```

Where tCCz is forecast cycle: CC = 00, 06, 12, 18; cwl = combined water level (surge+tide), htp = harmonic tidal predictions, swl = surge-only component.

Timeliness changes:

The following STOFS-2D-Global NetCDF cwl (combined water level) points and fields files will be available over five minutes earlier:

```
stofs_2d_glo.tCCz.points.cwl.nc stofs_2d_glo.tCCz.fields.cwl.nc
```

Where tCCz is forecast cycle: CC=00, 06, 12, 18; cwl = combined water level

File size changes:

The increased stations for NWS Eastern and Alaska Regions and for satellite altimetry use, and the increased unstructured grid consisting of over 12.78 million nodes, which increases coastal grid resolution from up to 300 m to up to 80 m for U.S. West Coast and Alaska with the addition of a floodplain, changes the following STOFS-2D-Global NetCDF and GRIB2 (up to 30%) file sizes:

```
stofs_2d_glo.tCCz.points.{cwl,htp,swl}.nc
stofs_2d_glo.tCCz.fields.{cwl,htp,swl}.nc
stofs_2d_glo.tCCz.{alaska,conus.east,conus.west,guam,hawaii,northpacific,puertori}.f{hour}grib2
```

Where tCCz is forecast cycle: CC=00, 06, 12, 18; cwl = combined water level, htp = tidal predictions, swl = surge-only component; hour=000-180.

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

<https://nomads.ncep.noaa.gov/pub/data/nccf/com/stofs/para/>
https://para.nomads.ncep.noaa.gov/pub/data/nccf/oaaport/stofs_2d_glo/

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

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National Service Change Notices are online at:

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

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