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Service Change Notice 21-14 Updated
NOAA's National Ocean Service Headquarters Silver Spring MD
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From: Patrick Burke
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NOS/Center for Operational Oceanographic Products and Services

Subject: Updated: Implementation of new Oceanographic Forecast Modeling System for the U.S. West Coast (WCOFS) and the Upgraded Northern Gulf of Mexico (NGOFS2): Effective Monday, March 22, 2021

Updated to reflect new implementation date of Monday, March 22, 2021.

Effective on or about Monday, March 22, 2021, beginning at 1200 Coordinated Universal Time (UTC), the new NOAA/National Ocean Service (NOS) Operational Forecast Systems for the West Coast (WCOFS) and the Northern Gulf of Mexico (NGOFS2) will be implemented on NOAA's Weather Climate Operational Supercomputing System (WCOSS). NGOFS2 integrates the existing Northern Gulf of Mexico (NGOFS), Northeastern Gulf of Mexico (NEGOFS), and Northwestern Gulf of Mexico (NWGOFS) into one model grid and extends the model domain to the Mexico border and into the Mississippi River up to Baton Rouge. NGOFS, NEGOFS, and NWGOFS will be retired and their products (NetCDF output files and web products) will no longer be available after NGOFS2 is implemented in operations.

A. Changes to the existing OFS

Output from NGOFS, NEGOFS and NWGOFS will no longer be available on the CO-OPS THREDDS server:

https://opendap.co-ops.nos.noaa.gov/thredds/catalog.html
ftp://tidepool.nos.noaa.gov/pub/outgoing/ofs

or on National Centers for Environmental Prediction (NCEP) NOAA Operational Model Archive and Distribution Service (NOMADS) and File Transfer Protocol (FTP) Web services:

https://nomads.ncep.noaa.gov
ftp://ftpprd.ncep.noaa.gov
Under directory structure:
pub/data/nccf/com/nos/prod/OFS.YYYYMMDD
and with filenames:

nos.OFS.fields.nHHH.YYYYMMDD.tCCz.nc
nos.OFS.fields.fHHH.YYYYMMDD.tCCz.nc
nos.OFS.hflux.forecast.YYYYMMDD.tCCz.nc
nos.OFS.hflux.nowcast.YYYYMMDD.tCCz.nc
nos.OFS.init.nowcast.YYYYMMDD.tCCz.nc
nos.OFS.stations.nowcast.YYYYMMDD.tCCz.nc
nos.OFS.stations.forecast.YYYYMMDD.tCCz.nc
nos.OFS.met.forecast.YYYYMMDD.tCCz.nc
nos.OFS.met.nowcast.YYYYMMDD.tCCz.nc
nos.OFS.obc.YYYYMMDD.tCCz.nc
nos.OFS.river.YYYYMMDD.tCCz.nc.tar
nos.OFS.forecast.YYYYMMDD.tCCz.in
nos.OFS.forecast.YYYYMMDD.tCCz.log
nos.OFS.nowcast.YYYYMMDD.tCCz.in
nos.OFS.nowcast.YYYYMMDD.tCCz.log
nos.OFS.jlogfile.YYYYMMDD.tCCz.log
nos.OFS.corms.YYYYMMDD.tCCz.log

Where YYYY, MM, DD is year, month, day; CC is cycle (03, 09, 15, 21); HHH is forecast hour, and OFS is ngofs, negofs or nwgofs.

Output from CBOFS, DBOFS and GOMOFS will be made available greater than five minutes earlier.

B. New NGOFS2 System

NGOFS2 will provide users with nowcast (analyses of near present) and forecast guidance of the three-dimensional physical conditions of the Northern Gulf of Mexico, including surface water levels, surface water currents, water temperature and water salinity, and 3-dimensional (3-D) water currents, water temperature and water salinity up to 48 hours.

As its core ocean prediction model, NGOFS2 uses the same Finite Volume Community Ocean Model (FVCOM) developed jointly by the University of Massachusetts, Dartmouth and the Woods Hole Oceanographic Institution as used by the existing NGOFS, NEGOFS and NWGOFS. FVCOM is a prognostic, unstructured-grid, finite-volume, free-surface, 3-D primitive equation coastal ocean circulation model with a horizontal grid comprised of unstructured triangular cells and the irregular bottom is presented using generalized terrain-following coordinates. FVCOM is one of the NOS-supported community ocean models used to develop predictive coastal applications. NGOFS2 operates within the NOS Coastal Ocean Modeling Framework (COMF) and will have the same four daily nowcast and forecast cycles as NGOFS at 03, 09, 15 and 21 UTC.

NGOFS2 bathymetry has a minimum depth of 1.0 m and maximum depth of 1750.3 m. The unstructured triangular grid has 303,714 nodes and 569,405 elements. The horizontal triangular grid size ranges from 45 m to 10 km, with higher resolution located in tidal creeks, inlets connecting bay with coastal ocean and intracoastal waterways and coarser resolution along the open boundary. The model has 41 uniform sigma levels in vertical.

NWS provides the meteorological forcing for the nowcast and forecast cycles 12 km resolution North American Mesoscale (NAM) weather prediction

model. Non-tidal water levels and 37 tidal constituents along the open boundary are interpolated from NWS Global Real-Time Ocean Forecast System (G-RTOFS) and the Advanced Circulation Model (ADCIRC) ec2001 tidal database, respectively. The temperature and salinity along the open boundary are interpolated from the G-RTOFS forecast guidance. The river forcing is provided by U.S. Geological Survey (USGS) real-time river discharge observations for nowcast cycles; the last observed discharges are persisted for forecast cycles.

C. New WCOFS System

The WCOFS domain encompasses the entire West Coast from California to Washington to the 10 m isobath and extends offshore for more than 1,000 km. WCOFS will provide users with nowcast (analyses of near present) and forecast guidance of the three-dimensional physical conditions of the entire U.S. West Coast, including water levels, currents, temperature and salinity up to 72 hours.

WCOFS is based on the Regional Ocean Modeling System (ROMS) developed by the coastal ocean modeling community and supported by Rutgers University. ROMS is a free-surface, terrain-following primitive equation ocean model widely used by the scientific and operational community for a diverse range of applications. ROMS is one of the NOS-supported community ocean models used for predictive coastal applications. ROMS operates within the NOS Coastal Ocean Modeling Framework (COMF). The model grid has 348x1016 points in the horizontal with grid resolution of about 4km. The vertical grid follows the terrain and consists of 40 levels.

WCOFS nowcast/forecast starts with an analysis from a 3-day data assimilation window. ROMS's 4-dimensional variational data assimilation (4DVAR) methodology is used to improve the initial conditions of the ocean state. Currently, the following observations are assimilated:

- Three-satellite sea surface temperature (SST): the Visible Infrared Imaging Radiometer Suite (VIIRS) onboard the Suomi National Polar-Orbiting Partnership, VIIRS from NOAA-20, and Advanced Baseline Imager from GOES-17.
- Surface currents from the National High Frequency Radar (HFR) network.
- Absolute dynamic topography (ADT) from satellites Jason 3, Sentinel 3, Cryosat 2 and SARAL/Altika.

WCOFS has three open-ocean boundaries, north, south and west. NCEP's Global Real Time Ocean Forecast System (RTOFS) is used to provide open boundary conditions for non-tidal water level, temperature, salinity and non-tidal depth integrated currents. Tidal currents and water level are constructed from Oregon State University's TPXO8 tidal database. Temperature and salinity within a 100km zone along the open boundary are also nudged towards RTOFS temperature and salinity fields. Meteorological (NAM) surface forcing conditions are derived from the NWS North American Mesoscale 12 km atmospheric forecast model data. Operational products from the NWS Global Forecasting System (FV3GFS) serve as the backup meteorological surface forcing conditions in the event that NAM products are not available for both the nowcast and forecast runs. Additionally, WCOFS uses USGS real-time river discharge observations at the Columbia

River and climatology discharge and temperature for 14 rivers in Washington and the Fraser River in Canada during the nowcast run. River discharge and temperature are held constant from the last observation throughout the forecast period.

Nowcast and forecast guidance cycles are run daily with 24-hour nowcast and 72-hour forecast.

D. Dissemination of New Products

D1. Model output files

Fields and station forecast guidance from WCOFS and NGOFS2 will be available in NetCDF format on CO-OPS THREDDS server:

https://opendap.co-ops.nos.noaa.gov/thredds/catalog.html
ftp://tidepool.nos.noaa.gov/pub/outgoing/ofs

and on NCEP Web services:

https://nomads.ncep.noaa.gov/pub/data/nccf/com/nos/prod/
ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/nos/prod/
https://www.ftp.ncep.noaa.gov/data/nccf/com/nos/prod/

As part of NCEP's standard 30-day parallel testing, the output products from NCO parallel runs will be available here:

https://para.nomads.ncep.noaa.gov/pub/data/nccf/com/nos/para/

Delayed long-term model archives on National Centers for Environmental Information (NCEI) NOMADS are available here:

https://www.ncei.noaa.gov/thredds/model/model.html

Web products for WCOFS and NGOFS2 will be displayed at:

https://tidesandcurrents.noaa.gov/ofs/wcofs/wcofs.html
https://tidesandcurrents.noaa.gov/ofs/ngofs2/ngofs2.html

IOOS EDS viewer:

https://eds.ioos.us/#

The following types of model output files will be available from WCOFS and NGOFS2:

The first type is field/gridded data that includes three dimensional gridded data at 3-hour intervals:

nos.{OFS}.fields.nHHH.YYYYMMDD.tCCz.nc
Where HHH is 000, 003, and 006 when OFS = ngofs2
Where HHH is 003, 009, ..., 024 when OFS = wcofs
nos.{OFS}.fields.fHHH.YYYYMMDD.tCCz.nc
Where HHH is 000, 003, ..., 048 when OFS = ngofs2

Where HHH is 003, 006, ..., 072 when OFS = wcofs and two-dimensional gridded surface data at one-hourly intervals:
nos.{OFS}.2ds.nHHH.YYYYMMDD.tCCz.nc
Where HHH is 000, 001, ..., 006 when OFS = ngofs2
Where HHH is 001, 002, ..., 024 when OFS = wcofs
nos.{OFS}.2ds.fHHH.YYYYMMDD.tCCz.nc
Where HHH is 000, 001, ..., 048 when OFS = ngofs2
Where HHH is 001, 002, ..., 072 when OFS = wcofs

Where YYYYMMDD is year, month, day; CC is 03, 09, 15 or 21 when OFS = ngofs2; CC is 03 when OFS = wcofs.

The second type is station/point data with a 6-minute interval. Water level, surface wind, water temperature, salinity and water currents are the output variables:
nos.{OFS}.stations.nowcast.YYYYMMDD.tCCz.nc
nos.{OFS}.stations.forecast.YYYYMMDD.tCCz.nc

Where CC is 03, 09, 15 or 21 when OFS = ngofs2; CC is 03 when OFS = wcofs and three-dimensional daily averaged field output.

nos.wcofs.avg.nowcast.YYYYMMDD.tCCz.nc
nos.wcofs.avg.forecast.YYYYMMDD.tCCz.nc
Where CC is 03.

D2. Model Input Files

The following forcing condition files are also available for rerun and research purposes:

Initial condition file for nowcast:
nos.{OFS}.init.nowcast.YYYYMMDD.tCCz.nc

Meteorological forcing files:
nos.{OFS}.met.nowcast.YYYYMMDD.tCCz.nc
nos.{OFS}.met.forecast.YYYYMMDD.tCCz.nc
nos.ngofs2.hflux.nowcast.YYYYMMDD.tCCz.nc
nos.ngofs2.hflux.forecast.YYYYMMDD.tCCz.nc

River forcing file:
nos.ngofs2.river.YYYYMMDD.tCCz.nc.tar
nos.wcofs.river.YYYYMMDD.tCCz.nc

Open boundary forcing file:
nos.{OFS}.obc.YYYYMMDD.tCCz.nc

Open boundary nudging file:
nos.wcofs.clim.YYYYMMDD.tCCz.nc
nos.wcofs.roms.tides.YYYYMMDD.tCCz.nc

Run control input files:
nos.{OFS}.nowcast.YYYYMMDD.tCCz.in
nos.{OFS}.forecast.YYYYMMDD.tCCz.in

Real-Time model run log files:
nos.{OFS}.corms.YYYYMMDD.tCCz.log
nos.{OFS}.jlogfile.YYYYMMDD.tCCz.log
nos.{OFS}.nowcast.YYYYMMDD.tCCz.log
nos.{OFS}.forecast.YYYYMMDD.tCCz.log
{OFS}.status

Where CC is 03, 09, 15 or 21 when OFS = ngofs2; CC is 03 when OFS = wcofs.

Forecast guidance from both WCOFS and NGOFS2 are used by commercial, recreational mariners, fishermen, emergency managers, search and rescue responders and NWS marine weather forecasters. The development and implementation of WCOFS is a joint project of the NOS/Center for Operational Oceanographic Products and Services (CO-OPS), the NOS/Office of Coast Survey (OCS), National Environmental Satellite, Data and Information Service (NESDIS), and NWS/NCEP/NCEP Central Operations (NCO). Rutgers University provided technical support for ROMS. The development and implementation of NGOFS2 is a joint project of CO-OPS, OCS, NCONWS, NCO and the FVCOM development group at the University of Massachusetts, Dartmouth. WCOFS and NGOFS2 will be monitored 24 x 7 by both NCO/NCEP and CO-OPS Continuous Real-Time Monitoring System (CORMS) personnel.

Additional information about WCOFS and NGOFS2 will be found at the following links AFTER implementation:

https://tidesandcurrents.noaa.gov/ofs/wcofs/wcofs_info.html
https://tidesandcurrents.noaa.gov/ofs/ngofs2/ngofs_info.html

Note: The NOS OFS model is not designed to be used as a storm surge model, and during extreme weather events may provide inaccurate results. Its water level forecast guidance data are released for limited public utility and should be used with appropriate caution. In particular, WCOFS uses a numerical hydrodynamic model to generate the nowcast and forecast information; therefore, they should be considered as model-generated nowcast and forecast guidance. For more detailed information related to the OFS disclaimer, please visit:

https://tidesandcurrents.noaa.gov/disclaimers.html

NCEP urges all users to ensure their decoders can handle changes in content order 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. We will review any feedback and decide whether to proceed.

If you have any questions concerning these changes, please contact:

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For questions regarding dataflow aspects, please contact:

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National Service Change Notices are online at:

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

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