May 2018

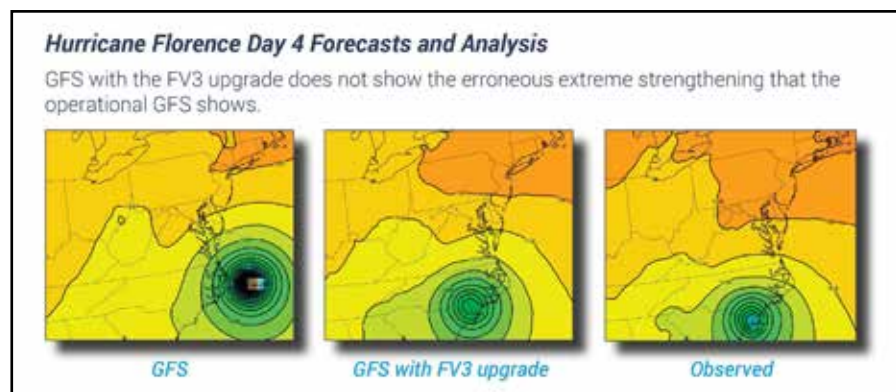## NWS Releases Global Forecast System Version 15.1

In early May, NWS announced it was planning to release the latest version of its signature forecasting model, the FV3-based Global Forecast System (GFS), Version 15.1. Once the NWS National Centers for Environmental Prediction (NCEP) completes a 30-day technical test successfully, this version will be the new operational model. The targeted release date is on or about Wednesday, June 12, 2019.

In February, NWS paused its implementation timeline to review user concerns about the excessive snow and a cold bias in the model and to explore other potential improvements. In the following months, NWS modified the model to alleviate excessive snow and cold bias in the model and made three key updates:

◆ Changed the way snow amounts were calculated and communicated to the land surface model, basing it on the fraction of frozen precipitation falling on the ground rather than on the total precipitation in cold conditions

◆ Refined the interaction of radiation with cloud particles, allowing for each type of hydrometeor (convective rain, stratiform rain, snow, graupel, and ice) to assume its own physical characteristics as calculated by the Geophysical Fluid Dynamics Laboratory microphysics scheme (like particle radius) and interact accordingly with the radiation scheme

◆ Updated the supersaturation parameter over ice in the data assimilation system.

The results show an improvement over biases previously found in the model. As a result of the advantages offered by GFSv15.1, NWS is confident moving forward with the upgrade, which includes the FV3 dynamical core. You can find more details about the scientific results in the Service Change Notice. Additionally major changes include:

◆ Updating data assimilation to take in NPOESS Preparatory Project Ozone Mapping Profiler Suite ozone

◆ Placing NOAA-19 Solar Back-scatter Ultraviolet Instrument/2 ozone in monitor

◆ Assimilating Meteosat-11 Spinning Enhanced Visible and InfraRed Imager Channels 5 and 6

◆ Updating quality control for GOES Satellite AMVs in preparation for GOES-17.

Hurricane Florence Day 4 Forecasts and Analysis

GFS with the FV3 upgrade does not show the erroneous extreme strengthening that the operational GFS shows.

GFS | GFS with FV3 upgrade | Observed

If GFSv15.1 is implemented in June, GFSv14 model output will remain available through September 30, 2019, on the NCEP Model Analyses and Guidance (MAG) Evaluation website and NOAA National Operational Model Archive and Distribution System (NOMADS) Para-NOMADS Website.

◆ For questions regarding products from GFS Version 15.1, please contact: ***Brian Gross**, Director, Environmental Modeling Center*

◆ For questions regarding the data flow aspects of these data sets, please contact: ***Carissa Klemmer**, Chief, NCO Implementation and Data Services Branch*

◆ For media inquiries, please contact: ***Lauren Gaches**, NWS Public Affairs, 301-683-1327*

Working Together to Understand and Mitigate Flooding Impacts

By *Jonathan Guseman, WCM, NWS Jackson, KY*

Focusing on flash flooding and hydrology gave the recent NWS Jackson, KY, Integrated Warning Team a more targeted agenda. Core partners from the Kentucky Weather Preparedness Committee-East were invited for a full day of discussion on eastern Kentucky's greatest weather-related disaster, flash flooding.

In the morning, attendees took part in a deadly flash flooding tabletop exercise. The exercise also included three distinct waves of severe thunderstorms that tore through the area.

NWS Jackson forecasters teamed up to produce weather briefings for attendees and discussed briefing content and partner action items at intervals throughout the event.

Forecasters used the Situation Report template, a well-respected tool, and offered numerous iterations of threat graphics partners could use in future briefings. This exercise also keyed in on many of the various ways NWS sends products: traditional text, social media graphics, NWSChat, etc. In addition to responding to partner concerns, the exercise allowed several forecasters to complete their Deployment-Ready Task Books.

The afternoon session consisted of split presentations. First staff took part in a webinar on Flooded Locations and Simulated Hydrographs (FLASH) by Megan Terry, Service Hydrologist in Springfield, MO, while partners were offered a presentation on river forecasts vs. outlooks by Hydrologist Ryan Fliehman. Next NWS Jackson Hydrology Program leader, Pete Geogerian, and Flash Flood Focal Point, Jane Marie Wix, offered partners an in-depth demonstration on issuing Flood/Flash Flood Warnings via WarnGen software and explained how the office uses the RiverPro program to issue River Flood Warnings after collaborating with the Ohio River Forecast Center.

The workshop concluded with a recap of a recent major severe thunderstorm and flash flooding event. Many partners in attendance talked about how much they learned, while NWS staff appreciated the valuable feedback about its services.

A special thank you goes out to NWS Wilmington, OH, for providing service coverage that day, allowing all NWS Jackson staff to take part in the event.

The New NOAA/NWS National Forecast Chart

By *NWS Communications Staff, Silver Spring, MD*

In April, the NWS Weather Prediction Center (WPC) officially upgraded its national forecast charts depicting daily weather across the United States for the upcoming 3 days. These updates are the most substantial changes to these charts in more than 18 years and were implemented after an extensive experimental phase and feedback process.

The national forecast chart is used extensively across the weather enterprise and is shared daily with more than 40,000 emergency management contacts through the Federal Emergency Management Agency (FEMA).

NWS believes the new charts are cleaner and easier-to-read. The charts display daily weather features and hazardous weather forecasts over the contiguous United States. In addition to showing severe weather and flash flooding, the map displays areas of rain, snow, freezing rain, thunderstorms, mixed precipitation and tropical cyclones.

The upgrade incorporates the latest mapping services from Esri Geographic information System (GIS) services and other open source data visualization tools.

"The National Forecast Chart is America's go-to summary of the day's weather. This upgrade dramatically modernizes the look, feel and function of the chart to enable the most effective decision support for our partners," said WPC Director David Novak, Ph.D.

In addition to the static files, perhaps the most substantial change is to introduce an interactive GIS map to display the forecast charts. This GIS option allows users to turn weather and hazard layers on and off and provides panning and zoom capabilities.

The charts will continue to be available in a variety of image formats, including pdfs and thumbnail images for NWS and NOAA web pages. A Spanish-language version of the forecast chart will also be produced with the new map format.
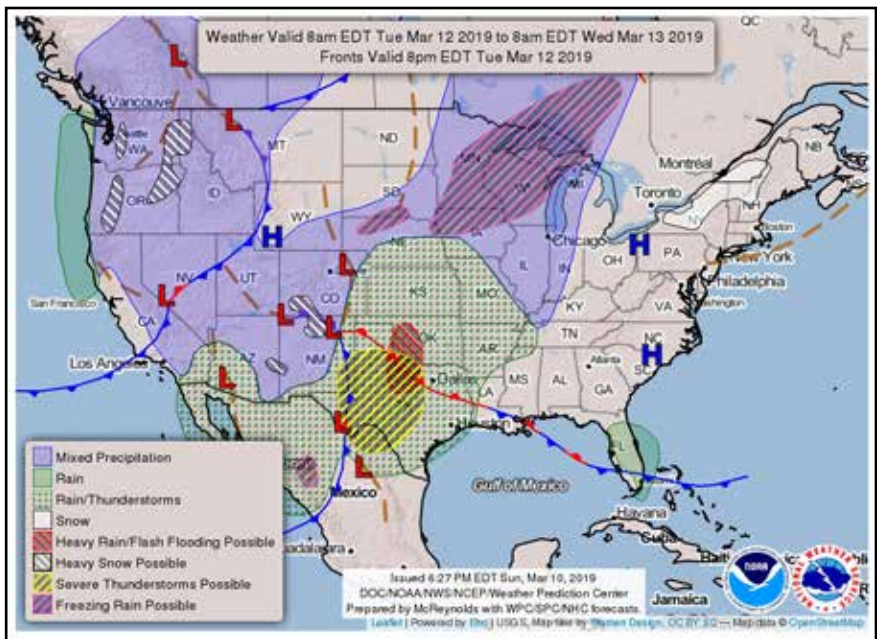
NWS Supports Meso18-19 Field Research Campaign for VORTEX-Southeast

By **Greg Patrick,** *Chief, Science and Technology Services Division, NWS Southern Region Headquarters*

Between Nov 1, 2018 and April 30, 2019, NWS field offices took part in the Meso18-19 field observation campaign as part of the VORTEX-Southeast tornado research project. The Verification of the Origins of Rotation in Tornadoes EXperiment-Southeast (VORTEX-SE) brings together operational meteorologists, researchers and social scientists to collaborate on research. The program looks at the storms and conditions producing tornadoes in the southeast United States. VORTEX-SE began in 2016 and continues through 2021.

When the weather pattern across the Southeast appeared favorable for severe thunderstorms and tornadoes, VORTEX-SE Project Manager Erik Rasmussen, NOAA Office of Oceanic and Atmospheric Research (OAR), would decide whether to declare an Intensive Observing Period (IOP).

Up to 10 IOPs were planned during the 6-month Meso18-19 campaign which allowed researchers to gather special 3-D atmospheric measurements of wind, temperature, and moisture. The team used special surface mesonet stations, university upper air soundings, and research instruments such as wind and thermodynamic profilers to gather data to supplement the existing weather observation network.

NWS field offices contributed to Meso18-19 by releasing upper air soundings every 6 hours during each IOP. Upper air sites at 13 NWS offices from Texas, Oklahoma, Missouri to Georgia and Florida took part in the special sounding
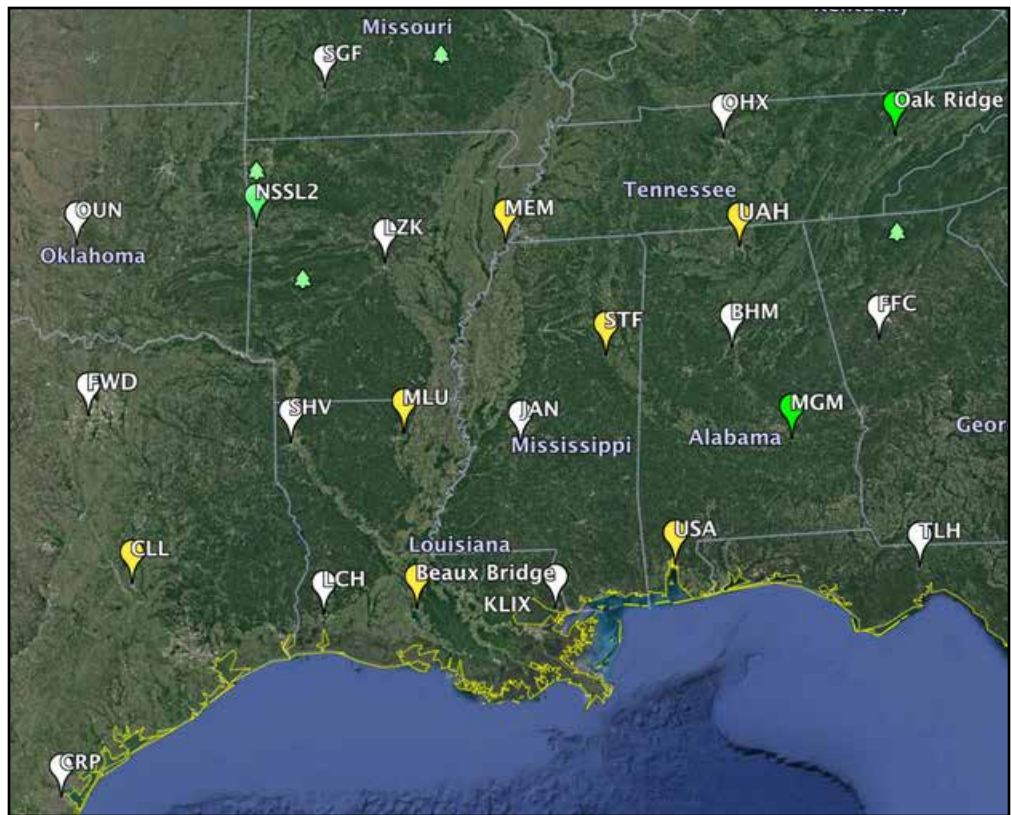
releases that supplemented the regularly scheduled 1200 UTC and 0000 UTC soundings. The map shown indicates locations of the participating NWS sounding sites as well as the locations of the special sounding sites operated by OAR and participating universities.

The more frequent and more numerous soundings were not only beneficial in real-time monitoring of the atmosphere, but also will help researchers understand the temporal evolution of atmospheric changes leading to tornado potential.

On March 3, 2019, during the sixth IOP of this campaign, a violent EF-4 tornado occurred in Lee County, AL. In the hours leading up to that tornado, Meso18-19

Upper air sites during the Meso18-19 campaign. NWS upper air sites are shown by the white icons, with university-operated and OAR-operated sites shown in yellow and green.

special soundings were being used by forecasters at the Storm Prediction Center and at NWS forecast offices to help anticipate the degree of tornado threat.

VORTEX-SE researchers were watching closely as the severe weather episode and tornadic events evolved. Rasmussen noted, "I was very impressed with how well forecasters were able to fine-tune the short-term outlooks and provide quality warnings. The sad loss of life tells me that we have to continue to work on making sure everyone understands, and is able to respond to, the information coming out of the NWS and communicated so effectively by the media and others."

The VORTEX-SE research activities and the data gathered during Meso18-19 will be used to more fully understand the predictability and societal impacts of southeast U.S. tornadoes. The next major VORTEX-SE field/observation campaign is being planned for fall of 2020 and spring 2021.