



FAMOUSLY HOT

FORECASTS



Fall/Winter 2017

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Recreation of the 1900 Eclipse Expedition

by Leonard Vaughan - Hydrologist

The eclipse on August 21st 2017, was the perfect opportunity to recreate one of the most historic eclipse expeditions on record in the United States. Back on May 28th, 1900, the U.S. Weather Bureau sent a team of meteorologists to study the total solar eclipse. At that turn of the century, there was much interest among scientists about the effects of the moon's shadow upon the earth's atmosphere. Due to the technology limitations of the day, a total solar eclipse was the only time scientists could actually look directly at the sun to

make observations. The U.S. Weather Bureau expedition consisted of 11 people, led by Meteorologists Cleveland Abbe and Frank Bigelow. Abbe is known as the father of modern weather forecasting.

The NWS partnered with Tom English, Director of the Cline Observatory at Guilford Technical Community College near Greensboro, NC and Sam Zaidy, director of the Newberry County Library. We were able to take observations at the same site as the 1900 expedition, the former home of Dr. Houseal. Leonard Vaughan, Service Hydrologist and Hunter Coleman, Lead Forecaster conducted the event. Leonard even dressed the part for the recreation wearing clothing from around 1900. Observations of temperature and cloud cover were taken every 5 minutes through the event from 1:00 pm until 4:15 pm. 1 minute observations were taken during the peak of the event from 2:20 pm until 3:20 pm. They used a cotton region shelter, borrowed from the SC Climate Office to house the thermometers.



NWS Hydrologist, Leonard Vaughan taking observations during the eclipse

Recreation of the 1900 Eclipse-Continued

There were several notable observations made during the eclipse:

- Temperature warmed to 95° prior to the eclipse onset
- A 3° drop in temperature was observed around 1:50-1:55 pm, likely associated with increasing clouds and possible outflow from a nearby shower
- A 4° drop in temperature was noted from 2:20-2:40 (just before totality) associated with the loss of solar radiation.
- Around 2:31 pm cicadas, insects and frogs began making audible noises which became louder through totality
- Flashlight needed at 2:36 pm to read thermometers, then no longer needed at 2:48 pm.
- Several flocks of Purple Martins and Swallows began to fly in a confused manner around totality
- The minimum temperature observed was 84°, which occurred around 5 minutes after totality. The temperature remained steady for nearly 15 minutes.
- There was a noticeable reduction in cumulus clouds just after totality and remained mostly cloud free through the end of the observation period.



Eclipse Photo taken in Newberry by meteorologist, Hunter Coleman

GOES-16 Brings Groundbreaking Technology to Forecasters

by Frank Alsheimer - Science and Operations Officer



At 6:42 PM on November 19, 2016, the Geostationary Operational Environmental Satellite – R series (GOES-R) was launched from an Atlas rocket at Cape Canaveral Air Force Station in Florida. The satellite, which became known as GOES-16 when it reached its orbiting altitude on November 30, 2016, is carrying the largest leap forward in U.S. geostationary remote sensing in over 25 years. The satellite bus itself contains several different and unique instruments. The advanced baseline imager (ABI) provides 60X more data than its U.S. predecessors, GOES 13, 14, and 15. Cloud and moisture imagery from the ABI will come as often as every 30 seconds, with 4X the previous spatial resolution. There are also 3X more spectral bands on the instrument, allowing us to see information with much greater vertical resolution than before.

GOES-16-Continued

There is also a groundbreaking Geostationary Lightning Mapper (GLM) instrument aboard GOES-16. The GLM is the first operational lightning mapper flown in geostationary orbit. It will collect information such as the frequency, location and extent of lightning discharges to identify intensifying thunderstorms and tropical cyclones. The GLM will be able to consistently scan over large portions of the Atlantic and Pacific Oceans, which is difficult to do effectively from land-based lightning systems.

Additional instruments aboard GOES-16 will measure ultraviolet and X-ray irradiances, helping to monitor space weather and warn of solar flares that are potentially disruptive to communications, navigation, high altitude aircraft, and power grids.

After a period of validation and calibration, beta and provisional data from GOES-16 has been transmitted to earth since March 1st. The data from this satellite has already been used to help forecast and observe severe weather outbreaks, hurricanes, heavy precipitation and flash flood events, and even the recent solar eclipse. We are expecting to learn a lot about winter storms during the upcoming months.

During the month of November, GOES-16 will gradually move from its current test location at approximately 89 degrees west longitude, to its final location of 75 degrees west longitude, where it will then be given the nickname GOES-East. GOES-16 is just the first in a series of 4 geostationary satellites that will be launched from the U.S. over the coming decade. The next satellite, GOES-S, is expected to launch next spring, and after its validation and calibration are complete, it will be moved to a longitude of 135 degrees west longitude sometime in early 2019 and named GOES-17 (a.k.a. GOES-West). That will give full coverage for the continental United States, as well the nearby eastern Pacific and western Atlantic oceans for monitoring of large ocean winter storms as they approach the west coast of the U.S., and hurricanes as they approach the east coast of the U.S. from the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. GOES-17 will be able to see all the way out to Hawaii, as well as southern parts of Alaska.



Late Season Freeze Devastates SC

by Chris Rohrbach - Meteorologist

The March 2017 North American Blizzard dumped up to 3 feet of snow across portions of the Northeast and even brought a few snow showers to the Midlands of South Carolina. However, the headline in the Southeast that week was the hard freeze which devastated the agricultural community. The South Carolina Department of Agriculture estimated an 85 to 90 percent loss in the state peach crop. South Carolina is the second largest peach producer in the nation with an average economic impact of \$300 million each year.

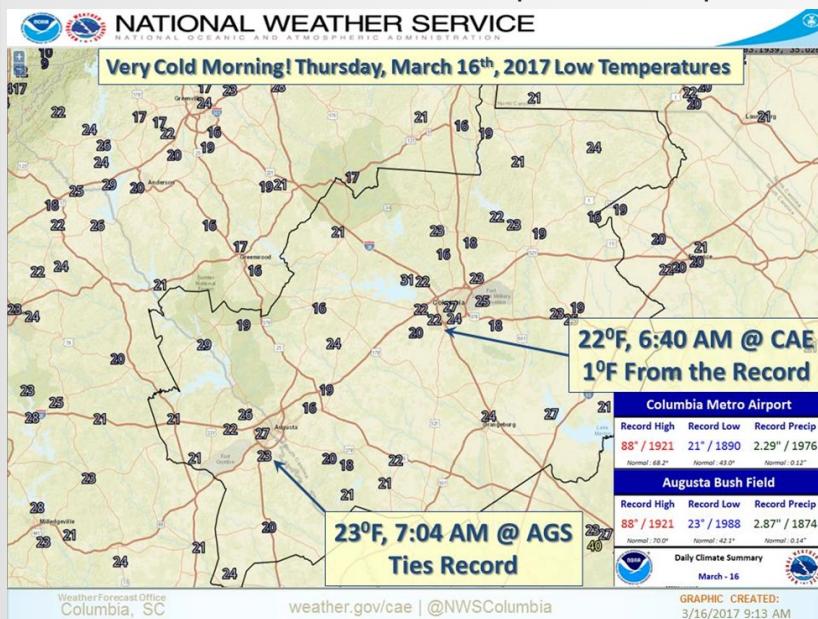


Photo Credit: Clemson University

Dry, cool air associated with high pressure sitting squarely over the Southeast allowed temperatures to drop into the teens to low 20s across the Midlands and CSRA on the night of March 15th. The coldest temperature recorded was 14°F in Silverstreet, SC and Bethune, SC. The Augusta Regional Airport in Augusta, G.A. tied its record low temperature for March 16 of 23°F. Normal nighttime temperatures for mid-March in the Midlands and CSRA are in the low 40s. The following night, temperatures dropped into the mid-20s further compounding the agricultural woes.

The freeze may not have been as devastating had it not been for the unseasonably warm temperatures in previous months. The average temperature in January and February this year was 7.8°F warmer than normal in South Carolina, and was the second warmest on record. This contributed to an earlier than normal peach bloom. The near-record warmth was also the culprit behind premature azalea blooms at Augusta National Golf Club. The lack of the iconic azalea flowers piqued national media interest during the Masters Golf Tournament in early April.

S.C. farmers have become all too familiar with destructive weather events in recent years. The South Carolina Department of Agriculture estimated total losses of over \$375 million during the historic flooding of October 2015. The following year also brought extensive crop damage when Hurricane Matthew tracked up the state's coastline. Although nature has dealt S.C. farmers a tough hand, they will continue to adapt and hope for better luck in the coming season.



Low temperature plot from morning of March 16th
(unofficial observations)

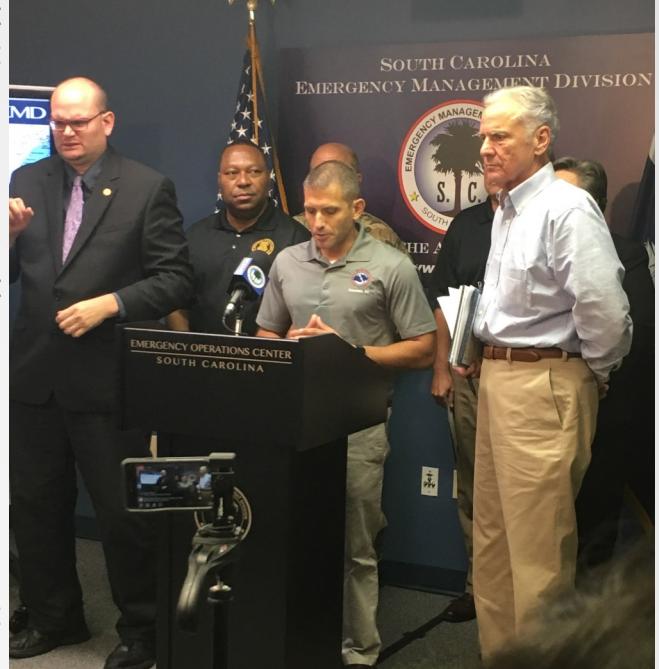
Providing Decision Support During Irma

by Whitney Smith - Meteorologist

To evacuate or not to evacuate? That was just one of countless questions that decision makers in South Carolina were faced with as Hurricane Irma threatened the Southeastern US in early September. Meteorologists from the National Weather Service in Columbia were on site at the South Carolina Emergency Operations Center (SEOC) to provide the latest forecast information to support decision makers as they tackled those tough questions.

The deployment of three NWS Columbia meteorologists to the SEOC began on Wednesday, September 6th and continued through the duration of the event. Tasked with collecting the latest forecast data from the National Hurricane Center and each of the four NWS forecast offices that cover South Carolina and combining it into one concise forecast for the entire state, forecasters worked fast paced 8-12 hour shifts. Their forecasts were presented during daily conference calls with county emergency managers, executive calls with the governor and agency heads, press briefings with the governor and local media, and briefings for the National Guard and others working on site at the SEOC.

One of the most challenging aspects of Hurricane Irma decision support came as many of the forecast models began taking the storm on a track further west than previous model runs had. Even though the eye of the storm was no longer expected to track directly through South Carolina, significant impacts could still be expected across the state. Clearly communicating those impacts to decision makers and the public was crucial to decisions and preparations that had to be made days in advance.



Warning Coordination Meteorologist, John Quagliariello providing forecast information during the SC Governor's press briefing



NWS Columbia meteorologist, Rachel Cobb briefing the State Emergency Operations Center at shift change

Meteorologists from NWS Columbia had trained for that task through the winter and spring, striving to improve how they communicate complicated high impact weather forecasts without using technical jargon. This training came into play sooner than they had hoped with Hurricane Irma looming near the region. Providing decision support is a key aspect of the NWS's Weather Ready Nation initiative and ultimately our mission to protect lives and property.

Fall Weather Hazards

by Whitney Smith - Meteorologist

With the Atlantic Hurricane Season coming to an end on November 30th and the season of Fall well under way, it's important to be aware and make a plan for the numerous hazardous conditions that are possible through every single season. Are you ready for Fall weather hazards?

Know your Risk, Take Action, Be a Force of Nature!



As the days get shorter and temperatures fall, a new round of weather hazards are on the rise. This transitional season often features weather hazards seen during both warm and cold months, including hurricanes, wildfires, intense winds, flooding, droughts, early season snow and more.

Get ready for fall weather with preparedness tips from the National Weather Service. Stay safe this fall!. **#FallSafety**

Winter Weather Driving Safety Tips

by Rich Okulski - Meteorologist in Charge

Winter weather is an infrequent visitor to The Midlands, however it is good to adhere to the following safety tips if you must drive in snow and ice:

- ⇒ **Avoid driving when you are fatigued.**
- ⇒ **Never warm a vehicle in an enclosed area such as a garage.**
- ⇒ **Keep your gas tank at least half full to avoid gas line freeze up.**
- ⇒ **Avoid using your parking brake if at all possible.**
- ⇒ **Do not use cruise control when driving on a slippery surface (wet or icy).**
- ⇒ **Drive slowly in ice and snow. Every action takes longer.**
- ⇒ **Pack blankets in your vehicle in case you get stuck.**
- ⇒ **Do not power up hills or stop while climbing a hill.**

The bottom line is stay home if you are able to do so in winter weather conditions.

While dangerous road conditions are one of the most deadly hazards during winter, it's not the only threat you may encounter. Other winter hazards include brutal cold, heavy snow and ice, dangerous flooding, extreme wind, and treacherous fog. **#WinterSafety**



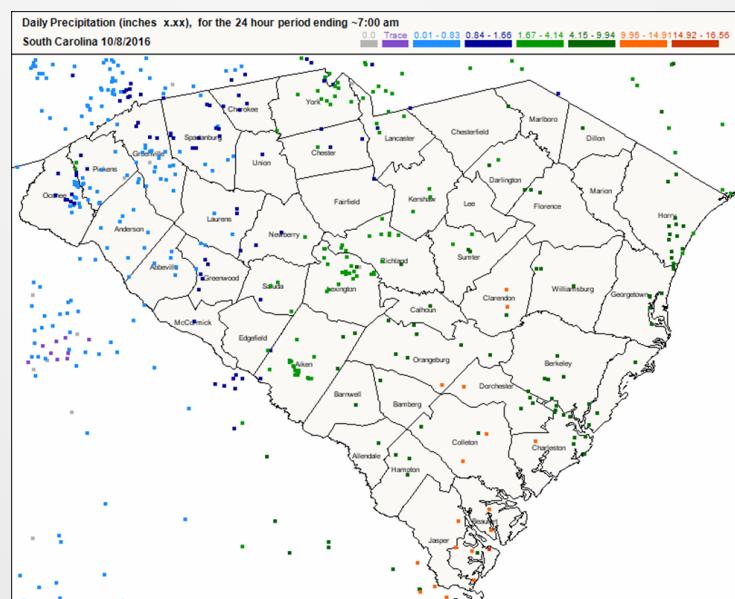
Citizen Science in Action—CoCoRaHS

by Rachel Cobb - Meteorologist

CoCoRaHS, the Community Collaborative Rain, Hail, and Snow Network, has been active in South Carolina and Georgia since 2008. Since then, over 500 volunteers have signed up to be CoCoRaHS precipitation observers in WFO Columbia's forecast area, and July 2017 saw 20% more reports than July 2016. However, there were still only 176 active observers in 2017. Therefore, we are always looking for more volunteers, especially in underserved counties, such as Lee, SC and Lincoln, GA. We would like to achieve the national goal of 1 observer per square mile in urban areas, and 1 observer per 36 square miles in rural locations. If you have ever been interested in the weather, this is the best time of year to become involved with CoCoRaHS. Summer is nearing an end, but afternoon thunderstorms continue, and tropical season is upon us. Your rain and hail reports are incredibly important. During Hurricane Matthew, there were 936 CoCoRaHS rainfall reports across South Carolina from October 8th through October 10th, with a record high value of 16.56 inches on Hilton Head Island. Even if you previously signed up for CoCoRaHS but haven't reported in a while, it's never too late to get back into it.

So, what is CoCoRaHS? It is a unique, non-profit, community based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow). Automated surface observations are everywhere these days, and are valuable for temperature data, but not all sensors measure precipitation. In a very real way, you could be acting to improve climatological data sets by taking, and reporting, your rain and snow observations! Why is CoCoRaHS important? Precipitation is essential for life. As many of us know, it can vary greatly with topography, storm type and season. Meteorologists, engineers, hydrologists, entomologists, insurance experts, and building contractors are all very interested in precipitation. And for some, like the many farmers of our region, it is their very livelihood.

Want to become a volunteer? You can sign up online at www.cocorahs.org. Training materials are available, as well as links to purchase the official 4" rain gauges. You may also inquire about upcoming local training sessions in your area by contacting your local coordinator, Leonard Vaughan, at Leonard.Vaughan@noaa.gov.



Bringing Research into Operations

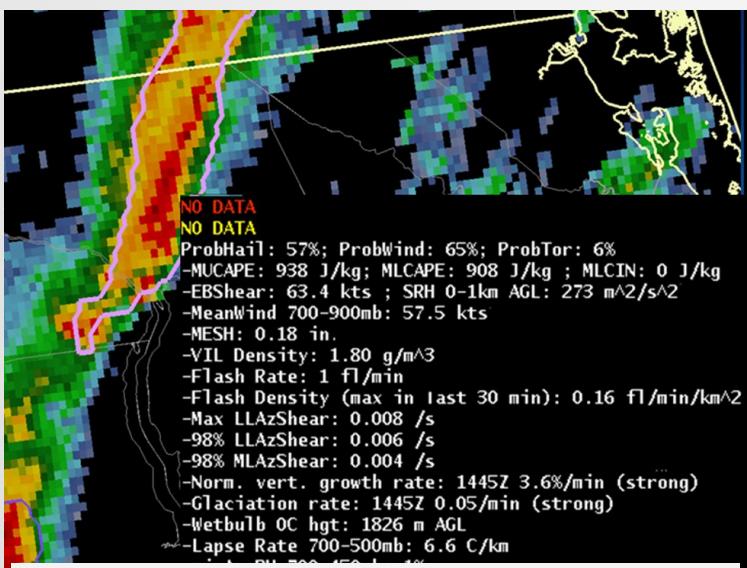
by Hunter Coleman - Meteorologist

The National Weather Service (NWS) has developed multiple testbeds and proving grounds to facilitate the transfer of research capabilities to operational implementation at NWS field offices and national centers. These testbeds host meteorologists and hydrologists for a week or two at a time in order to evaluate new and emerging technologies and science to determine the operational readiness for deployment. The Hazardous Weather Testbed, a joint project of the NWS and the National Severe Storms Laboratory (NSSL) was one of the first testbeds and consists of two primary programs, the Experimental Forecast Program and the Experimental Warning Program. Additional testbed and proving ground activities include the Aviation Weather Testbed and the Hydrometeorology Testbed, among others.



The National Weather Center building in Norman, OK, which hosts the Hazardous Weather Testbed.

NWS Columbia has sent several forecasters to participate in these testbed activities through the years, each time bringing back valuable information to incorporate into operations. It is a unique experience for forecasters that allow them early access to techniques and technologies that may be implemented at the field offices in the future. Many of the new technologies that have come out of the testbed activities are used in operations today by our forecasters during forecast and warning operations.



Example of the ProbSevere model output a forecaster may use in warning operations.

One of the most useful products to come out of the testbeds is the ProbSevere model, which is a statistical model that predicts the probability that a storm will produce severe weather in the near term (next 60 min). It incorporates many variables such as satellite imagery, radar data, total lightning and more. ProbSevere has been used operationally and provided forecasters with increased situational awareness during warning operations as well as provide additional confidence a warning may or may not be issued for a particular storm.

Weather Ready Nation Ambassador Initiative

by John Quagliariello - Warning Coordination Meteorologist



The [Weather-Ready Nation](#) (WRN) Ambassador initiative is the National Weather Service's (NWS) effort to formally recognize NWS partners who are improving the nation's readiness, responsiveness, and overall resilience against extreme weather, water and climate events. The WRN Ambassador initiative helps unify the efforts across government, non-profits, academia, and private industry toward making the nation more ready, responsive, and resilient against extreme environmental hazards.

To be recognized as a WRN Ambassador, an organization must commit to:

- ⇒ Promoting Weather-Ready Nation messages and themes to their stakeholders
- ⇒ Engaging with NWS personnel on potential collaboration opportunities
- ⇒ Sharing their success stories of preparedness and resiliency
- ⇒ Serving as an example by educating employees on workplace preparedness

To support the efforts of WRN Ambassadors, the NWS can:

- ⇒ Provide outreach content about creating a Weather-Ready Nation
- ⇒ Explore innovative approaches for collaboration with your organization
- ⇒ Assist with [StormReady](#) opportunities for communities
- ⇒ Recognize your organization as a WRN Ambassador
- ⇒ Share the WRN Ambassador logo for your use



We must involve everyone in an effort to move people, and society, toward heeding warnings, taking action, and influencing their circles of family, friends, and social network to act appropriately. The WRN Ambassador initiative is the connecting hub of a vast network of federal, state, and local government agencies; emergency managers and city planners; researchers; the media; the insurance industry; nonprofit organizations; the private sector; and many others who are working together to address the impacts of extreme weather on daily life.

How to Become a WRN Ambassador:

Any organization across all levels of government, businesses large and small, non-profit and non-governmental organizations, and academia can become a WRN Ambassador by submitting a short online [application](#).



WRN Ambassador—Continued

2017 WRN Ambassador of Excellence Award:



Richland County, SC Emergency Services Department



Richland County, SC Emergency Services Department developed and implemented a network of professional grade, automated weather monitoring stations known as the Richland County Weather Information Network Data System, or RC Winds. There are over 40 stations across Richland and some surrounding counties

providing near real-time and historic weather data, including temperature, wind speed, rainfall and humidity. The information provided by RC Winds is used routinely in NWS operations, and has improved the accuracy and timeliness of flash flood and severe thunderstorm warnings. This has greatly enhanced the NWS' ability to protect lives and property and to build a Weather-Ready Nation.

NWS Columbia would like to recognize all of our WRN Ambassadors:

- Aiken County Emergency Management Division
- Augusta-Richmond County Emergency Management Agency
- Bamberg County Emergency Services
- Barnwell County Emergency Management
- Burke County Emergency Management Agency
- Carolinas Integrated Sciences and Assessments (CISA)
- Challenger Learning Center of Richland District One
- City of Sumter
- Columbia County Emergency Management
- Columbia Metropolitan Airport
- East Central Health District
- Edgefield County Emergency Management Agency
- Gold Cross EMS
- Kershaw County Amateur Radio Club, Inc.
- Kershaw County Emergency Management
- Lee County Emergency Management
- McCormick County Emergency Services
- McDuffie County Fire Rescue Service
- @Midlands_Wx
- Orangeburg County Emergency Management
- Palmetto Chapter of the American Meteorological Society
- Pee Dee Ice & Fuel, Inc.
- Simply Flood LLC
- South Carolina Farm Bureau Insurance
- South Carolina Weather
- WAGT-TV Augusta, GA
- WJBF-TV Augusta, GA
- WLTX-TV Columbia, SC
- 28th Operational Weather Squadron, Shaw AFB

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