NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

STORM COURIER

Charleston, SC
Weather Forecast Office

Spring/Summer 2016

Inside this issue:

Are You Vulnerable to a Hurricane's Storm Surge

by Robert Bright - Meteorologist & Tropical Program Leader

Hurricanes are a serious threat across the Lowcountry of South Carolina and Coastal Empire of Georgia bringing a variety of hazards. The one hazard that is particularly dangerous to life and property is storm surge, especially at the coast, and this is the main reason for evacuations. However, there are many people in this area who have not experienced a big surge event since there hasn't been one since Hurricane Hugo in 1989 and there have also been many new residents in the last 25+ years.

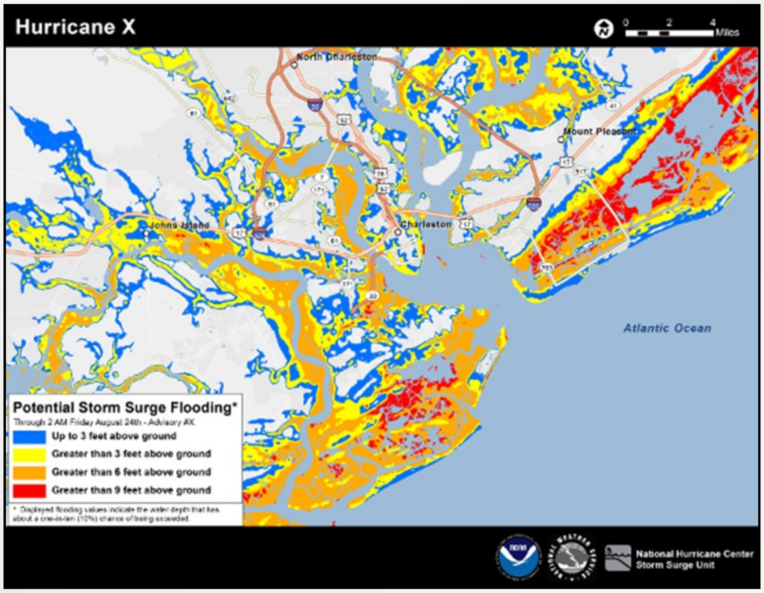
Storm Surge Fast Draw Video
(Spanish version)

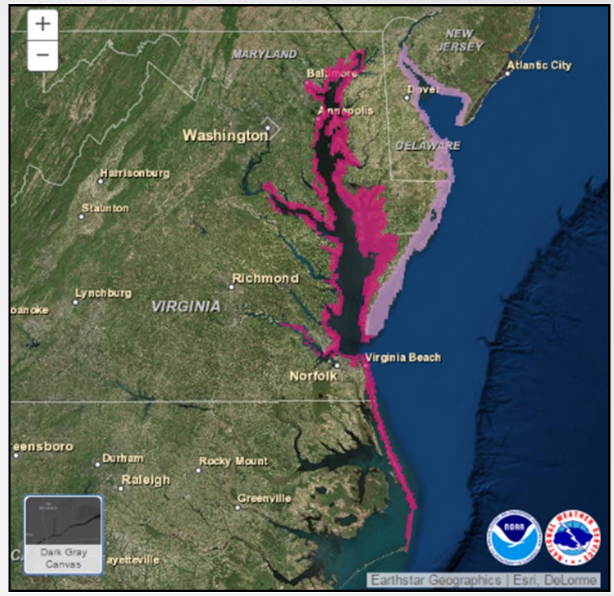
For those that are unaware, storm surge is the abnormal rise in water generated by a storm, mainly due to the strong winds blowing over the ocean for a long period of time. When combined with the normal high tides, water levels can rise significantly causing extreme flooding not only at the oceanfront but potentially also several miles inland.

Unfortunately, the coastal areas of South Carolina and Georgia are particularly vulnerable to inundation due to the low elevation, concave shape of the coastline and shallow continental shelf offshore. So how do you know if you are at risk from storm surge? First of all, you should be aware that you do not need to live at the beach to be at risk. You can check out NOAA's storm surge inundation maps and/or our online local hurricane guide. Also, you should check with your county's emergency management office for assistance.

Storm Surge - Continued

For 2016, the National Weather Service will continue to issue enhanced storm surge products, including the Potential Storm Surge Flooding Map and Experimental Storm Surge Watch/Warning graphic (shown below).





Note: These are static examples. Both products will be interactive with pan and zoom capabilities.

The Potential Storm Surge Flooding Map will be available on the National Hurricane Center's (NHC) website soon after a Hurricane Watch is issued. The map will include tide information and consider forecast uncertainty, ultimately showing reasonable worst-case water depths above ground that people should be prepared for. The other product is still in an experimental phase, but will indicate areas in danger from life-threatening storm surge, approximately 48 hours in advance. The graphic will also be available on the NHC's website, about 30 minutes after the official Advisory is released. For more information, check out the NHC's surge webpage.

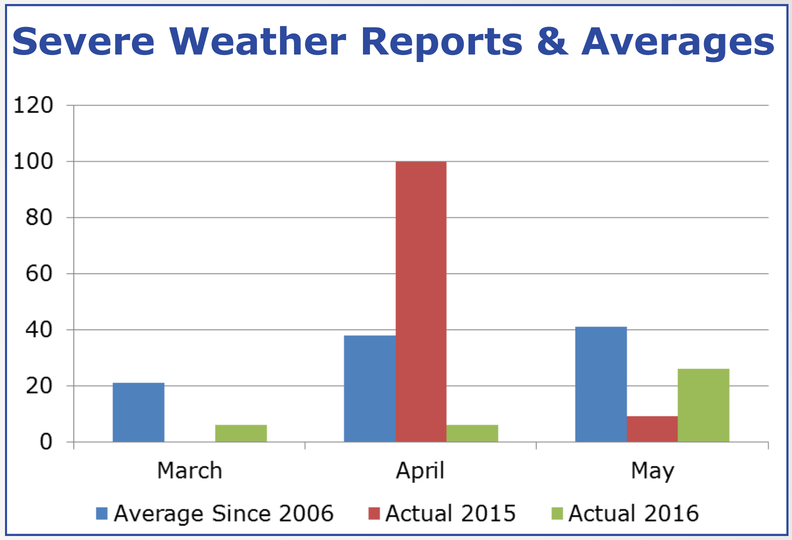
2016 Atlantic Hurricane Season Tropical Cyclone Names

~~Alex~~	Hermine	Otto
~~Bonnie~~	Ian	Paula
~~Colin~~	Julia	Richard
Danielle	Karl	Shari
Earl	Lisa	Tobias
Fiona	Matthew	Virginie
Gaston	Nicole	Walter

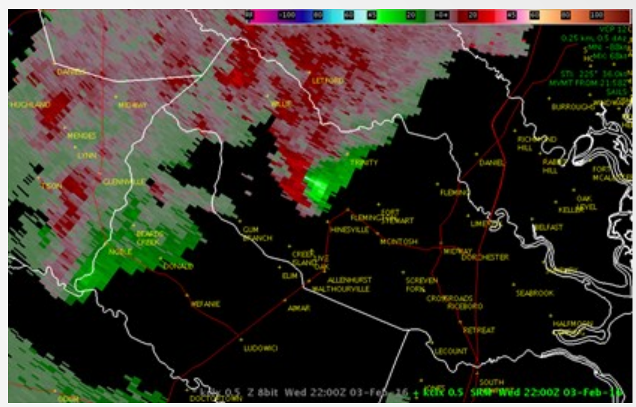
2015-16: Spring Severe Weather Seasons Less Active Than Normal

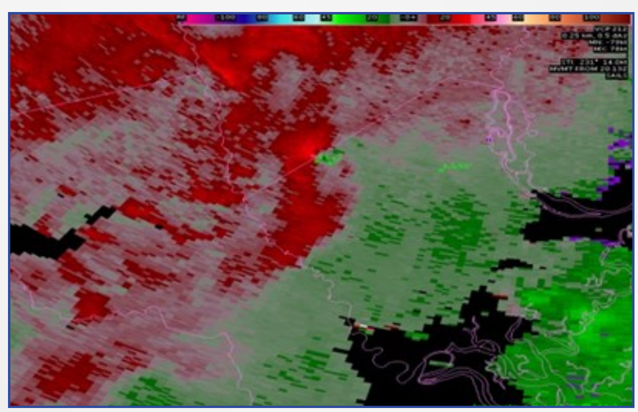
by Steve Rowley - Meteorologist & Severe Weather Program Leader

With the exception of April 2015, which featured 100 severe weather reports (most occurring during April 19 and April 26 severe events), the spring months of 2015 and 2016 were below the 11 year average (beginning in 2006). Of particular interest, there was *no* severe weather during March 2015, and 16 of the 26 reports we received during May 2016 (thus far) occurred during a single May 3 event.



The reasons for the lack of severe weather have been varying and complex; we can't point to a single cause which explains all non-events. Significant severe weather occurs during our spring months due to a combination of factors. Think of these factors as ingredients; the diagnoses of the timing and magnitude of ingredients necessary for severe weather occupies much of our forecast attention. Specifically, our biggest spring severe weather episodes feature some combination of the following ingredients: instability (warmth/humidity which increases the propensity for air to rise), strong low to mid-level atmospheric winds, and the arrival of weather features which force air to rise, such as cold fronts and upper -level lows or troughs. As with any weather event, when these necessary ingredients do not arrive in our area at the same time and/ or do not attain their potential intensities, we frequently escape with little or no severe weather – particularly during the past two spring seasons.





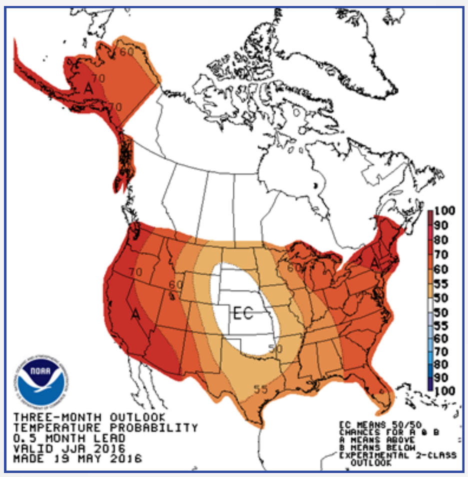
Storm relative velocity images of EF-1 tornadoes that occurred during an other-wise relatively uneventful 2016: the Fort Stewart GA tornado of Feb 3rd (top) and the Bloomingdale GA tornado of May 17th.

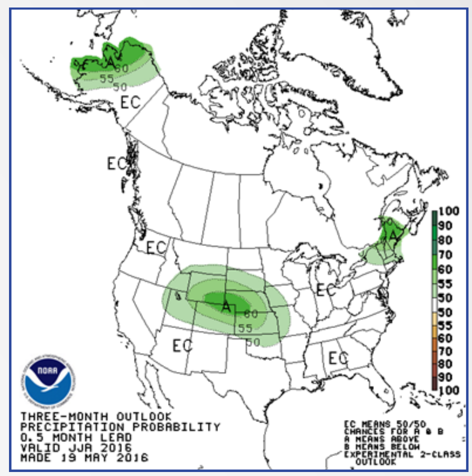
2015-16: Spring Severe Weather - Outlook

So, what, if anything, does this mean for the upcoming summer of 2016? Since the reasons for the relative lack of severe weather during the past couple of springs have been varying and complex, identifying any correlations between spring and subsequent summer conditions or attempting to use spring conditions to predict summer conditions remains in the realm of speculation. For instance, who could have predicted that the relatively quiet spring of 2015 (with the exception of two days in April) would have been followed by July 2015, our busiest severe weather month since 2006 which yielded over 200 severe weather reports?

The experimental summer (June-July-August) outlook for our area indicates that odds favor above-normal temperatures, but the odds for above, normal and below normal precipitation remain about equal.

Clearly, this outlook offers little utility for seasonal severe weather prediction. As always, your local National Weather Service forecasters will assess severe weather ingredient trends on an hourly, daily and weekly basis through the summer and will remain constantly prepared to issue severe weather Warnings when needed.

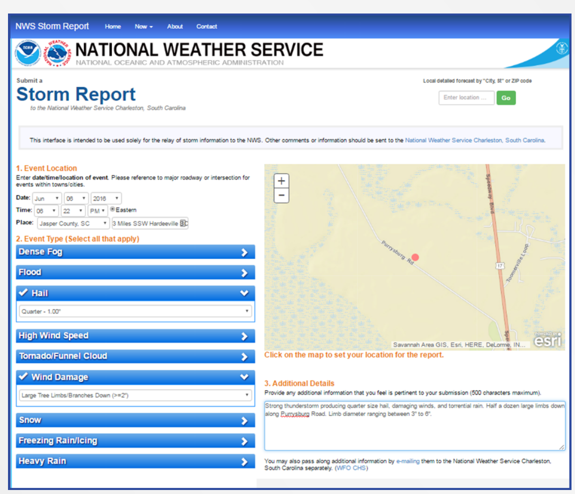




Submit Your Rain & Damage Reports Online!

Have a weather report? There are many ways to get those valuable reports to us! You can still report severe weather via our severe weather phone line (1-888-383-2024) or by email, but did you know there's a third online method available? Simply go to our NWS CHS Storm Report page and fill out our the following:

- **When** - Start time and, if possible, duration.
- **Where** - Location (utilize the clickable map).
- **What** - Types of severe weather observed.
- **Contact Information** - If we need additional information - voluntary.

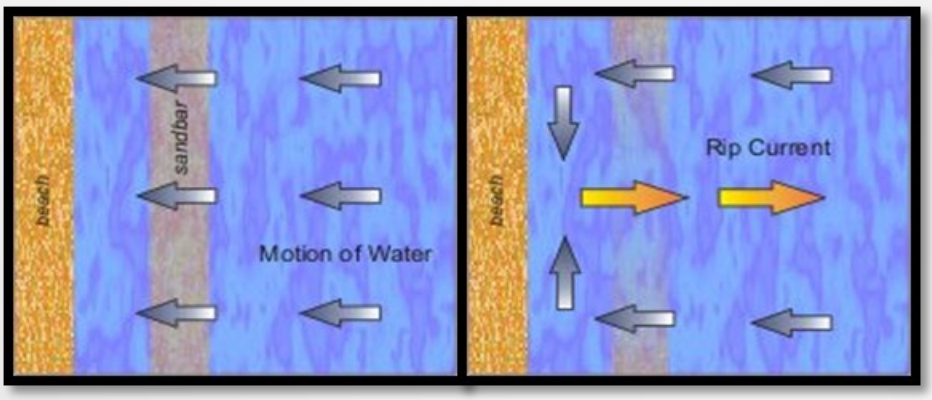


We appreciate your help!

The Ocean's Killer: Rip Current Science and Safety

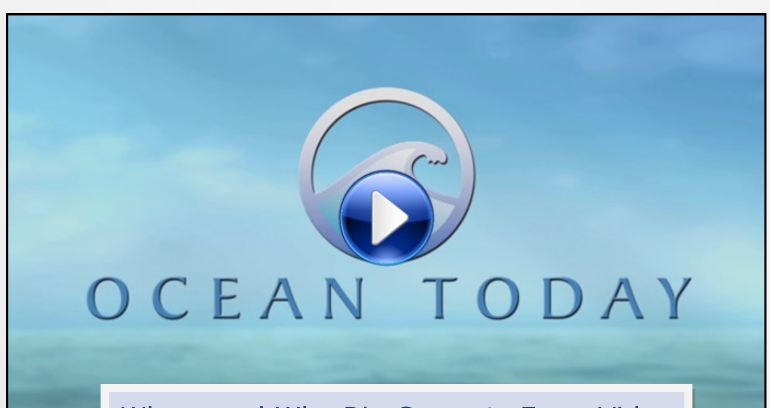
by Carl Barnes - Meteorologist & Marine Program Leader

In 2015, rip currents were the third most deadly weather related phenomena according to the National Weather Service Office of Climate, Water, and Weather Services. Rip currents accounted for more fatalities than tornadoes and hurricanes combined for the year and double the amount of fatalities from lightning. Unfortunately, fatalities from rip currents occur yearly on South Carolina and Georgia beaches, but if we work together to understand the science of rip currents and what to do if you become caught in one, we can change that!



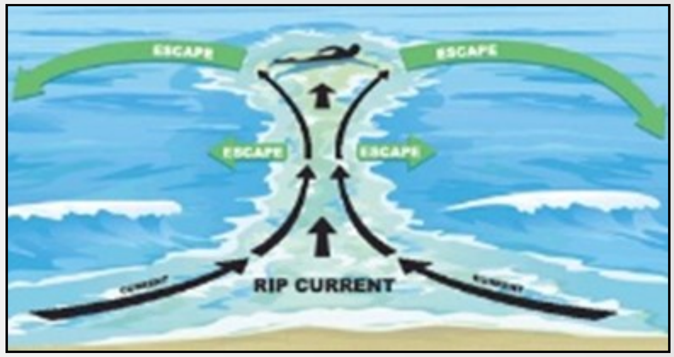
A rip current is a narrow, fast moving channel of water that starts near the beach and extends offshore through the line of breaking waves. It is Mother Nature's way of counteracting the transport of water toward shore by breaking waves, and rips are possible anytime there is a breaking wave, regardless of size! The Southeast Coast is particularly vulnerable to rip currents due to our exposure to wave energy year-round, with especially powerful waves common during hurricane season. Additionally, our wide, flat, sandy beaches and fine sediment transported from the multitude of rivers and harbors encourage the formation of well-defined yet transient sandbars. The high tidal ranges of coastal waters leads to rapidly changing water levels in the near shore area and can help to "carve out" a channel, called a trough, through these sand bars as the tide is going out. Finally, the jetties, groins, and piers found on many popular beaches can focus wave energy and encourage consistent sand bar and trough formation.

Additional rip current resources can be found at ripcurrents.noaa.gov and on our local rip current science webpage.



Where and Why Rip Currents Form Video

Rip Current Safety - Continued



Spotting a rip current can be difficult but is an important practice. When you arrive at the beach, stand back from the water on a high spot, if possible, but never directly on a dune as this causes erosion. Begin by identifying where the waves are most commonly breaking. These areas are where there are sandbars, and are typically the safest places to play in the water. A lack of breaking waves is typically a good indication of a break in the sandbar, and this is the most favorable location for rip current formation. Additionally, look for discolored water in this location and foam or sediment drifting out to sea against the direction of breaking waves.

Steps to Stay Safe at the Beach

- Always swim near a lifeguard, the chance of downing on a beach with lifeguards is 1 in 18 million!
- Check the latest National Weather Service Rip Current Forecast.
- Know how to swim and what the flag colors mean at your beach.

If You Find Yourself in a Rip Current

- Don't fight the current!
- RELAX and FLOAT to save energy
- If you are a strong swimmer, swim parallel to shore until you escape the current's pull, then swim diagonally to shore away from the current.
- If you are not able to escape the rip current, face the shore and call or wave for help.

Sir Francis Beaufort and the Beaufort Wind Scale

by Pete Mohlin - Meteorologist & Marine Program Leader

More than 200 years ago a wind scale, used to estimate wind speed and its impacts on sailing ships, was created. Incredibly, it's still in use today as an aid to mariners, modified to also include the effects on land. For this, we extend a huge thank you to Sir Francis Beaufort, born in Navan County, Meath, Ireland on May 27, 1774.

The Beaufort Wind Scale - Continued

Driven by his love of the sea, Beaufort left school as a teenager. By the age of just 16 he had already experienced his first shipwreck, caused by inaccurate marine charts of the time. This would spur his interest in hydrography (science that measures and describes the physical features of bodies of water and the land areas that are adjacent to them) which led to his creation and updating of more accurate nautical charts.

Self-educated, he had already risen to the rank of Commander of the British Navy in 1800. Then in 1805, Beaufort went to do a survey of the waters around Rio da la Plata, South America. It was a year later in his journal on weather conditions at sea he would develop the first wind force scale. It was later called the Beaufort Wind Force Scale, measuring and describing the wind speed at sea. Specifically it was a methodology for measuring the strength of wind as it impacted sailing ships, and would later be modified to account for its effects on steamships.

The first scale went from Calm (Force 0) to Hurricane (Force 12) in which the wind strength was correlated with the amount of sail a full-rigged ship would carry in these conditions. When the steamships replaced the sailing ships, the scale was adjusted by defining levels in terms of the state of the sea or wind speed.

In 1829 Beaufort was appointed British Admiralty Hydrographer of the Navy, a position he held for the next 25 years. It was during this time that not only did he develop the finest surveying and charting system in the world (some of which is still in use today), but in 1838 the British Navy would officially adopt his wind scale.

The scale was revised in 1874 to have the wind force numbers refer to the state of the sea and the motion of trees.

In 1946 the scale was changed to extend the values up to Force 17, which expanded on the hurricane-force winds. However, the extended scale is primarily only used in Taiwan and mainland China, and typically the scale is only defined up to Force 12.

Before Beaufort would pass away on December 17, 1857, several of his other significant accomplishments included:

- The investigation of the Earth's magnetic forces in the Antarctic in 1839-43.
- Promoted the development of reliable tide tables.
- Pushed for the expansion of record keeping at 200 British Coast Guard stations.
- Maintained weather journals with entries of cloud conditions, precipitation and wind force.
- Appointed Knight Commander of the Bath in 1848.

Article sources:

NOAA.gov

English Historical Fiction Authors

Navan & District Historical Society

Beaufort Wind Scale

Developed in 1805 by Sir Francis Beaufort, U.K. Royal Navy

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	Less than 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Sea heaps up, waves 13-19 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Moderately high (18-25 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	High waves (23-32 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Very high waves (29-41 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	Exceptionally high (37-52 ft) waves, foam patches cover sea, visibility more reduced	Widespread damage to structures.
12	64+	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	Severe structural damage, widespread devastation.

Getting a Bird's Eye View of Storm Damage Using Drones

by Ron Morales - Warning Coordination Meteorologist

For the past year, the NWS Eastern Region has had a team exploring the feasibility of using unmanned aerial vehicles (UAVs), or drones, to assist with rapid response storm damage surveys. The initial goal was to find out whether it would be feasible for individual Weather Forecast Offices (WFO) to purchase and operate their own UAVs. After several in-depth discussions and remote meetings with the NOAA Unmanned Aircraft Systems Program Office, it was clear that this option was not the way for WFOs to go due to liability, budget, training and sustainability issues.

The team then turned its focus toward other viable solutions for obtaining UAS/drone data to assist with storm damage surveys through local county EM teams and the FAA UAS Test Sites. Through these options, obtained data would be without cost, liability or training issues for local NWS offices. The unmanned systems data was obtained on a royalty free basis without data restrictions, operational control of or responsibility for the platform, a principle-agent relationship, liability, or any waiver or immunity from compliance with applicable laws including FAA regulations.

Last fall, Mike Sporer, Forecaster at NWS Blacksburg, VA, successfully conducted a storm spotting training session in conjunction with the UAS operators associated with the FAA's Virginia UAS Test Site. This event connected qualified UAS operators willing to share aerial imagery with the NWS and provided an opportunity for both NWS and Virginia UAS Test Site personnel to stress the importance of safe and responsible UAS operations.

In a parallel effort, through local Emergency Management (EM) relationships, NWS Charleston was able to acquire airborne imagery from UAS by tapping into the rapidly growing community of commercial UAS operators that have a special waiver with the FAA to legally fly their small UAVs (less than 55 lbs.).

The Berkeley County EM hired a local UAS imaging company to conduct an aerial survey following a severe storm event. The EM shared the UAS imagery with NWS Charleston and other county partners. NWS Charleston was able to use this aerial video and high-resolution imagery to determine the severe storm event was a F-1 tornado. Thus, the EM partnership facilitated a post-storm damage assessment of a tornadic event within a county warning area at no charge to NOAA/NWS. This is an innovative data acquisition strategy supporting NOAA's Weather-Ready Nation.

Building & Expanding Our Presence Via Community Events & Social Media

by Julie Packett - Administrative Support Assistant

Decision Support Services

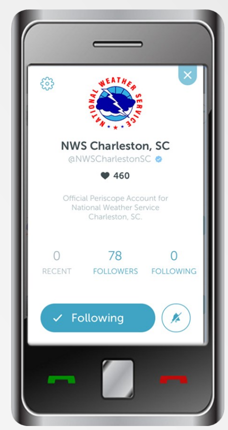
Our mission at the National Weather Service is to protect life and property. With changing times and the rapid growth to the Coastal Empire and the Lowcountry, fostering county and state partnerships and embracing technology advances has played a critical role in distributing our forecasts and warnings to the public.

Most recently, several Charleston forecasters worked closely with Hilton Head Emergency Management and emergency services by providing weather support for the public attending the PGA Heritage Golf Tournament. With more than 100,000 people in attendance and widely exposed to outdoor elements, our mission was to provide onsite, real-time weather support over the course of four days to help keep the public and first responders safe from potentially high impact weather.

Periscope

To further carry out our mission, many NWS offices, including NWS Charleston, are exploring the use of Periscope, as social media tool which allows users to provide live-streaming video content to followers.

To follow us on Periscope, search for NWSCharlestonSC. To receive notification any time our office goes Live on Periscope, ensure notifications are turned on.



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