NATIONAL WEATHER SERVICE
CHARLESTON, SC

WEATHER.GOV/CHS

STORM COURIER

WINTER 2007-2008

Significant Weather Events of 2007

by Jon Jelsema - Meteorologist

The weather pattern across southern South Carolina and southeast Georgia throughout 2007 was primarily influenced by high pressure. Although there were some heavy rainfall and severe weather events, much of the forecast area was dealing with moderate to severe drought conditions in 2007. Even though much of the year was uneventful, there were a few significant weather events that did keep forecasters busy!

On February 13th, a potent storm system resulted in 2 EF1 tornadoes and quite a bit of wind damage across the area. Another significant weather event was a late season freeze on April 8th, where temperatures dipped down into the 20s in many locations, and resulted in hundreds of millions of dollars in crop damage across South Carolina and Georgia. On April 15th, a strong cold front pushed into the region and resulted in 3 EF1 Tornadoes and numerous wind damage reports. Many low country residents may also remember the bouts of smoke from the southern Georgia and northern Florida wildfires that would occasionally move into the area during the month of May and into early June. The remnants of Tropical Storm Barry moved up the Georgia and South Carolina coast on June 2nd, bringing with it strong winds responsible for downing trees and power lines, heavy rainfall, and very rough surf conditions. The months of June, July and August featured typical afternoon and evening shower and thunderstorm development on most days. There were numerous severe weather warnings issued through the summer months, with many reports of wind damage and large hail. Several heat advisories and excessive heat warnings were issued during the month of August, as the combination of heat and humidity resulted in heat indices well above 100 degrees. In fact, some heat indices topped 120 degrees on August 10th. Significant coastal flooding and beach erosion occurred at the end of September and lingered into early October, as strong onshore flow in combination with high astronomical tides, resulted in a prolonged period of battering waves and elevated tidal levels, devastating beaches along the South Carolina and Georgia coasts. In late October, the combination of strong onshore winds and high astronomical tides brought another assault on the low country beaches, with significant beach erosion and some structural damage to homes reported. On December 21st, a strong area of low pressure developed off the coast of South Carolina and Georgia. Moderate to heavy rains fell across the area in association with this system, bringing much needed rainfall to some drought stricken areas. In addition, the tight pressure gradient resulting from the storm system off the South Carolina and Georgia coast and a wedge of high pressure inland, produced some wind damage, with measured wind gusts as high as 55 mph.

Throughout 2007, a total of 232 Severe Thunderstorm Warnings, 26 Tornado Warnings, 121 Special Marine Warnings, 24 Flash Flood Warnings, 5 Excessive Heat Warnings, 2 Coastal Flood Warnings and a host of other advisory products were issued by the Charleston, South Carolina National Weather Service Office.

What's Inside This Issue

A Wrap-Up of the 2007 Atlantic Hurricane Season

by Robert Bright - Meteorologist

2007 Hurricane Season

Andrea
Barry
Chantal
Dean
Erin
Felix
Gabrielle
Humberto
Ingrid
Jerry
Karen
Lorenzo
Melissa
Noel
Olga

Although the 2007 Atlantic hurricane season turned out to be less busy than predicted by the National Oceanic and Atmospheric Administration (NOAA) in terms of the number of tropical storms and hurricanes, it was still busier than normal according to the number of tropical storms. In fact, there were 15 tropical storms, 5 more than the long-term average of 10. Six tropical storms became hurricanes, and 2 became major hurricanes (Category 3 to 5), both near the long-term averages. In addition, for the first time since records began in 1851, 2 Category 5 hurricanes (Dean and Felix) made landfall in the same season, both in Mexico.


Hurricane Dean - August 2007

Although the official Atlantic hurricane season runs from June 1 to November 30, tropical and subtropical storms can form any time of year. In fact, Subtropical Storm Andrea developed in May while Subtropical Storm Olga developed in December, and later became a tropical storm. Subtropical Storm Andrea developed east of Jacksonville, Florida on May 9. The main impacts to southern South Carolina and southeast Georgia were along the coast, including higher than normal tides, high surf and gusty winds around 40 mph. The only other systems to affect our area were the remnants of Tropical Storm Barry and Tropical Storm Gabrielle. Tropical Storm Barry weakened into a tropical depression just before making landfall in the Tampa Bay area of Florida and then became an extra (non)-tropical low over eastern Georgia on June 3. The system intensified and moved up the U.S. East Coast bringing 2-6 inches of rain, gusty winds near 50 mph and higher than normal tides to the area. Tropical Storm Gabrielle developed from an extra-tropical low between Bermuda and North Carolina on September 8 before moving northwest and then north and making landfall along the Cape Lookout National Seashore in North Carolina on September 9. The main impact to Charleston's County Warning Area was increased seas in the form of swells.

A Brief Tour of Our Website Including the New Weather Activity Planner

by Robert Bright - Meteorologist/Webmaster

Our website, weather.gov/chs, is full of information, although it just may be a little less than obvious how to navigate the many pages within it. Let's begin with the map on the homepage, which shows you any advisories, watches, and/or warnings that are currently in effect. You can also click on the map to access a "point" forecast for the location you clicked on. The forecast is pulled from the National Weather Service's National Digital Forecast Database (NDFD). From the point forecast page you can access numerous other ways of displaying the forecast, including the Tabular Forecast, Hourly Weather Graph, and Interactive Forecast Map. Back on our homepage under the map, you can obtain Text Forecasts, Area Forecast Matrices, Graphical Forecast Matrices, and Graphical Forecast Images. Below this you can access radar and satellite imagery. The left-hand menu contains links to current conditions/

hazards, forecasts, climate data, weather safety (including our SKYWARN spotter page), local research, and our office information, among other things. In addition, many of our office programs have their own webpages, including Aviation Weather, Fire Weather, Hydrology, Marine Weather, and Tropical Weather, which can be found under the Forecasts section. Also in this section is a link to the new "Activity Planner". This tool helps you plan activities that require certain ranges of particular weather parameters. For example, if you are looking for a sunny day with temperatures above 80 degrees, relative humidities less than 60%, and rain chances less than 20% in order to complete an outside painting job, the tool will tell you during which time period(s) those conditions are forecast.

Sea Fog

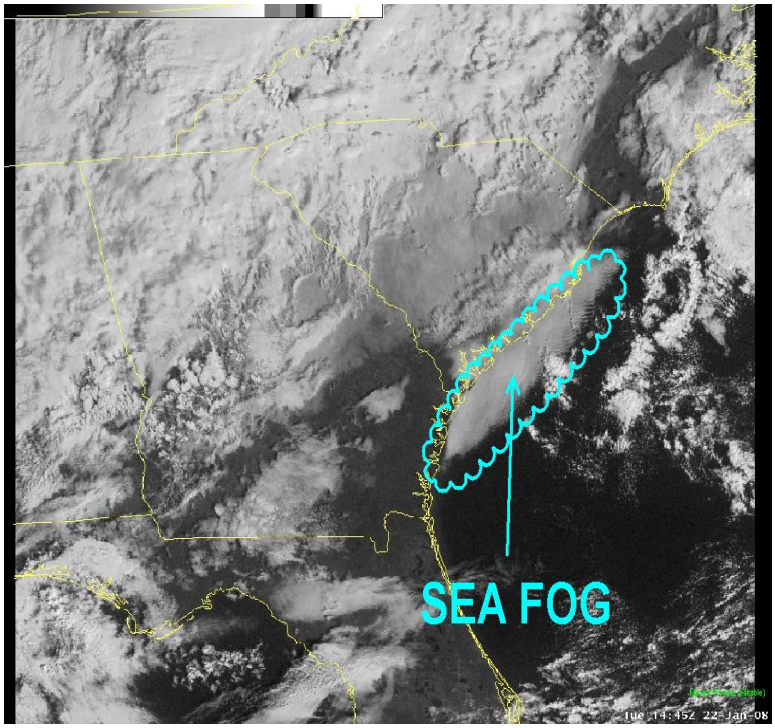
by Pete Mohlin - Senior Meteorologist

Now that the cooler months of the year are here, sea fog will occasionally be of concern to forecasters, as well as its impacts on mariners, motorists and others who are at or along the coast.

Already this winter we have seen several events of sea fog, with even a prolonged period of sea fog during the early to middle part of December. For almost a week, from December 7th through the 12th, sea fog impacted the coastal counties of southern South Carolina and southeast Georgia, the nearby coastal waters, Charleston Harbor, and the Intracoastal Waterway. While the fog would occasionally dissipate, it did impact these areas much of the time for 6 days straight. Visibility in the fog was oftentimes reduced to ¼ mile or less, and even near zero at times over the coastal waters.

What is Sea Fog?

Sea fog is a type of advection fog, meaning that it caused by the advection or transport of warm and moist air over a colder surface. In the case of sea fog it is the warm and moist air flowing over the relatively colder ocean waters. The fog then forms when the air is cooled to below its dew point (or the temperature at which saturation occurs). Once sea fog forms, it becomes a dangerous hazard to navigation as visibility becomes severely reduced. Also, if the sea fog moves onshore the reduced visibility can also become a hazard to motorists and others at or near the coast.



Conditions Favorable for Sea Fog Formation

The development of sea fog can be a very challenging forecast for meteorologists. However, there are several factors that usually will lead to its formation.

Sea fog will usually occur during the cooler months of the year (late autumn through late winter or early spring). It is during this time when the sea surface temperature of the shelf waters in the Atlantic have cooled considerably from the rest of the year. Knowing that sea fog is more likely to develop during the cooler months, meteorologists at your National Weather Service can then look for other factors in its formation.

Although it is not uncommon for sea fog to develop in an unstable environment, its formation is much more likely in a stable air mass. Thus there would usually need to be an inversion over the ocean to prevent vertical mixing. An inversion is a layer of the atmosphere where temperature increases with height, rather than decreases (which is more typical). The inversion traps moisture and prevents it from evaporating into the air from the ocean. Generally the lower the inversion is in relation to the oceans surface, the more favorable for sea fog formation.

The next factor to look for is the amount of saturation of the air, with relative humidity as close to 100% as possible favoring its formation. However, if other factors are present, then even relative humidity values as low as around 85 or 90% are still possible for its development.

Generally we want the air temperature over the ocean to be similar or a little warmer than the water temperatures. More importantly we look for the dew point of the air that is similar or higher than the sea surface temperature.

Finally, we need to consider the winds and its fetch over the water. While sea fog is not uncommon at speeds such as 20 mph, it is more likely during lighter winds at speeds of less than 10 or 15 mph. And winds that are blowing over the ocean with a longer fetch will also aid in its formation. So for the local area we would look for winds from the Northeast, East, Southeast or South (occasionally Southwest) to result in the longer fetch. And many times if the wind is from these directions and sea fog forms, then it could also move onshore, becoming not only a hazard to mariners, but a hazard to those on land as well.

Sea Fog Safety Tips

If sea fog does form, here is some advice to follow;

For mariners, make sure you reduce your speed. Ensure that all navigational and running lights are on. Use your proper fog signals such as horns to indicate your position.

Should the sea fog move onshore, then motorists are urged to reduce their driving speed. Allow extra space between you and the vehicles in front of you. Use only low beam headlights or fog lights in the fog.

What's the Rainfall in Your Backyard or Schoolyard?

by Joe Calderone - Meteorologist

A common theme heard about the rainfall amount from the official gage is, "That's not what I got!"

Now you can let the National Weather Service know how much rain, hail, or snow you measured in your backyard by joining the Community Collaborative Rain, Hail, and Snow Network - CoCoRaHS. This new program will help meteorologists and researchers study the variability of precipitation across both the Palmetto and Peach States. The accumulated data will be available to anyone with a use or interest in precipitation data.

CoCoRaHS started in Ft. Collins, Colorado in 1998 after a devastating flood. Researchers went back to look at the precipitation data that led to the flood and found that the rainfall had missed all the official gages! The Colorado state climatologist, Nolan Doeskin, developed a new volunteer observing network to fill the gaps between official gages called CoCoRaHS. The network has spread across the country and will commence in South Carolina on March 1, 2008, and in Georgia on May 1, 2008. The plan is to eventually have an observer every square mile across each state. CoCoRaHS programs are currently up and running in over 25 states.

This is truly a fun, educational and community-based project. Everyone can help - young and old and in between. Here are the basic requirements for being a CoCoRaHS weather observer:

1. Have access to the internet and the ability to browse the CoCoRaHS web site (which is where you will enter your daily precipitation data although reports by mail are perfectly welcome).
2. Have an official-type CoCoRaHS rain gauge (you can buy one for about $20 on our website)
3. Have a good site on your property with good exposure (as tree and obstruction free as possible) where you can place the rain gauge about five feet off the ground
4. Be willing to enter your precipitation data on a daily basis between 6 and 9AM through our internet web site.

What are the benefits of being a CoCoRaHS observer? Although participating in the CoCoRaHS is completely voluntary, you come away with the feeling that you are making an important contribution that helps others. By providing your daily precipitation

data, you truly help in filling in pieces of the puzzle that affect many in your part of Southern South Carolina and Southeast Georgia in one way or another - whether it's farmers and ranchers, emergency management personnel or the National Weather Service as they evaluate ongoing thunderstorms or study the long term climate record. CoCoRaHS also provides a great way to learn more about weather and water by participating collaboratively with many local scientists.

One unique great benefit of CoCoRaHS is that it provides real science activities for the classroom. Over the last several years CoCoRaHS staff have worked with science teachers in the Poudre, Colorado school district as well as a science teacher from Texas to develop lesson plans that are fun for the kids, teach basics concepts of meteorology and meet national science education standards. These lesson plans are developed for a variety of grade levels and are built around CoCoRaHS's emphasis on measuring precipitation.

Please visit the CoCoRaHS web site at: http://www.cocorahs.org to learn more about the program and register your backyard or schoolyard as an official reporting site. Once you register and begin to report, your rainfall observations will become part of the record as well as being plotted on county- and state-based maps of South Carolina and Georgia. You can view the maps and see how your observation fits in with your neighbors involved in CoCoRaHS across the country.

If you have any questions, you may get in touch with the CoCoRaHS coordinator for Southern South Carolina and Southeast Georgia, Joe Calderone, through the web site by clicking on South Carolina and Georgia on the U.S. map and scrolling down past training opportunities to the state coordinators or you may email him directly at joseph.calderone@noaa.gov.

"CoCoRaHS – Because Every Drop Counts!"

NWS Charleston Begins Issuing Experimental Marine Weather Warnings

by Steven Taylor - Senior Meteorologist

On December 3, 2007, the National Weather Service office in Charleston, SC joined twelve other National Weather Service offices in issuing a new, experimental Marine Weather Warning bulletin. The Marine Weather Warning, also known as the MWW, is intended to complement the Coastal Waters Forecast and to help better inform the Marine Community of adverse marine hazards that are currently impacting or expected to impact the coastal waters of south coastal South Carolina and north coastal Georgia.

Patterned after how the National Weather Service currently relays information about longer term hazards such as coastal flooding, winter storms and non-precipitation events, the MWW will relay all long-term marine watches, warnings and advisories that are issued by the National Weather Service, and will describe in detail exactly what the mariner can expect. The MWW will not replace the Special Marine Warning which will still be issued whenever thunderstorms are expected to produce winds over 34 knots, hail the size of pennies or larger and/or waterspouts.

Three new marine watches were also implemented on December 3, 2007: Gale Watch, Storm Watch and Hurricane Force Wind Watch. These new marine watches will be issued by forecasters, by way of the MWW, whenever the risk for a particular marine hazard has increased, but the specific timing and/or location of the event is still somewhat uncertain.

The following are criteria will be used for issuing the three marine watch products:

Gale Watch – issued when sustained winds or frequent gusts of 34 to 47 knots are possible, generally within 24 hours.

Storm Watch – issued when sustained winds of frequent gusts of 48 to 63 knots are possible, generally within 24 hours.

Hurricane Force Wind Watch – issued when sustained winds of 64 knots or greater are possible outside of a hurricane, generally within 24 hours.

These new watch products and implementation of the MWW is expected to expand to other National Weather Service offices through the spring and summer. Full implementation throughout the entire National Weather Service is expected to be complete by October 1, 2008.

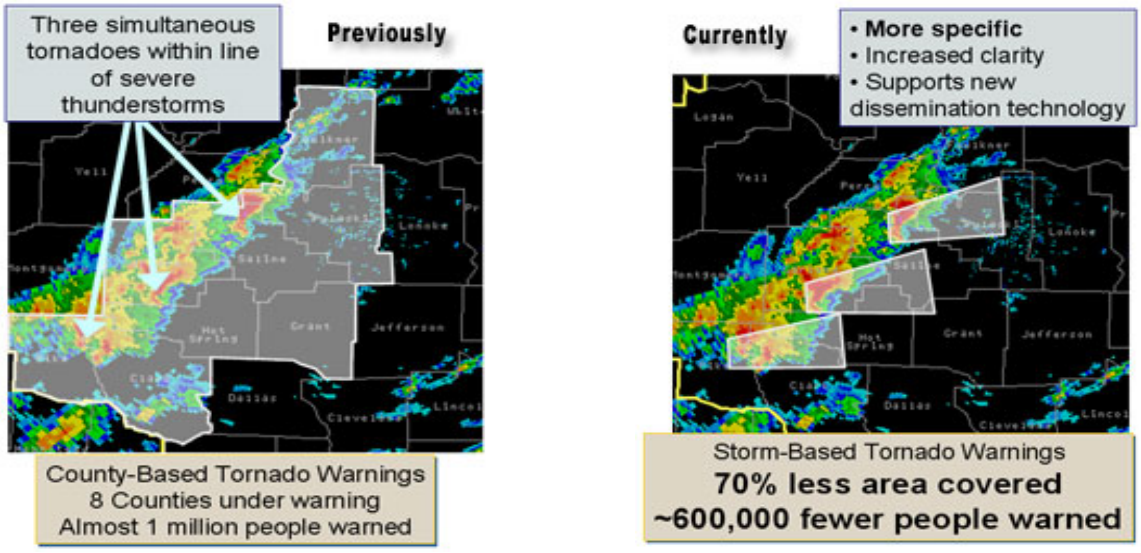
Weather Service Makes the Change to Storm Based Warnings

by Paul Yura - Warning Coordination Meteorologist

The National Weather Service (NWS) mission is defined as the provision of weather forecasts and warnings for the protection of life and property and the provision of weather information for the Nation's economic well-being. The NWS previously issued and disseminated warnings for tornado, severe thunderstorm, flood and marine hazards using county and fixed zone boundaries. Realizing the continuing need to improve the specificity and accuracy of warnings for tornadoes, severe thunderstorms, floods and marine hazards, the National Weather Service has implemented ***Storm-Based Warnings*** as of October 1, 2007.

Storm-Based Warnings **(also called polygon warnings)**, are essential to effectively warn for severe weather. ***Storm-Based Warnings*** show the specific severe weather threat area and are not restricted to already defined county or marine zone boundaries. By focusing on the true threat area, warning polygons will improve NWS warning accuracy and quality. ***Storm-Based Warnings*** will promote improved graphical warning displays, and in partnership with the private sector, support a wider warning distribution through cell phone alerts, pagers, web-enabled Personal Data Assistants (PDA), etc. NOAA Weather Radios will work as before and continue to alert entire counties.

These polygon or storm based warnings can be viewed in real time on our local National Weather Service website at www.weather.gov/chs



As seen in the left image above, during the old legacy system the entire county was under a weather warning when in fact only a small section of the county may have been in the path of the severe storm. With the new Storm Based Warnings (right image), the meteorologists at the National Weather Service will be able to better warn citizens by drawing the warning box only for areas that are directly in the path of the storm.

Unusually Dry Conditions in 2007

by Jonathan Lamb - Meteorologist

2007 ended a very dry year for southeast Georgia and southern South Carolina. River and stream levels fell to near-record levels, especially during October and November. Of the nine river forecast points covered by the National Weather Service in Charleston, the last site to reach flood stage in 2007 was the Ogeechee River at Eden on March 15th. Surprisingly, Eden then reached the tenth lowest discharge on record on November 15th (122 cubic feet per second). In Fall 2007, most area rivers and streams were flowing at or below 15 percent of normal. Despite most of the area being under drought declarations, water restrictions have been rare across southern South Carolina and Southeast Georgia. The first weeks of 2008 have brought beneficial rains to much of the area and river levels are returning to near normal for this time of year. However, long-term rainfall totals are still well below normal and it remains to be seen whether the long-term drought will come to an end during 2008.

The lack of rainfall resulted in very low water levels on area lakes as well. Here is a look at some effects of the extremely dry conditions in 2007.

Lake Moultrie, 10-07

Dry Pond in Dorchester County, 11-07

Lake Marion, 10-07

Lake Marion, 10-07

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NOAA AND THE NATIONAL WEATHER SERVICE...WORKING TOGETHER TO SAVE LIVES!

Whenever severe weather strikes, remember, as a trained weather spotter *we want to hear from you*! If you measure or estimate winds of 50 mph or greater, observe trees and/or power lines down, structures damaged, hail (any size), flooding (water running across the road, ditches overflowing, creeks/streams out of their banks), tornadoes, funnel clouds or waterspouts, pick up the phone and call us. In addition, if you see or hear of any injuries, fatalities, or damage from lightning, give us a call. Your valuable reports help us confirm what we're detecting on radar, and could make a life-or-death difference for the people in the next town or in the next county about to be hit by the severe storm that just went over your house. *When in doubt, please call us!*

If you take any interesting pictures of weather phenomena, we would love to see them. You can e-mail your digital pictures to our Skywarn account at ***chs.skywarn@noaa.gov***

You can always call the toll-free number we provided to you during the training.

Or, leave a report on our severe weather answering machine :
1-888-383-2024

E-mail reports and pictures to:
CHS.SKYWARN@NOAA.GOV

Forecasts & Conditions:
843-744-0303