National Weather Service
CHARLESTON, SC

STORM COURIER

Significant Weather Events of 2010

By Jon Jelsema - Meteorologist

The 2010 Calendar year will not be remembered as an unusually active year for severe weather, but did feature a few rather unusual weather events across southern South Carolina and southeast Georgia. These events, in addition to day to day forecasting operations, kept Meteorologists at the National Weather Service (NWS) busy issuing a wide variety of weather watches, warnings and advisories!

Winter 2009/2010

Low country residents will likely remember the rather wet and cold winter which impacted the southeast United States last winter. Many locations across the local area received 10+ inches of rainfall during December 2009. Following the drenching December, one of the coldest periods in recent memory was observed during the first half of January 2010, when temperatures struggled to hit 50 degrees during the day and fell below the freezing mark consistently at night. Temperatures rebounded during the middle to late part of January 2010, before another Arctic invasion made its presence felt during the month of February. In fact, February 2010 was the coldest February in the past 30 years at both the Charleston and Savannah International Airports. In addition to the cold conditions, many residents of southern South Carolina and southeast Georgia may remember the heavy snow event which occurred on February 12th, 2010, when an area of low pressure tracked by just off the South Carolina and Georgia coast. The storm initially brought rain to the local area, before changing to snow and beginning to accumulate. Many locations received enough snow to cover the ground and coat the roads, with as much as 6 to 8 inches reported across a good portion of Colleton, Dorchester, and Berkeley counties.

NWS Charleston, SC office during the February 12th, 2010 snowstorm.

Spring 2010

Following the unusually cold winter, temperatures rebounded nicely in March, April, and May. Despite the warmer weather, the severe weather season was unusually quiet with only a few severe weather episodes impacting the region. One particular event on April 8th, 2010, resulted in an EF0 Tornado 2 miles west of Bluffton, SC. The tornado snapped off the tops of a few pine trees, a few of which landed on and damaged vehicles, tore off some aluminum flashing from homes, knocked down several fences, destroyed a shed and damaged a swing set. A more widespread severe weather episode occurred on May 23rd, 2010, when numerous reports were received from across the low country, of trees and power lines down, as well as large hail.

Summer 2010

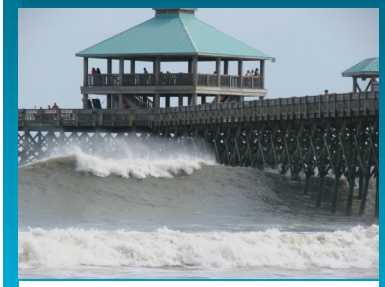
Pop-up afternoon thunderstorms were nearly a daily occurrence throughout June, July and August, keeping NWS forecasters busy watching the radar and

Inside this issue:

Special points of interest:

- Atlantic Hurricane Season kind to U.S.
- 2011 Hurricane Awareness Tour stop: Savannah, GA!
- A wealth of weather information on the web.
- Send in your reports via Twitter.
- Amazing visual effects of the sky!
- NWS faces seen more frequently on TV?
- NWS support during the Gulf Oil Disaster.

Signifcant Weather Events of 2010 continued...



Swell impacting the Folly Beach, SC Pier from distant Hurricane Earl, September 2nd, 2010.

"NWS forecasters issued a total of 39 Heat Advisories and 5 Excessive Heat Warnings for the local area, nearly the same number as the previous 4 years combined."

Unusually Hot Temperatures affect the southeast United States during the summer of 2010.

assessing storm severity. Numerous Severe Weather episodes impacted the local area, resulting in sporadic reports of downed trees and power lines, structural damage to homes and businesses, large hail, as well as flash flooding.

Besides the typical pulse severe thunderstorms, low country residents may remember the persistently hot conditions last summer. To put the heat into perspective, NWS forecasters issued a total of 39 Heat Advisories and 5 Excessive Heat Warnings for the local area, nearly the same number as the previous 4 years combined. Heat Advisories are issued when the combination of heat and humidity results in apparent temperatures of 105 to 114 degrees and Excessive Heat Warnings when apparent temperatures exceed 114 degrees.

The summer of 2010 went down in the record books as the warmest on record at both the Charleston and Savannah International Airports. The Savannah International Airport also recorded an impressive stretch of days with high temperatures at or above 90 degrees, ending on August 14th, 2010 at 40 consecutive days. This is the 2nd most consecutive 90+ degree days dating back to 1874.

Fall 2010

Weather conditions slowed down during the fall as pop-up afternoon showers and thunderstorms became fewer and farther between. There were a couple events worth noting during the fall months however. One event that a few residents may have witnessed occurred on September 2nd, 2010, when powerful 8 to 10 foot swells lapped onto area beaches as Hurricane Earl passed by well east of the South Carolina and Georgia coast.

Another event occurred on October 25th, 2010, when a strong cold front resulted in a late season severe weather event. Numerous reports of golf ball to baseball size hail were received, along with a few reports of trees and power lines down. Following the late season severe weather event, the weather became much quieter with below normal rainfall and a gradual transition into the winter months.

Winter 2010/2011

Arctic chill descended on the region once again this winter, resulting in soaring energy bills during the months of December 2010 and January 2011. In fact, the average temperature during the period beginning December 1st, 2010 and ending on January, 31st, 2011 was the 2nd coldest on record for the combined months of December and January, at both the Charleston and Savannah International Airports.

In addition to the cold temperatures, a couple winter weather events unfolded across the region. Many residents will likely remember snow flakes flying through the air on the day after Christmas, as a storm system moved through the area changing rain over to snow. Many locations received a quick dusting of snow accumulation and a couple locations had an inch of snow deposited on grassy surfaces. Thankfully much of the snow fell during the daylight hours, keeping road surfaces wet and drivable for the most part.

Mother Nature wasn't as kind to the region on January 10th, 2011, when a storm system moved through the region and resulted in freezing rain. The freezing rain and ice accumulation caused all types of headaches across much of the low country. Numerous power outages occurred as the additional weight from ice accumulation caused many tree branches and limbs to be knocked down on power lines. Traffic became nearly impossible across portions of the area as well, with ice accumulating on roads, bridges and overpasses. This resulted in the delay or closure of many area schools and businesses.

For a more thorough review of several of the more significant weather events which impacted the low country in 2010, visit the following web page :

http://www.erh.noaa.gov/chs/events.shtml.

Throughout 2010, a total of 211 Severe Thunderstorm Warnings, 11 Tornado Warnings, 109 Special Marine Warnings, 13 Flash Flood Warnings, and a host of other advisory products were issued by the Charleston, SC NWS Forecast Office.

Very Active 2010 Atlantic Hurricane Season Was Kind To U.S.

By Robert Bright - Meteorologist

The 2010 Atlantic hurricane season turned out to be very busy with 19 tropical storms, which tied with 1887 and 1995 for third most on record. Twelve of those tropical storms became hurricanes, which tied with 1969 for second highest on record. Five of the hurricanes reached major hurricane strength (Category 3, 4 or 5 on the Saffir-Simpson Hurricane Wind Scale). An average season produces just 11 tropical storms, 6 hurricanes and 2 major hurricanes.

As expected by the National Oceanic and Atmospheric Administration (NOAA), La Nina played a role in creating less wind shear over the tropical Atlantic Ocean. Other contributing factors were the record warm ocean temperatures and an abundance of weak low pressure systems coming off the west coast of Africa which are often the "seedlings" of tropical cyclones. Although there was an unusual number of tropical storms, the weather patterns through the summer and fall were such that most were steered away from the U.S.. This included a deep high pressure system over the East Coast, which kept the region warmer and drier than normal. Only 2 tropical storms (Bonnie and Hermine) made landfall in the U.S. while Major Hurricane Earl stayed just offshore the East Coast. However, Earl brought tropical storm- force winds to North Carolina and Massachusetts as well as deadly rip currents along much of the East Coast.

For more information on the 2010 Atlantic hurricane season, check out the National Hurricane Center's website. For a local tropical cyclone climatology, check out…

http://weather.gov/chs/tropical/hurrstats_web.shtml.

Visible satellite image of Hurricane Earl as it moved up the Eastern U.S. Coast on September 3rd, 2010.

NOAA's Hurricane Hunter Aircraft Coming To Savannah!

By Ron Morales - Warning Coordination Meteorologist

Savannah, GA has been selected to be one of the stops on the annual Hurricane Awareness Tour! The event will take place at the Savannah Hilton Head International Airport in Savannah, GA on May 5, 2011.

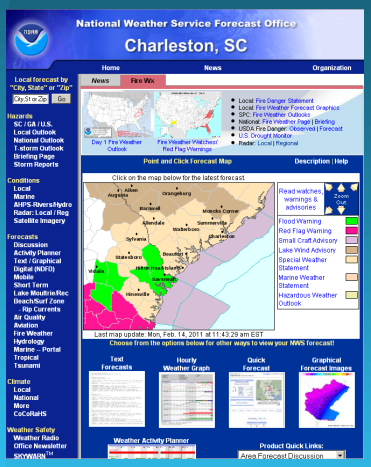
The highlight of the tour will be the arrival and display of the Lockheed WP-3D Orion, which is NOAA's Hurricane Hunter aircraft. The event will be hosted by both NOAA's National Weather Service Office in Charleston, South Carolina and the Savannah Hilton Head Airport, in conjunction with the NOAA's National Hurricane Center out of Miami Florida, NOAA's Airport Operations Center at MacDill Air Force Base located in Tampa Florida, and the Chatham county Emergency Management Division. This specially equipped P-3 Orion aircraft not only plays a vital role in helping NOAA's National Hurricane Center forecast the track and strength of hurricanes, but also participates in many other national and international research missions. Some recent missions and experiments that the P-3 has been involved in include: a climate study off the west coast of Mexico, a low level wind jet experiment over central and South America, a study of bow echoes and mesoscale convection in the U.S. Midwest, and several others.

For more information about NOAA's WP-3D Orion and other research aircraft, please visit NOAA's Aircraft Operations Site at:

http://www.aoc.noaa.gov/aircraft.htm

In addition to the Hurricane Hunter aircraft, there will likely be vehicles and/or aircraft on display from other agencies such as local Coast Guard, Marine and Fire/ Emergency services, giving the experience of a mini air show. There will also be some other static displays and information booths. Although the target audience for this event will be a select group of approximately 500 4th and 5th grade elementary school students, there will also be an opportunity for the general public to view and tour the aircraft and other exhibits. This will be a well publicized event, with local media coverage and likely several VIPs in attendance from state, local and city level.

"Savannah, GA has been selected to be one of the stops on the annual Hurricane Awareness Tour!"



Navigating Our Website

By Robert Bright - Meteorologist/Webmaster

Have an event planned over the next 7 days and want the weather forecast? Wondering how cold the winter is expected to be? Need to plan an outdoor event but can only do it when rain chances and temperatures are low enough? Well, you can get all of this information and more on our website:

http://weather.gov/chs.

The map on the home page shows you if and where any advisories, watches, warnings and statements are currently in effect. You can also click on the map to obtain a "point" forecast for that location, which comes from our National Digital Forecast Database (NDFD). Once at the point forecast page you can access other ways of displaying the forecast from the links under the "Additional Forecasts & Information" section on the bottom right. These include the "Tabular Forecast", "Hourly Weather Graph", "Quick Forecast", and "Interactive Forecast Map". You should select each of these options to see which one best suits your needs.

Back on our homepage under the map, you can obtain "Graphical Forecast Images", which display the forecast of various weather parameters in graphical format. You can also access the "Weather Activity Planner" which allows you to query our forecast database to see when and if certain forecast parameters will be met. For example, you may be looking to plan an outdoor event and want to see when we are forecasting temperatures above 70 degrees in coincidence with rain chances below 30 percent. Current radar and satellite imagery is also available further down the page, as well as climate plots for Charleston, SC and Savannah, GA.

The left-hand menu contains links to current conditions/hazards, forecasts, climate data, weather safety (including our SKYWARN spotter page), local research, and information pertaining to our office, among other things. In addition, many of our office programs have their own webpages, which are listed under the "Forecasts" subheader. These include Aviation Weather, Fire Weather, Hydrology, Marine Weather, and Tropical Weather. One of the most popular sections of our website is the climate webpage, which can be accessed by clicking on "Local" under the "Climate" subheader. From this page you can access a wealth of climate information, including climate outlooks from the NOAA Climate Prediction Center. In addition, you can obtain climate data for many locations across southern South Carolina and southeast Georgia by selecting the "NOWData" tab.

Hopefully you will enjoy all of the information on our website. If you have any comments or questions while surfing, feel free to let us know by sending an email to:

chs.webmaster@noaa.gov

and we will respond as soon as possible. You can also fill out a short survey which can be accessed near the bottom of the left menu.

"the National Weather Service is now following the #wxreport hash tag on Twitter."

NWS on Twitter

By Ryan Aylward - Meteorologist

In an effort to obtain timely significant weather reports from the public, the National Weather Service (NWS) is now following the #wxreport hash tag on Twitter.

Everyone is encouraged to "tweet" any significant weather events including, but not limited to, snow and/or other wintry precipitation, strong winds, large hail, trees and/or power lines down, storm damage, and flooding.

The process is very simple and only requires you to include your location, weather report, and the **#wxreport** hash tag. By sending in a report via Twitter, NWS forecasters in Charleston, SC will instantly be alerted and see your "tweet" on their computers.

Now anyone can send reports into the NWS! We look forward to seeing your reports in the near future!

For more information on storm reports via Twitter, go to this website:

http://www.weather.gov/stormreports/.

Science Corner: Atmospheric Optics

By Peter Mohlin - Meteorologist

While many of you may be familiar with the various different types of clouds, when conditions are just right, there are other phenomena that can occur in the sky. Some of them are fairly common, while others might only be seen once or twice in a lifetime at best. Collectively, anything having to do with light and color in the atmosphere and usually produced by water droplets, ice crystals and/or dust are called atmospheric optics.

The most recognizable atmospheric optic is probably the rainbow, which most of you have likely seen at least once, perhaps even on multiple occasions. However, there are several other visual spectacles that are less familiar, and all of which occur through 4 different methods: reflection, refraction, scattering and/or diffraction of light. If you ever saw something in the sky that looked strange, yet magnificent or beautiful, you might have been looking at some type of atmospheric optic.

Next we will briefly discuss several different types of atmospheric optics, indicating how they form and showing a photo of each.

Circumzenithal Arc

The Circumzenithal Arc, also called the Bravais' Arc or "a smile in the sky" is similar to a rainbow, but develops through the refraction of sunlight through one side and one face of horizontally oriented ice crystals. It is generally observed in Cirrus clouds, and its colors are similar to a rainbow, ranging from violet on the inside to red on the outside.

Belt of Venus

The Belt of Venus, also called the Anti-Twilight Arch or Venus's Girdle is visible many times just before sunrise or just after sunset, and occurs just above the horizon in the direction opposite the sun. It is slightly off-color, pinkish to brownish border separating the dark shadow band of the earth from the sky above. While the blue sky is normal sunlight reflecting off the atmosphere, in the Belt of Venus there is backscattering of reddish light from the setting or rising sun. It is best visible when the sky is clear, yet dusty and extends approximately 10 to 20 degrees above the horizon.

Corona

Although similar in appearance to a Halo, the Corona is formed by the diffraction of light passing through clouds containing small water droplets of a fairly uniform size. They occur with Altocumulus and Altostratus clouds and are seen as a white or colored circle, or a set of concentric circles of light visible around the sun or the moon. Their occurrence can also be an indication of precipitation arriving at your location within 6 to 12 hours.

Science Corner: Atmospheric Optics Continued…

Crepuscular Rays

Crepuscular Rays, also called Shadow Bands, Solar Rays or Sunrays, are usually produced by an obstruction to sunlight. The obstruction can be caused by Cumuliform clouds, dust or other particles in the atmosphere where the light becomes scattered. The rays are parallel to each other and their source can be traced back to the sun.

Anti- crepuscular Rays

Anti-Crepuscular rays are much like Crepuscular Rays, except they are bands of light or shadows that are observed on the opposite horizon from where the sun is found.

Glory

A Glory is produced by light that is backscattered (a combination of diffraction, reflection and refraction) towards its source by a cloud of uniformly sized water droplets. The phenomenon appears much like the halo of a saint, can have multiple colored rings and can fluctuate greatly in their size. However, most people only see one ring and they are usually only visible from an airplane or on a mountaintop, where the clouds are below your point of view and you are located between the sun and the clouds. They are sometimes called an Anticorona or a Brocken Bow.

Halo

A Halo is usually a bright circle centered on the sun or moon, but can be a variety of bright circles or arcs. The Halo results from the refraction of light by ice crystals that are suspended in the atmosphere and exhibits a prismatic coloration ranging from red on the inside to blue on the outside. They most commonly occur with Cirrostratus clouds and can be used to predict the weather. If they are seen with these clouds it is often an indicator that precipitation will occur within 12 to 24 hours.

Science Corner: Atmospheric Optics Continued...

Iridescence

These are brilliant spots or borders of colors in clouds, usually red and green, caused by diffraction of light by small cloud particles. This phenomenon is usually observed in Cirrus or Cirrocumulus clouds within about 30 degrees of the sun and is characterized by bands of color in the cloud that contour the cloud edges. The Iridescence is sometimes referred to as Irisation.

Parhelion

Parhelion is the scientific name for Sun Dogs, and is also known as Parhelia and Mock Suns. They appear as luminous spots at the same elevation and roughly 22 degrees to the right and left of the sun. They result from the refraction of sunlight passing through ice crystals. At times however, only one Parhelion or Sun Dog will be visible dependent upon the cloud cover, and they are exclusively associated with Cirriform clouds.

Secondary Rainbow

Rainbows are caused by the refraction, total reflection and scattering of light, and are always observed in the opposite direction from the sun. While a single or primary Rainbow features all the colors of the spectrum from violet on the inside to red on the outside, the secondary Rainbow shows these same colors, but in reverse order. The secondary Rainbow is about 10 degrees further out from the primary Rainbow, and is about twice as wide. The light of the secondary Rainbow is much less intense than that of the primary bow, given the same viewing conditions. A third or tertiary Rainbow, and higher order rainbows are also possible, but due to their low luminosity are rarely seen. If they do occur they are found on the same side as the sun, making them much more difficult to see.

Sun Pillar

This phenomenon is also called a Sub-Sun or a Light Pillar, and is caused by the reflection of light off the surfaces of falling ice crystals that are associated with Cirriform clouds. The Sun Pillar is a vertical shaft of light extending upward or downward from the sun, usually when the sun is low in the horizon.

Science Corner: Atmospheric Optics Continued…

Green Flash

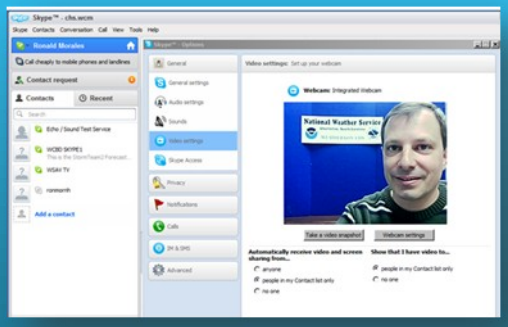
The Green Flash results from the refraction of light. It is also called a Blue Flash, a Blue-Green Flame and a Green Segment. Light moves slower in the lower and denser air near the earth's surface than in the thinner air above, so the sunlight will follow paths that curve slightly in the same direction as the curvature of the earth. The higher frequency green and blue light will curve more than the lower frequency red and orange light, so the blue and green rays from the upper edge of the setting sun will remain visible after the red and orange rays are obstructed by the curvature of the earth. The Green Flash is only visible for about a second and they are best seen on an unobstructed view of the horizon. If you are fortunate enough to witness its occurrence, it is said to bring you good luck.

Tangent Arc

The Tangent Arc is caused by the refraction of light above and below the sun, through horizontally oriented ice crystal columns. It is similar to a Halo, but it appears over and tangent to the Halo around the sun. The shape of the arc will vary with the elevation of the sun, with the arc forming a sharp angle when the sun is low in the sky. Like other Halos the Tangent Arc is red on the inner edge and blue on the outer edge because the red light is refracted more than the blue light.

Using Skype To Communicate with T.V. Media Partners

By Ron Morales - Warning Coordination Meteorologist



Our local T.V. media partners have expressed a strong interest in using Skype for live, video interviews. If you are not familiar with Skype, it allows you to have live video phone conversations with anyone else that has the software loaded on their PC, laptop or even smart phone. The software is available for download free on the web (www.skype.com).

In the near future, you will likely see some of the faces of the National Weather Service Forecast Office in Charleston on your local T.V. weather broadcast, especially during severe or unusual weather events.

Deepwater Horizon Oil Spill Support

People across the nation will undoubtedly remember the disaster which struck the Gulf of Mexico April 20th, 2010, when the Deepwater Horizon Oil Rig exploded killing 11 men, injuring 17 others, and sending a continuous stream of oil into the water for nearly 3 months.

The oil streaming into the Gulf, was finally halted on July 15th, 2010 when a cap was placed on the failed well head, and was declared "effectively dead" by federal government officials after relief wells were filled with cement sealing the blown out well thousands of feet below the ocean floor on September 19th, 2010. Before the well head was contained, oil was flowing into the Gulf of Mexico at an estimated rate of 62,000 barrels or 2.6 million gallons per day. Over the course of the disaster, 4.9 million barrels or 206 million gallons of oil was released into the Gulf of Mexico, making it the largest oil spill in United States controlled waters and the largest in the Gulf of Mexico.

The disaster resulted in an unprecedented response, calling experts from many professions to help resolve the problem, and restore the damage done to the environment and the economy of the northern Gulf Coast.

The National Weather Service (NWS) was one of a number of National Oceanic and Atmospheric Administration (NOAA) line offices called upon to provide technical support during the Deepwater Horizon oil spill response.

NWS Incident Meteorologists were summoned from across the country to provide detailed weather support information to key officials. The information, assisted officials in making important decisions on how to respond and where to allocate resources to maximize efficiency and effectiveness.

Meteorologist Jon Jelsema, a forecaster at the Charleston, SC NWS office, was one of a handful of NWS Meteorologists that were dispatched to the northern Gulf coast to respond to the oil spill. His duties included working for the NWS office in Mobile, AL as an operational forecaster issuing weather forecasts and warnings for the FL panhandle, southern AL, southern MS, and the adjacent marine area along the northern Gulf coast. In addition to these duties, Jon worked on the Decision Support desk relaying current radar information on the location and movement of thunderstorms over the northern Gulf Coast and adjacent coastal waters, and provided 3 to 6 hour thunderstorm forecasts to incident support personnel, to help ensure the safety of those involved in the cleanup efforts.

Weather information was critical during this disaster, as it allowed officials to make informed decisions on the safest, most effective, and timely methods to respond to the crisis and work toward restoring the environment.

Satellite Image of Oil Slick seen from NASA's Terra satellite on May 24, 2010.

"The National Weather Service (NWS) was one of a number of National Oceanic and Atmospheric Administration (NOAA) line offices called upon to provide technical support during the Deepwater Horizon oil spill response."

Photo showing degraded oil taken along the northern Gulf of Mexico coast, in Dauphin Island, AL on July 4, 2010.

Mission: "Protection of Life and Property and Enhancement of the National Economy"

NATIONAL WEATHER SERVICE
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We're on the Web!
www.weather.gov/chs

Your Report Makes a Difference!

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 give us a call. 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 in the path of the severe storm that just went over your home. *When in doubt,* ***please call us!***

You can reach us by calling the toll free number which we provided to you during the spotter training session you attended.

You can also leave a report on our severe weather answering machine: 1-888-383-2024.

For Forecast and Current Conditions call: 1-843-744-0303.