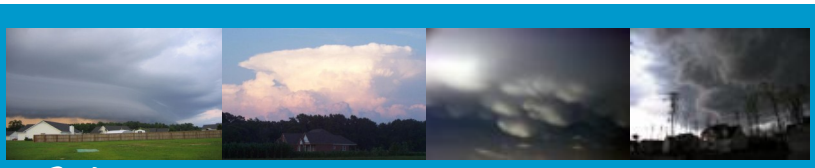


Changing Skies
Over Central North Carolina

VOLUME 10, ISSUE 1 SPRING 2013
NOAA'S NATIONAL WEATHER SERVICE RALEIGH, NC

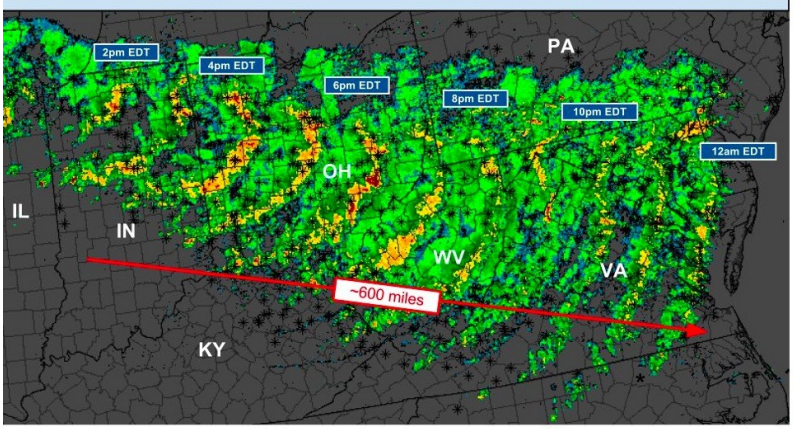
INSIDE THIS ISSUE:

Forecast Formats	2
Wireless Emergency Alerts	3
New NWS Director	3
Precipitation Modeling	4
Drought Update	8
StormFest	9
NWS Welcomes Blake Ellis	10

Understanding a Derecho: What is it?

One of the biggest severe weather events of last year was the derecho that crossed the Midwest into the Mid Atlantic states in late June. The storm affected 11 states including IL, IN, OH, PA, KY, WV, MD, VA, NC, DE and NJ. Unfortunately, 22 people were killed, mostly from trees falling on homes and vehicles. Over 5 million people were without power. This was the first derecho to really capture widespread major media attention as it rolled through big markets like Chicago, Indianapolis, Baltimore, Washington D.C. and Tidewater, VA. This was a progressive derecho that covered 600 miles in 10 hours averaging 60 mph. Wind speeds within the derecho gusted from 80 to 100 mph and record gusts were recorded at Fort Wayne, IN, Zanesville, OH and Huntington, WV. While the derecho only clipped North Carolina, there was plenty of buzz for the next several weeks and the buzzword was "derecho." Soon every thunderstorm was being called a derecho. So as we approach severe season we thought this would be a good time to talk about derechos and their various characteristics.

June 29, 2012 Midwest to East Coast Derecho
Radar Imagery Composite Summary 18-04 UTC
~600 miles in 10 hours / Average Speed ~60 mph



Over 500 preliminary thunderstorm wind reports indicated by * Peak wind gusts 80-100mph. Millions w/o power.

Summary Map by G. Carbin NWS/Storm Prediction Center

Definition

A derecho (pronounced similar to "deh-REY-cho") is a widespread, long-lived wind storm that is associated with a band of rapidly moving showers or thunderstorms. Although a derecho can produce destruction similar to that of tornadoes, the damage typically is directed in one direction along a relatively straight swath. As a result, the term "straight-line wind damage" sometimes is used to describe derecho damage. By definition, if the wind damage swath extends more than 240 miles (about 400 kilometers) and includes wind gusts of 58 mph (93 km/h) or greater along most of its length, then the event may be classified as a derecho.

Wind Strength

By definition, winds in a derecho must meet the National Weather Service criterion for severe wind gusts (greater than 57 mph) at most points along the derecho path. But in stronger derechos, winds may exceed 100 mph. For example, as a derecho roared through northern Wisconsin on July 4, 1977, winds of 115 mph were measured. More recently, the derecho that swept across Wisconsin and Lower Michigan during the early morning of May 31, 1998 produced a measured wind gust of 128 mph in eastern Wisconsin, and estimated gusts up to 130 mph in

(continued on page 6)

Print and Mobile Options for Your Forecast

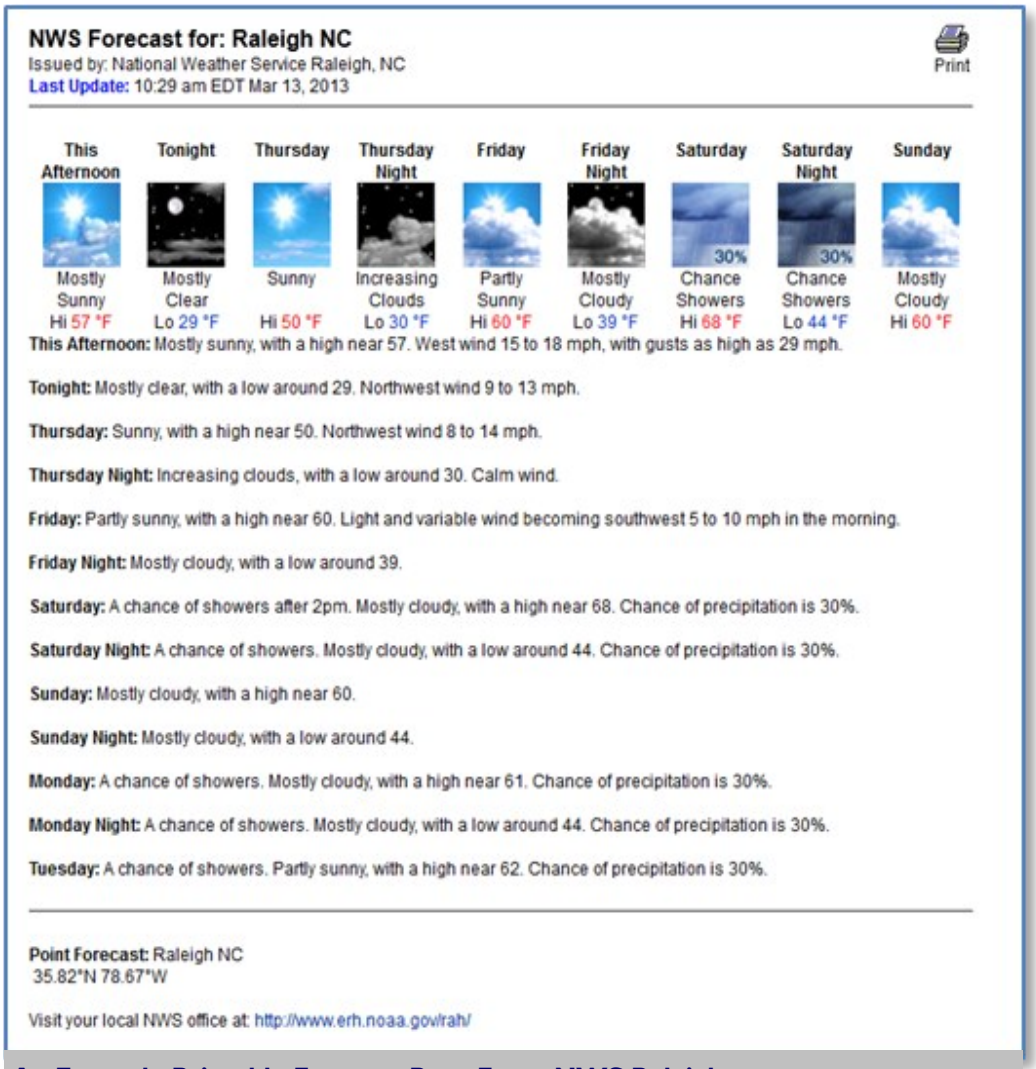
The NWS office in Raleigh is always searching for new and better ways to serve the people of central NC. In addition to our dense observation network, detailed aviation forecasts, and full suite of watch/warning/advisory products, we produce hourly forecasts of temperatures, humidity, rain chances, wind, and numerous other weather parameters, all out to 7 days in advance. That is a lot of information! This forecast information can be presented in a variety of ways, tailored for specific users (such as fire weather partners) or for general use. One such way is the Printable Forecast Page – a simple, uncluttered, single-page display of the 7-day forecast. This is a great way for businesses, hotels, schools, government agencies, and others to print and display their neighborhood forecast for their customers, employees, and students on a daily basis. Here is how to get to this page:

1.) Go to www.weather.gov/raleigh (our local web page).

2.) Click on your location on the map to see your local forecast.

(continued on page 5)

"The NWS office in Raleigh is always searching for new and better ways to serve the people of Central NC."



NWS Forecast for: Raleigh NC
Issued by: National Weather Service Raleigh, NC
Last Update: 10:29 am EDT Mar 13, 2013
Print

This Afternoon	Tonight	Thursday	Thursday Night	Friday	Friday Night	Saturday	Saturday Night	Sunday
Mostly Sunny Hi 57 °F	Mostly Clear Lo 29 °F	Sunny Hi 50 °F	Increasing Clouds Lo 30 °F	Partly Sunny Hi 60 °F	Mostly Cloudy Lo 39 °F	30% Chance Showers Hi 68 °F	30% Chance Showers Lo 44 °F	Mostly Cloudy Hi 60 °F

This Afternoon: Mostly sunny, with a high near 57. West wind 15 to 18 mph, with gusts as high as 29 mph.

Tonight: Mostly clear, with a low around 29. Northwest wind 9 to 13 mph.

Thursday: Sunny, with a high near 50. Northwest wind 8 to 14 mph.

Thursday Night: Increasing clouds, with a low around 30. Calm wind.

Friday: Partly sunny, with a high near 60. Light and variable wind becoming southwest 5 to 10 mph in the morning.

Friday Night: Mostly cloudy, with a low around 39.

Saturday: A chance of showers after 2pm. Mostly cloudy, with a high near 68. Chance of precipitation is 30%.

Saturday Night: A chance of showers. Mostly cloudy, with a low around 44. Chance of precipitation is 30%.

Sunday: Mostly cloudy, with a high near 60.

Sunday Night: Mostly cloudy, with a low around 44.

Monday: A chance of showers. Mostly cloudy, with a high near 61. Chance of precipitation is 30%.

Monday Night: A chance of showers. Mostly cloudy, with a low around 44. Chance of precipitation is 30%.

Tuesday: A chance of showers. Partly sunny, with a high near 62. Chance of precipitation is 30%.

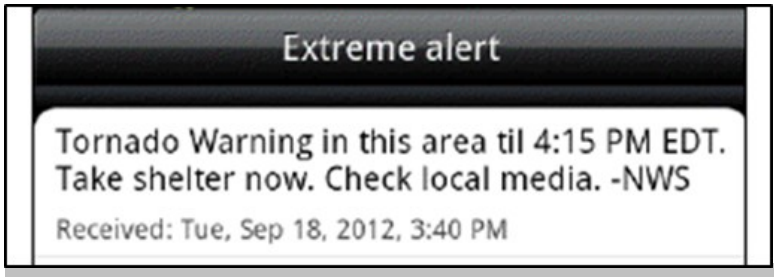
Point Forecast: Raleigh NC
35.82°N 78.67°W

Visit your local NWS office at: http://www.erh.noaa.gov/rah/

An Example Printable Forecast Page From NWS Raleigh

Wireless Emergency Alerts on Your Mobile Device

Imagine this: You're driving down the highway, humming along to your favorite tunes, when the cell phone stowed in your bag suddenly makes a strange noise. To investigate, you take the next exit and safely pull over to check the screen. Good thing you did: Your phone just alerted you to a tornado a few miles away in the same county you're driving through.



An Example of a Wireless Emergency Alert

Sound plausible? It is. Last June, America's wireless industry rolled out a new nationwide text emergency alert system, called Wireless Emergency Alerts (WEA), which will warn you when weather threatens.

The text alert service is free and automatic – there's no need to sign up or download an app, and this service will not use any of your paid text messages or minutes. As long as your cell phone is WEA-capable, you'll get wireless alerts for the most dangerous types of weather from NOAA's National Weather Service no matter where you are.

NOAA's NWS will broadcast warnings via WEA for weather emergencies that are most dangerous to life and property: tornadoes, flash floods, hurricanes, extreme wind, blizzards and ice storms, tsunamis, and dust storms. Severe thunderstorm warnings will not be part of the initial rollout of broadcast messages because they are so frequent; however, these will continue to be broadcast by NOAA Weather Radio, media outlets and Internet-based services.

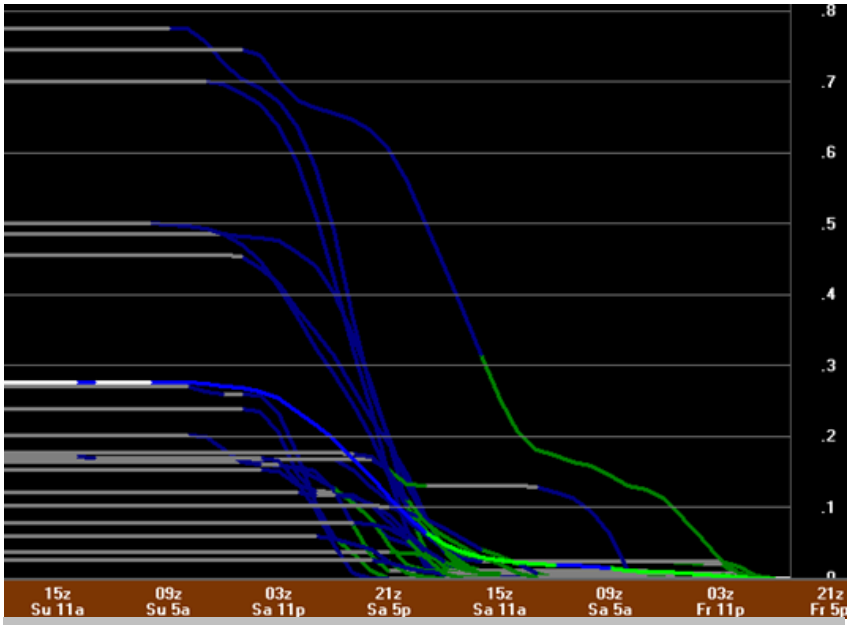
When your phone receives a WEA message, it will alert you with a unique ring tone and vibration. These 90-character messages are a "heads up" to prompt you to seek further information about the threat. The message will look like a text, but it's not a traditional text message most people are used to. This text message will automatically pop up on your cell phone's screen and you won't have to open it up to read it.

The Wireless Emergency Alert system relies on "best-effort" networks, so delivery of alerts at a given place and time is not guaranteed. The new alert system is not a replacement for other alert systems, and you should not rely on it as a sole source of emergency information. A weather alert sent through WEA is intended to notify the public that a warning has been issued and that you should seek additional information. Remember: Not all phones are capable of receiving Wireless Emergency Alerts.

Cell service customers can opt out of weather alerts, but we strongly discourage you from doing so. These weather alerts are a vital public service that ultimately helps America become a more weather-ready nation. Armed with late-breaking weather warnings, people will have the timely information they need to make smart decisions about how to protect themselves, their families, their friends and neighbors, and their personal property.

-Nick Petro

Do More Models Make it Merrier?



Short Range Ensemble Forecast (SREF) members showing various forecasts for liquid equivalent precipitation amounts.

"A winter storm from the past February provides a good example of the utility of ensembles ."

A weather forecast is an estimate of the future state of the atmosphere. It is created by estimating the current state of the atmosphere using observations and then calculating how this state will evolve in time using a Numerical Weather Prediction (NWP) computer model. Forecasters have always understood the value of examining multiple NWP forecasts to help produce a more reliable forecast. Instead of running just a single forecast, an ensemble approach runs the computer model a number of times from slightly different starting conditions, model frameworks, or model configurations. The complete set of forecasts is referred to as the ensemble family, and individual forecasts within it, ensemble members.

Ensemble prediction is a relatively new tool for operational forecasting that allows for a rapid and scientifically-based comparison of multiple model forecasts. The ensemble forecasts give the forecaster a much better idea of what weather events may occur at a particular time. By comparing these different forecasts the forecaster can decide how likely a particular weather event will be. If the forecasts vary a lot then the forecaster knows that there is a lot of uncertainty about what the weather will actually do, but if the forecasts are all very similar forecasters will have more confidence in predicting a particular event. Forecasters at the NWS Raleigh use a number of ensemble forecast systems, with the most commonly used system called the Short Range Ensemble Forecast (SREF). The SREF is composed of 21 different members, with the average value of all of the forecasts called the "mean".

A winter storm from the past February provides a good example of the utility of ensembles. Predicted liquid equivalent precipitation from the SREF members and the SREF mean for the February 16-17 winter storm is shown at left. The plot is viewed from right to left with amount of precipitation in tenths of an inch shown in the vertical axis and the color of the lines indicating likely precipitation type. At about the same time as the SREF output shown at left, one of our primary models, the NAM, indicated 0.03" of liquid equivalent precipitation during the event, while the other primary model, the GFS, indicated 0.34", a big spread between the two. The SREF output suggests that confidence in precipitation amount is low as its members have values ranging from 0.05" to 0.78". A majority of the SREF members are clustered in the 0.10" to 0.30" range with a few outliers indicating much greater amounts. In the end, SREF mean value indicated 0.28" which was very close to the observed 0.39".

-Jonathan Blaes

Print and Mobile Options for Your Forecast (continued from page 2)

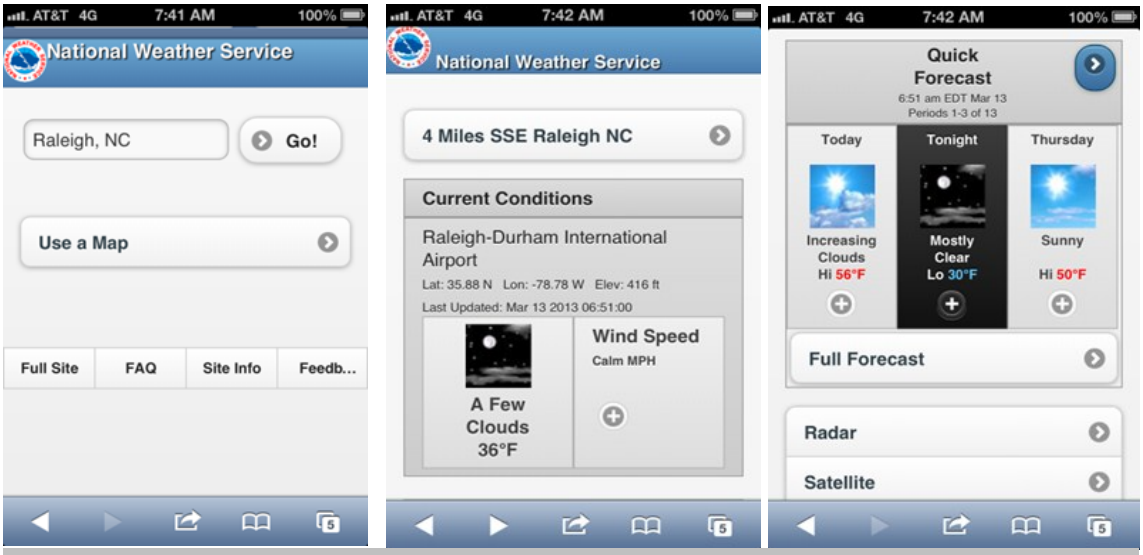
3.) Scroll down about halfway, just under the 7-day forecast, under the "Additional Forecasts and Information" header. Click on the second option from the top left, "Printable Forecast".

4.) Choose "Print" from the top right to print a one-page forecast with graphics and text. You can now bookmark this forecast in your web browser, for easy access on a daily basis.

Another tool at your disposal is the NWS Mobile Weather site. On your smartphone or tablet, simply go to mobile.weather.gov to access the site. This is a quick and easy way to view your local, current conditions and get either a quick forecast or the detailed outlook for your neighborhood while on-the-go. Remember, we update our forecast every 3 hours, and often more frequently, so you'll always get the latest forecast.

As always, your feedback on these tools, and suggestions for other ways that we can give you the information that you need, are greatly appreciated!

-Gail Hartfield



Screenshots From the National Weather Service Mobile Weather Site

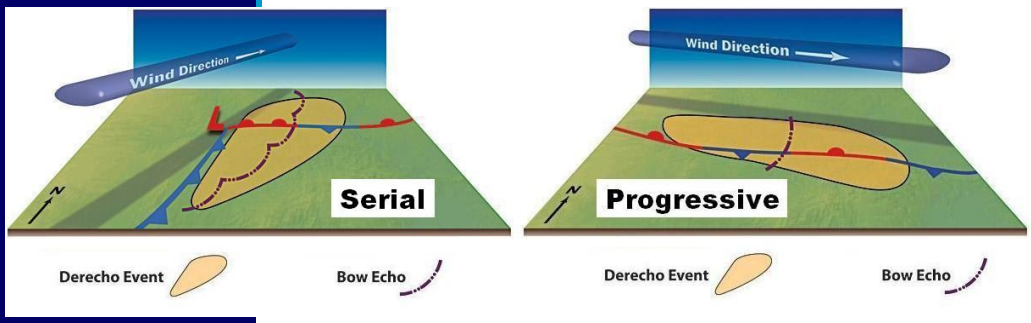
New National Weather Service Director Selected

Louis W. Uccellini, Ph.D., has been selected to become the next assistant NOAA administrator for weather services and the 16th director of NOAA's National Weather Service. Since 1999, Uccellini has led the NWS' National Centers for Environmental Prediction, which in 2012 moved to a new state-of-the-art facility in College Park, MD. At NCEP, he was responsible for directing the planning, science and technology, and operational responsibilities related to NCEP's Central Operations and Environmental Modeling, as well as seven national centers, including the National Hurricane Center in Miami, Storm Prediction Center in Norman, Okla., and Space Weather Prediction (continued on page 10)

Understanding a Derecho (continued from page 1)

Lower Michigan.

The winds associated with derechos are not constant and may vary considerably along the derecho path, sometimes being below severe limits (57 mph or less), and sometimes being very strong (from 75 mph to greater than 100 mph). This is because the swaths of stronger winds within the general path of a derecho are produced by what are called *downbursts*, and downbursts often occur in irregularly-arranged clusters, along with embedded *microbursts* and *burst swaths*. Derechos might be said to be made up of *families of downburst clusters* that extend, by definition, continuously or nearly continuously for at least 240 miles.



Types of Derechos

Two main types of derechos may be distinguished. This classification largely is based on the overall organization and behavior of the associated derecho-producing convective system and reflects, in part, the dominant physical processes responsible for the thunderstorms that produce the damaging winds.

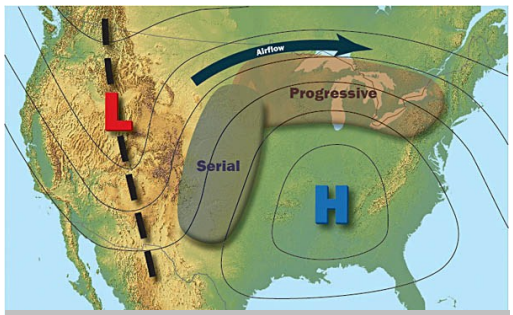
The type of derecho most often encountered during the spring and fall is called a serial derecho. These are produced by multiple bow echoes embedded in an extensive squall line (typically many hundreds of miles long) that sweeps across a very large area, both wide and long. This type of derecho typically is associated with a strong, migratory low pressure system.

The second type of derecho is called a progressive derecho. These are associated with a relatively short line of thunderstorms (typically from 40 miles to 250 miles in length) that may at times take the shape of a single bow echo, particularly in the early stages of development. In some cases, the width of a progressive derecho and its associated bow echo system remain relatively narrow even though they may travel for hundreds of miles. In other cases, the progressive derecho and associated bow echo system begin relatively small, with a narrow path, but over time grow to exceed 250 miles in width. The line of thunderstorms of a progressive derecho often begins as a single bow echo that evolves into a short squall line, typically with more than one embedded bowing segment.

Progressive derechos may travel for many hundreds of miles along a path that is relatively narrow compared to those of serial derechos. Often they are associated with an area of weak low pressure at the surface.

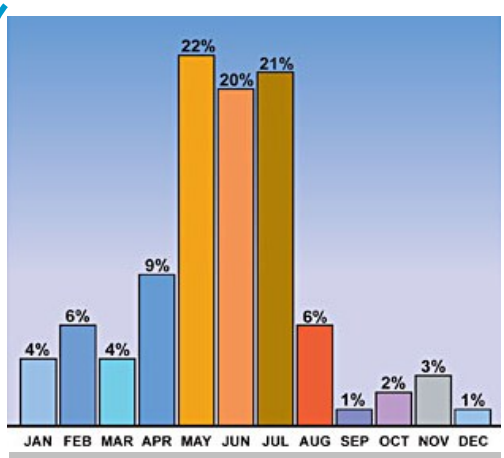
Derechos and Heat Waves

Some of the most intense summer derechos, especially those of the progressive type, occur on the fringes of major heat waves. Examples include the July 1983 "I-94" derecho in the upper Mississippi Valley, the Mid-July 1995 derechos in New York and Canada, and the more recent Ohio Valley / Mid-



Synoptic Setup for Derechos Near Heat Waves

"Some of the most intense summer derechos, especially those of the progressive type, occur on the fringes of major heat waves."



Derecho Climatology by Month

Atlantic derecho of June 2012. The relationship is more than statistical. It turns out that the meteorological conditions favorable for large-scale heat waves often also are conducive to derechos. In the United States, this is especially true from the Upper Missisippi Valley and Upper Great Lakes into the Ohio Valley and Northeast.

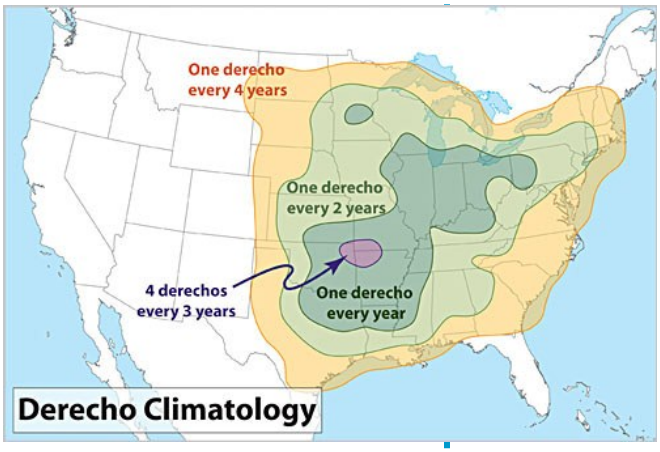
The primary link between heat waves and derechos is the presence of an elevated mixed layer, or EML. An EML is a layer of mid-tropospheric air that originates over the arid, elevated terrain. EMLs exhibit sharp decreases in temperature with height. The large vertical temperature differentials (or "steep" lapse rates) in EMLs are analogous to those observed over black-topped roofs and parking lots on sunny days. Such thermal stratification encourages the formation of strong updrafts that can lead to the development of thunderstorms. In fact, the frequent presence of an EML on days otherwise favorable for thunderstorm formation to a large extent accounts for the intensity of the storms commonly encountered over the Great Plains.

During a typical heat wave over the central and eastern United States, a large, stationary upper-level high pressure area usually is present over the south-central states. Persistent westerly winds on the poleward side of the high allow EMLs generated over the Rocky Mountains to extend eastward into the Ohio Valley and Northeast, well beyond their usual range over the Plains. Warm air aloft associated with the base of the EML acts as a "cap" or "lid" that prohibits thunderstorm development along much of the extent of the EML, southward into the heat wave-associated "high." But on the northern fringe of the EML, where low-level uplift frequently is focused along a stationary front marking the northern edge of the heat wave, updrafts that form in the strongly heated air near the ground may breach the cap, resulting in an explosive release of instability. If other conditions are favorable (e.g., low-level moisture is abundant along the front, winds are largely unidirectional, parallel to it, and increase with height), additional storms may erupt in concentrated fashion along the boundary, yielding a band of downstream-developing storms and, on occasion, a full-blown derecho.

Derecho Climatology

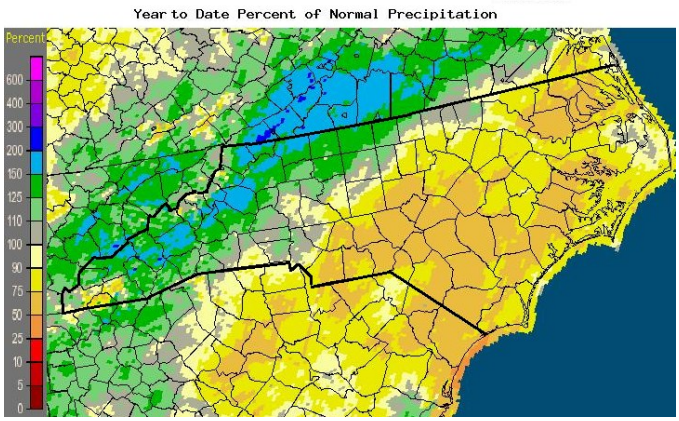
Derechos in the United States are most common in the late spring and summer (May through August), with more than 75% occurring between April and August (see graph at left). As might be expected, the seasonal variation of derechos corresponds rather closely with the incidence of thunderstorms.

Derechos in the United States most commonly occur along two axes. One extends along the "Corn Belt" from the upper Mississippi Valley southeast into the Ohio Valley, and the other from the southern Plains northeast into the mid Mississippi Valley (figure below). During the cool season (September through April), derechos are relatively infrequent but are most likely to occur from east Texas into the southeastern states. Although derechos are extremely rare west of the Great Plains, isolated derechos have occurred over interior portions of the western United States, especially during spring and early summer.



-Brandon Vincent and Ryan Ellis (source: NWS Storm Prediction Center)

Spring Drought Update



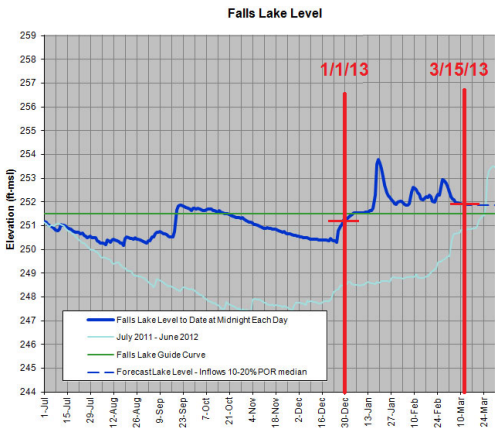
"The western half of the Tar Heel state benefitted greatly from a wet period from late December into January."

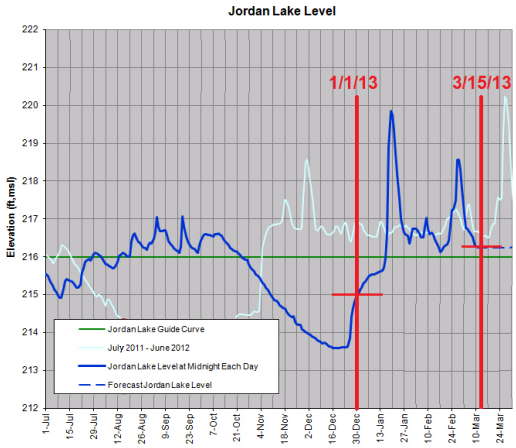
The western half of the Tar Heel state benefitted greatly from a wet period from late December into January. The east, however, has been slow to catch up, and is running a deficit for the year to date.

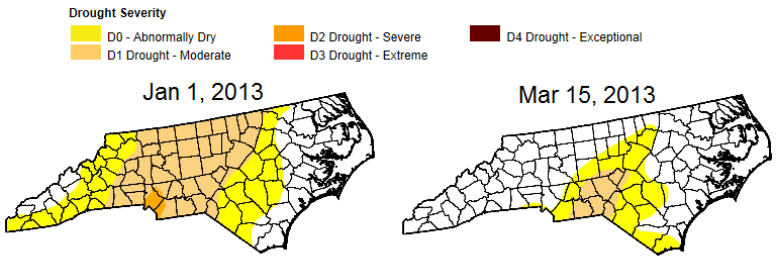
Even near normal rainfall is of great benefit during the cool months, however, as evaporation is low and demand from other sources, such as agriculture and public use, is also reduced. The water supply reservoirs in central NC have all risen above their target elevations and now contain enough water to last through the summer, even if our rainfall deficit lingers through the spring.

Drought impacts have accordingly declined significantly early in 2013. Nearly the entire state west of Interstate 95 (~70% of the state) was categorized as abnormally dry or worse on January 1st, as compared to ~25% on March 15th. Only a small area (~7 counties) of south-central NC remained categorized as suffering from moderate drought by the U.S. Drought Monitor (http://drought.gov/drought).

-Mike Moneypenny







Week	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
January 1, 2013	31.03	68.97	38.63	1.45	0.00	0.00
March 12, 2013	73.10	26.90	6.85	0.00	0.00	0.00

May 4th Marks Fourth Annual StormFest

North Carolina Museum of Natural Sciences in Raleigh, NC

The fourth annual Stormfest at the North Carolina Museum of Natural Sciences will take place Saturday, May 4. Hosted by WFO Raleigh and the museum in collaboration with the American Red Cross and local media, this event typically draws weather enthusiasts and others from across the state. The event allows everyone the opportunity to experience and learn more about severe storms in North Carolina.

At Stormfest, NWS staff members, local media and TV meteorologists, researchers, storm chasers, emergency officials and several public service organizations will be available all day providing demonstrations and educational material for adults and children. At past Stormfests, participating organizations have included the American Red Cross, the North Carolina Baptist Men, Central Carolina Skywarn, the North Carolina State Climate Office, the Salvation Army, and local chapters of the American Meteorological Society, among others. A favorite activity among those visiting the museum for Stormfest has been a panel discussion each with on-air morning and Chief Meteorologists from the major television stations serving the Raleigh-Durham market. The moderated discussion, entitled "Ask the Experts", has focused on their career paths, notable weather events in their professional careers, weather safety, careers in meteorology, and challenges in their industry. The panel typically fields questions from the audience.

In addition to meeting some of your National Weather Service forecasters and staff, you will have the opportunity to personally interact briefly with the meteorologists you see on television every day. Stormfest is a lot of fun, and one of its main purposes is to get people ready for severe weather. Visitors will have the opportunity to learn how a variety of organizations increase community severe weather awareness, preparedness, and response. Some demonstrations and hands-on activities will aid in understanding severe weather safety and what the organizations do help keep people safe.

Put the activity on your calendar now for Saturday, May 4. Stormfest hours will be the museum hours of 9 AM to 5 PM. The museum is located in downtown Raleigh at 11 West Jones St. General admission to the museum is free.

-Darin Figurskey

NOAA's National Weather Service
Raleigh, NC

1005 Capability Drive
Suite 300
Centennial Campus, NCSU
Raleigh, NC 27606

Phone: 919-515-8209
Fax: 919-515-8213
Forecast Line: 919-515-8225

New NWS Director (continued from page 5)

Center in Boulder, Colo. Uccellini is also a fellow of the American Meteorological Society and just completed his term as the society's president.

Uccellini, 63, began his weather career at the Goddard Space Flight Center's Laboratory for Atmospheres as the section head for the Mesoscale Analysis and Modeling Section in 1978. In 1989, he joined the NWS as chief of the Meteorological Operations Division and then became director of the Office of Meteorology in 1994.

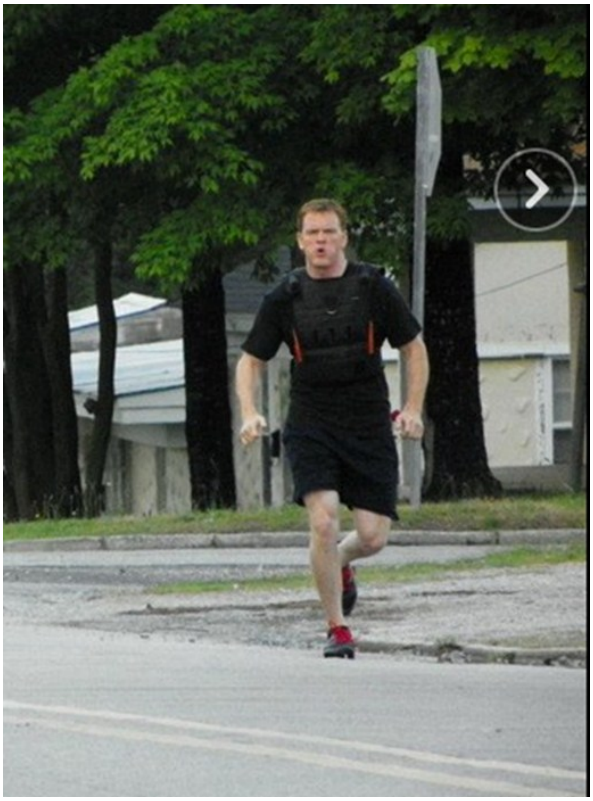
Uccellini received his Bachelor of Science (1971), Master (1972), and Ph.D. (1977) degrees from the University of Wisconsin-Madison. He has published more than 60 journal articles and chapters in books, and is known for coauthoring the widely acclaimed two-volume book, Northeast Snowstorms. A native of Bethpage, N.Y. on Long Island, Dr. Uccellini is a resident of Columbia, MD. He and his wife, Susan, have three children.

-NOAA

William Blake Ellis Joins WFO Raleigh Electronics Team

On December 31, 2012, NWS Raleigh welcomed a new addition to the family. William Blake Ellis arrived at our office on New Year's Eve as a new electronics technician. Blake was formerly an Aerospace Specialist Supervisor at Pope Air Force Base, and most recently served as a Senior Manufacturing Engineer Technician for UTC Aerospace Systems in Wilson. A resident of Clayton, Blake has a Bachelor's Degree in Business Administration from Campbell University. Blake has been a welcome addition to the Raleigh office, and has been active learning NWS operations and "jumping in with both feet" to make sure all types of systems and equipment have been working well.

-Darin Figurskey



New electronics technician Blake Ellis running with a 20-pound vest during the 2012 Memorial Day Murph activities in Clayton. Photo courtesy of the examiner.com.