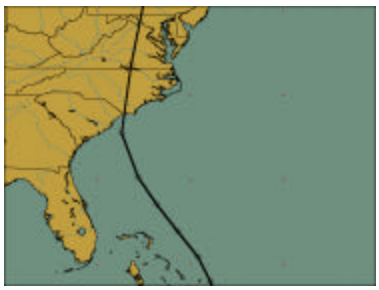
National Weather Service
Raleigh, North Carolina

Changing Skies
Over Central North Carolina

Volume 1, Issue 3
Summer 2004

Looking Back: 50th Anniversary of Hurricane Hazel

By Doug Schneider



In August and September 1954, Hurricanes Carol and Edna would brush the Outer Banks of North Carolina. But these storms were merely warning shots that grazed the coast. In the morning hours of October 15, Hurricane Hazel made a direct hit on the heart of North Carolina. It was one of the greatest natural disasters to ever affect the state, and one of the most destructive hurricanes to strike the United States.

Hazel began to form near the southern end of the Windward Islands on October 5, and tracked west into the Caribbean Sea. It took a sharp turn to the north and crossed between Haiti and the eastern tip of Cuba. As it moved northwest parallel to the Bahamas, it intensified to a Category 4 hurricane on the Saffir-Simpson Scale. Unlike many hurricanes that follow that path, it did not curve east out to sea, and instead made a straight line for North Carolina.

Hazel made landfall near the South Carolina border at Calabash. The flood caused by the storm surge reached 18 feet above mean low water. The storm surge was likely enhanced by the timing of the landfall at the highest lunar tide of the year. Winds along the southern coast were estimated around 150 mph. Wilmington reported winds of 98 mph, and winds at Wrightsville Beach were estimated at 125 mph. Even after landfall, the winds maintained their

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Inside this issue:

Flash Flooding

By Michael Moneypenny

Visualize a flash flood. What are some of the characteristics you pictured? Torrential rain? A wall of muddy water roaring by, sweeping trees and cars downstream? People clinging to the upper branches of trees, mere feet above the water's surface as rescuers struggle to reach them through the raging current? While these scenarios are certainly some of the more extreme characteristics of flash flooding, flash flooding in central North Carolina is almost always slower to develop and less severe than the flooding typically seen in disaster preparedness films or Hollywood movies.

There are only a couple of firm criteria used by the National Weather Service to define a flash flood: 1) the flooding develops quickly, within 6 hours of the onset of rain, and 2) the flooding threatens life and/or property. Another type of flash flooding results from the collapse of a dam, but dambreak flooding is beyond the scope of this discussion.

The gently rolling topography of central North Carolina doesn't normally induce the extremely rapid runoff needed to produce the stereotypical "raging wall of water" that most folks associate with a flash flood. Flash flooding in central North Carolina is s lower to develop and requires very high rainfall rates, typically around 3 inches of rain in an hour, or 4 to 5 inches in a 6 hour period. There are only a couple of weather events which affect our area that can produce rainfall rates in this range; thunderstorms and tropical cyclones.

Individual summertime thunderstorms rarely produce flash flooding as they usually only last 30 to 45 minutes and produce up to an inch of rain. It is common for storms to line up along frontal zones or along other atmospheric boundaries, however, and when this

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Are You Ready for the Hurricane Season?

By Gail Hartfield

"Preparation through education is less costly than learning through tragedy."
- MAX MAYFIELD, DIRECTOR
NATIONAL HURRICANE CENTER

While tropical cyclones have historically wreaked most of their havoc at the coast, those of us who live and work inland have major concerns as well—including torrential flood-producing rains and strong damaging winds. Hurricanes Floyd and Fran in recent years have proven that inland locations can be just as vulnerable to tropical cyclones. And we can't limit our concern to hurricanes: tropical storms and tropical depressions can produce as much heavy rain and flooding as a hurricane. While we can't prevent a tropical cyclone from coming, we can make sure we're adequately prepared. Here are a few preparedness tips to help you be ready for the worst:

While the storm is still far away:

- Consider the type of hazards that could affect your family. Know your home's vulnerability to flooding and wind.
- Locate a safe room or the safest areas in your home for each hurricane hazard. In certain circumstances the safest areas may not be your home but within your community.
- Have an out-of-state friend as a family contact, so all your family members have a single point of contact.
- Make a plan for what to do with your pets if you need to evacuate.
- Check your insurance coverage. Flood damage is not usually covered by homeowner's insurance.

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Lightning – The Underrated Killer

By Doug Schneider

Lightning makes every single thunderstorm a potential killer, whether the storm produces one single bolt or ten thousand bolts. This is what makes lightning so dangerous. During the past 30 years, lightning killed an average of 80 people per year in the United States based on documented cases. This is more than the average of 68 deaths per year caused by tornadoes and the average of 16 deaths per year caused by hurricanes. On average, only floods kill more people. However, because lightning usually claims only one or two victims at a time, and because lightning does not cause the mass destruction left in the wake of tornadoes or hurricanes, lightning generally receives much less attention than the more destructive weather-related killers.

During a thunderstorm, each flash of cloud-to-ground lightning is a potential killer. The determining factor on whether a particular flash could be deadly depends on whether a person is in the path of the lightning discharge. In addition to the visible flash that travels through the air, the current associated with the lightning discharge travels along the ground. Although some victims are struck directly by the main lightning stroke, *many victims are struck as the current moves in and along the ground*.

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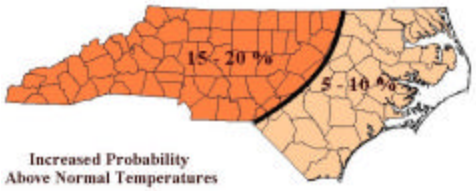
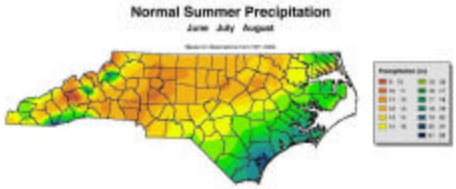
Summer 2004 Outlook

By Brandon Locklear

There are indications that North Carolina will experience above normal temperatures during the summer (June-July-August) season. Currently, conditions across the tropical Pacific Ocean are reading in the normal range, indicating ENSO-neutral conditions.



As a result, the summer period will be influenced by other atmospheric or oceanic patterns. Additionally, recent abnormal dry soil conditions across the state (see latest drought conditions) also suggests above normal temperatures. Dry soil conditions allow very little evaporation from incoming solar energy, thus allowing a significant higher amount of solar energy to directly heat and warm the ground and surrounding air.



There is much lower confidence in the precipitation forecast. There are no strong signals to indicate whether the June-July-August period would be drier or wetter than normal. June however, does mark the beginning of the tropical storm season for North Carolina. Given the unpredictable nature of tropical storms and the lack of strong oceanic and atmospheric signals, North Carolina has equal chance of near, above and below normal precipitation.

Preparing for the Dangers of Summer Heat

By Gail Hartfield

When the topic of deadly weather comes up, most people tend to think about high-profile events such as tornadoes, hurricanes, and flooding. But did you know that the number one weather-related killer nationwide is actually *heat?* In the last ten years, excessive heat has been responsible for an average of 237 deaths per year. Since 1986, when the National Weather Service began tracking heat-related illnesses and fatalities, heat has killed 2590 people in the U.S.—far more than those killed by lightning, tornadoes, floods, or tropical cyclones during that same time period. Heat-induced injuries in just the last five years have totaled 2943 people nationwide, a figure that is likely greatly underestimated. In North Carolina in 2002, heat illness led to 8 deaths and 29 injuries (although, again, these have likely been underreported). Unfortunately, excessive heat and their dangers receive little media attention, possibly because they aren't as "exciting" as tornadoes and hurricanes. Individuals most susceptible to heat illness include the elderly (especially those without air conditioning or on certain medications), athletes (who can push themselves too hard and quickly develop dehydration and heat stroke), children (whose body temperature can rise much more quickly than an adult's), and outdoor and migrant workers.

So what can you do to keep from becoming a statistic? First, be informed. The National Weather Service issues 3-hourly forecasts of heat index (which is a measure of how the combined hot temperatures and humidity affect the body) out to 72 hours (www.erh.noaa.gov/rah/gfe/gridded.html). A heat index over 95° means that those exerting themselves outdoors (such as construction workers) should take it easy and use extra caution. Those without air conditioning should consider spending time in a place that does, such as a library or mall. For heat index values near or over 105°, the National Weather Service issues a heat advisory, meaning that no one should spend extended periods of time outdoors, and should instead stay in air conditioning as much as possible. Excessive heat warnings are issued for heat index values over 110°. It has been shown that heat threat is cumulative, becoming much more serious after two or more days with a heat index over 100°.

Second, everyone should know the warning signs of heat illnesses. The most serious heat illness, called a heat stroke, can begin as just some cramping and heavy sweating, but when it progresses to shallow breathing, throbbing headache, rising body temperature, confusion, and dizziness, medical attention must be sought *immediately*. Once the body becomes unable to regulate itself and the sweating mechanism fails, the internal temperature can rise to over 106 degrees in just 10 to 15 minutes.

Third, know what to do if you or someone around you comes down with a suspected heat illness. For milder symptoms such as cramping and heavy sweating, go to a cool, shaded, well-ventilated area or into air conditioning, to keep the illness from progressing. Sip cool water, mist water on your face, and rest. If the more serious symptoms of heat stroke develop, it is critical to seek professional medical attention right away.

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Highlight on Bill Boyes... Triad SKYWARN EC

By Jeff Orrock

Bill Boyes, a native Rhode Islander, is a dedicated SKYWARN volunteer donating his time to help protect life and property. Bill has lived in North Carolina for 15 years working in electronics technology for the past 25 years. He received his first Ham Radio license in 1979 while a senior in high school. In Rhode Island , Bill spent 2 years as the state Section Emergency Coordinator for the Amateur Radio Emergency Service and was in charge of state Amateur communications during Hurricane Gloria.

Bill lists one notable achievement as the first known east coast hookup of Amateur Radio data into the NWS system. Later that year Packet TNC's became available. While in Rhode Island, SKYWARN was mostly called to activate for winter weather events. That's why it's cool to be doing that again for the Raleigh NWS.

When not weather spotting, Bill is into Amateur Radio, especially Morse Code, coastal fishing, kayaking, photography, and competitive racquetball.

In Bill's words, "It is a joy and a privilege to lead Triad SKYWARN. The level of dedication and professionalism that our volunteers show makes it the success it is. I truly believe that the measure of effectiveness for leaders is the ability for the system to run at 100 percent efficiency completely without the leader being present. I can be on vacation 1000 miles away and rest assured that the job will get done.

"To me, having an Amateur Radio license would be a shallow achievement without rendering service to the public. While SKYWARN does not require people to be Amateur Radio Operators, it is a wonderful hobby and a very efficient tool for coordinating 12 counties of information. Amateur, or Ham Radio, has had a big part in teaching me life lessons in technology, service, and community. I encourage people to explore this wonderful hobby and service."

For more information regarding Triad SKYWARN, check out **www.arrl.org**.

Flash Flooding...continued

(Continued from page 1)

happens, more than one storm may pass over an area, producing enough additional rain to initiate flooding. At other times, atmospheric conditions may generate longer-lived, slow-moving storms capable of producing 2 to 4 inches of rain along their path. Flooding from thunderstorms is more common on smaller streams and in urban areas where expanses of paved ground concentrate runoff and overtax storm drainage systems.

Tropical cyclones, while relatively rare, are responsible for more flood-related deaths than thunderstorms. Rainfall in excess of 6 inches over a period of a few hours is common with tropical systems, and every few years a slow-moving cyclone dumps 10 to 15, or even 20 inches of rain somewhere in the Tar Heel state. Due to the enormous size of the rain shield, a tropical system produces much, much more water which must run off than a thunderstorm, so the area impacted by flooding is much larger, and the flood waters are much deeper.

To give you an example, Hurricane Floyd in September, 1999 produced a large swath of 12 to 16 inch rain over a large portion of eastern North Carolina along the Tar River. Compounding the problem, Hurricane Dennis the previous week had already dumped 4 to 8 inches of rain on this same area. The flooding which resulted caused 35 flood-related deaths in North Carolina, with damage estimated at around 3 billion dollars. In addition, whole towns were underwater, roads flooded, bridges washed out, and water treatment plants failed – cutting off water supplies. Over 7000 homes were destroyed and another 56,000 damaged by flood waters. River gauges on the Tar River at Rocky Mount and Tarboro crested around 10 feet above their previous record high water marks.

Well over half of the deaths associated with flash flooding result from an individual trying to drive their vehicle through the flooded area. In some instances the vehicle is stalled, and the people drown while trying to wade out of the water, but it is even more common for a vehicle to be swept off the road and downstream, trapping the people inside to drown.

While the typical automobile weighs around 2 tons, remember

that friction is what prevents the vehicle from sliding sideways when force is exerted on the side of the car. This friction is present only at the 4 small points where the tires contact the road. Moving water exerts an enormous amount of lateral pressure on the side of the car, especially once the water reaches the car's body. A car is also somewhat buoyant, and the water is lifting the car at the same time, greatly decreasing the car's effective weight, and thus, the friction holding it on the road. This is why only 2 feet of swiftly flowing water is enough to sweep an average-sized vehicle off the road.

A final factor which must be considered is that water on the road is difficult to see at night, and it is impossible to judge its depth, especially when it is flowing across the road. When water is encountered on the road at night during potential flood situations, the best course of action is to turn around and look for another route.

The National Weather Service's Doppler weather radar provides accurate rainfall estimates every 5 to 6 minutes. In addition, high resolution topographic and demographic maps have been incorporated into our flash flood warning system, allowing us to better identify surface features which impact storm runoff. As such, the accuracy of our flash flood forecasting has continued to increase over the past few years.

Looking Back: 50th Anniversary of Hurricane Hazel...continued

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intensity. Fayetteville measured gusts of 110 mph, while in Goldsboro, Kinston, and Faison, winds were estimated around 120 mph. The Raleigh-Durham Airport measured a 90 mph gust. As the storm tracked north, it produced 100 mph wind gusts from Virginia all the way to New York.

The destruction left behind in North Carolina was compared by some to the battlefields of Europe after World War II. The damage from the storm surge in Brunswick County and New Hanover County was massive. Countless trees across the eastern half of the state were uprooted and snapped, many falling on homes and structures. Nearly 40,000 structures had damage across thirty counties in the state, with approximately $136 million in property losses. The death toll in the state was nineteen, and over 200 people were injured. Along its entire path from Haiti to Canada, over 600 people were killed with $350 million in property damage (in 1954 dollars).

Until Hurricane Fran came through the state in 1996, Hurricane Hazel was the storm by which all other tropical storms were measured in North Carolina. It has been the only Category 4 hurricane to affect the state. The following hurricane season provided little relief, as three hurricanes would make landfall in North Carolina in 1955.

Lightning – The Underrated Killer… continued

(Continued from page 2)

While virtually all people take some protective actions during the most dangerous part of thunderstorms, many leave themselves vulnerable to being struck by lightning as thunderstorms approach, depart, or are nearby.

Studies have shown that most people struck by lightning are struck not at the height of a thunderstorm, but before and after the storm has peaked. This shows many people are unaware of how far lightning can strike from its parent thunderstorm. DO NOT wait for the rain to start before seeking shelter, and do not leave shelter just because the rain has ended. Any lightning safety plan should incorporate the 30/30 Rule. The 30/30 Rule states that people should seek shelter if the "Flash-To-Bang" delay (length of time in seconds between a lightning flash and its subsequent thunder) is 30 seconds or less, and that they remain under cover until 30 minutes after the final clap of thunder. A 30 second lead time is necessary prior to a storm's arrival because of the possibility of distant strikes. A 30 minute wait after the last thunder is heard is necessary because the trailing storm clouds still carry a lingering charge. This charge can and does occasionally produce lightning on the back edge of a storm, several minutes after the rain has ended. Don't be fooled by sunshine or blue sky!

Most lightning deaths and injuries in the United States occur during the summer months when the combination of lightning and outdoor summertime activities reaches a peak. During the summer, people take advantage of the warm weather to enjoy a multitude of outdoor recreational activities. Unfortunately, those outdoor recreational activities can put them at greater risk of being struck by lightning. People involved in activities such as boating, swimming, fishing, bicycling, golfing, jogging, walking, hiking, camping, or working out of doors all need to take the appropriate actions in a timely manner when thunderstorms approach. Where organized sports activities take place, coaches, umpires, referees, or camp counselors must protect the safety of the participants by stopping the activities sooner, so that the participants and spectators can get to a safe place before the lightning threat becomes significant. To reduce the threat of death or injury, those in charge of organized outdoor activities should develop and follow a plan to keep participants and spectators safe from lightning. The safest location during a thunderstorm is inside a large enclosed structure with plumbing and electrical wiring. These include shopping centers, schools, office buildings, and private residences. If lightning strikes the building, the plumbing and wiring will conduct the electricity more efficiently than a human body. If no buildings are available, then an enclosed metal vehicle such as an automobile, van, or school bus makes a decent alternative. Buildings which have exposed openings are NOT SAFE (even if they are "grounded"). These include beach shacks, metal sheds, picnic shelters/ pavilions, carports, and baseball dugouts. Porches are dangerous as well.

Follow these safety rules!

1. Get inside a house, large shelter or an all-metal vehicle (not a convertible).
2. Only use the telephone in an emergency.
3. Remain clear of tall, isolated trees and telephone poles.
4. Stay away from wire fences, clotheslines or metal pipes and rails.
5. If you are caught outside away from shelter, and you feel your hair stand on end, squat down, tuck your head as low as you can, and cover your ears. DO NOT LIE FLAT ON THE GROUND.
6. Follow the 30/30 rule: if you hear thunder 30 seconds after seeing the flash, move indoors quickly. Stay indoors until 30 minutes after the last thunder is heard.

Inside homes, people must also avoid activities which put their lives at risk from a possible lightning strike. As with the outdoor activities, these activities should be avoided before, during, and after storms. In particular, people should stay away from windows and doors and avoid contact with anything that conducts electricity. People may also want to take certain actions well before the storm to protect property within their homes, such as electronic equipment. Do not use electrical appliances, ESPECIALLY corded telephones unless it is an emergency (cordless and cell phones are safe to use). Computers are also dangerous as they usually are connected to both phone and electrical cords. Do not take a shower or bath or use a hot tub. If you are inside a vehicle, roll the windows up, and avoid contact with any conducting paths leading to the outside of the vehicle (e.g. radios, CB's, ignition, etc.). Convertible vehicles offer no safety from lightning, even if the top is "up". Other vehicles which are NOT SAFE during lightning storms are those which have open cabs, such as golf carts, tractors, and construction equipment.

Lightning is one of the most capricious and unpredictable characteristics of a thunderstorm. Because of this, no one can guarantee an individual or group absolute protection from lightning. However, knowing and following proven lightning safety guidelines can greatly reduce the risk of injury or death. Remember, **YOU** are ultimately responsible for your personal safety, and should take appropriate action when threatened by lightning. With common sense, we can greatly reduce the number of lightning deaths.

Lightning Facts:

- Lightning kills more people each year than tornados and hurricanes *combined*.
- Lightning can strike as far as 10 miles away from the rain area in a thunderstorm. That's about the distance you can hear thunder. If you hear thunder, the thunderstorm is close enough that lightning could strike your location at any moment.
- The temperature of a typical lightning bolt is hotter than the surface of the Sun!
- On average, 20% of lightning strike victims die; 70% of survivors suffer serious long term effects.
- Each second there are 40 to 100 lightning flashes worldwide.
- To tell how far away a lightning strike is, count the number of seconds between the flash and the thunder. Divide the number of seconds by five. If you see lightning and it takes 10 seconds before you hear the thunder, then the lightning is 2 miles away from you.

For more information on the science of lightning and lightning safety, visit http://www.srh.weather.gov/jetstream/lightning/lightning_intro.htm

Are You Ready for the Hurricane Season?

(Continued from page 2)

- Stock non-perishable emergency supplies, and assemble a disaster supply kit.
- Purchase a NOAA weather radio, so you can stay up-to-the-minute with any warnings, watches, or advisories.

As the storm arrives:

- Keep up with the latest information by listening to NOAA weather radio (make sure it has a working battery) and other local media outlets.
- Bring in or secure any outdoor objects which could be picked up and thrown around by the wind.
- If you live in a flood-prone area, put sandbags, plywood, and plastic garbage bags in place, to help protect your home from rising waters.
- If the water is rising and approaching your home, if a flood warning is issued, or if you are ordered to evacuate, leave your home immediately, and go directly to a safe shelter.
- If water is getting into your home, immediately shut off your electricity at the circuit breakers.
- Avoid travel if possible. Although you may be curious to see what the storm is doing, threats to your life will be everywhere—including downed trees and power lines, falling branches, and flooded streets. Most people who die in tropical cyclones perish after they drive into flood waters. In the last 30 years, 59% of deaths were from inland flooding. In rushing flood waters as little as a foot deep, no vehicle—not even an SUV—is safe or powerful enough.

After the storm:

- Test drinking water to make sure it's safe.
- Do not use fresh food that has come in contact with flood waters. Wash any canned goods affected by flood waters.
- Stay away from any known flooded areas, as the water may still be rising. Make sure that children do not play near flooded streams or creeks.
- Stay far away from any downed power lines. Call your local electric company to report downed lines.
- Do what you can to help your neighbors and community, if possible.

Want to know more? Visit the National Hurricane Center's website at www.nhc.noaa.gov

2004 HURRICANE ACTIVITY

By Jeff Orrock

NOAA forecasters are predicting an above-normal Atlantic hurricane season. Officials said the season outlook is for 12 to 15 tropical storms, with six to eight systems becoming hurricanes, and two to four of those major with winds in excess of 112 mph. Seasons similar to this year's have averaged two to three land falling hurricanes in the continental United States.

Factors we are already seeing favoring an above-normal season are lower surface pressures accompanied by above normal sea surface temperatures in the tropics. Weaker easterly trade winds and forecast low vertical wind shear in the tropics will also contribute to favorable conditions for hurricane development in the Atlantic.

Hurricane activity also follows a multi-decadal variability and this is a major contributing factor to the increased hurricane activity since 1995. Above normal hurricane activity is just one part of the global-scale pattern of climate fluctuations, which affect temperature and rainfall patterns in many parts of the world for periods of 20+ years at a time. This year's hurricane outlook reflects increased levels of hurricane activity observed since 1995. Between 1995-2003, Atlantic hurricane seasons have averaged 13 tropical storms, 8 hurricanes, and 4 major hurricanes.

Above-normal seasons feature a lot of activity in the deep tropics of the Atlantic. These become hurricanes and major hurricanes, and have general westward tracks toward the United States. This is why we have so many more hurricane landfalls in the U.S. during above-normal seasons. Another unique side effect of active seasons by far is the number of major hurricanes with winds in excess of 120 mph.

Dr. Gray from Colorado State University is also expecting an above-average number of Atlantic basin tropical cyclones. According to Dr. Gray not only is hurricane activity expected to remain above normal this season, his group is forecasting a 70% probability of a major hurricane making landfall on the U.S. coast.

Hurricane season runs from June 1 through November 20th and with another active year on tap now is the time to prepare disaster kits and think about how you will protect you property and loved ones when a hurricane again sets its sights on North Carolina. Remember hurricanes bring a variety of problems ranging from flooding to tornadoes and long term disruptions in utility services. Don't be caught off guard this season. It only takes one hurricane to create a disaster.

Summer Intern

By Ruth Aiken

Ms. Kimberly (Kim) Coleman, a native of Jackson, Mississippi, and a student at Jackson State University (JSU), joined the staff at the Raleigh National Weather Service Office for a 10-week Summer Program. Ms. Coleman is being sponsored by the Department of Commerce Intern Program through the Oak Ridge Institute for Science and Education (ORISE). Kim is also a member of the NOAA Grant, Initiating a New Partnership for the 21st Century: NOAA/NWS and JSU Promoting Diversity in Atmospheric Science through Research.

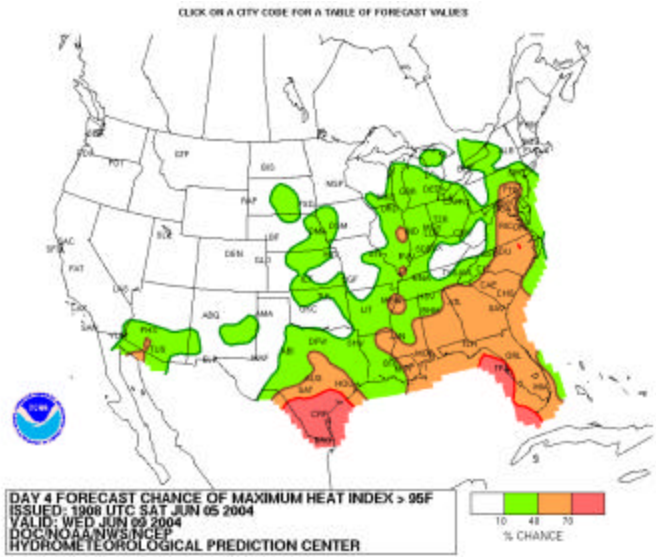
Ms. Coleman has worked at National Weather Service Forecast Offices in Shreveport, LA; Birmingham, AL; and Jackson, MS. While at these offices, her research projects included severe weather climatology, thunderstorm microburst and hail. Some of the results from her research have been presented at both the NWA and the AMS Annual Conferences. Kim also has experience in the Cooperative Observer Program and is familiar with the hydro-meteorological duties.

Preparing for the Dangers of Summer Heat...continued

(Continued from page 3)

The National Weather Service office in Raleigh spearheaded a heat danger awareness campaign through early summer, which culminated in a Heat Wave Danger Awareness Day on July 14, 2004. Full color posters detailing heat dangers, illness prevention, and basic first aid were distributed to area high schools for display. Information packets will be sent to television stations across central North Carolina, and a special web page focusing on heat waves is under development on our website (www.erh.noaa.gov/rah). Finally, we will issue special Public Information Statements with more details on the NWS's heat wave alert program and additional prevention and first aid tips. Future plans call for an expansion of the awareness campaign to day care centers, agricultural groups, and elder care facilities.

Remember, an ounce of prevention is worth a pound of cure. Tune into NOAA weather radio or check out our web page for the latest forecasts and conditions throughout the summer, and stay cool!



Here is a sample forecast of heat index probabilities. Find out what the chances are of reaching a particular heat index threshold for days 3 through 7 by visiting www.hpc.ncep.noaa.gov/heat_index.shtml. Heat index forecasts through day 3 can be found on the NWS Raleigh website at www.erh.noaa.gov/rah.

HURRICANE FORECAST PROCESS...

By Jeff Orrock

Part of the mission of the National Weather Service's National Hurricane Center (NHC) is to save lives and protect property by issuing watches, warnings, forecasts, and analyses of hazardous weather conditions in the tropics. The local NWS Weather Forecast Offices including the Raleigh office localize the hurricane threat for central North Carolina forecasting inland wind, rain and flooding. The NHC and WFO Raleigh have various roles in the forecast process which are closely coordinated.

The forecast process begins with observations including satellites, buoys, reconnaissance aircraft, and radar. Quality, quantity, and timeliness of remote sensing observations are critical for accurate and timely forecasts and warnings. The second phase is analysis. The various observations are checked for quality, analyzed, and put into a suite of computer models. Model guidance and interpretation is the third key step. The computer models take observations and perform millions of calculations to generate predictions of hurricane behavior and the conditions of the atmosphere in which the hurricane is embedded. The model results are packaged as guidance for the appropriate national centers and local forecast offices. Model data is evaluated and used in the NWS's forecast and warning process.

Once model data is analyzed and preliminary hurricane forecasts are made coordination occurs with the NWS. Forecasts and warnings are coordinated between the national centers and local forecast offices to provide consistency, which is critical during severe weather episodes. Following internal coordination issuing offices generate forecast and warning products for release to the media and you at home. Many tough decisions are made based on hurricane forecast so we strive for the most accurate and detailed forecasts possible.

The Raleigh National Weather Service office also coordinates with State and local emergency management as well as the National Guard, Red Cross and local power companies. The Raleigh NWS office will work with your community leaders through emergency management to determine whether the forecast and warning products issued were useful and to determine how we can provide even better service.

Related Hurricane Links...

NOAA Hurricane Outlook
http://www.cpc.noaa.gov/products/outlooks/hurricane.html

Colorado State Hurricane Outlook
http://tropical.atmos.colostate.edu/forecasts/

Hurricane Hazel Weather Review Article from 1954
http://www.aoml.noaa.gov/general/lib/lib1/nhclib/1954.pdf

Hurricane Preparedness and Safety
http://www.nhc.noaa.gov/HAW2/english/intro.shtml

Learning about tropical weather
http://www.srh.weather.gov/jetstream/tropics/tropics_intro.htm

National Weather Service
Raleigh, North Carolina

1005 Capability Drive
Suite 300
Raleigh, NC 27606

Phone: 919-515-8209
Fax: 919-515-8213
Forecast Line: 919-515-8225
Website: www.erh.noaa.gov/rah

"**Changing Skies**" is a triannual publication of the National Weather Service, Raleigh NC. For information or questions, contact Warning Coordination Meteorologist Jeff Orrock (jeff.orrock@noaa.gov)
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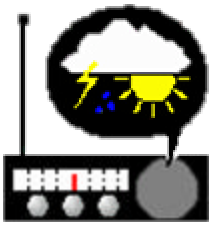
NOAA Weather Radio: The Voice of the National Weather Service



NOAA Weather Radio provides a continuous broadcast of the latest weather information for your local area from the National Weather Service. NOAA Weather Radio is an "all hazards" radio network, working in conjunction with the Federal Communication Commission's Emergency Alert System. In addition to weather related watches and warnings, the Weather Radio system can provide information on all types of hazards, including Civil and National Emergency Messages.

North Carolina is served by over 27 NOAA Weather Radio transmitters which are located within North Carolina as well as in 3 neighboring states. These transmitters provide broadcasts to all 100 counties in North Carolina.

NOAA Weather Radio Stations Serving Central NC

Station	Location	Frequency
WWF 60	Buck Mountain	162.500 mhz
WXL 58	Chapel Hill	162.550 mhz
WXL 50	Fayetteville	162.475 mhz
KXI 72	Garner	162.450 mhz
WNG 586	Henderson	162.500 mhz
WXL 59	Tarboro	162.475 mhz
WXL 42	Winston-Salem	162.400 mhz
WNG 597	Ellerbe	162.400 mhz

For an interactive map of NWR transmitters across North Carolina, go to:
http://www.erh.noaa.gov/rah/ncnwr/