The Mountain Weather Journal

2008 Edition

What's New at Jackson???

By: Shawn Harley
Meteorologist-in-Charge

Greetings from your friends and neighbors at the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service Forecast Office in Jackson, Kentucky. With summer approaching, I want to bring you up to date on changes to the heat advisory and excessive heat warning programs. In an ongoing effort to improve services, the National Weather Service Forecast Offices serving Kentucky and most of the central part of the country have implemented new heat advisory and warning criteria for the coming summer. The criteria have been lowered to better reflect the effects of heat and humidity, and to provide a more uniform heat advisory and warning service across the region.

While different criteria will continue to be used in different parts of the country, the National Weather Service Forecast Offices in Paducah, Louisville, and Jackson, Kentucky have all adopted the same heat advisory and excessive heat warning criteria. A heat advisory will be issued when either the heat index is forecast to reach 100 degrees or the actual air temperature is forecast to reach 95 degrees. An excessive heat warning will be issued when there is a 48 hour period during which the maximum heat index reaches 105 degrees and the minimum heat index does not fall below 75 degrees. An excessive heat warning may also be issued if there will be 4 consecutive days of either 95 degree temperatures or 100 degree heat indices.

If a heat advisory or excessive heat warning is issued it is important to know how to deal with the heat. The American Red Cross, National Weather Service and Federal Emergency Management Agency offer the following safety tips when a heat wave is predicted or is happening. If working outside, slow down and avoid strenuous activity. If strenuous outdoor work must be performed, work during the early morning hours well before the heat of the day. Wear light weight and light colored clothing, and stay out of the sun. If you can, remain in an air conditioned building during the hottest part of the day. If air conditioning is not available, stay on the lowest floor out of the sunshine. Drink plenty of water even if you do not feel thirsty, and avoid drinks with caffeine or alcohol in them. Avoid using salt tablets unless directed to do so by a physician. Also remember to always check on elderly neighbors who may be unable to leave their homes. While it is not possible to predict months in advance whether our area will be affected by significant heat waves during the coming summer, it is important to know what to do in case we do experience a heat wave.

Table of Contents

What's New at Jackson???

(Continued)

By: Shawn Harley
Meteorologist-in-Charge

By monitoring your National Weather Service forecast during the coming months, you will know when excessive temperatures are expected and can plan accordingly. In addition to monitoring the forecast, you may also be interested in viewing observed temperatures and other information on our new East Kentucky Climate Extras webpage. You can check this out at:
http://www.crh.noaa/gov/jkl/?n=climateextras

This webpage can also be accessed from our front page by clicking on "More..." under the Climate header which shows up in the left hand menu. On the East Kentucky Climate Extras webpage, you'll find maps showing observed high and low temperatures and precipitation from across eastern Kentucky. These observations are provided by our dedicated volunteer cooperative weather observers. You'll also find graphs of temperatures and precipitation for Jackson and London, Kentucky and how recent temperatures and precipitation compare to normal. There is also other interesting and useful climatological information on the East Kentucky Climate Extras webpage.

All of us at your National Weather Service Forecast Office in Jackson wish you a safe and happy summer. As always, we would appreciate hearing from you. If you have any comments regarding our webpage or the services we provide, please give us a call, send us an email, or drop us a note. We are constantly striving to improve our products and services and your feedback is important to us.

Airplanes and "Thermals"

By: Brian Schoettmer
Meteorological Intern

Imagine a hot day in the middle of July. The weather in the morning is beautiful with calm winds and not a cloud in the sky. This nice day is a good thing because you are scheduled to fly later that afternoon and you would like to have a smooth flight. As the plane takes off, you are very surprised at how bumpy the ride is because the weather is clear.

Has this ever happened to you? What causes this phenomenon? The answer is that even though there is not a cloud in the sky, the air is very turbulent due to an invisible phenomenon meteorlogists and pilots call "thermals". To understand how thermals work, a person must understand how air parcels (bubbles of air) act in certain situations, such as a hot day. One property of an air parcel is that if it is warmer than the air immediately surrounding it, the bubble of air will rise until it is either the same temperature or cooler than the air around it. Have you ever heard the expression "hot air rises and cold air sinks"? The reason this is true has to do with the denisty of the air. When a bubble of air is warmed, it expands because it has a greater pressure. This expansion of the bubble makes it less dense than its surroundings, just like a balloon. If the air parcel is warmer than its surrounding environment, the parcel is considered to be positively buoyant. The best way to imagine buoyancy is to picture a small beach ball at the bottom of the pool. Pretend that the beach ball is the parcel of warmer air and that the pool is the surrounding colder environment. If you let the beach ball go, what happens? It rises as fast as it can. This is exactly what it means to be buoyant and explains exactly why you have a bumpy ride in an airplane on a clear day.

In general, the atmosphere cools as you get to higher and higher altitudes. So once an air parcel becomes warmer than its surroundings and starts to rise, it has the possibility to rise thousands of feet into the air. This rising air creates what we call a "thermal" or an "updraft". There is more to the process, however. Another expression you might have heard is "What goes up, must come down". This holds true for the warm air because it eventually reaches a height were it cannot climb anymore. Air that is cooler than its surroundings will sink because its pressure is lower and the parcel is denser. Now you might be able to imagine your airplane flying through air that is rising and falling at differ ent speeds, creating the sometimes very bumpy, ride. Imagine the airplane flying though a pool of beach balls.

Now you might be wondering what causes the parcel of air to become warmer than its surroundings near the ground. The answer to that question is found in the energy of the sun. On a clear day, the sun is able to heat the ground to the best of its ability, which makes the air near the ground warmer than the air directly above it. The rising process then begins. Another factor in warming air near the ground deals with how absorbent the surface is of the sun's radiation. Have you ever walked barefoot across a parking lot in the middle of the summer? Did you notice how much hotter the black parking lot is than green grass? The color of the surface helps determine how much of the sun's radiation the it will absorb. So, how can you avoid a bumpy ride? The best time to fly when you want to avoid the "bumps" would be early morning or late in the evening. Why is this? In the morning, the sun has not had a chance to heat the surface, so the air should be relatively smooth as long as there is little wind. Another good time to fly is in the evening close to sunset. The sun is not positioned at a good angle to heat the surface, so the energy provided to cause the rising thermals is gone and the atmosphere is calm.

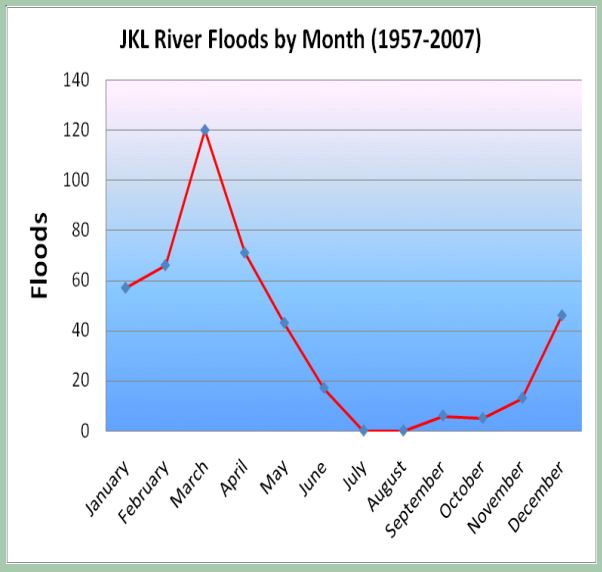
So the next time the sky is clear, think about what might be going on with the air above you and what type of aircraft ride you are experiencing. Having knowledge of what type of environment an airplane is flying in will better help you prepare for the flight. Glider pilots are especially aware of their situation because they cannot fly without thermals.

Don't knock the weather...9 out of 10 people couldn't start a conversation if it didn't change once in a while.

Eastern Kentucky River Flood Climatology

By: Pete Geogerian
General Forecaster

While we are past the peak season of river flooding, as seen on the chart below, there are only two months (July and August), when a river flood has not occurred. So what makes winter and spring months the most active? There are two main causes for this pattern. The first one is the fact that vegetation is mostly in a dormant state during this time. As a result of this dormancy, rainfall is not absorbed nearly as well as it is during the late spring, summer, and early autumn months. As such, much of the rainfall will occur in the form of runoff, which is the process by which water makes its way to creeks and streams, and eventually rivers. A higher amount of runoff will translate to a higher response on an area river. The other factor is the higher likelihood of prolonged rain events that tend to occur from December through May due to a more active jet stream.



No matter what time of the year it is, a great tool for staying ahead of rising rivers is the Advanced Hydrologic Prediction Service (AHPS). Here you can get critical river observations and forecasts, as well as a wealth of other hydrological and meteorological data.

Do You Know?

By: Bonnie Terrizzi
Hydrometeorological Technician

Small Boats – Wind, Lightning and Safety

May 17th - 23rd 2008 has been designated as "Safe Boating Week" across the United States. In an effort to promote safe boating practices of the recreational small boater, NOAA's National Weather Service wishes to emphasize the importance of weather awareness and planning whenever you decide to take to the water.

Eastern Kentucky is home to some of the most beautiful, and the largest of lakes east of the Mississippi River (not counting the Great Lakes). Buckhorn Lake, Cave Run Lake, Paintsville Lake, Carr Creek, Laurel Lake, and of course Lake Cumberland, the largest of these Kentucky jewels which covers over 50,000 acres. These lakes have a superb reputation for excellent fishing and water recreation that draws residents and visitors alike each year. To get to those fish, many fishermen choose to use a boat. The lakes of eastern Kentucky are large, but they are not an ocean. Every boat plying the lakes of east Kentucky is classified as a small boat, even though they range from a fairly large-looking houseboat, to the sleek bass boat.

Weather can pose a serious threat to any boater, but especially to those who are unprepared. As a small boat operator, it is sometimes easy to overlook the obvious. You can easily be beyond a half hour from any marina, and oftentimes, the distance is even greater. Weather can be both friend and foe to the recreational boater. Calm winds and seas make for enjoyable power boating, waterskiing, and fishing. A fresh breeze and a light chop provide an invigorating sailing or wind surfing experience. But the sudden emergence of dark clouds, shifting and gusty winds, torrential downpours and lightning can turn a day's pleasure into a nightmare of distress.

Wind is tricky because it can vary widely over just a few feet. The best example is to look at tornado damage where one house is blown apart, and the house next door has a few shingles blown off - or no damage at all. There have been many studies of wind effect on various structures in wind tunnels. The NWS uses wind gusts of 58 MPH as a basis of warnings with thunderstorm wind because a 58 MPH gust will start to blow shingles off a normal house. It can uproot a tree if the ground is fairly wet, and a trailer that is not properly tied down can roll over. Aged or poorly constructed sheds can also be toppled if the wind hits broadside.

But a boat on open water is much different than anything based on solid ground. Winds can make boating difficult at much lower speeds than are required to produce hazardous conditions on land. The National Weather Service takes this into account, and will issue a "Lake Wind Advisory" whenever winds will create a hazard to boating conditions on the area lakes.

Between April 1st and October 31st of each year which is the peak boating season for east Kentucky, a Lake wind advisory will be issued when the sustained wind speeds are between 20 to 29 mph for at least one hour, or wind gust of 35 to 44 mph for any duration. Higher wind speeds will require a Wind Advisory or High Wind Warning which will also have an impact over the land. The Lake Wind Advisory will be issued for winds that are not associated with thunderstorms.

In addition to creating choppy water conditions, winds in the range of 20 to 29 mph can create hazards for small boat operators in maneuvering on the open water, or in trying to dock safely at the local marina. Wind gusts of 34 knots or more can easily capsize a small boat, especially if the boater is unprepared. Navigation of a pontoon party barge with cross winds of that magnitude will pose a difficult challenge, especially to a novice boater who has rented a boat for the day.

Lightning also presents a serious danger to boaters. The best course of action a vessel operator can take to reduce the risk from a lightning strike is to return to safe harbor and seek shelter inside a sturdy, enclosed building. If caught on the open water, remember that one does not have to be struck directly by a lighting bolt while on deck to receive severe injuries or be killed. Tall masts, antenna booms and fly decks are all high profile targets for a lightning strike, and frequently, strikes to vessels produce extensive damages to navigational and communications equipment. All on board should stay away from all

ungrounded metal objects. But most importantly, the boat owner should have their boat properly grounded. That evolves having a special cable running through to the boat's bottom, allowing a path for the lightning strike to travel directly through the boat and discharge into the water, without the electric charge traveling over most of the boat surfaces.

Perhaps the boat operator's most important tool would be NOAA Weather Radio. In addition to the forecast and current weather conditions in the area, NOAA Weather Radio will give the greatest advance warning when strong winds approach the area. You can purchase a NOAA Weather Radio at a local electronic dealer or at most major retailers. Knowing what to expect will allow everyone to enjoy the resources offered by the area lakes, and also allow for important decision making that can save your life, and the lives of your family.

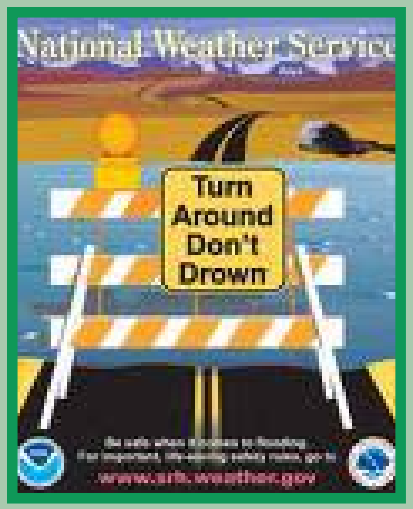
Fire Weather Deployments

By: John Jacobson
Lead Forecaster

When you turn on the local news and see reports about forest fires raging in different parts of the country, someone from the Jackson National Weather Service (NWS) Office may be out there providing weather forecasts to the fire fighters. The Jackson Weather Office happens to have three forecasters who are certified as Incident Meteorologists (IMETS). This is the only NWS office east of the Rockies that has three IMETs. The IMETs assigned to the Jackson office are John Jacobson, Jon Pelton, and Tony Edwards. In the 5 NWS offices surrounding Jackson, there are only a total of 3 IMETs assigned to those five offices. An IMET is meteorologist specially trained to respond to many different types of emergencies. The most common emergency an IMET responds to is a large forest fire, but they also might be called upon to respond to oil spills, toxic releases or a variety of natural disasters. Jon Pelton has deployed in the past to help with the Space Shuttle Recovery as well as the aftermath of hurricane Katrina.

This has been a busy year for the IMETs at the Jackson Weather Office. Tony Edwards and Jon Pelton both deployed to fires in the Okie Kanokie swamp in May and June. The Okie Kanokie swamp is located in southern Georgia and northern Florida. Tony then deployed to fires in central Idaho and at Yellowstone in July. John Jacobson was sent to the Sleeper Lake Fire on the Upper Peninsula of Michigan in July, while Jon Pelton deployed to the Sawmill Complex Fire in Phillipsburg, Montana in late July/early August. Deployments usually last for two weeks and the IMETs typically are working 15-16 hour days in order to provide the weather support required for decision makers to decide how to fight the fires and to protect the lives of the fire fighters. Looking at the drought conditions in the Appalachians this year, this is probably not the last deployment for the Jackson IMETs.

Vist us on the web at:
http://www.weather.gov/jacksonky



The Edward T. Earhart Memorial Scholarship

By: Tabitha Brewer
Administrative Support Assistant

In 1997, the employees of the Jackson National Weather Service Office wanted to make a contribution to the community that would help future generations. After much discussion, they decided to create a scholarship that would be funded solely from donations of the employees. Dave Stamper, then the Data Acquisition Manager, met with Hazard Community College and set up the Jackson Weather Office Employee Scholarship. This scholarship awards a disbursement of $125 per semester to a student. The student must hold a cumulative grade point average of at least a 2.0 at the time of his/her second year and should, although it is not a requirement, have an interest in a science-related field. The student, based on this criteria, is chosen by the college.

The scholarship remains in place today, but the name has changed. Due to the events of September 11, 2001, the employees of the Jackson National Weather Service decided to rename the scholarship in honor of Edward T. Earhart, a Navy weatherman from eastern Kentucky (Rowan County) who perished in the attack on the Pentagon. The scholarship was renamed in his honor during a memorial service held for him at Morehead State University.

Due to the generous contributions of both past and current weather service employees at Jackson and a very generous donation from the Earhart family, the Edward T. Earhart Memorial Scholarship became endowed on November 5, 2007. In order for a scholarship to be endowed, it must have a principal of $10,000. Once a scholarship becomes endowed, it will remain in place forever, thus helping students reach their educational goals.

Since the establishment of the scholarship in 1997, we have had seven recipients from eastern Kentucky. They are: Christopher Turner - 1997 - 1998, Dwayne Gross - 1998-1999, Michael Harvey - 1999 - 2000, Nick Valentine - 2000 - 2001, Wanda Dickerson - 2001 - 2002, Camron Gentry - 2002-2004, Michael Manning - 2004 - 2005, Sara Griffith - 2005 - 2006 and Amanda Hounshell - 2007 - 2008.

The Employees of the Jackson National Weather Service hope to help many more students in the future.

Memorial held at Morehead State University

Weather Terminology

By: William Modzelewski
General Forecaster

There is a wide variety of weather terms you hear when listening to a forecast and other weather information. Here are some of the more common terms, and what they mean:

Watch -- A variety of watches are issued by the National Weather Service, including Tornado Watches, Severe Thunderstorm Watches, and Winter Storm Watches. A watch means conditions are favorable for the weather conditions mentioned in the watch, but are not necessarily imminent. Montior the latest forecasts for futher updates and possible warnings.

Warning -- A warning means that a certain weather condition is occurring, or is about to occur. Warnings are issued for things such as tornadoes, severe thunderstorms, flash floods, and winter storms. When a warning is issued, take the necessary precautions to protect life and property. Remember, a watch means to "Watch Out" and a warning means to "Look Out."

Probability of Precipitation (or chance of precipitation) -- This is the percent chance of measuarable precipitation at any given point in a county, or a group of counties, covered in the forecast. This term does not necessarily indicate how much of the area will be covered with precipitation, or how long the precipitation will last.

Slight Chance -- There is approximately a 20 percent chance or less of measurable precipitation at any given point in a county, or group of counties, covered in a forecast.

Chance -- There is between a 30 and 50 percent chance of measurable precipitation at any given point in a county, or group of counties, covered in a forecast.

Likely -- There is a 60 to 70 percent chance of measurable precipitation in a county, or group of counties, covered in a forecast.

Categorical -- There is between an 80 and 100 percent chance of measurable precipitation at any given point in a county, or group of counties, covered in a forecast.

The next three terms below are know as areal qualifiers in the forecast. ANAWS forecasters will use these terms when a certain type of precipitation is expected to affect a specific percentage of the area.

Isolated -- It is expected that 20 percent of the area covered in the forecast will experience measureable precipitation (ex. isolated showers and thunderstorms).

Scattered -- It is expected that 30 to 50 percent of the area covered in the forecast will experience measureable precipitation (ex. scattered showers and thunderstorms).

Numerous -- It is expected that 60 to 70 percent of the area covered in the forecast will experience measureable precipitation (ex. numerous showers and thunderstorms).

Severe Thunderstorm -- A thunderstorm that produces winds of 58 mph or greater, and/or hail three quaters of an inch in diameter or greater.

Tornado -- A violently rotating column of air extending from the base of a thunderstorm down to the ground.

Funnel Cloud -- A rotating, funnel shaped cloud, extending down from the base of a thunderstorm, but not in contact with the ground.

Flash Flood -- A rapid flood that occurs within 6 hours or less of the heavy rain which caused it. A flash flood occurs when at least 6 inches of water is flowing across a road or field, or where there is at least 3 feet of standing water.

Flood or Areal Flood -- This type of flooding occurs beyond 6 hours of the heavy rain event. Flash floods often transition to areal floods. Flood warnings are also issued for rivers running out of their banks.

Winter Season 2007-2008 Climate Summary

By: Jeff Carico
Hydrometeorological Technician

The winter season of 2007-08 saw warmer than normal termperatures along with drier than normal conditions. Each of the winter months at both the Jackson Weather Office and the London Corbin Airport finished with above normal temperatures. In fact, December of 2007 was the 5th warmest December ever at both locations. Since December, January and February were above normal. Jackson and London easily closed out the winter warmer than average, by at least a couple of degrees. Furthermore, London saw the 2007-08 winter season finish as their 5th warmest ever. Jackson and London had a wetter than normal December. But both locations experienced a drier than average January and February which in turn made a drier than normal winter. Although Jackson ended up around a half an inch drier, London ended winter with over a two and a half inch precipitation deficit.

The Jackson Weather Office ended the season with a maximum average temperature of 47.2 degrees and a minimum average temperature of 30.3 degrees. The mean temperature for winter 2007-08 was 38.7 degrees which is 2.0 degrees above the normal temperature of 36.7 degrees. The Winter of 2007-08 was the 12th warmest on record since the Jackson Weather Office opened in 1981. Jackson recorded 11.05" of precipitation during the winter season which is 0.46" below the normal of 11.51". Jackson also received 7.9" of snow during the same time frame. Jackson normally sees 18.9" during the winter months of December, January and February. The 2007-08 winter season was 6th least snowiest winter of all time.

The London-Corbin Airport finished the year with an average temperature of 40.0 degrees, which is 2.8 degrees above the normal of 37.2 degrees. London had a maximum average of 47.2 degrees with a minimum average of 30.3 degrees. London's winter of 2007-08 tied the winter of 1971-72 as the 5th warmest winter since limate records began in 1954. London received only 9.47" of precipitation through December, January and February, which is 2.57" drier than the normal of 12.04". The winter of 2007-08 was the 11th driest winter at London. No snow data is recorded at the London- Corbin Airport.

Looking ahead towards summer 2008, the Climate Predicition Center has indicated that slightly above normal temperatures and near normal precipitation can be expected over June, July and August.

Weather Quiz

1. Which kills more people every year: Floods, Lightning or Tornadoes?

2. Which contains more water: an inch of rain or an inch of snow?

3. Is fog created by: hot air over cold ground or cold air over hot ground?

4. Where is the best place to be in a tornado: a highway underpass or a ditch?

5. _____means that a certain weather condition is occurring, or is about to occur.

6. _____means conditions are favorable for certain weather condit ions

7. _____A violently rotating column of air extending from the base of a thunderstorm down to the ground.

8. _____A rotating, funnel shaped cloud, extending down from the base of a thunderstorm, but not in contact with the ground.

Answers: 1. Floods; 2. Inch of rain; 3. Cold air over hot ground; 4. Ditch; 5. Warning; 6. Watch; 7. Tornado; 8. Funnel Cloud

Northwest Flow Snow

Difficult to say - Difficult to Forecast

By: Gary Votaw
Science & Operations Officer

Snow associated with northwest low-level winds is a fairly common occurrence in portions of the sourthern Appalachians during the late fall, winter, and early spring. Northwest flow snow (NWFS) events usually develop following the passage of cold fronts when a shallow, moist layer of air covers the Tennessee and Ohio River valleys and then is forced upward while moving toward the Appalachian crest.

Long recognized as a significant winter forecasting problem, it has only in recent years received noteworthy attention by both the academic and operational communities. There is a group of meteorologists, geographers and climatologists who have worked together since 2005 to understand how to better forecast snow in the southern Appalachian Mountains during times of northwest flow. The group consists of primarily the Science and Operations Officers of 6 National Weather Service offices and faculty members at 5 North Carolina universities who usually meet monthly via conference telephone calls. For futher information about current and past research by this NWFS group, go online to: http://www.erh.noaa.gov/gsp/localdat/NWFS_discussion_group/nwfs_discussion_group.html

Cooperation between people involved in academic and operational fields provide a rare opportunity for improving the bridge between research and application. Operational forecasters can help steer research efforts to maximize societal benefit and closer ties between the two helps provide a “reality check” for some of the theoretical aspects of research. Also, such ties help students gain experience and increases learning while steering some of the top students to regional colleges that have programs in the atmospheric sciences.

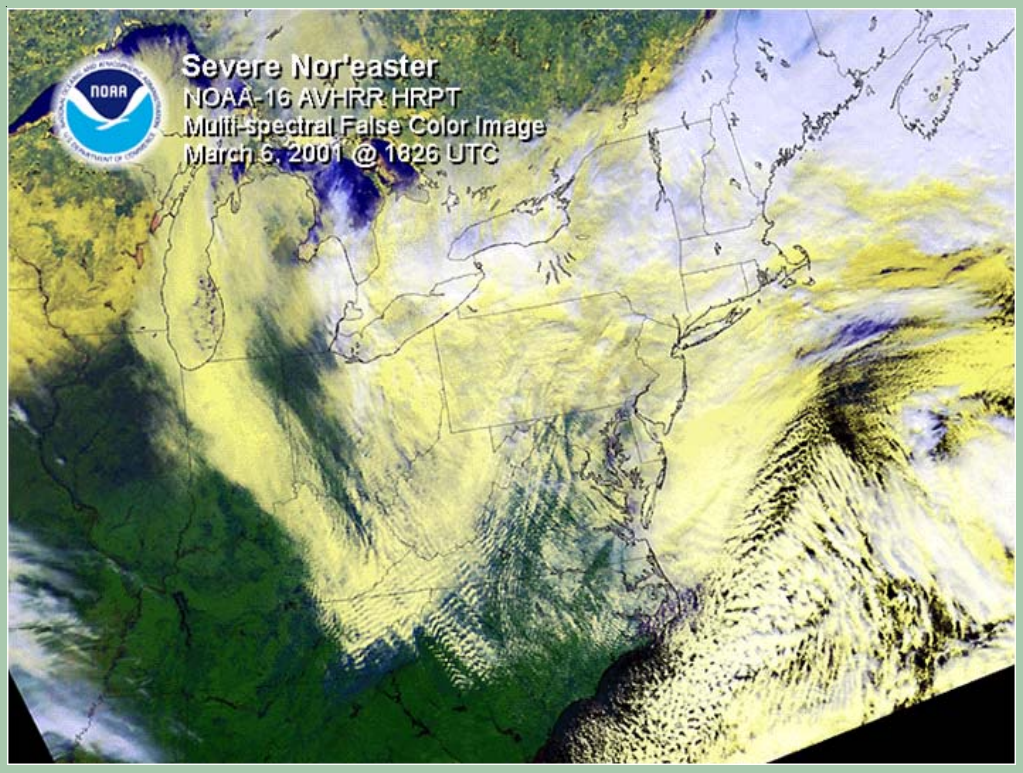
What tools aid this research?

A coordinated effort by such diverse individuals and over such large distances is noteworthy, but it could not be done without additional people and a variety of instruments to mearsure the atmosphere, such as: 1) Instruments placed near the top of Poga Mountain (on the North Carolina/Tennessee border) include radar that is vertically pointed, automated weather observations, and upper-air soundings (balloon releases); 2) Computers help produce a variety of models that stimulate the atmosphere for an event which enables researchers to understand how precipitation might change, if for example, temperature, moisture or the wind were different than expected; 3) Individual people, including cooperative (COOP) observers, report snowfall at their locations which help the researchers know why the snow amounts vary by location, elevation and at what time it occurred; 4) Satellites, automated surface sensors, and radars provide increasingly better information about the atmosphere.

What are some things that have been learned so far?

1. Northwest flow producted 91% of the snow water equivalent (water melted from snow) during the 2006-2007 season at Poga Mountain.
2. Water evaporated from the Great lakes provides moisture and instability during event. Of 191 Northwest flow events from 1975-2000, 47.1% exhibited a Great Lakes Connection. However, the Great lakes were directly responsible only for up to 1/5 of NWFS precipitation at some locations in southern Appalachians.
3. Physics of snow processes and its interaction with the Appalachian topography is better understood

Below is a false color representation of the eastern U.S. after a strong NWFS episode and shows the potential for the Great Lakes to contribute snowfall in such events. The skies at mid-day are nearly clear across Indiana, Ohio and Kentucky. Note the large swath of snow left behind, extending from lake Michigan to East Kentucky, with banded clouds and snow continuing over the higher Appalachian Mountains of western Virginia and northeastern Tennessee.



How is WFO Jackson contributing to this team?

Thus far, wind and temperature data from various levels in the atmosphere have been collected that indicates conditions existing on each day during the past 50 years on which there was recorded snow in Eastern Kentucky. These data are combined with daily snow amounts received from COOP observers and an approximate elevation where they were recorded. Statistical analysis will be done to evaluate how much wind flow toward (or away from) the Appalachians increases or decreases snow amounts, and where across East Kentucky does this flow have the greatest effect. This will help forecasters understand how forecasted snow could change given changing or expected wind conditions relative to the Appalachians.

What's New on the Web?

By: Tony Edwards
General Forecaster

We continue to look for ways of interest to improve our web services at the National Weather Service in Jackson. A couple of items have been made available to those interested in daily climate data for stations across eastern Kentucky. One of the new products is a daily plot of the weather data taken from our dedicated cooperative weather observers. As of May 2008, there are approximately 66 cooperative weather observer stations in the 33 counties that we cover in Kentucky. All of these stations have the ability to report precipitation amounts received over the last 24 hours, and many also report the daily high and low temperatures. These reports are normally received at the weather office around 7 AM each morning. The reports are then made available in the Regional Temperature and Precipitation Summary sent out around 10 AM each morning, but now can also be viewed on a plotted map. Those familiar with our website can click on the "More" link under "Climate" on the site's left-side menu. This will take you to our "Climate Extras" page where you can access the data plots. Below are a couple of examples of recent reports.

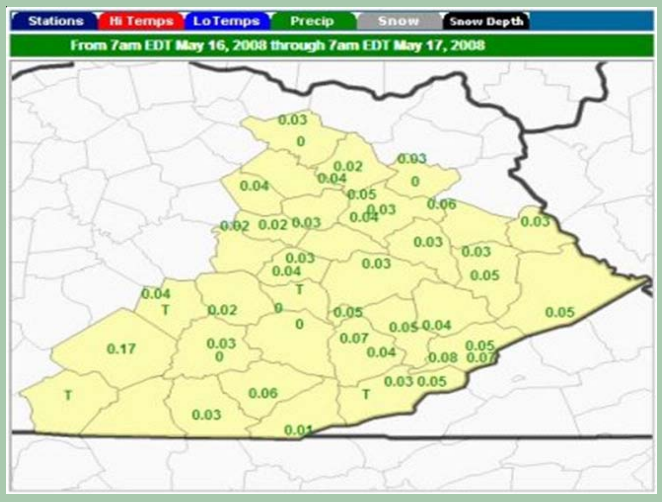


Image 1: Map of Rainfall Received between 7 AM May 16th & 7 AM May 17th 2008

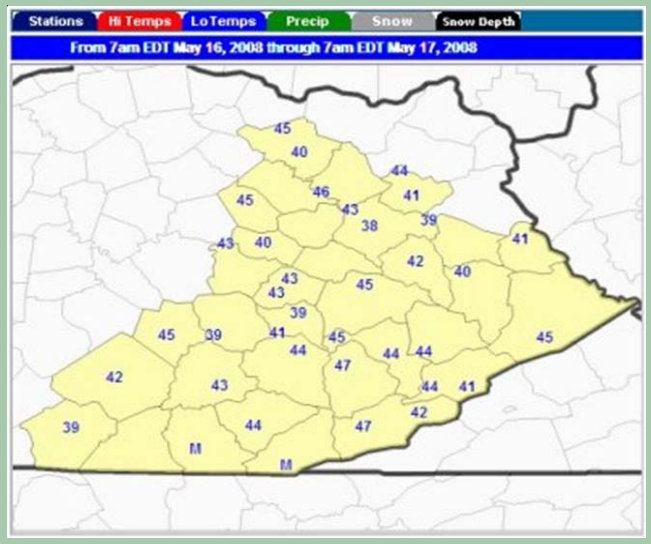


Image 2: Map of Low Temperatures Observed on May 17th 2008

Also accessible from the "Climate Extras" page are Climate Graphs of the data taken from the Jackson Weather Office and the London-Corbin Airport. The graphs display the daily observed high and low temperatures for each month back to 2005 compared to the average temperatures and record temperatures for each day. There is also a graph of the year-to-date temperatures and precipitation allowing you to quickly compare how the observed conditions compare to what is normal. Here's a little more information on how to read these graphs…

Temperature

The temperature graph depicts the normal, record and observed daily high and low temperature for each day of the year, starting with January on the left, through December on the right.

- Normal temperature range (difference between the high and low) is shown in light green.
- Record high temperatures are shaded light red.
- Record low temperatures are shaded light blue.
- The dark blue lines depict the actual observed daily high and low temperature range.

Precipitation

The two precipitation graphs depict both the normal and actual observed total precipitation (rain and melted snow) and snowfall, accumulated on a daily basis from the beginning of the year on the left, to the end of the year on the right (or to the current day on the present year's graph). Total precipitation is the top graph, with snowfall on the bottom.

- Normal amount of precipitation/snowfall is depicted by a yellow line.
- The stair-step line indicates the observed precipitation or snowfall.
  When the accumulation of observed precipitation/snowfall is above normal, that area is shaded dark green.
  When the accumulation of observed precipitation/snowfall is below normal, the area is shaded tan.

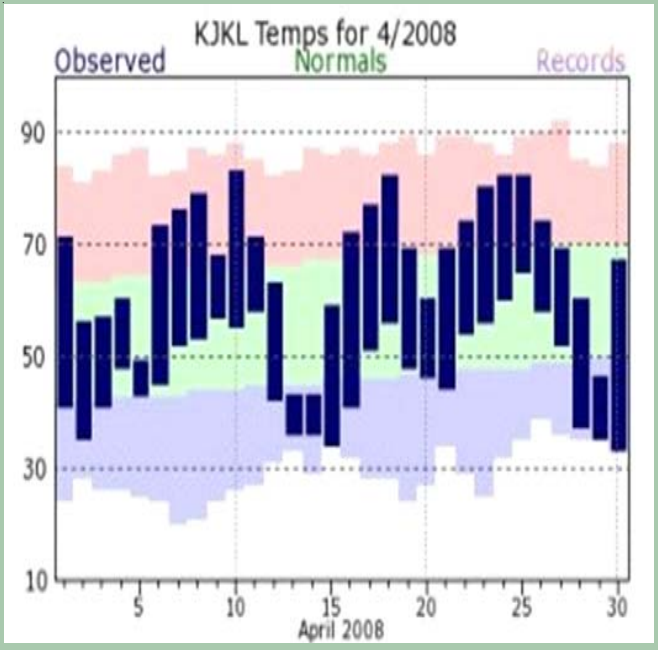


Image 3: Jackson climate Graph through May 16th, 2008

Image 4: Jackson Climate Graph of Temperatures for April 2008

Super Outbreak

By: Anthony Richey
General Forecaster

The largest tornado outbreak to ever occur in the United States took place on April 3-4, 1974. A record 148 tornadoes raked across 13 states causing the deaths of 330 people and injuring 5484 others. The tornadoes caused an estimated $600 million in damage. At the peak of the outbreak, 15 tornadoes were on the ground simultaneously. One tornado was on the ground for more than 2 hours. The most damaging and deadly tornado of the outbreak cut a swath of death and destruction across Xenia, OH, where 33 people were killed. Ninety-four significant tornadoes occurred during the super outbreak including 30 F-2's, 35 F-3's, 23 F-4's, and 6 F-5's. At the time the super outbreak occurred, a significant tornado was classified as any tornado causing at least one death or rated at F-2 or higher on the Fujita scale.

At least 26 tornadoes struck the Commonwealth of Kentucky on April 3, killing 77 people, injuring 1377 and causing an estimated $110 million in damage. Losses were sustained by 6,625 families, and between 1,800 and 2,000 of the State's farms were damaged to some extent. The tornadoes affected 39 counties within a strip some 150 miles wide extending from north to south through the central and eastern part of the State. Pulaski County, in eastern Kentucky, was struck by three separate tornadoes during the evening of April 3. The first of these (74) touched down near Mt. Victory at 7:55 PM CDT and moved into Rockcastle County before lifting. This storm killed 6 and injured 30 in Pulaski County. One death and 10 injuries were reported in Rockcastle County. The second tornado (83) moved into southern Pulaski County shortly after 9:00 PM after killing 2 and injuring 16 in eastern Wayne County. The storm hit Alpine at 9:20 PM CDT and caused 29 injuries in Pulaski County. Pulaski County apparently was struck by Kentucky's final tornado of the outbreak (84) between 11:30 PM and midnight, as the storm moved from Piney Grove Church near the Russell County line through Nancy and Bobtown to Level Green in Rockcastle County. The below map that shows the path, intensity (the thicker the line the greater the tornadoes intensity along that segment of its path), and a reference number of each tornado that occurred during the Super Outbreak. The numbers in parentheses above are the reference numbers assigned to each tornado on the track map. Each tornado was assigned a number based on the chronological order in which it was confirmed to have touched down.

Diagram 1. Map showing the tracks and reference numbers of the tornadoes that occurred Kentucky during April 3-4, 1974 super tornado outbreak.

A total of 9 tornadoes (65, 66, 74, 75, 76, 77, 83, 84, 88 in diagram 1) swept across 8 counties in eastern Kentucky on April 3 and 4. All told 10 people were killed and 145 were injured. The tornadoes caused an estimated $43 million in damage. Diagram 2 below shows a visible satellite image from 4 p.m. on April 3, 1974. Three distinct thunderstorm complexes, which spawned most of the tornadoes of the super outbreak, can be seen over Indiana, kentucky, Ohio, and Tennessee.

Diagram 2. Visible satellite image from 2100 GMT, April 3, 1974 showing the thunderstorm complexes that spawned the record 148 tornadoes of the Super Outbreak as indicated by the red arrows.

Images 1, 2, and 3 illustrate some of the damage that occurred as the result of a tornado (65 perhaps?) that hit the town of Camargo, KY, in Montgomery County on April 3, 1974. the photos are of fairly good quality and depict extensive damage to trees and homes around Camargo.

Diagram 3. Camargo, KY tornado damage.

Diagram 4. Camargo, KY tornado damage.

Diagram 5. Camargo, KY tornado damage

Weather Safety

By: Bonnie Terrizzi
Hydrometeorological Technician

While severe weather can occur any time of year across Eastern Kentucky, the peak severe weather season runs through June. So, as we go through this potentially dangerous time of year, now is a good time to review some weather safety rules.

§ *Flash Flooding*

Flash floods and floods are the number one weather related killer in Kentucky and across the United States. For more information on floods and flash floods please visit:

http://www.nws.noaa.gov/floodsafety/.

If driving, **DO NOT DRIVE THROUGH FLOODED AREAS!** Even if it looks shallow enough to cross. The large majority of deaths relating to flash flooding are due to people driving through flooded areas. Water only one foot deep can displace 1500 pounds! Two feet of water can easily carry most vehicles. Roadways concealed by floodwaters may not be intact.

If caught outside, move to higher ground immediately! Avoid small rivers or streams, low spots, culverts, or ravines. Do not try to walk through flowing water more than ankle deep, as it only takes six inches of water to knock you off your feet. Do not allow children to play around streams, drainage ditches or viaducts, storm drains, or other flooded areas.

§ ***Lightning***

Lightning kills more people in an average year than tornadoes in Kentucky. Although Severe Thunderstorm Warnings are NOT issued for lightning, you should move to shelter when thunder is heard as lightning can strike 10 to 15 miles away from where the rain is falling. "When Thunder roars, Go Indoors!"

If outside, go to a safe shelter immediately, such as a sturdy building. A hard top vehicle with the windows up can also offer fair protection. If you are boating or swimming, get out of the water immediately and move to a safe shelter away from the water. During a thunderstorm you should avoid isolated trees or other tall objects, bodies or water, sheds, fences, convertible automobiles, tractors, and motorcycles. If inside, avoid using the telephone (except for emergencies) or other electrical appliances.

For more on Lightning Safety visit:
http://www.lightningsafety.noaa.gov/

§ ***Thunderstorm Winds***

A Severe Thunderstorm Warning means 58 mile per hour winds or greater, or penny size hail or larger is expected. Severe Thunderstorm winds can be stronger than most tornadoes in Eastern Kentucky. Damaging Severe Thunderstorm winds are more common than torndaoes, and can overturn mobile homes, tear roofs off homes and buildings, and can uproot trees. Therefore, it is important that you take shelter, preferably in a basement, and stay away from windows during a Severe Thunderstorm Warning.

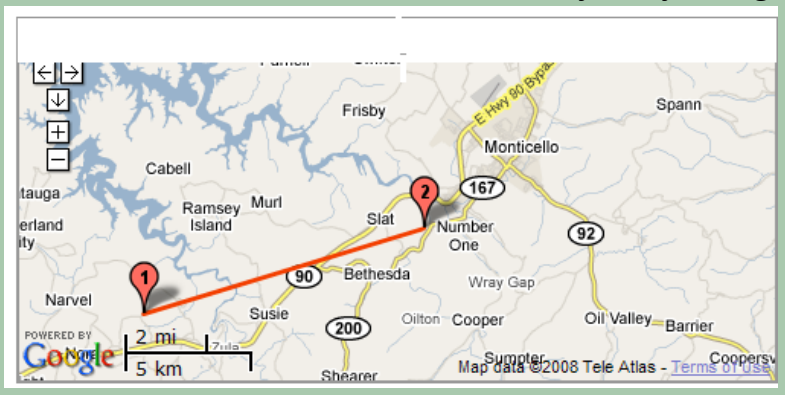
§ ***Tornado Safety***

A Tornado Warning is issued by the National Weather Service when a tornado has been sighted, or indicated by Doppler radar. In a home or building, move to the basement and get under a sturdy piece of furnture. If no basement is available, move to a small interior room away from windows on the lowest floor and get under something sturdy. Mobile homes offer little protection from tornadoes. You should leave a mobile home for more sturdy shelter. Never try to outrun a tornado in your car; instead leave it immediately for safe shelter. If no shelter is nearby, lie in ditch with your head covered. Do NOT seek shelter under a highway bridge or overpass!!

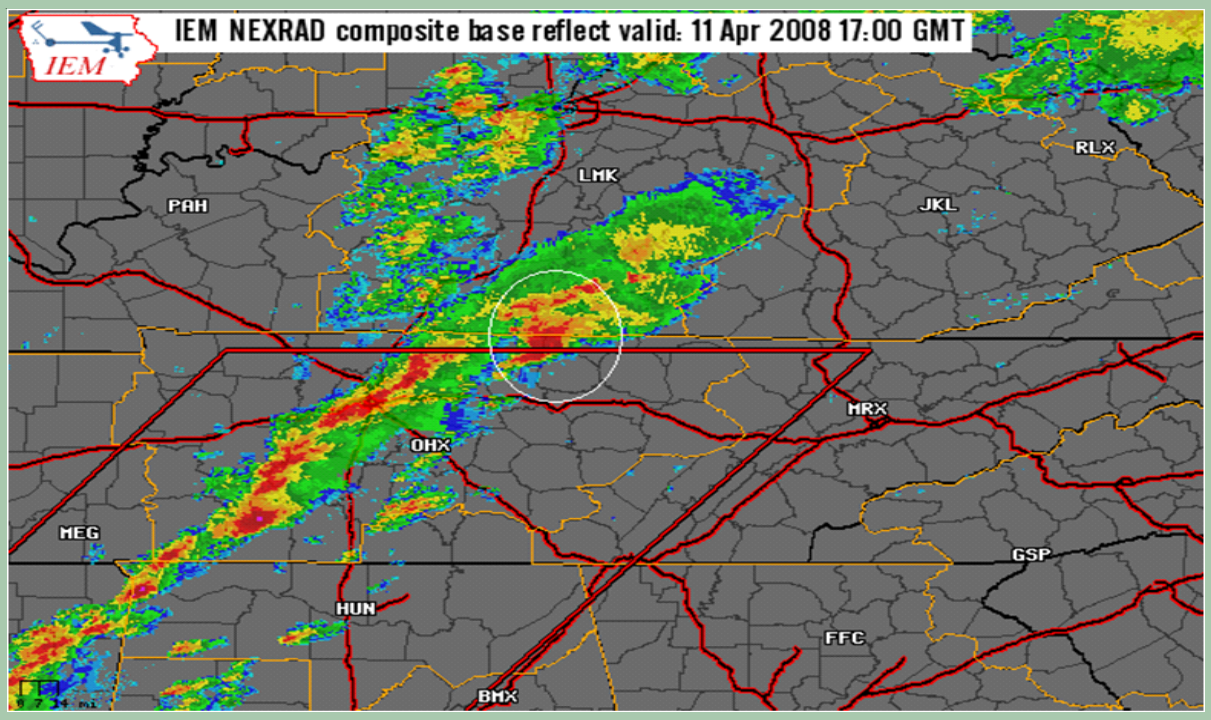
Weather History

By: Tom Johnstone
Warning Coordination Meteorologist

During the early afternoon of April 11th 2008, the strongest tornado to affect eastern Kentucky in nearly 7 years hit Wayne County. The tornado, rated a strong EF-2 on the Enhanced Fujita Scale, is estimated to have had winds approaching 130 mph as it roared in from Clinton County. Nearly 40 structures were heavily damaged or destroyed by the tornado, but thanks to early warnings and an excellent response by Wayne County residents and officials only 1 minor injury was reported. Below is the track the tornado took on its more than 7 mile journey through Wayne County.

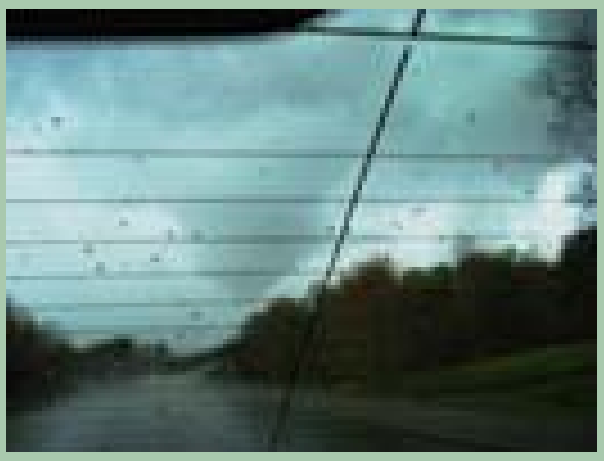


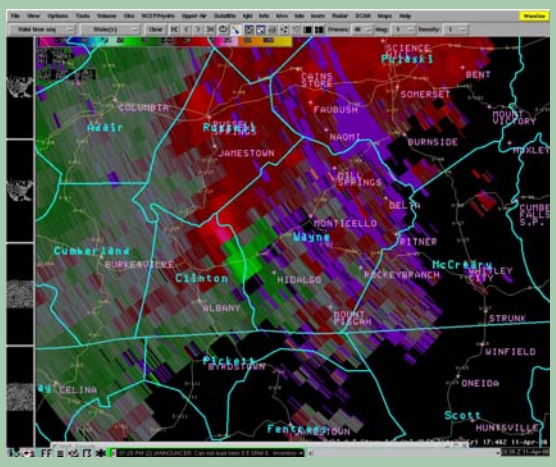
Thunderstorms formed during the late morning hours over central Tennessee in association with a warm front. As you can see in the image below, by 1 PM the storms were widespread and had become quite intense, especially just to the southwest of Wayne County in Tennessee. The storm which would go on to produce the tornado in Wayne County has been circled.



By 130 PM EDT, while the storm was over Clinton County Kentucky, meteorologists began to detect a strengthening pattern of rotating winds in the storms updraft. Storms with a rotating updraft are termed “Supercells” by meteorologists. Supercells are the longest lasting and most dangerous kind of thunderstorm, and they are the type of storm most frequently associated with tornadoes. Over the next 20 minutes, the rotation within the storm continued to strengthen. The image on the next page is a Doppler Radar “Storm Relative Velocity” image from 148 PM EDT.

Green colors depict areas where air flow is toward the radar (the Jackson radar is to the northeast in this case) while red colors depict air moving away from the radar. The Supercell's mesocyclone in this case is represented by the area just to the west of Wayne County where air flow toward the radar is directly adjacent to air flow away from the radar. The picture to the bottom left, taken along Highway 90 and looking west into Clinton County, shows the tornado as it bears down on Wayne County.





The final damage toll from this devastating storm is around $1.5 million dollars, but as mentioned above there was no loss of life or serious injury and things certainly could have been worse. This storm's power provided powerful and graphic evidence of why mobile homes and automobiles must be abandoned in a tornado. The picture to the left below is an aerial shot of the remains of a relatively new tied down and anchored mobile home. Note how far downstream the debris, including the steel undercarriage, were scattered. If you think the bathroom of a mobile home offers a little more protection, take a look at the undisturbed ground level aftermath of the same trailer in the bottom right picture. If you live in a mobile home, don't wait until a tornado is sighted to take action. The Storm Prediction Center in Norman, OK issues Tornado Watches as soon as conditions become favorable for tornadoes to develop. When the Tornado Watch is issued, try to plan on visiting friends or family who live in a frame home or have a basement.

June and July remain active months for tornadoes across Kentucky, so don't let down your guard. Make sure you know where to go when a tornado is sighted or a tornado warning is issued, and be prepared to act quickly. A NOAA All-Hazards Alert Radio is the best and fastest way to receive the National Weather Service watches and warnings which could very well save your life. Remember…"Don't be scared, be prepared!"

Kid's Corner

By: Anthony Richey

General Forecaster

Thunderstorms and the Weather They Produce

Thunderstorms form mostly during the spring and summer months when warm moist air from the Gulf of Mexico collides with cool dry air from Canada. Thunderstorms are produced by a special type of cloud called cumulonimbus or thunderheads (Figure 1). Thunderstorms produce many types of weather including lightning, heavy rain, and hail (Figures 2-5).

Figure 1. A thunderstorm cloud, otherwise known as a cumulonimbus or thunderhead.

Figure 2. Cloud to ground lightning

Figure 3. Lightning striking a building.

Figure 4. A rain shaft below a thunderstorm.

Figure 5. Small hailstones from an ordinary thunderstorm

When conditions are just right, very powerful thunderstorms called supercells can form (figure 6). A Supercell is a very special type of thunderstorm that forms mostly over the Great Plains of the central United States. What makes a supercell thunderstorm different from a regular storm? The answer is that supercells rotate, can exist for several hours and produce very dangerous weather such as tornadoes (figure 11), very large hail (figures 12&13), flooding, and very strong winds. Supercell thunderstorms also display special features on satellite and Doppler radar imagery such as a hook echo (figure 8) and brightly colored cloud tops (figure 9). Strange looking cloud formations called mammatus often dangle from the underside of severe thunderstorms (figure 7).

Figure 6. A supercell thunderstorm.

Figure 7. Mammatocumulus or mamma underneath a severe storm

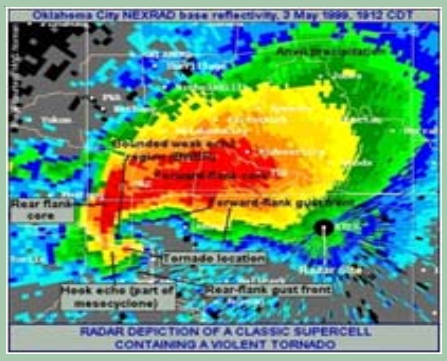
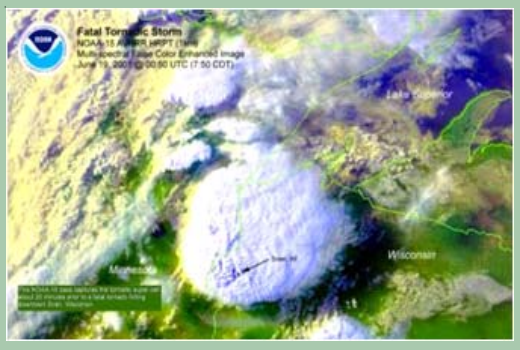
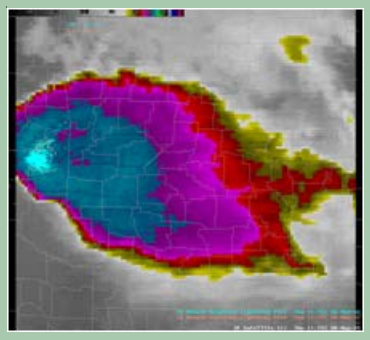


Figure 8. What a supercell looks like in a Doppler radar image.





Figures 9 & 10. What a supercell thunderstorm looks like in visible and infrared satellite images.

Figure 11. A tornado.

Figure 12. Golf ball size hailstones.

Figure 13. Softball size hailstone.