The Southern Plains Cyclone

A Weather Newsletter from your Norman Forecast Office for the Residents of western and central Oklahoma and western north Texas

We Make the Difference When it Matters Most!

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Meet Your Weatherman Scott Curl

Hello! My name is Scott Curl and I am a Journeyman Forecaster at the National Weather Service Forecast Office in Norman.

I was born in Norman some 35 years ago and grew up in Newcastle, Oklahoma, just west of Norman. I struggle to remember a time when I was not fascinated by the weather. As a child I would spend many afternoons watching storms develop on the horizon to my west, and then watch in awe as the storms would move over the area. The sounds and smells and everything else about being in the middle of a storm were always a thrill.

Since I grew up in central Oklahoma, I could not imagine going anywhere but to the University of Oklahoma for my degree. In the spring of 1993, I graduated from OU with a Bachelor of Science degree in Meteorology with a minor in Mathematics. I was lucky enough during my senior year to become involved in a project that allowed me to spend time at the National Weather Service Office in Norman, working with then Science and Operations Officer, Larry Ruthi. Larry was instrumental in

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The Damaging Wind Event of June 16-17, 2005

By Kevin Brown, Lead Forecaster

Along with being a part of Tornado Alley, the Oklahoma and north Texas region is also an area of the United States that observes its share of damaging straight-line wind events. The summer months are the most common time of year for these events to occur. On June 16th and into the early morning hours of the 17th, atmospheric conditions were quite favorable for the development of an intense squall line of thunderstorms. There was ample low-level moisture, a very unstable airmass, moderate wind shear, and a stationary frontal boundary already in place. As is commonly found in the summer months, the steering currents of the atmosphere were from the northwest, which allows thunderstorms to form over or just northwest of the region, and move quickly to the south and east. Occasionally when we have thunderstorm complexes move through, an evolution into what we call a derecho can occur. So, what exactly is a derecho? In simple terms, it is what meteorologists call a long-lived wind storm, producing damaging wind gusts over a large area by the occurrence of numerous downbursts.

A couple of days before this event, a cold front passed through Oklahoma and western north Texas and then stalled over central Texas. During the daytime hours of June 16th, this boundary lifted north as a warm front, and by late afternoon, extended from western Kansas, southeastward through western and south central Oklahoma, down into east Texas. This front would eventually be a major

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No Tornadoes in May!

By Jennifer Palucki, Meteorologist Intern

For the first time since 1950, no tornadoes occurred in May within Oklahoma state lines, including the panhandle. Prior to this year, the lowest number of tornadoes that occurred in May was two in 1988.

Why is this so astonishing? Climatologically speaking, Spring is the peak season for tornadoes and severe weather to occur in Oklahoma. In a calendar year, Oklahoma usually experiences 54 tornadoes, and 40 of those 54 usually occur in Spring. On average, 21 of those tornadoes occur within the month of May, more than any other month.

Every other month has seen at least one year without a tornado. No tornadoes were observed in 1987 and 1988 in the month of April, while no tornadoes were observed in 1987 and 2003 in the month of June.

The most tornadoes ever to occur in May happened in 1999 where 90 tornadoes occurred, including the devastating F5 tornado that tore through Oklahoma City. In addition, the most tornadoes ever to occur in a single year was in 1999 when 145 tornadoes were observed.

The least amount of tornadoes to occur a single year was in 1988 where

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Climate Notes

By Jennifer Palucki, Meteorologist Intern

Dry Spring. Spring in Oklahoma City and Wichita Falls ended up being one of the top ten driest. Oklahoma City's Spring (March through May 2005) was the second driest spring ever. Oklahoma City only received 2.96 inches of precipitation. Rain that fell on the last day of May, 0.59 inches, prevented 2005 from being the driest Spring on record for Oklahoma City. The driest spring on record for Oklahoma City occurred in 1895 where only 2.57 inches of precipitation fell.

Wichita Falls was also dry this Spring. Only 3.91 inches of precipitation fell which makes Spring of 2005 the fifth driest Spring on record. The driest Spring ever in Wichita Falls occurred in 1971 where only 1.92 inches of precipitation fell.

Wet Start to Summer. While Oklahoma City in June was only 0.26 inches above normal with 4.89 inches of precipitation falling, and Wichita Falls was actually below normal in June, many locations in northern Oklahoma are well above normal. The following are selected precipitation totals from northern Oklahoma.

- Waynoka - 13.61 inches
- Freedom - 10.58 inches
- Fort Supply - 9.36 inches
- El Reno - 9.32 inches
- Cushing - 9.25 inches
- Red Rock - 8.30 inches
- Shawnee - 7.64 inches

For more on the heavy rainfall and subsequent flooding, see page 5 for the June 2005 Flood Summary.

Record Low Temperatures in July. After a strong cold front moved through the area on July 27th, low temperatures dropped to record setting values during the morning hours of July 28th and July 29th. Several locations across Oklahoma and western north Texas set new low temperatures records for those days, and in some cases, breaking the previous record by as much as 7 degrees! For three locations, the low temperatures observed on July 28th did not only tie or break the record low for the date, but also tied or broke the record low for the month. Billings dropped to 50 degrees;

Climate Notes Continued

the old record was 52 degrees. Freedom and Weatherford both tied their record low temperature for the month at 49 and 52 degrees, respectively.

Tales, Legends, and Other Sayings

By Mike Branick, Lead Forecaster

Weather-related sayings and stories have been commonplace in many cultures since the beginning of time, many of which have been passed down through the years. Are they truth, or are they myth? Can they really be used to predict the weather? This column will examine a different popular weather saying in each issue, exploring its origins and whether or not there is any real meteorological truth upon which it might be based.

If you have heard of a particular weather-related story or saying that you've always wondered about and would like us to look into it, please e-mail your questions and requests to *Jennifer.Palucki@noaa.gov*.

This Issue's Topic – "Heat Lightning" - What is it, and how is it different from other kinds of lightning?

There is no difference between "heat lightning" and other types of lightning. What some people have called heat lightning is really only a luminous flash from ordinary lightning that occurs too far away for thunder to be heard.

The popular misconception about heat lightning is that it is a different kind of lightning that somehow occurs in the absence of thunderstorms, does not produce thunder, and occurs merely as the result of excessive heat. None of these are true. The misconceptions have arisen because observations of "heat" lightning often are made when skies are clear overhead, and often on hot summer evenings. The simple fact is that the thunderstorm causing the lightning is near or even beyond the horizon, so it is too far away to see at night—and too far away for the thunder to be heard.

Tornadoes: From Page 1

only 17 tornadoes were observed. Through May 2005, only 15 tornadoes have occurred. However, since preliminary June data suggests that more than two tornadoes occurred, and we have the rest of the year yet to go, it appears that 2005 will not be a record year for lowest number of tornadoes.

In other tornado trivia, during the months of April, May and June 2005, peak tornado season, there have been no tornado deaths in the United States for the first time since 1950. In total this year, there have only been 5 tornado deaths, all occurring in Arkansas and Georgia. Four of the five deaths occurred in mobile homes. Oklahoma averages five tornado deaths per year. However, the last Oklahoma tornado death occurred in 2001.

Weatherman: From Page 1

helping me get selected as a Meteorologist Intern in October of 1993 at the Norman office. I have been very fortunate to remain in Norman over the past twelve years and have experienced everything from floods and ice storms to widespread wildfires to tornado outbreaks. The most significant of these events being the May 3rd, 1999 tornado outbreak, in which several of my family members were impacted.

Other than the usual duties of being a forecaster, I am also the Fire Weather Program Leader here at the Norman office. Through that experience, I have had the privilege of working with several local, state and federal agencies. These agencies have aided me and the Norman office over the past several years in reestablishing the presence of the local National Weather Service offices back into the local fire community.

Outside of the office, I spend most of my time with my wife and kids, which keeps me very busy. I also like to spend time reading, watching movies, bowling, fishing and hiking.

The Air Quality Index Explained

By Jennifer Palucki, Meteorologist Intern

During the summer months in Oklahoma, its common to see a lot of haze on the horizon. This haze can greatly affect your health. The Air Quality Index, or AQI, is issued daily to provide you with information on the air quality in your area, the health concerns for different levels of air quality values, and how you can protect yourself when levels are high.

Air pollution such as inhalable particulates contribute to the brown haze as seen over Boston. Photo from *www.epa.gov/airnow*.

The United States Environmental Protection Agency (EPA) requires the Department of Environmental Quality to issue an AQI for all metropolitan areas with a population greater than 350,000. In Oklahoma, an AQI is issued for Oklahoma City, Tulsa and Lawton.

Major pollutants, including ground level ozone, particle pollution (inhalable particulates), carbon monoxide, sulfur dioxide and nitrogen dioxide, and measured and monitored at more than 1000 locations across the United States. An AQI value is assigned for each pollutant in an area. The highest AQI value for a given pollutant, is the AQI value for the day.

Ozone alerts are issued when the forecasted weather conditions, including winds, temperatures and cloud cover, combined with the current ozone concentrations suggest that tomorrow's ozone levels will reach or exceed unhealthy levels.

There are six levels of air quality. A rating of "Good" indicates a AQI value between 0 and 50 which means the air pollution in your area is minimal, and poses little or no risk to your health. A rating of "Moderate" indicates an AQI value between 51 and 100 and the air pollution levels are acceptable, but could be a moderate health concern for extraordinarily sensitive people. A rating of "Unhealthy for Sensitive Persons" indicates a AQI between 101 and 150. This implies people who are sensitive to air quality may experience health effects. For example, people with lung disease are at a greater risk with ozone or particle pollution levels are in this range. The general public is rarely affected in this range. A rating of "Unhealthy" indicates a AQI value between 151 and 200. People sensitive to air quality are at risk for more serious health effects, while the general public may start feeling some effects. A rating of "Very Unhealthy" indicates AQI values between 201 and 300 and may cause a health alert to be issued. This means everyone may experience more serious health effects. Lastly, a rating of "Hazardous" indicates the AQI is greater than 300 and will trigger health warnings of emergency conditions. Everyone is likely to be affected.

Air Quality Index Values	Levels of Health Concern
Between:	*Air Quality Levels are:*
0 to 50	Good
51 to 100	Moderate
101 to 150	Unhealthy for Sensitive Groups
151 to 200	Unhealthy
201 to 300	Very Unhealthy
301 to 500	Hazardous

Typical values of the AQI is below 100, with greater than 100 values only occurring a few times a year. AQI values of 300 or more are extremely rare. In Oklahoma, we generally only see indices of 100 or greater in the summer. This is because high temperatures and light winds make the air more stagnant and what pollution that is in the air won't be "blown away."

People at most risk are active children because they spend a large amount of time outdoors and their lungs are still developing, people of all ages who are active outdoors, people with heart or lung disease, asthmatics, and the elderly. If you are one of these people, limit outdoor activity in times of elevated AQI values.

Air pollution such as ozone contribute to smog. Photo from *www.epa.gov/airnow*.

The Oklahoma Department of Environmental Quality suggest 10 steps to improve air quality.

- Take public transportation or car pool.
- Combine errands into one trip.
- Ride a bike.
- Walk or in-line skate.
- Care for your car with regular maintenance, tune ups, oil changes, and checking tire inflation.
- Refuel during cooler periods - it prevents gas fumes from heating up and creating ozone.
- Don't top off the tank - it releases gas fumes into the air.
- Work at home if possible.
- Get travel updates before you leave home so you won't get stuck in traffic.
- Spread these tips around.

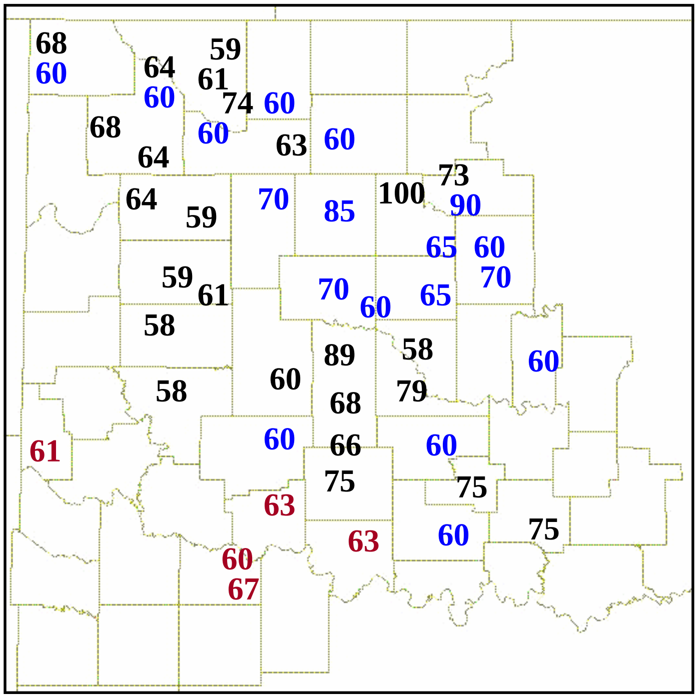
The National Weather Service in Norman relays the AQI for Oklahoma City every morning Monday through Friday and can be found on our website at *weather.gov/norman* and can be heard on NOAA Weather Radio. Ozone alerts for Lawton and Oklahoma City are also relayed by NWS Norman.

More information on the Air Quality Index, hazards that air pollution causes, and current air quality conditions can be found on the EPA's website at *www.epa.gov/airnow* or on the Oklahoma Department of Environmental Quality webpage at *www.deq.state.ok.us/AQDnew/*.

Wind Event: From Page 1

player in where significant winds would occur later that evening and overnight. The derecho surged southeastward along this frontal boundary where the most unstable air was located.

Severe weather commenced during the late afternoon hours, and ended shortly after midnight. At approximately



Preliminary thunderstorm and non-thunderstorm wind gusts from June 16th, 2005. Reports obtained from the Oklahoma Mesonet, Automated Surface Observing Stations, Cooperative Observers and the public. Graphic created by Jennifer Palucki, NWS Norman. Black indicates measured wind gusts, blue indicates estimated wind gusts, and maroon indicates non-thunderstorm wind gusts.

4:30 in the afternoon, severe thunderstorms developed over northwest Oklahoma, where the aforementioned front met up with a developing surface low pressure area. These very intense thunderstorms, known as supercells, eventually evolved into a southward propagating derecho, which affected a large part of northern, central, and southern Oklahoma, and even portions of western north Texas. The Norman Forecast Office issued one tornado, one flash flood, and 94 severe thunderstorm warnings to alert the citizens of Oklahoma and western north Texas to the dangers that existed.

Although damaging winds were the primary concern, very large hail did occur early on in the event. The largest hail reported was the size of baseballs. This occurred when the primary mode of thunderstorms was discrete supercells. This very large hail was reported just south of Laverne, with golf ball size hail reported in the Lookout, Rosston, Mooreland, and Waynoka areas of northwest Oklahoma. During the early evening hours, these supercells merged, and evolved into a large thunderstorm complex, which propagated south and east. As typically occurs during this process, the frequency and size of hail decreased, while the potential for widespread damaging wind gusts increased.

There were two main areas of Oklahoma that were affected by significant wind damage. One area extended from just west of El Reno, south and southeastward through Minco, Chickasha, Blanchard, Dibble, Washington and on down toward Marlow. It was in this area where an 89 mph gust was measured by an Oklahoma Mesonet station. Another area, where the strongest wind speeds were measured, extended from near Waynoka, to just south of Enid, to Hennessey, eastward through Marshall, Orlando, Coyle, and Perkins. Just southeast of Marshall, a wind gust of 100

Extensive roof damage to a home east of Chickasha. Photo taken by Dale Thompson, Grady County Emergency Manager.

mph was measured by another Oklahoma Mesonet station. These two areas were hit with very strong winds directly associated with the thunderstorms. Damage ranging from trees that were blown over, to shingles blown off of homes and businesses, to more extensive roof damage occurred in these areas. In addition, numerous power poles were snapped and power lines were downed which resulted in widespread power outages across the state.

Tree damage along a road in Grady County. Photo taken by Dale Thompson, Grady County Emergency Manager.

There were also portions of southwestern Oklahoma and western north Texas that were blasted with 60+ mph winds, but with no thunderstorm activity whatsoever! These winds were labeled as "non-thunderstorm wind gusts" in the figure on the left. Although these winds were created by the outflow from the mentioned thunderstorm complex, this outflow surged out far enough away from the thunderstorms that storm activity was not observed at these sites.

All in all, 32 of the 56 counties in the NWS Norman County Warning Area experienced severe winds on June 16th and 17th. Of these 32, four of them experienced the high winds without ever observing a thunderstorm!

June 2005 Flood Summary

By Steve Kruckenberg, Service Hydrologist

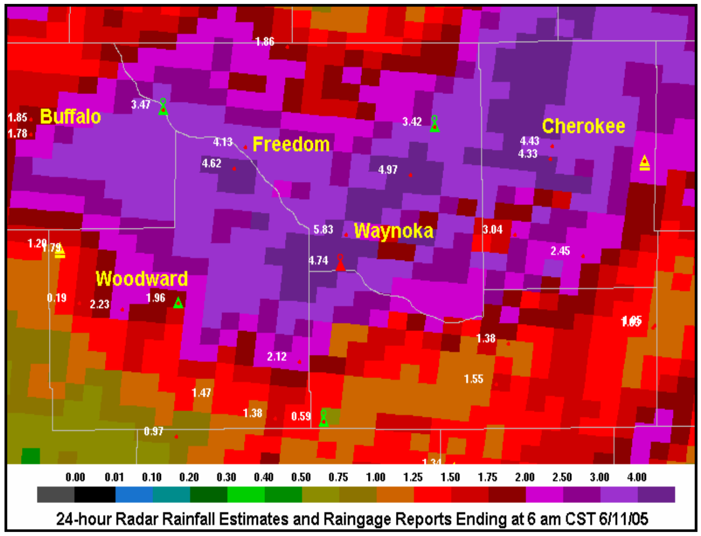
After a quiet Spring in the NWS Norman area of responsibility, flooding returned to the region in June 2005, including a significant flash flood/river flood event during the middle of the month.

June 1, 2005. The first heavy rainfall and flood event of June occurred during the late evening of May 31st and early morning of June 1st as a large complex of thunderstorms moved through parts of western north Texas. Strong to severe thunderstorms dropped rainfall totals of 2 to 4 inches over an isolated area in Knox County, Texas, including a rainfall report of 3.09 inches at the river gage site 4 miles north of Benjamin, TX.

The subsequent heavy runoff produced brief flooding along the South Wichita River in Knox County. At the river gage site 4 miles north of Benjamin on Texas State Highway 6, the South Wichita River crested at 13.2 feet, 1.2 feet above flood stage, at 7:45 am CST on June 1st, and was above flood stage from 3:00 am CST to 10:30 am CST on June 1st. Minor rural flooding occurred over rangelands near the river.

June 10-13, 2005 - Heavy Rainfall. During a 72-hour period on June 10th-13th, strong to severe rainfall producing thunderstorms helped produce a significant flood event across northwestern through central Oklahoma, and especially in the Cimarron River basin. During this period, a strong upper level storm system combined with a quasi-stationary front at the surface generated multiple rounds of thunderstorms over the region.

The first and most significant rainfall event occurred during the evening of June 10th and the early morning of June 11th. Multiple thunderstorms moved over the same areas and dropped rainfall amounts of 3 to 6+ inches over eastern Harper, northern Woodward, Woods, and Alfalfa counties in northwestern Oklahoma. The highest 24-hour rainfall reports for the period ending at 6am CST on June 11th included: Waynoka - 5.83 inches; Alva 7SSW - 4.97 inches; Waynoka 5S - 4.74 inches; Freedom 3 SW 4.62 inches; Cherokee - 4.43 inches; Cherokee 1SSW - 4.33 inches; Freedom - 4.13 inches; Enid - 3.71 inches; and Alva 1 NE - 3.42 inches.



Graphic of 24-hour radar rainfall estimates (in color) and raingage reports (text) ending at 6am CST on June 11th, 2005.

More thunderstorms formed in the Texas Panhandle during the afternoon of June 11th and moved into western and northern Oklahoma during the evening. Round after round of storms passed over the same rain-soaked areas of northwestern Oklahoma during the evening of June 11th, and the storms did not abate until the late afternoon hours of June 12th. As a result, 1 to 2-inch totals were observed over parts of Ellis, Woodward, and Woods counties for the 24-hour period ending at 6am CST on June 12th. The band of heaviest rainfall stretched from near Arnett to Freedom to Alva. Some of the largest rainfall totals included: Freedom 3 SW - 1.91 inches; Fargo 1W - 1.84 inches; Freedom - 1.79 inches; Fort Supply 2S - 1.53 inches; Woodward 2WSW - 1.25 inches; Laverne 1S - 1.14 inches; Gage 2SW - 1.12 inches; and Arnett 9 WSW - 1.00 inches.

The 24-hour totals ending at 6am CST on June 13th ranged from 2 to 4 inches across parts of Roger Mills, Ellis, Harper, Woodward and Woods counties, with another area of 2 to 4 inches in eastern Washita, eastern Custer, southern Blaine and north Caddo counties. Some of the heaviest totals for this period included: Colony 3NE - 4.01 inches; Hinton 7W - 3.30 inches; Newkirk 1NW - 3.24 inches; Fort Supply 3 SE - 3.08 inches; Mackie 4NNW - 2.94 inches; Gage 2SW - 2.64 inches; and Fargo 1W - 2.51 inches.

Three-day storm total rainfall amounts from June 10th-13th were significant in northwestern and west central Oklahoma with some totals topping the 7-inch mark. Some of the greatest storm totals for this period included: Waynoka - 9.07 inches; Freedom - 8.14 inches; Fort Supply 3SE - 7.61 inches; Woodward - 5.57 inches; Cherokee - 5.47 inches; Cheyenne 11NW - 5.30 inches; Colony 5.21 inches; Lamont - 4.15 inches; Mutual - 4.06 inches; Laverne - 4.04 inches; and Great Salt Plains Dam - 4.01 inches.

June 10-14, 2005 - River Flooding. The heavy rainfall and subsequent runoff eventually produced minor to moderate flooding along the Cimarron River in northwestern and central Oklahoma during this period

Minor to moderate rural flooding occurred along the Cimarron River 5 miles south of Waynoka, OK at the river gage site. The Cimarron River initially crested at 10.1 feet, 2.1 feet above flood stage, at 3:30 am CST on June 11th, and then fell to just above flood stage early on June 12th. However, more heavy rains and runoff during the morning and afternoon of June 12th produced a second, higher crest at 10.9 feet, 2.9 feet above flood stage at 10:30 pm CST on June 12th. The Cimarron River at the Waynoka gage site was above flood stage from 9:30 pm CST on June 10th to 2:30

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pm CST on June 14th.

The high flows on the Cimarron eventually routed downstream and produced near bankfull conditions on the Cimarron River 9 miles east of Okeene, and minor flooding conditions at the river gage site 2 miles south of Dover, OK. The Cimarron River near Dover crested at 17.2 feet, 0.2 feet above flood stage, and 10:30 am CST on June 14th, and remained above flood stage from 6:00 am CST to 5:00 pm CST on June 14th.

The Cimarron River near Waynoka. Photo taken by David Litzenberger on June 13th, 2005 at 12 pm CST. At this time, the river was in minor flood at a stage of 9.3 feet, 1.3 feet above flood stage.

High flows along the Cimarron River in southwestern Kansas eventually moved down the river and into northwestern Oklahoma, and brought minor flooding conditions along and near the Oklahoma-Kansas border. The Cimarron River 17 miles northeast of Buffalo at the river gage site, crested at 8:00 am CST on June 14th at 6.0 feet, which is flood stage.

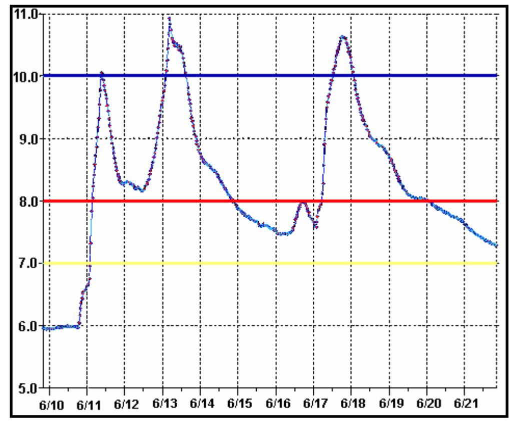
However, the Cimarron River was not the only river affected by the heavy rainfall. Locally high flows along the Canadian River in west Central Oklahoma also produced flooding on June 12th-13th. The Canadian River near Bridgeport, OK crested at 15.0 feet, 1 foot above flood stage, at 8:30 am CST on June 13th, and remained above flood stage from 12:00 am CST to 10:30 pm CST on June 13th.

The Canadian River at Bridgeport. Photo taken by Lonnie Helderman on June 13th, 2005 at 9 am CST. At this time, the river was cresting at 15.0 feet, 1 foot above flood stage.

June 15-17, 2005 - Heavy Rainfall. Two more rounds of severe weather during the evening and overnight hours of June 15th-16th, and June 16th-17th, dropped more heavy rain over northwestern Oklahoma. The storms on June 15th-16th moved fairly rapidly through the area, but did drop totals of 1 inch or more in isolated areas of western and northern Oklahoma. However, the more significant event occurred on June 16th-17th as slow-moving storms made their way across the region. The entire Cimarron River basin from northwestern through central Oklahoma was drenched again with rainfall totals of at least an inch, with some areas receiving 2 to 4 inches. Some of the largest rainfall totals included: Waynoka 5S - 3.95 inches; Waynoka 3S - 3.50 inches; Ingalls - 3.28 inches; Stillwater 9SW - 3.25 inches; Buffalo 2 SSW - 2.75 inches; and Buffalo 1W - 2.40 inches.

June 16-19, 2005 - River Flooding. The Cimarron River basin in northwestern and central Oklahoma was visited again by minor to moderate flooding from near Buffalo, downstream to near Dover after two more days of thunderstorms and heavy rainfall plagued the region. The river gage site near Waynoka was the first to rise above flood stage as the Cimarron River crested briefly at flood stage of 8.0 feet at 11:30 am CST on June 16th. The Cimarron River remained just below flood stage until the slow-moving thunderstorms during the evening and overnight hours of June 16th-17th brought a third crest above the moderate flood level of 10 feet during the month of June. The Cimarron River near Waynoka crested at 10.6 feet at 12:00 pm CST on June 17th, and remained above flood stage from 11:00 pm CST on June 16th until 7:00 pm CST on June 19th.

A slow-moving supercell thunderstorm that remained nearly stationary over the Cimarron River in northwestern Harper County dropped 3+ inch amounts of rainfall in the area. The high flows from the Cimarron in this area and portions of southwestern Kansas eventually traveled downstream and brought a crest above flood stage at the river gage site near Buffalo, OK. The Cimarron River near Buffalo crested at 6.1 feet, 0.1 feet above flood stage, at 2:30 am CST on June 19th, and remained above flood stage from 3:15 pm CST on June 18th to 11:30 am CST on June 19th.



Time series of the Cimarron River near Waynoka beginning June 10th and ending June 22nd, 2005. The curved blue line indicates the river stage (shown on the y-axis) at the given date and time. The solid, horizontal red line indicates when the river is in minor flood, and the solid, horizontal blue line indicates when the river has reached moderate flood. This graph shows all three crests above moderate flood stage that occurred in June.

Flood flows on the Cimarron River near the Waynoka area moved downstream, and combined with local runoff in central Oklahoma, to produce minor flooding near Okeene and Dover. River levels slightly above bankfull were observed on the Cimarron River near Okeene during the daylight hours on June 18th. In addition, the Cimarron River near Dover crested at 17.6 feet, 0.6 feet above flood stage, at 4:30 am CST on June 19th, and remained in flood from 12:30 pm CST on June 18th until 12:30 pm on June 19th.

Despite the abundant amounts of rain this June, it was beneficial rainfall that did not cause major damages or urban flooding.

Norman Forecast Office Notebook - A Complete Look at Events and Happenings

By Rick Smith, Warning Coordination Meteorologist

NWS Enhances Online Radar Displays. The National Weather Service Southern Region, working in cooperation with the North Central Texas Council of Governments, has developed a method to improve the way radar information is displayed on our website. These radar images called Radar Integrated Display with Geospatial Elements (RIDGE), allows the WSR-88D radar image to be combined with geospatial elements such as topography maps, highways and county boundaries. This not only produces a better image, but provides additional reference information that should make referencing locations much easier. RIDGE also adds the ability to overlay polygon warnings issued by the National Weather Service Forecast Offices. Forecasters draw these polygons to identify the most significant threat area in severe weather warnings.

The images are in a GIF format, a common image format that can be viewed on all Internet browsers. These images also have a world file associated with them, which is important for GIS users. The world file (ascii text file) tells GIS software where the image is placed on a map, which enables GIS users to incorporate the radar image into any other GIS data layer.

The looping feature of the pages utilizes a Java plug-in. The Java Plug-in allows the use of multiple image formats which include GIF and PNG which maintain clarity when zoomed. On both the static image webpage and the loop webpage, you can select which overlays are displayed through the use of check boxes located below the image. The static pages contain JavaScript which enables the user to determine both the azimuth and distance from a feature you select by clicking on the image.

You can access all of the RIDGE radar sites and get more details at *www.srh.noaa.gov/ridge/*. Please tell us your comments and suggestions on the new service!

Summer Research Experience at the Norman Forecast Office. The Norman Forecast Office is a proud participant in the Research Experiences for Undergraduates (REU) program. Each year, the program is funded by a grant from the National Science Foundation, and invites motivated college students interested in a career in scientific research to apply for a 10-week summer research program in Norman.

Students from all over the United States come to Norman each summer to participate in this research program under the supervision of meteorologists and other scientists associated with the National Weather Center. This includes OU's Center for Analysis and Prediction of Storms, School of Meteorology, Environmental Verification and Analysis Center, College of Geosciences, Cooperative Institute for Mesoscale Meteorological Studies, Oklahoma Climatological Survey, Center for Spatial Analysis, International Center for Natural Hazards and Disaster Research, Sasaki Applied Meteorology Research Institute, OU Supercomputing Center for Education and Research, Department of Geography, National Severe Storms Laboratory, Storm Prediction Center, Radar Operations Center, and the Warning Decisions Training.

Students conduct research on a wide variety of topics, including severe weather, tornadoes, numerical weather prediction models, atmospheric radiation, climatological studies, dryline studies, and more. Students are expected to prepare and present papers reporting the results of their research.

REU participant Aisha Muhammad, a sophomore meteorology student at the University of Oklahoma worked with the Norman Forecast Office to explore weather awareness among the ever growing Hispanic population in Oklahoma City. According to latest census figures, more than 51,000 people in Oklahoma City speak Spanish, and a significant number of those do not speak English very well. Given that the weather can often be dangerous in this area, meteorologists are particularly interested in the results of the research.

Aisha's research involved an internet-based survey, as well as surveys completed in person at a community center in Oklahoma City. Findings from the study are still be analyzed, but preliminary results indicate the need for more in-depth research into ways weather information can be more effectively communicated to everyone in our area.

For more information on the REU program, visit *www.caps.ou.edu/reu/reu.html*.

National Weather Center. In less than one year, meteorologists, researchers, students, and faculty will come together to work and learn in a new state of the art facility. Known as the National Weather Center, this new building on the south campus of the University of Oklahoma (at Jenkins and Highway 9) will house the Norman Forecast Office, along with the Storm Prediction Center, National Severe Storms Laboratory, University of Oklahoma School of Meteorology, the NWS Warning Decision Training Branch, Center for Analysis and Prediction of Storms, and a variety of other agencies and offices.

The building is scheduled to be completed in the Spring of 2006. The Norman Forecast Office will move into the new building in August of 2006. Watch our website for more details on this exciting move! For more details about the building, and to watch the progress online, visit *nwc.ou.edu*.

Hello and Goodbye

From the Staff at NWS Norman

We would like to welcome Matt Foster to the NWS Norman family. Matt comes to Norman as the Information Technology Officer (ITO) from NWS Shreveport. Welcome Matt!

We would also like to say goodbye and good luck to Dan Miller. Dan has been a forecaster here at NWS Norman since 1998. He has recently been promoted to the Science and Operations Officer in Duluth, Minnesota. We wish him the best of luck! We'll miss you!

Cooperative Observer Notes

Hints on Avoiding Common Observer Errors

By Daryl Williams, Hydrometeorological Technician

Cooperative weather data gathered in Oklahoma and western north Texas are forwarded to the National Climatic Data Center (NCDC) in Asheville, North Carolina. The data are quality controlled and published as the official climatic record. Cooperative observers can assist in the accuracy of that record by following some basic rules and avoiding common mistakes.

An important fact to keep in mind is that you are looking ***back*** 24 hours from the time of your observation. A rainfall or temperature reading taken at 7 am on Tuesday the 15th includes any rainfall, snowfall or temperature that occurred ***after*** 7 am on Monday the 14th. In this example, a rain event that occurred in the late morning of the 14th would be recorded on the 15th at 7am. The same would be true for a temperature reading. A maximum or minimum temperature recorded after 7 am on the 14th (in this example) would be recorded on the 15th on the B-91 form.

Deviation from these basic rules causes ***data time shifting errors***. Rainfall and temperature analysis depend on readings taken at about the same time. This process is called "time series analysis." Data that are recorded on the wrong day makes the time series analysis very difficult. NCDC tries to identify and correct time shifted data from cooperative observers. Avoiding time shifting errors at the beginning makes the data much easier to quality control.

A common practice that causes time shifting is the use of calendars or duty logs to record the precipitation or temperatures during the month and the then recording the data on the b-91 form at the end of the month. A rain shower that occurs at noon on the 14th should be recorded on the B-91 form on the 15th (for a morning observation station in the example above). If you use a feed store calendar or a duty log and record the rainfall on the 14th, you risk "shifting" the rain event back one day.

Temperature errors occur much the same way. It is important that you remember that the reading is a look ***back 24 hours*** from the time of observation. A complete discussion of temperature errors is contained in the NWS Observing Handbook #2. If you do not have a copy of this handbook, just ask and we will send you one. This book covers many important facts about cooperative data collection.

The following are a few other general rules that can help the data collection process:

- Always use black ink on the B-91 form.
- Always total the precipitation at the end of the month.
- Remember snow events always require three entries; melted water equivalent, snow fall to the nearest tenth of an inch, and snow depth to the nearest inch.
- Temperature readings should contain three readings also; the maximum, minimum and "at observation" temperatures. The "at observation" temperature on the last day of the month should also be placed above the column for the "at observation" reading for the next month.

Please refer to the example page on the inside cover of your B-91 booklet for examples of these procedures and many others.

As always, if you have any questions about recording or phoning in your data, please give us a call.

New Observers

The NWS staff would like to welcome Larry Lunn to the NWS Norman cooperative observer program. We look forward to working with this new observer for many years to come.

Observers Needed

Are you interested in weather? Do you live in Apache or Thomas? Call 405-360-5928 for more information about becoming an official NWS cooperative observer.

Award Recipients

The following observers have recently received Length of Service awards:

Christine Payne - 20 years
Morris Poe - 25 years
Letha Crispin - 35 years
Mary Schlabs - 40 years

Thank you for the hard work and valuable meteorological data you have collected. We look forward to working with all of you for many more years.

100 Degree Heat

Oklahoma City reached 100 degrees for the first time in nearly two years on July 22, 2005. The last time Oklahoma City reached 100 degrees was August 28, 2003.

Remember to mail the previous month's cooperative observer forms and recording rain gage tapes by the 5th of the month!

The Norman NWS Cooperative Observer Program Team:

Daryl Williams   Forrest Mitchell   Jennifer Palucki   Ty Judd   John Pike

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National Weather Service
Forecast Office
Norman, OK

Phone Number:
405-360-5928

Web Page:
www.srh.noaa.gov/oun

Meteorologist-in-Charge:
Mike Foster

Warning Coordination Meteorologist:
Rick Smith

Science and Operations Officer:
David Andra

Editor:
Jennifer Palucki

National Weather Service Forecast Office
1200 Westheimer Drive, Room 101
Norman, OK 73069

Check out our text-based and graphical forecasts for your county at *www.srh.noaa.gov/oun*.

Please share this with friends, relatives, and colleagues. Comments and suggestions are always appreciated, by phone at 405-360-5928 or by e-mail at Jennifer.Palucki@noaa.gov.