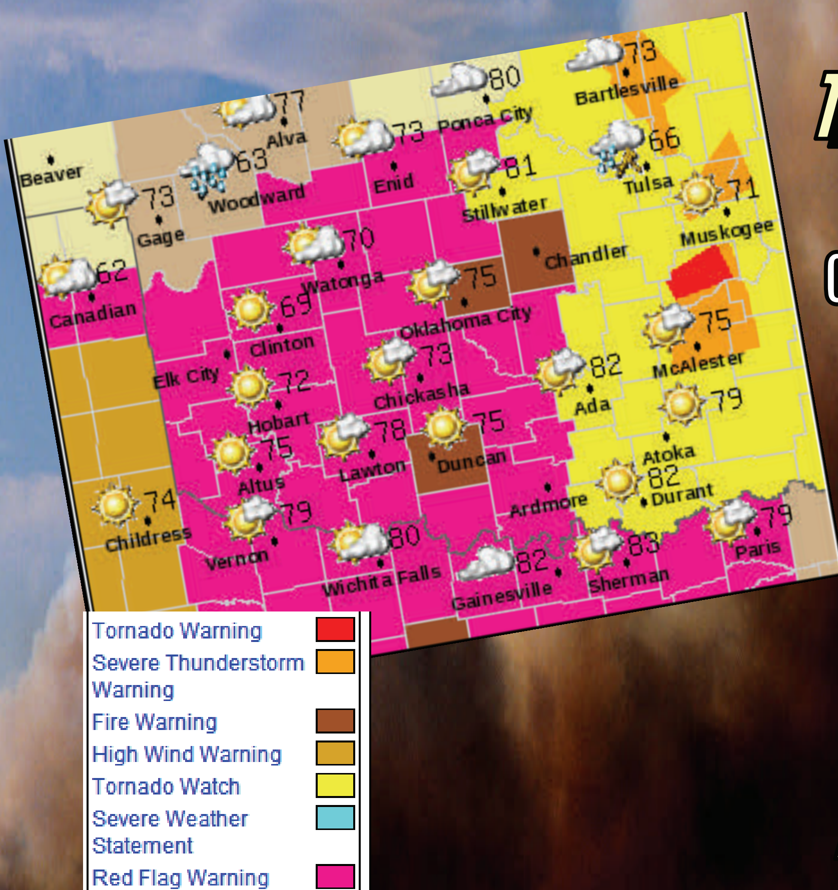
The Southern Plains Cyclone

Spring/Summer

A newsletter from your Norman Forecast Office for the residents of western and central Oklahoma and western north Texas

Spring's Most Significant Event:

April 9, Wildfire Outbreak



Tornado Anniversaries

Wichita Falls, 1979

Central Oklahoma, May 3, 1999

Feature Articles

March Snowstorm

Vortex II

Tropical Prediction Center

Meet Your Weatherman

Jeff Engel

NATIONAL WEATHER SERVICE

We Make the Difference...When it Matters Most!

OK

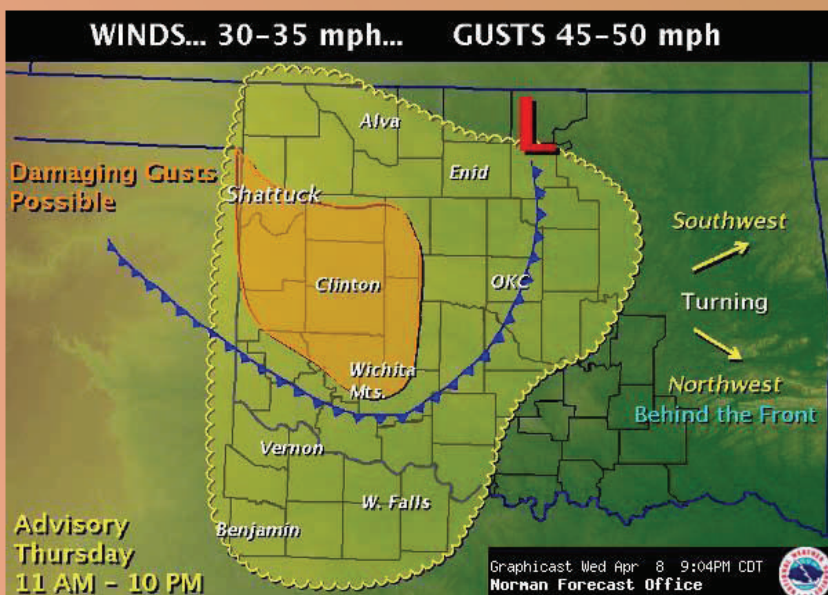
TX

Outbreak of Damaging Wildfires

April 9, 2009

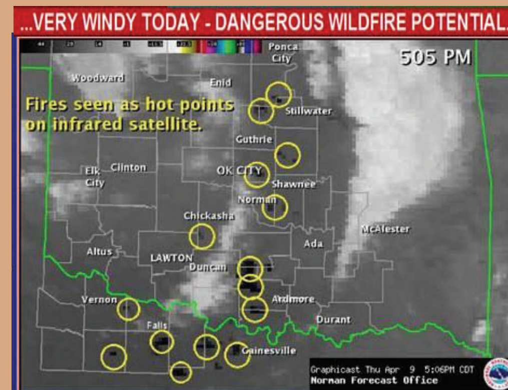
By Alex Lamers, SCEP and Patrick Burke, General Forecaster

Dozens of wildfires ravaged central and southern Oklahoma and parts of western North Texas, beginning in the morning on Thursday, April 9th, 2009, and continuing through the mid morning hours on Friday, April 10, 2009. The first wildfire was reported to the Norman Forecast Office between 10:00 and 11:00 AM, leading up to the rapid occurrence of wildfires by 3:00 PM. A dryline became sharply defined around midday, stretching from north central Oklahoma to near Henrietta, Texas. The dryline then moved east, allowing very warm and very dry air to overtake most of the region. At the same time, low pressure intensified, causing a significant increase in winds. Sustained winds of 25 to 35 mph, with gusts around 45 mph, likely contributed to the fire starts that occurred behind the dryline in the late morning through mid afternoon. A further increase in winds during the late afternoon made fires not just difficult to contain, but nearly impossible to contain. Following the dryline, a Pacific cold front swept through from west to east, and westerly winds increased to 40 mph sustained with severe gusts of 60 to 70 mph. These winds persisted an unusually long time – 3 to 4 hours – in central and southern Oklahoma and part of western north Texas. The strongest wind gust, 76 mph, was recorded 3 miles southeast of Frederick in Tillman County, Oklahoma, at 2:25 PM. A second cold front arrived in the mid to late evening, turning winds to the northwest at somewhat lower and more consistent speeds, which aided firefighters.



A graphi-cast that appeared on the NWS Norman enhanced web page on Wednesday, April 8, 2009. The forecast - valid the next day - depicted a frontal passage accompanied by strong and possibly damaging winds. Other forecast products, including Red Flag Warning, emphasized the threat of wildfires.

See **Wildfires** on page 4

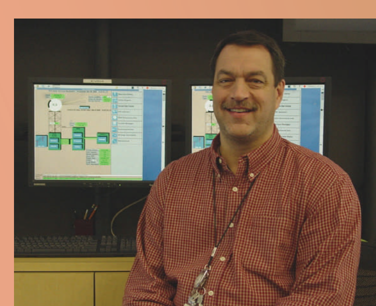


A graphi-cast issued from NWS Norman during the height of the wildfire outbreak on April 9, 2009. At least 15 large, uncontained wildfires are revealed as dark hot spots in this infrared satellite image.

Meet Your Weatherman Jeff Engel

Hi, I'm Jeff Engel. I am the Electronics Systems Analyst (ESA) here at the National Weather Service Forecast Office in Norman. It almost never fails that whenever I meet someone new and tell them that I work for the National Weather Service, they ask me some sort of question about the weather forecast. At that point, I have to sort of drop my head and admit that I probably have no more of an idea about what the weather is going to do than they do, because my job has nothing to do with forecasting the weather! As the ESA, my primary duty is to oversee the operation and maintenance of all the systems and various types of equipment and communications that are used to get information in and out of the Norman Forecast Office.

The meteorologists at NWS Norman use a lot of tools and data to produce weather forecasts and to is-



See **Jeff** on page 6

Overview

On average over 1000 tornadoes hit the U.S. each year. Every tornado, no matter how strong, can threaten lives and property. And although the vast majority of tornadoes are toward the weaker end of the scale, several strong to violent tornadoes can be expected to strike somewhere within the U.S. every year. Advances in technology and improvements in our ability to predict tornadoes and educate the public on safety, have lead to declining numbers of tornado-related deaths per capita for those who shelter in a sturdy building (Important Note: the survival rate in mobile homes has not improved significantly). Still, the origin of tornadoes (called tornadogenesis), and why some rotating storms produce tornadoes while most do not, remains one of meteorology's great mysteries.

Many times, when scientists want to study a phenomenon, they bring the subject into a laboratory and make detailed observations and measurements while performing controlled experiments. In meteorology, that is not possible, except in a simulated sense using computer models. The models' advantage is that they can perform intensive calculations very quickly and display information in a variety of ways. But the models only "know" what we tell them via the equations that drive them. As long as we have gaps in our knowledge remain, the benefits of modeling will be limited.

The only alternative, then, is to take the laboratory to the field! In 1994 and 1995, a research project, The Verification of the Origin of Rotation in Tornadoes EXperiment (VORTEX) was designed around the approach of taking a fleet of vehicles, both on the ground and in the air, directly into the vicinity of rotating thunderstorms. VORTEX resulted in new conceptual models for how tornadoes may form, drawing attention to low level fronts and boundaries, and to the layer of air between cloud base and the ground (where few direct measurements are available), and an important cascade of descending air that forms toward the rear of a supercell storm just prior to tornadogenesis. In the years since, forecasters have employed these tools to better understand which storms are most likely to produce tornadoes.

Although numerous smaller field projects in the past 14 years have incrementally advanced our knowledge of tornadoes, the time was becoming ripe for another large scale, intensive effort. Beginning in Spring of 2009, and culminating in Spring 2010, VORTEX2 is by far the largest and most ambitious effort ever made to understand tornadoes. Over 100 scientists and crew members and up to 40 science and support vehicles are participating. The National Science Foundation (NSF) foundation and the National Oceanic and Atmospheric Adminstration (NOAA) together are contributing over $10 million towards this effort. Participants were drawn from several universities, and several government and private organizations. The group is truly international, including members from Italy, Netherlands, United Kingdom, Canada and Australia.

The unprecedented armada of cutting edge instruments includes 10 mobile radars, 10 mobile mesonet instrumented vehicles, 38 deployable instruments, 4 disdrometers (instruments used to measure the diameters and velocities of falling hydrometeors such as rain and hail), weather balloon launching vans, unmanned aircraft, damage survey teams, and photogrammetry teams seeking to literally surround tornadoes and the supercell thunderstorms that form them. VORTEX2 is fully nomadic with no home base. Scientists will roam from state to state following severe weather outbreaks through the Plains.

A part of the VORTEX2 armada. The full armada includes dozens of vehicles carrying meteorological instruments toward thunderstorms during the 2009-2010 experiment.

VORTEX2 hopes to at least begin answering the questions: How and why do tornadoes form? Why are some violent and long lasting, while others are weak and short lived? How strong are the winds near the ground? How can we better forecast tornadoes? Can we make warnings more accurate and achieve even better lead time?

LaGrange, WY, Tornado June 5, 2009

by

Chris Sohl, Senior Forecaster at NWS Norman, and participant in the Vortex Operations Center

One of the primary responsibilities of the Vortex Operations Center (VOC) was to provide forecast and situational support to the Vortex2 field leaders*. The VOC staff also included a National Weather Service liaison who facilitated a bi-directional exchange of information between the Vortex2 armada members and an NWS office located near a targeted storm. Along with being able to access meteorological observational and forecast data on computer workstations, the VOC also had the capability to display each of the armada's gps-transmitted locations onto a geographical map background displaying 88-D radar data

See VORTEX on Page 3

VORTEX...from page 2

over the target area.

The day before the LaGrange, Wyoming tornado, the Vortex2 armada intercepted two supercell thunderstorms (also in southeast Wyoming). While the storms apparently produced no tornados, they still provided the armada teams an opportunity to employ tactical positioning methods designed to optimize data collection. The experience gained on this day would be successfully applied the very next day as the armada tracked a supercell that produced a long-lived tornado near LaGrange, Wyoming.

Even though the Vortex2 armada's projected target area covered a large area of real estate that extended from South Dakota to northern Texas, the somewhat unusual nature of this year's spring severe weather season forced the armada to consider target areas outside of the original plan. The LaGrange storm was one such day when the teams had to travel outside of the original boundary of the pre-defined target area. The analysis of weather data that day pointed to southeast Wyoming and western Nebraska as an area where parameters were forecast to become favorable for supercell thunderstorms.

The Vortex2 Field Command (FC) vehicle is pictured with a tornado near Lagrange, WY, on June 5, 2009. NWS Norman Meteorologist in Charge, Mike Foster, was among the FC crew for two weeks, including during successful intercept.

Nearly an hour before the eventual target storm was identified, the VOC relayed to the armada that the Storm Prediction Center had issued a tornado watch that included parts of southeast Wyoming. At the time, a few storms were beginning to develop in southeast Wyoming including one that would eventually produce the LaGrange tornado. Soon afterward, the VOC advised the armada that the local National Weather Service Forecast Office in Cheyenne, Wyoming had issued a Severe Thunderstorm Warning for one of the storms. The VOC, however, also noted that this appeared to be a left-moving storm (which typically has a much smaller potential to produce a tornado).

Almost an hour before tornado development, the VOC advised the field teams that a Severe Thunderstorm Warning had been issued for another storm, one that would soon become the target storm. As the thunderstorm continued to develop, a radar summary was provided to the field leaders which included the observation of a strengthening low-level circulation in the target storm. At the request of the NWS liaison, the field team was asked if an observed wall cloud was also exhibiting rotation.

The VOC advised the field leaders that the Cheyenne Forecast Office had issued a Tornado Warning for the targeted storm. Just after 4 pm MDT, the Vortex2 field coordinator confirmed a tornado. Throughout much of the lifetime of the tornado, the Weather Channel, traveling with the armada, was broadcasting live video. This allowed the VOC team to also view the tornado footage in real-time on the Situation Awareness Display located next door in the Norman Forecast Office. Not surprisingly, the size of the group in the VOC gradually grew as awareness of the ongoing successful intercept of a tornadic supercell increased.

As the afternoon progressed into evening, the VOC continued to provide the armada with mesoanalyses. While the armada was focused on the targeted tornadic storm, the VOC also relayed information on nearby storms that potentially could interact with the target storm or perhaps provide an alternate storm for study - should the current targeted storm weaken.

Not all of the support provided by the VOC was strictly meteorological. The VOC also provided assistance in coordinating repairs after some of the armada probes encountered very large hail which heavily damaged their windshields (including a 4.5 inch hailstone report which the NWS liaison relayed to the Cheyenne Forecast Office). In concert with the NWS liaison, the VOC also helped to coordinate possible subsequent damage surveys by the local Forecast Office and the Vortex2 teams. As the evening wound down and the armada vehicles were returning to motels in Nebraska, the VOC continued to monitor severe storms that eventually tracked across the armada's route. At the same time, the VOC, along with the NWS liaison, also helped to coordinate live interviews with national media.

By the end of the day, I felt a sense of contentment and relief that a tornadic supercell was successfully intercepted by the Vortex2 team, especially considering the unusual scarcity of tornados since the program began. Although the Vortex2 teams had collected data on supercell storms, up to that day they had yet to intercept a tornadic storm. One couldn't help but feel happy for the field teams, many of whom had been driving thousands of miles, living out of suitcases and living away from home for the preceding four weeks. It was particularly pleasing that the long-tracked tornado remained in open country and caused minimal damage. Even though the program still had another week to run for the 2009 season, the LaGrange tornado ended up being the only one observed through the duration of the project. Perhaps in 2010 Mother Nature will be less stingy in the opportunities she provides for research scientists to unravel yet a few more of the secrets behind tornadogenesis.

For More Information... http://www.vortex2.org/home/

Wildfires...from page 1

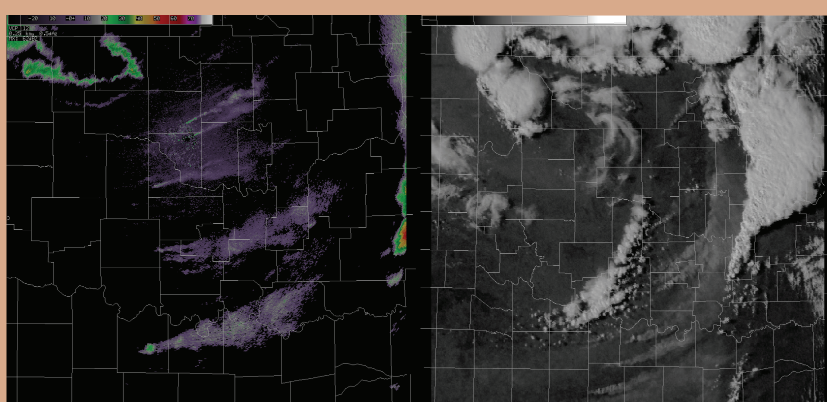
The National Weather Service (NWS) in Norman began advertising the elevated fire potential with a Fire Weather Watch, issued Tuesday evening, nearly 48 hours prior to the event. On Wednesday, the NWS upgraded the Fire Weather Watch to a Red Flag Warning from western north Texas up through southern and central Oklahoma, including the Oklahoma City metropolitan area. The Red Flag Warning was then extended farther north and east before sunrise Thursday morning. The Red Flag Warning update issued at 3:58 AM on Thursday April 9th, stated that:

"TEMPERATURES IN THE 70S AND 80S AND RELATIVE HUMIDITIES BETWEEN 5 AND 25 PERCENT AND STRONG WESTERLY WINDS WILL CREATE CONDITIONS THAT WILL MAKE ANY WILDFIRES EXTREMELY DIFFICULT TO CONTAIN."

A Wind Advisory was also in effect for the same area as the Red Flag Warning. Issued Wednesday evening, the Wind Advisory stated that::

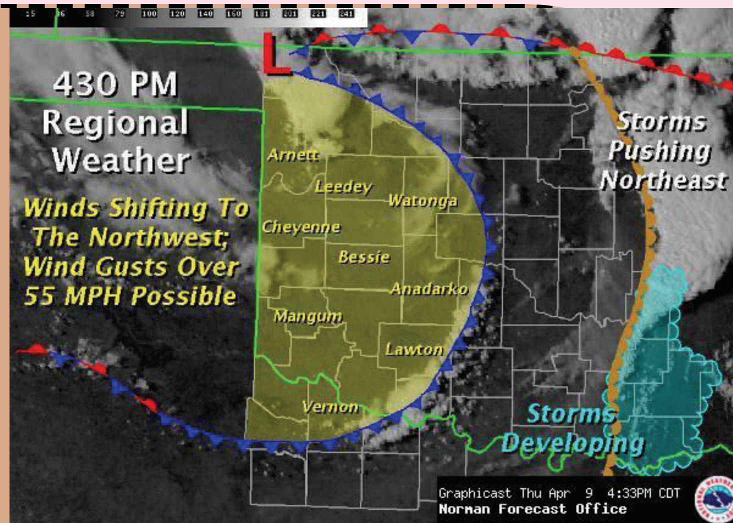
"IT IS POSSIBLE THAT THE AREA FROM LAWTON UP TO WATONGA…AND OVER TO SHATTUCK...CHEYENNE...AND ELK CITY… MAY EXPERIENCE A ONE TO TWO HOUR PERIOD OF DAMAGING WIND GUSTS AROUND 60 MPH THURSDAY AFTERNOON. THIS AREA WILL BE MONITORED FOR A POSSIBLE UPGRADE TO HIGH WIND WARNING."

This forecast, along with an accompanying web-based graphic, gave a heads up to the potential for excessive wind gusts with this storm system. In reality, the high winds lasted longer and affected a larger area, as gusts over 60 mph, and in some cases 70 mph, surged deeper into central Oklahoma Thursday afternoon, and did not decrease significantly until around 8:00 PM.



Around 4:30 PM on Thursday, April 9, 2009, the central Oklahoma, Twin Lakes (KTLX), Weather Surveillance Radar detected thick smoke plumes emanating from ten or more wildfires lined up between Bowie, TX, and Orlando, OK (left). Visible satellite imagery clearly shows the same smoke blowing from west to east and intercepting a line of developing thunderstorms (right).

Routine products such as short term forecasts were issued periodically throughout the day, updating the "big picture" forecast elements such as the locations of the dryline and cold fronts, and expectations for temperature, wind, and humidity in the next several hours. By mid afternoon, when sat-



A graphi-cast issued from the NWS in Norman on Thursday afternoon, April 9, 2009. Numerous wildfires produced smoke plumes just west of the dryline. The smoke is visible from space in this satellite image. When the Pacific cold front surged across the wildfire locations winds went from bad to worse, with frequent severe gusts over 60 mph.

ellite imagery and media reports alerted meteorologists to the escalating emergency, it became apparent that firefighters would need forecasts with a greater level of detail as they planned their attacks. At 3:37 PM, the NWS began issuing Special Weather Statements with the following headline:

"THIS INFORMATION IS INTENDED TO SUPPORT DECISIONS RELATED TO FIRE FIGHTING EFFORTS OVER CENTRAL AND SOUTHERN OKLAHOMA AND INTO WESTERN NORTH TEXAS"

These Special Weather Statements, and an accompanying web-based graphic, were updated hourly through midnight. These products contained highly detailed information regarding the location of wind shift boundaries, their estimated arrival times at various locations, and the resulting change in wind direction, sustained wind speed, and gust speed.
Starting at 3:22 PM, Fire Warning messages were transmitted via weather radio at the request of emergency management in several Oklahoma counties. Fire Warnings are a tool that emergency managers can use to disseminate evacuation orders via the NWS, using NOAA All Hazards Weather Radio. These messages describe the area threatened using well known street names, and provide instructions on which direction or along which roads people should travel to remove themselves from the path of the fire. In some cases, the Fire Warning message will include the locations of emer-

See Wildfires on Page 8

Marking Tornado Anniversaries

Red River Outbreak April 10, 1979

Adapted from a Summary Provided by Don Burgess, National Severe Storms Laboratory [Ret.]

On Tuesday, April 10, 1979, an outbreak of strong tornadoes terrorized residents of western north Texas and southwest Oklahoma. Three isolated supercells, forming in mid afternoon, moved northeastward as a trio and were responsible for the worst part of the outbreak. Overall, the outbreak produced nearly 30 tornadoes and a large number of damaging wind and severe hail reports.

The supercell that produced the Seymour, Texas, tornado in this National Severe Storms Laboratory photograph, later produced a deadly and devastating tornado at Wichita Falls.

The northern supercell tracked through Vernon and Lawton. Around 3:40 PM CST, a tornado devastated the southeastern portion of Vernon, TX, where 11 people were killed. The storm would later strike the southern portion of Lawton, causing severe damage and killing three.

The middle supercell tracked between Harrold and Grandfield, and produced the longest single tornado track of the outbreak (64 miles). Fortunately, the strong and wide Harrold-Grandfield tornado spent its entire life in rural areas. One person was killed.

The southern supercell, the Wichita Falls storm, produced its first tornado at 4:53 PM CST, near Seymour, TX. The storm's second tornado, the terrible Wichita Falls tornado, formed at 5:55 PM to the southwest of the city, and moved through the southern and eastern sides of Wichita Falls beginning shortly after 6:00 PM. The tornado was 1.5 miles wide as it passed through 8 miles of residential area in Wichita Falls.

Forty-two people were killed outright by the storm and 3 others died as a result of heart attacks. Total property damage in Wichita Falls was estimated at $400 million (in 1979 dollars). Over 3,000 homes were destroyed and another 1,000 were damaged. Over 1,000 apartment units/condominiums were destroyed and another 130 damaged. In addition, approximately 140 mobile homes were destroyed, two schools were demolished and 11 others sustained serious damage. Over 100 commercial businesses, some of them large manufacturers, were destroyed. It is estimated that between 10% and 20% of the population of the city was displaced by the tornado. To put the deaths and property damage in perspective, it should be noted that no single U.S. tornado has killed as many as 42 people in the 30 years since the Wichita Falls storm. The total property damage of $400,000,000 still stands as the most costly tornado in American history.

Central Oklahoma May 3, 1999

The May 3, 1999, outbreak of nine prolific supercell thunderstorms and numerous strong to violent tornadoes may have defined an entire generation of meteorologists and Oklahomans. The event was unusually concentrated in space and time, with storms raking central Oklahoma and bordering regions of the state over a period of about seven hours. Those of us who witnessed that Monday afternoon ten years ago are familiar with the extent of devastation – 40 people killed, 675 injured, and $1.2 billion in damage (the worst of which occurred in Bridge Creek, Moore, Mulhall, and Stroud). But we are also familiar with the truly heroic efforts of meteorologists, public officials, doctors and nurses, friends and neighbors, who worked together to save lives. Detailed histories of the weather evolution on May 3rd are available many places on the internet and in meteorological journals. Instead of repeating what has been documented, here are a few insights from the NWS Norman Meteorologists who were on shift during the tornado outbreak. Many of these professionals are still here today, serving the people of central and western Oklahoma and western north Texas.

Daphne LaDue, then a meteorologist with the National Severe Storms Laboratory (NSSL), took this photograph of the Stecker, OK, tornado - the first significant tornado of the May 3, 1999, outbreak. This became one of the more recognizable images associated with the tornado outbreak.

See May 3rd on Page 6

For More Information... http://srh.noaa.gov/oun/wxevents/

May 3rd...from page 5

Jim Purpura (Former Warning Coordination Meteorologist, now Meteorologist in Charge at NWS San Diego)

"My wife and the doctors had agreed our second baby would be born on May 4th, 1999. As the WCM at Norman, Oklahoma, and a believer in Murphy's Law, I jokingly told all at the staff to "plan for a massive severe weather outbreak on May 4th!"

As the storms began to develop, I became aware of their persistence. I also noted that the storms would make it from southwest Oklahoma into central Oklahoma, and on their present course, come close to Norman, where we lived. We began to put our tornado plan in place, and emptied an interior closet in case we would need to take shelter.

Since I lived 5 minutes from work, I told my wife…'The tornado will miss us, but I really need to see what is happening at work. If you start having contractions let me know and I'll be right back!' I went in to the office at 7 pm as the tornado was entering Oklahoma City, and left about midnight for home.

We went to the hospital early the next morning, May 4th, and our second child, a girl, was born. Suzanna Rose Purpura is 10 years old now, and memories of her birth on May 4th will always be linked to the devastating tornadoes of May 3rd."

Scott Curl (General Forecaster, both then and now)

"I worked the day shift, putting together the seven day forecast package. By the end of my shift I was fairly certain that severe weather was going to occur…but my mindset was more on hail and wind, with the possibility of a tornado or two. I briefed the evening shift on the expected severe weather threat and told them that I was available to stay and help with warnings.

I think I issued the first severe warning…around 445 pm. I then watched this storm take on supercell characteristics and turned the severe warning into a Tornado Warning sometime around 520 pm. The number of storms and their severity made us have to sector the warning responsibility between multiple meteorologists. This event was unique, however; instead of sectoring based on area or counties, we did it based on storms. Over the next couple of hours, it was a matter of taking the nearly continuous reports, from phone, amateur radio and television, and issuing severe weather statements as quickly as possible. I was trying to put out as much information as I could to allow people to make decisions that I felt would or could save their lives.

In between issuing products I made some quick phone calls to my mom and dad, who live in Newcastle, and my wife in southwest Oklahoma City. I received a phone call from my wife that my mother-in-law's edition had been heavily damaged and a large part of it completely destroyed. My mother-in-law was not injured, but her home was damaged, and she was being evacuated from the area. When this information became known to the office it was determined that I should try and leave to be with my family. It

See May 3rd on Page 7

Jeff...from page 1

sue warnings of hazardous weather. Key systems include the Next Generation (NEXRAD) weather radar, the Advanced Weather Interactive Processing (computer) System (AWIPS), rain gauges, network printers, and even mice on desktop computers. There are a multitude of other sensors and systems that I and my team of Electronics Technicians are responsible for keeping in prime condition. I supervise a group of four Electronics Technicians that work diligently to repair any piece of our equipment that isn't working, install updates and modifications, maintain network security, and perform preventive maintenance, calibrations, and numerous other duties. This requires the entire maintenance team to work closely with all of the meteorologists to ensure that every system in the office and out in the field is working as efficiently as possible. Without reliable information going into and out of our office, our meteorologists would be unable to perform their jobs.

I was born in Huntsville, Alabama, but I was raised in the Dallas, Texas, area. I graduated from Lloyd V. Berkner High School in Richardson, Texas, and, at that point, I had no idea what I wanted to do with my life. I enrolled at a nearby community college, but before classes even started I changed my mind because of a brochure that we received in the mail one day from Control Data Institute. That brochure said that I could learn computer maintenance in 9 months, and that's what I did.

After graduating from CDI, I got a job with Concurrent Computer Corporation (CCC) in Bartlesville, Oklahoma. Three years later CCC moved me to the Oklahoma City area where I worked out of my home in Norman. One of my customers at that time was the National Severe Storms Laboratory. Eventually another customer, the National Weather Service Operational Support Facility (OSF) arrived in Norman. That group is known today as the Radar Operations Center (ROC). They were using Concurrent computers in association with the NEXRAD network. The CCC was strictly in the large, main frame type of computer business, but that demand started to shrink quickly. That's about the time that I decided to look for other employment. The ROC hired me in 1992. While there, I worked as a Hotline Maintenance Specialist, Acceptance Test Monitor, and was eventually assigned to be part of a team that developed and fielded the Open Radar Product Generator.

Being the ESA here certainly has its challenges, but I wouldn't trade it for anything. I feel very blessed to be a part of this wonderful staff.

Outside of work, I am a big fan of University of Oklahoma football and basketball. I also still follow the Dallas Cowboys and Mavericks. My wife and I will be married for 23 years this June. We have two daughters that we are very proud of, and we are all very involved in our Church.

May 3rd...from page 6

was extremely hard for me to get up from that chair. I felt an obligation to continue to do my job of providing the warnings for the people of central Oklahoma."

Cheryl Sharpe (General Forecaster, both then and now)

"I was scheduled to work a supernumerary shift with somewhat flexible hours. As was usual in the spring, I came in at 10 a.m. - with the full expectation of working well into the evening. At 4 p.m., I stood by the short-term desk to listen to the shift-change briefing. About that time, a tiny radar echo appeared near Lawton - and the Storm Prediction Center raised our outlook from "moderate risk" to "high risk." I joined Scott at the warning desk.

Soon, the big supercell was approaching the Oklahoma City metro area. "The Big One" was on its way. There was an "ominous" feel to the scene at the office - kind of a quiet anticipation of a major disaster. By this time, other supercells had formed, and Scott and I divided the forecast area. Later, Kevin, on the short-term desk, took warning responsibility for our Texas counties. About that time, Kevin announced that he needed a list of our current warnings because he was going to call NWS Tulsa to ask them to prepare to back us up, if needed. The storm was about 10 miles away, and a slight right turn would have brought it into Norman. That request was probably the single most memorable operations-related event of the night for me.

As the night progressed, tornadic supercells threatened nearly all my friends and relatives who lived in Oklahoma at the time - even a couple of friends in Tulsa - at some point. That elevated the stress level significantly.

Scott left and Doug took his place. Soon, Scott returned, unable to reach his house in Newcastle due to road closings in Moore. Finally, at 9:30 p.m., Chris Sohl came in to help out. He took my place at the warning desk and I was done for the day. It had been a nerve-wracking night, the kind I hope I never see again."

Chris Sohl (Senior Forecaster, both then and now)

"One of my kids was scheduled to take a final exam that evening at the University of Oklahoma, so I decided to accompany her over to OU with the plan of going to the top of Dale Hall tower to try to get a better vantage point to view the storms. Unfortunately, the view out of the Dale Hall tower was murky because of intervening low cloud cover and haze.

I then received a call requesting that I come in to work. Upon arriving, the atmosphere in the office was calm and down to business - no doubt a stark contrast to the frenetic activities occurring just a few miles to our north. I quickly took over responsibility for one of the warning desks. For the next several hours, we continued to issue tornado warnings in rapid fire succession.

At one point during the evening, I talked with the emergency management official involved in ongoing search and rescue operations near the small community of Mulhall which had just been struck by a powerful tornado. The news I had for him wasn't good; there was another tornadic supercell headed towards Mulhall.

Meteorologically speaking, it was a remarkable evening. Not only had a major metropolitan area been struck by a devastating tornado, but the number of supercell thunderstorms that developed in a relatively small geographical area was impressive. The thunderstorms that formed not only rapidly became supercells, but a large number of them also produced tornadoes."

Kevin Brown (Senior Forecaster, both then and now)

"I came in for the evening shift, knowing that there would likely be severe weather, but a huge tornadic outbreak was not at the top of our lists. I believe I was relieving Scott and had him go directly to the warning desk during the shift briefing.

The evening flew by, between my writing short term forecasts and aviation forecasts nearly non-stop and watching/hearing live coverage. Everyone at the office knew what needed to be done and they did it. David was a big help there, as he would often step back and make sure we were on top of our situational awareness. The biggest impact on me was when helicopters flew in behind the Oklahoma City storm and showed the path. I think we were expecting fatalities well into the hundreds. That gave an enhanced sense of urgency to the rest of the evening, as storms equal or even exceeding the intensity of the Oklahoma City/Moore storm continued well into the overnight hours. I began issuing warnings and statements toward midnight. Although there was a lull in activity during the late night/early morning hours, I was not relieved of duty until around 10 AM the next morning."

An aerial survey in the days following the Mat 3, 1999, tornado outbreak, revealed scour marks and bare soil where a large and violent tornado had tracked toward Moore and Oklahoma City. For several miles the tornado had moved parallel to Interstate 44, seen crossing this picture from lower right to upper left.

David Andra (Science and Operations Officer, both then and now)

"As reports and video from the first supercell arrived in our office it was clear that 1) this storm was a prolific tornado producer and 2) it was moving directly toward densely populated central Oklahoma as it grew stronger. Between 5:30 and 6:30 PM we realized we were watch-

See May 3rd on Page 8

May 3...from page 7

ing a major tornado outbreak unfold. We redoubled our efforts to ensure we stayed ahead of the storms with long lead time warnings and other information. We planned in the office to beef up staffing, prepare for service backup in the event we were incapacitated, and emphasized the danger in our messages. At the same time, we considered the impact the storm might have on our own homes and families. Much of the time it was impossible to call home because the phone lines for the area were saturated with calls.

We continued warning operations, for sometimes 4 separate tornadoes at a time, for several hours after the OKC metro F5. By midnight, as the storms became less capable of tornadoes, we then had to focus on support for rescue and recovery efforts along with handling the crush of media inquiries and damage survey organization. Some of us left after 1 AM only to return by 6 AM, with more severe storms developing the next morning.

While tornadoes may be viewed as a spectacle of nature, this event for me personally left no doubts that they also bring great suffering and loss of life. It is important for us to never lose sight of that fact and remember that every decision we make and every warning we send may be life altering for someone we serve."

Forrest Mitchell (Hydrometeorological Technician in 1999, Observations Program Leader today)

"I began preparing for May 3rd 20 years earlier, in 1979, when I was hired on as a contract Weather Radio Broadcaster. Over the next two decades, the one reoccurring topic that I discussed…with numerous forecasters…was when an F5 tornado occurs in Oklahoma City, how we will cover it on Weather Radio.On the morning of May 3rd, 1999, I worked the last in what is typically a seven day stretch of night shifts which run from midnight to 8am. I launched the morning radiosonde flight, and plotted the balloon data up to 400mb, as we always do. There were indications that told me there would be severe weather later in the day. What the Upper Air plot didn't tell me was the amount and intensity of the event about to unfold.

I went home and got to bed by 9am. I woke up at 1:30pm, and loitered around the house, while waiting for the phone call I knew was coming. Kevin Brown called as the first storms were brewing in southwest Oklahoma.

When I arrived at the office, Kevin directed me to devote full attention to Weather Radio. The Console Replacement System (CRS) and its automated voice had been installed in September of 1998, but this was going to be the first time that we let CRS do automated broadcasts of the warnings for a major event. It was usually 20 seconds from the time the warning forecaster pressed "Enter" to send the warning, until the first alarm tone burst was broadcast. If it took more than 30 seconds, then some problem was usually occurring. For this event, I would use the "30 second rule" before I intervened and broadcast a warning live through Emergency Override. I would also use Emergency Override to Tone the Severe Weather Statements that gave updated tornado location.

One of the warnings the CRS "slipped" on was the first tornado warning for Oklahoma County. No problem - I set off radios 30 seconds after the warning was issued. What followed was, in my opinion, the single most important weather product this office has ever issued. It was the "Tornado Emergency" Severe Weather Statement composed appropriately by David Andra, one of the "Masters" of weather radio. Here was the culmination of what we had been discussing and planning for the past 20 years! Needless to say, I made sure that I was in my best voice for the most important live broadcast I have ever made."

Dennis McCarthy (Former Meteorologist in Charge)

"Devastation from the F5 tornado from Chickasha to Oklahoma City was incredible, but the combined efforts of public officials, media, and many individuals saved hundreds of lives.

From an operational perspective, the May 3rd out-

See May 3rd on Page 13

Wildfires...from page 3

gency shelters where evacuees can gather to receive support and information. Unlike any wildfire event seen before, the outbreak on April 9, 2009, required Fire Warnings in rapid succession - almost at the pace that we are accustomed to issuing warnings for severe thunderstorms. At the height of the outbreak, NWS Norman dedicated one meteorologist to the sole task of coordinating and disseminating Fire Warnings. NWS Norman issued eleven Fire Warnings for 8 different communities (some Warnings were updates of previously issued Warnings). The warned communities were all located in Oklahoma, and included Marietta, Wellston, Sparks, Velma, Loco, Midwest City, Bradley, and Lindsay.

Although Fire Warnings were not issued in western north Texas, infrared satellite heat signatures revealed large wildfires near Electra, Petrolia, and Lake Arrowhead, and NWS Norman collaborated with Texas fire officials by phone throughout the evening. In fact, the NWS provided weather briefings by phone to firefighters, emergency managers, and media partners, almost continuously between 3:00 PM and 9:00 PM.

News reports indicate that as a result of the April 9, 2009, wildfires in Oklahoma, 49 people were injured and more than 140 homes were destroyed. The fires burned an estimated 52,000 acres. Numerous outbuildings were also destroyed. The counties that experienced the greatest impact were Oklahoma County in Midwest City, Carter County, Grady County, Stephens County in Velma and Loco, McClain County, and Garvin County.

NWS Norman was fully staffed, and, in fact, juggled the additional threat posed by thunderstorms, some of which produced large hail in Kay and Hughes Counties, and damaging wind gusts in Woodward and Blaine Counties. The staff at the National Weather Service Office in Norman extends their sympathy to those who were injured or displaced from their homes by the wildfires of April 9, 2009.

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

Tornado Season Recap

If you look at the preliminary tornado statistics for Oklahoma, it has been a relatively quiet year. Of course, if you were affected by one of the tornadoes, it was anything but quiet.

So far in 2009, 31 tornadoes have been reported in Oklahoma. This is well below the January through July average of 46. Thankfully, as is usually the case, the majority of the tornadoes (71%) have been relatively weak (EF0-EF1) and have not caused a lot of significant damage. The worst tornado of the year occurred on February 10th, when an EF4 tornado struck Lone Grove, Oklahoma (see the Winter 2009 cover story). Eight people died, making it the deadliest tornado in the United States so far this year, and the deadliest in Oklahoma since May 3, 1999.

StormReady

NWS Norman is proud to have one of the nation's most active StormReady programs. The level of interest in Oklahoma and north Texas is a real testament to the dedicated men and women who work in emergency management to make sure citizens are informed and prepared for hazardous weather.

The latest addition to the StormReady family is Oklahoma State University in Stillwater. OSU was officially recognized on August 13th, and they become the second university in Oklahoma, and the third in the Norman Forecast Office's county warning area to achieve this recognition. Congratulations to OSU!

Several more communities are in the final stages of the application process, so look for them in the next newsletter.

Editor's Note

Well, for the second year running Spring ran into Summer. And although unintentional, the merger of two issues into one yielded great results - like chocolate and peanut butter, pineapple and pizza, crimson and cream. There is a lot of written material in this double issue, and although I would not expect you to make it through in one pass, please come back to read the incredible human stories and insights to NWS warning operations contained here. You won't regret it !

Readers' Gallery

We'd like to see what the weather looks like, not from a satellite or radar image, but from your back yard! Severe weather is always interesting, but just as nice are pictures of sunsets, icicles, shallow fog, you name it. So send us your weather photos (preferably ones taken in Oklahoma and western north Texas), and we'll try to spin up a gallery to include in the next issue of the Southern Plains Cyclone!

Ask Your Weatherman

Have a burning question about how the weather works? Do forecasters use a phrase that you would like to hear explained? Not quite sure how to read a hydrograph on our web site? Well… ask us! We'll be happy to answer your question in the next issue of the Southern Plains Cyclone.

National Weather Festival

Have you ever wondered just what goes on in the National Weather Center building? Would you like to get a close look at some of the vehicles used in the recent VORTEX-2 tornado experiment, or help launch a real weather balloon?

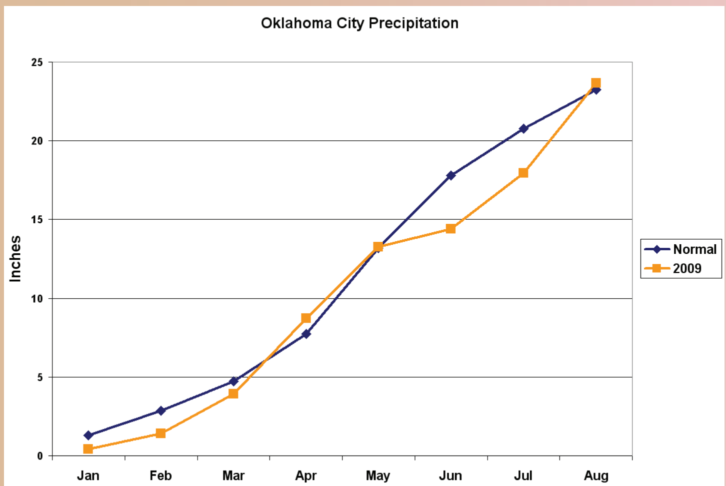
If you answered "yes" to any of these questions, you need to mark your calendar for Saturday, November 7th and the National Weather Festival. This is your chance to learn more about the important work that goes on at the National Weather Center - to tour the building and talk to the outstanding meteorologists and researchers that make Norman the weather capital of the world.

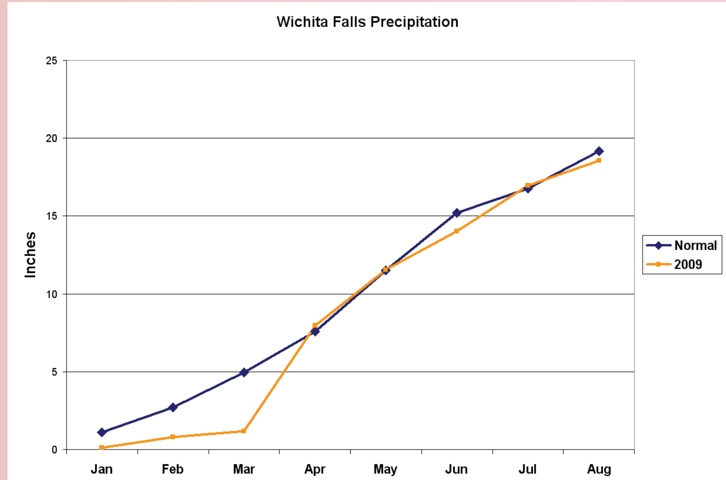
By visiting the web site listed below, you can take a look back at last year's Festival to get an idea of what to expect. Watch the NWS Norman website for more details on the 2009 event.

Saturday, Nov. 7, 2009

http://www.norman.noaa.gov/events/nwf08/

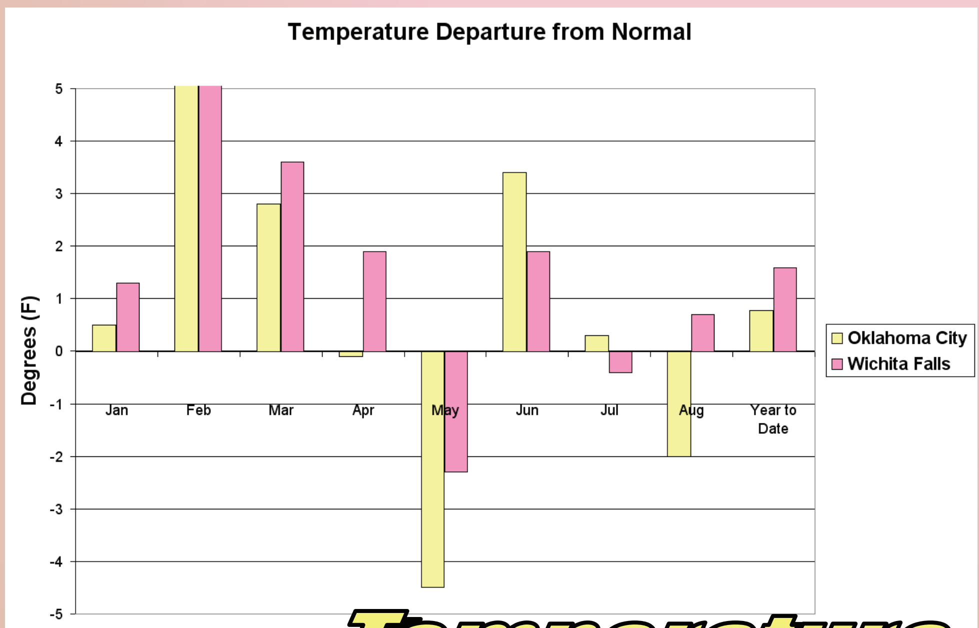
By the Numbers





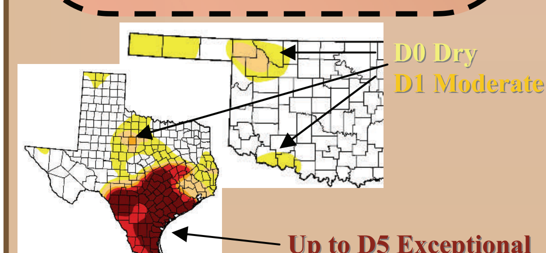
Precipitation

As of August, the year 2009, had seen precipitation close to normal at Will Rogers World Airport in Oklahoma City, and at Sheppard Air Force Base in Wichita Falls. Oklahoma City slipped below normal during an unusually dry June, but rebounded with above normal August rainfall. Wichita Falls saw a very dry winter, but caught up fast with 6.77 inches of rain in April. Of course, these are only two point measurements, and rainfall varies greatly even from one side of town to another. Looking at the broad picture, and incorporating the dense network of observing stations maintained by the Oklahoma Mesonet, year-to-date precipitation appears near normal along I-44 and I-35 from Wichita Falls to Oklahoma city and Ponca City. Moving east of that line, rainfall was above normal (as much as 8 inches surplus in far southern Oklahoma). Moving west of the aforementioned line, rainfall was below normal (as much as a 6 inch deficit in northwest Oklahoma). With the August 25th release of the U.S. Drought Monitor, Northwest Oklahoma received the only D1 Drought designation in the NWS Norman forecast area.



Temperature

While we have seen above normal temperatures for the majority of 2009, the month of May was a notable exception. At a time of year when swimming pools open and backyard barbeques signal the arrival of - for practical purposes - summer, we experienced an anomalously cool month. Oklahoma City came in more than 2 degrees below normal, and Wichita Falls - more than 4 degrees. The cooler weather had its up side, if you don't enjoy the usual barrage of spring severe weather. The Storm Prediction Center issued its lowest number of May weather watches since 1992, and issued zero watches for the entire U.S. during an unprecedented stretch from May 17th to May 25th. Oklahoma City also experienced a very mild August. Despite all this, temperature for the year-to-date has averaged 0.8 above normal at Oklahoma City, and 1.6 degrees above normal at Wichita Falls. Climate outlooks indicate the likelihood of El Nino development this fall, but the signal is not yet strong enough to make specific predictions about temperature trends in the Southern Plains.



NWS Teamwork: Tropical Prediction Center

Adapted from information available online from the Tropical Prediction Center

Entering late summer and fall, we arrive at peak hurricane season. Although Oklahoma and north Texas are hundreds of miles from any coast, the inland impacts of tropical cyclones are many in number; they include deadly flooding, tornadoes, and strong winds. In 2007, an unusual tropical system intensified over central Oklahoma, causing over $21 million in damage (See Erin Intensifies over Oklahoma, Autumn 2007). And we are all affected when a storm the likes of Katrina in 2005, strikes our neighbors along the Gulf Coast. Thus, it is a fitting time for the next in our series on the National Centers for Environmental Prediction.

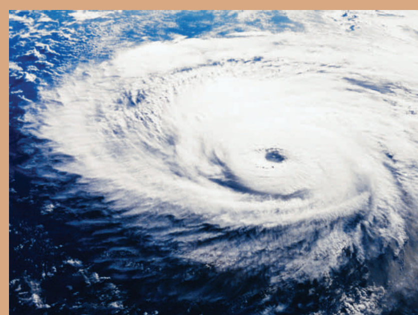
NATIONAL HURRICANE CENTER

The Tropical Prediction Center consists of three main branches, the most recognizable of which is the National Hurricane Center (NHC), located on the campus of Florida International University in Miami, Florida. Meteorologists at the NHC are the nation's leading experts in the fields of tropical meteorology and hurricane forecasting. Their mission is to save lives, mitigate property loss and improve economic efficiency by issuing the best watches, warnings, forecasts and analyses of hazardous tropical weather, and by increasing understanding of these hazards.

During hurricane season the NHC operations room is staffed by at least two hurricane forecasters around the clock. One side of the room is used for storms in the Atlantic basin, and the other side is for those in the Eastern Pacific basin. When a tropical cyclone is present anywhere in these basins, the National Hurricane Center will prepare and issue advisories every six hours, with intermediate advisories in between if needed.

In preparing the forecasts, the hurricane specialists are looking at what is happening with the storm in real time, with information from hurricane hunter aircraft, data buoys and satellites. They will analyze as many as twelve computer models to aide their predictions. When competing influences result in varying cyclone track and intensity amongst the computer models, it is up to the forecasters to rely on their years of experience to decipher the most likely outcome of the storm.

Before issuing an official forecast, the NHC conducts a coordination



conference call with other National Oceanic and Atmospheric Administration (NOAA) offices. These calls typically include NOAA's Storm Prediction Center, Hydrologic Prediction Center, Ocean Prediction Center, and the affected coastal National Weather Service forecast offices. Taking input from the call, the hurricane forecasters will then put the finishing touches on the official forecast, taking care to make sure the information will be easily understood and suit the needs of the public, broadcasters, and emergency management agencies.

EXTERNAL PARTNERS

To further facilitate the dissemination of accurate, life saving information, the NHC building includes a media room. During the threat of a landfalling hurricane in the United States, the room is opened up to local and national media outlets, providing around the clock coverage of the approaching storm. The building contains a second room for external collaboration. In this room, the National Weather Service and Federal Emergency Management Agency (FEMA) serve to bridge communications between the National Hurricane Center and emergency managers. The team broadcasts video teleconferences to respond to emergency management questions and concerns.

OTHER HURRICANE BRANCHES

The NHC is complimented by the Tropical Analysis and Forecast Branch (TAFB) and the Chief Aerial Reconnaissance Coordination All Hurricanes (CARCAH). TAFB is staffed by 17 meteorologists who issue more than 100 marine forecasts and warnings every day of the year for shipping interests. These forecasts cover a 14 million square nautical mile area in the tropical and subtropical Atlantic, including the Gulf of Mexico, the Caribbean Sea, and Pacific oceans. TAFB also issues Tropical Weather Discussions for both the Atlantic and Pacific basins. When needed, TAFB issues precipitation estimates for tropical systems within 36 to 48 hours of landfall over certain countries of the Caribbean. The branch also provides operational support to the hurricane specialists during tropical cyclone landfall events.

The CARCAH supports the Tropical Prediction Center's entire operation by providing the critical direct measurements that forecasters need from inside the storm. When forecasters need an airplane to investigate a storm, CARCAH arranges the flight, collects the desired data, and gets it into the forecasters. The fleet consists of 13 aircraft, ten of which are WC-130s of the Air Force Reserve located at Keesler Air Force Base in Mississippi. The other three aircraft come from NOAA.s Aircraft Operations Center at MacDill Air Force Base in Tampa Bay, Florida. Missions usually last at least 10 hours to allow the aircraft to penetrate the storm center three or four times. The Air Force Reserves train throughout the year,

See Tropical on Page 13

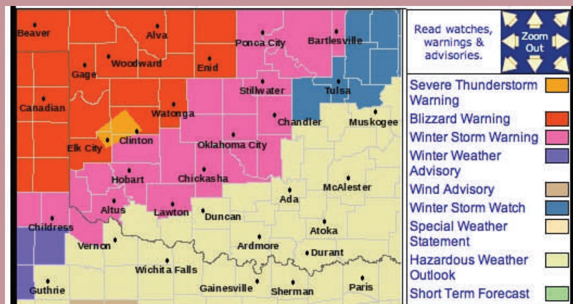
For More Information... http://www.nhc.noaa.gov/

Early Spring Blizzard

March 27-28, 2009

A strong, late-season winter storm walloped northwest Oklahoma with record setting snowfall. North winds began gusting over 40 mph when a cold front moved into northwest Oklahoma just after midnight on March 27th. Temperatures quickly fell into the 20s and 30s. At the same time, a powerful upper level storm moved out of New Mexico, and began to intensify over the Oklahoma and Texas Panhandles, spreading moisture and lift downstream into northwest Oklahoma.

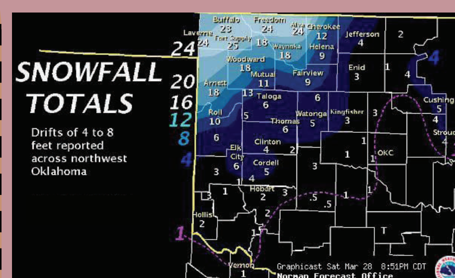
Snow began around daybreak from Buffalo to Woodward and Gage. It was late afternoon, however, when snow became moderate and heavy, leading to significant accumulations. By early evening, some locations had already picked up over six inches of snow. The blustery winds also caused blowing and drifting which further reduced visibility and soon made traveling dangerous or impossible.



Early on March 27th, before it was cold enough to snow, but after a blizzard warning was set in place, a severe thunderstorm occurred at the leading edge of the larger scale weather system. This created the perhaps unprecedented oddity of a portion of western Oklahoma being warned for a severe thunderstorm and a blizzard at the same time.

Snow became more widespread overnight, and some thunder was even observed with the more intense squalls beneath the upper level storm. Snowfall rates of one to two inches per hour were reported, and locations north of a line from Roll to Mutual and Cherokee received between one and two feet of snow by sunrise. Snowfall totals lessened rapidly to the south of the upper level storm track, but a respectable 3 to 6 inches of snow was measured from Elk City and Cordell up to Watonga and Enid, and over to Stillwater. Snowfall totals of up to two inches were reported as far southeast as Oklahoma City. A sharp southern cut-off to the snowfall represents the influence of a stream of dry mid and upper level air that developed from the Texas South Plains up through southwest and central Oklahoma.

Almost all roads in northwest Oklahoma were snow packed and impassable for some time. Some roads were said to be unidentifiable, and in other cases the snowpack was so tall and heavy that bulldozers could not clear a path. Several roofs collapsed under the weight of the heavy, wet snowpack. During the storm, numerous traffic accidents resulted in mostly minor injuries. Two people died, however, in accidents that were indirectly related to the presence of the winter storm. At least 6000 people lost power during the peak of the blizzard, and some went without power for two full days.



A graphi-cast issued from the NWS Norman Forecast Office shortly after snow had ended.

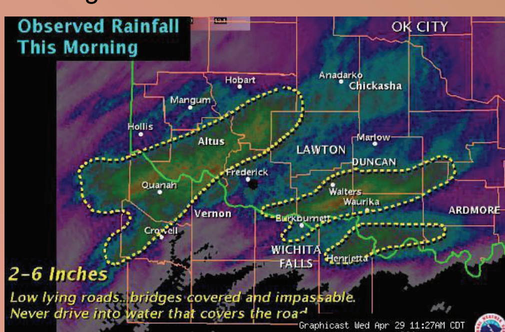
In June, the White House approved a request from Oklahoma Gov. Brad Henry for federal disaster aid in four counties, Beaver, Ellis, Woods, and Woodard, where up to two feet of snow fell.

A Foot of Rain

April 28, 2009

The last week of April was one of the more active weather periods during the 2009 spring storm season. Impacts included widespread damaging winds and hail, flash flooding, and a scattering of EF-1 and EF-2 tornadoes.

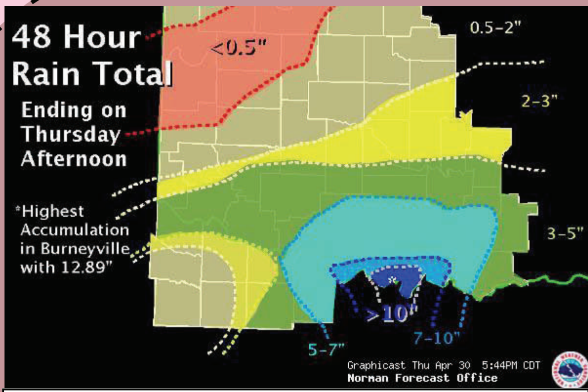
Expectations were high on the weekend of April 25-26, with forecasts of a moderate risk of severe weather. The initial focus was a dryline in far western Oklahoma. Numerous supercell thunderstorms developed on the afternoon of the 25th. Large hail was common with storms from Hobart up to near Woodward… arching east toward Enid. As is sometimes the case, the ingredients for tornado formation were not met until just after dark, when the nocturnal low level jet caused a marked increase to the wind shear near the ground. Thunderstorms in Garfield County developed a fine balance between their associated inflow and outflow, resulting in four tornadoes.



A graphicast from NWS Norman showing radar-based rainfall estimates on the morning of April 29, 2009. Flooding was already occurring along the Red River, with more rain to come.

The first tornado touched down near the expo center in the northwest side of Enid, and moved northeast across Highway 81. The twister either destroyed or caused significant

See Heavy Rain on Page 13



A graphi-cast issued from NWS Norman on Thursday, April 30, 2009. The image depicts a preliminary estimate of the distribution of rain over a two day period in late April. The 12.89 inches measured at the Burneyville, OK mesonet station established new daily and monthly records for that station.

May3...from page 8

break demonstrated several things. It validated the National Weather Service (NWS) modernization of the 1990s, which brought new radars and workstations to modern forecast offices staffed by dedicated, highly trained people. NOAA's National Severe Storms Forecast Laboratory and Forecast Systems Laboratory were instrumental in developing Doppler radar and advanced workstations, which helped us manage this huge outbreak. I wish those developers could have been present in the Norman Weather Forecast Office (WFO) that day. It showed how research and development produce dramatic improvements in warning operations.

The magnitude and intensity of the May 3rd event would have overwhelmed all of us in the past, but modern technology combined with excellent ground truth spotter reports and TV coverage helped us keep up. I am proud to have served as ham radio base station operator from the WFO for the May 3rd outbreak. I am also proud of the efforts of the dozens of ham radio operators who contributed reports and maintained communication when telephones and cell phones failed. I am especially proud of the performance of the entire Norman WFO staff. The combined effort of NWS staff, storm spotters, emergency managers, law enforcement officers, and the media on May 3rd, 1999, was the most incredible I have ever seen."

Tropical...from page 11

and participate in other NOAA missions so they remain in practice.

In fact, all the branches of the Tropical Prediction Center remain active outside of hurricane season. The lull in tropical weather during the winter and spring is arguably when the most important work is done – discussing the effectiveness of tropical weather forecasts, performing research, listening to emergency managers, and planning for the next big storm.

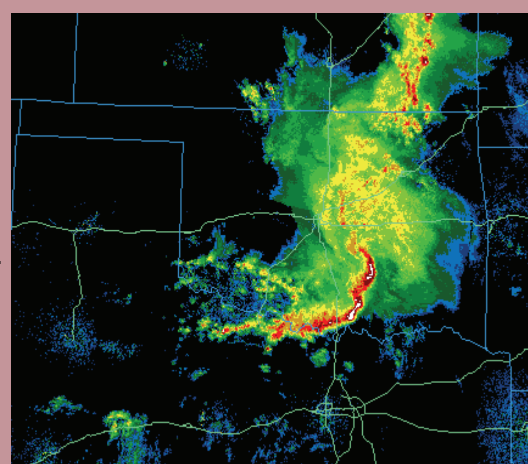
Heavy Rain...from page 12

damage to a number of trailers, metal buildings, and trees. Frame houses along the path sustained some roof damage. Other tornadoes moved primarily across farmland near Hillsdale and Kremlin, but they did cause spotty damage to power poles, barns, and some homes.

Scattered thunderstorm development was nearly continual that night and through the day on Sunday, April 26th. This, in part, acted to reduce the availability of unstable air – which could have led to a more significant severe weather outbreak. Still, a few locations did not escape without additional thunderstorm damage. Softball size hail was reported near Lamont, OK, a few tornadoes formed Sunday afternoon in northwest Oklahoma, and several locations received very heavy rain.

Water would become a big weather story just a few days later, on April 29th. A large bow echo tracked through southern and central Oklahoma early in the day. In addition to heavy rain, a few tornadoes formed on the leading edge of the bow, causing damage near Stratford, Byars, Wewoka, and Yeager. Damaging straight line winds occurred just north of Ada, and were estimated at 90 to 95 mph.

While the strong winds rolled eastward from Ada, the southern edge of the thunderstorm complex stalled near the Red River. Daytime heating and a steady inflow of Gulf Moisture yielded a slow moving line of storms with very heavy rain.



A regional radar mosaic - courtesy of the University Corporation for Atmospheric Reseasrch (UCAR) - showing intense rainfall along the Red River on the afternoon of April 28, 2009.

During a period of just over 18 hours, the Oklahoma Mesonet observing station at Burneyville, OK (Love County) recorded 12.89 inches of rain. Most of this, 12.42 inches, fell on the calendar day of April 29th. This broke several records, including the daily record at Burneyville and the daily rainfall record for any Oklahoma Mesonet station since the network's inception in 1994. Moreover, the single day total of 12.42 inches was sufficient, on its own, to make April 2009, the wettest month ever observed at the Burneyville station. When you add in the rest of April, the monthly total reached 15.36 inches. National Weather Service observations date back much farther than 1994, and the 12.42 inch daily rainfall at Burneyville ranks as the fourth highest single day amount in Oklahoma history. Topping the list is the Enid Cooperative Observing Station that measured 15.68 inches of rain on October 11, 1973.

COOP Observer Notes

Length of Service Awards

Nancy Rozzell	Healdton, OK	25 Years
Marvin Moore	Walters, OK	15 Years
Peggy Howell	Calvin, OK	15 Years
Morene Adams-Morris	Waurika, OK	15 Years

Weather Words

Mixing

Meteorologists often use “Mixing” to mean a turbulent vertical exchange of air between the surface (i.e., the ground) and some higher level. The depth of mixing (also called mixed-layer depth) varies greatly according to time of day, time of year, and the larger scale weather regime. Mixing is usually maximized at the warmest time of day, which is why the wind usually increases during the morning and early afternoon. When a cold front arrives during daylight and is accompanied by strong upper level winds, mixing can become vigorous, with the majority of the air “mixing down” to the ground. A prime example of this was observed during the wind swept fire outbreak of April 9, 2009.

New Observers

Tom Chesnut	Wewoka, OK
Kevin Rhoades (Emergency Manager) & Mike Clifton (Fire Chief)	Purcell, OK
Austin Domebo	Dustin, OK
Darrel Cole	Tussy, OK
Robert Norvell	Amber, OK

The Norman NWS Cooperative Observer Program Team:

Forrest Mitchell Daryl Williams Ty Judd John Pike Christine Riley

Thanks for Reading!

National Weather Service
Forecast Office
Norman, OK

Phone Number:
405-325-3816

Web Page:
weather.gov/norman

Meteorologist-in-Charge:
Mike Foster

Warning Coordination Meteorologist:
Rick Smith

Science and Operations Officer:
David Andra

Editor:
Patrick Burke

Graphical and Written Forecasts & Warnings for Your Community:

weather.gov/norman

Tour our office and the National Weather Center:

nwc.ou.edu/tourdetails.php

National Weather Service Forecast Office
120 David L. Boren Blvd. Suite 2400
Norman, OK 73072

Please share this with friends, relatives, and colleagues. Comments and suggestions are always appreciated, by phone at 405-325-3816 or by e-mail at Patrick.Burke@noaa.gov.