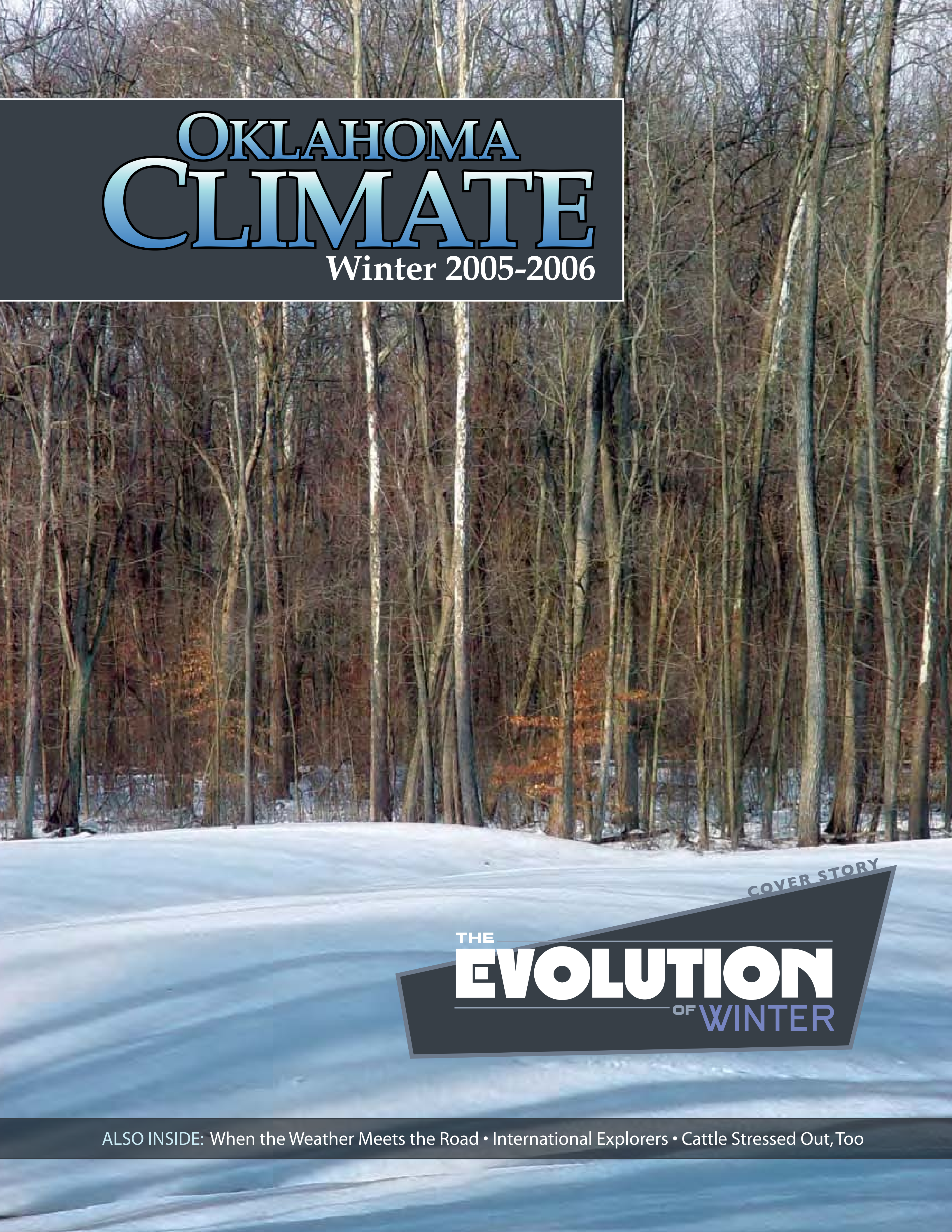
Oklahoma Climate

Winter 2005-2006



COVER STORY

The Evolution of Winter

ALSO INSIDE: When the Weather Meets the Road • International Explorers • Cattle Stressed Out, Too

MESSAGE FROM THE EDITOR

The warm, dry autumn we just experienced in Oklahoma might scare a few folks, what with warnings of impending doom due to global warming being all the rage these days. Of course, it was only 30 years ago that we were being prepared for the return of another ice age. At any rate, with the politicization of the arena of global climate change, you can count on us to fold like a cheap tent at the first hint of controversy. What we are willing to say, however, is that regardless of the root cause, the climate has been and will continue to change, but a little context is needed. After all, a global temperature reading is pretty much meaningless to our little corner of the world. It's much more important for Oklahomans to understand how the climate is changing in our region in order to be better prepared for those changes.

That leads us to the historical perspective article from this issue of "Oklahoma Climate." Oklahoma's winter weather has been changing recently, and if you like your winters just a bit warmer and wetter, you might be rather pleased. Read about the current trends and how it might affect your part of the state. Our feature articles deal with pretty important issues here in the state of Oklahoma. First, read about the efforts of our Outreach division here at the Climate Survey, attempting to help people from other regions of the world better deal with weather disasters. A second article deals with efforts by the State Department of Transportation in making your travels along the state's highways safer by use of weather data. Finally, get a look at how Oklahoma Mesonet data is used to help ranchers protect their cattle from Old Man Winter by use of the Cattle Stress Model.

Our classroom activity is about, fittingly, winter weather. In addition, be sure to read our regular features dealing with agricultural weather, weather safety, and a weather summary of the previous three months.

I sincerely hope you enjoy this issue of "Oklahoma Climate." If you have any questions or comments, please feel free to contact me at gmcmanus@ou.edu.

Gary McManus – Editor

Oklahoma Climate
Winter 2005 - 2006

Cover Photo: Photo by Stdrovia Blackburn. If you have a photo that you would like to be considered for the cover of Oklahoma Climate, please contact Gary McManus at gmcmanus@ou.edu.

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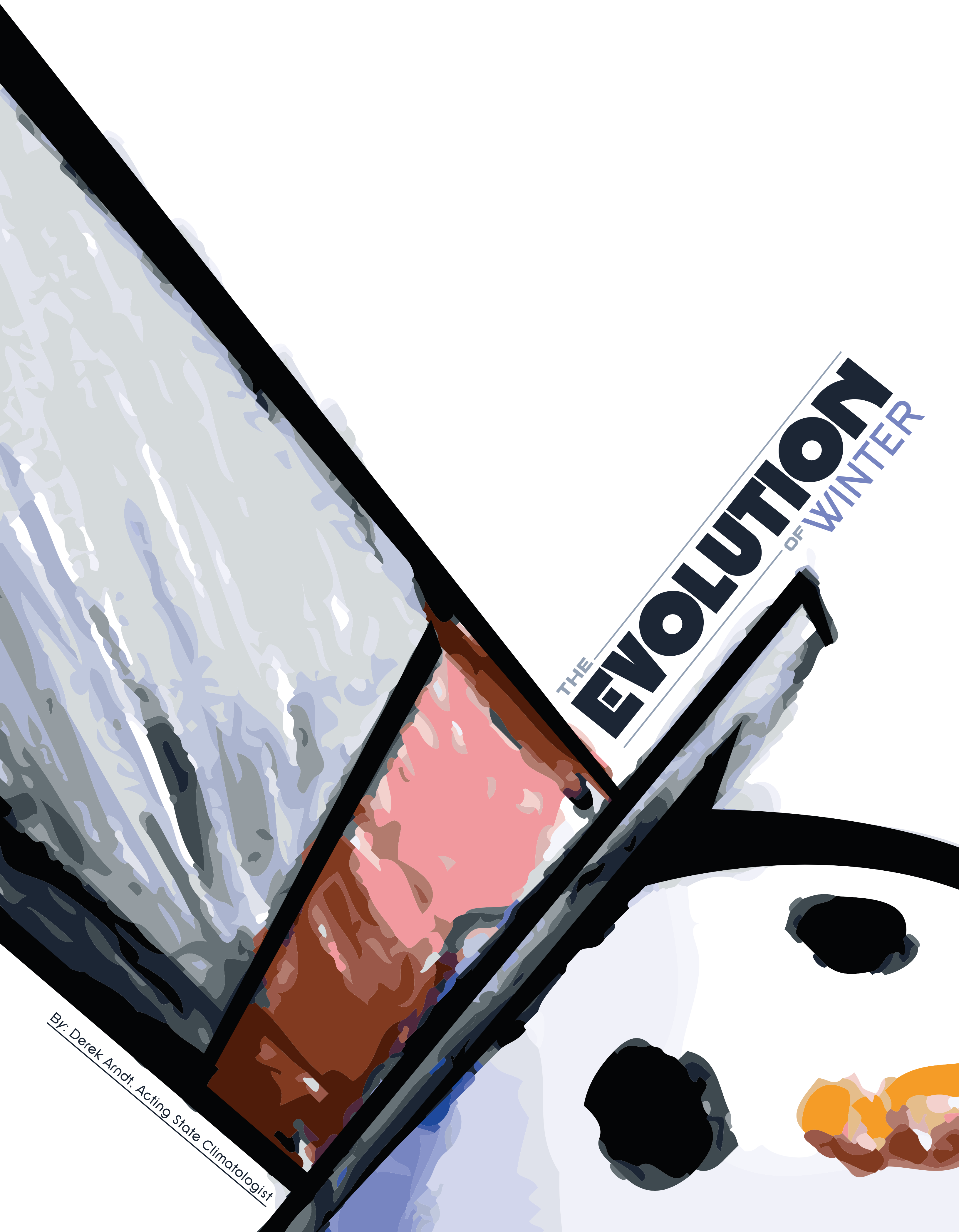
THE EVOLUTION OF WINTER



By: Derek Arndt, Acting State Climatologist

The Evolution of Winter

Ah, the stories. As kids, we often heard about the hardships of the "olden days" from loved ones of previous generations. Laced with truths, sprinkled with embellishments, these stories are a given in family lore. Most of us accepted those parts referring economic and technological differences, hopefully gleaning value from the wisdom of experience. And most of us dismissed the "perils of nature" portions, replete with uphill-both-ways hills, always-in-your-face winds and "busting up ice this thick" as harmless but untrue indulgences.

But, upon further climatological review, maybe those ice thickness stories weren't completely off base. It turns out that – for Oklahoma, anyway – the previous generation's winters were harsher than those of us who saw the 1980s through childrens' eyes. The truth is that Oklahoma's winters are evolving, at least on a decade-to-decade scale.

How have winters changed? They are much wetter and much warmer lately. We'll get into how much shortly. But first, a few definitions. Winter is defined by climatologists slightly differently than the "official" calendar seasons, which use astronomical events as their markers. For climatologists, winter is composed of the whole months of December, January and February. The observational climate record of Oklahoma begins in 1895, so the winter of 1895-96 is the first of 110 winters that are in the books for the Sooner State.

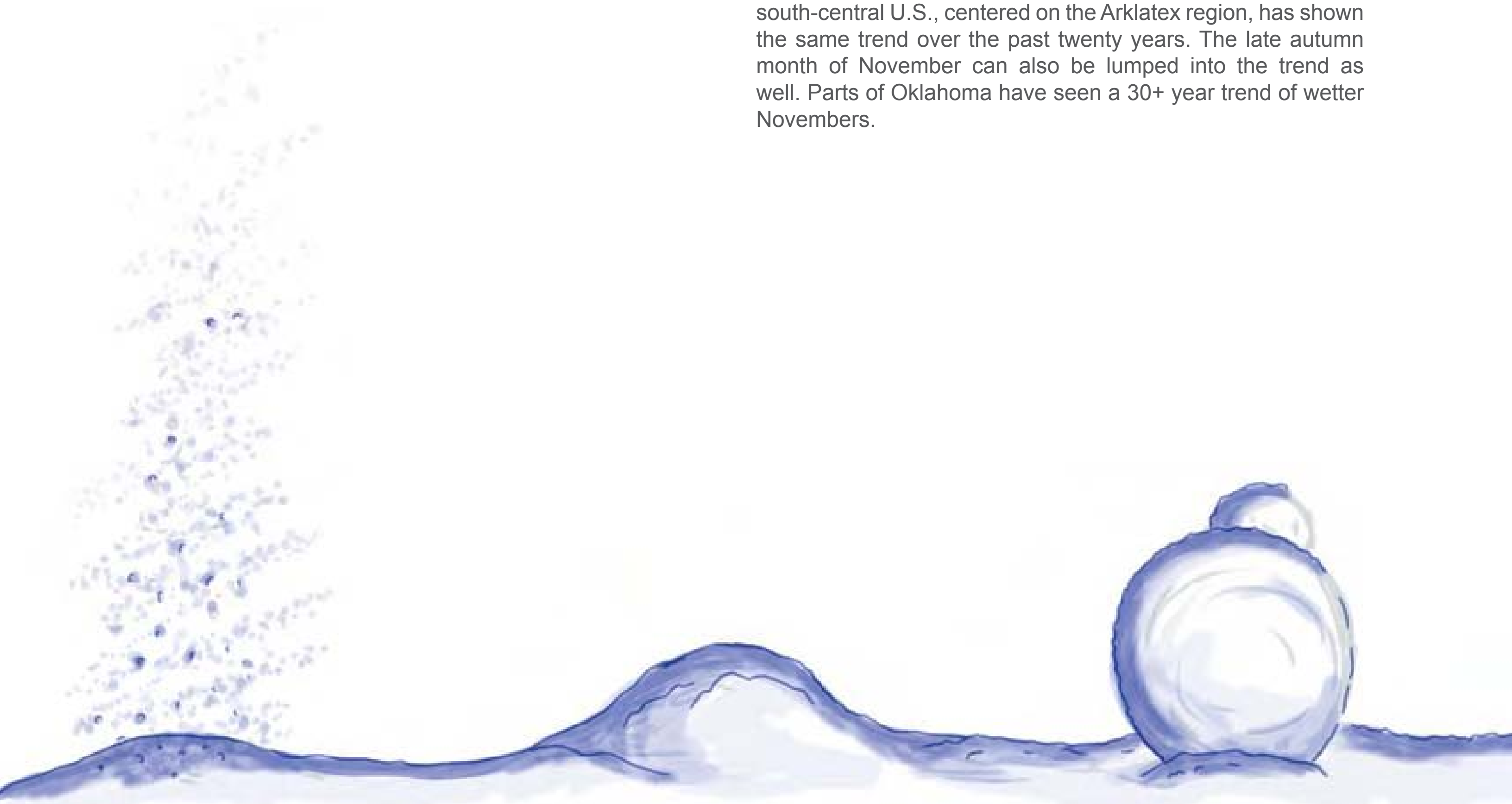
The Recent Reign of Winter Rain

Perhaps the most notable, and most dramatic, change in recent winters is a marked increase in precipitation since the mid-1980s. During the last 21 winters, the statewide-averaged precipitation has been above Oklahoma's long-term average of 4.87 inches sixteen times. This span includes the three wettest winters in the state's recorded history, and five of the ten wettest (see table).

The upward trend in winter precipitation is noticeable throughout the state, but is most dramatic in south-central Oklahoma. The five-year running average precipitation has been at or above the long-term average since the winter of 1982-83. East-central and northeastern Oklahoma are also significantly above the long-term trend during the last two decades. This is notable because these three regions, along with southeastern Oklahoma, rely on winter precipitation much more than the rest of Oklahoma. During an average winter, southeast Oklahoma receives more than twice the precipitation of central Oklahoma, which in turn receives more than twice the precipitation of the panhandle.

But the spike isn't just contained to the wet-winter regions of eastern and southern Oklahoma. Western Oklahoma, which historically receives a pittance of its precipitation during the cold months, has been riding above the long-term average almost continuously since the mid-1980s. Southwest Oklahoma's four wettest winters have all occurred in the 20 years since 1984-85.

This wetting trend isn't just contained to Oklahoma, nor is it just contained to the three winter months. A large patch of the south-central U.S., centered on the Arklatex region, has shown the same trend over the past twenty years. The late autumn month of November can also be lumped into the trend as well. Parts of Oklahoma have seen a 30+ year trend of wetter Novembers.



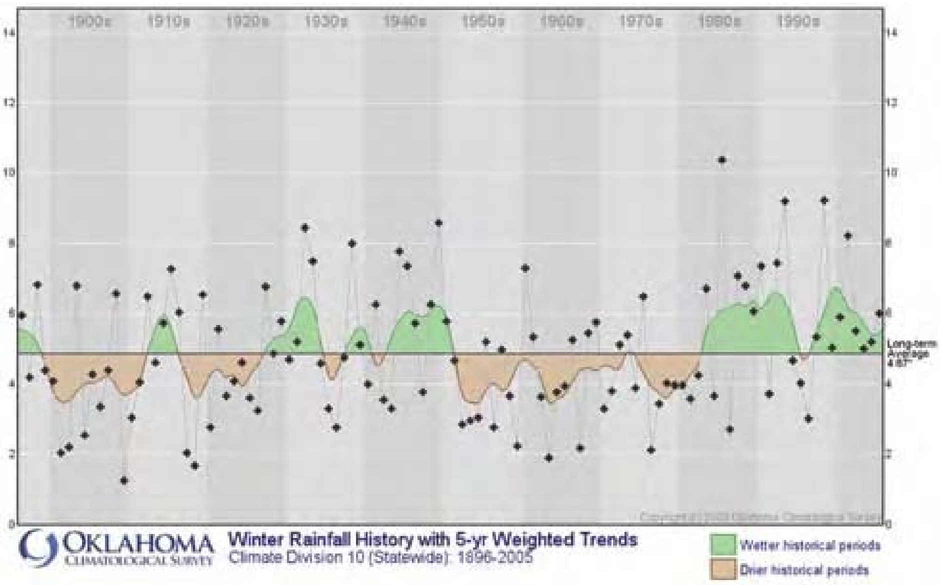


Figure 1 *- Oklahoma's statewide-averaged winter precipitation since 1895-96. Individual seasons are marked by black diamonds. Five-year trends are shown in green (above the long-term average of 4.87") or brown (below the long-term average).*

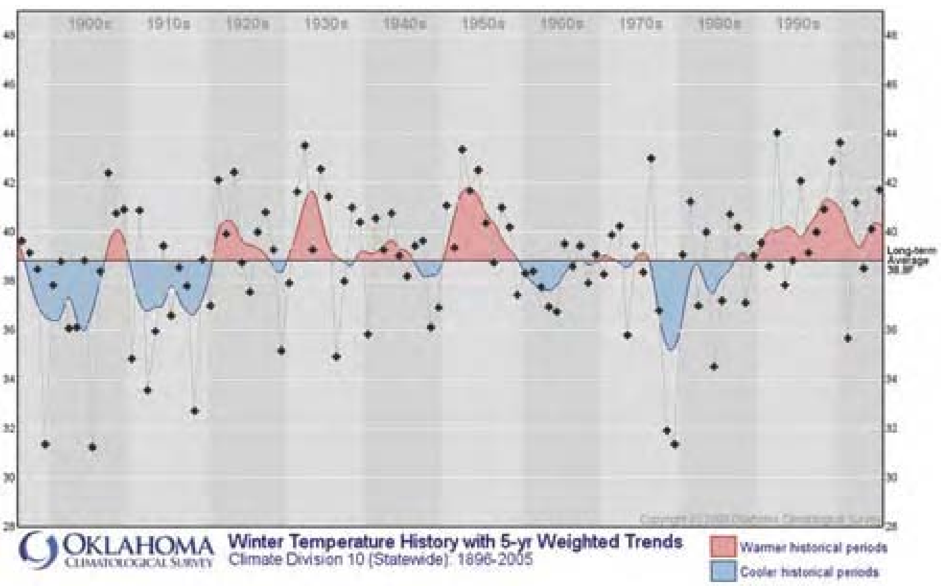
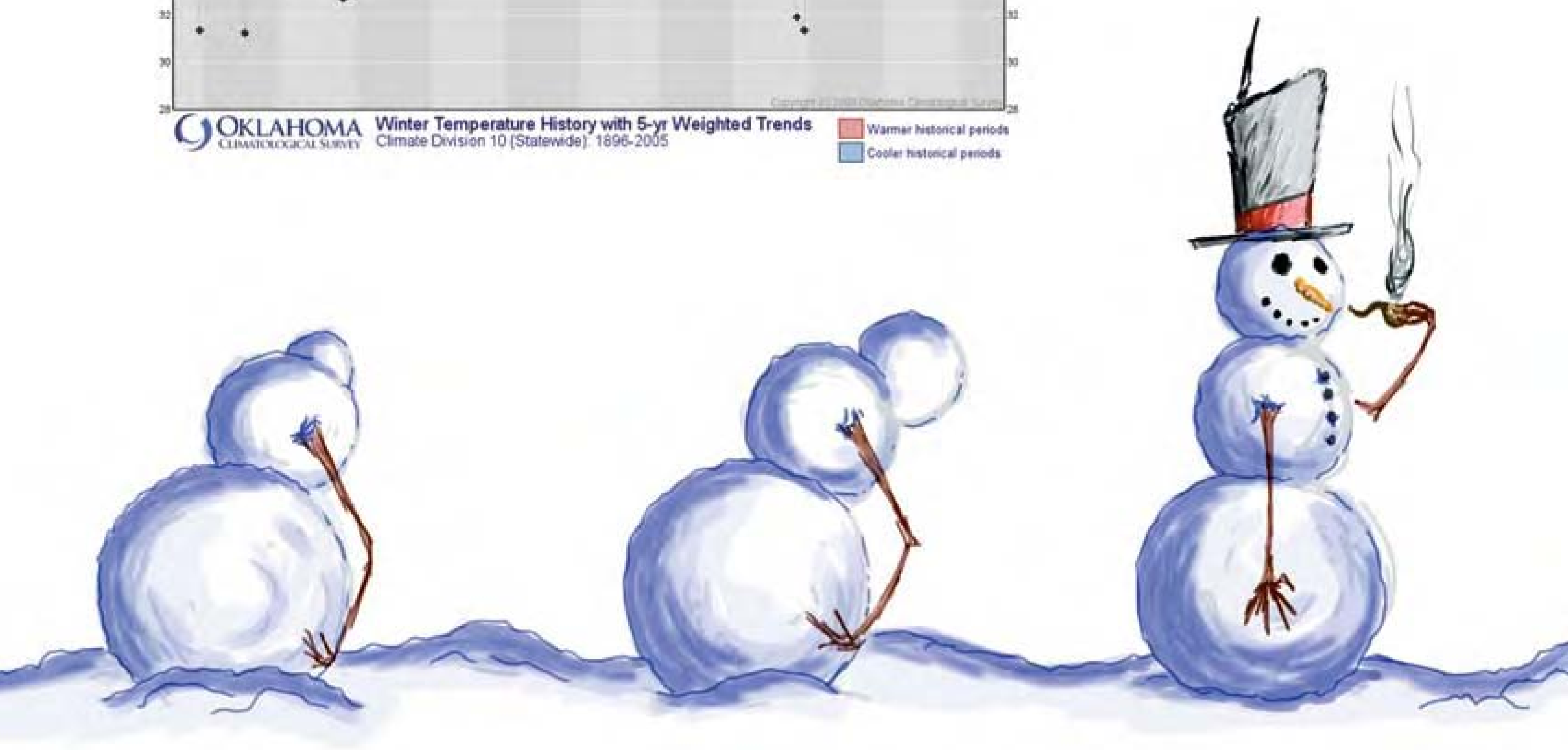


Figure 2 *- Oklahoma's statewide-averaged winter temperatures since 1895-96. Individual seasons are marked by black diamonds. Five-year trends are shown in red (above the long-term average of 38.8 F) or blue (below the long-term average).*



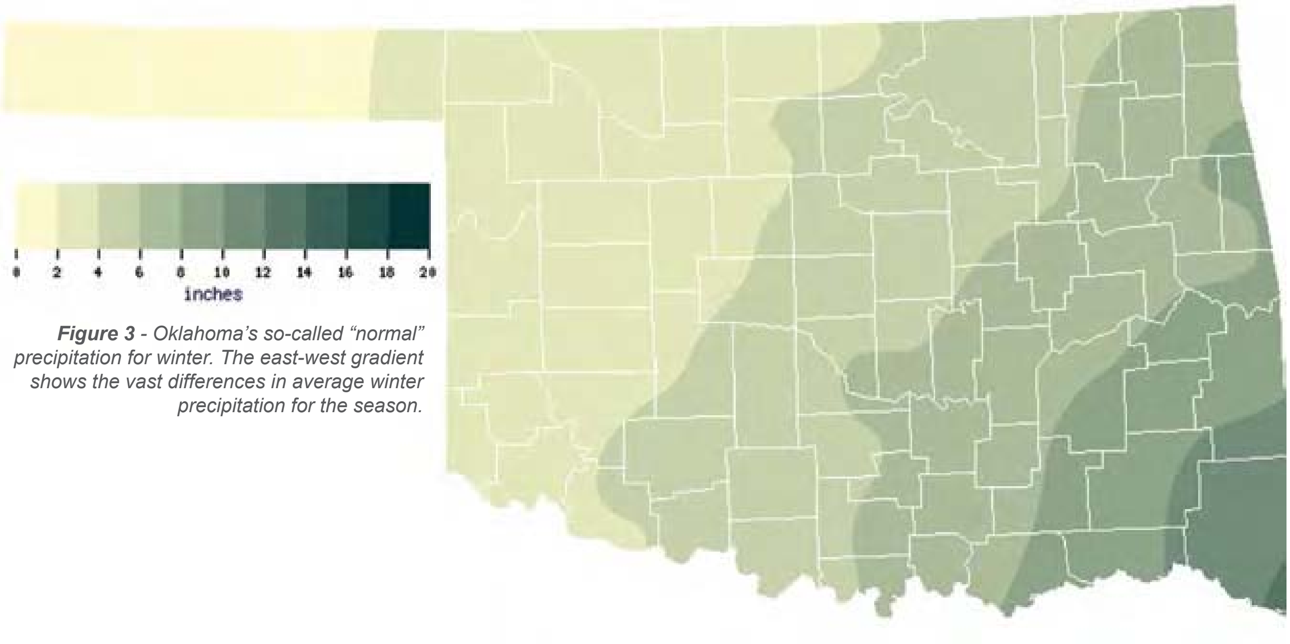


Figure 3 *- Oklahoma's so-called "normal" precipitation for winter. The east-west gradient shows the vast differences in average winter precipitation for the season.*

Temperate Temperatures

Oklahoma's winters have also grown warmer, or less cold, depending on how you look at it. The last fifteen years have seen the two warmest winters in recorded history (see table). However, in contrast to the precipitation signal, the temperature increase is slightly more focused on the western two-thirds of the state.

The epicenter of the state's winter warming is the panhandle, which has seen its three warmest winters in the last fifteen years. Historically cold winters have gone by the wayside in the last quarter-century here. Only three of the panhandle's last 25 winters land in the region's 25 coolest, which is about half of what one would expect from a random non-biased population.

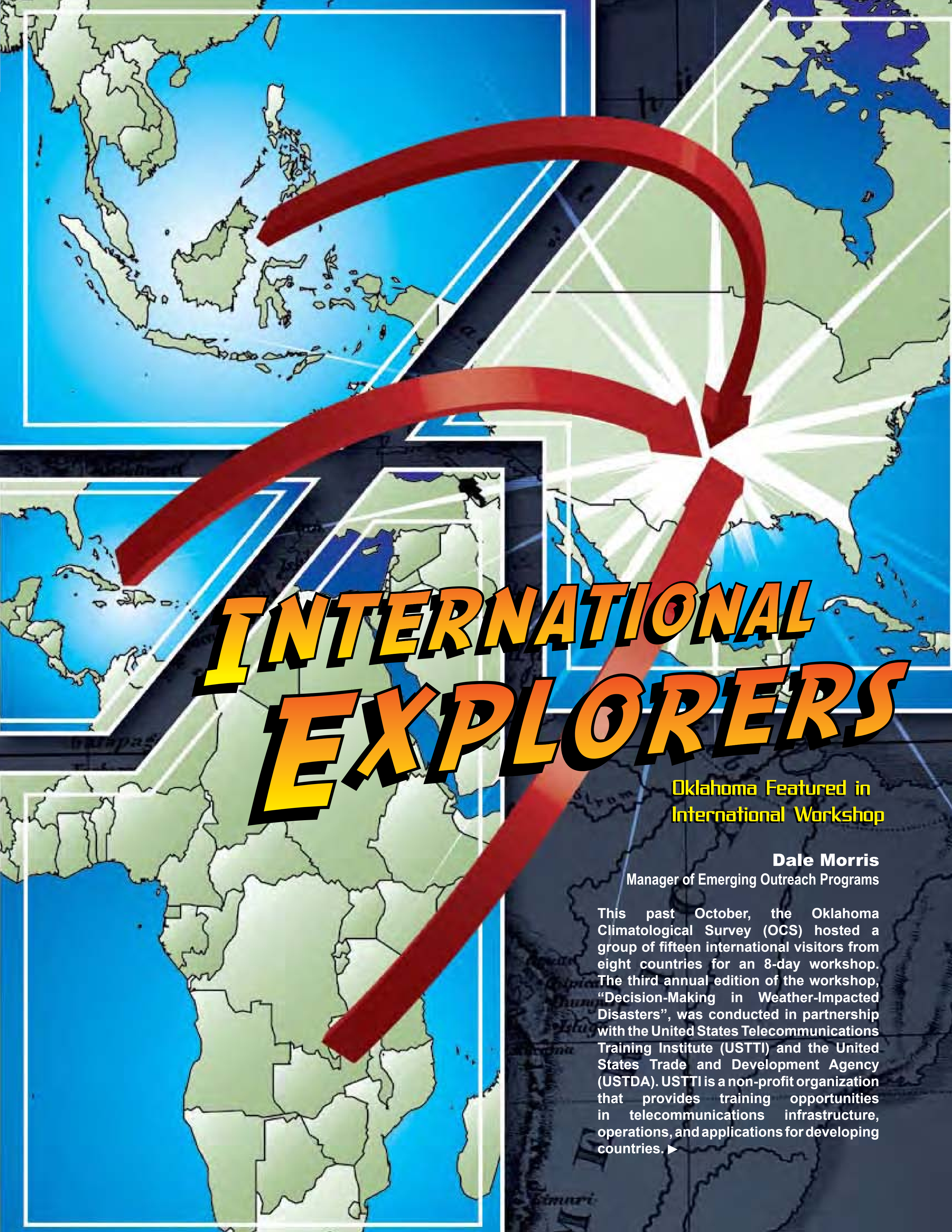
Moreover, prolonged spells below freezing – the events that cause farm ponds to freeze "this thick" in Tales of Yore – have become much rarer in the last quarter century. The tiny town of Jefferson in north-central Oklahoma has one of the state's most robust and continuous temperature records, dating back to 1895. In its 110-year climate record, it has seen week-long freezes 22 times, but only one of those occurred in the last twenty years.

So, What's Happening?

The impacts of these changes are felt in different ways. The warming may be partly connected to the state's two colossal ice storms in December 2000 and January 2002 – which will undoubtedly be etched in the current generation's Tales of Yore. After all, slight differences in temperatures just above the surface can completely change precipitation type. It's not all bad, however. Warmer winters mean fewer heating degree-days, which are strongly correlated with energy demand. During the last twenty years, wintertime heating degree-days at Tulsa are down by about 4 percent.
The jury is still out on what is causing the regions wetter, warmer winters. It is difficult to get our minds and our math around the big picture armed with only one century of observations. The recent trends could just be a fluctuation in the long-term climate. They could also be connected to other fluctuations seen around the globe. The climate sciences are just beginning to understand these "teleconnections" between local climate and conditions elsewhere on the planet. Fluctuations in sea-surface temperatures have been shown to be correlated with Oklahoma's long-term precipitation and temperature signal.

There could also be a cyclic explanation. These trends – while large – aren't entirely unprecedented. While it's true that the last 20 years have seen five of Oklahoma's ten warmest winters, it should be noted that the other five also occurred within a twenty-year period of the 1930s and 1940s. The recent trends fit, in an exaggerated way, a roughly half-century cycle (25 years wet, 25 years dry) that has emerged from Oklahoma's climate record.

Whatever the cause, give your favorite uncle the benefit of the doubt the next time he mentions how thick the ice was when he was nineteen. But don't take his word for it on that uphill-both-ways bit. We're pretty sure that's made up.



INTERNATIONAL EXPLORERS

Oklahoma Featured in International Workshop

Dale Morris
Manager of Emerging Outreach Programs

This past October, the Oklahoma Climatological Survey (OCS) hosted a group of fifteen international visitors from eight countries for an 8-day workshop. The third annual edition of the workshop, "Decision-Making in Weather-Impacted Disasters", was conducted in partnership with the United States Telecommunications Training Institute (USTTI) and the United States Trade and Development Agency (USTDA). USTTI is a non-profit organization that provides training opportunities in telecommunications infrastructure, operations, and applications for developing countries. ►

USTDA seeks to advance economic opportunities for U.S. commercial interests in developing countries. Both USTTI and USTDA provided logistical support and invited participants. The countries represented in the workshop were Haiti, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam, and Zambia. Many of these visitors were areas affected by the devastating tsunami of December 2004. Nearly every country represented has a high risk for tsunamis, and USTDA is concentrating many of their efforts in these areas.

While in Oklahoma, participants learned how our citizens are warned during severe weather, including the respective roles of the National Weather Service, local emergency management and public safety officials, and the broadcast media. The Oklahoma Mesonet was showcased as a relatively inexpensive system that collects high-quality data in real-time and disseminates this valuable information to decision-makers. OCS' OK-FIRST program was highlighted as an innovative method of educating public safety officials how to make decisions based on quality weather information.

The group toured several operational facilities, including the Norman Forecast Office of the National Weather Service (NWS), the Storm Prediction Center, the emergency operations centers of the City of Moore and the State of Oklahoma, a television station, and Weathernews Americas, Inc. Additional support for the workshop was provided by several departments at the University of Oklahoma (the Cooperative Institute for Mesoscale Meteorological Studies, the College of Geosciences, and the Department of Geography) and the National Oceanic and Atmospheric Administration (NOAA; the Warning Decision Training Branch and the National Severe Storms Laboratory).

Weather topics covered included basic meteorology, hurricanes and typhoons, floods, drought, fire weather, monsoons, and numerical weather forecasting using computers. The course included a review of notable weather-related disasters in the U.S. including the great Galveston Hurricane of 1900, the Tulsa Flood of 1984, the tornado outbreak of May 3, 1999, and Hurricane Katrina. Man-made disasters affected by the weather like the Oklahoma City bombing were also discussed. Participants were exposed to technology like Doppler weather radar, weather satellites and NOAA weather radio. They also learned from case studies of disaster events in a computer lab exercise.

Standing, Left to Right: Duong Khanh, Vietnam; Tolib Kemas, Indonesia; Achmad Sasmito, Indonesia; Kevin Kloesel, Assistant Dean of College of Geosciences, USA; Chantal Isme, Haiti; Wilfred Nyasenda, Zambia; Kamolrat, Saringkarnpasit, Thailand; John Snow, Dean of College of Geosciences, USA; Che Gayah bin Ismail, Malaysia; Sap Van Tran, Vietnam; Boonthum, Tanglumlead, Thailand; Nadzri bin Siron, Malaysia; Dale Morris, Workshop Coordinator, USA; Felino Castro, Phillipines; Suwith Kosuwan, Thailand; Phonpasit Phissamay, Laos; Wilson Lejarde, Phillipines; Arnel Manoos, Phillipines

One highlight of the workshop was remarks by Ambassador Edward Perkins, former U.S. Ambassador to the United Nations, Australia, Liberia, and South Africa. Ambassador Perkins also served as Director General of the Foreign Service. While in the Foreign Service, he visited every continent, including Antarctica. He currently serves as Executive Director of OU's International Programs Center. In his remarks, Ambassador Perkins reminded the participants of the importance of weather forecasts in the global community and the impacts weather can have upon all human activity. He presented his remarks during a dinner which was also attended by participants in an international Climate Prediction and Applications workshop hosted by CIMMS, one of OCS' sister organizations at OU.

OCS' international guests actually visited the United States for three weeks. After leaving Oklahoma, the visitors attended additional communications training by the Pan American Health Organization and tsunami training by the joint tsunami warning centers of NOAA. Together, these courses comprised USTTI's Emergency Communications course sequence.

Mesonet Manager Chris Fiebrich explains Mesonet instrumentation at the Norman Mesonet site.

This workshop illustrates how OCS and its associated weather organizations in Norman are world leaders in the weather enterprise. This workshop is one way OCS helps others to replicate some of the innovative ideas and technologies developed at OCS. Other efforts include the Mesonet 2002 Institute, held in June 2002 in Oklahoma City, and last spring's Innovations in Managing Weather-Impacted Situations workshop. During Mesonet 2002, the Oklahoma Mesonet team presented information about the design, implementation, operations, funding, and outreach of the Mesonet. Attended by emergency management representatives from 11 states, the Innovations workshop focused on OCS' OK-FIRST program.

Although the international participants have different cultures and ethnicities, they were all unanimous in their appreciation of the hospitality they received in Oklahoma. They also were quite positive in their feedback about the content and structure of the workshop, recommending others to attend in the future.

The Oklahoma Mesonet was showcased as a relatively inexpensive system that collects high-quality data in real-time and disseminates this valuable information to decision-makers

Photos from the Frozen Field

WHEN THE WEATHER MEETS THE ROAD

In 2004, more than 4,700 people died on our nation's highways during adverse weather conditions. In comparison, 183 people perished in floods, tornadoes, lightning, and hurricanes combined during the same year. Those statistics indicate a pressing need for meteorologists to work with highway engineers to increase the safety of our roadways.

The enormous task to construct and maintain safe roads across Oklahoma falls to the Oklahoma Department of Transportation (ODOT). ODOT is responsible for 12,200 miles of state and U.S. highways, 900 miles of interstate highways, and approximately 6,700 bridges. Road construction and maintenance, both affected by weather, accounted for nearly $750 million, roughly 85% of ODOT's annual budget, for the 2003 fiscal year. To add to the challenge, travel on Oklahoma roadways is expected to increase 50 percent to 53 billion miles per year within 25 years.

Weather affects many different roadway operations (e.g., traffic flow, pouring concrete, road-surface treatment) across Oklahoma. For example, rain can cause an overall reduction of vehicle speed on urban highways of 10 to 16%. A one-day closure of a highway may result in $15 to $76 million of lost wages, productivity, and time. Adverse weather also compromises the safety of maintenance personnel and increases the workload for ODOT employees, leading to operational delays and the possibility of obstructed lanes.

By: Dr. Renee A. McPherson
Jackie Dubois, and Jessica Rathke

OCS FEATURE ARTICLE

"Intelligent" Roadways

So what can be done about the weather when it meets the roadway? The Institute of Transportation Engineers suggests three primary strategies for road weather management: advisory, control, and treatment. Advisory strategies focus on providing information to both the public and transportation managers regarding current and predicted weather conditions. Control strategies are used to alter traffic flow and manage roadway capacity by changing the timing of traffic signals and other roadway devices. Treatment strategies apply resources (e.g., snowplows, de-icing chemicals) to the roadway to minimize or eliminate the impact of weather.

In Oklahoma, travel advisories are issued by ODOT through their web site at http://www.okladot.state.ok.us/. Additionally, the local forecast offices of the National Weather Service and Oklahoma's print and on-air media provide information for the motorist, especially before and during inclement weather. Data used by these providers include county-by-county, real-time weather observations of the Oklahoma Mesonet (http://www.mesonet.org/).

With the increasing use of technology, "intelligent transportation systems" are being developed to warn the public more directly regarding highway weather conditions. For example, in cooperation with the University of Oklahoma's (OU) College of Engineering, ODOT is deploying dynamic messaging signs at key locations along Oklahoma's interstate system. These signs not only can advise travelers about construction delays, but they can be used during hazardous weather to warn motorists of imminent danger. In addition, as cameras are installed to monitor traffic on Oklahoma's urban interstates, near-real-time images can be used to determine weather hazards along the roadway.

Paving the Way

Weather information systems for surface transportation are being tested extensively in other states, such as Iowa and Washington. These systems deliver weather information in a way that can be integrated into important decision-making processes, including chemical treatment of roadways. For example, the Federal Highway Administration (FHWA) has led an effort to prototype and test a Maintenance Decision Support System (MDSS) for advanced decision-making by maintenance managers. The MDSS can help managers determine staffing levels, plan the most efficient treatment routes, select chemicals for treatment, and determine the timing of maintenance activities.

The FHWA also is funding an initiative to design and prototype a system for data gathering, quality checking, and data dissemination using current weather reporting stations operated by state departments of transportation. The Oklahoma Climatological Survey is working with Mixon/Hill, Inc. of Overland Park, Kansas, to complete this initiative for the FHWA by the end of 2006. OCS's experts in data quality assurance are examining new and improved methods for verifying the quality of data from road

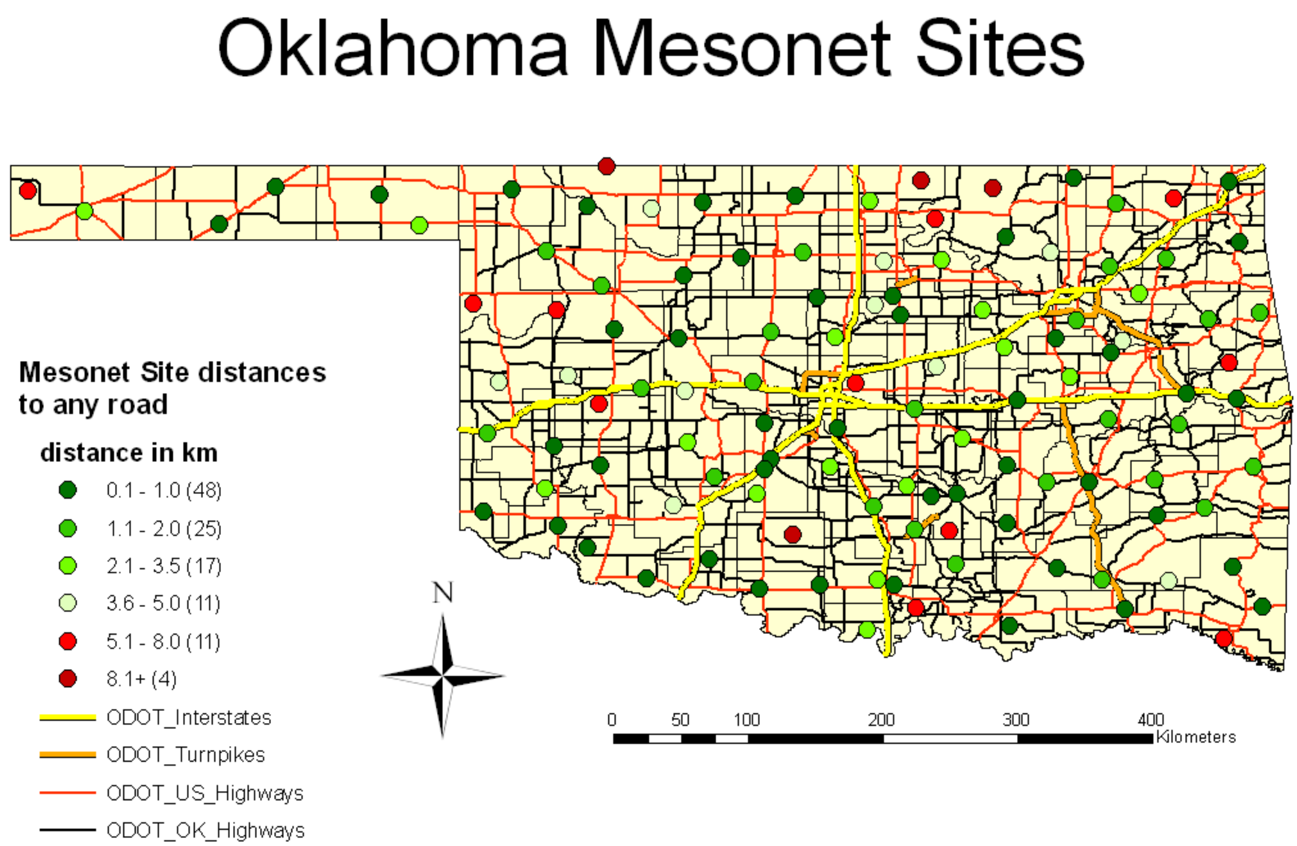


Figure 1
Map of distance of Oklahoma Mesonet sites from the nearest interstate, U.S. highway, or state highway. Note that more than half of the sites are within 2 kilometers (1.2 miles) of a major highway.

weather information systems (RWIS). RWIS stations are similar to Oklahoma Mesonet weather stations, but they also include road pavement sensors to measure pavement temperature and chemical composition of the roadway.

Traveling Forward

What are the next steps? OCS meteorologists, OU engineers, and ODOT officials are teaming to enhance road weather services for ODOT managers, highway engineers, and the public. OCS's research team will analyze what Oklahoma Mesonet sites are most suitable for road weather information along important transportation corridors (see Fig. 1) and whether information voids exist. OCS's product developers will examine best practices by other states and study use of weather information by ODOT to develop products tailored toward helping these officials make better, more timely decisions.

The primary goals for all road weather services activities in Oklahoma are to increase safety of motorists and ODOT employees and to reduce construction and maintenance costs. Keep your eyes on the road and see what transpires over the next few years to help you make safe driving decisions!

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FALL 2005 SUMMARY

By: Gary McManus

If Oklahoma's weather during the fall of 2005 was made into a movie, many would walk out due to boredom. Dry and warm is no way to sell tickets, and the state was exactly that, finishing as the 9th warmest and 13th driest autumn on record. Of course, the lack of precipitation also meant severe weather became almost an afterthought, but the rainfall that comes with those severe storms was greatly missed. The state missed out on the two big national weather stories of 2005, with super-hurricanes Katrina and Rita steering clear of Oklahoma for the most part. Rita did brush the southeast with a bit of rainfall, but it was insignificant compared to the months-long droughty conditions in that area. The lack of precipitation also contributed to the warmer climate as most of the sun's energy was spent heating the ground instead of evaporating any moisture from rainfall. Fall did come with a few weak tornadoes, and not a lot of damage was reported with the twisters. The state's first snowfall made an appearance during November in the Panhandle where a couple of inches briefly covered the ground.

Precipitation

While virtually the entire state was overly dry during the fall, the eastern half of the state was particularly parched. The east central area of Oklahoma was the driest at nearly 10 inches below normal for the season – the 4th driest such period on record for that area. The southeast was similarly effected with a nine-inch deficit. The only area that appeared to finish above normal was a small section of the far-southwest; Mangum led the state with nearly 10 inches of rainfall for the season, and the areas immediately surrounding it had between six and eight inches. Some areas in East central Oklahoma had a tough time exceeding two inches. The far-western Panhandle towns of Kenton and Boise City recorded less than an inch, but that is not wholly unexpected for that part of the state.

Temperature

The entire state finished the season warmer than normal during fall, nearly three degrees above average statewide. The Panhandle was the warmest relative to normal and finished with the 5th warmest on record. The dry air allowed 20 records to be either tied or broken during the fall, although the majority of those were for high temperatures.

September Daily Highlights

September 1-6: The month's first six days were fairly uneventful, with seasonable temperatures and a couple of visits by cool fronts. High temperatures exceeded 100 degrees on the 1st and 2nd in the eastern half of the state, but remained in the 90s otherwise. Quiet and cooler conditions arrived on the 5th, which allowed lows to drop into the 60s, as opposed to the 70s of the previous few days. A few showers and storms struck the northwest early on the 6th along a stalled cold front, triggered by an upper-level disturbance moving in from the west.

September 7-12: The upper-level disturbance from the 6th remained in the area on the 7th, providing light rain and cloudy skies to the northwest. The weather during the proceeding five days was warm and muggy with little rainfall. Haze was reported over much of the state under the sinking air of a high pressure dome which had settled over the southern U.S. High temperatures were predominantly in the 90s, and lows remained in the upper 60s and lower 70s.

September 13-15: An approaching cold front combined with an upper-level storm system approaching from the west to generate several bouts of severe thunderstorms. Large hail and severe winds were commonly reported across the state with the storms. The largest hail was reported on the 14th as hail to the size of baseballs fell near Mangum. Severe winds damaged the roof of a grocery store in Tipton early in the morning on the 14th, and downed numerous power poles. Temperatures during this period were dependent upon the proximity of precipitation; areas near precipitation had highs in the 70s and 80s, with other areas in the 90s.

September 16-22: The 16th was a near perfect day with crisp blue skies and light winds, a by-product of the cool, dry airmass ushered into the state following the frontal passage. A deepening low pressure system over the Central Plains kicked winds up from the south at 10-20 mph on the 18th, drawing warm, moist air over the state from the Gulf of Mexico. High temperatures returned to triple-digit territory, and lows struggled to dip below 70. A cold front intruded into the northwest on the 22nd, bringing cooler temperatures to that area.

September 23-24: The remnants of Hurricane Rita made their presence felt in the state on the 23rd and 24th. For most of the state, that influence was confined to high cloudiness from the storm's spiral bands. Southeastern Oklahoma received appreciable rainfall from Rita, however, with nearly three inches of warm rain falling in Idabel. That rainfall was confined to the extreme southeastern tip of the state. Otherwise, temperatures rose into the mid-90s, and winds swung around to the northeast under the storm's influence.

September 25-30: The weather turned hot with the withdrawal of Rita to the east. Temperatures soared into the 90s and 100s under sunny skies, nearly 15 degrees above normal. A cold front entered the northwest on the 26th bringing cloudiness to that area. Northerly winds gusted to 30 mph behind the front. A stronger cold front entered the state on the 28th and combined with an upper-level storm system to produce a few showers and thunderstorms. The strong northerly winds with the front caused massive dust storms in central Oklahoma, reducing visibilities down to one mile in a few locations. The month's last day was chaotic with the approach of another upper-level disturbance from the west. Strong storms formed across the state in the afternoon on the 30th, accompanied by many severe wind and large hail reports.

October Daily Highlights

October 1-4: Dying thunderstorms greeted the month's first day, with redevelopment occurring in the eastern half of the state that night. Heavy downpours and small hail were reported with some of the storms. Those areas with rain managed only 70s for high temperatures, while 80s and 90s dominated where skies cleared. Clear skies on the 2nd soon gave way to high cloudiness from Hurricane Otis spinning in the Gulf of California. Strong southerly winds picked up to nearly 40 mph that morning, but calmed somewhat that afternoon. Highs peaked in the 80s and 90s. The warmth and windiness continued through the 4th with the approach of a cold front. Muggy conditions existed ahead of the front, the moisture borne northward from the Gulf of Mexico.

October 5-11: An unseasonably warm morning on the 6th, with lows in the 60s and 70s, was soon obliterated by a strong cold front. The temperature dropped 20 degrees after the front's passage, and most high temperatures occurred in the morning or early afternoon. Showers and storms formed along the front; heavy rainfall was reported in the southwest and west central sections of the state. Strong northerly winds gusting to 40 mph occurred behind the frontal boundary. The strong winds continued into the 6th, combining with temperatures in the 40s and 50s to drop wind chills into the 20s. Most of the high temperatures, 50s and 60s, on the 6th were recorded just after midnight. The cool weather lasted for a few more days. Lows in the 40s, along with some 30s, were common, and highs were generally in the 60s and 70s.

October 12-18: This week-long period was punctuated by unseasonably warm temperatures. Very little precipitation was reported other than light showers in various locations. Highs in the 80s and 90s were common, with record-high temperatures occurring on the 17th in Tulsa, and in McAlester, Oklahoma City and Tulsa on the 18th.

October 12-18: This three-day period was marked by lots of sunshine and warm weather. A cold front approached from the north on the 18th and acted as a focus for showers and storms late that night.

October 19-21: A cold front entered the state in the northwest just as a powerful upper-level storm passed overhead, setting up the month's most significant bout of severe weather. The most severe storms struck in the far northwest corner of the state. A tornado was reported to have touched down in Harper and Woodward counties. A wind gust of 90 mph was reported in Woodward County, and golfball-sized hail fell in Harper County. Temperatures dropped into the 60s following the frontal passage, while highs ahead of the front rose into the 90s. The cold front was draped across central Oklahoma the next morning, keeping morning temperatures 15-20 degrees cooler than the previous morning. Highs on the 20th were more seasonable, from the mid-50s to the low 70s. That weather extended through the 21st as well.

October 22-29: High pressure on the 22nd made for light winds along with high temperatures in the 60s and 70s. A cold front positioned itself in northwest Oklahoma by mid-evening however, eventually making its way across the state on the 23rd. Cool weather prevailed for the next several days. Low temperatures plummeted with the clear skies into the 20s and 30s over much of the state. Record lows occurred in McAlester and Tulsa on the 25th as temperatures dipped below freezing in those locations. Temperatures warmed into the 70s by the 29th, but winds gusting to over 40 mph made for unpleasant conditions.

October 30-31: An upper-level wave passed over the state on the 30th, triggering a few showers in the morning hours. Low clouds increased in coverage in the afternoon as a weak cold front boundary moved into the northwest. The real blast of cold air came on Halloween as a strong cold front pushed through the state. Severe thunderstorms cropped up overnight with heavy rainfall traversing the state from the northwest to the southeast. Rainfall amounts well over an inch were reported over the northwest and southeast. Skies cleared just in time for little ghosts and goblins to go trick-or-treating, with temperatures holding steady in the upper 40s and low 50s.

November Daily Highlights

November 1-4: The month's first four days were dominated by spring-like conditions. Unseasonably warm temperatures and sunny skies were marred only by the strong southerly winds gusting over 40 mph throughout the period. Oklahoma City eclipsed records for both maximum high and maximum low temperatures on the 4th with readings of 86 degrees and 60 degrees, respectively. Parts of southern Oklahoma eclipsed 90 degrees as well.

November 5-11: A cold front moved into northern Oklahoma overnight on the 5th, cooling temperatures and calming winds in that area. High temperatures behind the front remained above normal however, with areas south of the front reaching near-record levels. After the frontal passage, high pressure settled in once again on the 6th, providing more pleasant weather. The strong winds and warm weather returned on the 7th. Near record highs, low humidities, and winds gusting over 40 for the next several days created extreme fire danger conditions. A strong cold front on the 9th dropped temperatures to more seasonable levels for a couple of days before strong southerly winds returned on the 11th, allowing temperatures to soar once again into the 80s. Eight record high temperatures were set in the state from the 5th through the 8th.

November 12-15: A strong upper-level low pressure system moving eastward across Colorado provided the impulse needed for a few showers and thunderstorms. There were various reports of severe winds and hail with the storms, but nothing widespread. A cold front trailing the upper-level system then swept through the state on the 13th with gusty north winds and high temperatures 10-20 degrees cooler than the 12th. Another cold front passed through the state on the 15th, generating more thunderstorms. Temperatures dropped into the 40s and 50s after the front's passage, and non-thunderstorm winds gusted up to 60 mph.

November 16-25: The next 10 days were generally dry and warm, punctuated by occasional cold frontal passages. The warm weather and low humidities combined with those strong winds to create extreme fire danger throughout the period. High temperatures fluctuated with the fronts from 60s to 80s.

November 26-30: An upper-level storm moving though south Texas helped to generate a few light showers in the rain-parched southeast on the 26th while also kicking winds up to over 40 mph. A deep low pressure system moved across central Kansas on the 27th which increased the winds further. Damaging wind gusts of over 60 mph were reported in western Oklahoma, along with blowing dust. A few thunderstorms struck in the north, but rainfall amounts were once again on the meager side. A front being dragged along by the upper-level low raced through the state on the 28th, swinging winds around to the northwest at over 35 mph, with gusts to 50 mph. The winds combined with temperatures in the 30s and 40s to create wind chill values in the teens early on the 29th. The month ended with familiar conditions as gusty winds and low humidities combined to create extreme fire conditions across the state.

Fall 2005 Statewide Extremes

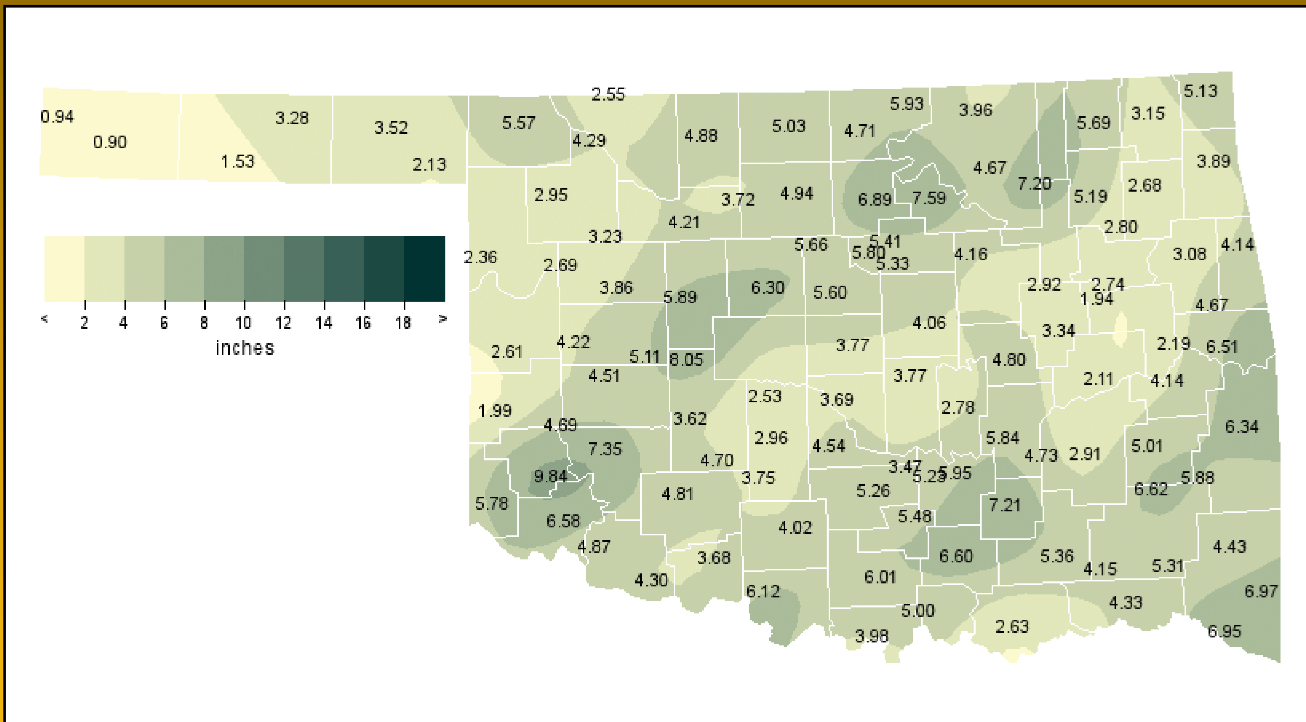
Description	Extreme	Station	Date
High Temperature	102ºF	Buffalo	Sept. 18th
Low Temperature	10ºF	Vinita	Nov. 30th
High Precipitation	9.84 in.	Mangum	
Low Precipitation	0.90 in.	Boise City	

Fall 2005 Statewide Statistics

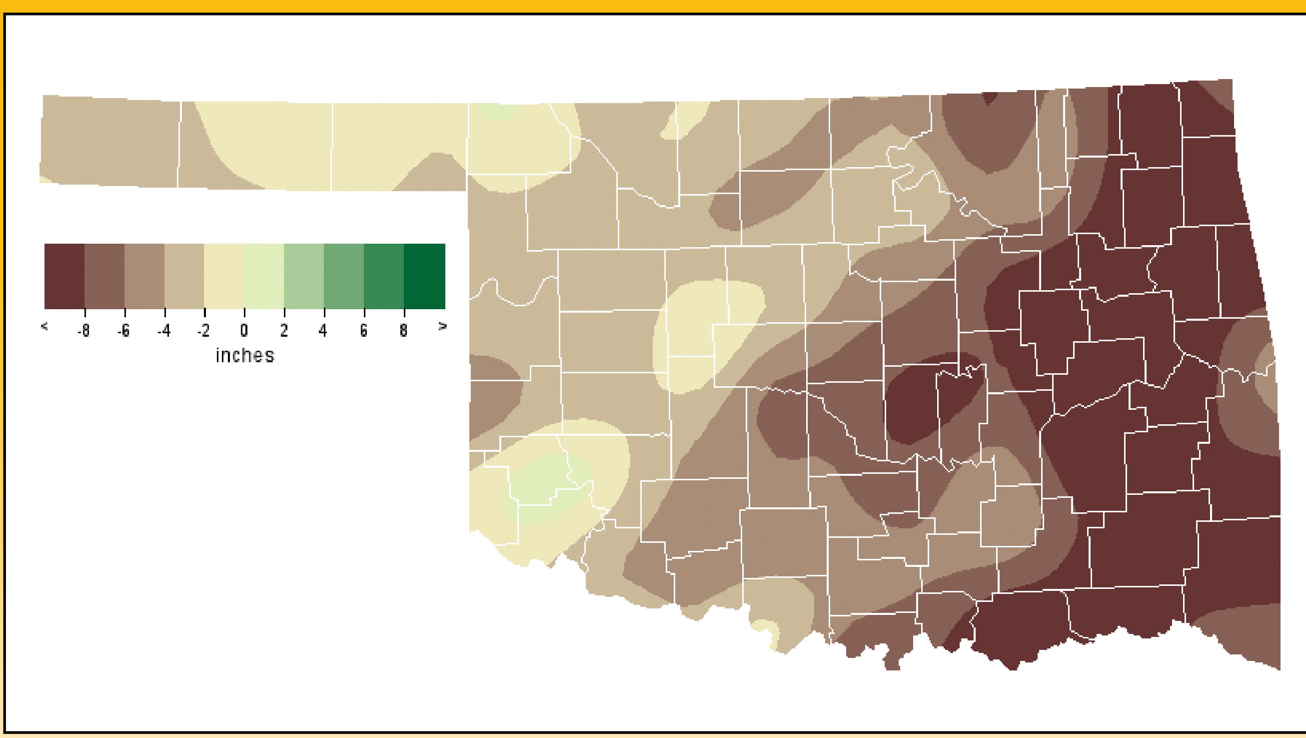
	Average	Depart.	Rank (1892-2005)
Temperature	63.5ºF	2.8ºF	9th Warmest
	Total	**Depart.**	**Rank (1892-2005)**
Precipitation	4.44 in.	-5.57 in.	13th Driest

FALL 2005 SUMMARY

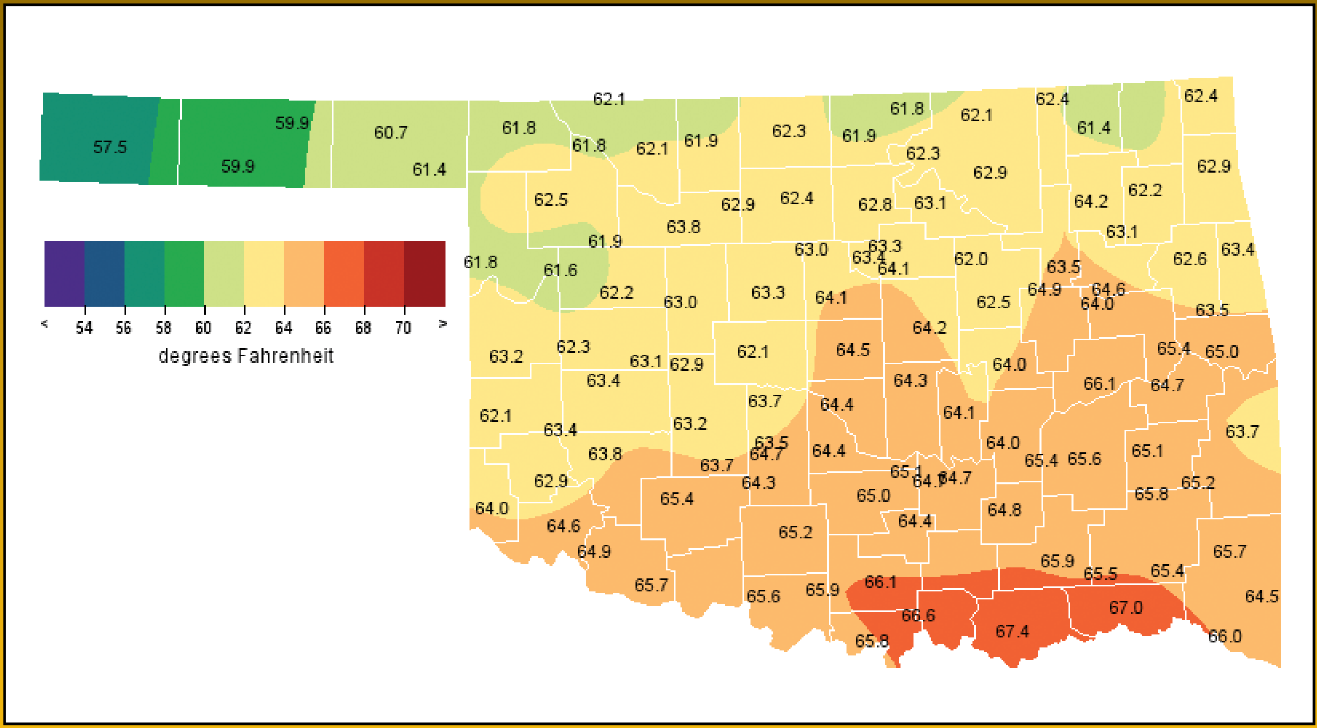
Observed Rainfall



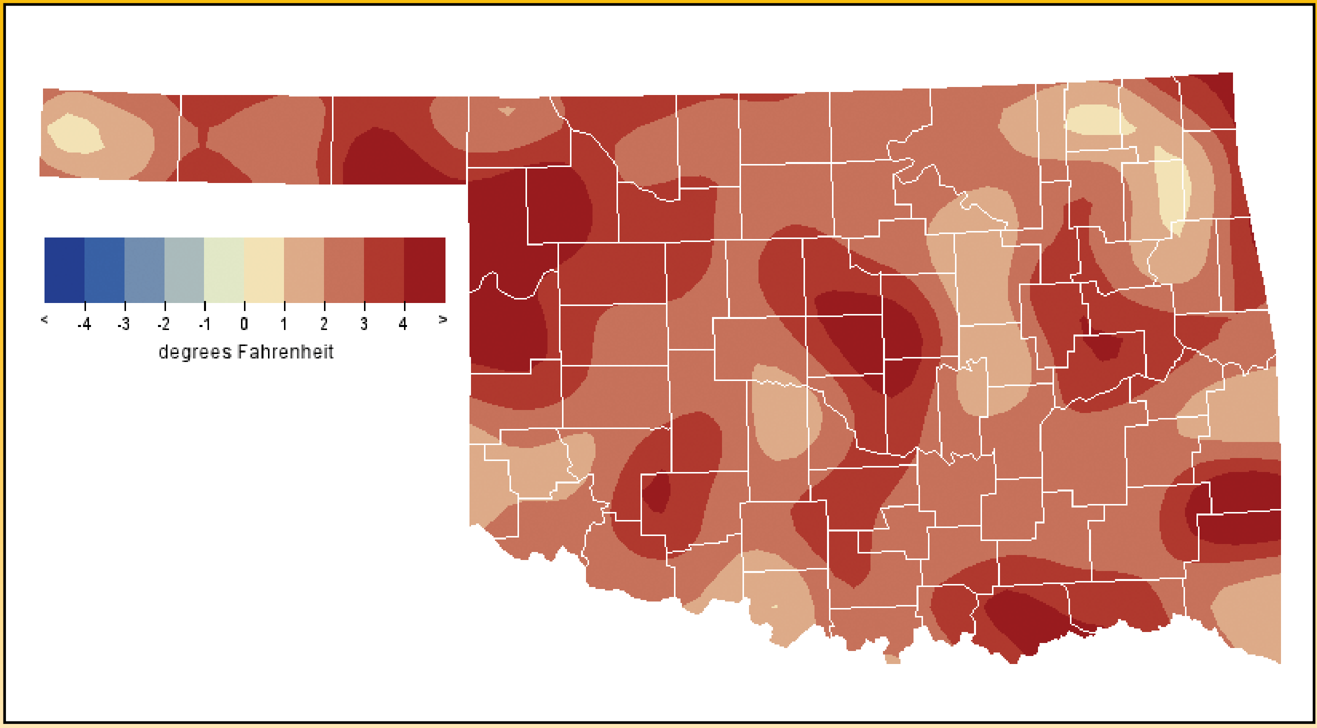
Rainfall Departure from Normal



Average Temperature



Temperature Departure from Normal



Fall 2005 Mesonet Precipitation Comparison

Climate Division	Precipitation (inches)	Departure from Normal (inches)	Rank since 1895	Wettest on Record (Year)	Driest on Record (Year)	2004
Panhandle	2.53	-1.90	20th Driest	10.34 (1941)	0.70 (1956)	7.72
North Central	4.44	-3.43	27th Driest	17.19 (1986)	0.97 (1910)	9.70
Northeast	4.56	-7.47	10th Driest	27.94 (1941)	2.60 (1948)	12.53
West Central	3.95	-3.37	24th Driest	20.71 (1986)	1.01 (1954)	10.69
Central	4.41	-6.17	14th Driest	20.42 (1923)	2.11 (1910)	11.82
East Central	3.73	-9.80	4th Driest	22.86 (1923)	2.40 (1948)	14.13
Southwest	5.78	-2.32	39th Driest	18.40 (1986)	0.95 (1910)	12.16
South Central	5.17	-6.52	18th Driest	24.03 (1923)	2.18 (1948)	16.18
Southeast	5.60	-9.00	9th Driest	25.15 (1984)	3.11 (1963)	17.47
Statewide	4.44	-5.57	13th Driest	18.15 (1923)	2.44 (1910)	12.41

Fall 2005 Mesonet Temperature Comparison

Climate Division	Average Temp (F)	Departure from Normal (F)	Rank since 1895	Hottest on Record (Year)	Coldest on Record (Year)	2004
Panhandle	60.4	3.3	5th Warmest	62.7 (1963)	53.6 (1976)	57.5
North Central	62.3	2.7	12th Warmest	65.8 (1931)	56.0 (1976)	60.7
Northeast	62.9	2.7	12th Warmest	66.6 (1931)	55.3 (1976)	62.1
West Central	62.7	2.9	8th Warmest	65.7 (1931)	55.9 (1976)	60.9
Central	63.7	2.5	12th Warmest	67.3 (1931)	56.9 (1976)	62.6
East Central	64.6	3.0	9th Warmest	67.6 (1931)	56.7 (1976)	63.7
Southwest	64.1	2.3	16th Warmest	66.9 (1931)	57.1 (1976)	63.1
South Central	65.5	2.7	11th Warmest	68.3 (1931)	57.8 (1976)	64.4
Southeast	65.4	3.3	9th Warmest	68.3 (1931)	56.8 (1976)	63.8
Statewide	63.5	2.8	9th Warmest	66.3 (1931)	56.2 (1976)	62.1

Fall 2005 Mesonet Extremes

Climate Division	High Temp	Day	Station	Low Temp	Day	Station	High Monthly Rainfall	Station	High Daily Rainfall	Day	Station
Panhandle	102	Sep 18th	Buffalo	11	Nov 16th	Boise City	5.57	Buffalo	1.42	Oct 10th	Buffalo
North Central	101	Sep 18th	Freedom	16	Nov 30th	Blackwell	6.89	Red Rock	2.84	Oct 1st	Breckenridge
Northeast	97	Sep 18th	Copan	10	Nov 30th	Vinita	7.59	Pawnee	2.72	Sep 13th	Pawnee
West Central	98	Sep 13th	Camargo	17	Nov 16th	Erick	5.89	Watonga	1.84	Sep 30th	Weatherford
Central	97	Sep 19th	Chickasha	13	Nov 30th	Bristow	6.30	Kingfisher	3.49	Oct 5th	Bristow
East Central	101	Sep 22nd	Webber Falls	13	Nov 30th	Okmulgee	6.51	Sallisaw	2.50	Sep 15th	Stuart
Southwest	100	Sep 20th	Grandfield	18	Nov 16th	Mangum	9.84	Mangum	3.04	Sep 15th	Mangum
South Central	100	Sep 28th	Burneyville	16	Nov 30th	Centrahoma	7.21	Centrahoma	3.80	Sep 15th	Fittstown
Southeast	101	Sep 1st	Antlers	14	Nov 30th	Wister	6.97	Broken Bow	2.87	Sep 15th	Idabel
Statewide	102	Sep 18th	Buffalo	10	Nov 30th	Vinita	9.84	Mangum	3.80	Sep 15th	Fittstown

AGRICULTURE WEATHER WATCH

BY: ALBERT SUTHERLAND, CPA, CCA
MESONET ASSISTANT EXTENSION SPECIALIST
OKLAHOMA STATE UNIVERSITY

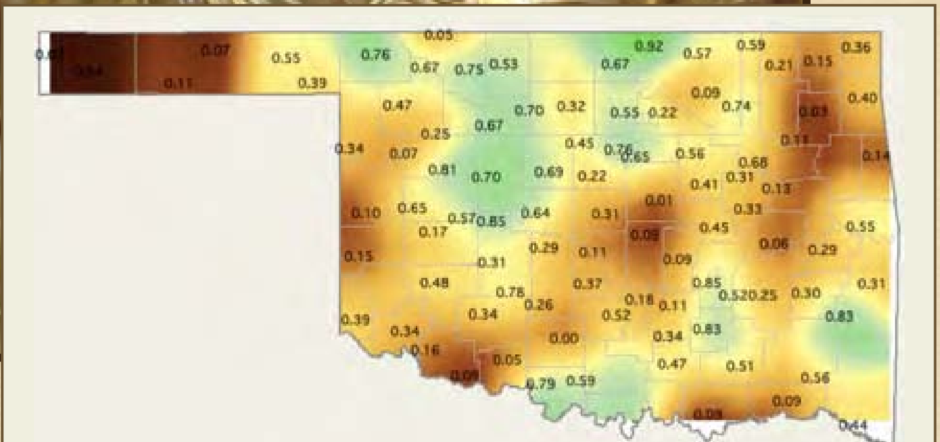


Figure 1
10-inch Fractional Water Index Map, December 7, 2005.

Oklahoma is dry, dry, dry!

And oh yes, did I mention it's DRY in Oklahoma!

Agricultural producers are reeling from the lack of Oklahoma rainfall. Looking at the 10-inch Fractional Water Index Map for December 7, 2005 from the Oklahoma Mesonet provides a clear view of just how dry it is in Oklahoma farm fields. (See Figure 1). A quick scan of the 10-inch Factional Water Index (FWI) Map indicates that close to three-quarters of the Mesonet tower locations are below 0.5 FWI and many locations are near or below 0.3 FWI.

The Oklahoma Mesonet soil moisture maps of Fractional Water Index provide an excellent statewide overview of water available for plant growth. Statewide maps are available for four soil depths, 2 inches, 10 inches, 24 inches, and 30 inches. The Fractional Water Index is based on a scale of 0.0 to 1.0 FWI. At 0.0 FWI the soil is powder dry. At 1.0 FWI, the soil is saturated. The soil moisture range for good plant growth is between 0.8 and 0.95 FWI. From 0.6 to 0.8 FWI, plants are undergoing mild stress. Below 0.5 FWI, the soil moisture is low enough that plant growth is severely limited.

Added to the already low soil moisture is that rain is unlikely in late December. The National Oceanic and Atmospheric Authority Climate Prediction Center is forecasting that the rest of December has a high probability of being below normal in precipitation and below normal in temperature.

Besides the stress of low soil moisture in the wheat root zone, the wheat has suffered the added stress of extremely low air temperatures between December 5th and 8th. Mark Hodges with the Oklahoma Wheat Commission has seen wheat bounce back from many stresses over the years. What concerns him this year is that the cold stress came on top of water stress. Plants already stressed are more prone to damage as additional stresses occur. If any "winterkill" damage has occurred, it will take several weeks for it to show up, so for now it is a wait and see situation. Wait to see if rain comes. Wait to see if winterkill has damaged the wheat crop.

Without changes in weather patterns for the better, namely, good rainfall and normal temperatures, this year's wheat grain crop is in jeopardy.

Like the wheat for grain, winter wheat pasture is faring poorly. It may become non-existent without rainfall, soon. Once, the cattle eat the wheat foliage already in the field, there won't be enough new growth to provide the feed they need. That will mean ranchers will have to bring in feed or move the cattle.

While this has been a stressful time on wheat and livestock producers, the dry weather has been a plus for soybean and cotton growers. Harvest on these crops has proceeded well with no rain to slow harvest or reduce crop quality.

To access the products mentioned previously and connect to the latest agricultural weather information, go to Oklahoma AgWeather at http://agweather.mesonet.org. This web site is a joint project of the University of Oklahoma and Oklahoma State University. It uses the latest information from the Oklahoma Mesonet and the Oklahoma Climatological Survey. If you have any questions or comments about the Oklahoma AgWeather site, please, contact Albert Sutherland by phone at 405-224-2216 or by email at albert.sutherland@okstate.edu.

URBAN FARMER

by: Albert Sutherland

December

- Complete yard clean-up. It is important to remove leaves from cool-season lawn areas to prevent grass die-out.

- Prune trees. Make proper pruning cuts by sawing on the outer edge of branch collars. This is a raised doughnut shaped area at the branch base. Do NOT use pruning paint, it slows callus growth over branch cuts.

- Clip holly or evergreen plants for Holiday Season decorations. Use florist foam and a container that can hold water to keep arrangements looking fresh.

January

- Spray dormant oil to control insect pests on ornamentals and fruit trees. Apply when the daytime temperature is above 50∞F and the nighttime temperatures above freezing for 3-4 days. Use the summer rate for evergreen shrubs.

- Roundup herbicide can be applied to dormant bermudagrass areas to control green winter weeds. For best results, apply on a day when the air temperature will be in the upper 40s or higher.

- Prune trees that are prone to excessive sap flow. These include pines, willows, elms, and maples. Do NOT apply pruning paint. It will not stop excessive sap flow and will slow callus growth over branch cuts.

- Plan spring and summer landscape projects.

- Peruse plant and seed catalogs or websites. These colorful catalogs and websites will provide you many ideas for landscape projects and brighten drab, cold weekends.

- Collect seed trays, media, and seeds to start transplants. Start seeds for hardy herbs (cilantro, dill, parsley) and hardy vegetables (broccoli, cabbage, onion) to be transplanted after mid-March.

February

- Test lawn and garden soils. Contact your local County OSU Extension office for soil testing bags, pricing, and sampling information.

- Prune fruit trees.

- Spray peach trees with lime-sulfur soon after pruning and before bud swell to control peach leaf curl.

- Fertilize pecan and fruit trees based on a soil test. In general, apply one tenth of a pound of actual nitrogen per year of tree age per tree, up to a maximum of 3 pounds of actual nitrogen per tree for pecan, 1 pound of actual nitrogen per tree for apple and plum, and 0.5 pound of actual nitrogen per tree for peach, pear, and cherry.

- Fertilize ornamental trees and shrubs. Use a quick release fertilizer at a rate of 1 pound of nitrogen per 1,000 square feet of root area. Tree and shrub roots extend out 2-3 times the distance from the trunk to the branch ends (tree dripline).

- Fertilize tall fescue after mid-February. Use a quick release fertilizer at a rate of 0.5 to 1 pound of nitrogen per 1,000 square feet.

- Start seeds for tomatoes and peppers to be transplanted in early April and flowers (wax begonia, seed geranium, impatiens, lobelia, salvia, verbena, and vinca) to be transplanted in late April.

- Shear evergreen shrubs and prune summer-flowering shrubs. Do NOT prune spring-flowering shrubs in February. Prune spring-flowering just after they bloom.

Cattle Stressed Out, Too

By Albert Sutherland, CPH, CCA

You reach out and turn the handle to open the door. As the door swings open you're greeted by a blast of cold air that stops you in your tracks. The cold goes right through your clothes. It starts a chill that goes bone deep.

SLAM! You close the door. Where is that thick coat and where was the last place you put those gloves? Better grab that winter hat, too.

When we get cold, we go back inside and put on more clothing, but what about cattle out in Oklahoma pastures and wheat fields. These animals have to depend on their own "coat." Fortunately, their hide and hair offers them great protection from the "elements." As the weather chills in the fall, it stimulates cattle to grow a thicker set of hair. This is referred to as a cow's "winter coat."

Another way that cattle deal with cold weather is to eat more. The extra feed is used to help cattle maintain their body temperature. If feed is limited, body fat will be utilized as an energy source and the cattle will lose weight. Livestock producers know they will be feeding more in the winter. They have to balance out the amount of feed with the severity of the weather. Colder winters bring with them the potential for low gain.

Gain is a measure of how fast a cow gains weight. Cattle with better gain are more profitable for the livestock producer than those with less gain. When cold weather comes, cattle eat more feed and gain less weight. How much the weight gain is impacted is dependent on the severity of the winter weather.

To help producers determine the level of stress that cattle may experience, the Oklahoma Mesonet created the Cattle Stress Model. This model is available at no cost on the Oklahoma AgWeather (http://agweather.mesonet.org) website. This model provides a statewide map of current cattle stress conditions and forecasts for up to 60 hours into the future.

Cattle cold stress is an index based on air temperature and wind speed.

Figure 1 - Cattle Stress Model map showing cattle cold stress index (updated every 15 minutes)

The Cattle Stress Model shows stress levels based on a cattle stress index. There are three levels of cold stress and three levels of heat stress. The model is updated every 15 minutes with data collected from Oklahoma Mesonet towers. (see Figure 1)

Cattle cold stress is an index based on air temperature and wind speed. This is similar to wind chill temperature, but the scale is different for cattle than for humans. As the temperature drops and the air speed increases, the degree of cattle cold stress increases. Stress categories are used to indicate the severity of the cattle stress conditions. The temperatures for setting the level of cattle cold stress changes through the year to reflect the differences in cattle coat hair. Cattle have the least amount of hair in the late summer and the most at the end of winter. (see Table 1) Cattle hair is an excellent insulator when it is dry, but loses its insulative value when the animals are wet. The worst cold stress occurs when rain proceeds a sharp drop in temperature.

How does a livestock producer manage his or her herd to overcome cold stress? The primary tool a producer has is to increase the amount of cattle feed. Increasing cattle feed must be done gradually to avoid severe digestive disorders. David Lalman, OSU Beef Cattle Specialist, recommends slightly increasing feeding amounts during the cold stress days and extending the increase into more pleasant weather. This helps the animals get back to good weight gains sooner.

As an example of how to implement David Lalman's recommendations, a cow consuming 16 pounds of grass hay per day and 5 pounds of 20% range cubes under mild weather, could have its feed increased to 20 pounds of grass hay per day (also possibly offering a better quality hay) plus 6 to 7 pounds of range cubes during a severe weather event. This is not a doubling of the energy intake but extending this amount for a day or two after a storm can help overcome the energy loss during the storm and is done in a manner that does not cause digestive disorders.

Another feeding approach to offset cattle cold stress is to use higher quality hay during times of high stress.

Since wind adds to cattle cold stress, providing a windbreak can be a big help. While a structure provides the best protection, even a natural shelterbelt of trees or tall shrubs can help. While a shelterbelt does not stop all wind, it can slow the wind to create better conditions.

Cattle stress from the weather is not just a winter problem. It is also a summer problem. In the summer the air temperature and relative humidity are factored together to determine the level of heat stress. Heat stress also robs cattle of gain. When the heat index climbs, cattle stop feeding and move to cooler locations. They will seek shady spots and lie down to minimize activity. This keeps their body temperature from climbing, but it also leaves less time for them to eat.

How livestock producers deal with the heat varies greatly with the type of cattle feeding locations. There is little that producers can do for pasture cattle. Nearby shelterbelts or shade trees can provide much needed shelter from the sun. It is important to provide plenty of water and locate it where the cattle will drink often. In confined animal situations, sprinklers or misters can be used to cool the air. This is similar to the misters used at zoos, amusement parks, and outdoor restaurant areas.

If a producer feeds cattle, he or she has the option of timing feed delivery. The best time to feed cattle in the summer or winter is in the evening. That way the heat from digestion occurs during the night, rather than in the daytime. In the summer, the heat of feed digestion occurs in the coolest part of the day to better help cattle deal with the daytime heat. In the winter, feeding cattle in the evening helps boost their body temperature during the coldest part of the day.

Whether it's the winter, spring, summer or fall, the Cattle Stress Model is available to help producers improve the health of their cattle.

Table 1 - Cattle coat impact on wind chill temperature stress levels.

Cattle Coat	Dates	Mild	Moderate	Severe
Dry heavy winter	January 1 – March 31	19-10	9-0	<0
Dry spring	April 1 – April 30	45-32	31-18	<18
Dry summer	May 1 – October 15	59-46	45-32	<32
Dry fall	October 16 – November 30	45-32	31-18	<18
Dry winter	December 1 – December 30	32-20	19-7	<7
Wet	Year-round	59-46	45-32	<32

Winter Weather Forecasting by Andrea Melvin

Winter weather forecasting is not an easy process. Surface temperatures along with the temperature and moisture content at different levels in the atmosphere all contribute to whether precipitation reaching the ground will be snow, sleet, freezing rain, or rain. These conditions can change in the matter of minutes.

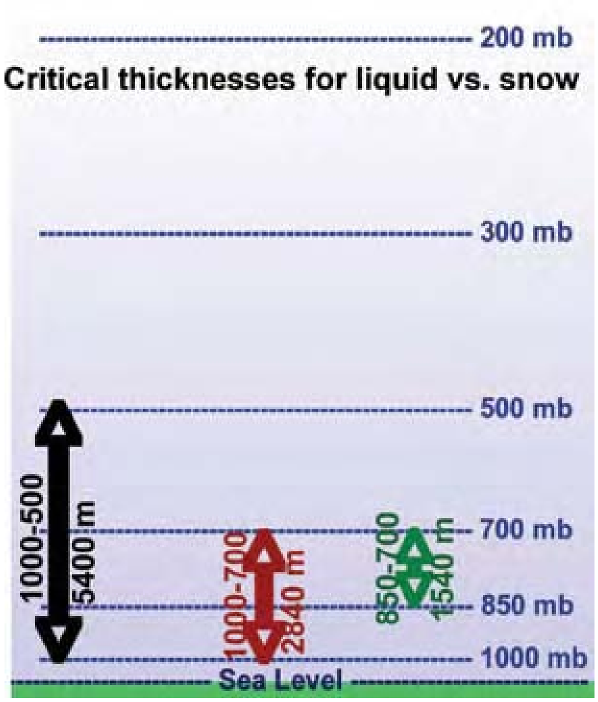
Forecasters need large amounts of data to produce reliable forecasts. Unfortunately, the data networks take measurements at different time intervals and the distance between stations differs widely from network to network. This requires the forecaster to use his/her best judgment when working with data collected at different times. For instance, surface temperatures are recorded by instruments located near the surface. The National Weather Services' (NWS) Automated Surface Observing System (ASOS) has stations across the United States that take measurements once every hour. The Oklahoma Mesonet, a statewide network, has stations in each of the states' 77 counties that take measurements once every five minutes.

The vertical temperature measurements are even more difficult to use in making a forecast. Measurements of temperature and humidity above the surface are taken by attaching instruments to balloons. The balloons called radiosondes transmit the data back to earth using radio signals. The radiosondes cost about $100 each. The NWS has 93 radiosonde stations across the country. Due to the cost, each station launches only two balloons a day. Other countries also launch radiosondes to collect upper atmospheric data. All countries launch their balloons at the same time every day so that the data can be compared. These times are 0 UTC (Universal Coordinated Time) and 12 UTC. That means in the Central Standard Time zone the balloons are launched at 6 a.m. and 6 p.m. (i.e., 7 a.m. and 7 p.m. during Central Daylight Savings time).

For Oklahoma, there is only one radiosonde station located at the Norman NWS Forecast Office. Oklahoma forecasters have to use the data collected twice a day from one station to make their vertical temperature and moisture predictions. The next closest stations are over 100 miles away. Weather conditions can change dramatically for the towns between the radiosonde stations.

Computer models are used to forecast the changes in weather conditions like temperature or humidity between data reporting schedules. The shorter the time interval between data collection updates (i.e., from radiosondes or surface networks) the more accurate the computer model output is. The time interval for upper air data is 12 hours. This long time lag between data updates can result in large differences between the actual temperature at 500 mb and the model's calculated 500 mb temperature.

As the balloon goes up, the instruments take measurements when the barometer reaches a specific pressure value. All countries are required to report data at standard pressure levels (e.g., 1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20 and 10 mb). Along with temperature, pressure, winds, and humidity, the radiosonde records the height when it reaches each standard pressure value.
The pressure level heights are used to compute a "thickness" value. "Thickness" refers to how thick the layer of air is between two pressure levels. Warm air needs more room because the molecules are moving quickly and bounce off of each other when they collide. Cold air needs less space. The cold molecules do not move quickly and have fewer collisions. For example, if the 1000-500 mb layer had a thickness of 5570 meters over Madill, OK and the thickness of the 1000-500 mb layer over Chandler, OK was 5423 meters, the air at Madill is warmer than the air in Chandler.



Experienced forecasters have developed thickness thresholds to help them determine the type of precipitation to expect at the ground. A thickness threshold of 1520 meters or less for the 850-700 mb layer will generally support snow at the surface. While a 1000-850 mb layer with a thickness of 1400 will produce rain. Once you have determined the thickness of each layer and determine the most likely type of precipitation, the fun begins. If each layer's threshold points to a different precipitation type, the forecaster's job becomes even more challenging. A warm layer in the middle atmosphere will melt any snow falling from above. However, if the layer below is not cold enough or thick enough, some of the precipitation may refreeze resulting in a mixture of sleet, snow, and rain. Elevated surfaces like power lines or tree limbs with temperature at or below freezing will be coated with ice as any rain instantly freezes. When all of the layers agree on rain or snow, the forecaster can be confident in the precipitation type. The forecaster will also look at the surface temperature and/or the soil temperature. If these values are right at freezing, it could be too warm for snow to stick or too cool causing rain to become freezing rain. The following table provides the critical thresholds in meters for each of the thickness layers typically used by forecasters.

Thickness Thresholds*

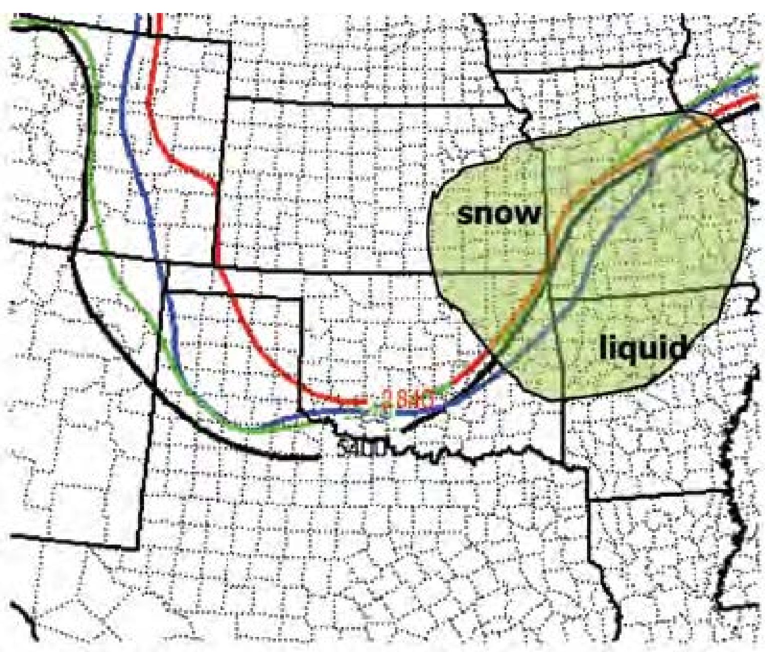
*Not valid in mountainous areas.

Layer	Flurries	Snow	Mixed Precip	Rain
850-500 mb			4050	
850-700 mb		1520	1540	1555
1000-500 mb	5240	5360	5400	5490
1000-700 mb		2800	2840	2870
1000-850 mb			1300	1325

The thickness thresholds are calculated for each of the 93-radiosonde stations. Then the values are used to create a contour for each layer which is plotted on a US map. These maps are called thickness charts or spaghetti plots. When the lines are close together, the thresholds match on the precipitation type. When the lines are far apart, the thresholds do not agree on precipitation type. Areas north of all lines will have snow if precipitation occurs. Areas south of all line will have rain if precipitation occurs. Precipitation type in areas between the lines is unknown. The spaghetti plots are created once an hour using data produce by computer models.

The spaghetti plots are a good estimate of the type of precipitation supported in each layer but surface temperatures play a huge role in what happens once the precipitation reaches the ground. Warm surface temperatures will begin the melting process focusing concerns on elevated surfaces. Snowfall accumulations may be smaller if warm surface temperatures stay above freezing melting the snow quicker than it can accumulate. However, over time, continued precipitation may lower surface temperatures below freezing allowing snow to accumulate or rain to freeze.

The next time a winter weather storm is forecasted for your area, take a look at the spaghetti plots to see how the atmosphere is torturing your local forecasters. When you feel yourself grumbling about the 6 inches of snow on your walk instead of the 1-inch forecasted, you will remember winter weather forecasting is not an easy task.



000311/0300V000/ ONALERT CRITICAL THICKNESS (FSL/MAPS/RU
1000:500(black) 1000:700(red) 850:700(green) 850Zero(blue)

CLASSROOM ACTIVITY

During the first week of January 2005, several upper-level troughs swept past Oklahoma. The results on the ground were remarkably different. Some areas received heavy rains and flash flooding, while others received freezing precipitation and snow. The role of surface conditions and atmospheric thicknesses were very important in determining the final precipitation type deposited on the ground.

Precipitation occurs across much of Oklahoma and the Texas panhandle. Examine the critical thickness map for 6:00 a.m. on January 4, 2005.

1. In northwestern Oklahoma, what is the probable form of precipitation (snow or non-snow) as it falls from the clouds?

2. How confident are you in your answer?

3. What information makes you more or less confident in your forecasted precipitation type?

4. Does this mean it will definitely reach the surface in this form?

Compare the 6:00 pm, January 5th thickness map to the Mesonet surface temperature map. Focus on the placement of the freezing line at the surface.

5. Do the two products place the freezing line in the same place?

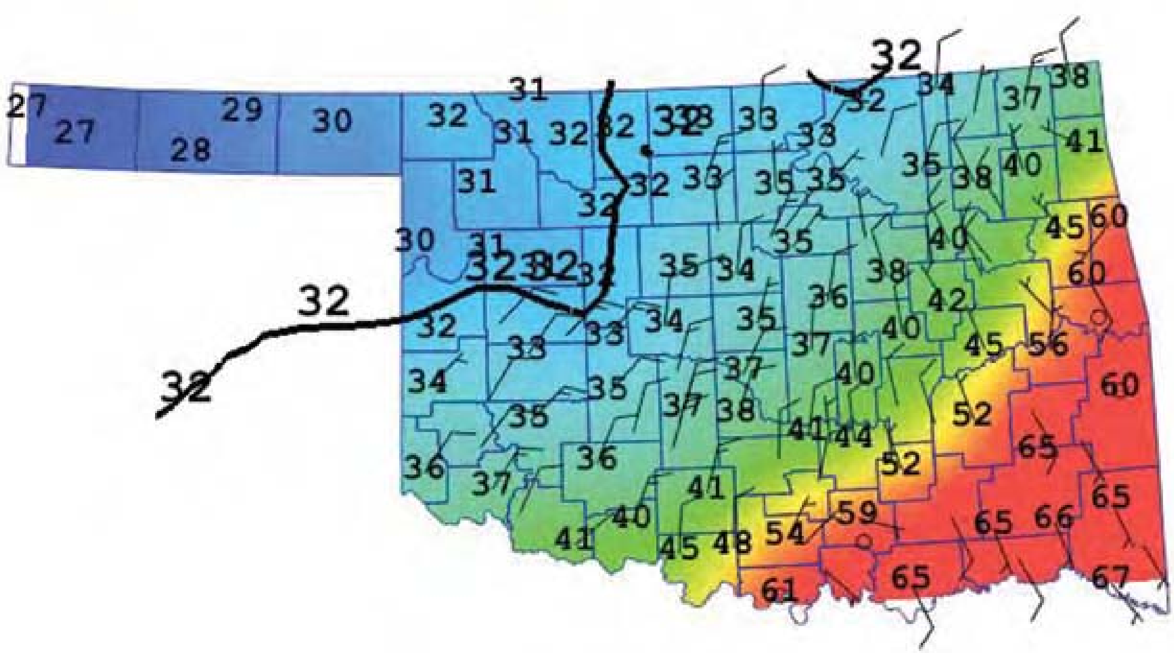
6. Which should you believe? Why?

7. If an estimated freezing line is different from the actual surface freezing line by 50 or 100 miles, what does that mean for road and utility crews?

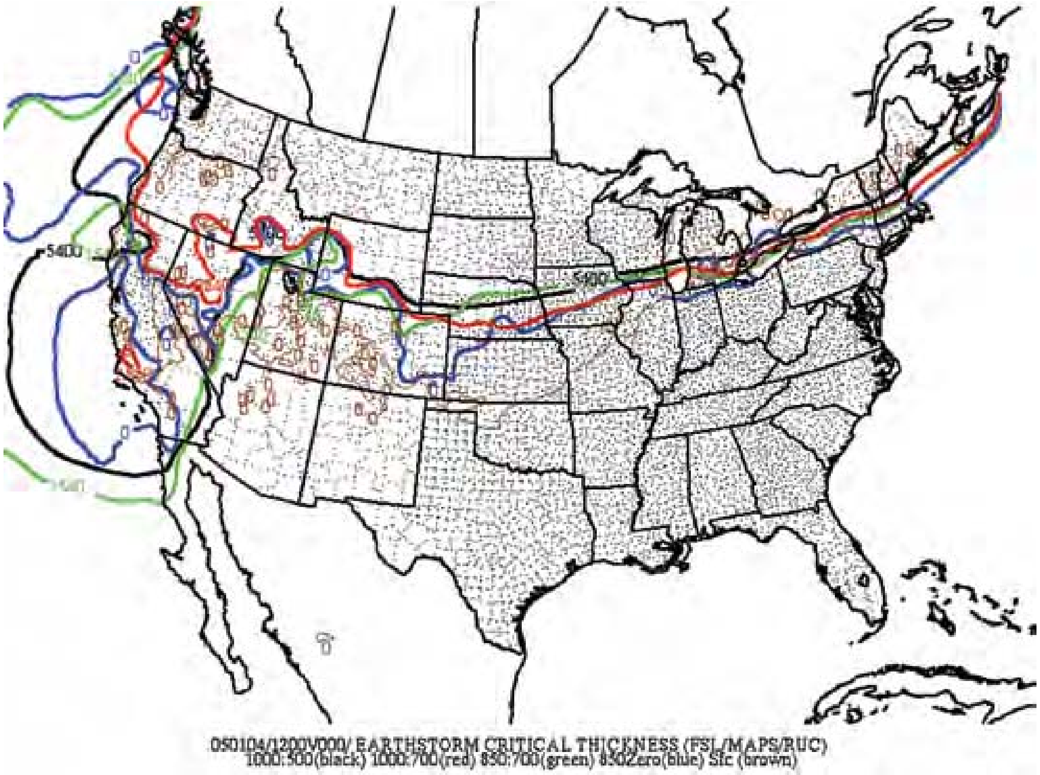
8. How might it impact schools in the area? (Think about problems bus drivers might encounter.)

A complete Case Study of this event with expert analysis of forecast and real-time products can be found at:
http://okfirst.ocs.ou.edu/train/casestudies/WinterWxLab/Jan2005.main.html .

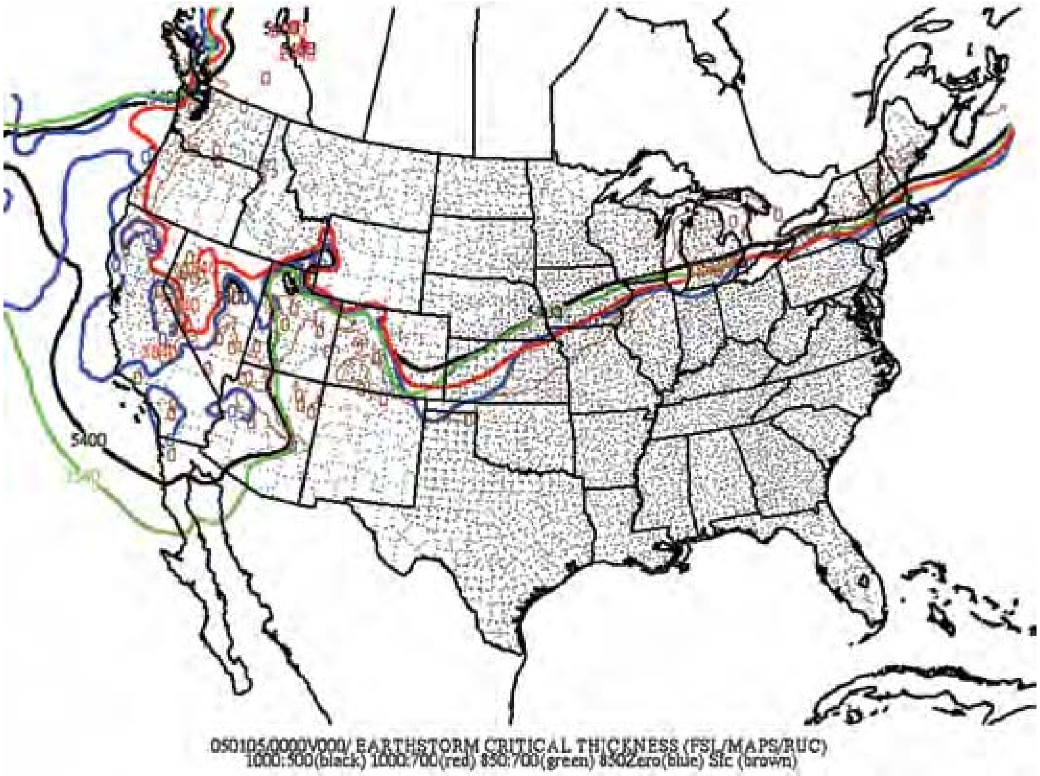
Oklahoma Mesonet Surface Temperature Map for January 4, 2005 at 6 p.m.



Thickness Map for January 4, 2005 at 6 a.m.



Oklahoma Mesonet Surface Temperature Map for January 4, 2005 at 6 p.m.



Winter Weather driving tips

The winter combination of overcast skies, reduced visibilities, ice, snow, and rain leads to thousands of accidents and dozens of deaths every year. Remember, even experienced drivers can find their nerves and skills tested by winter road conditions. Motorists can avoid accidents if they observe a few winter weather driving tips.

Before beginning your trip, know the current road conditions. For the latest conditions of Oklahoma roads, highways and Interstate highways, please call (405) 425-2385.

- Always wear your safety belt!
- Keep your car's windows, mirrors, and lights clear of snow and ice.
- Leave a few minutes early to allow extra time to get to your destination.
- Be aware of potentially icy areas such as shady spots and bridges and overpasses.
- Keep a safe distance of at least six seconds behind other vehicles and trucks that are plowing the road. You need at least three times more space to slow down on a slick road.
- Be deliberate in maneuvering your vehicle – most skidding is caused by sudden stops and turns.
- If your vehicle skids, don't hit the brakes. Ease off of the accelerator and gently steer into the direction of the skid.
- Don't pass a snowplow or spreader vehicle. Treat these as you would emergency response vehicles.
- Keep an emergency winter driving kit in your car.
- More information is available from the FEMA Winter Weather Driving Site http://www.fema.gov/hazards/winterstorms/winterf.shtm

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