Topeka News

Volume 2, Issue 3 August 2008

Special points of interest:

- Tons of post-event severe weather information! A good look at the Chapman and Manhattan tornados on June 11th.
- Fall Special: A look at why leaves change color, and a review of equinox and solstice definitions.
- Big changes at WFO-Topeka this past quarter!

Inside this issue:

Significant Tornadoes Devastate Portions of North Central and Northeast Kansas the Night of June 11th By: Dennis Cavanaugh

Severe thunderstorms developed along a nearly stationary front across portions of eastern Nebraska and central Kansas during the afternoon hours of June 11th. Around sunset, the front sharpened up and pushed southeast and extended from central Kansas to northeast Kansas. Supercell thunderstorms moved along this boundary from 9 pm to midnight and produced significant tornadoes that devastated the town of Chapman and produced heavy damage near the cities of Salina and Manhattan, and near the town of Soldier.

Picture 1 - Extensive damage in the middle of the tornado damage path in Chapman, KS

The Chapman tornado touched down at approximately 10:12 pm near the town of Enterprise, continued east-northeast into Chapman, then crossed Interstate 70 before lifting at approximately 10:26 pm. The tornado was a half mile wide as it entered Chapman, and produced estimated wind speeds of 150 mph, which is consistent with a rating of EF-3 on the Enhanced Fujita Scale for tornado damage. There were four serious injuries and one fatality in Chapman as a result of the tornado. The southeastern half of the town sustained significant damage to three churches, all of the city's public schools, and several businesses. Many residences were also completely destroyed. Images from Doppler Radar indicated a strong circulation of approximately 130 kts (150 mph) at 3,000 feet above ground level (Picture 2).

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Climate/Summer Storm Review

An active weather pattern became established over the Central Plains States from the end of May, through much of the month of June, and July.

The period started off with a severe weather event May 1st. Hail reports were scattered across much of the warning area early during the event, with estimated diameters up to golf ball size. The more significant aspect of the event was the bow echo that produced 60 to 80 mph winds as it swept from west to east across the northeast portions of the state. Two tornadoes also spun up along the leading edge of the line. One tornado produced EF-0 damage in Osage County, and the other EF-2 damage in Douglas County.

The middle of the month was characterized by rather benign thunderstorm activity. The most notable consequence occurred when a Topeka teenager was struck by lightning on the 10th of the month while she was in the shower at her home.

Severe weather ramped back up toward the end of the month,

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The Benefit of Owning a NOAA All-Hazards Weather Radio

The most effective and reliable means of obtaining severe weather information continues to be the All Hazards NOAA Weather Radio. The National Weather Service in Topeka, KS broadcasts weather information 24 hours a day, 365 days a year on five different frequencies across northeast Kansas. Normal broadcasts feature the 7 day forecast, climate information, the hazardous weather outlook, hourly weather observations from across the region, a regional weather summary, and during the morning hours, a fire weather forecast for the day.

Special programming includes all severe thunderstorm and tornado watches, warnings, and statements, all flood and flash flood related watches, warnings, and statements, river flood warnings, special weather statements for strong, non-severe thunderstorms, public information statements, and several non-weather related products such as Amber Alerts and Civil Emergency Messages. Many of these products will "tone alert" or set off a loud, high pitched tone designed to wake up and alert radio owners. On most models, a light on the unit will also flash.

Weather Radios can be purchased at electronics, grocery, and some department stores across the United States, and several brands are available. Newer units utilizing SAME (Specific Area Message Encoding) technology allow users to program in their own and select surrounding counties. The National Weather Service is happy to help the public program their radios correctly. For more information, residents of northeast Kansas may call 785-234-2592 to speak with a meteorologist at the National Weather Service in Topeka who can assist.

The same seven broadcast channels are used throughout the United States, so a Weather Radio can travel with an individual or family across the county. Battery powered units can be used in vehicles if programmed correctly, and are an excellent source for weather information to campers. The broadcast is typically best heard within 40 miles of each transmitter. If your transmission sounds scratchy or weak, you may want to try tuning in to a different channel for a clearer signal. Transmitter sites in northeast Kansas include (see chart at above right) Topeka, Concordia, Abilene, Blue Rapids, and Halls Summit.

Transmitter	Call Sign	Frequency
Topeka	WXK-91	162.475 MHz
Concordia	WXK-94	162.550 MHz
Abilene	WXL-71	162.525 MHz
Blue Rapids	KZZ-67	162.425 MHz
Halls Summit	KGG-98	162.425 MHz

A weekly test is held every Wednesday at noon. This is a chance for users to be sure their radios are in proper working order, and for the NWS-Topeka to make sure their warning operations are correct. Some radios come programmed NOT to tone alert for the weekly test. Please consult the instruction booklet for your particular radio to see if that is the case.

Local media outlets are also excellent sources for obtaining severe weather information, as is the internet. When a NOAA Weather Radio alarms, users are encouraged to listen to the broadcast, then check either the television or internet for additional information. The National Weather Service in Topeka can be found online at www.weather.gov/topeka. Cities and towns across northeast Kansas have in place warning sirens that can be turned on in the event of a weather emergency. Each individual county across northeast Kansas has their own policy for when the sirens will be turned on. For information on when sirens will go off in your county, contact your local emergency manager. The National Weather Service in Topeka does not sound sirens, but will assist each county in their decision to sound or not sound their sirens. NOAA Weather Radios remain the premiere source for up-to-date severe weather information.

For more information, please visit the national All Hazards NOAA Weather Radio internet page at **http://www.nws.noaa.gov/nwr/**

Climate/Storm Data Review Continued…

with an active stretch between May 22nd and 25th. The month of June saw almost non-stop convective weather, with severe reports coming into the NWS office in Topeka nearly every day between the 2nd and the 12th of the month, the 15th and 19th, and again nearly every day between the 23rd and 28th.

A prolific hail event transpired during the morning hours of June 2nd. Hail up to the size of softballs demolished portions of southwest Manhattan, including airport property, numerous vehicles, and several car dealerships. Photos and video came rolling in from across the city—notably from one business located near the airport. The building featured several sky lights, many of which were smashed by the large hail. Employees sent pictures of softball sized hail stones sitting on their desks to the NWS in Topeka. The event was quite extraordinary, not only because of the magnitude of the size of the hail, but because the thunderstorms that produced the storms were so prolific at such an early hour (between 7:30am and 10:30am).

The afternoon of June 5th, the atmosphere was ripe for severe weather development, prompting much talk within the meteorological community, by the broadcast media, and residents across northeast Kansas. Thunderstorms developed along a dry line and cold front

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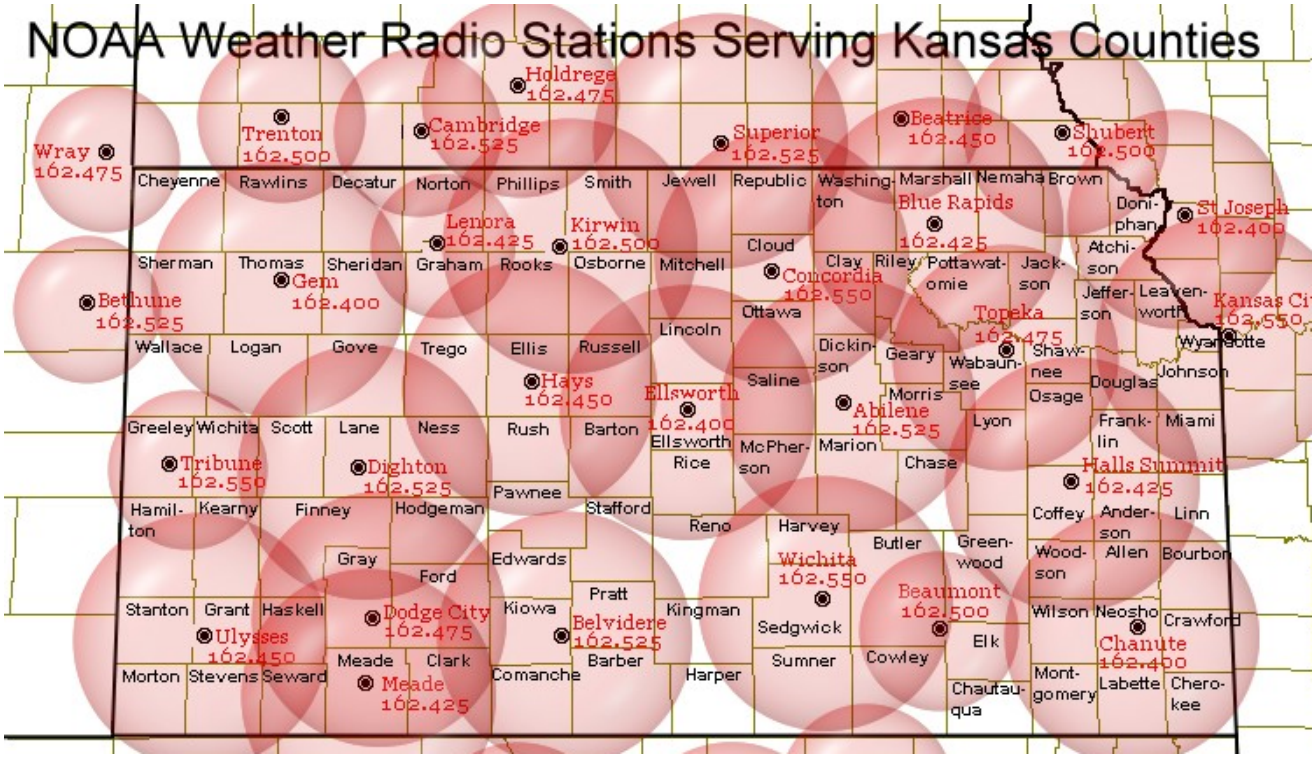
Left: The Chapman Tornado (Photo by Scott Blair).

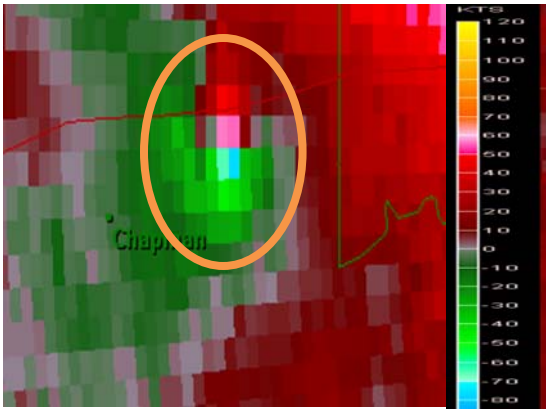
Middle: Baseball size hailstones in Wabaunsee County (Photo courtesy of WIBW)

Right: A car demolished by the Chapman tornado (Photo by NWS Storm Survey Team)

What NOAA Weather Radio Broadcast Will Work Best For You?



Chapman/Manhattan Tornadoes Continued…



Picture 2 - Storm Relative Motion from KTWX, NWS Topeka, KS Doppler Radar just after the tornado moved through Chapman.

A three dimensional rendering of the supercell thunderstorm that produced the Chapman and Manhattan tornadoes is included (Picture 3) to offer readers a look at the larger circulation present within this strong supercell thunderstorm. This is not a rendering of the tornado itself, but shows a deep, strong circulation within the supercell. Green colors indicate winds moving towards the radar, KTWX located near Alma, KS (out of the page), while red colors indicate winds moving away from the radar (into the page).

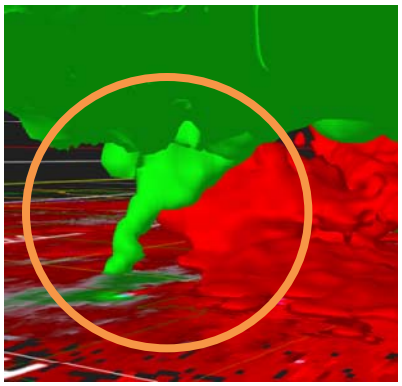
This supercell continued east-northeast while the Chapman tornado lifted north of Interstate 70. The storm produced another tornado one mile north of Ogden at approximately 10:48 pm. This tornado continued into Manhattan, and then lifted at approximately 11:03 pm just east of Kansas State University's campus.

The tornado was a quarter mile wide as it entered the Miller Ranch Area in southwest Manhattan (Picture 4). The estimated wind speeds at this location were 170 mph, which is consistent with a tornado damage rating of EF-4. There were no serious injuries or fatalities associated with this tornado despite having had several well built, new construction homes being completely wiped off of their foundation in the Miller Ranch Area. Several area businesses sustained extensive damage. KSU officials estimate that tornado damage to the campus will amount to more than 20 million dollars.

"The tornado was a quarter mile wide as it entered the Miller Ranch Area in southwest Manhattan"

Doppler Radar indicated another strong circulation, in this case, about 110 kts (125 mph) at around 2500 ft above ground level, as the tornado was moving into southwestern Manhattan (Picture 5).

The supercell thunderstorm that produced the Chapman and Manhattan tornadoes was absorbed by other thunderstorms after the Manhattan tornado lifted. A new supercell thunderstorm developed and moved northeast along the



Picture 3 - A 3-D rendering of Picture 2. The perspective is roughly from KTWX in Alma, looking southwest at the approaching storm.

Picture 4 - Extensive tornado damage to residences in the Miller Ranch Area of Manhattan, KS.

frontal boundary draped through Pottawatomie County around 11 pm. This supercell produced a tornado four miles south-southwest of Havensville, KS in Pottawatomie County at approximately 11:47 pm. The tornado continued northeast into Jackson County near Soldier and then on into southeastern Nemaha County before dissipating around 12:15 am on June 12th.

The tornado was approximately 300 yards wide as it moved south of Soldier (Picture 6). The estimated wind speeds at this location were 130 mph which is consistent with a tornado damage rating of EF-2. One fatality occurred when the tornado struck a mobile home near the Nemaha and Jackson County border, but fortunately, no other fatalities or injuries were reported. Doppler Radar once again indicated a strong circulation associated with the low levels of the tornadic supercell thunderstorm (Picture 7). There, a low level circulation of

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Climate/Storm Data Review Continued…

during the late afternoon. Favorable atmospheric wind and instability profiles allowed discrete storms to develop and later congeal into a line, and become severe. There were several small circulations embedded within the line. Six tornadoes touched down that evening, three of which were in Clay County. The most significant damage was rated EF-1 associated with a tornado that tracked from north of Oak Hill to northwest of Clay Center. Beyond the tornadoes, hail—up to two inches in diameter—was the initial severe weather threat while the storms were still discrete during the late afternoon. Once they merged into a line, strong winds—up to 70mph—became the dominant severe weather type.

A tornado outbreak wreaked havoc on portions of central and northeast Kansas on June 11th, when tornadoes ripped through the towns of Chapman and Soldier, and through a portion of the city of Manhattan. A detailed write-up of this event is available on page one of this newsletter.

Hail events peppered days during the middle of the month, before another more widespread severe weather event struck on the 27th. Trained spotters in portions of north central Kansas reported hail up to the size of tennis balls, and thunderstorm wind gusts to 60 mph.

The month of July was a bit less active than June, but featured several severe weather events as well. The first came just before the July 4th holiday weekend, when hail and strong winds impacted portions of east central Kansas including the cities of both Topeka and Lawrence. Heavy rain and sporadic hail was noted on the 5th, 7th, and 8th.

A somewhat obscure event took place the afternoon of the 9th. No thunderstorms were evident on local radar, but several trained spotters and emergency managers called in reports of funnel clouds! A weak boundary had hung up from across the southwest corner of Lyon County back eastward through Coffey and Anderson Counties. This may have allowed for sufficient low level wind shear beneath low topped, non-severe clouds to produce the funnel clouds. Heavy rain and flash flooding impacted portions of northeast Kansas the 17th and 21st of the month. Thereafter, several days of July experienced hail and strong winds. The 29th had an environment favorable to tornadic development. A lone tornado warning was issued after trained spotters reported a funnel cloud to the National Weather Service in Topeka. August has been a bit on the cool, dry side thus far.

"There were several small circulations embedded within the line. Six tornadoes touched down that evening, three of which were in Clay County"

Why Do Leaves Change Color? By: Aubry Wilkins

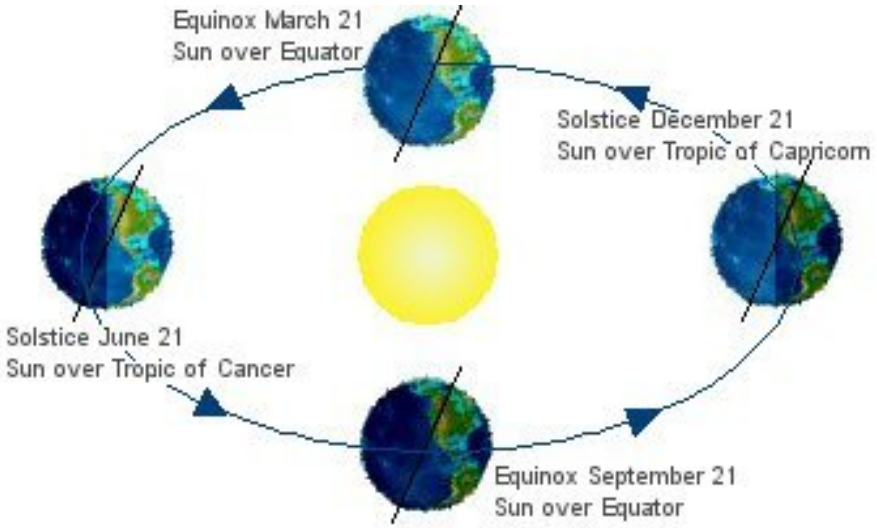
As the summer days begin to slip away, autumn begins to show itself in the gradually changing colors of leaves. Those who miss the warm summer days often enjoy the beautiful colors of autumn before the cold of winter sets in, but why do the leaves suddenly change colors in the fall?

Throughout the spring and summer months, trees use their leaves to produce food. Carbon dioxide, water and energy from the sun are all taken in by the tree and converted to glucose, a usable energy form for the tree, by the process of photosynthesis. The chemical chlorophyll is what controls photosynthesis and is also what gives trees, and other plants, their green color. Other chemicals, such as carotene and xanthophyll, are present within the leaves which help the tree capture more of the sun's energy. These chemicals produce a variety of colors, such as yellow and orange, however, they are not as abundant within the leaves as chlorophyll, so their color is easily masked.

As the summer comes to a close and the days begin to get shorter, less sunlight reaches the Earth and trees begin to shut down chlorophyll production and survive off stored energy through the winter. As the amount of chlorophyll within the tree leaves decreases, the green color begins to vanish, and other the colors show. Weather may also play a part in the coloration trees assume in the fall months. Warm, sunny days followed by cool nights often result in more red hues throughout the fall due to different chemical reactions within the leaves. An early frost may cause leaves to turn brown, and extra moisture may cause colors to appear less intense.

What is the Difference Between an Equinox and a Solstice? By: Aubry Wilkins

When we think of seasonal weather, we often think of extremes such as the short, cold days for winter and long, hot summer days, but when the calendar marks the first day of spring, the weather doesn't seem to agree, and may remain cold for several weeks after. Why do the seasons change and why does the weather sometimes take awhile to "catch up?"



In short, the seasons change due to the tilt of the Earth. The Earth is tilted on its axis approximately 23.5 degrees and this tilt combined with our elliptical orbit around the sun causes the seasons to change; as the Earth travels around the sun, the amount of sunlight which reaches each hemisphere differs. When the northern hemisphere is tilted away from the sun, it experiences winter and, conversely, when it is tilted towards the sun, the hemisphere enjoys the longer days associated with summer. The times when the Earth is at such extremes in orbit are called "solstices" and this is when the sun is directly above either the Tropic of Capricorn (winter) or the Tropic of Cancer (summer). In between the solstices are days when the earth receives an equal amount of sunlight on both sides of the equator, these times are referred to as an "equinox."

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It is important to remember that "solstice" and "equinox" are actually specific times within a day, and do not represent a full day. The times of the solstice and equinox vary each year but the winter solstice for the northern hemisphere usually occurs on December 21 and the summer solstice on June 21. Similarly, the vernal (spring) equinox generally falls on March 21 while the autumnal (fall) equinox is close to September 21.

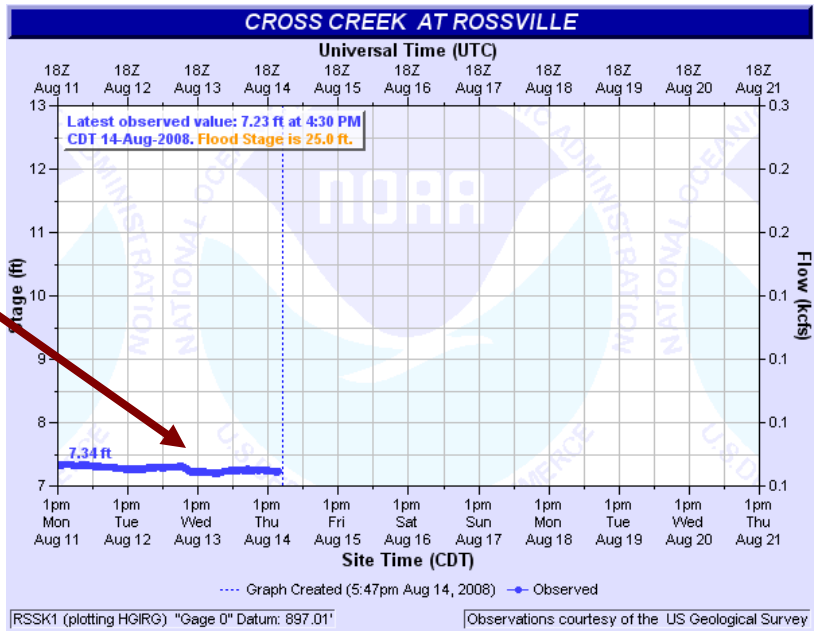
The dates and exact local (Central) times for the events are listed below:

Year	Vernal Equinox	Summer Solstice	Autumnal Equinox	Winter Solstice
2008	March 20 12:48am	June 21 6:59pm	Sep 22 10:44am	Dec 21 6:04am
2009	March 20 6:44am	June 21 12:45am	Sep 22 4:18pm	Dec 21 11:47am
2010	March 20 12:32pm	June 21 6:28am	Sep 22 10:09pm	Dec 21 5:38pm

New Automated River Gauge at Rossville, KS

A new automated river gauge was installed at Rossville, KS along Cross Creek, a tributary of the Kansas River. The river level had been read by observers in Rossville for several years. The USGS, in partnership with the National Weather Service in Topeka, KS, was able to install the automated gauge early this summer so manual readings were no longer needed. Forecasts for this point will continue to be issued when needed, typically during heavy rain events when the river is expected to rise above "Action Stage" or 20 feet. Readings are taken by the automated gauge every 15 minutes, whereas manual readings were only obtained every few hours. A new automated river gauge is soon to be activated at Manhattan as well! Stay tuned for details in our next issue.

River Level Stage Tracker



An image of the river level reading of the Cross Creek at Rossville via the NWS-Topeka website at http://www.crh.noaa.gov/ahps2/index.php?wfo=top

Staff News

The NWS-Topeka staff list has finally begun to settle down after many new faces the past few months. Several individuals have retired, and other have accepted new positions. This has opened the door to many new faces locally. Marion Smith, the Administrative Support Assistant accepted a new position at Central Region Headquarters. Kateri Flory takes her place. Jeramie Lippman accepted a new job at the Aviation Weather Center in Kansas City, and was replaced by WFO-Sacramento SCEP Jared Leighton. Aubry Wilkins, a SCEP that assisted WFO-Topeka this past summer will return to WFO-Omaha, NE in the fall, and continue her education at Creighton University. Jesse Lundquist, a senior at the University of Kansas has signed on as the new SCEP at the NWS-Topeka office. Rick Leupold, and Electronics Technician, also recently accepted a position here in Topeka. Congratulations and best wishes to all who have left! Please also help us welcome the newest members of our staff!

Congratulations also go out to Shawn Byrne. He graduated from the University of Kansas with a degree in Atmospheric Science. Shawn was a Hydrometeorological Technician with the NWS in Topeka while he attended classes at KU. Now that he has his degree, he has officially been converted over to the position of Meteorological Intern.

Meteorologist Intern Shawn Byrne at the KU graduation ceremony.

New to the Office

Rick Leupold– Electronics Technician
Kateri Flory– Administrative Support Assistant
Jared Leighton– Meteorological Intern
Jesse Lundquist– SCEP

Those Who Have Moved On...

Marion Smith– Central Region Headquarters
Jeramie Lippman– Kansas City Aviation Weather Center
Aubry Wilkins– SCEP at WFO Omaha

National Weather Service
1116 NE Strait Avenue
Topeka, KS 66616

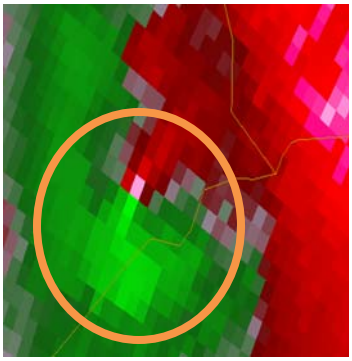
Phone: 785-234-2592
Spotter Hotline: 1-800-432-3929
E-mail:
w-top.webmaster@noaa.gov

Topeka News

Chapman/Manhattan Tornadoes Continued…

around 140 kts (160 mph) is indicated about 2700 ft. above ground level.

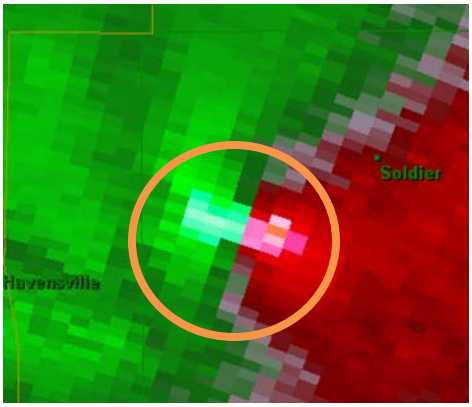
In summary, several supercell thunderstorms developed across portions of central Kansas and moved into the National Weather Service in Topeka, KS County Warning Area (CWA) after 9 pm. These thunderstorms moved along a cold front, intensified, and went on to produce significant tornadoes from Chapman, KS northeast towards Soldier, KS. Although there was extensive, costly, property damage across the area, the number of injuries and fatalities were surprisingly low considering the strength of these three tornadoes in the CWA, and the time of day that they had occurred—after sundown.



Picture 5 - SRM from KTWX as the tornado was moving through southwestern Manhattan, KS.

Northeast Kansas is a region where significant tornadoes are statistically more likely to occur than in most other parts of the world, however these events remain incredibly rare. When significant tornadoes do occur, there is little that can be done to avoid property damage. But, an effective early warning system is in place to minimize the threat to individuals across the region. A successful early warning system has many key ingredients. First, the National Weather Service provides an essential role in sending out Severe Thunderstorm and Tornado Warnings, but many others have a vital role in keeping the public safe from severe weather. Local Emergency Management, local first responders, broadcast media and storm spotters all play a vital role in the dissemination of warning information. Accurate spotting and reporting of severe thunderstorm features helps keep friends, neighbors and community members safe. Without the help of all parties involved in severe weather warning operations during the night of June 11th, 2008, the impact on the lives of those who live in the Topeka CWA would have been much greater. Our thoughts go out to all those who were affected by the tornadoes of June 11th, and thanks to all of those who helped to get the word out about the severity of these storms.

Picture 6 - Tornado damage to hardwood trees and a residence near Soldier, KS



Picture 7 - SRM from KTWX as the tornado was nearing Soldier, KS.