SCIPP
A NOAA RISA TEAM

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The First Half of 2018: Severe Weather by The Numbers

Patrick Marsh, Storm Prediction Center

By many measures the first half of the 2018 severe weather season (January through June) was extremely quiet. But just how quiet? Well, it ultimately depends on what metric you use to quantify the season. Let's take a look at a few metrics.

Storm Prediction Center Categorical Risks

SPC issues Day 1, Day 2, and Day 3 Convective Outlooks that depict non-severe thunderstorm areas and severe thunderstorm threats across the contiguous forty-eight United States, along with a text narrative. The categorical forecast specifies the level of the overall severe weather threat via numbers (e.g., 5), descriptive labeling (e.g., HIGH), and colors (e.g., magenta).

These categorical levels, numbers, and colors are:

TSTM (light green) - General or non-severe thunderstorms - Delineates, to the right of a line, where a 10% or greater probability of thunderstorms is forecast during the valid period.

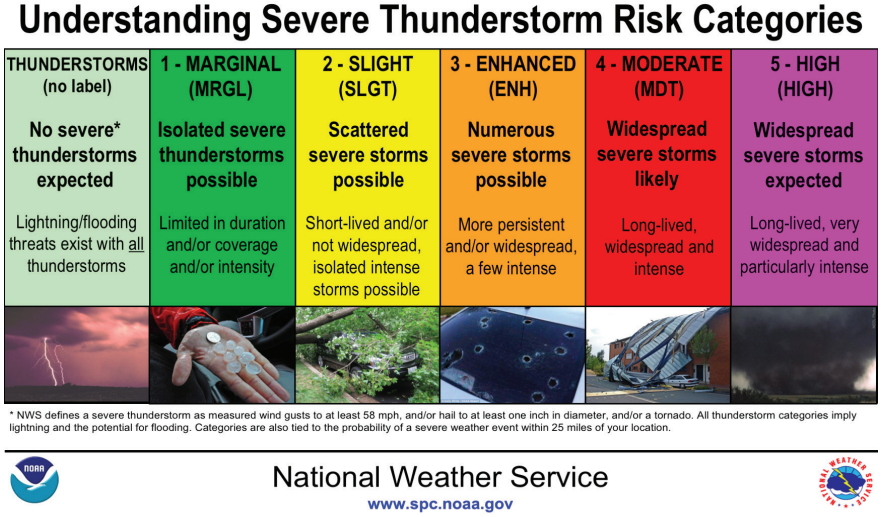
1-MRGL (dark green) - Marginal risk - An area of severe storms of either limited organization and longevity, or very low coverage and marginal intensity.

2-SLGT (yellow) - Slight risk - An area of organized severe storms, which is not widespread in coverage with varying levels of intensity.

3-ENH (orange) - Enhanced risk - An area of greater (relative to Slight risk) severe storm coverage with varying levels of intensity.

4-MDT (red) - Moderate risk - An area where widespread severe weather with several tornadoes and/or numerous severe thunderstorms is likely, some of which should be intense. This risk is usually reserved for days with several supercells producing intense tornadoes and/or very large hail, or an intense squall line with widespread damaging winds.

5-HIGH (magenta) - High risk - An area where a severe weather outbreak is expected from either numerous intense and long-tracked tornadoes or a long-lived derecho-producing thunderstorm complex that produces hurricane-force wind gusts and widespread damage. This risk is reserved for when high confidence exists in widespread coverage of severe weather with embedded instances of extreme severe (i.e., violent tornadoes or very damaging convective wind events).



Pictorial respresentation of the risk categories issued by the Storm Prediction Center (SPC).

From 2003-2017, the SPC issued an average of approximately 170 Thunderstorm days, 111 Slight Risk days, 24 Moderate Risk days, and 3 High Risk days during the first-half of the year. A couple of notes about these numbers. Higher categorical risks are subsets of the lower categorical risks. In other words, in order to have a High Risk, all other risks are also included in the counts. Also, Marginal and Enhanced risks were introduced late in 2014 but were not used until 2015. Thus, for the 2015-2017 period, an approximate average of 134 Marginal Risk days and 48 Enhanced Risk days were issued.

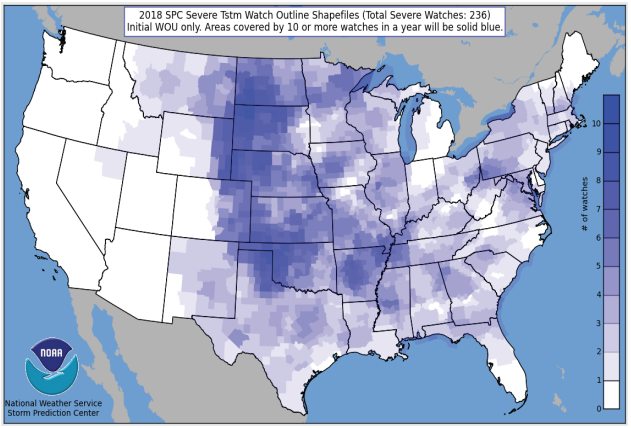
In 2018, SPC issued 166 Thunderstorm days, 124 Marginal Risk days, 85 Slight Risk days, 40 Enhanced Risk days, 10 Moderate Risk days, and 0 High Risk days. In all counts, the number of days with thunderstorm or severe thunderstorm risks is lower than average; although, admittedly, with Enhanced, Moderate, and High risks, the sample size is rather small.

Storm Prediction Center Watch Counts

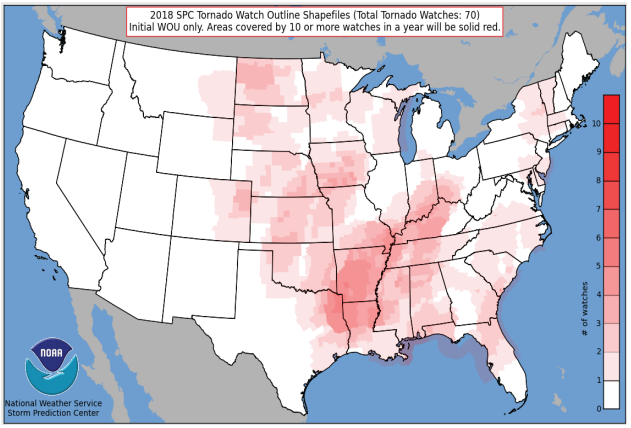
When conditions become favorable for organized severe thunderstorms or tornadoes to develop, the NOAA/NWS Storm Prediction Center (SPC) issues Severe Thunderstorm or Tornado watches. Although a tornado can occur in either type of watch, a Tornado Watch is issued when conditions are favorable for either multiple tornadoes or a single intense tornado. A Severe Thunderstorm watch is issued when there is an expectation of organized thunderstorms producing at least 6 total severe weather events. In the United States we define a severe thunderstorm as a thunderstorm capable of producing hail at least one inch in diameter, wind gusts in at least 58 mph, or a tornado. SPC watches encourage the general public to stay alert for changing weather conditions and probable warnings.

From 2000-2017, the SPC issued an average of 309 Severe Thunderstorm watches and 174 Tornado watches during the first half of those years. This sums to a total of 483 watches. There is some year-to-year variability in the watch counts, with 2016 having the fewest watches (309) and 2008 having the most (644).

How about this year? Through June, the SPC has only issued 189 Severe Thunderstorm watches and 62 Tornado watches for a total of 251 – with nearly half of those watches coming in the month of June. This means that 2018 had 58 fewer watches in the first half of the year than the previous first-half minimum. Furthermore, to highlight just how few watches have been issued through the first half of 2018, May of 2003 had more watches issued (261) than January through June 2018 combined!



Number of severe thunderstorm watches issued in each county in 2018 as of July 23.



Number of tornado watches issued in each county in 2018 as of July 23.

Severe Weather Fatality Counts

The National Weather Service, along with NOAA's National Centers for Environmental Information, maintains a database of severe weather occurrence along with the some of the impacts (e.g., injuries, fatalities, losses). Unfortunately for the purposes of this article, it takes several months after the severe weather occurrence for the event to be certified and entered into the official severe weather database. Thus, comparing raw counts of tornado, damaging thunderstorm wind, and large hail would be rather limited as May will not be certified until the end of July and June will not be certified as official until the end of August.

If you are interested in seeing a comparison of preliminary tornado, wind, and hail reports as compared to historical preliminary reports, a series of graphics on the SPC's Warning Coordination Meteorologist's website (http://www.spc.noaa.gov/wcm) are updated daily with this information.

Although the counts of severe thunderstorm hazards will likely be unavailable until later this summer, some information, such as fatalities, are a little easier to calculate in real time given the overwhelming few fatalities there are compared to the raw number of severe weather occurrence.

From 2000-2017 there were an approximate average of 66 fatalities from tornadoes during the first part of the year. This number may surprise you given its relatively high value and the seemingly lack of stories of tornado fatalities of late. This is twofold. First, the average number of fatalities is skewed by the fact that 2011 had 546 fatalities owing to the events of 27 April and 22 May 2011. If you don't remember, 27 April 2011 had over 300 tornado fatalities on a single day, and 22 May 2011 had a tornado move through Joplin, Missouri, killing in excess of 150 people. By comparison, 2005 only had five fatalities through the first half of the year, representing the fewest in the 2000-2017 period.

If we remove both 2005 and 2011, the average number of fatalities is a lower, but still too high, of 40 persons.

In 2018, there were only 3 tornado fatalities during the first half of the year – a new record low for the entire US Severe Weather Database (going back to 1950). So, if you've been thinking there have not been a lot of news about tornado fatalities, you are probably not dreaming.

If we take a look at fatalities directly related to thunderstorm winds during the 2000-2017 period, again for only the first half of the year, we find that there have been approximately 12 fatalities per year. Once again 2011 leads in terms of the number of fatalities with 31 severe thunderstorm wind caused fatalities; 2003 has the fewest with only 2.

Although the numbers for 2018 wind fatalities is a bit more uncertain as compared to tornadoes, at least 11 fatalities have occurred in the first half of the year, which is near average. Exact numbers will not be known until the end of the year. In fact, a single day in May resulted in at least five fatalities in the Northeast – more than the entire years' worth of tornado fatalities. Thus, even though many people do not take severe thunderstorm warnings seriously, severe thunderstorms do have the potential to result in the loss of life and should be taken seriously.

Now, let's take a look at hail fatalities. It may seem foolish to examine hail fatalities as most people think that hail could not kill you. However, since 2000 there have been 5 hail fatalities: 2 in 2000 and 3 in 2014. Thus, the average is approximately one fatality approximately every five years. Typically,

these fatalities occur when people are caught outside, well removed from a structure that can provide safety, when a thunderstorm producing very large hail in excess of two-inches in diameter overtakes them. Fortunately, in 2018, there are no known fatalities directly stemming from hail.

What Does This All Mean for the Rest of 2018?

Simply put: Nothing.

As I have previously written in here, although it is always an interesting endeavor to look at the statistical characteristics of severe thunderstorms and tornadoes and assess how good or bad something is, we would be well served to not forget the human impact of actual severe thunderstorms and tornadoes. Although severe thunderstorms are incredibly rare in terms of the spatial scale of the United States – it's quite possible to go your entire life and never experience a tornado or severe criteria wind or hail -- when one affects you personally, it can easily become a year or lifetime defining event.

I like to remind people that no matter what the experts say about a severe weather season, be it an above average or below average year, if you are directly impacted, to you it's quite likely to be the worst severe weather season ever. So, even though 2018 has been a below average tornado year (at least through this writing), for some of those among us, it was the worst one.

Remember, it only takes one event to change a life.

Weather is inherently personal.

Drought Update

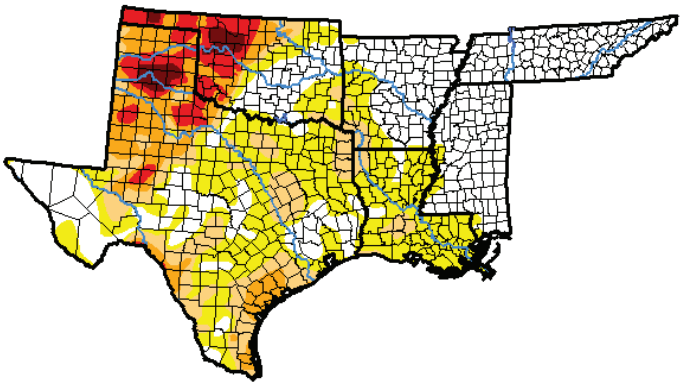
Kyle Brehe and Rudy Bartels,
Southern Regional Climate Center

At the end of June and into July, exceptional and extreme drought classifications are still present in extreme western Oklahoma and southwestern Texas. Extreme drought classifications are present in western Oklahoma and northern, central, and southeastern Texas. Severe drought classifications are present throughout parts of northern, central, and northeastern Texas, western and southeastern Oklahoma, southwestern Arkansas, and northwestern Louisiana. The moderate drought classification remains throughout parts of central, northern, and northeastern Texas. Moderate drought classification appeared in northern and southeastern Oklahoma, central, western, and southwestern Arkansas, central, northwestern, and northeastern Louisiana, and southwestern Mississippi. There are currently no drought conditions in Tennessee.

In June, there were severe storm reports everyday throughout the Southern Region except on June 6.

On June 2, 2018, baseball sized hail was reported in Hector, Arkansas and an 100 mph (160.93 kph) wind gust was reported in Colt, Arkansas. Also, strong winds downed many trees in Holly Springs, Mississippi.

On June 24, 2018, an 83 mph (133.58 kph) wind gust was reported in Camargo, Oklahoma.



Released Thursday, July 5, 2018
Richard Tinker, CPC/NOAA/NWS/NCEP

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	39.35	60.65	30.12	17.24	7.39	1.68
Last Week *05-29-2018*	51.74	48.26	26.46	16.47	7.90	1.90
3 Months Ago *03-06-2018*	52.15	47.85	33.68	16.43	11.74	0.62
Start of Calendar Year *01-02-2018*	31.09	68.91	42.64	15.33	0.30	0.00
Start of Water Year *09-26-2017*	72.17	27.83	2.38	0.02	0.00	0.00
One Year Ago *06-06-2017*	89.19	10.81	1.02	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

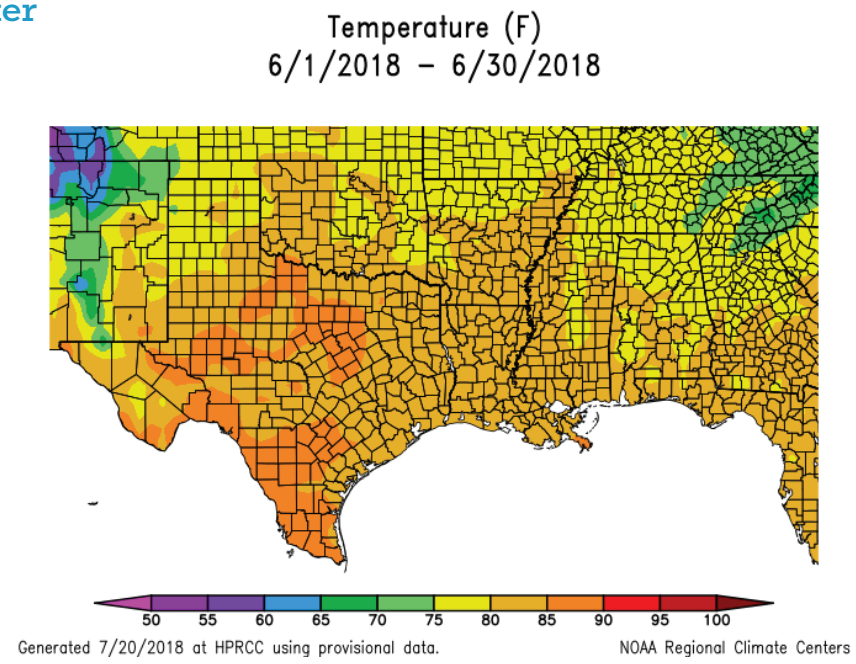
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Above: Drought Conditions in the Southern Region. Map is valid for July 3, 2018. Image is courtesy of the National Drought Mitigation Center.

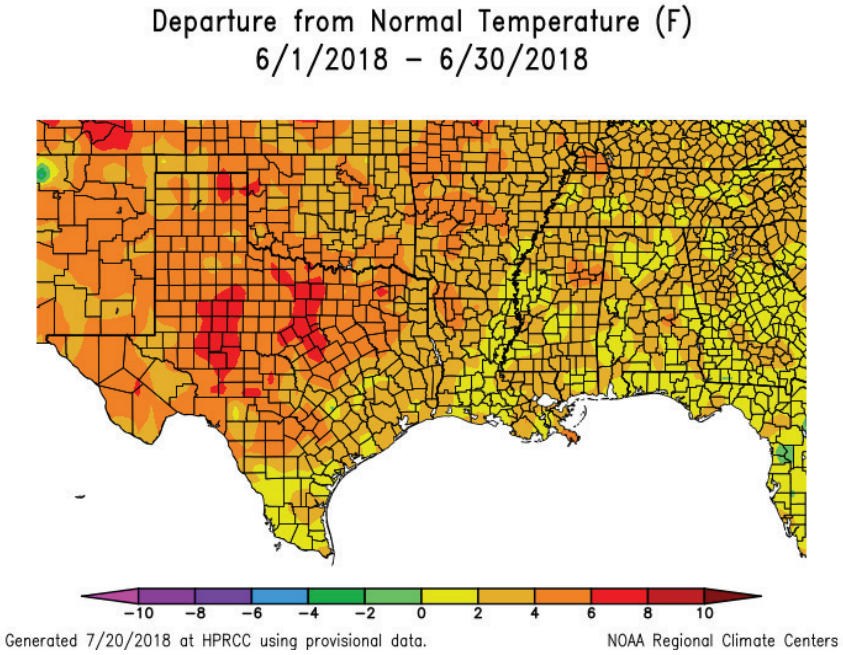
Temperature Summary

Kyle Brehe and Rudy Bartels,
Southern Regional Climate Center

June temperatures were above normal throughout most of the Southern Region. Western Oklahoma and northern and central Texas experienced temperatures 6 to 8 degrees F (3.33 to 4.44 degrees C) above normal. Northwestern Tennessee, northeastern Mississippi, northwestern Louisiana, northwestern, central, and southwestern Arkansas, western, southern, and northeastern Oklahoma, and northern, central, western, and northeastern Texas experienced 4 to 6 degrees F (2.22 to 3.33 degrees C) above normal temperatures. The statewide monthly average temperatures were as follows: Arkansas – 80.00 degrees F (26.67 degrees C), Louisiana – 82.00 degrees F (27.78 degrees C), Mississippi – 80.60 degrees F (27.00 degrees C), Oklahoma – 80.60 degrees F (27.00 degrees C), Tennessee – 76.50 degrees F (24.72 degrees C), and Texas – 83.90 degrees F (28.83 degrees C). The statewide temperature rankings for June were as follows: Arkansas (ninth warmest), Louisiana (eighth warmest), Mississippi (fifteenth warmest), Oklahoma (tenth warmest), Tennessee (eleventh warmest), and Texas (third warmest). June was the second consecutive month where temperatures were above normal throughout the Southern Region. All state rankings are based on the period spanning 1895-2018.



Average June 2018 Temperature across the South

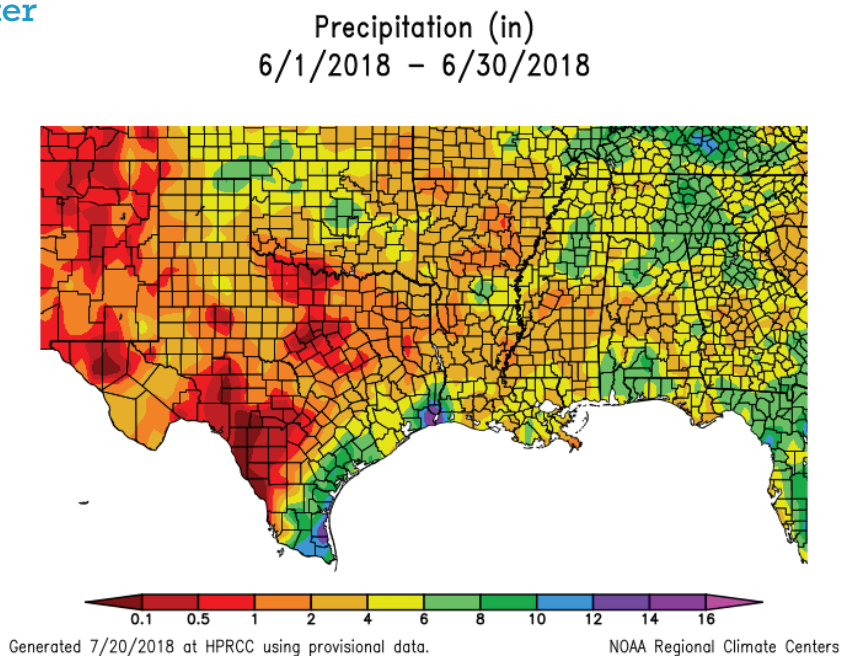


Average Temperature Departures from 1981-2010 for June 2018 across the South

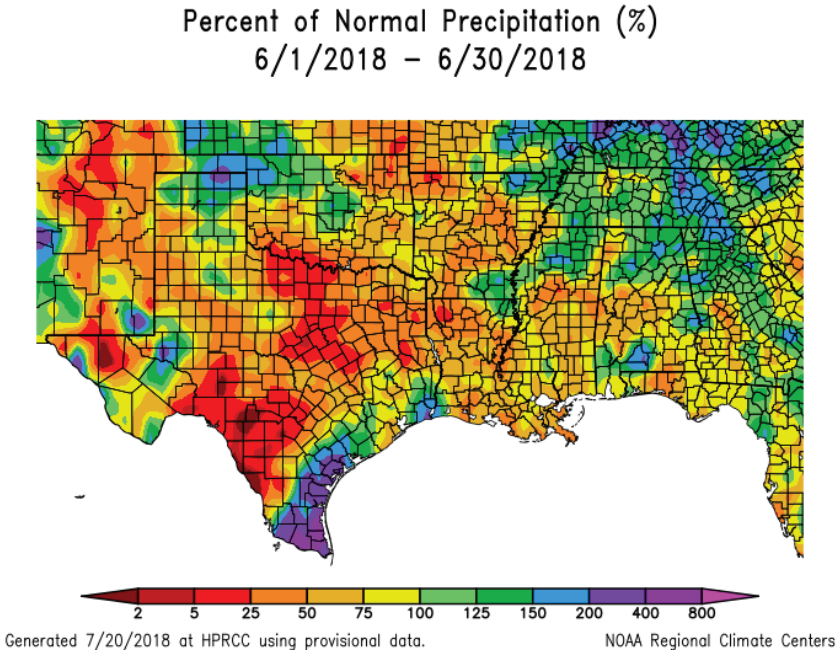
Precipitation Summary

Kyle Brehe and Rudy Bartels,
Southern Regional Climate Center

Precipitation values for the month of June varied spatially throughout the Southern Region. Parts of western, southwestern, and central Texas received 5 percent or less of normal precipitation. Western, southwestern, central, and eastern Texas, northwestern Louisiana, northwestern Arkansas, northeastern Oklahoma, and an area in central Mississippi received 25 percent or less of normal precipitation. In contrast, extreme southern Texas received 400 percent or more of normal precipitation. Parts of northern, western, southeastern and southern Texas, western Oklahoma, and southeastern Tennessee received 200 – 400 percent of normal precipitation. The state-wide precipitation totals for the month were as follows: Arkansas – 2.93 inches (74.42 mm), Louisiana – 3.56 inches (90.42 mm), Mississippi – 3.72 inches (94.49 mm), Oklahoma – 3.60 inches (91.44 mm), Tennessee – 5.61 inches (142.49 mm), and Texas – 2.47 inches (62.74 mm). The state precipitation rankings for the month were as follows: Arkansas (thirty-seventh driest), Louisiana (forty-first driest), Mississippi (fifty-sixth driest), Oklahoma (fifty-sixth driest), Tennessee (twenty-first wettest), and Texas (fifty-fourth driest). All state rankings are based on the period spanning 1895-2018.

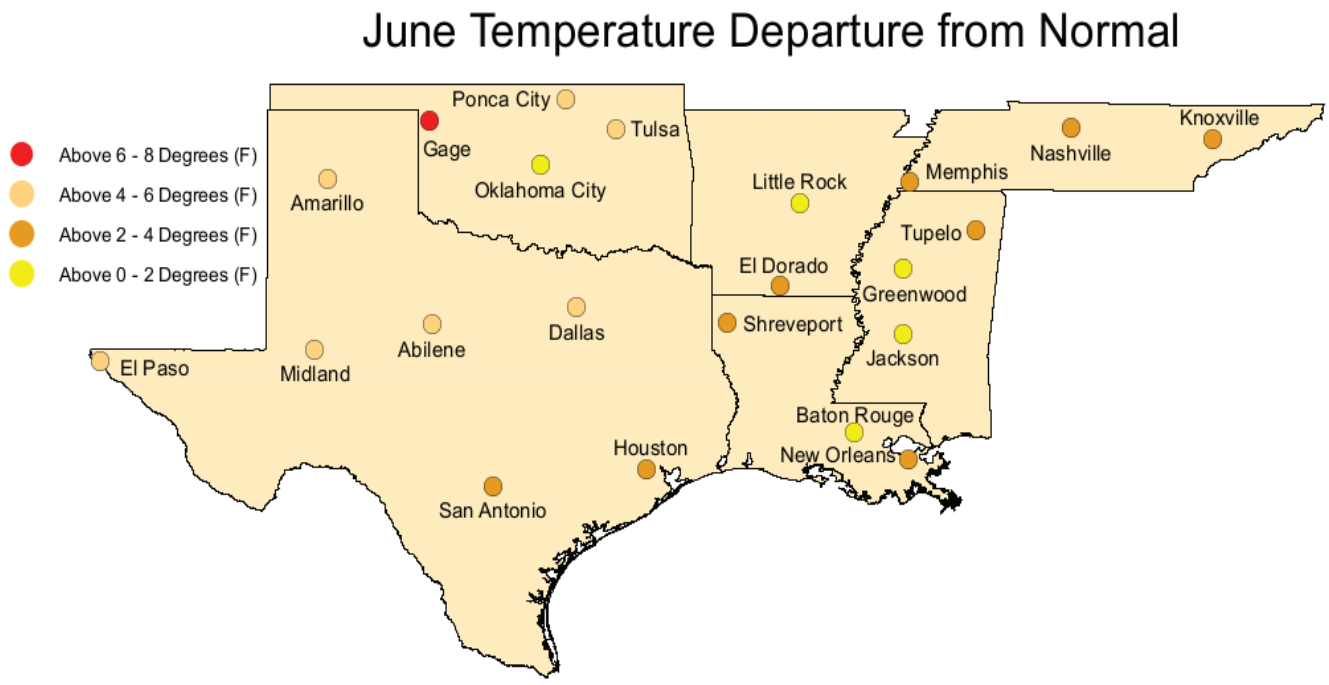


June 2018 Total Precipitation across the South

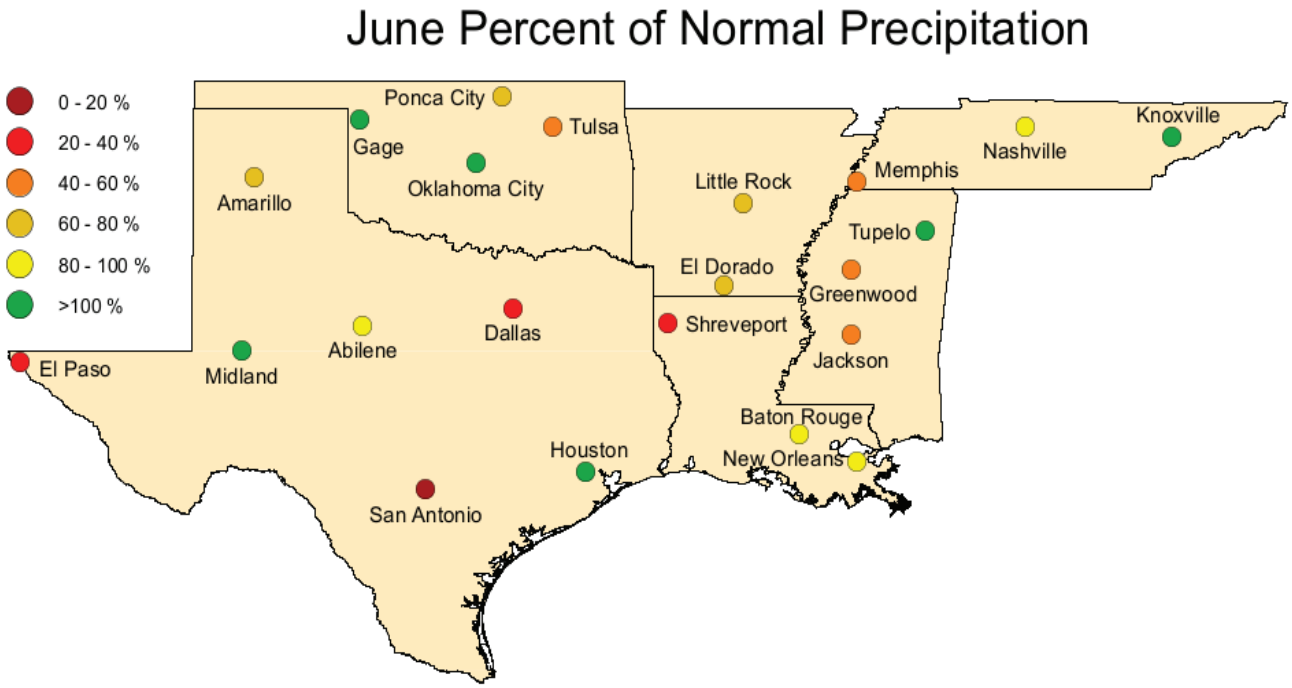


Percent of 1981-2010 normal precipitation totals for June 2018 across the South

Regional Climate Perspective in Pictures



June 2018 Temperature Departure from Normal from 1981-2010 for SCIPP Regional Cities



June 2018 Percent of 1981-2010 Normal Precipitation Totals for SCIPP Regional Cities

Climate Perspective

State	Temperature	Rank (1895-2018)	Precipitation	Rank (1895-2018)
Arkansas	80.00	9th Warmest	2.93	37th Driest
Louisiana	82.00	8th Warmest	3.56	41st Driest
Mississippi	80.60	15th Warmest	3.72	56th Driest
Oklahoma	80.60	10th Warmest	3.60	56th Driest
Tennessee	76.50	11th Warmest	5.61	21st Wettest
Texas	83.90	3rd Warmest	2.47	54th Driest
Regional	**82.01**	**6th Warmest**	**3.13**	**46th Driest**

State temperature and precipitation values and rankings for June 2018. Ranks are based on the National Climatic Data Center's Statewide, Regional, and National Dataset over the period 1895-2018.

Station Summaries Across the South

Station Summaries Across the South											
Station Name	Temperatures								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	%Norm
El Dorado, AR	93.5	70.3	81.9	3.7	98	06/28	59	06/04	3.15	-1.75	64
Little Rock, AR	90.9	70.7	80.8	1.7	97	06/28	62	06/04	2.86	-0.79	78
Baton Rouge, LA	91.8	73.7	82.7	1.6	95	06/30+	66	06/06	6.36	-0.05	99
New Orleans, LA	91.9	75.7	83.8	2.3	97	06/30	68	06/06	6.78	-1.28	84
Shreveport, LA	94.0	73.6	83.8	4.0	100	06/29	66	06/05+	1.74	-3.66	32
Greenwood, MS	90.8	70.5	80.6	1.9	96	06/15	61	06/04	2.41	-1.90	56
Jackson, MS	91.0	70.5	80.7	1.7	97	06/30	62	06/04	2.46	-1.66	60
Tupelo, MS	90.7	69.9	80.3	2.2	95	06/30+	60	06/04	7.50	2.98	166
Gage, OK	94.2	68.3	81.2	6.1	101	06/12+	51	06/03	7.03	3.53	201
Oklahoma City, OK	90.3	68.9	79.6	1.6	97	06/28	59	06/04	6.00	1.07	122
Ponca City, OK	91.3	70.7	81.0	4.4	99	06/28+	56	06/04+	3.40	-1.66	67
Tulsa, OK	91.8	71.7	81.8	4.2	99	06/28	60	06/04	2.09	-2.63	44
Knoxville, TN	87.9	67.0	77.4	2.4	95	06/19+	59	06/06+	4.13	0.32	108
Memphis, TN	91.6	72.1	81.9	2.3	96	06/16+	64	06/04	2.06	-1.57	57
Nashville, TN	90.2	69.3	79.7	4.0	96	06/17+	60	06/06+	3.82	-0.32	92
Abilene, TX	95.8	71.9	83.9	4.4	103	06/02	61	06/04	2.97	-0.59	83
Amarillo, TX	94.1	64.3	79.2	4.8	107	06/01	53	06/03	2.23	-0.93	71
El Paso, TX	100.6	74.1	87.4	5.7	108	06/22	64	06/17+	0.37	-0.57	39
Dallas, TX	95.5	75.8	85.7	4.4	101	06/22	67	06/04	1.27	-2.58	33
Houston, TX	93.7	76.1	84.9	2.5	98	06/05	72	06/09+	6.64	0.71	112
Midland, TX	98.3	73.5	85.9	5.6	109	06/01	64	06/04	2.56	0.76	142
San Antonio, TX	96.8	75.9	86.3	4.0	101	06/06+	73	06/21+	0.71	-3.43	17

Summary of temperature and precipitation information from around the region for June 2018. Data provided by the Applied Climate Information System. On this chart, "depart" is the average's departure from the normal average, and "% norm" is the percentage of rainfall received compared with normal amounts of rainfall. Plus signs in the dates column denote that the extremes were reached on multiple days. Blueshaded boxes represent cooler than normal temperatures; redshaded boxes denote warmer than normal temperatures; tan shades represent drier than normal conditions; and green shades denote wetter than normal conditions.

Social Policies May Increase Heat Vulnerability

Mark Shafer, SCIPP Director

Heat waves are among the deadliest natural hazards. Dense urban environments may concentrate heat through the heat island effect. Factors such as age, crime, and poverty increase mortality risks associated with heat waves. Cities such as Chicago, IL, which suffered hundreds of fatalities during a 1995 heat wave, have established outreach programs that target neighborhoods most vulnerable to the effects of heat. But recent research shows that these neighborhoods may be becoming more difficult to locate.

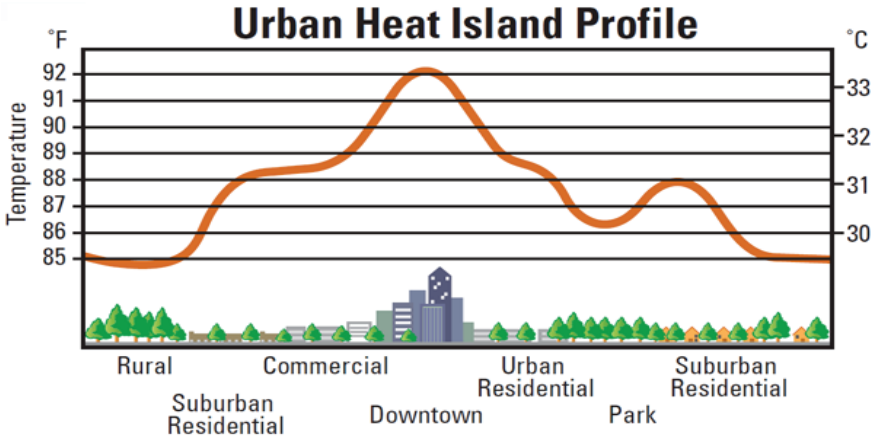
Bev Wilson and Arnab Chakraborty, researchers in the Department of Urban and Regional Planning at the University of Illinois, recently examined population patterns in Chicago and their effects on vulnerability to heat extremes. They found that from 1990 to 2010, concentrations of the most vulnerable populations have become more dispersed and decentralized, making it more difficult to monitor potential impacts and deliver relief and medical attention in a timely fashion.

Using census data, Wilson and Chakraborty identified a dispersion of vulnerability measures over time. Public housing policies, including elimination of high-rise public housing projects in favor of a mixed-income, distributed approach, and economic changes such as gentrification of some neighborhoods, have led to more vulnerable people moving from city cores to suburbs and outlying areas. Such areas are more likely to lack centralized pubic transportation that may allow access to cooling centers.

Although the research has only examined Chicago at this point, the results may have implications for growing metropolitan areas of the Southern Plains. Issues of decentralization, lack of access to public transportation, crime (which keeps people indoors and windows and doors closed), and inability to afford air conditioning are universal. As cities heat up, both through increasing the coverage of paved areas contributing to the heat island effect and warming associated with climate change, the risks to the most vulnerable people increases.

The research was conducted as part of a project examining environmental and social aspects of heat vulnerability in association with the Chicago mayor's office, the Chicago Department of Public Health, the Office of Emergency Management and Communications, and local power utility ComEd. Their study was recently published in the Journal of Environmental Planning and Management.

Bev Wilson & Arnab Chakraborty (2018) Mapping vulnerability to extreme heat events: lessons from metropolitan Chicago, Journal of Environmental Planning and Management, DOI: 10.1080/09640568.2018.1462475



This figure shows the estamated temperature on any given hot day in various areas of a major city.

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From Our Partners

NOAA RISA's SCIPP Team: A better-informed public is a safer public

NOAA's Regional Integrated Sciences and Assessments (RISA) program supports research teams that help expand and build the nation's capacity to prepare for and adapt to climate variability and change.

In 2015, the NOAA RISA team for the South-Central, the Southern Climate Impacts Planning Program (SCIPP), administered surveys, synthesized the results, and created flood brochures to help improve key messaging strategies towards flood risk in Tulsa, Oklahoma. SCIPP's efforts improved public awareness and helped Tulsa maintain their Community Rating System (CRS) eligibility, contributing to a reduction in the flood insurance rates of local homeowners.

About the project: https://www.youtube.com/watch?v=0JNFJaehLV4&feature=youtu.be

About RISA: https://cpo.noaa.gov/RISA

About the Disaster Resilience Network: http://tulsapartners.org/tpi/

If you have any questions, please do not hesitate to contact us by emailing info@southcentralclimate.org.

Contact Us

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For any questions pertaining to historical climate data across the states of Oklahoma, Texas, Arkansas, Louisiana, Mississippi, or Tennessee, please contact the Southern Regional Climate Center at (225)578-5021.

For questions or inquiries regarding research, experimental tool development, and engagement activities at the Southern Climate Impacts Planning Program, please contact us at (405)325-7809 or (225)578-8374.

Monthly Comic Relief

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