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Southern Climate Monitor

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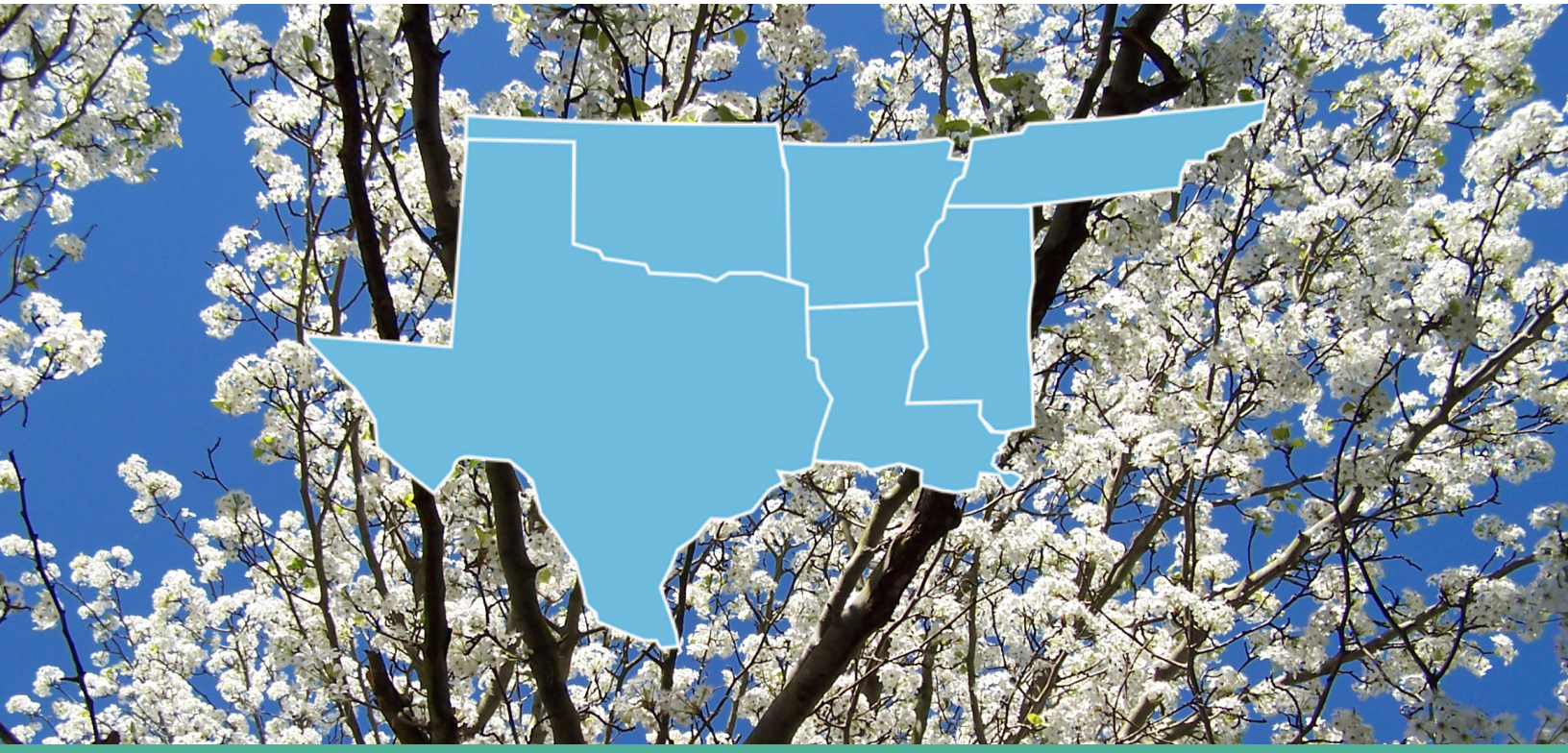

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A Cursory Look at Severe Thunderstorm Locations During the First Half of 2016

Patrick Marsh, Meteorologist, Storm Prediction Center

In last month's edition of the Southern Climate Monitor, Ms. Carly Kovacik discussed how the 2016 severe weather season had produced a below average number of tornadoes but a near average number of severe hail and wind reports. This month I thought it would be interesting to examine the forecasts of severe thunderstorms produced by the National Weather Service's (NWS) Storm Prediction Center (SPC).

The SPC is tasked with the prediction of severe thunderstorms and tornadoes for the contiguous United States. With regards to the NWS, and in turn the SPC, severe thunderstorms are defined to be those producing hail in excess of 1" in diameter, wind in excess of 50 kts (58 mph), or a tornado. (It should be noted that unlike most of the rest of the world, the United States does not consider Flash Flooding in the context of a severe thunderstorm. Instead, heavy rainfall and flash flooding are addressed through a myriad of flood related products.)

The NWS has structured its severe thunderstorm forecasts and warnings in a manner that allows one to think of the process as "Ready -> Set -> Go." SPC plays a key role in both the "Ready" and "Set" parts of the forecast and warning process, with the local NWS forecast offices playing key roles in both the "Set" and "Go" pieces.

At the "Ready" stage, the SPC has several forecast products to convey the threat of severe thunderstorms. The products, collectively known as Convective Outlooks, identify areas where severe weather is possible. SPC produces Convective Outlooks for Day 1 (the current day) all the way out to Day 8, which is seven days in the future. If your area is highlighted within one of these convective outlooks, there is no need to cancel any plans that you may have. Rather, given that this is the "Ready" piece of the NWS forecast/warning process, one should do things to help him or her prepare for severe weather. This may include things such as reviewing his or her overall severe weather safety plans, checking the batteries in the NOAA Weather Radio, and identifying sources as to where one can find additional weather information should it become necessary.

During the day of the severe weather event, the SPC may issue a Severe Thunderstorm Watch or a Tornado Watch. This is the "Set" piece. If you find yourself in a Severe Thunderstorm Watch or a Tornado Watch, again, this does not mean it's time to cancel all plans. Rather one should take the time to review his or her severe weather plan in the context of his or her current situation. For example, if you are out shopping, take a moment to identify where the severe weather refuge areas are located. Also, at this point it becomes important to stay weather aware in case a Severe Thunderstorm Warning or a Tornado Warning is issued.

Severe Thunderstorm Warnings and Tornado Warnings constitute the "Go" piece of the "Ready -> Set -> Go" forecast/warning paradigm. Severe Thunderstorm Warnings and Tornado Warnings indicate that severe thunderstorms have been observed or are believed to be imminent. This means it's time to enact your severe weather safety plan.

Now that we've covered the "Ready -> Set -> Go" process, let's take a moment to look at where severe thunderstorms were possible during the first half of 2016 (through June 15th). These forecasts would be considered the "Ready" piece.

The SPC Day 1 Convective Outlook is a product issued by the SPC identifying where severe thunderstorms, and by extension tornadoes, may occur on that particular day. This product is updated multiple times during the day by the severe weather experts at the SPC. SPC meteorologists evaluate hundreds of pieces of meteorological information and synthesize it all into 4 sub products: Categorical Outlooks, Probability of Tornadoes, Probability of Damaging Thunderstorm Winds, and Probability of Large Hail. For our purposes, we will use the categorical outlook since it is a synthesis of the probabilistic outlooks for tornadoes, wind, and hail. A brief explanation of each of the categories contained in the categorical outlook can be found in Figure 1.

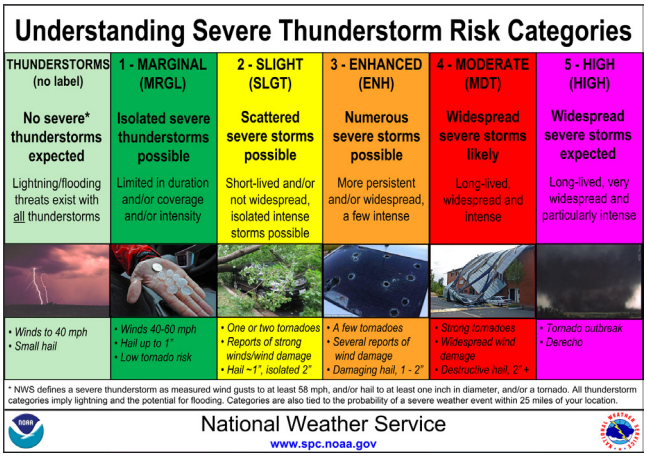


Figure 1. Explanation of each of the severe thunderstorm risk categories contained in the categorical outlook.

Figure 2 is a map that shows the number of days a location was contained in any of the Day 1 categories. In other words, this is where SPC believed there was at least a chance of thunderstorms to occur. As one might imagine, by mid-June, everywhere within the contiguous United States has had the potential to experience a thunderstorm. Additionally, as one might also expect, the southeast United States has seen the most number of days with thunderstorm potential, with the SCIPP state of Louisiana being the most favored location. The reason for the "hot spot" across the southeast has to do with this location being located so close to many of the ingredients necessary for thunderstorm formation; the most important being: moisture.

Figure 3 is similar to Figure 2, except rather than identifying regions where thunderstorms are possible, we have limited it to only areas where severe thunderstorms were possible. As some might have expected, not everywhere within the contiguous United States has been identified by SPC as having the potential for severe thunderstorms. Many areas west of the Rocky Mountains have been identified as having few days with severe thunderstorm potential. There are perfectly valid meteorological reasons for this which have to do with the geography of the United States, but we'll leave that to a subsequent SCIPP article.

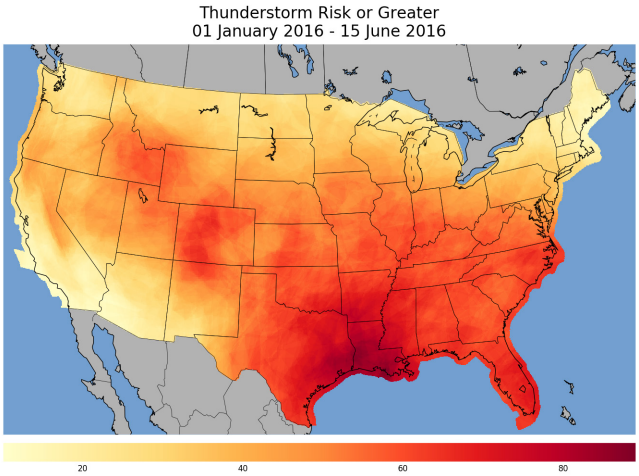


Figure 2. Number of days with a thunderstorm risk or greater.

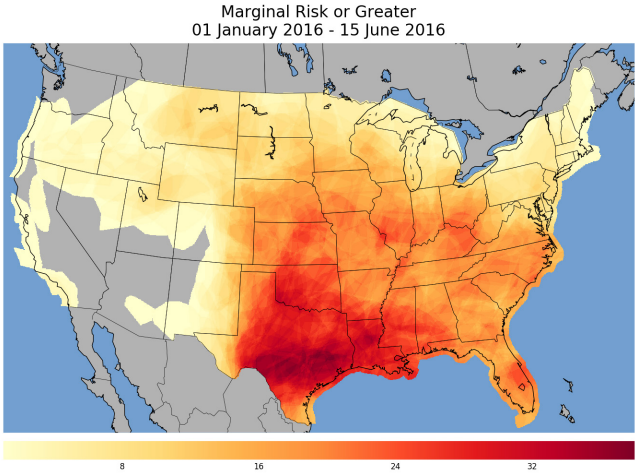


Figure 3. Number of days with a marginal risk or greater.

As for areas east of the Rocky Mountains, just about everywhere has seen at least one day where SPC identified the potential for severe thunderstorms. The only exception to this is far east Maine, where the colder waters of the north Atlantic Ocean can influence the atmosphere's ability to produce severe thunderstorms. Lastly, areas across the southern plains and western Gulf Coast remain the "hot spot" of areas identified by SPC for severe thunderstorm potential, keeping emergency managers and meteorologists across the SCIPP region busy.

Figures 4 through 6 display the number of days at each location where SPC issued Slight Risks, Enhanced Risks, and Moderate Risks respectively. (Note, a graphic depicting SPC High Risks was not included as SPC has not issued a High Risk since 28 April 2014.) In general, the same pattern that we saw in Figures 2 and 3 play out in the Slight Risk (Figure 4) and Enhanced Risk (Figure 5) graphics. The south central United States has been the most active region of the year. Regarding Moderate Risks (Figure 6), the SPC has only issued 4 of these all year: one along the Gulf Coast and another across the mid-Atlantic region (both in February) and 2 across portions of the Great Plains of the United States (both in late Spring).

Although it is always an interesting endeavor to look at the forecasts of severe thunderstorms, let's not forget the human impact of actual severe thunderstorms. 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. Weather is inherently personal.

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 2016 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.

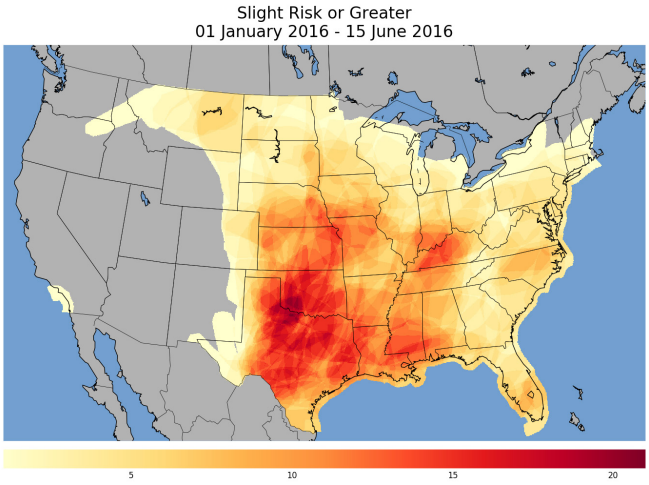


Figure 4. Number of days with a slight risk or greater.

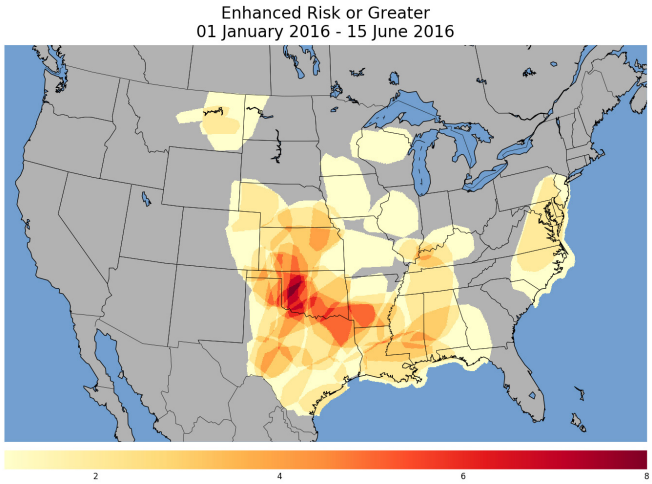


Figure 5. Number of days with an enhanced risk or greater.

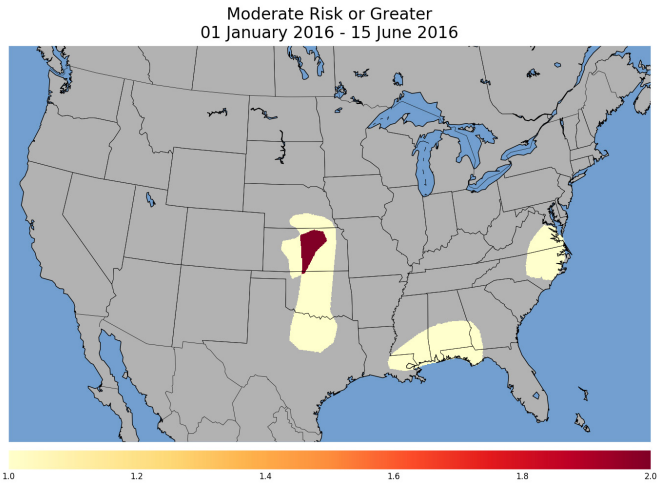


Figure 6. Number of days with a moderate risk or greater.

Drought Update

Luigi Romolo,
Southern Regional Climate Center

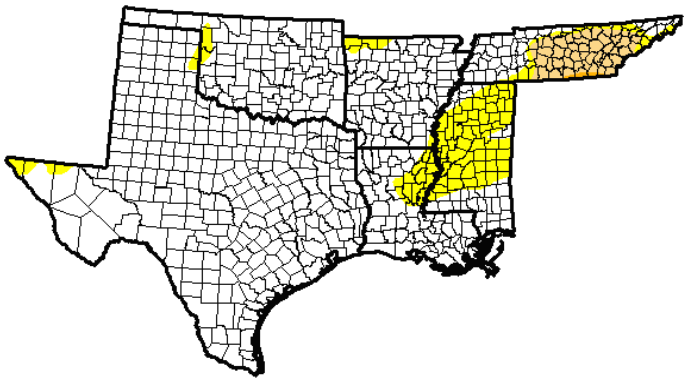
Drought conditions across the Southern Region have improved in the northwestern portion of the region but are is slightly worse in Tennessee. Dry conditions in central Tennessee has led to the expansion of moderate drought. Wet conditions in northwestern Texas has allowed for some improvement, with only a small area of moderate drought remaining in the northern Texas panhandle, near the Oklahoma border.

On May 9, 2016, a tornado outbreak resulted in several twisters in south eastern Oklahoma. One person was reported killed in Garvin County, Oklahoma. A second fatality was reported in Johnston County, Oklahoma, as an EF3 tornado touched down approximately four miles (6.4 km) south of Connerville, Oklahoma.

Several tornadoes were reported in northwestern Texas on May 22, 2016, but fortunately there were no injuries or fatalities reported.

On May 28, 2016 softball-sized hail was reported in Medina county Texas, and billiard ball-sized hail was reported in Taylor County, Texas.

Severe flooding was reported in Brenham, Texas when over 20 inches (508 mm) of rain fell on Thursday, May 26, 2016. According to the Houston Chronicle, there was at least one flood-related fatality (Information provided by the Texas Office of State Climatology).



Released Thursday, June 2, 2016
Mark Svoboda, National Drought Mitigation Center

Above: Drought conditions in the Southern Region. Map is valid for May 31, 2016. Image is courtesy of National Drought Mitigation Center.

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	86.02	13.98	3.80	0.16	0.00	0.00
Last Week *5/24/2016*	85.30	14.70	2.47	0.00	0.00	0.00
3 Months Ago *3/1/2016*	80.47	19.53	0.55	0.00	0.00	0.00
Start of Calendar Year *12/29/2015*	97.72	2.28	0.00	0.00	0.00	0.00
Start of Water Year *9/29/2015*	36.88	63.12	37.43	18.31	5.72	0.00
One Year Ago *6/2/2015*	91.32	8.68	0.32	0.00	0.00	0.00

Intensity:

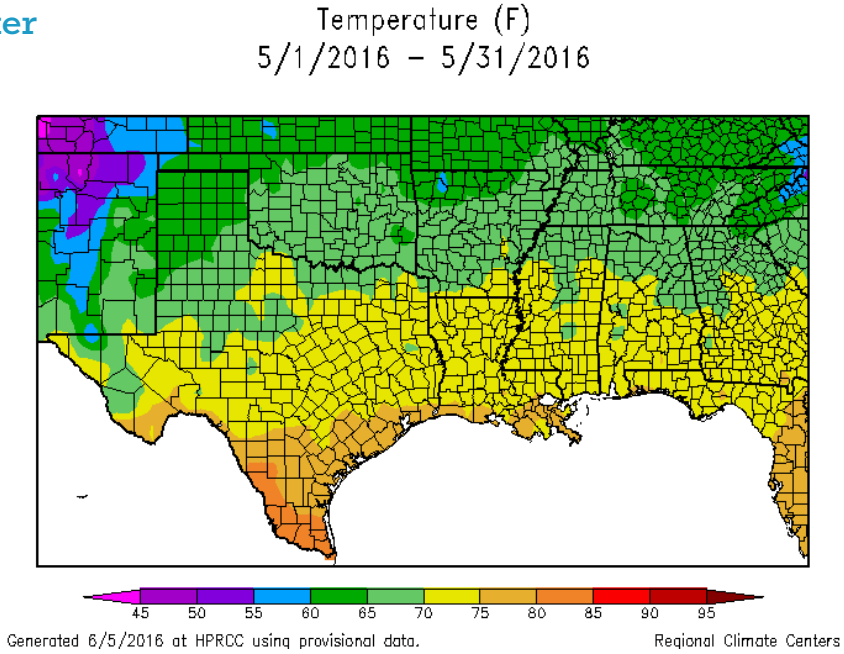
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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

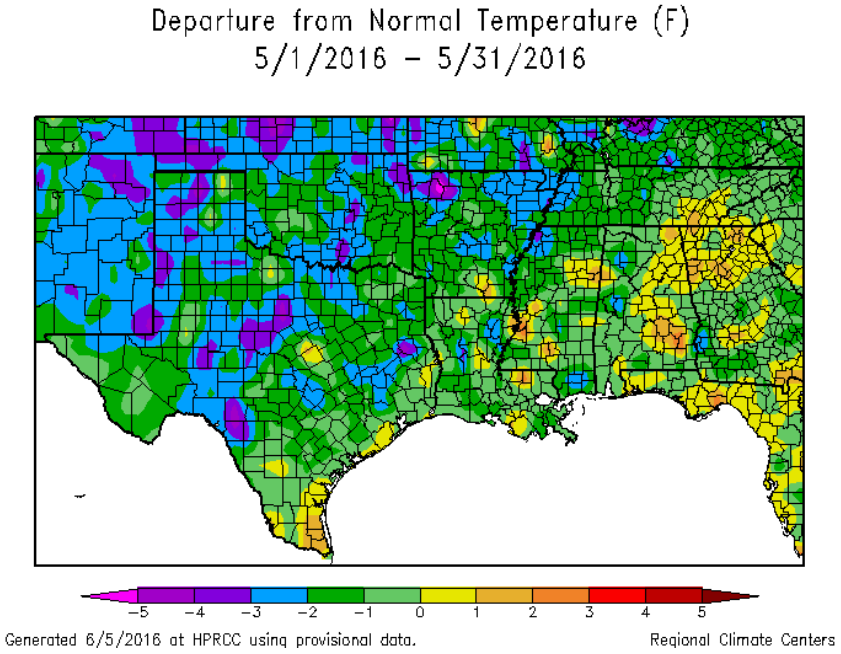
Temperature Summary

Luigi Romolo,
Southern Regional Climate Center

In contrast to the past month, May was a cooler than normal month across the Southern Region. Most stations averaged between 0-2 degrees F (0-1.1 degrees C) below normal, with the exception of northern Texas and western Oklahoma, where temperatures averaged between 2-4 degrees F (1.11 to 2.22 degrees C) below normal. The statewide monthly average temperatures were as follows: Arkansas reporting 67.00 degrees F (19.44 degrees C), Louisiana reporting 73.20 degrees F (22.89 degrees C), Mississippi reporting 70.60 degrees F (21.44 degrees C), Oklahoma reporting 66.20 degrees F (19.00 degrees C), Tennessee reporting 65.30 degrees F (18.50 degrees C), and Texas reporting 71.60 degrees F (22.00 degrees C). The state-wide temperature rankings for May are as follows: Arkansas (twenty-ninth coldest), Louisiana (fifty-first Coldest), Mississippi (forty-third coldest), Oklahoma (twenty-fifth coldest), Tennessee (forty-fifth coldest), and Texas (thirty-fifth coldest). All state rankings are based on the period spanning 1895-2016.



Average May 2016 Temperature across the South

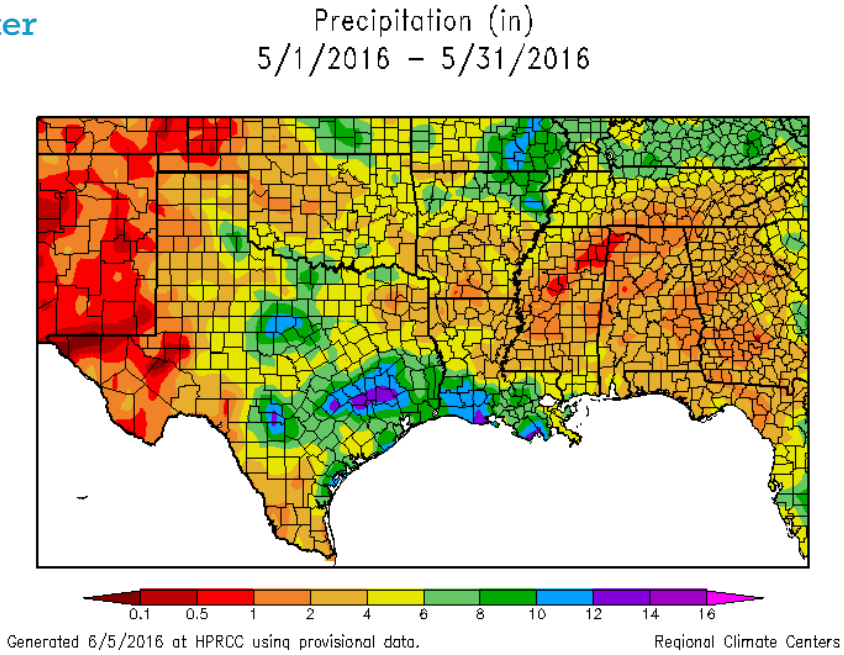


Average Temperature Departures from 1971-2000 for May 2016 across the South

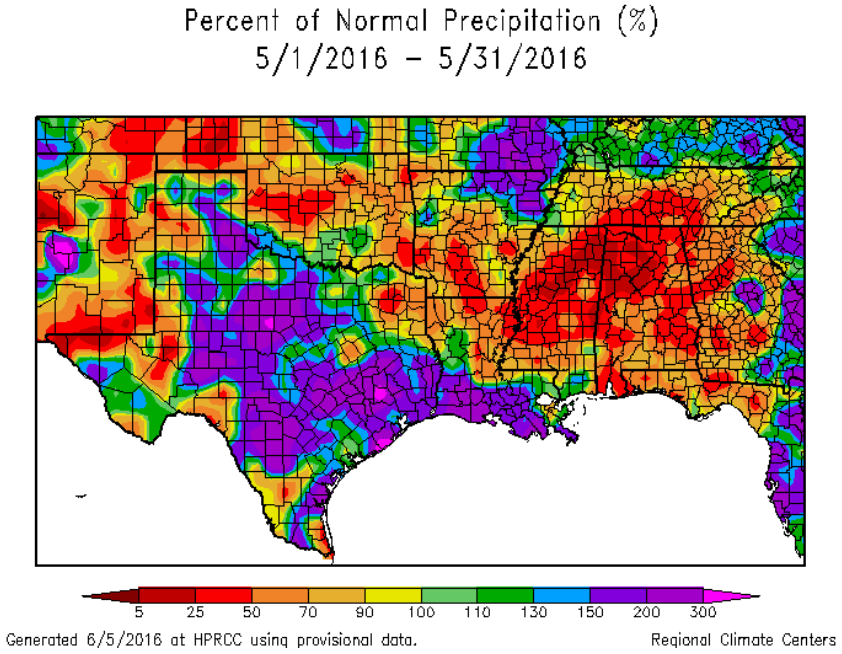
Precipitation Summary

Luigi Romolo,
Southern Regional Climate Center

With the exception of Texas and southern Louisiana, May was generally a drier than normal month in the Southern Region. Conditions were generally driest throughout much of Mississippi and south central Tennessee, with many stations averaging less than half the expected monthly totals. Conversely, precipitation totals along coastal Louisiana averaged between 150 to 200 percent of normal. Similar values were also observed in central and southeastern Texas. The state-wide precipitation totals for the month are as follows: Arkansas reporting 4.64 inches (117.86 mm), Louisiana reporting 5.69 inches (144.53 mm), Mississippi reporting 2.58 inches (65.53 mm), Oklahoma reporting 3.80 inches (96.52 mm), Tennessee reporting 3.83 inches (97.28 mm), and Texas reporting 4.70 inches (119.38 mm). The state precipitation rankings for the month are as follows: Arkansas (fifty-fifth driest), Louisiana (fortieth wettest), Mississippi (twenty-forth driest), Oklahoma (forty-fourth driest), Tennessee (forty-eighth driest), and Texas (eighteenth wettest). All state rankings are based on the period spanning 1895-2016.

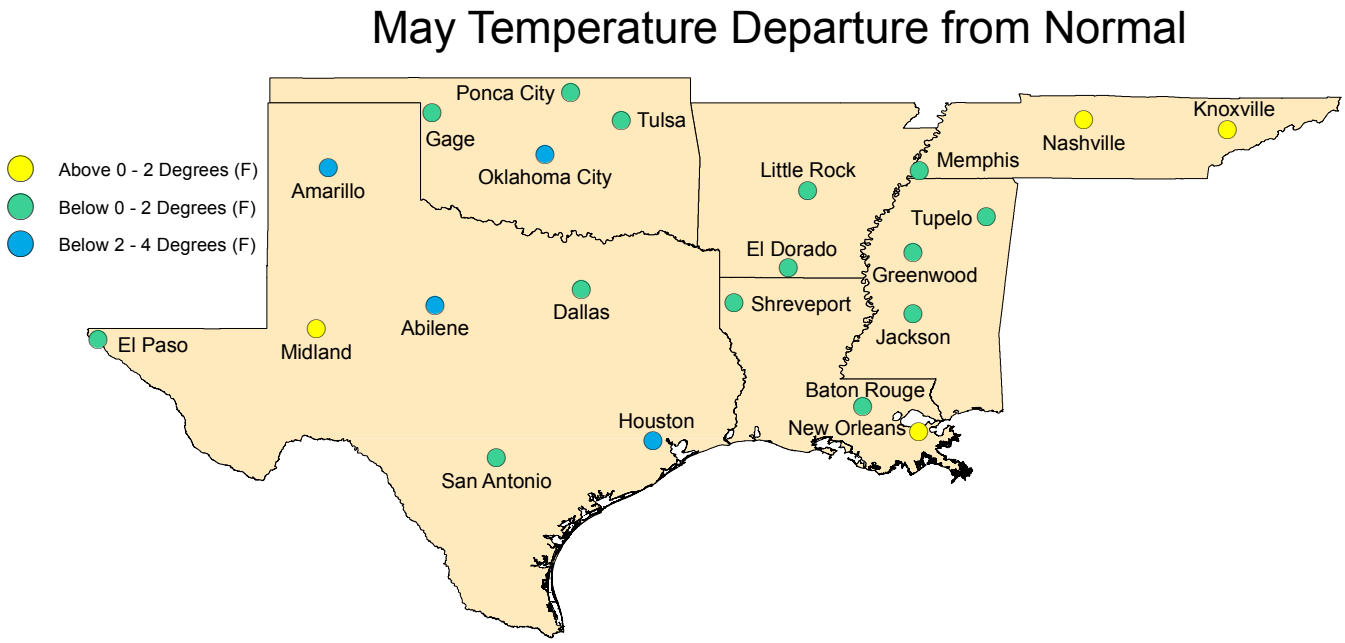


May 2016 Total Precipitation across the South

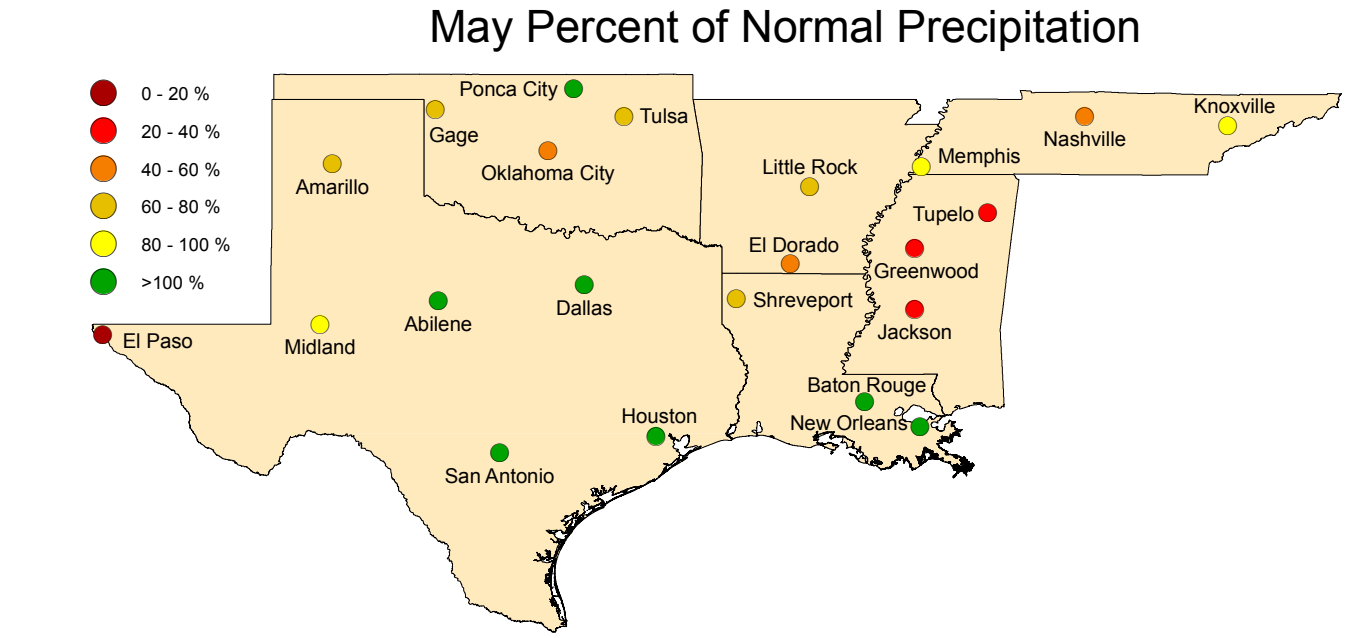


Percent of 1971-2000 normal precipitation totals for May 2016 across the South

Regional Climate Perspective in Pictures



May 2016 Temperature Departure from Normal from 1971-2000 for SCIPP Regional Cities



May 2016 Percent of 1971-2000 Normal Precipitation Totals for SCIPP Regional Cities

Climate Perspective

State	Temperature	Rank (1895-2011)	Precipitation	Rank (1895-2011)
Arkansas	May	29th Coldest	4.64	55th Driest
Louisiana	73.20	51st Coldest	5.69	40th Wettest
Mississippi	70.60	43rd Coldest	2.58	24th Driest
Oklahoma	66.20	25th Coldest	3.80	44th Driest
Tennessee	65.30	45th Coldest	3.83	48th Driest
Texas	71.60	35th Coldest	4.70	18th Wettest

State temperature and precipitation values and rankings for May 2016. Ranks are based on the National Climatic Data Center's Statewide, Regional, and National Dataset over the period 1895-201 1.

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	80.5	59.7	70.1	-1.2	91	05/29	48	05/05+	2.08	-2.97	41
Little Rock, AR	80.5	60.1	70.3	-0.8	92	05/29	50	05/06+	3.44	-1.43	71
Baton Rouge, LA	84.8	64.3	74.5	-1.1	91	05/31+	50	05/07	6.16	1.27	126
New Orleans, LA	85.1	69.9	77.5	0.8	92	05/30	59	05/08+	4.95	0.32	107
Shreveport, LA	82.8	63.5	73.1	-0.1	92	05/29	53	05/07+	3.08	-1.85	62
Greenwood, MS	81.5	59.7	70.6	-1.2	92	05/30	45	05/06	1.49	-3.46	30
Jackson, MS	83.0	60.9	71.9	-0.4	95	05/30	46	05/06	1.36	-3.02	31
Tupelo, MS	81.0	59.6	70.3	-0.4	92	05/30	46	05/06	1.19	-4.37	21
Gage, OK	78.1	52.0	65.0	-1.3	93	05/25	36	05/03	2.35	-0.92	72
Oklahoma City, OK	77.8	57.1	67.5	-2.4	90	05/10	40	05/03	2.62	-2.03	56
Ponca City, OK	77.1	55.4	66.2	-1.4	90	05/25	39	05/03	5.80	0.99	121
Tulsa, OK	77.3	58.4	67.8	-1.4	89	05/10	43	05/03	3.91	-2.00	66
Knoxville, TN	78.0	57.1	67.5	0.3	89	05/31	42	05/16+	4.06	-0.45	90
Memphis, TN	80.1	60.8	70.5	-1.2	92	05/30	49	05/06	5.07	-0.18	97
Nashville, TN	78.6	56.8	67.7	0.2	91	05/26	40	05/15	2.37	-3.13	43
Abilene, TX	81.0	59.9	70.5	-2.5	93	05/25	46	05/03	8.53	5.35	268
Amarillo, TX	77.1	49.2	63.1	-2.5	90	05/25+	34	05/02	1.60	-0.69	70
El Paso, TX	86.8	59.9	73.4	-0.5	97	05/06	44	05/02	0.06	-0.41	13
Dallas, TX	81.5	63.5	72.5	-1.4	93	05/10	48	05/03	6.25	1.35	128
Houston, TX	83.1	65.9	74.5	-2.4	89	05/28+	54	05/04	7.20	2.11	141
Midland, TX	87.3	60.2	73.8	0.2	101	05/23	46	05/02	1.47	-0.27	84
San Antonio, TX	83.7	66.5	75.1	-1.8	93	05/27	53	05/04	9.14	5.13	228

Summary of temperature and precipitation information from around the region for May 2016. 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.

Record Heat for the Globe for Thirteenth Straight Month

Barry Keim, Louisiana State Climatologist, Louisiana State University

NOAA released a report last week noting that globally, May 2016 was the warmest May on record, with our record-keeping going back to 1880. That's 137 Mays, and this past one was the warmest. What is interesting is that this past April (2016) also broke a record as the warmest April on record, and the same can be said for this past March, February, and January too. In fact, this can be said for the past 13 straight months, dating back to June 2015. Every one of those months was the warmest of record, dating back to 1880. I think this establishes a full-blown pattern! Figure 1 shows that while most of the globe was warmer than normal, there are still regions with below normal temperatures, which are shown in blue. For example, parts of central Asia, much of southern South America, the central North Pacific Ocean, and the North Atlantic. The North Atlantic cool spot, located just south of Greenland, is garning a lot of attention and is called the "Cold Blob," and many are wondering what its impact may be on the upcoming hurricane season. The thinking is that the cold water in this region is likely coming from ice melting off of the Greenland ice sheet, and it will likely have an impact on oceanic circulation patterns. However, it is clear that most of earth's surface was warmer than normal, especially across large expanses of the Indian Ocean and southwestern Pacific, leading to the record warmth for the globe, on average. It is also interesting to note that the pattern across Louisiana fell very close to average for the month of May. If you have any questions, feel free to contact me at keim@lsu.

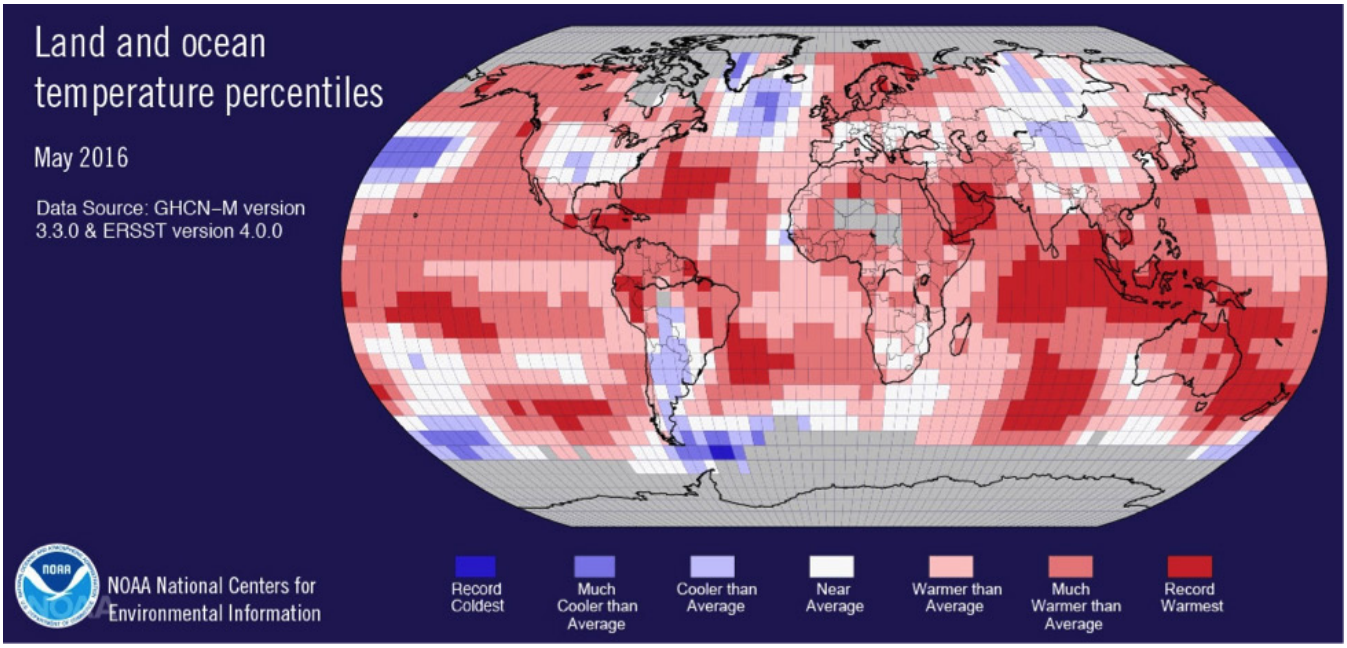


Figure 1. Geographical pattern of the record warmth for May 2016. Graphic is from NOAA's National Centers for Environmental Information and is found at http://www.noaa.gov/persistent-heat-across-globe-makes-baker%E2%80%99s-dozen-record-books.

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Contact Us

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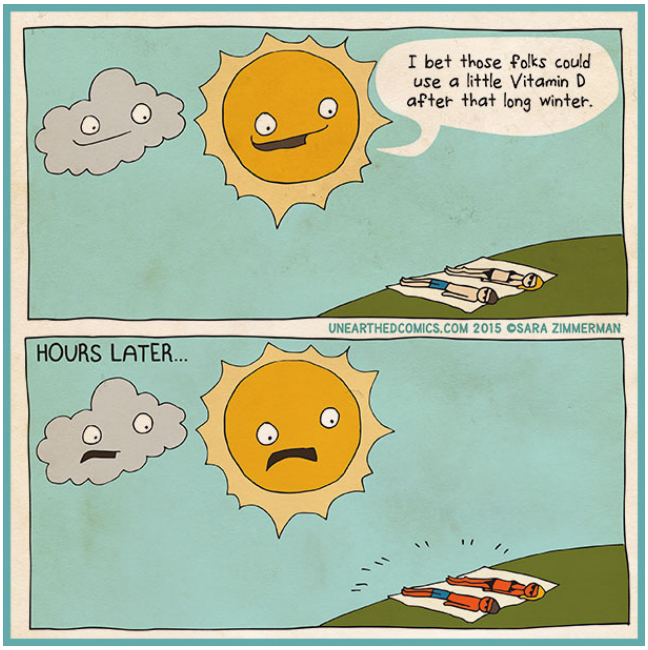
For any questions pertaining to historical climate data across the states of Oklahoma, Texas, Arkansas, Louisiana, Mississippi, or Tennessee, please contact the Southern Regional Climate Center at 225-578-5021.

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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