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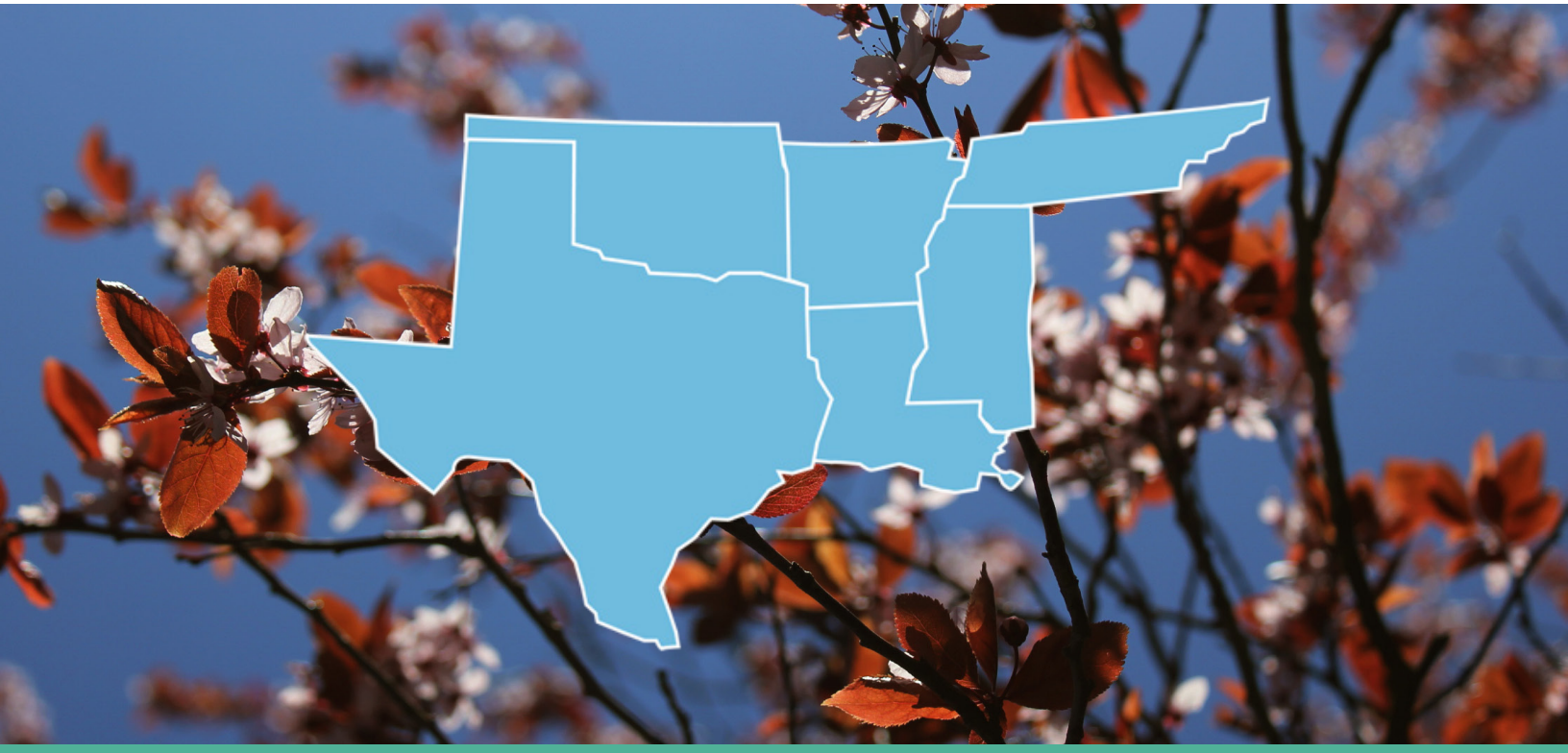
Southern Climate Monitor

March 2015 | Volume 5, Issue 3



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Climate Training for Native American Tribes

Rachel Riley, SCIPP Associate Program Manager, University of Oklahoma

Last summer and fall, SCIPP, in conjunction with the Department of Interior's South Central Climate Science Center, hosted four climate training workshops for tribes in Oklahoma and Texas. The purpose of the workshops was to educate tribal environmental professionals and related staff on the basics of climate science and introduce them to the concept of how to conduct a vulnerability assessment.

The idea for the workshops stemmed from conversations that occurred during an intertribal meeting in Oklahoma in 2011. That meeting focused on climate change education and learning about the climate-related concerns that tribal stakeholders in the southern Great Plains had regarding climate change, but the need to communicate more in-depth information about climate science and climate data was also realized. That realization led to a proposal submission on conducting climate training workshops for Native American Tribes in Oklahoma and Texas.

Through generous support from the NOAA Regional Integrated Sciences and Assessments program, materials were developed and four two-day workshops were conducted in August and September 2014 in Wyandotte, Fort Cobb, Durant, and Stroud, Oklahoma (Figure 1). The workshop in Wyandotte was hosted by the Eastern Shawnee Tribe of Oklahoma, Stroud was hosted by the Sac and Fox Nation, Fort Cobb was hosted at the Caddo-Kiowa Technology Center, and Durant was hosted by the Choctaw Nation of Oklahoma. Thirty-nine tribes reside in Oklahoma and three reside in Texas. In total, 35 tribal participants from 18 tribes attended the workshops.

The climate education component of the agenda covered topics including Introduction to Climate, Basics of Climate, Weather Hazards and Hazard

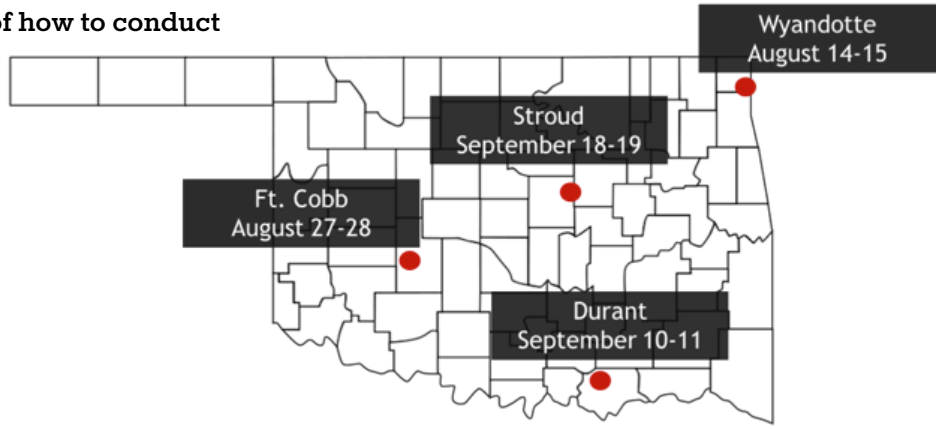


Figure 1. Workshop dates and locations in 2014

Climatology, Past Climate Reconstruction and Climate Proxies, Climate Variability and Change, and a summary presentation on Climate Tools and Data, where attendees learned about where to access climate data and tools on the internet. All of the climate education materials are available for free on SCIPP's website, www.southernclimate.org.

A special topic was also presented at each workshop; the topic chosen by a few representatives in each region. The special topics provided an opportunity for the attendees to learn in-depth about a hazard that has had a significant impact on area tribes. The special topics presented included drought planning, 2007 flooding and Tropical Storm Erin, and managing the 2014 Guthrie fire. Guest presenters included SCIPP Director Mark Shafer, University

of Oklahoma Professor Jeff Basara, and Oklahoma Forestry Services Fire Management Staff Forester Drew Daily, respectively.

To gauge learning on these aforementioned topics, a questionnaire was administered at the beginning and end of each workshop. The participants' scores improved from 63% correct at the beginning to 81% at the end. Additionally, the average number of sources with which the participants were familiar increased from 2.5 to 4.5 (out of 6 listed sources).

Another component of the workshop focused on the recently released 2014 National Climate Assessment (NCA). A summary of the NCA's Indigenous Peoples, Lands, and Resources chapter was presented, followed by a discussion among the attendees regarding its relevancy and key points that stood out to them. Participants were interested to see the impacts of climate change on other tribes, but noted that Oklahoma has some unique circumstances that make their challenges a bit different.

Finally, participants were introduced to vulnerability assessments and how the concept could be a useful planning tool. Terms such as hazards, vulnerability, sensitivity, adaptive capacity, and coping actions were defined. Vulnerability assessment examples were presented, ranging from very large, in-depth multi-agency assessments to smaller, less in-depth assessments that might be within the scope of a tribe. After the introduction, attendees worked through a handout, identifying climate impacts on their tribe and potential adaptation strategies that could be used to address those impacts.

These workshops continued a long-standing engagement of helping tribal members understand the causes of climate variability and change, relate it to their tribal operations, and engage in longer-term planning with their circumstances and limited resources in mind. While in many cases they may not control large, contiguous areas of land and water, they are in a position to understand the physical processes that connect them to their neighbors and engage in dialogue about solutions. SCIPP is continuing to work with tribal members to address unmet climate-related needs.

Figure 2. SCIPP Research Associate Alek Krautmann presenting on climate change in Fort Cobb, Oklahoma

Figure 3. Workshop participants and instructors in Durant, Oklahoma

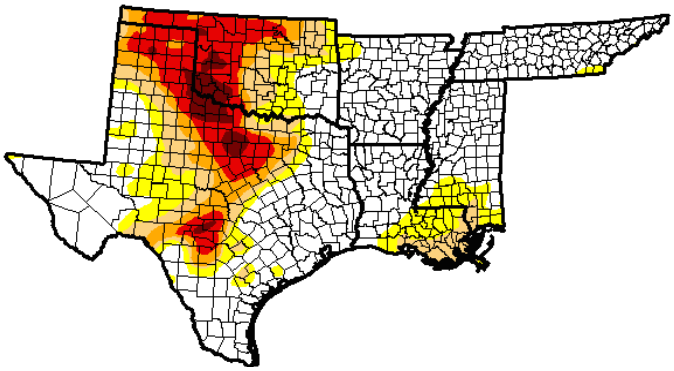
Drought Update

Luigi Romolo,
Southern Regional Climate Center

Drought conditions in the Southern Region improved significantly over the past month. Above normal precipitation over Arkansas and western Tennessee has led to the removal of all moderate drought and abnormally dry conditions and the two states are now drought-free. Similarly, much of the moderate drought that was located in southeastern Louisiana and southern Mississippi has been reduced to just a small number of counties/parishes along the northern gulf coast. In southeastern Texas, heavy rainfalls throughout the month has led to the removal of some moderate and severe drought. Conversely, dry conditions in northern Texas and Oklahoma has led to some expansion of extreme drought.

The final week of March brought its fair share of severe weather to Oklahoma and Arkansas. Strong storms and over a dozen tornado reports left tens of thousands of people without power on March 25-26. Over 15 injuries have been reported and 4 fatalities, including one twister related death in Tulsa County, Oklahoma.

On March 31, baseball-sized hail was reported in Bolivar County, Mississippi, and four tornadoes were reported in eastcentral Arkansas. Damage from the storms appears to be mostly limited to power lines, and trees.



Released Thursday, April 2, 2015
Eric Luebehusen, U.S. Department of Agriculture

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	57.31	42.69	29.63	19.60	12.60	2.79
Last Week 3/24/2015	55.25	44.75	29.95	19.37	11.66	2.79
3 Months Ago 12/30/2014	41.57	58.43	33.88	18.43	8.80	2.36
Start of Calendar Year 12/30/2014	41.57	58.43	33.88	18.43	8.80	2.36
Start of Water Year 9/30/2014	41.74	58.26	35.49	22.66	8.47	1.98
One Year Ago 4/1/2014	34.69	65.31	45.56	27.99	17.02	3.38

Intensity:

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

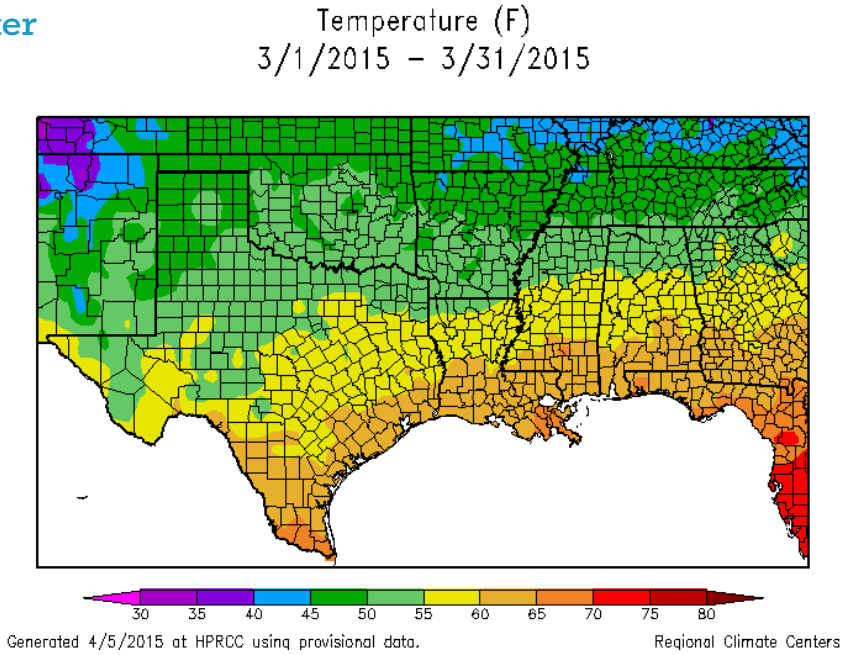
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Above: Drought conditions in the Southern Region. Map is valid for March 31, 2015. Image is courtesy of National Drought Mitigation Center.

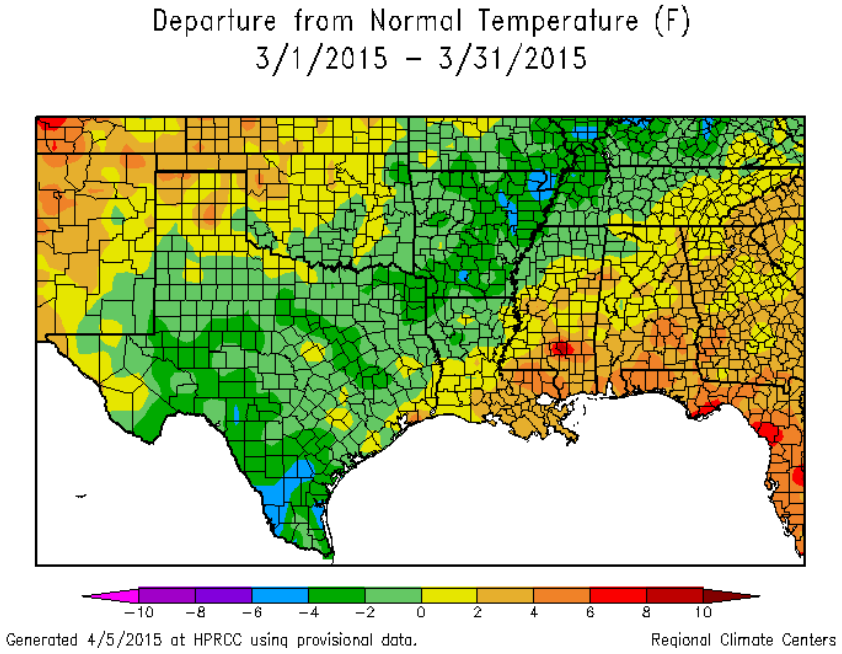
Temperature Summary

Luigi Romolo,
Southern Regional Climate Center

March temperatures varied spatially across the Southern Region, however, most stations in the region averaged within 2 degrees F (1.11 degrees C) of normal. The coldest anomalies occurred in the south of Texas, particularly in the climate divisions of South Texas and the Lower Valley. Temperatures there averaged between 2 to 6 degrees F (1.11 to 3.33 degrees C) below normal. Similar departures from normal also occurred in northeastern Arkansas. The warmest anomalies occurred in southern Mississippi, where most stations averaged between 4 to 6 degrees F (2.22 to 3.33 degrees C) above the monthly average. The state-wide average temperatures for the month are as follows: Arkansas averaged 49.90 degrees F (9.94 degrees C), Louisiana averaged 60.69 degrees F (15.89 degrees C), Mississippi averaged 57.40 degrees F (14.11 degrees C), Oklahoma averaged 51.10 degrees F (10.61 degrees C), Tennessee averaged 49.00 degrees F (9.44 degrees C), and Texas averaged 56.40 degrees F (13.56 degrees C). Because most stations in the region experienced near normal average temperatures, all state temperature rankings fell within the two middle quartiles.



Average March 2015 Temperature across the South

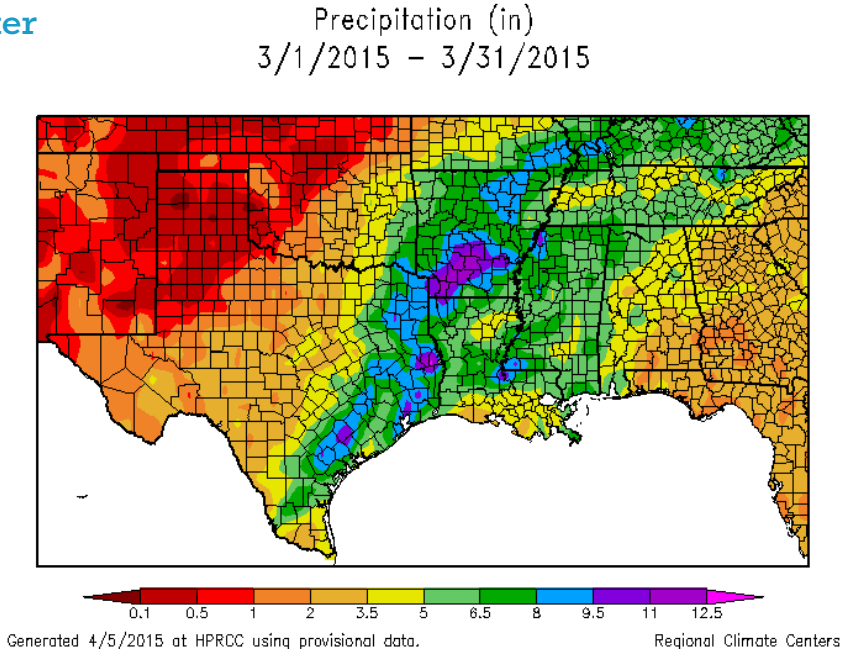


Average Temperature Departures from 1971-2000 for March 2015 across the South

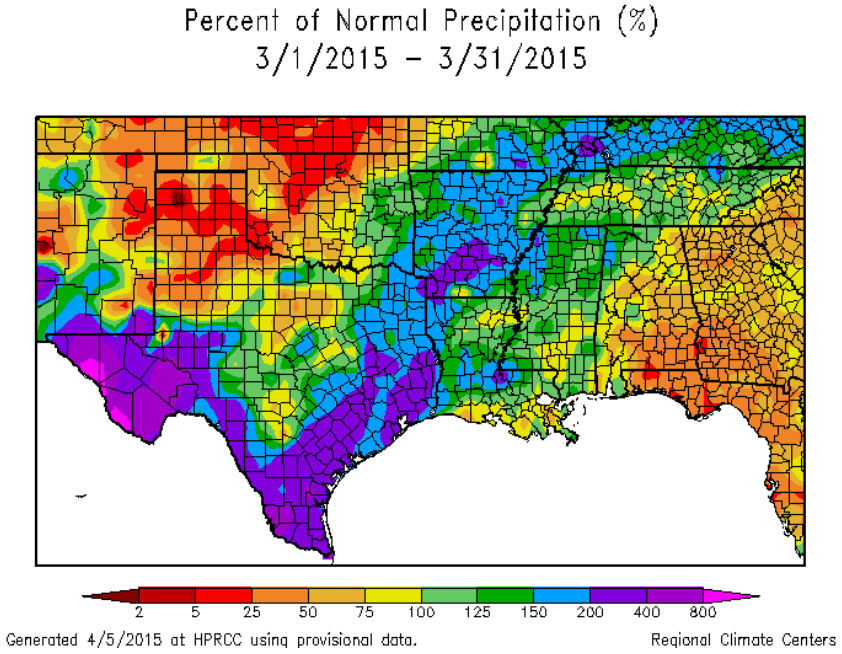
Precipitation Summary

Luigi Romolo,
Southern Regional Climate Center

March precipitation in the Southern Region varied from extremely dry in some areas to extremely wet in other areas. The highest departures from normal occurred in the Trans Pecos, South Texas and Lower Valley climate divisions of Texas, and in southern Arkansas. A bulk of the stations in these locations averaged over two to three times the monthly normal, and in the case of the Trans Pecos Climate Division, some stations reported over four times of normal. In contrast, many stations in the northern Texas panhandle reported only 25 percent of normal precipitation for the month. This was also the case over north central Oklahoma. The state-wide average precipitation totals for the month are as follows with: Arkansas reporting 7.64 inches (194.06 mm), Louisiana reporting 5.85 inches (148.59 mm), Mississippi reporting 6.06 inches (153.92 mm), Oklahoma reporting 2.22 inches (56.39 mm), Tennessee reporting 5.00 inches (127.00 mm), and Texas reporting 3.35 inches (85.09 mm). For the state of Texas, it was the fourth wettest March on record (1895-2015), while Arkansas recorded its twelfth wettest March on record (1895-2015). All other state-wide precipitation rankings fell within the two middle quartiles.

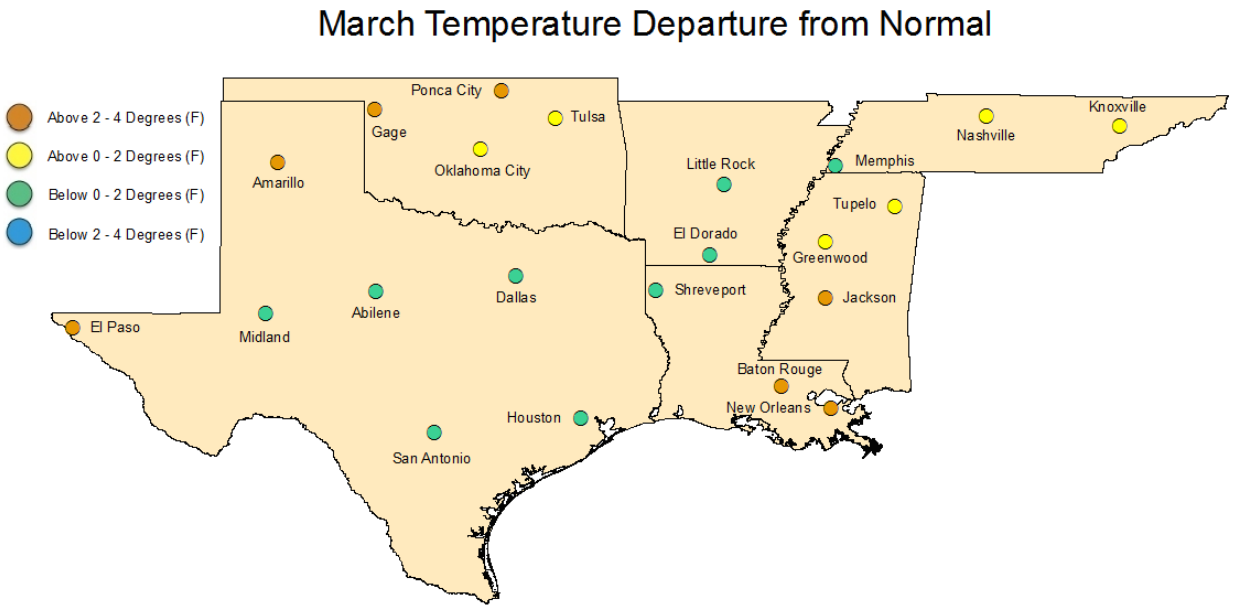


March 2015 Total Precipitation across the South

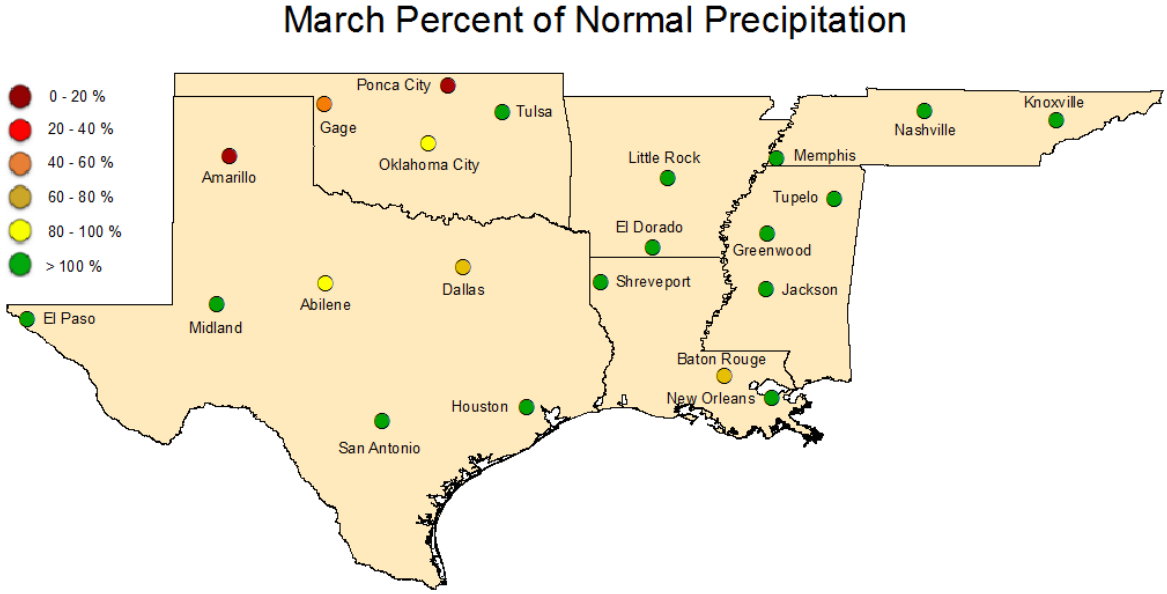


Percent of 1971-2000 normal precipitation totals for March 2015 across the South

Regional Climate Perspective in Pictures



March 2015 Temperature Departure from Normal from 1971-2000 for SCIPP Regional Cities



March 2015 Percent of 1971-2000 Normal Precipitation Totals for SCIPP Regional Cities

Climate Perspective

State	Temperature	Rank (1895-2011)	Precipitation	Rank (1895-2011)
Arkansas	49.90	41st Coldest	7.64	12th Wettest
Louisiana	60.69	39th Warmest	5.85	34th Wettest
Mississippi	57.40	40th Warmest	6.06	52nd Wettest
Oklahoma	51.10	43rd Warmest	2.22	54th Driest
Tennessee	49.00	51st Warmest	5.00	61st Wettest
Texas	56.40	57 Coldest	3.35	4th Wettest

State temperature and precipitation values and rankings for March 2015. 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	63.4	44.6	54.0	-1.8	82	03/29	19	03/06	6.37	1.62	134
Little Rock, AR	61.8	43.2	52.5	-0.9	84	03/31	17	03/06	8.10	3.42	173
Baton Rouge, LA	75.6	54.6	65.1	3.6	87	03/17	26	03/06	3.38	-1.03	77
New Orleans, LA	74.9	57.9	66.4	3.8	86	03/17	31	03/06	6.36	1.81	140
Shreveport, LA	66.3	48.5	57.4	-0.5	85	03/17	24	03/06	8.02	3.88	194
Greenwood, MS	66.1	46.4	56.3	0.8	80	03/31+	20	03/06	5.14	0.83	119
Jackson, MS	70.2	49.2	59.7	2.8	84	03/16	23	03/07+	7.27	2.23	144
Tupelo, MS	64.2	44.0	54.1	0.1	82	03/17	18	03/06	6.42	1.60	133
Gage, OK	67.9	34.8	51.3	4.0	88	03/16	12	03/05	1.04	-0.84	55
Oklahoma City, OK	65.2	42.1	53.6	1.4	86	03/31	10	03/05	2.62	-0.44	86
Ponca City, OK	64.7	37.0	50.9	2.1	86	03/31	7	03/05	0.26	-2.45	10
Tulsa, OK	63.8	41.9	52.8	1.5	85	03/31	17	03/05	3.71	0.42	113
Knoxville, TN	61.8	41.3	51.5	1.2	78	03/25	19	03/06	4.44	0.10	102
Memphis, TN	62.4	43.0	52.7	-1.3	80	03/31	15	03/06	5.48	0.32	106
Nashville, TN	62.1	39.1	50.6	0.6	82	03/31	9	03/06	4.29	0.18	104
Abilene, TX	67.5	44.0	55.7	-0.7	91	03/29	20	03/05	1.60	-0.14	92
Amarillo, TX	65.6	35.7	50.6	2.8	87	03/31	12	03/05	0.21	-1.18	15
El Paso, TX	71.9	47.5	59.7	3.1	88	03/29+	27	03/06	0.61	0.35	235
Dallas, TX	65.0	47.2	56.1	-1.5	83	03/31+	22	03/06+	2.53	-0.96	72
Houston, TX	72.0	52.9	62.5	-0.2	83	03/31+	30	03/06	6.34	2.93	186
Midland, TX	67.7	41.8	54.7	-0.9	91	03/29	24	03/06+	1.65	1.05	275
San Antonio, TX	70.3	51.6	60.9	-1.3	83	03/29+	31	03/06	2.97	0.66	129

Summary of temperature and precipitation information from around the region for March 2015. 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 wdays. 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.

What Do Meteorology and the Military Have in Common?

Barry Keim, Louisiana State Climatologist, Louisiana State University

All Quiet on the Western Front is a book written by Erich Maria Remarque, who was a World War I (WWI) veteran. What Remarque was referring to in the title of the book - The Western Front – was a dividing line that separated the German forces to the north and east, and Allied troops (French, British, Belgian, and later the Americans) to the south and west, as shown in red in Figure 1. This was the Western Front as of 1914, but there was really little change in the line of demarcation during the course of the war, which lasted until 1918. There was also an Eastern Front during WWI that divided the Russians and Romanians from the Germans, Turks, Bulgarians, Hugarians, and Austrians. So what does this have to do with the weather? Well, the term "front" - as in a cold front, warm front, stationary front, and occluded front - is a term borrowed from the military, and in particular, from the Eastern and Western Fronts during WWI.

Meanwhile, back in Bergen, Norway..... scientists in the Bergen School of Meteorology were chipping away at new techniques in weather forecasting. They were just unraveling the complexities of mid-latitude cyclones, complete with their converging winds, forward motion, and the lines of demarcation between opposing airmasses. These boundaries between airmasses - e.g., in St. Bernard, we're talking about cold dry air from Canada bumping into warm moist air from the Gulf of Mexico - formed boundaries, that resembled the lines of demarcation during WWI along the Eastern and Western Fronts. As a result, the concept of a weather "front" was born, which was publised in a famous paper by Jacob Bjerknes and Halvor Solberg in 1921. The published paper actually focused on the production of rainfall in a cyclone, but little did they know that this work would signficantly change the way we approached weather forecasting by

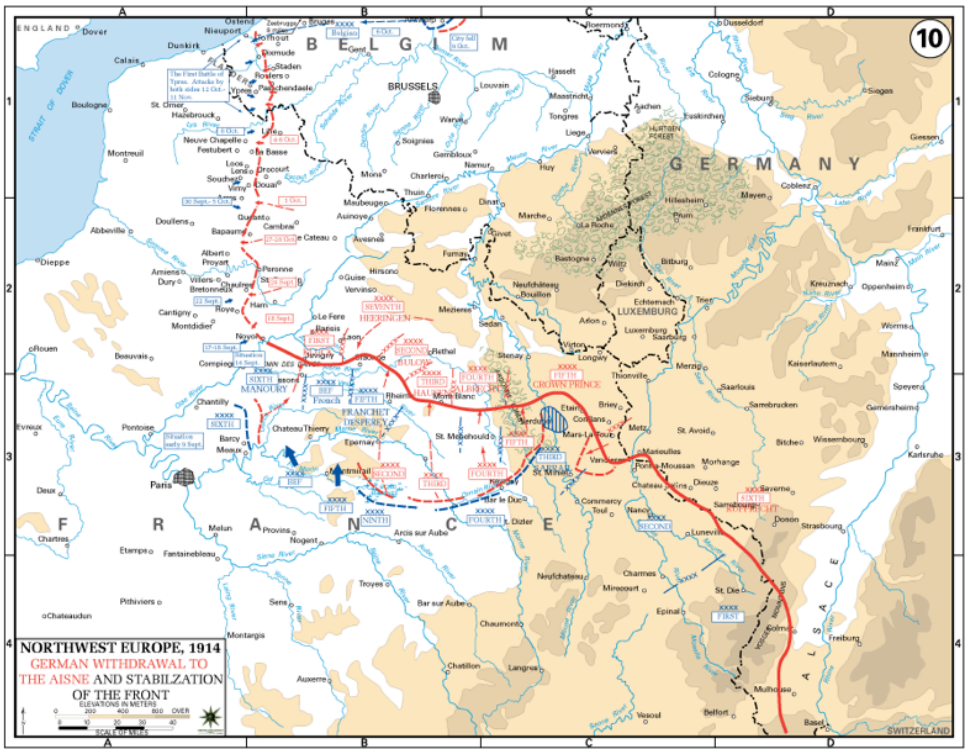


Figure 1. The Western Front in Europe during World War 1 depicted in red. This map was constructed by personnel from the U.S. Army and is in the public domain. It can be found at <http://upload.wikimedia.org/wikipedia/commons/3/3e/Stabilization_of_Western_Front_WWI.PNG>.

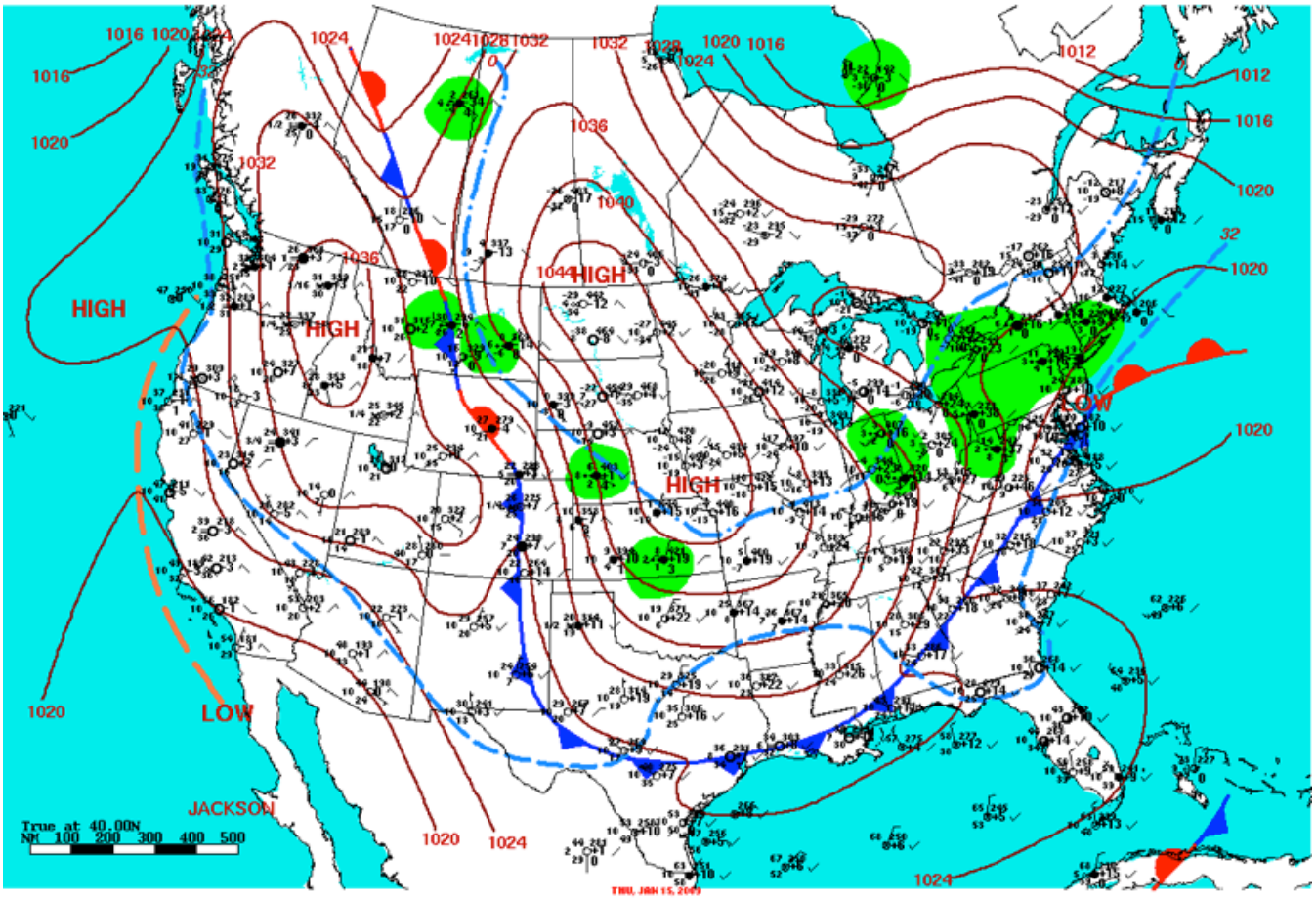


Figure 2. Daily weather map from January 15, 2009. In Louisiana, a cold front divides cold air that originated in Canada from warmer, more humid air to the south. Daily weather map can be accessed at http://www.hpc.ncep.noaa.gov/daily-wxmap/dwm_stnplot_20090115.html.

introducing the terms "warm front" and "cold front." As ingenious as the research was, it took some time to take root, as the concept of fronts was eventually adopted and used on weather maps in the United States beginning in late 1942, over 20 years after its inception. Needless to say, but the concept of "fronts" in meterology is not going away anytime soon, with the nomenclature having persisted now for nearly a century and is still very central to our interpretation of weather patterns and forecasting today. Give this article some thought the next time a cold "front" sweeps across the plains of Da Parish. If you have any questions, feel free to contact me at keim@lsu.edu.

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