SCIPP
A NOAA RISA TEAM

Southern Climate Monitor

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The Southern Climate Monitor is available at
www.srcc.lsu.edu & www.southernclimate.org

Partnership Between OWL and SCIPP

James Cuellar, SCIPP Student Assistant/OU School of Meteorology Undergraduate Student
Leah Hill, OU School of Meteorology Undergraduate Student

Preface

- James Cuellar

The Oklahoma Weather Lab, or OWL, is a student organization run through the University of Oklahoma School of Meteorology, whose primary focus is to teach undergraduate meteorology students the ins and outs of operational forecasting. This is accomplished through morning and evening shifts where selected shift leaders will lead a group of students in forecasting for the state of Oklahoma and Key West, Florida along with going over a number of selected topics that help students understand the intricacies of operational forecasting. One of these shifts primarily focuses on long-range forecasting and climate forecasting and is inconspicuously named the OWL Climate Shift. It is in this shift where the partnership between OWL and the Southern Climate Impacts Planning Program, or SCIPP, come together to teach students about the importance of long-range and climate forecasting.

In 2014, SCIPP and OWL decided to partner together to find ways to better communicate how the drought in the southern plains was affecting the public along with communicating updates to its intensity and potential future relief. This was achieved by creating a weekly podcast discussing primarily drought conditions across the southern climate region. These podcasts created an opportunity for students to learn about and understand long-range and climate forecasting. The utilization of the Baron Lynx graphics system along with posting the podcasts to YouTube allowed for the information to be well-communicated.

Our Project

When Leah and I took over the duties for the OWL Climate Shift last semester, we wanted the shift to be more interactive with both the students and the public while still continuing the Weekly Regional Podcasts. We set goals to increase student interest in long-range forecasting. This included creating and implementing lessons on various long-range weather and climate phenomena that can cause changes in day-to-day weather patterns. This included understanding this processes and impacts of oscillations such as the ENSO, the NAO, the AO, and other oscillations that impact long-term weather patterns across the globe. Instead of focusing solely on the names and impacts of each oscillation, we wanted the students who attended the shift to know why these oscillations occur and what exactly defined the positive and negative phases of each oscillation. We also covered Climate Prediction Center (CPC) outlooks as we delved into the exact definition of the percentages of confidence for both temperature and precipitation outlooks. Branching off of the CPC outlooks, we also covered in detail the tools and computer models that are used to create these outlooks. This included discussing why 500-millibar heights were crucial to determining the average surface temperature of a particular area. Lastly, we used ongoing major weather events to explain how some natural disasters can be manifested over long periods of time such as the devastating California wildfires that occurred in the fall of 2018 and the long-term effects of the southern plains drought that lasted from 2010 to 2015.

Along with increased student involvement and interaction, Leah and I also expanded the social media presence OWL had in regard to climate forecasting. While we continued the Weekly Regional Podcasts just as previous shift leaders for the OWL Climate Shift had done, we wanted to include educational videos that simplified what exactly each one of our graphics were outlying. For example, we created a video discussing how and why the thickness of the atmosphere is a good indication for what surface temperatures are going to be. Also, with the upcoming weak El Niño, we discussed what processes were occurring in the equatorial Pacific to cause this long-term weather pattern, and we examined the usual impacts the continental United States sees with weak El Niños. Our goal with this project is to educate the public so that those who watch the Weekly Regional podcasts can have a better idea as to what each graphic we present means.

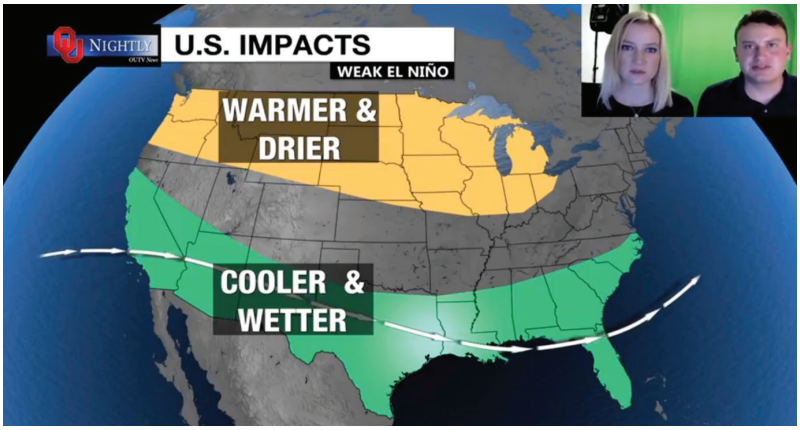


Figure 1: Screenshot of an educational video that supplements the Weekly Regional Podcast. In this picture, Leah (left) and James (right) discuss the impacts of El Nino on the continental United States.

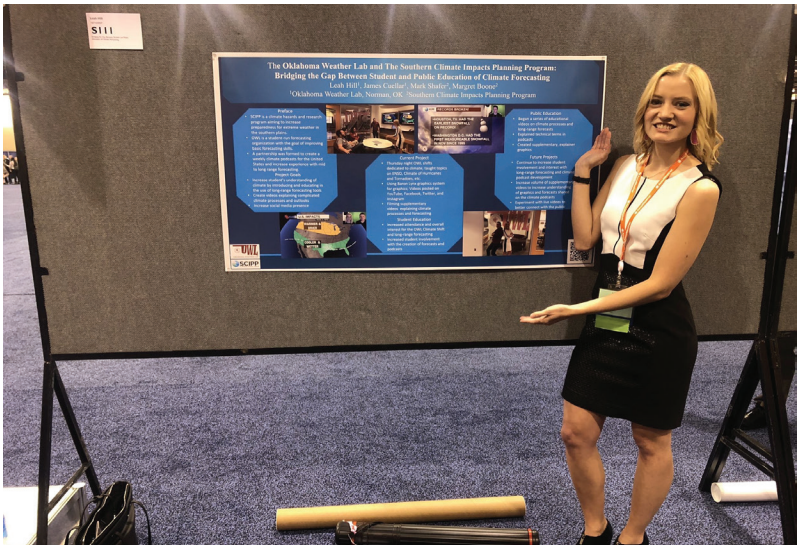


Figure 2: Leah presenting the OWL/SCIPP poster at AMS in Phoenix, AZ.

Due to the success of the podcasts, the educational videos, and student involvement, we decided Leah would present our work at the 2019 American Meteorological Society (AMS) conference. We put together a poster for the student poster session, and come January, Leah was on a plane heading for AMS.

American Meteorological Society Experience

- Leah Hill

The weekend of the AMS student conference was an incredible experience. I met professionals in different meteorology fields, and attended panel discussions. There was also a career fair on the Saturday of the conference where meteorology companies and graduate schools set up booths and met with students about their programs.

Presenting the poster itself on that Sunday was one of the most nerve racking yet exciting things I had ever done. The poster was featured on the AMS Twitter page, resulting in many people showing up to my station asking questions and wanting to hear about myself and James's work. I loved interacting with everyone and talking about the project I was so proud of. My favorite part of presenting was getting feedback and hearing suggestions of more videos James and I could film. The experience filled my head with

ideas and I left the poster session with a page full of notes for future projects.
The AMS conference and the poster presentation was such a great learning experience. There is no better way to come up with new ideas about climate, or meteorology concepts, than being in a room full of hundreds of others with the same interests. I am incredibly grateful I had this opportunity, and I am looking forward to growing the climate podcasts even more this semester.

Figure 3: James (middle) and Leah (right) discussing the impacts of El Nino on the continental United States in the OWL Climate Shift.

Future of the Partnership
- James Cuellar

Some of our ideas for the expansion of our project prior to the AMS conference included having students being involved in creating their own weekly regional podcasts so that we could create a rotational system in the future so that more than two people can be a part of the Weekly Regional podcasts. In addition, we wanted to increase the amount of supplementary videos that would further educate the public on the content of the Weekly Regional Podcasts. We also wanted to experiment with live videos, such as Facebook Live or Periscope, to further engage with the public on the production of the podcasts and what our mission is as an organization. Lastly, we want to discuss more in depth the climatology of severe weather, particularly in the continental United States, as that is something that could impact places like the University of Oklahoma in the future.

Thanks to the AMS conference, there were a number of suggestions for us to talk about in regard to the future of the project as well. This included keeping track of the amount of engagements we get with each social media platform. Another suggestion was to focus on global warming projections and hold shifts with the purpose of creating mock weather forecasts sometime in the future based on each global warming projection, in particular, the RCP global warming projections. By doing this, the students can further understand what effects climate change will have on various places around the world.

By implementing these ideas and proposals in the future, we hope to increase interest in long-range and climate forecasting amongst students in the School of Meteorology University of Oklahoma. The importance of getting more students interested in long-range forecasting is vital to research that will be conducted in the future as the climate changes. This can also act as a spring board for students who wish to work in the private sector as companies, such as those in the energy sector, need long-term forecasts so that they can budget properly for the upcoming season. All in all, we are excited that this partnership looks to be growing an expanding, and we hope to have further updates on the continuation of this project in the future.

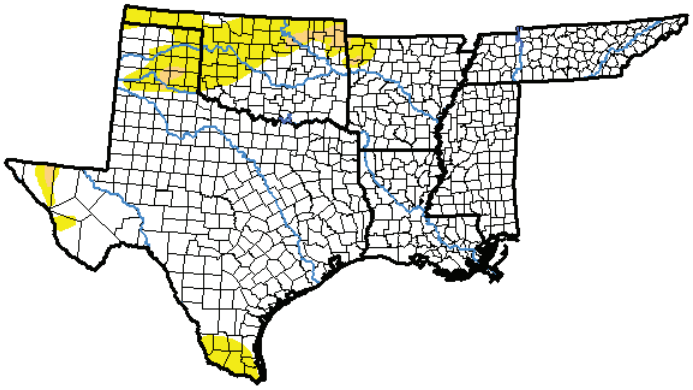
If you have an questions or comments about the partnership between OWL and SCIPP, or would like to provide feedback for this article, you can contact James Cuellar via jcuellar@mesonet.org.

Drought Update

Kyle Brehe and Derek Thompson,
Southern Regional Climate Center

At the end of December, drought conditions degraded across parts of the Southern Region. Moderate drought classifications were present in parts of extreme western and northern Texas as well as northeastern Oklahoma and northwestern Arkansas, with the total area experiencing moderate drought conditions increasing slightly. There were no drought conditions in Tennessee, Louisiana, and Mississippi. There was an increase in the area experiencing abnormally dry conditions, as abnormally dry conditions developed across far southern and northern Texas as well as across much of northern and western Oklahoma.

In December, there were a total of 125 storm reports across Texas, Oklahoma, Arkansas, Louisiana, Mississippi, and Tennessee. There were 5 tornado reports, 17 hail reports, and 103 wind reports. Louisiana and Texas tallied the most tornado reports (2), while Texas tallied the most hail (11) and wind (41) reports. Texas tallied the most reports total (54) while Arkansas tallied the least (2). Every state except Oklahoma had at least one hail report, while every state except Arkansas had at least one wind report. Three states (Arkansas, Oklahoma, and Tennessee) did not report any tornadoes. There were only 6 days in December where a storm report of any type was reported in the Southern Region, with 112 of the 123 total reports occurring on three days (60 on December 26, 23 on December 27, and 29 on December 31).



Released Thursday, December 27, 2018
Richard Tinker, CPC/NOAA/NWS/NCEP

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	87.64	12.36	1.20	0.00	0.00	0.00
Last Week *12-18-2018*	92.32	7.68	1.20	0.00	0.00	0.00
3 Months Ago *09-25-2018*	70.82	29.18	12.09	4.10	0.48	0.00
Start of Calendar Year *01-02-2018*	31.09	68.91	42.64	15.33	0.30	0.00
Start of Water Year *09-25-2018*	70.82	29.18	12.09	4.10	0.48	0.00
One Year Ago *12-26-2017*	34.14	65.86	41.30	8.42	0.30	0.00

Intensity:

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

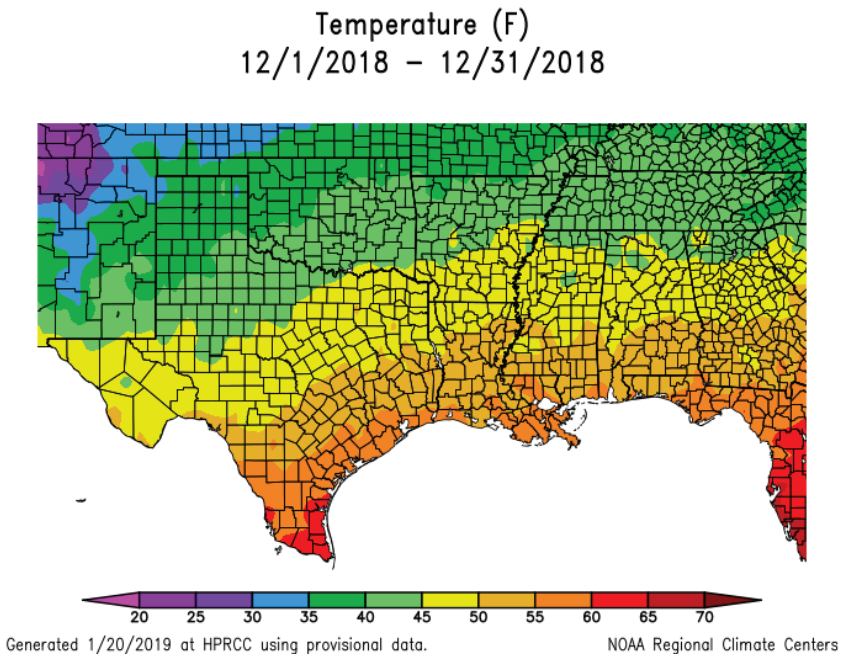
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Above: Drought Conditions in the Southern Region. Map is valid for December 25, 2018. Image is courtesy of the National Drought Mitigation Center.

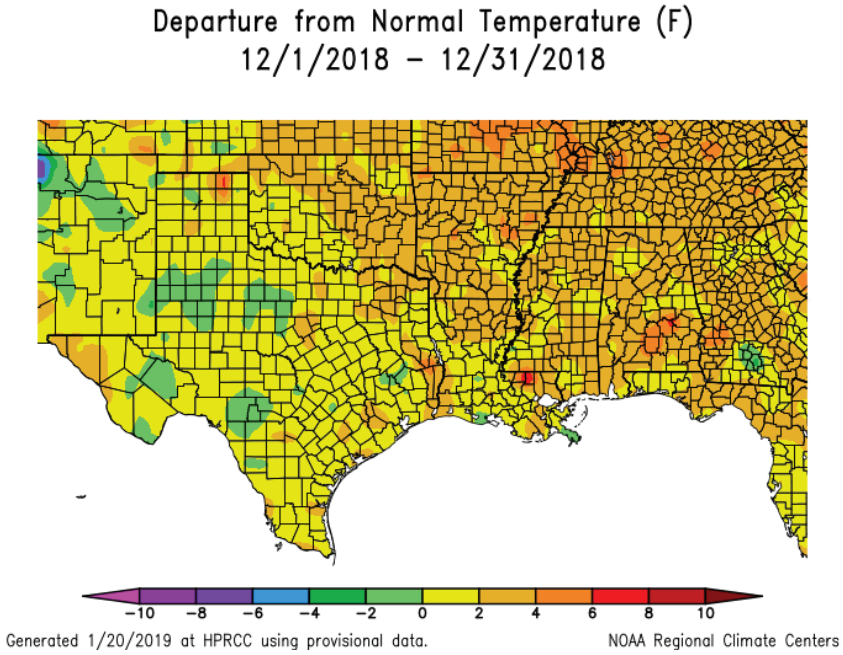
Temperature Summary

Kyle Brehe and Derek Thompson,
Southern Regional Climate Center

Temperatures for the month of December were above normal throughout much of the Southern Region. Parts of northern, north-central, eastern, southwestern, and western Texas, western Oklahoma, southern and central Louisiana, and southwestern Mississippi experienced temperatures 0 to 2 degrees F (0.00 to 1.11 degrees C) below normal. Parts of far western, southern, southeastern, eastern, northeastern, and northern Texas; eastern, northern, central, and western Oklahoma; most of Arkansas; northern, western, and southeastern Louisiana; southern and northern Mississippi; and almost all of Tennessee experienced temperatures 2 to 4 degrees F (1.11 to 2.22 degrees C) above normal. Parts of eastern and northern Texas; northwestern, central, and eastern Arkansas; and northwestern and northeastern Tennessee experienced temperatures 4 to 6 degrees F (2.22 to 3.33 degrees C) above normal. A small part of northern Texas experienced temperatures 6 to 8 degrees F (3.33 to 4.44 degrees C) above normal.



Average December 2018 Temperature across the South

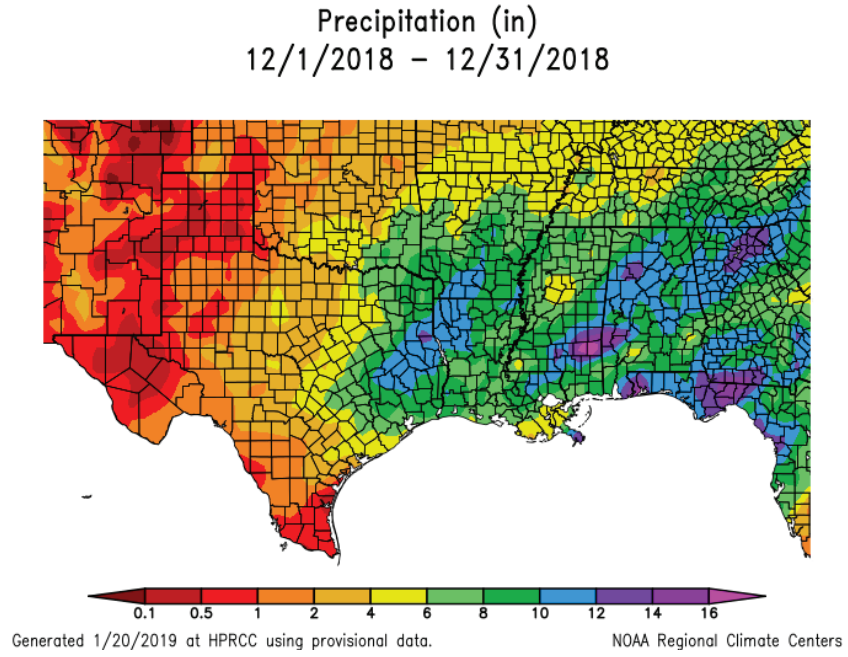


Average Temperature Departures from 1981-2010 for December 2018 across the South

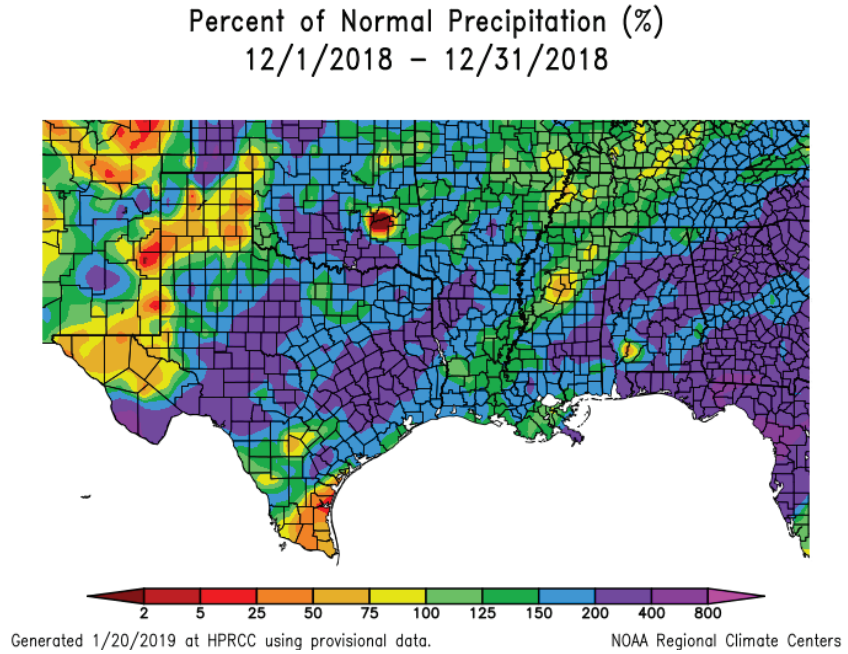
Precipitation Summary

Kyle Brehe and Derek Thompson,
Southern Regional Climate Center

Precipitation values for the month of December were above normal across much of the Southern Region. Parts of southern, northern, and western Texas received 50 percent or less of normal precipitation. In contrast, parts of central, western, southern, eastern, northeastern, and northern Texas; far western, central, northern, and southern Oklahoma; northwestern, western, southwestern, southern, southeastern, and central Arkansas; northern, western, and southeastern Louisiana, southern, central, eastern, and northwestern Mississippi, and eastern Tennessee received 150 percent or more of normal precipitation. Parts of central, western, eastern, southern, northeastern, and northern Texas, central, southern, and far western Oklahoma, northwestern and southeastern Louisiana, southwestern and central Arkansas, and eastern and southwestern Mississippi received precipitation 200 to 400 percent of normal. Parts of far western Texas and far western Oklahoma received precipitation 400 to 800 percent of normal.

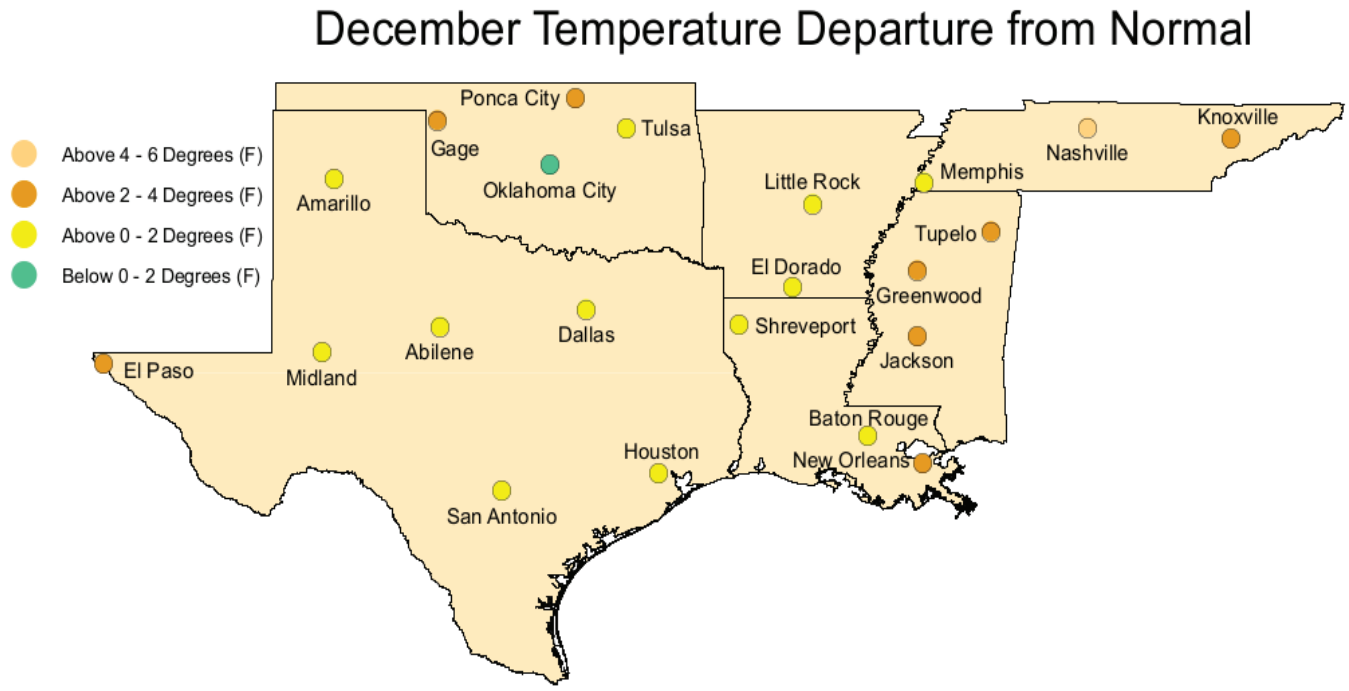


December 2018 Total Precipitation across the South

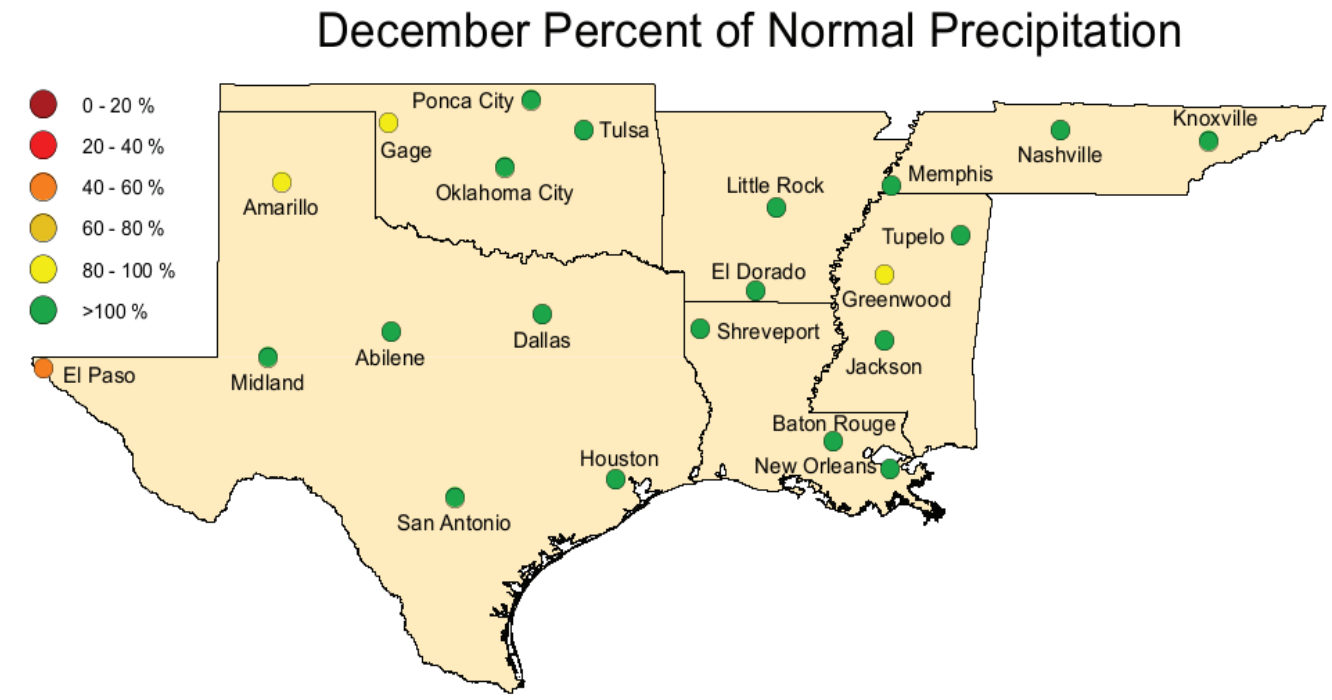


Percent of 1981-2010 normal precipitation totals for December 2018 across the South

Regional Climate Perspective in Pictures



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



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

Climate Perspective

Due to the government shutdown, the 'Climate Perspectives' graphic, which conveyed region and statewide rankings for average temperature and precipitation, is unavailable for December 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
Little Rock, AR	52.8	36.7	44.8	1.8	70	12/01	23	12/11	10.32	5.35	207
Baton Rouge, LA	63.3	45.1	54.2	0.8	80	12/01	27	12/11	9.64	4.04	172
New Orleans, LA	65.6	51.3	58.5	2.9	83	12/02+	36	12/12	5.33	0.09	101
Shreveport, LA	57.6	41.3	49.5	1.4	75	12/01	27	12/11	11.27	6.50	236
Greenwood, MS	57.2	39.2	48.2	2.3	79	12/01	25	12/11	4.89	-0.76	86
Jackson, MS	60.0	40.2	50.1	2.3	81	12/01	22	12/11	8.03	2.88	155
Tupelo, MS	54.3	38.3	46.3	2.2	71	12/31	25	12/11	7.55	1.27	120
Gage, OK	52.0	23.4	37.7	2.6	65	12/16	13	12/15+	0.76	-0.13	85
Oklahoma City, OK	49.6	30.9	40.3	-0.3	63	12/01	20	12/05	4.16	2.28	221
Ponca City, OK	50.3	27.4	38.9	2.3	64	12/11	16	12/09	2.30	0.88	161
Tulsa, OK	51.1	31.4	41.3	1.8	61	12/16+	19	12/10	3.58	1.09	143
Knoxville, TN	51.2	36.5	43.8	3.0	73	12/31	21	12/06	7.50	3.00	166
Memphis, TN	53.3	37.9	45.6	2.0	73	12/01	22	12/11	8.84	3.10	154
Nashville, TN	53.1	36.8	45.0	4.5	71	12/02	20	12/11	5.41	1.17	127
Abilene, TX	56.1	36.6	46.4	1.1	69	12/01	25	12/15	3.64	2.41	295
Amarillo, TX	52.1	25.6	38.9	1.9	69	12/15+	11	12/29	0.58	-0.13	81
El Paso, TX	57.2	37.8	47.5	2.7	71	12/22	25	12/30	0.43	-0.35	55
Dallas, TX	56.6	40.2	48.4	1.3	72	12/01	29	12/05	4.55	1.97	176
Houston, TX	64.7	46.4	55.6	1.2	80	12/01	34	12/11	7.62	3.88	203
Midland, TX	57.1	34.5	45.8	1.4	75	12/22	25	12/15	1.02	0.42	169
San Antonio, TX	64.2	43.3	53.7	0.8	79	12/01	33	12/11+	2.35	0.44	123

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

Fourth National Climate Assessment

Leah Kos, SCIPP Climate Assessment Specialist

Recently, 13 US Federal agencies released the Fourth National Climate Assessment (NCA4), Volume II, Climate Change Impacts, Risks, and Adaptation in the United States. The National Climate Assessment is the most comprehensive, authoritative assessment of the effects of climate change on the US economy and communities. Included in the NCA4 is an assessment of climate variability and change and its impacts across the South Central United States. Notably, the states comprising of the Southern Climate Impacts Planning Program (SCIPP) region are represented in both Chapter 19: Southeast (Arkansas, Louisiana and coastal Mississippi) and Chapter 23: Southern Great Plains (Oklahoma and Texas).

Threatened infrastructure, altering ecosystems and species distributions, increased heath threats, urban and rural industry impacts, and sea level rise are among the major concerns and challenges detailed in the Southeast and Southern Great Plain chapters. In economic terms, the impacts add up to billions of dollars. The assessment finds that early action to address these impacts can lower economic, environmental, social, and cultural costs and could help to prevent conflict or displacement from lands and resources.

Both chapters lay out the changes already being felt in the South-Central United States, as well as what lies ahead. The top findings for each region are included below.

The top findings for the Southeast include:

• Expanding urbanization is creating new climate vulnerabilities for cities, especially on infrastructure and health. Poor air quality due to pollutants, wildfires and allergens, as well as heat-related illnesses are expected to increase with longer summer heat waves. Cities will also experience a greater risk to vector-borne diseases as favorable conditions for transmission will expand to year-round. More frequent heavy rainfall and flooding events are weakening the region's roads and transit, and by 2050 the Southeast is expected to have the most vulnerable bridges in the nation.

• Sea level rise has increased flooding in coastal and low-lying regions. Rising temperatures and changing ocean currents have contributed to increases in local relative sea levels at a rate higher than the global average and is resulting in greater high tide flooding frequencies and inland-moving storm surge. As sea levels continue to rise, flooding from these events are expected to increase in both frequency and duration and will further impact regions within flood prone areas such as on road closures, storm water management systems, and deterioration of infrastructure due to saltwater.

• Ecosystems are threatened by a changing climate and will be transformed from shifting winter temperature extremes, wildfire patterns, rising sea levels, hurricanes, floods, droughts, and warming ocean temperatures. By 2100, a lengthening freeze-free season and less frequent and intense cold temperatures will lead to the northward migration and redistribution of tropical and subtropical species and organisms including insects, birds and plants. In addition, increased wildfire risks and invasive species will negatively impact the agriculture and forest industries.

• Rural communities will experience greater health and economic vulnerabilities from increasing heat extremes and changing seasons. Agriculture, timber and manufacturing sectors are imperial across the Southeast and are at risk

of decreasing productivity and losing over one-half billion labor hours to extreme heat-related impacts by 2100. More than half of the land across the Southeast remains rural and will experience greater health risks and stresses on cooling demands, especially on poverty-stricken areas.

The top findings for the Southern Great Plains include:

• Demands for food, energy and water resources will increase with growing populations, urban economic development opportunities and increasing drought periods. Recent severe droughts exposed challenges at the intersection of these three resources, negatively impacting agriculture production, water consumption and treatment, and energy production. Increasing hydrological extremes along with a projected 20% increase in water demand by mid-century due to population growth will continue to deepen these impacts across the Southern Great Plains.

• Habitats of species are being altered by a changing climate. Rising temperatures and the shift to a drier climate have led to the northward migration of species such as birds and butterflies and threatens the decline of certain species including the lesser prairie-chicken. Higher water temperatures and lower salinity levels have led to an increase in harmful algae blooms and threatens sensitive estuarian species.

• Infrastructure is becoming increasingly vulnerable to rising temperatures, extreme precipitation and continued sea level rise. Longer, hotter summers will create more stress on cooling systems, energy utilities and road surfaces. Increases in both heavy rain and drought periods will further threaten roads, aging pipelines, sewer lines, building foundations, and several dams and levees. The coastal region of Texas is especially vulnerable to rising sea levels, experiencing higher than normal rates due to the extraction of fossil fuels and groundwater. By 2050, an expected $30 billion in property values will be exposed to rising sea levels and more frequent flooding.

• These changes will negatively impact human health, including through heat related illnesses and deaths, and diseases transmitted through food, water and insects.

• Climate-induced changes pose an existential threat to Indigenous peoples, including to tribal cultural traditions and community resilience. Excessive heat, drought and the changing of native species are disrupting ceremonial cycles and increasing health threats. Efforts to build community resilience can be hindered by economic, political and infrastructure limitations, but opportunities exist to implement adaptation practices otherwise limited to city and state governments.

In the face of such risks, groups across the region are working together to identify opportunities for adaptation and to lessen impacts from a changing climate. Current regional adaptation actions across the SCIPP region include integrating climate services and early warning systems to improve the development of sustainable infrastructure and increase agricultural production. Other examples of adaptation measures include installing cool roofs to lessen heat impacts, improving planning and monitoring prior to flood events, strengthening or relocating critical infrastructure, participating in the Federal Emergency Management Agency's Community Rating System program, practicing prescribed fire to reduce wildfire impacts, and implementing drought contingency plans and water-use cutbacks. As the science is becoming more evident, adaptation strategies will continue to increase the opportunities for policymakers, practitioners and scientists across the SCIPP region to increase resiliency and lessen impacts in a changing climate.

About the Fourth National Climate Assessment

Mandated in the Global Change Research Act passed by Congress in 1990, the National Climate Assessment synthesizes the state of climate knowledge and assesses climate change impacts, risks, and adaptation across the United States every four years. The main objective is to help Americans better identify, avoid, and/or reduce climate-related risks. The National Climate Assessment process relies on consensus and undergoes extensive review.

Volume II of the Fourth National Climate Assessment builds upon the physical science assessment presented in Volume I, the Climate Science Special Report, released in November 2017. Vol. II places a strong emphasis on regional information, addressing the impacts of climate change on 10 regions of the United States. It also evaluates the risks from climate changes across 15 national-level topics, often using case studies to provide additional context and showcase community success stories.

The report was written by more than 300 Federal and non-Federal authors representing a range of expertise, a number of whom were selected through a public call for nominations. The Southeast chapter has 9 authors, the lead author of which was former LSU SCIPP program manager Lynne Carter, and 5 technical contributors including LSU SCIPP's Vincent Brown and Barry Keim. The Southern Great Plains chapter has 15 authors including OU SCIPP's Mark Shafer, and one technical contributor. Both chapters are backed by more than 190 citations from published articles, reports, and books.

The full National Climate Assessment report can be viewed online at nca2018.globalchange.gov. Within the report, to view the chapters covering the South Central United States, please refer to either Chapter 19: Southeast at nca2018.globalchange.gov/chapter/19/ or Chapter 23: Southern Great Plains at nca2018.globalchange.gov/chapter/23/.

We hope that this new resource will provide you with the pertinent climate information needed to better assist in preparing for weather and climate changes both now and in the future.

Southern Climate Monitor Team

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Margret Boone, Program Manager SCIPP (OU)

From Our Partners

Southern Climate Monitor Changes

Starting in January 2019, the Southern Climate Monitor will become a quarterly publication. The Southern Climate Monitor will be released in March, June, September, and December. By changing to quarterly publications, we aim to provide more in-depth material that is timely and relevant to our SCIPP region.

The new Southern Climate Monitor will feature several articles highlighting research, policy, extreme events, our regional and national stakeholders, our SCIPP Team, and our Partners. Please be watching for our new quarterly publication, available March 2019!

Contact Us

To provide feedback or suggestions to improve the content provided in the Monitor, please contact us at monitor@southernclimate.org. We look forward to hearing from you and tailoring the Monitor to better serve you. You can also find us online at www.srcc.lsu.edu & www.southernclimate.org.

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