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A NOAA RISA TEAM

# Southern Climate Monitor

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# A Heat-Health Regional Pilot in the Paso del Norte Region

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## Motivation: Heat risk at the border

Each year, episodes of extreme heat occur along the U.S.-Mexico border, frequently causing illness and death. According to recent statistics from the National Oceanic and Atmospheric Administration, heat was the number weather-related cause of death in the United States, between 1987 and 2016 (http://www.nws.noaa.gov/om/hazstats.shtml). With the prospects of a hotter regional climate, and increasing local temperatures, due to the urban heat island effect, increased public awareness, more precise bioclimatic studies, and improved forecasts can help improve early warning and reduce the likelihood of heat-related illnesses and deaths (Sarofim et al. 2016). This summary describes the first phase of a heat-health initiative in the Paso del Norte region, including the cities of El Paso, Texas, Ciudad Juárez, Chihuahua, and Las Cruces, New Mexico, an area with a population of over 2.5 million people (Figure 1). The initiative aims to reduce the public health risks of extreme heat, through the development of local climate services, social learning, and partnerships between researchers and practitioners.


Figure 1: Map of the Paso del Norte region, featuring the NIHHIS pilot initiative cities, Las Cruces, New Mexico, El Paso, Texas, and Ciudad Juárez, Chihuahua, Mexico. Figure courtesy of Jeremy Weiss, University of Arizona.

The region's extreme heat season typically extends from May to September—months when triple-digit temperatures have been recorded—although daily maximum temperatures can top 90°F from March through October (http://www.weather.gov/epz/climatedataforelpaso). During the drier months, maximum temperatures can exceed 110°F in El Paso and Ciudad Juárez, with record temperatures near 110°F (43°C) in Las Cruces. Between 2010 and 2012 Ciudad Juárez consistently experienced more than 30 days over 100°F between June 1 and September 15 (Esquivel Ceballos and Peña López 2013). In El Paso, Texas (elev. 3740 ft.), the average number of days per year reaching 100 degrees or more, for 30-year climate averages, has increased from 6 days per year (1890-1921) to 22 days per year (1980-2011) (personal communication, Greg Lundeen, National Weather Service). During years of persistent and exceptionally high temperatures, El Paso experiences more than 60 days per year reaching 100 degrees or more. Multi-day to multi-week periods of triple digit days accompanied by warm night-

time temperatures can expose those who work outdoors, people at-risk from other medical conditions (e.g., heart disease), and urban dwellers who lack air conditioning, to potential health risks, from prolonged exposure to high temperatures.

## Climate services

In 2015, NOAA, in collaboration with the Centers for Disease Control, kicked off the National Integrated Heat Health Information System (NIHHIS) (https://toolkit.climate.gov/nihhis/). NIHHIS, like the National Integrated Drought Information System (NIDIS), aims to provide comprehensive climate services to address risks to society. The NIHHIS model is to provide services through multiple coordinated strategies, including: integrated multi-disciplinary research and pilot projects, assessment of risks, vulnerabilities and opportunities, interagency and private sector partnerships, forecasts that span time scales from days to seasons, co-production of science and policy (e.g., Meadow et al. 2015), and the timely and clear communication of forecasts and information. The Paso del Norte region initiative, which began in 2016, is a first step toward developing the climate services capacity of the region to address heat-related health risks.

## Building on a history of partnership

The initiative builds on regional bi-national partnerships between federal, state, and local governments, to manage a variety of environmental hazards, including floods and air quality. In response to a high number of heat-related deaths in the early 2000s (Table 1), the City of El Paso developed an Extreme Weather Task Force (EWTF), to improve preparedness and coordination across city departments. The EWTF also fosters better communication between emergency managers, public health professionals, local media, and the National Weather Service. Other important relationships that provided a foundation for the initiative were among the research community, with relevant collaborations on urban climate hazard research, with a strong public health component, between the University of Texas at El Paso, Universidad Autónoma de Ciudad Juárez, and Colegio de la Frontera (e.g., Velazquez-Angulo et al. 2012; Grineski et al. 2012; Collins et al. 2013; Grineski et al. 2013; Amaya et al. 2016). The initiative was also able to build upon trust relationships developed with the City of Las Cruces, through a NOAA-funded project, in collaboration with SCIPP (Petersen et al, 2017).

| Year | Deaths |
|---|---|
| 2017 | 0 |
| 2016 | 4 |
| 2015 | 3 |
| 2014 | 2 |
| 2013 | 2 |
| 2012 | 2 |
| 2011 | 6 |
| 2010 | 2 |
| 2009 | 3 |
| 2008 | 5 |
| 2007 | 4 |
| 2006 | 2 |
| 2005 | 8 |
| 2004 | 12 |
| 2003 | 7 |
| 2002 | 10 |

**Table 1: El Paso County, Texas, heat-related mortalities, 2002-2017. Data: El Paso County Medical Examiner's Office. Source: Grace Ortiz, Texas Department of Family and Protective Services.**

After accomplishing initial scoping and establishing a multi-institutional organizing committee, the pilot initiative convened a workshop, that brought together individuals in government, academia, and practitioners, from México and the U.S. (Garfin et al. 2017). The committee assembled experts from public health, emergency management, weather and climate, sustainability, and urban planning, in order to gain a better understanding of: historical climatology and vulnerabilities to heat in the region, to identify and document science and communication needs and gaps, and to garner information for developing information products, improving forecasts and identifying promising pathways to collaborate on reducing heat risks and increasing early warning capacity. Workshop working groups (Figure 2) identified key needs, including co-production of discipline-specific environmental and health information to

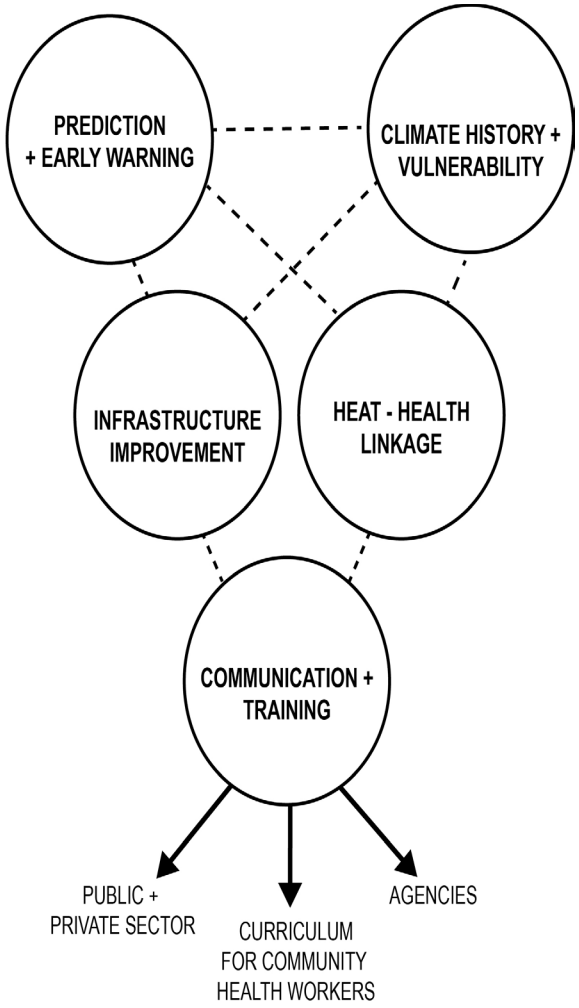


**Table 2: Paso del Norte region community of practice working groups. Group interactions stimulate research and program development, and feed into enhanced communication and outreach.**

support decisions on all timescales, improved risk communication strategies, enhanced coordination and communication among emergency management entities, public health surveillance and monitoring, coupled with improved climate prediction skill.

## Community of Practice

During subsequent meetings in 2017, working group participants formed an informal community of practice (COP), which established short- and long-term priorities. In 2017, the COP (a) developed regional climate, public health, and expertise data resources, (b) coordinated a May 2017 Heat Awareness Month program, with public events and endorsements by the three Paso del Norte region city mayors, and (c) wrote multiple proposals to establish public education curricula and conduct research relevant to the development of an early warning system. While the coordination of sustained activity is noteworthy and necessary, it is not sufficient to address the NIHHIS goal of improving the use of forecasts to enhance preparedness. Meeting this goal requires further knowledge exchange, in order to understand the parameters needed by public health professionals and emergency managers to use forecasts to reduce risks (e.g., Hondula et al. 2015; Davis et al. 2016; Petitti et al. 2016).

One COP working group recommended an integrated plan, that connects short-term activities, such as the Heat Awareness Months, with the longer-term goals associated with urban sustainability. Two basic tenets underpinning the integrated plan are (a) the initiative will be most effective if it leads to lasting, long-term change, and (b) framing the issue in terms of urban resilience and sustainability, which are more charismatic than "extreme heat," will generate greater interest among potential funders, collaborators, and elected officials. Activities that aim for outcomes that are lasting, specific (e.g., focusing on a particular geography or vulnerability), measurable, and financially feasible are more likely to create "win-win" outcomes among multiple interest groups or objectives. Another COP group proposed formalizing the reduction of risks related to extreme heat, through a binational task force. One mechanism through which the task force could address the public health side of binational heat-related risks, is through the adoption of syndromic surveillance for extreme heat (e.g., Smith et al. 2016). The Commission on Environmental Cooperation, a trilateral agency to address common environmental issues in North American countries, has developed a guide for implementing protocols to help public health preparedness and responses to episodes of extreme heat (CEC 2017). The CEC has funded extreme heat syndromic surveillance experiments in Mexico and

Canada—providing rich lessons for the Paso del Norte initiative.

## Future challenges and Next Steps

The Paso del Norte COP is planning an annual workshop, in April 2018, along with a May 2018 Heat Awareness Month. COP members continue to work toward garnering funds for additional research, forecast improvements, outreach, and capacity building—and have a neighborhood-level research project aimed at public communication in high vulnerability communities at the fringe of the urban area. One prospect for the future is to develop a coast-to-coast heat-health social learning network, focused on Mexico-U.S. border communities. The goals of this proposed network are (1) to share ideas and best practices for reducing heat-related risks, at scales from households to counties, (2) to foster collaboration among multiple sectors and organizations that are working to reduce risk, and (3) to connect public health, planning, and emergency management practitioners with researchers, to conduct studies that help inform strategies and policies to address challenges. To kick-start further knowledge exchange and network building the COP will connect with NIHHIS pilot projects in other parts of North America.

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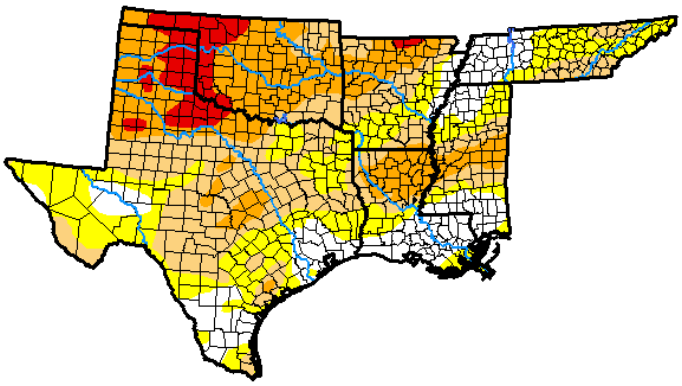
# Drought Update

Kyle Brehe and Rudy Bartels,
Southern Regional Climate Center

Over the month of January 2018, drought conditions worsened from severe to extreme drought in western Oklahoma and northern Texas. Conditions worsened from moderate to severe drought in central Oklahoma, and northern and central Texas. Moderate drought conditions expanded throughout southern and western Texas and in central and western Tennessee. Abnormally dry conditions appeared in central and northern Tennessee and western Texas. In contrast, conditions improved from extreme to severe and moderate drought in central Arkansas.

In January, there were only three days with severe weather throughout the region. There were 44 severe weather events (12 tornadoes, 26 wind, and six hail events) reported throughout the Southern Region. All 12 tornado events occurred January 21 and 22 in Texas, Arkansas, and Louisiana. Most of the wind events also occurred in Texas, Arkansas, Mississippi, and Louisiana. Four of the hail events occurred on January 21 in Oklahoma and Texas. The only state not reporting any severe weather during January was Tennessee.

On January 22, 2018, three tornadoes were reported in Mississippi. In Covington, Mississippi a tornado caused one injury. In Lincoln, Mississippi, severe winds destroyed a barn and caused multiple downed trees.



Released Thursday, February 1, 2018
Richard Helm, NCEI/NOAA

*Drought Conditions (Percent Area)*

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| **Current** | 16.79 | 83.21 | 57.69 | 29.36 | 6.74 | 0.00 |
| **Last Week** *01-23-2018* | 17.17 | 82.83 | 53.71 | 22.85 | 4.33 | 0.00 |
| **3 Months Ago** *10-31-2017* | 65.38 | 34.62 | 10.50 | 0.06 | 0.00 | 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** *09-26-2017* | 72.17 | 27.83 | 2.38 | 0.02 | 0.00 | 0.00 |
| **One Year Ago** *01-31-2017* | 68.68 | 31.32 | 17.70 | 6.40 | 0.73 | 0.00 |

*Intensity:*

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

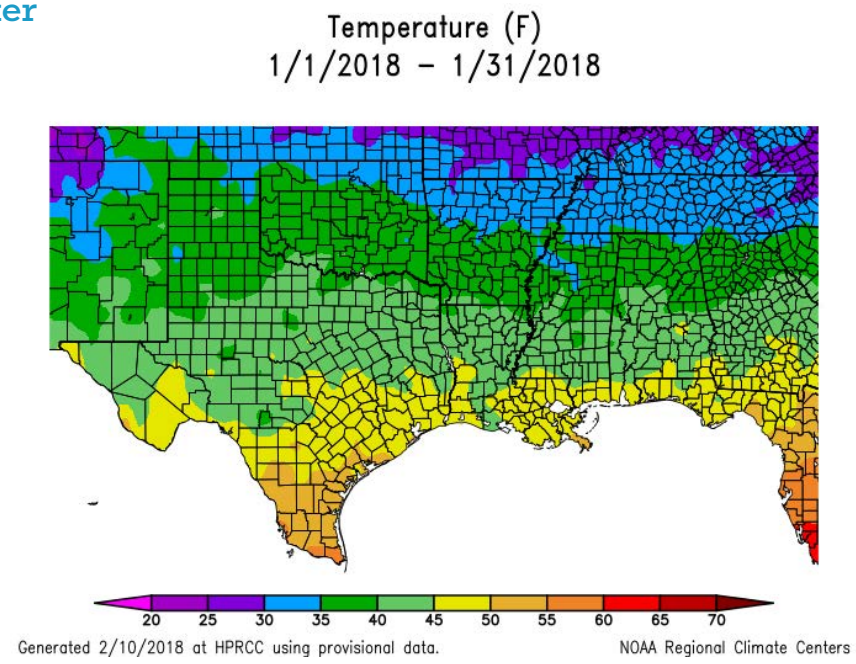
*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

**Above: Drought Conditions in the Southern Region. Map is valid for January 30, 2018. Image is courtesy of the National Drought Mitigation Center.**

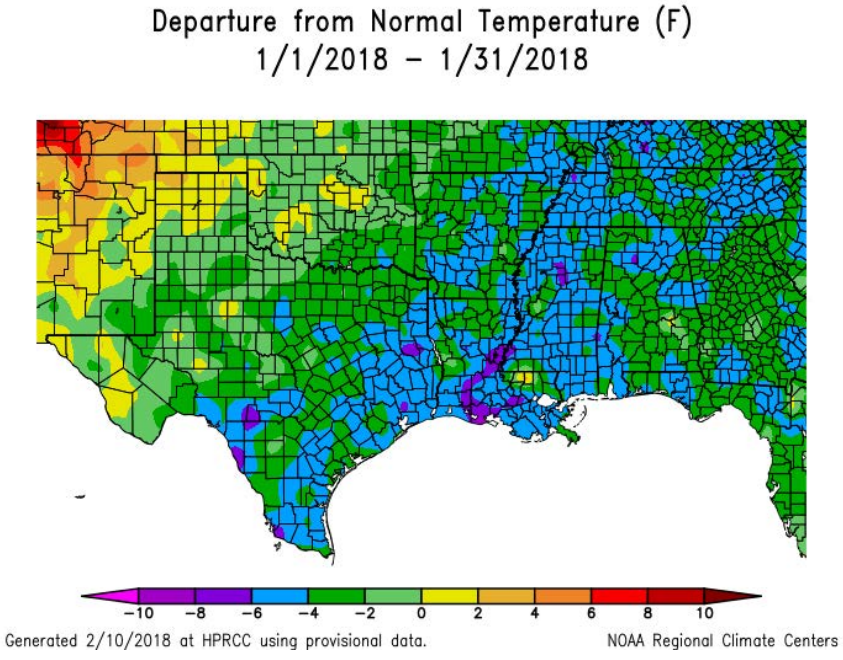
# Temperature Summary

Kyle Brehe and Rudy Bartels,
Southern Regional Climate Center

January temperatures were below normal for most of the Southern Region. A few areas in central and southern Louisiana, north central Mississippi and southwestern Texas were 6 – 8 degrees F (3.33 to 4.44 degrees C) below normal. Southeastern Oklahoma, central, eastern and southern Texas, and most of Mississippi, Louisiana, Arkansas, and Tennessee were 2 – 6 degrees F (1.11 to 3.33 degrees C) below normal. The only areas showing near to slightly above normal temperatures were central and western Oklahoma and northern and western Texas. The statewide monthly average temperatures were as follows: Arkansas – 35.70 degrees F (2.06 degrees C), Louisiana – 44.30 degrees F (6.83 degrees C), Mississippi – 40.20 degrees F (4.56 degrees C), Oklahoma – 36.30 degrees F (2.39 degrees C), Tennessee – 32.90 degrees F (0.50 degrees C), and Texas – 43.90 degrees F (6.61 degrees C). The statewide temperature rankings for January were as follows: Arkansas (twentieth coldest), Louisiana (fifteenth coldest), Mississippi (seventeenth coldest), Oklahoma (fifty-third coldest), Tennessee (twenty-third coldest), and Texas (thirty-seventh coldest). All state rankings are based on the period spanning 1895-2018.




**Average January 2018 Temperature across the South**

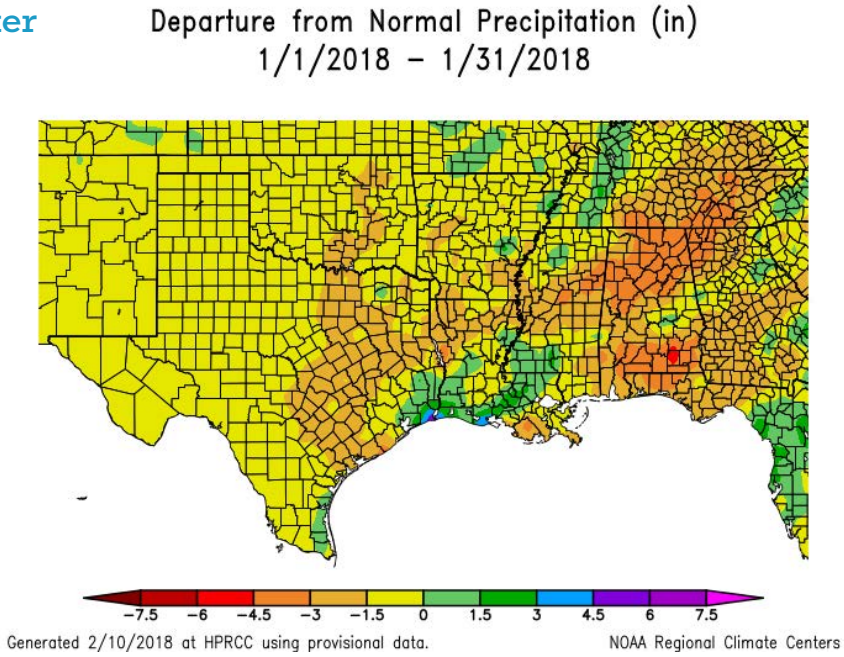



**Average Temperature Departures from 1981-2010 for January 2018 across the South**

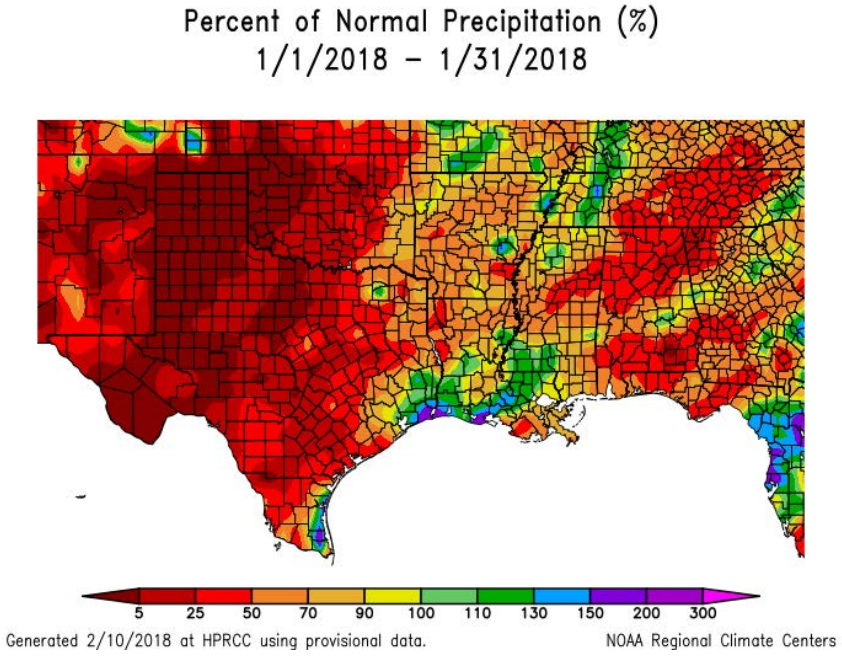
# Precipitation Summary

Kyle Brehe and Rudy Bartels,
Southern Regional Climate Center

Precipitation values for the month of January were below normal for most of the Southern Region. North, west, and central Texas, and western Oklahoma received 25 percent or less of normal precipitation. Areas of central, northern, and southern Tennessee, central and southern Mississippi, southeast and north Louisiana, central, eastern, and southern Texas, central northern, western, and southern Arkansas, and eastern Oklahoma received 25 – 70 percent of normal precipitation. In contrast, extreme southern Louisiana and southern Texas received 150 - 200 percent of normal precipitation. Parts of southern Louisiana, southeast Texas, southwest and north central Mississippi, eastern Arkansas, and western and eastern Tennessee received 110 – 130 percent of normal precipitation. The state-wide precipitation totals for the month were as follows: Arkansas – 2.56 inches (65.02 mm), Louisiana – 4.64 inches (117.86 mm), Mississippi – 3.71 inches (94.23 mm), Oklahoma – 0.49 inches (12.45 mm), Tennessee – 2.49 inches (63.25 mm), and Texas – 0.64 inches (16.26 mm). The state precipitation rankings for the month were as follows: Arkansas (thirty-third driest), Louisiana (fifty-ninth driest), Mississippi (thirty-third driest), Oklahoma (eighteenth driest), Tennessee (sixteenth driest), and Texas (twenty-first driest). All state rankings are based on the period spanning 1895-2018.

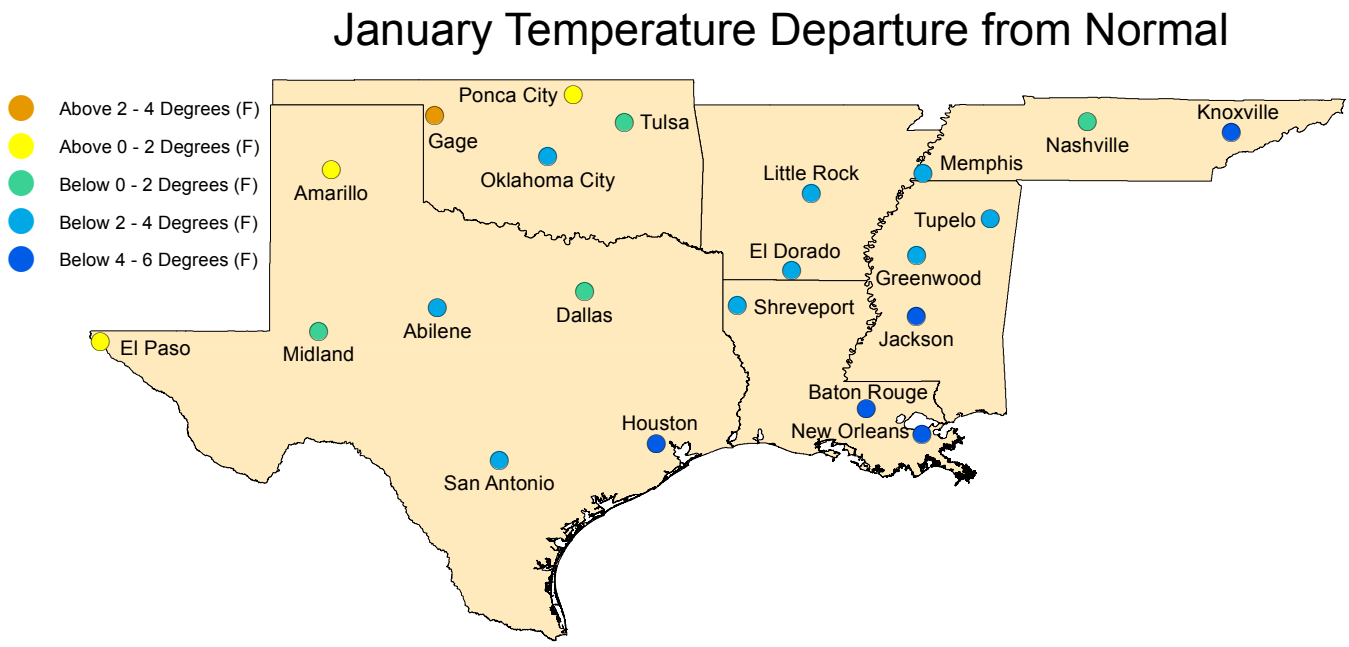



**January 2018 Total Precipitation across the South**

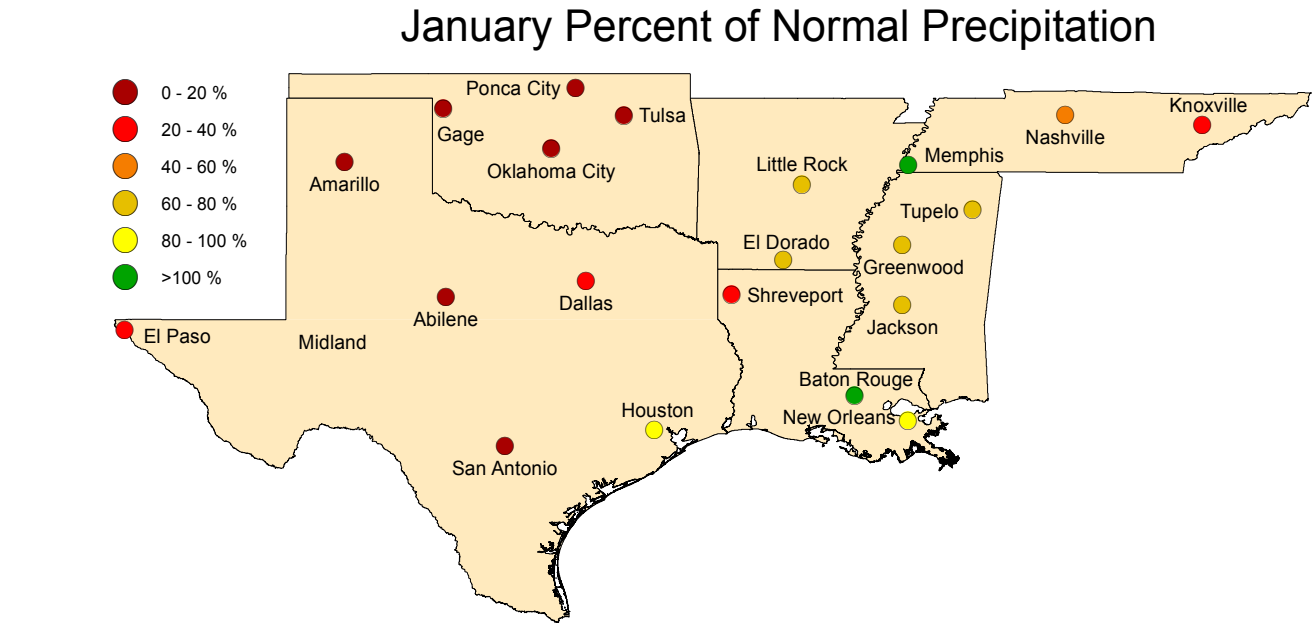



**Percent of 1981-2010 normal precipitation totals for January 2018 across the South**

# Regional Climate Perspective in Pictures




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




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

# Climate Perspective

| State | Temperature | Rank (1895-2018) | Precipitation | Rank (1895-2018) |
|---|---|---|---|---|
| Arkansas | 35.7 | 20th Coldest | 2.56 | 33rd Driest |
| Louisiana | 44.3 | 15th Coldest | 4.64 | 59th Driest |
| Mississippi | 40.2 | 17th Coldest | 3.71 | 33rd Driest |
| Oklahoma | 36.3 | 53rd Coldest | 0.49 | 18th Driest |
| Tennessee | 32.9 | 23rd Coldest | 2.49 | 16th Driest |
| Texas | 43.9 | 37th Coldest | 0.64 | 21st Driest |

**State temperature and precipitation values and rankings for January 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 | 52.2 | 28.6 | 40.4 | -3.5 | 70 | 01/11 | 3 | 01/17 | 3.07 | -1.23 | 71 |
| Little Rock, AR | 47.8 | 26.6 | 37.2 | -3.6 | 67 | 01/31 | 7 | 01/17 | 2.22 | -1.33 | 63 |
| Baton Rouge, LA | 57.2 | 35.4 | 46.3 | -5.4 | 73 | 01/21 | 14 | 01/17 | 7.17 | 1.45 | 125 |
| New Orleans, LA | 57.9 | 39.6 | 48.8 | -4.6 | 75 | 01/22+ | 20 | 01/17 | 4.55 | -0.6 | 88 |
| Shreveport, LA | 55 | 31.9 | 43.5 | -3.4 | 73 | 01/21 | 12 | 01/18+ | 1.41 | -2.79 | 34 |
| Greenwood, MS | 51.4 | 29.1 | 40.2 | -3.2 | 76 | 01/21 | 5 | 01/17 | 2.81 | -1.71 | 62 |
| Jackson, MS | 53 | 29.8 | 41.4 | -4.3 | 75 | 01/21 | 10 | 01/17 | 3.08 | -1.89 | 62 |
| Tupelo, MS | 49.2 | 27 | 38.1 | -3.6 | 70 | 01/21 | 4 | 01/17 | 3.37 | -1.11 | 75 |
| Gage, OK | 54.1 | 19.9 | 37 | 2.3 | 75 | 01/20 | -4 | 01/01 | T | -0.56 | 0 |
| Oklahoma City, OK | 49.8 | 24.4 | 37.1 | -2.1 | 70 | 01/21 | 2 | 01/17 | 0.2 | -1.19 | 14 |
| Ponca City, OK | 48.9 | 22.6 | 35.7 | 0.8 | 69 | 01/21 | -1 | 01/01 | 0.11 | -0.89 | 11 |
| Tulsa, OK | 49 | 26 | 37.5 | -0.2 | 72 | 01/21 | 3 | 01/01 | 0.26 | -1.4 | 16 |
| Knoxville, TN | 44.4 | 23.3 | 33.9 | -4.3 | 69 | 01/10 | 7 | 01/18+ | 1.54 | -2.78 | 36 |
| Memphis, TN | 46.2 | 28.6 | 37.4 | -3.8 | 68 | 01/21 | 7 | 01/17 | 4.02 | 0.04 | 101 |
| Nashville, TN | 46.3 | 26 | 36.1 | -1.6 | 69 | 01/21+ | 5 | 01/16+ | 1.63 | -2.12 | 43 |
| Abilene, TX | 57.4 | 28 | 42.7 | -2.2 | 77 | 01/31 | 5 | 01/17 | T | -1.02 | 0 |
| Amarillo, TX | 55.3 | 21.8 | 38.6 | 1.6 | 79 | 01/20 | 2 | 01/02 | T | -0.72 | 0 |
| El Paso, TX | 60.4 | 32.8 | 46.6 | 1.5 | 71 | 01/31 | 21 | 01/17 | 0.1 | -0.3 | 25 |
| Dallas, TX | 57.4 | 34.3 | 45.8 | -0.1 | 77 | 01/31+ | 13 | 01/17 | 0.85 | -1.28 | 40 |
| Houston, TX | 59.7 | 37.6 | 48.6 | -4.5 | 75 | 01/21 | 19 | 01/17 | 3.06 | -0.32 | 91 |
| Midland, TX | 59.7 | 27.7 | 43.7 | -0.2 | 78 | 01/20+ | 11 | 01/01 | 0.01 | -0.55 | 2 |
| San Antonio, TX | 60.7 | 37.8 | 49.3 | -2.5 | 74 | 01/11 | 21 | 01/03 | 0.28 | -1.48 | 16 |

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

## Southern Climate Monitor Team

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## From Our Partners

**South Central Climate Science Center Shifting Landscapes Special Topic Training: Connecting with Tribal Leaders**

February 22, 2018: As part of the Shifting Landscapes series, this learning opportunity is an extension of pervious introductory sessions. The workshop, which is designed for non-Native scholars (faculty members, postdocs, and graduate students) and non-Native government employees and researchers at the University of Oklahoma, will focus on strategies for connecting with tribal leaders. Those who attended participated in a number of activities and discussions designed to create a greater awareness of: connecting with tribal leaders- including initial contact; building and nurturing respectful relationships; andw orking collaboratively with tribal leaders and organizations. Faculty members, researchers and scholars will leave the workshop with a number of tools and resources designed to provide optimal potential for developing long-term research relationships with tribal organizations.

For more information, contact Todd Fuller at tfuller@ou.edu or (405) 325-1951.

## 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




SCIPP A NOAA RISA TEAM