Southeast Region: (Information provided by the Southeast Regional Climate Center) The top 10 weather and climate extremes that occurred across the region during the year are designated with "Extreme" in parentheses. The numbers associated with each extreme are used as identifiers rather than rankings.

• Temperatures across the Southeast were warmer than normal in 2018, except for a few small and isolated pockets in Alabama, Florida, Georgia and the Carolinas. The majority of the region was 1-2 degrees F (0.6 to 1.1 degrees C) warmer than normal, although a few stations in Alabama and Florida reported annual temperatures that were more than 3 degrees F (1.7 degrees C) above normal. Nine long-term stations (records of 50 years or longer) reported mean temperatures that were in the top three warmest on record, including Key West, FL (1874-2018; 3rd warmest), Tampa, FL (1890-2018; 3rd warmest), Cape Hatteras, NC (1895-2018; 2nd warmest), and Greenville, SC (1958-2018; 3rd warmest). The only long-term station that reported a maximum temperature ranked in the top three warmest was Plant City, FL (1949-2018; 2nd warmest), while two stations reported maximum temperatures in the lowest three, including Covington, VA (1963-2018; 1st coldest) and Juncos, PR (1949-2018; 3rd coldest). By comparison, there were 44 long-term stations with minimum temperatures in the top three warmest, and none in the lowest three, including Asheville, NC (1894-2018; 1st warmest), Cedartown, GA (1942-2018; 1st warmest), and Louisa, VA (1920-2018; tied for 1st warmest). Temperatures varied significant across the region from month to month. In January, several long-term stations in the Carolinas and Virginia observed or tied their highest or second highest count of January days with a maximum temperature of 32 degrees F (0 degrees C) or less, including Greensboro, NC (1903–2018; 8 days), Williamsburg 2 N, VA (1952–2018; 7 days), New Bern, NC (1949–2018; 6 days), and Florence, SC (1948–2018; 4 days) **(Extreme #1)**. After the cold start to the year, February roared in with 70 percent of the long-term stations reporting mean temperatures that were at least 8 degrees F (4.4 degrees C) warmer than normal. Every state in the region observed its warmest February on record except Virginia, which recorded its second warmest February **(Extreme #2)**. The months of March through August were variable across the region but did not set many records for either warm or cold conditions. By late August, however, a strong ridge of high pressure began to dominate much of the Southeast, bringing record heat to the region, which lasted from late August until mid-October, when temperatures finally cooled off. Many mainland stations reported one of their warmest Septembers on record, including Shelby, NC (1936-2018; 1st warmest), Asheville, NC (1892-2018; 1st warmest), Tarpon Springs, FL (1894-2018; 1st warmest), Gainesville, FL (1890-2018; 1st warmest), and Atlanta, GA (1878-2018; 2nd warmest). Tampa, FL (1890- 2018) reported a monthly average temperature of 85.9 degrees F (29.9 degrees C), which broke the old monthly temperature record for any month previously held by June 1998 with a temperature of 85.6 degrees F (29.8 degrees C). Seven stations reported a temperature of 100 degrees F (37.8 degrees C) during the month; the 100-degree F (37.8 degrees C) reading in Macon, GA was the first September 100-degree F reading since September 8, 1990 **(Extreme #3**). Humidity was also very high in September, with a number of inland airport stations reported new records for the number of hours with a dew point temperature of 65 degrees F (18.3 degrees C) or higher, including Charlotte, NC, Greenville-Spartanburg, SC and Asheville, NC, which reported more than 500 additional hours of very humid conditions above their previous records. In early October, many stations reported temperatures greater than 90 F (32.3 C); a number of National Weather Service offices noted that these were the latest occurrences of over 90 F in any year for their locations. The year ended with a colder than normal November, especially in the northwestern part of the region, and a warmer than normal December. Several stations in eastern Virginia and North Carolina reported a record number of days in 2018 with

maximum temperatures at or above 85 degrees F (29.4 degrees C), including Cape Hatteras, NC (1893-2018; 103 days), Wilmington, NC (1870-2018; 130 days), Charleston, SC (1938-2018; 157 days) and Savannah, GA (1871-2018; 170 days). Numerous stations along the East Coast reported a record-setting number of days with a minimum temperature at or above 70 degrees F (21.1 degrees C), including Gainesville, FL (1890-2018; 144 days), Birmingham, AL (1895-2018; 110 days), Atlanta, GA (1878-2018; 115 days), and Richmond, VA (1887-2018; 73 days). The coldest temperature of the year at any station in the Southeast was -14 degrees F (-26 degrees C) observed at Wakefield, VA on January 7 and the warmest temperature of the year was 105 degrees F (41 degrees C) observed at the University of South Carolina in Columbia, SC on July 11.

• Annual precipitation across the Southeast was well above normal in most areas of the region, with some small pockets of drier than normal precipitation. January through March was generally dry across the region, as wetter conditions generally prevailed for the rest of the year, especially the months of April through July and December. The driest areas of the Southeast were located along the East Coast of Florida, with deficits as much as 15.6 inches (396 mm) at Melbourne, FL (1936-2018; 7th driest) **(Extreme #4)**. Puerto Rico also experienced drier than normal conditions, with San Juan, PR receiving 4.3 inches (109 mm) less than normal. Drought expanded in both of those locations at the end of 2018. Drier than normal conditions were also observed in southeastern Georgia and South Carolina, where a moderate drought developed earlier in the year before wetter conditions late in the year ended the drought. The rest of the region experienced wetter than normal conditions, particularly areas affected by tropical systems Gordon, Florence and Michael. In Florida, the Big Bend area stretching west along the Panhandle experienced precipitation amounts as much as 20 inches (508 mm) wetter than normal. Pensacola, FL (1879-2018; 4th wettest) received 90.01 inches (2286 mm), which was 24.7 inches (627 mm) above normal and Tallahassee (1892-2018; 9th wettest) received 79.86 inches (2028 mm), which was 20.6 inches (523 mm) wetter than normal. Farther north, precipitation amounts were even higher, especially areas affected by Hurricane Florence. Much of North Carolina and Virginia, as well as the District of Columbia, northern Georgia, and northwestern South Carolina received precipitation amounts that were more than 20 inches (508 mm) higher than normal. Wilmington, NC (1869-2018; 1st wettest) received 102.40 inches (2601 mm) of rain, which was 44.79 inches (1138 mm) wetter than normal. While Hurricane Florence contributed to this rainfall total, Wilmington was so wet in 2018 that they would have set their all-time precipitation record even without the rainfall from Florence **(Extreme #5)**, Jocassee, SC (123.45 inches or 3136 mm), Montebello, VA (104.70 inches or 2659 mm), Sperryville, VA (86.08 or 2186 mm) and Mount Mitchell, NC (139.94 inches or 3554 mm) all set potential new state records for annual precipitation, which will have to be evaluated for accuracy by State Climate Extremes committees **(Extreme #6)**. Numerous locations in North Carolina and Virginia set their all-time record high precipitation in 2018, including Washington, DC (1979-2019; 66.29 inches or 1684 mm), Lynchburg, VA (1892-2018; 65.7 inches or 1669 mm), Morganton, NC (1900-2018; 76.46 inches or 1942 mm), and Carrollton, GA (1945-2018; 73.86 inches or 1876 mm). An additional 36 long-term stations observed precipitation that was ranked 2nd or 3rd wettest, including Atlanta, GA (1878-2018; 70.03 inches or 1779 mm; 2nd wettest), Cape Hatteras, NC (1895-2018; 90.07 inches or 2287 mm; 2nd wettest), and Walhalla, SC (1917-2018; 84.38 in or 2143 mm; 2nd wettest). A number of stations also set records for the number of days with measurable rain, including Pensacola, FL (1880-2018; 156 days), Anniston, AL (1939-2018; 141 days), Toccoa, GA (1899-2018; 161 days), and Lexington, VA (1899-2018; 157 days). Measurable snowfall was recorded in every state across the region during January, with two winter storms producing some of the greatest monthly accumulations in portions of south-central and southeastern

Virginia, central and eastern North Carolina, and coastal South Carolina. Portions of northern Florida and southern Georgia observed their first winter storm since December 1989, a span of over 28 years. With a tenth of an inch (2.5 mm) of snow recorded on the 3rd, Tallahassee, FL (1893–2018) observed its first measurable snowfall during the month of January and its greatest 1-day snowfall since December 1989. In southeastern Georgia, Alma (1949–2018) observed its greatest 1-day snowfall for January and its second greatest 1-day snowfall for any month on record, with an accumulation of 3.0 inches. Charleston, SC (1939–2018) observed its greatest 1-day snowfall for January and its third greatest 1-day snowfall for any month on record, with an accumulation of 5.3 inches (135 mm). On February 11, several long-term stations in central and western Virginia observed their wettest February day on record, including Wise 1 SE (1956–2018; 3.74 inches, 95 mm), Appomattox (1938–2018; 2.73 inches, 69.3 mm), and Buckingham (1895–2018; 2.71 inches, 68.8 mm). Well-above-normal snowfall was recorded across portions of North Carolina and Virginia during March, with some of the greatest monthly totals including 36.0 inches (914 mm) on Mt. Mitchell, NC (19.6 inches or 498 mm above average) and 25.2 inches (640 mm) at Burkes Garden, VA (17.8 inches or 452 mm above average). On March 24th and 25th, another winter storm produced 3 to more than 12 inches (76.2 to more than 305 mm) of snowfall across portions of northwestern North Carolina and southwestern Virginia, including 16.3 inches (414 mm) near Long Spur, 16.2 inches (411 mm) near Pilot, and 14.0 inches (356 mm) near Dublin. In addition, 15.0 and 12 inches (381 and 305 mm) of snow fell at Burkes Garden, VA (1896–2018) and Pulaski 2 E, VA (1922–2018), respectively, breaking the greatest 1-day snowfall on record for March and surpassing daily snowfall totals that were recorded during the “Storm of the Century” in March 1993. On May 24, Talbotton, GA (1893–2018) and Thomaston 4 SE, GA (1956–2018) observed their second and fifth highest 1-day precipitation total for any month on record, with 8.57 and 5.42 inches (218 and 138 mm), respectively. From May 15th through June 1st, Athens, GA (1857–2018) observed its longest streak of 18 consecutive days with measurable precipitation, surpassing its previous record in June 1963 by 4 days. In spite of a rainy summer, the period from mid-August to early September was one of the driest on record for parts of northern Georgia, most of South Carolina, and some stations in North Carolina. In September, Hurricane Florence brought torrential rain to North and South Carolina. The highest rainfall amount from Florence in North and South Carolina was 35.93 inches (913 mm) northwest of Elizabethtown and 23.63 inches (600 mm) west of Loris, respectively. These will likely become new record hurricane rainfalls for those two states. Most of southeastern North Carolina and parts of northeastern South Carolina received rain in excess of a 1000-year return period. Snow was observed unusually early in the season in the Washington D. C. area on November 15, as a developing low-pressure system moved up the East Coast. This resulted in the first measurable snow that occurred there in November in the last 22 years. Reagan International Airport received 1.4 inches (35 mm) and Dulles International Airport received 3.0 inches (76 mm). The snow, which was mixed with sleet and freezing rain, snarled traffic and closed schools. December also brought the first major snowstorm of the year to the Southeast. A low-pressure system skirted the Gulf and Atlantic coasts on December 8-10, as a high pressure to the north provided a source of cold air. Mount Mitchell, NC reported 32 inches (812 mm), Jefferson, NC received 20 inches (508 mm), and Boone, NC recorded 15 inches (381 mm) of snow in the storm. Many sites receive more than a foot of snow, which is close to the annual average snowfall for those locations.

• Four tropical systems (Tropical Storm Alberto, Tropical Storm Gordon, Hurricane Florence and Hurricane Michael) passed through the Southeast in 2018, bringing heavy rain and inland flooding, high winds, tornadoes, storm surge, and other significant impacts to parts of the region. Alberto formed as a subtropical depression over the northwestern Caribbean Sea, became a subtropical storm over the

southeastern Gulf of Mexico, and then transformed into a tropical storm before making landfall along the coast of the Florida Panhandle on May 28. Alberto produced heavy rainfall and flooding across the southern and central Appalachian Mountains, which took the lives of eight people in North Carolina and Virginia. Heavy rainfall fell over the Florida peninsula over a multi-day period as Alberto moved northward across the eastern Gulf of Mexico, with a maximum six-day total of 11.80 inches reported at Taylor Creek on the northern shore of Lake Okeechobee from 25–30 May. Maximum rainfall totals of 12.30 inches were reported near Helen in northeastern Georgia, 12.21 inches near Jonas Ridge in western North Carolina, and 5.48 inches near Lewis Mountain Camp in Virginia. The heavy rains caused flooding of several rivers, especially across western North Carolina. Tropical Storm Gordon moved inland along the Florida Panhandle on September 4, bringing heavy rain to Pensacola, FL and northwest into much of Alabama. Pensacola, FL received 18.25 inches (464 mm) of rain for the month, 12.27 inches (312 mm) wetter than normal; of that, 6.40 inches (163 mm) fell on September 5 alone as a feeder band from Gordon brought hours of rain to the station. The rainfall total from Gordon in Pensacola was 12.73 inches (323 mm). In Alabama, the highest rainfall from Gordon was 8.53 inches (217 mm) north of Bay Minette in the southeast part of the state. The strongest winds from Tropical Storm Gordon were reported at Dauphin Island, AL (74 mph; 33 m/s), Mobile, AL (57 mph; 25 m/s), and Pensacola, FL (52 mph; 23 m/s) on September 4, as the center of circulation approached the coast. Hurricane Florence **(Extreme #7)** approached the North Carolina coast on September 13 as a strong hurricane but weakened to a Category 1 storm before making landfall on the 14th, and the most severe impacts of the storm came from the 10-foot storm surge followed by the extreme impacts of more than 30 inches (762 mm) of rain across a large portion of southeastern North Carolina. At one point, more than a dozen river gauges in North Carolina alone had reached major flood stage, and portions of I-40 and I-95 were both closed due to the flooding. In New Bern, NC, storm surge from Florence damaged or destroyed more than 4,300 homes and 300 businesses, resulting in a loss of $100 million in combined residential and commercial damage. The North Carolina Division of Public Safety reported that 5,214 people and 1,067 animals were rescued from the high waters. Hurricane Michael **(Extreme #8)** made landfall near Mexico Beach, FL on October 10 as a Category 4 hurricane, and moved northeast across the Florida panhandle and southwest Georgia. It was still a hurricane when it was south of Macon in central Georgia on the 11th. Widespread damage occurred from Michael as the center of circulation passed over the Southeast. Hurricane Michael attained peak winds of 155 mph (69.3 m/s), as it made landfall near Mexico Beach, FL on October 10, becoming the first system to do so in the region as a Category 4 hurricane. A maximum wind gust of 129 mph (57.7 m/s) was measured at Tyndall Air Force Base near the point of landfall. Catastrophic damage occurred along the Florida coast at Mexico Beach and Panama Beach due to the extreme winds and storm surge. The 9 to 14 feet (2.7 to 4.3 m), storm surge wiped out nearly every structure along the coast near the point of landfall. The highest gust reported in Georgia was 115 mph (51.4 m/s) by a University of Georgia weather station at the Donalsonville airport. Michael moved rapidly across South and North Carolina and parts of Virginia, as it began it transition to an extra-tropical cyclone. At least 60 deaths were attributed to Michael in the United States alone. Utility companies estimated that over 3.1 million people were affected by loss of power due to the storm, with a peak outage of 1.6 million customers early in the morning of October 12.

• There were 3,621 reports of severe weather in 2018 across the region, which is 122 percent of the average of 2,948 for the period from 2000-2016. A third of the reports (1,220, compared to an average of 721) came from June alone. The total number of tornadoes confirmed in 2018 was 167, which is 109 percent of the average value of 153 from 2000-2016. All but three of the tornadoes were rated EF-2 or

lower. The season got off to a slow start in January and February, with less than half of the average number of severe reports occurring in each of those months. The number of reports in January (20, with one tornado and the rest damaging winds) was the lowest number in that month since 2004. In spite of the low total number of severe weather reports, February had 13 confirmed tornadoes, almost double the average number (7). On March 4th through the 7th, a powerful cyclone situated over the Northwest Atlantic Ocean generated exceptionally large swells with waves of 25 to 30 feet in height along the coastline of Puerto Rico and the U.S. Virgin Islands, which are located about 1,500 miles away. Coastal flooding caused significant beach erosion and damaged numerous structures along the northern and western coast of Puerto Rico. The largest hail reported in the Southeast in 2018 occurred in March and April. Hail accounted for nearly 45 percent (99 of 227) of the severe weather reports during March, including nine reports of 2-inch (i.e., hen egg-sized) or larger hailstones. On March 19th, extremely large hail with diameters ranging from 2.75 inches (baseball-sized) to more than 4 inches (softball-sized) caused extensive damage and destruction to homes, businesses, and vehicles across Cullman County, AL. An exceptionally large hailstone found in the community of Walter measured 5.38 inches (137 mm) in diameter, with a circumference of 13.75 inches (349 mm) and a weight of 9.8 ounces (0.26 kg) **(Extreme #9)**. This is officially the largest hailstone on record for the state of Alabama, surpassing the old record of 4.5 inches (114 mm). On March 19th, an EF-3 tornado tracked over 35 miles from Calhoun County in northeastern Alabama to Haralson County in northwestern Georgia, with a maximum path width exceeding one mile and four reported injuries. The greatest damage occurred in the city of Jacksonville, AL, where many homes were rendered uninhabitable and several buildings on the campus of Jacksonville State University sustained major damage. In April, three reports of large hail were recorded, including 3-inch (tea cup-sized) hail in St. Johns County, FL on the 10th and 2.75-inch (baseball-sized) hail in Gaston County, NC on the 15th. In June, about 95 percent (1,154 of 1,220) of the severe weather reports during the month were for strong thunderstorm winds, and nearly half (556 of 1,154) of these reports occurred in Georgia and South Carolina. Some of the highest thunderstorm wind gusts that were recorded during the month included 70 mph at Shaw Air Force Base near Sumter, SC and 69 mph at North Perry Airport near Hollywood, FL. Thunderstorm winds were responsible for 2 fatalities and 9 injuries in Alabama and Georgia, with most of these casualties caused by falling trees. On April 15, an EF-3 tornado tracked across portions of three counties in central Virginia, including the western portion of Lynchburg. Hundreds of trees were snapped or uprooted, and dozens of homes sustained major damage or destruction along its 25.8-mile (42 km) path, with at least 12 reported injuries. On June 28th, a southward-moving derecho produced a 300-mile (190-km) swath of wind damage, extending from northern Alabama and northwestern Georgia to the Gulf of Mexico along the Florida Panhandle. Some of the highest measured wind gusts included 58 mph at Birmingham-Shuttlesworth International Airport, AL and 52 mph at Tuscaloosa Regional Airport, AL, and Falcon Field in Peachtree City, GA. Hundreds of trees were blown down across these areas, with 1 fatality and 2 injuries caused by trees falling onto moving vehicles in central Alabama. In Madison County, AL, straight-line winds estimated at 100 mph snapped a 300-yard-wide swath of trees near the town of Gurley. A total of 231,000 customers lost power in Alabama following the derecho. Twelve people were injured at Traditions Park near Hayden AL on August 16, when a large tent collapsed on a crowd of approximately 150 people. The tent collapse occurred even though winds were estimated to be below severe limits and no other damage was reported in the vicinity. On December 2, an EF-3 tornado caused four injuries at Kings Bay Naval Base in Camden County, GA along the coast. A docked Coast Guard vessel reported a wind gust of 144 mph from the storm, as it passed near the coast.

• 2018 began with a broad area of moderate drought (D1) and abnormally dry conditions (D0) covering significant parts of every state in the region except for the Florida peninsula and the coastal plains of North and South Carolina. During January, drought expanded and worsened due to relatively dry conditions, particularly in southwestern Georgia, southeastern Alabama, and parts of the Florida panhandle. Severe drought (D2) spread to northern Alabama and Georgia and covered the entire Florida panhandle during that time. Near the end of January, 80 percent of the region was covered by drought or abnormally dry conditions, and an area of extreme drought (D3) was identified in central Alabama on January 30 before wetter conditions improved soil moisture in that area, eliminating the worst drought conditions. In contrast, heavier rain in the Carolinas and Virginia reduced drought conditions in those areas. Colder than normal temperatures in January caused minor damage to citrus crops, Vidalia onions and other vegetables, and stunted the growth of winter grains and pastures. However, it provided ample chill hours for fruit crops like nuts and peaches and built up cold tolerance in citrus orchards as well as killing off insect pests that had survived the previous two warmer winters. By mid-February, heavier precipitation eliminated all severe drought (D2) from the region, in spite of record-setting warm conditions. The very warm conditions (as much as 10 degrees F or 5.5 degrees C) led to early blooming of fruit trees and blueberries, making them vulnerable to frost. Heavier rain in the month caused problems for farmers in Alabama, Georgia, North Carolina and Virginia who were delayed in preparation of fields for planting due to the wet soil. The February warmth did contribute to the development of new regions of severe (D2) drought beginning in early March in southeastern Georgia and in early April in southern Florida, regions that were missed by the rain that soaked Alabama and northwestern Georgia as well as North and South Carolina and Virginia. These moderate drought areas persisted until mid-May, when a wet spell across the region removed all drought and most abnormally dry conditions from the region. Colder and drier conditions in March and April caused further delays in field preparation and planting of row crops and led to several episodes of sub-freezing temperatures, which damaged blossoming fruit in several states **(Extreme #10)**. About 10 to 50 percent of the flowering blossoms on peach trees in northern and central Georgia were lost to excessively cold temperatures. However, 2018's yield was higher than the past two years because the early frosts did less damage this year compared to the two previous winters. Moderate damage to the blueberry crop in southern Georgia was also reported, particularly in farms lacking frost protection. Dry conditions in early May improved field conditions for farmers, allowing them to catch up with planting and field work and reducing disease pressure. However, the rain that occurred later in the month caused flooding which damaged livestock pastures in southern Florida and drowned newly planted crops in low-lying areas. Wet conditions in June and July continued to cause problems for agricultural producers by delaying needed spraying of agricultural chemicals like fungicides, which were sorely needed in the humid conditions. For the rest of the year, drought conditions covered a much lower percentage of the region, mainly in coastal Georgia and southern South Carolina. Impacts on agriculture in the fall were dominated by the effects of the tropical systems, which passed through the Southeast. Tropical Storm Gordon caused losses for cotton, pecan and peanut farmers in southeastern Alabama and western Florida. Hurricane Florence, which dropped excessive rains over parts of North and South Carolina, caused significant impacts to vegetable production and flooded out numerous hog farms and chicken houses. In South Carolina, agricultural losses alone were estimated to surpass $125 million, including an estimated loss of 75 percent of the cotton crop ($56 million). In North Carolina, estimated losses to agricultural alone top $1.1 billion. Losses to row crops such as corn, soybeans and tobacco were estimated at $987 million, including 50 to 100 percent of unharvested tobacco. Other losses include $70

million to commercial forests, $30 million for lawn and landscaping, $27 million for vegetables and horticultural crops, and $23 million for livestock. The storm killed an estimated 5,500 hogs and 4.1 million chickens and turkeys. In all, the damage from Hurricane Florence was estimated at $18 billion. In October, Hurricane Michael caused tremendous damage to timber and decimated the Georgia cotton crop, which was just beginning to be harvested. Numerous pecan orchards, some of which had been planted nearly a century ago, were destroyed by the high winds. Georgia was the worst hit state in the Southeast, with an estimated $4 billion in agricultural losses. Losses in Alabama were estimated at $204 million, led by losses in cotton at $108 million. Florida's agricultural losses were estimated at $1 to 2 billion, including the loss of over 3 million acres of timber valued at $1.3 billion and crop losses of $158 million. Cotton along the path of the storm in Florida was considered nearly a total loss. Peanuts fared better than other crops since they were still in the ground in many fields. A new region of moderate drought (D1) developed in southern Florida in early November and was expanding at year's end. By the end of the year, the Florida drought covered 21 percent of the state, including the eastern half of the Florida peninsula stretching from the Everglades to Cape Canaveral. The dry conditions impacted planting of vegetables in that area and reduced the growth of pastures, leading to increased feeding of hay to livestock. In Puerto Rico, no abnormally dry conditions were observed in January through May, but returned to the island during the second half of the year. No drought was observed in Puerto Rico until the very end of the year when a small area of moderate drought (D1) developed in the central part of the island.