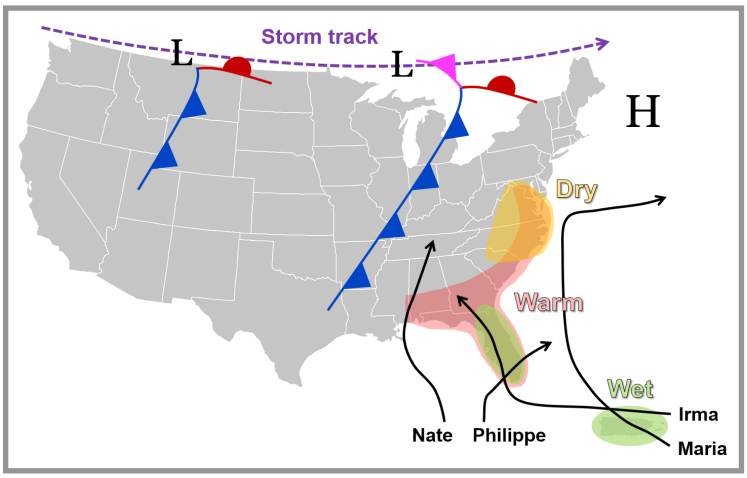
Quarterly Climate Impacts and Outlook

Southeast Region

December 2017

Regional Weather Pattern and Highlights for Autumn 2017



*Several weather and climate extremes occurred across the Southeast from September–November 2017 (i.e., meteorological autumn), including the **landfalls of three hurricanes and one tropical storm**. The mid-latitude storm track (i.e., jet stream) was positioned farther to the north than normal during autumn, which allowed Hurricanes Irma and Nate to move inland. While much of North Carolina and Virginia were **unusually dry**, several landfalling tropical cyclones produced **well-above-normal precipitation** across the Florida Peninsula, Puerto Rico, and the U.S. Virgin Islands. **Extreme warmth** occurred in portions of Florida and the coastal plain, where both maximum and minimum temperatures were well above average.*

Highlights for the Southeast

Four tropical cyclones (**Hurricane Irma, Hurricane Maria, Hurricane Nate, and Tropical Storm Philippe**) produced significant impacts across the Southeast region, including Puerto Rico and the U.S. Virgin Islands. Hurricane Irma was the first major hurricane to make landfall in Florida since Hurricane Wilma in October 2005. Hurricane Maria was the strongest hurricane to strike Puerto Rico since the San Felipe Segundo hurricane in September 1928, and it was also the **tenth most intense hurricane** on record in the Atlantic basin.

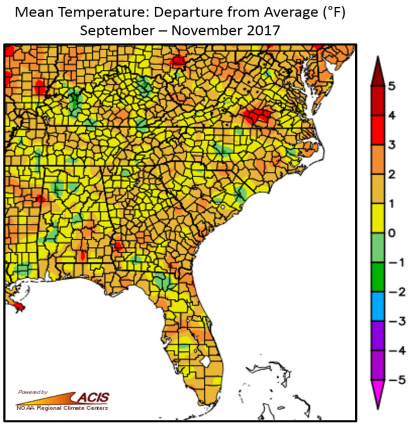
Extreme wetness occurred over much of the Florida Peninsula, Puerto Rico, and the U.S. Virgin Islands. Several long-term stations in these areas observed autumn precipitation totals that were **ranked within their three highest values on record**, including Melbourne WFO, FL (39.99 inches), the COOP station in Fort Pierce, FL (38.97 inches), San Juan, PR (32.56 inches), and Federal Point, FL (32.10 inches).

In contrast, abnormal dryness (D0) and moderate (D1) drought covered **at least 30% of every state** in the Southeast by the end of November, with the most persistent drought occurring in central North Carolina and south-central Virginia.

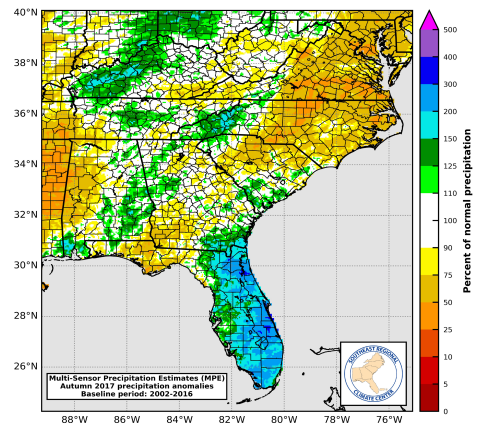
Relatively few extremes in average autumn temperature were recorded across the region. Less than 20% of the 185 long-term stations (i.e., period of record equaling or exceeding 50 years) observed autumn mean temperatures that were ranked within their ten warmest or coolest values on record. However, several stations in Florida observed autumn mean temperatures that were **ranked within their five warmest values on record**, including Miami (tied for warmest), Tampa (third warmest), and West Palm Beach (tied for fourth warmest).

Regional Climate Overview for Autumn 2017

Temperature and Precipitation Anomalies

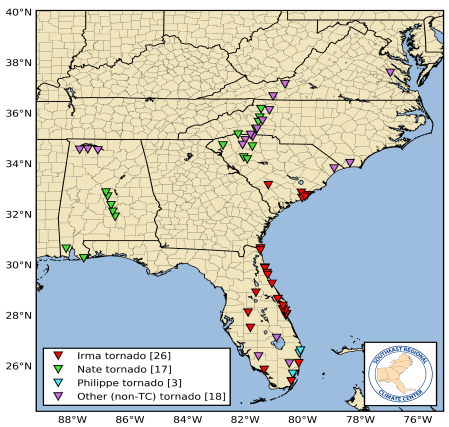


Much of the Southeast region was **warmer than normal** during autumn, driven primarily by **excessively warm daily minimum temperatures**. Nearly double the number of long-term stations (41) observed average daily minimum temperatures that were ranked within their ten warmest values on record, compared to only 21 stations for average daily maximum temperatures. In Florida, Melbourne and Miami observed their highest count of 44 and 20 autumn days with a minimum temperature at or above 75°F and 80°F, respectively. From October 7th–11th, a total of **142 long-term stations** across the region observed or tied their highest daily minimum temperature on record for October. Several stations recorded or tied their highest minimum temperature for **any month outside meteorological summer (June–August)**, including Tampa, FL (81°F), Augusta, GA (78°F), and Asheville, NC (71°F).



Autumn precipitation was **75% to less than 50% of normal** across much of North Carolina, Virginia, northern South Carolina, west-central Alabama, southwestern Georgia, and the Florida Panhandle. Well-above-normal precipitation, with departures of **150% to over 300% of normal**, was recorded over the Florida Peninsula, as well as portions of coastal Alabama, southeastern Georgia, and western North Carolina. With 25.71 inches of rainfall during September, the COOP station in Fort Pierce, FL observed its **wettest month on record** and the **ninth highest September precipitation total for the state of Florida**. From October 3rd–5th, a combination of heavy rainfall, strong easterly winds, and king tides (i.e., highest astronomical tides of the year) produced coastal flooding in southeastern Florida, with **6 to more than 12 inches of standing water** reported in Miami, Hollywood, and West Palm Beach.

Severe Weather



Severe weather was **unusually active** across the Southeast, with nearly 160% of the typical number of reports recorded during autumn. A total of **67 tornadoes** (7 unrated, 21 EF-0s, 31 EF-1s, 8 EF-2s) were confirmed from September–November, which is the **seventh highest autumn count** for the region during the 68-year period of record. Nearly 75% (49 of 67) of the tornadoes were spawned by the four landfalling tropical cyclones, including 26 from Irma, 17 from Nate, and 3 from Maria and Philippe. On October 8th, an EF-1 tornado produced by Hurricane Nate crossed the Blue Ridge Parkway at an elevation exceeding 3,000 feet and became the **first observed tornado in Ashe County, NC** since records began in 1950. On September 5th, a lightning strike killed a 63-year-old fisherman and injured three others in Juana Díaz, PR, as they were anchoring their boat prior to the arrival of Hurricane Irma.

Contacts: Chip Konrad, Jordan McLeod, and William Schmitz (SERCC)
Ellen Mecray (NOAA/NCEI)

Regional Climate Impacts for Autumn 2017

Hurricane Irma

Boats and other debris blocking the Overseas Highway in the Florida Keys following Hurricane Irma's storm surge. (Image credit: Charles Trainor Jr., Miami Herald)

After making landfall twice in southern Florida (Cudjoe Key and Marco Island) on September 10th, Hurricane Irma brought strong winds, heavy rainfall, coastal flooding, and numerous tornadoes to a broad portion of the Southeast region. **Five to more than 15 inches of rainfall** was recorded across the Florida Peninsula, southeastern Georgia, and the southern half of South Carolina. In Florida, the Fort Pierce COOP station, the Sanford COOP station, and Melbourne observed their **wettest day for any month on record**, with 13.85, 11.50, and 10.23 inches of precipitation, respectively. A combination of torrential rainfall and storm surge produced exceptional flooding in Miami, FL, Jacksonville, FL, and Charleston, SC, with **more than 350 water rescues** performed in Jacksonville. Some of the highest recorded wind gusts from Irma included 142 mph at Naples Municipal Airport, FL, 137 mph on Buck Island in the U.S. Virgin Islands, 130 mph on Marco Island, FL, and 120 mph on Big Pine Key, FL. Approximately **17 million people** across the Southeast lost power for less than a day to more than one week. About **one-fourth of over 50,000 homes** in the Florida Keys were destroyed, while 65% sustained major damage. Irma also caused catastrophic damage on St. Thomas and St. John in the U.S. Virgin Islands, where collapsed homes and buildings as well as downed trees and power lines produced **uninhabitable conditions**. At least **92 fatalities** (77 in Florida alone) were attributed to Hurricane Irma, including 14 nursing home residents in Hollywood, FL who died from heat exhaustion after the storm.

Agriculture and Livestock

During autumn, a prevalence of mild, dry weather coupled with periods of significant rainfall was generally **beneficial for crop harvesting and winter grain planting** across the Southeast. Good yields of cotton, soybeans, and peanuts were reported across much of the region, but over **$2.5 billion** in agricultural losses was caused by Hurricane Irma in Florida. Citrus fruit losses ranged from less than 30% to nearly 100% in groves across central and southern Florida, with the extent of damage varying by the quantity of fruit that dropped from the trees due to high winds. Many citrus trees were uprooted, and some growers were temporarily unable to pump floodwater out of their groves due to a lack of electricity, which could produce long-term tree damage. About **30%** of the pecan crop in Georgia was lost, as wind gusts from Irma exceeding 50 mph stripped off immature nuts and blew down thousands of pecan trees. Hurricane Maria destroyed about **80% of the crop production** in Puerto Rico, resulting in **at least $780 million** in agricultural losses. Dairy barns and plantain, banana, and coffee plantations were decimated, while 90% of poultry production on the island was lost, including **2 million of the 2.6 million fowls**.

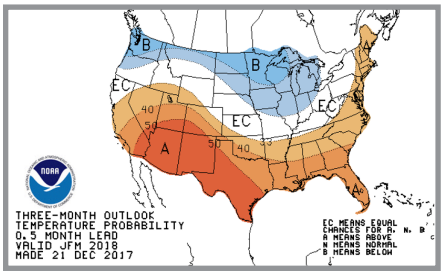
Hurricane Maria

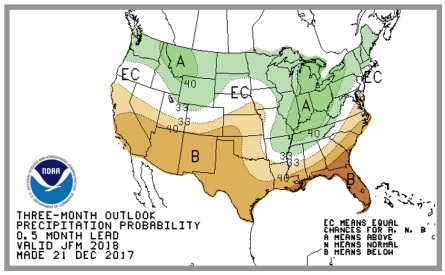
A damaged road in Toa Alta, PR. (Image credit: Ricardo Arduengo, AFP)

On September 20th, Hurricane Maria made landfall near Yabucoa, Puerto Rico as a Category 4 hurricane with maximum sustained winds of 155 mph. **Ten to more than 25 inches of rainfall** was observed across much of the island, with the highest total of 37.90 inches recorded near G. L. García. Broad portions of eastern and northwestern Puerto Rico observed maximum 12-hour rainfall totals that would be expected to occur **once every 1,000 years on average**. Widespread river flooding occurred, as 30 of the 65 USGS streamflow gages on the island exceeded major flood stage and 13 reached or exceeded their **highest crest on record**. Puerto Rico sustained **catastrophic infrastructural damage**, including a total loss of electricity, drinking water shortages, and damage to countless homes and buildings. The NWS Doppler radar in southeastern Puerto Rico was destroyed by Maria's strong winds. **Over 50% of the island** was without power for **at least 2 months**. While the preliminary death toll was 64, Hurricane Maria likely caused **hundreds of additional fatalities** across the island.

Regional Climate Outlook for Winter 2017–2018

Temperature and Precipitation





According to their seasonal outlook, NOAA's Climate Prediction Center (CPC) forecasted an increased probability of **warmer-than-normal winter temperatures** for nearly all of the Southeast, particularly across the southern half of the region. **Increased chances of below-normal precipitation** are predicted for Florida and much of Alabama, Georgia, and the Carolinas. Drought is expected to **persist and expand in coverage** across portions of these states, as La Niña conditions will likely suppress precipitation during winter.

La Niña

On December 14th, the CPC maintained a La Niña Advisory that was issued in early November, as La Niña conditions (i.e., below-average sea surface temperatures) **continued to strengthen** in the equatorial Pacific Ocean. There is at least an **80% chance** that a weak-to-moderate La Niña will persist through winter and early spring, with a transition to ENSO-neutral conditions expected thereafter. Climatologically, La Niña is associated with **above-average temperatures** and **below-average precipitation** across the Southeast during winter.

Southeast Region Partners

National Oceanic and Atmospheric Administration
- National Centers for Environmental Information
- National Weather Service Eastern Region
- National Weather Service Southern Region
- Climate Prediction Center
- National Hurricane Center
- National Weather Service River Forecast Centers
- National Integrated Drought Information System
- Carolinas Integrated Sciences and Assessments
- National Sea Grant Office
- Southeast and Caribbean Regional Collaboration Team

State Climatologists

U.S. Department of Agriculture
- Southeast Regional Climate Hub

U.S. Department of the Interior
- Southeast Climate Science Center
- South Atlantic Landscape Conservation Cooperative

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