

Climate Trends in the Southeast: Temperature

Key Points

- A *trend* is a long-term movement in a series of data points.
- The temperature trend for the Southeast as a whole from 1895 to 2012 is near zero, although some regions within the Southeast do have nonzero trends.
- Since 1960 the temperature trend across the Southeast has been increasing. However, the overall trend for the Southeast does not match increasing temperature trends seen in most of the United States.
- Temperatures are expected to continue to increase over the next century.

Measured temperature trends in the Southeast

Official observers have measured temperatures in the Southeast as far back as the 1840s, when surgeons kept careful records at US Army forts. Since then, hundreds of observers from the National Weather Service have added their records to the storehouse of weather data collected at the National Climatic Data Center in Asheville, NC. These records have been combined into regional averages of temperature that can be used to determine changes in temperature over time.

Figure 1 shows the annual average temperature for the Southeast (AL, FL, GA, NC, SC, and VA) from 1895 to 2012. This record shows that the trend in annual average temperature for the region over the entire period is near zero (purple). This means that there has been no long-term trend in annual temperature in the Southeast for the past

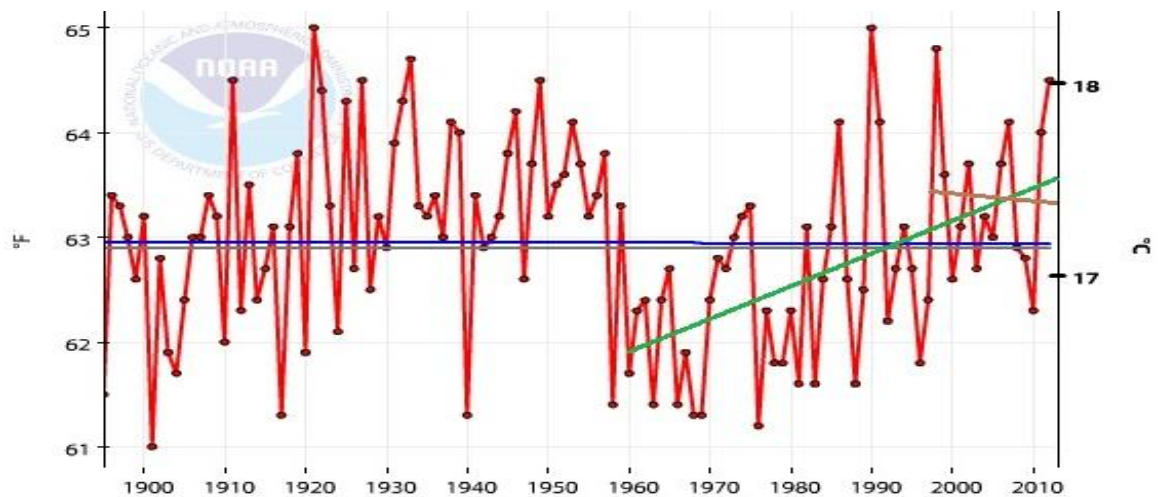


Figure 1. Annual average temperature in the Southeastern U.S. with trends for selected time periods (1985-2012; 1960-2012; 1998-2012) from: <http://www.ncdc.noaa.gov/cag/time-series/us>.

century, although there have been periods with rising or falling temperatures, such as the increasing trend from 1960 to 2012 (green) and the slightly decreasing temperature from 1998 to 2012 (brown). Trends are highly dependent on the time period used to do the calculation, and this can lead to differences in trend value. To avoid confusion, trend periods need to be clearly identified.

With the exception of the Southeast, most regions have warmed considerably over the past 100 years, particularly along the northern border and in the Southwest, as shown by the red shading in Figure 2.

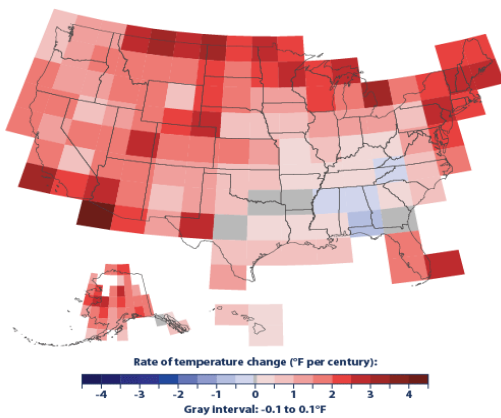


Figure 2. Rate of temperature change, 1901-2012 (Source: EPA).

Causes of changes in temperature

Some variations in average temperatures across regions are related to changes within the region itself, and others are caused by large-scale, global changes in the climate. Within an area, temperatures can vary naturally from year to year depending on the soil conditions and the rainfall and cloudiness that have occurred over the area. Wet years tend to be cooler than dry years since the precipitation and rain prevent the sun from

You can graph trends for your own state or region at this National Climatic Data Center site:

<http://www.ncdc.noaa.gov/cag/time-series/us>

heating the ground. Dry years also tend to be the hottest years since the sun's energy goes into heating the land and air. Over time, an area's average temperatures can change because of changes in land use. For example, cooling can occur as bare fields revert to forests, or warming can occur as pavement replaces grass when cities expand.

Temperatures also change from one year to the next because of longer-term cycles in the global atmosphere, such as El Niño (Figure 3). El Niño winters tend to be cooler and wetter than normal because of a strong stream of tropical air over Florida and southern Alabama and Georgia. Large volcanic eruptions, such as Tambora in 1815 and Krakatoa in 1883, can cause widespread cooling for several years after the eruption occurs. Solar activity also causes small changes in incoming energy over time.

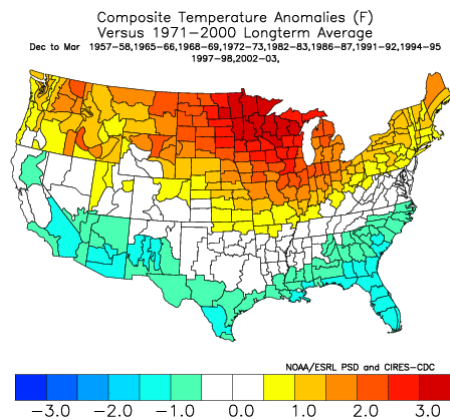


Figure 3. Temperature departures from normal in El Niño winters (Source: NOAA).

Temperature increases in the Southeast since the 1970s mirror increases in temperatures that have occurred across the US and the world as a whole. Most scientists believe that these increases in temperature are due to increases in greenhouse gases, which trap heat near the surface of the earth rather than releasing it back into space. These trends are likely to continue for the next century.

Resource: <http://www.ncadac.globalchange.gov/>