

Climate Change: The Local Effects in Coastal South Carolina

Coastal South Carolina residents face a variety of weather- and climate-related hazards, including hurricanes, storm surge, and coastal flooding. As our climate changes, so will the risks associated with these hazards. The specifics of a future climate cannot be known for certain, but scientists can produce scenarios of what is likely to occur based on best available evidence. These scenarios can help residents consider what aspects of life might be affected by these environmental changes. Similar to listening to the morning weather forecast to decide whether you should take an umbrella to work, future climate projections provide information on which to base future planning. This fact sheet reviews climate-related information specific to South Carolina and the Southeast.



Extreme Heat

Unlike other regions, the U.S. Southeast has not yet shown a clear warming trend¹. However, scientists expect average temperatures to increase in the next few decades² (Figure 1). Extreme temperatures are already more common, with more days above 95° F, more nights above 75° F, and fewer cold days since 1970. In the coming decades, coastal South Carolina may experience 20-30 more days per year above 95° F and 8-16 fewer freezing nights.

Impacts

Human health risks | Heat waves are dangerous to people and pets, causing heat cramps, heat stroke, or death. As air quality declines, people with respiratory issues will be affected.

Shifts in species | As temperatures increase, species adapted to warmer weather replace species adapted to cooler weather. This may cause changes to local ecosystems.

Stress on roads | High temperatures cause roads to soften and expand, leading to pot holes and other damage³.

Southeast Temperature: Observed and Projected

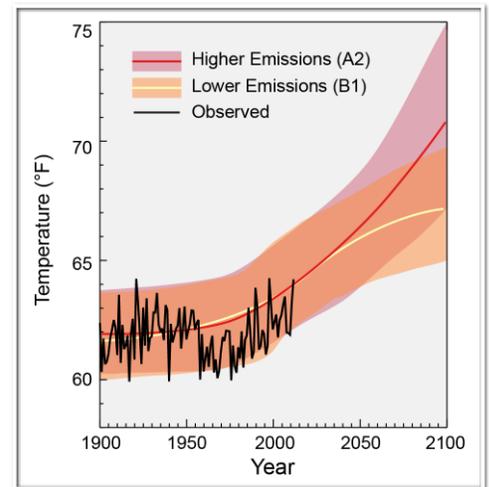


Figure 1: This graph shows observed temperatures (past) and temperature projections based on global greenhouse gas emissions output (future) for the U.S. Southeast. Local temperatures are expected to continue rising throughout the next century. Source: 2014 National Climate Assessment (NCA).

Annual Average Precipitation Trend (Inches)
1901 - 2010

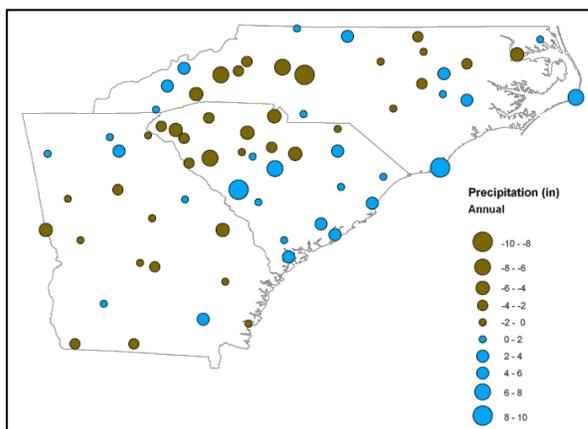


Figure 2: This graph shows observed (past) changes to yearly rainfall 1901-2010. Brown circles represent a decrease in rainfall and blue circles represent an increase in rainfall.

Source: South Carolina State Climatology Office



Rainfall Extremes

From 1901 to 2010 coastal South Carolina experienced a slight increase in average rainfall¹ (Figure 2). While climate models cannot say precisely how much average rainfall the coast will receive in the coming decades, it is likely that extremes will occur more often, meaning more episodes of both drought and heavy rain².

Impacts

Water contamination | Excess rain and drought can both lead to water quality problems. Rain may raise the water table high enough to mix with seepage from aging septic systems. Seepage and other pollutants can build up on road surfaces during dry periods, only to be swept into waterways during rain events.

Flooding | Heavy rainfall can overwhelm drainage systems, leaving standing water on streets and in yards.

Fisheries | Periods of drought lead to increased salinity in estuaries and can hinder important SC fisheries. For example, blue crabs are more susceptible to several diseases in high-salinity waters.



Sea Level Rise

Global sea level change is driven mostly by ice melt and the expansion of water due to heat. Local sea levels are also affected by the gradual sinking of the land. Sea level rose in Charleston by an average of 1.2 in/decade from 1921 to 2006⁴ (Figure 3). Due to increasing temperatures, future sea level rise may accelerate significantly. Scientists are 90% certain that global average sea level will rise 0.7-6.6 ft by 2100⁵ (Figure 4). The specific timing and degree of sea level rise within these bounds remains unknown.

Impacts

Flooding | Low-lying homes, roads, and other structures near waterways will become more susceptible to flooding.

Saltwater intrusion | Saltwater may invade freshwater resources, killing certain plant species, reducing well water availability and degrading drinking water aquifers.

Wetland loss | Wetlands may lose critical habitat due to inundation, unless space is available upland for migration.

Storm surge | Surge height from strong coastal storms will inundate more land, leading to greater property damage and flooding.

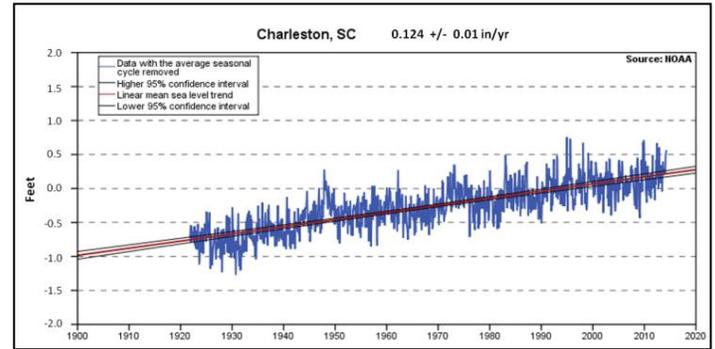


Figure 3: Tide gauge data from Charleston, SC shows local sea level has risen ~1.03 ft in 100 years. Source: National Oceanic and Atmospheric Administration.

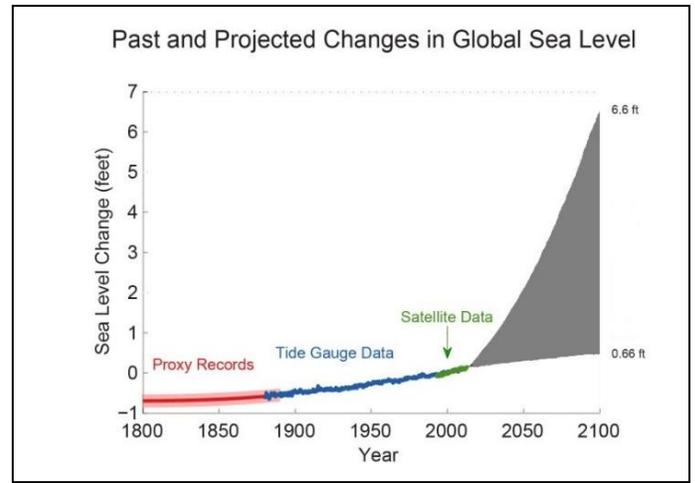


Figure 4: This figure shows past and future average global sea level compared to current sea level. Scientific evidence suggests that sea level will rise anywhere from 0.66 ft (8 in) to 6.6 ft by 2100. Source: 2014 NCA

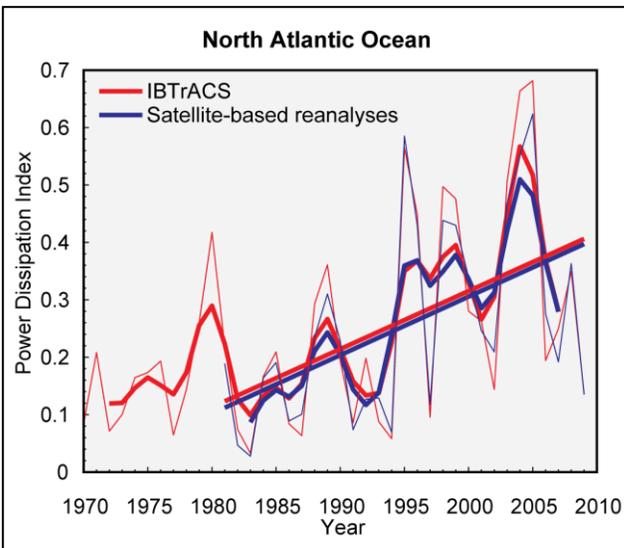


Figure 5: The “power dissipation index” (PDI) measures storm intensity, frequency, and duration. There has been an increase in PDI in the North Atlantic Ocean since 1970. Source: 2014 NCA.



Hurricane Intensity

Scientists expect that warmer temperatures will lead to fewer storms globally, but those that do form will be stronger in force² (Figure 5), with more category 4 and 5 storms. There are not enough data to analyze whether there will be any changes in the number of storms making landfall.

Impacts

Property loss | Stronger storms can cause greater property damage through increased storm surge, flooding, and winds.

Erosion | Stronger storms can cause extreme erosion, washing away beaches. This can greatly impact a community’s tourism economy.

Loss of life | Stronger storms increase the risk to humans and have the potential to result in greater loss of life.

¹ South Carolina State Climatology Office | ² Melillo et al. 2014. Climate Change Impacts in the United States: The Third National Climate Assessment. US Global Change Research Program, 841 pp. | ³ NRC. 2008. The Potential Impacts of Climate Change on US Transportation. Transportation Research Board Special Report 290. National Research Council | ⁴ www.tidesandcurrents.noaa.gov | ⁵ Parris et al. 2012. Global Sea Level Rise Scenarios for the US National Climate Assessment. NOAA Tech Memo OAR CPO-1. 37 pp.