NCASI Fact Sheet
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NOAA State Climate Summaries

MAY 2022

Background

The National Oceanic and Atmospheric Administration (NOAA) has created State Climate Summaries of observed and projected climate change (https://statesummaries.ncics.org). This fact sheet documents the climate variables covered at the website, model projection summaries, and limitations of models and data.

The climate summaries may be useful to forest products companies as they work to understand the potential effects of climate on current and future operations, and to contextualize local climate conditions for various reporting purposes, such as Environment, Sustainability, and Governance (ESG) disclosures.

Historical Climate Summaries

Historical climate summaries have been compiled from weather station data across the US. A list of the stations available for each state can be downloaded from https://statesummaries.ncics.org/downloads using the menu at the bottom of the page. The number of stations and the earliest year data were collected vary by state and by data recorded (temperature, precipitation). Summaries include a narrative that discusses the most pertinent climate metrics for that state, as determined by NOAA. State-specific climate data have been summarized by using weather stations within the state that had less than 10% missing data and covered the period since 1895-1900. However, data for some states started later if weather stations were not established in the early years. (For example, the start year for Hawaii is 1950.) Because there are few weather stations that cover the entire period (especially the early years), a given state might have only a dozen or fewer locations with weather data. The webpages for each state include a narrative that describes historical trends for that state, which can be downloaded.

Based on these data, maps are provided for key climate variables as determined by NOAA. As an example, for Georgia, graphs are provided for:

- Annual number of extremely hot days (maximum temperature of 100°F or higher)
- Annual number of freezing days (maximum temperature of 32°F or lower)
- June-August total precipitation (inches)
- Annual number of days with precipitation of 3 inches or more
- Annual number of very warm nights (minimum temperature of 75°F or higher)
- Total annual precipitation (inches)

In other states, the key metrics plotted differ. Downloadable graphs for these data are also available for each state. For example, Figure 1 shows the graph of Georgia precipitation data. Metadata can be accessed for each graph, but raw data are not in a collated form.

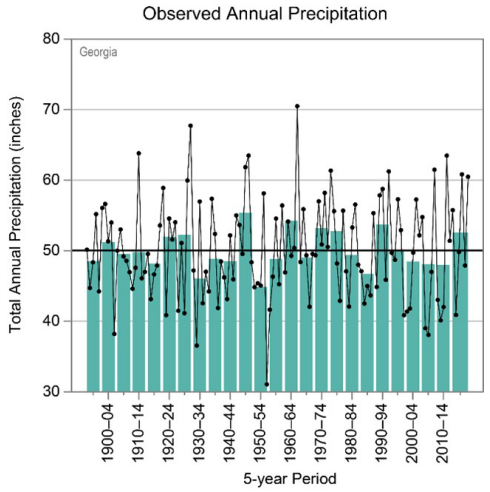

Figure 1. Observed total annual precipitation for Georgia from 1895 to 2020. Dots show annual values. Bars show averages over 5-year periods (last bar is a 6-year average). The horizontal black line shows the long-term (entire period) average of 50.0 inches. There is no long-term trend in annual precipitation for Georgia.

Projected Climate Summaries

State climate summaries also include a graph showing historical and projected annual temperatures. Figure 2 below shows the graph for Georgia.

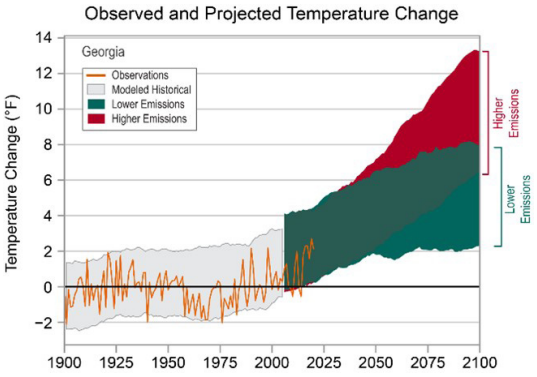

Figure 2. Observed and projected changes (compared to the 1901–1960 average) in near-surface air temperature for Georgia. Observed data are for 1900–2020. Projected changes for 2006–2100 are from global climate models for two possible futures: one in which greenhouse gas emissions continue to increase (higher emissions, red zone) and another in which greenhouse gas emissions increase at a slower rate (lower emissions, green zone).

Projected precipitation changes are available on the downloads page, with the state in question highlighted (Figure 3). Maps for different states are not provided separately.

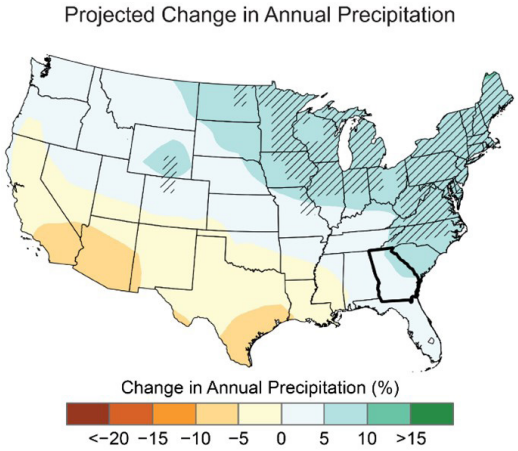

Figure 3. Projected changes in total annual precipitation (%) for the middle of the 21st century compared to the late 20th century under a higher emissions pathway (Georgia example). Hatching represents areas where the majority of climate models indicate a statistically significant change.

Related to the NOAA weather stations, NCASI has developed a Climate Projection Analysis Tool (CPAT) that uses climate model outputs to project temperature and precipitation conditions at a local scale. (CPAT is available to NCASI Member Companies. See https://www.ncasi.org/resource/cpat/ for more information.) These future conditions can be compared to the conditions under which timber tree species are currently found, based on data from the Forest Inventory and Analysis Program (FIA). The tool can then assess the future risk to a species if grown outside its current climate envelope.

Limitations

Although these data may be useful to examine potential trends in climate-induced changes over time, some caveats are warranted. These data are presented as coarse state summaries, and in some cases, instrumentation changes may have affected data over time. It is likely best to view these data as representative of general trends rather than as precise metrics. Also, the annual mean temperature does not necessarily correspond to seasonal changes. For example, in Wisconsin, there is more winter warming than summer warming in the historical data. Because models and temperature data (Figure 2) are normalized for the period 1900 to 1960 (mean zero over all models), the overlap of the gray zone in Figure 2 with the orange historical line does not necessarily demonstrate that the models are valid at the state level. Finally, the very wide spread of model outputs (Figure 2 green zone) is due to the different models used and the initial conditions for different model runs. Caution is warranted when using this wide forecast to interpret state-level future conditions.

Note also that the Intergovernmental Panel on Climate Change (IPCC), in its latest report (https://www.ipcc.ch/report/ar6/wg1/), indicated that the hottest scenarios (RCP8.5) are recognized to be controversial and perhaps unlikely. Thus, the lower green zone in Figure 2 is likely a more realistic projection.

For more information contact:

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