SOUTH CENTRAL
CLIMATE ADAPTATION SCIENCE CENTER
HOW DO WEATHER AND CLIMATE DIFFER?

People often use the terms weather and climate interchangeably, but weather and climate are different.

When we ask "Will it be hot today or rainy tomorrow?" we're asking about the weather. Climate, however, is the long-term average of weather conditions for a certain location.

A phrase many people use to help make the distinction is,

"Climate is what you expect, weather is what you get."

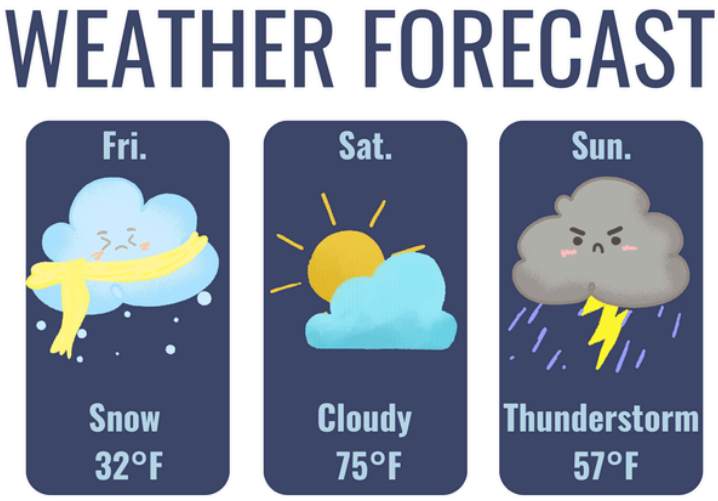



In other words, your seasonal wardrobe is what you expect to wear for a certain season, for example, long sleeves in winter. However, what you actually end up wearing on any given day is up to the weather.

Weather and Weather Forecasts

Weather is what we experience daily. For those of you who love following the daily weather forecast updates from local stations or a phone app, will see fluctuations in the temperature.

For example, in January of 2023, there were several variations in the temperatures throughout the month. The daily high for January 1st was 72°F, which was above average. However, on January 31st, the high temperature was only 24°F, which was below average. That's the weather. It varies each day and may be above or below the average.



Weather forecasts are built to look at these daily changes on a short term basis typically up to 7-14 days in the future. They are meant to be representative of the daily expected weather conditions on any given day during that time period.

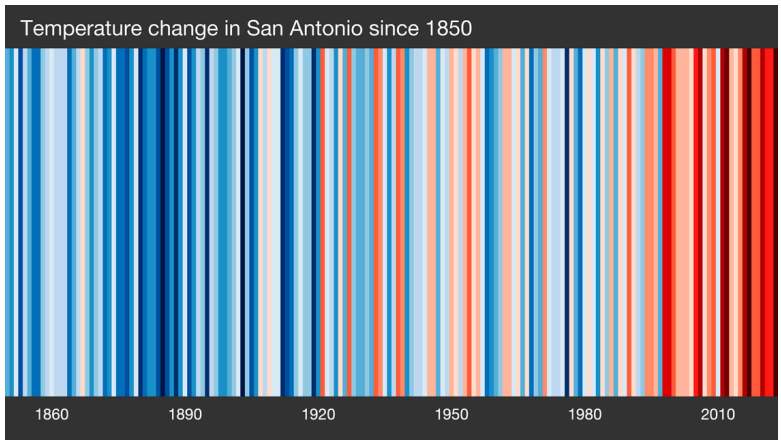
Now, let's say it's the middle of January in Oklahoma City, Oklahoma. You expect that the temperatures will be cold/chilly since it is in the middle of winter. The average high temperature in January is around 49°F. That's the climate or the expected average. Continue reading to learn more

Differences between Weather and Climate

More on Climate

Climate is the average of weather over time (at least 30 years) and location. For example, you can expect snow in the Northeastern United States in January or for it to be hot and humid in the Southeast in July. The climate record also includes extreme values such as record-high temperatures. When you hear your local weather person say "Today we hit a record high," they are talking about climate records.

One way that we communicate these changes visually is by using Climate Stripes. In 2018 Ed Hawkins developed a series of graphics, known as the "**Climate Stripes**," to show how temperature has changed over the last 150 years (NOAA).



Red: Above average temperatures

Blue: Below average temperatures

Did you know? The annual average temperature of the United States has warmed at a rate of 0.16 degrees Fahrenheit per decade between 1895 and 2023 (NOAA). That may not sound like much, but it adds up over time. Over 100 years of warming this becomes 1.6 degrees Fahrenheit above normal. This is like running a fever and you likely don't feel very well!

Climate Projections

Climate projections are different from weather forecasts as they cannot tell you what the climate may be on any given day or even year, but rather they help us see trends that we can expect. Using climate projections are one way that we are able to see what our climate may look like in the future.

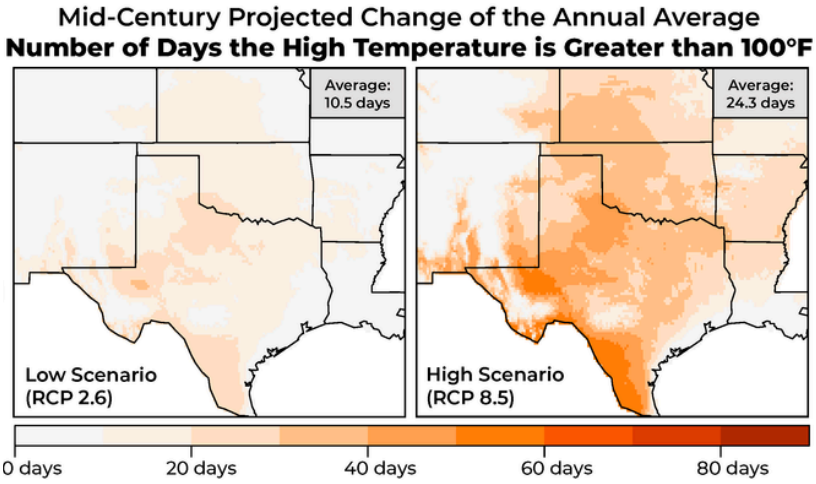
Climate projections **CAN** provide an estimate of how the climate may change over time.

- For example, they can show how the number of heatwaves per year on average may change.

Climate projections **CANNOT** show what the impacts of that change may be.

- For example, they cannot show how a projected increase in heat waves may impact hospital admissions for heat-related illnesses.

Though, climate projections may be used in other models to understand climate impacts. There are many datasets with climate projections, and we recommend consulting with CASC experts or other climate modeling experts before using climate projections.



The image above shows two different projections for the same time period with different inputs (e.g. emissions).

According to the Intergovernmental Panel on Climate Change (IPCC), climate projections are:

- Any description of the future climate and the pathway leading to it.
- Estimates of the future climate derived from climate model simulations. This can be either directly from climate model simulations or from downscaled climate model simulations.

Learn more about Climate Projects on our website: https://southcentralclimate.org/resources/climate-projections/