U.S. and Global Precipitation

This indicator describes trends in average precipitation for the United States and the world.

Background

Precipitation can have wide-ranging effects on human well-being and ecosystems. Rainfall, snowfall, and the timing of snowmelt can all affect the amount of water available for drinking, irrigation, and industry, and can also determine what types of animals and plants (including crops) can survive in a particular place. Changes in precipitation can disrupt a wide range of natural processes, particularly if these changes occur more quickly than plant and animal species can adapt.

As average temperatures at the Earth's surface rise (see the U.S. and Global Temperature indicator on p. 24), more evaporation occurs, which, in turn, increases overall precipitation. Therefore, a warming climate is expected to increase precipitation in many areas. However, just as precipitation patterns vary across the world, so will the effects of climate change. By shifting the wind patterns and ocean currents that drive the world's climate system, climate change will also cause some areas to experience decreased precipitation. In addition, higher temperatures lead to more evaporation, so increased precipitation will not necessarily increase the amount of water available for drinking, irrigation, and industry (see the Drought indicator on p. 32).

About the Indicator

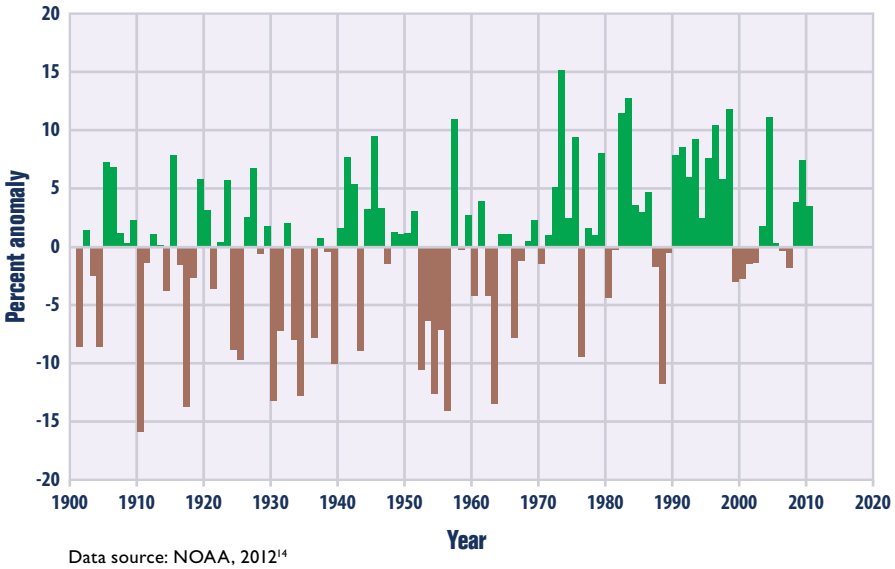
This indicator examines U.S. and global precipitation patterns from 1901 to the present, based on rainfall and snowfall measurements from land-based weather stations worldwide.

This indicator shows annual anomalies, or differences, compared with the average precipitation from 1901 to 2000. These anomalies are presented in terms of percent change compared with the baseline. Annual anomalies are calculated for each weather station. Anomalies for broader regions have been determined by dividing the country (or the world) into a grid, averaging the data for all weather stations within each cell of the grid, and then averaging the grid cells together (for Figures 1 and 2)

(Continued on page 29)

Figure 1. Precipitation in the Contiguous 48 States, 1901–2011

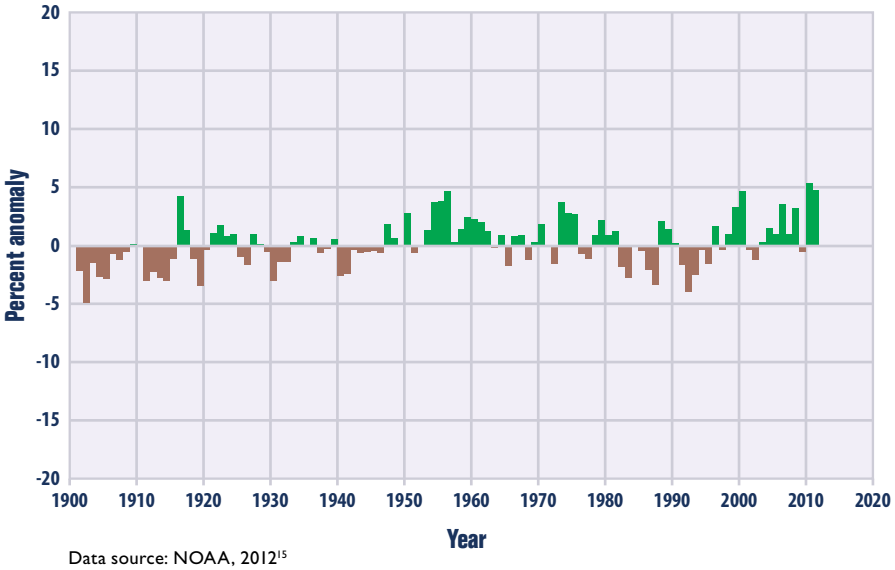
This figure shows how the total annual amount of precipitation in the contiguous 48 states has changed since 1901. This graph uses the 1901 to 2000 average as a baseline for depicting change. Choosing a different baseline period would not change the shape of the data over time.



Data source: NOAA, 2012[14]

Figure 2. Precipitation Worldwide, 1901–2011

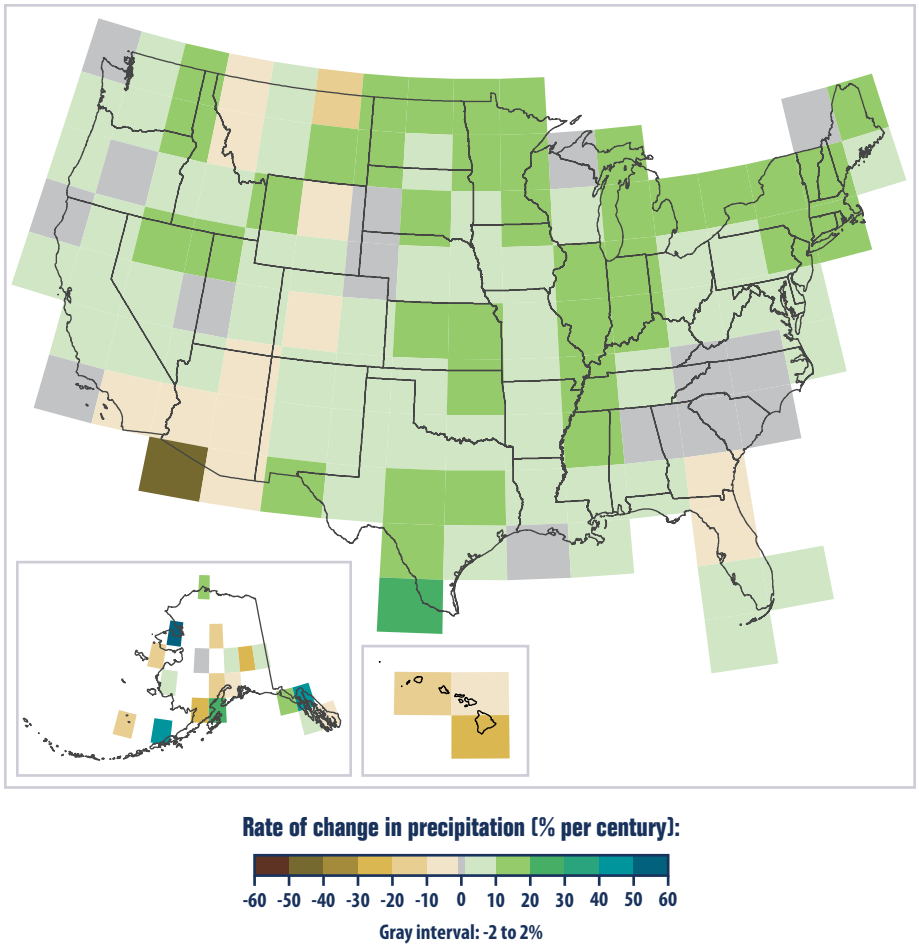
This figure shows how the total annual amount of precipitation over land worldwide has changed since 1901. This graph uses the 1901 to 2000 average as a baseline for depicting change. Choosing a different baseline period would not change the shape of the data over time.



Data source: NOAA, 2012[15]

Figure 3. Rate of Precipitation Change in the United States, 1901–2011

This figure shows the rate of change in total annual precipitation in different parts of the United States since the early 20th century (since 1901 for the contiguous 48 states, 1905 for Hawaii, and 1918 for Alaska).



Data source: NOAA, 2012[16]

Key Points

- On average, total annual precipitation has increased over land areas in the United States and worldwide (see Figures 1 and 2). Since 1901, global precipitation has increased at an average rate of 2.3 percent per century, while precipitation in the contiguous 48 states has increased at a rate of 5.9 percent per century.
- Some parts of the United States have experienced greater increases in precipitation than others. A few areas such as Hawaii and parts of the Southwest have seen a decrease in precipitation (see Figure 3).

or displaying them on a map (Figure 3). This method ensures that the results are not biased toward regions that happen to have many stations close together.

Indicator Notes

Data from the early 20th century are somewhat less precise because there were fewer stations collecting measurements at the time. To ensure that overall trends are reliable, the data have been adjusted where possible to account for any biases that might be introduced by station moves, changes in measurement instruments, and other changes.

Data Sources

The data for this indicator were provided by the National Oceanic and Atmospheric Administration's National Climatic Data Center, which maintains a large collection of climate data online at: www.ncdc.noaa.gov/oa/ncdc.html. Global, U.S., and regional precipitation anomalies were calculated based on monthly values from a network of long-term monitoring stations.