

Climate Change Indicators in the United States

www.epa.gov/climate-indicators

The Earth's climate is changing. Temperatures are rising, snow and rainfall patterns are shifting, and more extreme climate events—like heavy rainstorms and record-high temperatures—are already taking place. Scientists are highly confident that many of these observed changes can be linked to the levels of carbon dioxide and other greenhouse gases in our atmosphere, which have increased because of human activities.

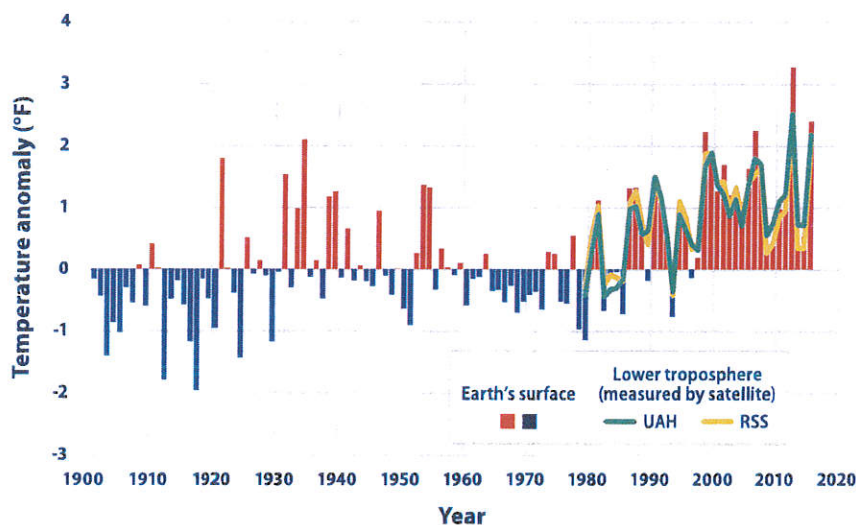
EPA partners with more than 40 data contributors from various government agencies, academic institutions, and other organizations to compile a key set of indicators related to the causes and effects of climate change. All of the indicators are based on observations over time and consist of the best available peer-reviewed, publicly available data. Some indicators show trends that can be more directly linked to human-induced climate change than others. Together, these indicators present credible and compelling evidence that climate change is happening now in the United States and globally.

WHAT'S HAPPENING

A few key points:

- **Atmospheric Concentrations of Greenhouse Gases:** Historical measurements show that the current global atmospheric concentrations of carbon dioxide are unprecedented compared with the past 800,000 years, even after accounting for natural fluctuations.
- **U.S. and Global Temperature:** Average temperatures have risen across the contiguous 48 states since 1901. Global temperatures show a similar trend, and all of the top 10 warmest years on record worldwide have occurred since 1998.
- **Coastal Flooding:** Flooding is becoming more frequent along the U.S. coastline as sea level rises. Nearly every site measured has experienced an increase in coastal flooding since the 1950s. The rate is accelerating in many locations along the East and Gulf coasts.
- **Snowpack:** Snowpack in early spring has decreased at more than 90 percent of measurement sites in the western United States between 1955 and 2016.
- **Heat-Related Deaths:** Since 1979, more than 9,000 Americans were reported to have died as a direct result of heat-related illnesses such as heat stroke. However, considerable year-to-year variability and certain limitations of the underlying data make it difficult to determine whether the United States has experienced long-term trends in the number of deaths classified as "heat-related."
- **Marine Species Distribution:** The average center of biomass for 105 marine fish and invertebrate species along U.S. coasts shifted northward by about 10 miles between 1982 and 2015. These species also moved an average of 20 feet deeper.

Temperatures in the Contiguous 48 States, 1901–2015

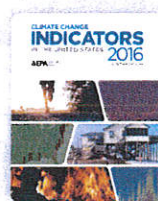


This indicator shows how annual average temperatures in the contiguous 48 states changed from 1901 to 2015, using the 1901–2000 average as a baseline.

Data source: National Oceanic and Atmospheric Administration (NOAA), 2016. National Centers for Environmental Information. www.ncei.noaa.gov.

USING THE INDICATORS

EPA's indicators are designed to be a "go-to" resource for the public, scientists, analysts, decision-makers, educators, and others who can use climate change indicators as a tool for communication, environmental assessment, and informed decision-making. The indicators are available in several forms.



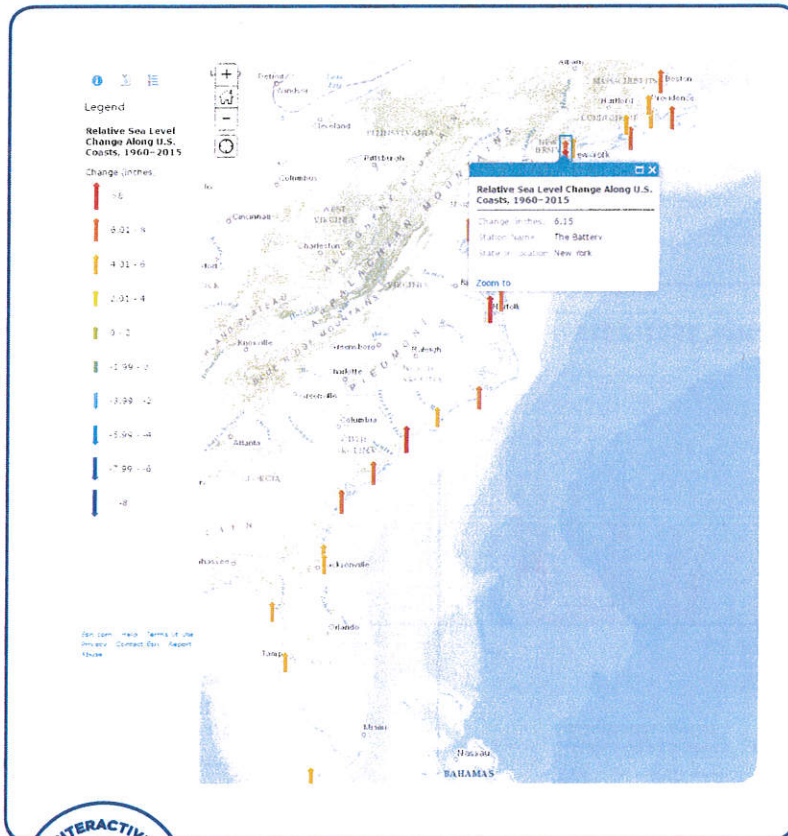
The indicators can be found online at: www.epa.gov/climate-indicators, where they are updated as data become available, usually on an annual basis. A PDF of the 2016 report is available online; order a printed copy by emailing: climateindicators@epa.gov.

ABOUT THE INDICATORS

EPA currently presents **37 indicators** and **five features** that each highlight a specific region, data record, or area of interest. The indicators and features are organized into six chapters, shown to the right.

Each indicator on EPA's website includes:

- Easy-to-understand graphs or maps depicting changes over time.
- Background on how the indicator relates to climate change.
- Key points about what the indicator shows.
- A description of each data source used and how the indicator was developed.
- Transparent technical support documentation.
- Web links to download high-resolution figures and data files.



Some indicators feature interactive maps online. For example, the sea level map shown here can be clicked to show trends at specific locations.

CLIMATE CHANGE INDICATORS AND HEALTH

The 2016 Indicators report includes a feature on how climate change can affect human health and what indicators can tell us about such climate/health interactions. For more information about climate and health connections, look for this symbol throughout the printed edition (available in PDF form online).



Subscribe to receive indicator updates at: www.epa.gov/climate-indicators.

INDICATORS

Greenhouse Gases



- U.S. Greenhouse Gas Emissions
- Global Greenhouse Gas Emissions
- Atmospheric Concentrations of Greenhouse Gases
- Climate Forcing

Weather and Climate



- U.S. and Global Temperature
- High and Low Temperatures
- U.S. and Global Precipitation
- Heavy Precipitation
- Tropical Cyclone Activity
- River Flooding
- Drought
- *A Closer Look: Temperature and Drought in the Southwest*

Oceans



- Ocean Heat
- Sea Surface Temperature
- Sea Level
- *A Closer Look: Land Loss Along the Atlantic Coast*
- Coastal Flooding
- Ocean Acidity

Snow and Ice



- Arctic Sea Ice
- Antarctic Sea Ice
- Glaciers
- Lake Ice
- *Community Connection: Ice Breakup in Two Alaskan Rivers*
- Snowfall
- Snow Cover
- Snowpack

Health and Society



- Heat-Related Deaths
- Heat-Related Illnesses
- Heating and Cooling Degree Days
- Lyme Disease
- West Nile Virus
- Length of Growing Season
- Ragweed Pollen Season

Ecosystems



- Wildfires
- Streamflow
- Stream Temperature
- *Tribal Connection: Trends in Stream Temperature in the Snake River*
- Great Lakes Water Levels and Temperatures
- Bird Wintering Ranges
- Marine Species Distribution
- Leaf and Bloom Dates
- *Community Connection: Cherry Blossom Bloom Dates in Washington, D.C.*