

Commonly Asked Questions:

NOAA Global Temperature Dataset

Version 5.1.0

(NOAAGlobalTemp v5.1.0)

About the Update

Why is the dataset being updated? Why is updating datasets good for users?

NOAA periodically updates its datasets to provide the most accurate depiction of environmental conditions. This updated dataset ensures that researchers, businesses, and industry have the best available information to develop tools, products, services, and assessments for decision making and that scientists can use in their research. The dataset is used by NCEI in the development of the monthly Global Climate Report. Other science-driven organizations in academic and economic sectors also use the dataset for global climate monitoring and applications.

Changes from Version to Version

What updates does this version introduce?

One of the two major updates is that the new version has complete global coverage. This was made possible through the use of additional data for the Arctic as well as improved scientific methods for infilling areas without data. Also, the data record now begins in January 1850 instead of 1880, extending the data record to include an additional 30 years of data.

What are the data sets used in this new version?

In addition to using [GHCNm v4.0.1](#) and [ERSST v5.0.0](#), the latest version of NOAAGlobalTemp v5.1.0 uses air temperature data in the Arctic Ocean from the International Comprehensive Ocean-Atmosphere Data Set ([ICOADS](#)) and the International Arctic Buoy Program ([IABP](#)) to improve spatial coverage.

Does this mean that NOAA's past global climate analyses weren't as accurate as the new version will be?

As technology improves and additional data sources become available, it is essential to update these datasets in order to provide the most accurate depiction of the Earth's environmental conditions. The Arctic is the fastest-warming region in the world, warming at least three times faster than any other region on Earth. The exclusion of this region in previous versions of

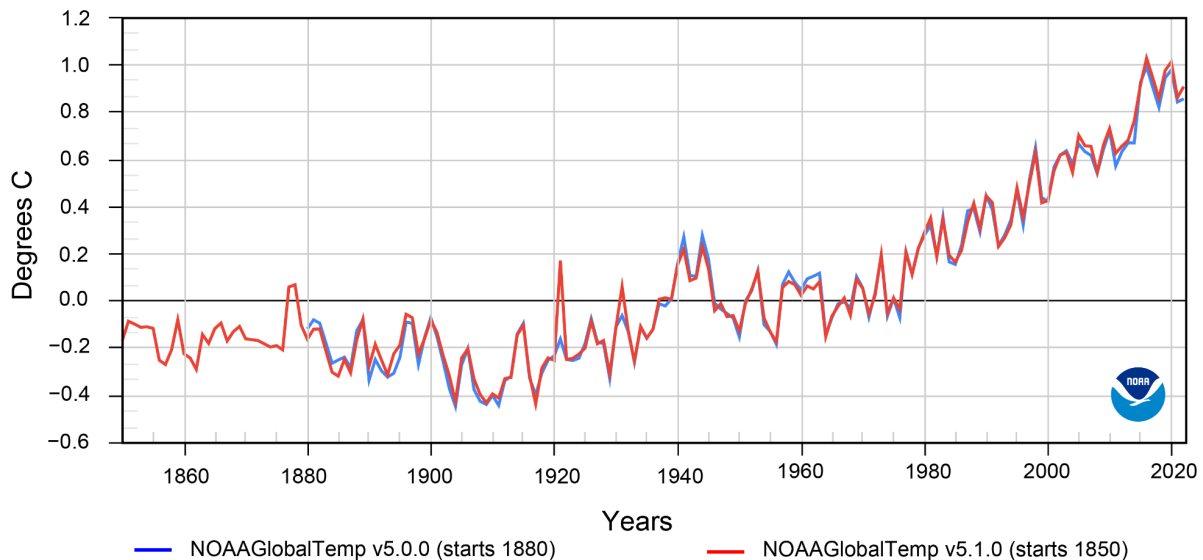
NOAAGlobalTemp resulted in a very slight cold bias in the global average, particularly in recent years. The new version of NOAAGlobalTemp corrects this and, while ranks and anomalies may change slightly, the previous version and the new version are very close to each other and the main conclusions regarding global climate change are very similar to the previous version:

- Global trends over decadal and longer time scales are consistent.
- The top-10 warmest years on record have occurred since 2010 and the last nine years (2014-2022) are the nine-warmest years on record.

However, the new version shows significantly more warming in the Arctic since 1980, which is mainly a result from complete coverage in the polar region.

Global Annual Temperature Anomalies

with respect to the 1901-2000 base period



How did NOAA NCEI get climate data from as far back as 1850?

NCEI's archives contain limited land and ocean data back to the mid-19th century. Our improved methodology, in combination with these limited observations, allowed us to produce full coverage back to 1850.

Operational Uses

How can the operational dataset be accessed?

As of February 2023, NOAA GlobalTemp v5.1.0 is available from NCEI at <https://www.ncei.noaa.gov/data/noaa-global-surface-temperature/v5/>

It is available in netCDF format.

How will the operational dataset be used by NCEI?

The dataset will be used to produce the Global State of the Climate report for January 2023 and henceforward for future reports and global monitoring. The [global section of the Climate at a Glance tool](#) will also be updated in mid-February 2023 to use the new version of the data set.

Beyond NCEI, who will use it, and what kind of studies does it contribute to?

Atmospheric research scientists and private sector interests constitute the major users of the dataset. Scientists around the world consider global surface temperature a critical component to help understand Earth's climate. Private sector interests use the dataset to assess related monthly factors, such as pending heating and cooling costs, or trends in the same. They use the data for global climate monitoring and assessment, environmental research, and informational products and services for various industries and economic sectors, such as agriculture.

Does the new version change the conclusions regarding global temperature increases?

Trends using the updated dataset (v5.1.0) are statistically consistent with the previous version over decadal and longer time scales. However, the new analysis exhibits significantly more warming in the Arctic since 1980 ($0.598^{\circ}\text{C dec}^{-1}$ vs. $0.478^{\circ}\text{C dec}^{-1}$). Trend differences primarily result from coverage gaps in the previous analysis.

Peer-Review Process/Transparency

What kind of testing and peer-review does the dataset undergo before NCEI releases it for use?

As a matter of course, scientists with NCEI used a series of quality assurance tests to ensure the accuracy and integrity of NOAA GlobalTemp version 5.1.0 as compared to the previous version. This updated version underwent scrutiny to validate its results. The methodology of the dataset was reviewed within NOAA and by peers in the global studies community. A series of readiness reviews took place before the final public release. A review journal article about the new version was published in 2021 in the Geophysical Research Letters journal:

Vose, R.S., B. Huang, X. Yin., D. Arndt, D.R. Easterling, J.H. Lawrimore, M.J. Menne, A. Sanchez-Lugo, H.-M. Zhang, 2021: Implementing full spatial coverage in NOAA's global

temperature analysis. *Geophysical Research Letters*, 48, e2020GL090873.
<https://doi.org/10.1029/2020GL090873>

What do scientists do with user feedback once the dataset is released?

NCEI scientists regularly review user feedback and evaluate its scientific value. Feedback with scientific merit and/or potential to support U.S. economic interests is used in future improvements of this product.