

FAQ / New NOAA Climate “Normals” (1981-2010) for the United States



SUMMARY:

With the close of 2010, NOAA’s National Climatic Data Center (NCDC) has commenced calculation of the 1981–2010 Normals. Climate Normals are the latest three-decade averages of climatological variables, including temperature and precipitation. This new product will be replacing the current 1971–2000 Normals product. NCDC is still acquiring data for the year 2010. We expect the final input data will be ingested and processed by the end of April 2011. NCDC will be releasing the new Normals in two phases. The most widely used Normals will be released by July 2011, and all other Normals will be made available in a supplemental release by the end of 2011.

FAQs

1. What are Normals?

In the strictest sense, a “normal” of a particular variable (e.g., temperature) is defined as the 30-year average. For example, the minimum temperature normal in January for a station in Chicago, Illinois, would be computed by taking the average of the 30 January values of monthly-averaged minimum temperatures from 1981 to 2010. Each of the 30 monthly values was in turn derived from averaging the daily observations of minimum temperature for the station. In practice, however, much more goes into NCDC’s Normals product than simple 30-year averages. Procedures are put in place to deal with missing and suspect data values. In addition, Normals include quantities other than averages such as degree days, probabilities, standard deviations, etc. Normals are a large suite of data products that provide users with many tools to understand typical climate conditions for thousands of locations across the United States.

2. When will the 1981–2010 Normals be available?

The new Normals will be made available in two releases. Core Normals will be made available by July 2011, and supplemental Normals will be available by January 2012. Initial access to both releases will be via file transfer protocol (FTP), with links to the FTP access on NCDC’s Web site. We expect to provide more advanced (and user-friendly) Web services and selection capabilities to the new Normals from NCDC’s Web site by November 2011 for the core Normals and April 2012 for the supplemental Normals.

3. What are considered “core” Normals?

The core 1981–2010 Normals are the most-widely used Normals as identified by NCDC in close consultation with the National Weather Service (NWS) and a wide array of climate data users. Specifically, core Normals refer to the daily and monthly station-based Normals of temperature, precipitation, snowfall, snow depth, and heating and cooling degree days. Generally, this coincides with the key products produced for each observation station called CLIM81 and CLIM84 released for the 1971–2000 Normals (except for snowfall and snow depth Normals).

4. What are “supplemental” Normals?

Supplemental Normals are a catchall category for all Normals products that will not be released in the core Normals release. An example is our population-weighted degree day normals product, which cannot be computed until the U.S. Census Bureau releases its final population figures.

5. Why aren’t the Normals released sooner?

The key factor determining when Normals will be made available is the acquisition of data from 2010 (especially December 2010). Currently, some station time series are “keyed” manually and/or are not fully incorporated into daily/monthly datasets for three to four months after being observed. NOAA waits until all relevant data have been incorporated before issuing the new set of Normals. However, the timelines for making the 1981–2010 Normals available described above represent a substantial reduction in development time compared to previous installments of Normals.

6. Where can I find more information of NOAA’s Normals?

Information on the current version of NOAA’s Normals, as well as the history of the Normals, can be found here: <http://www.ncdc.noaa.gov/oa/climate/normals/usnormals.html>.

The most current information on the development of 1981–2010 Normals is an extended abstract by Arguez et al. (2011) and can be accessed here:

<ftp://ftp.ncdc.noaa.gov/pub/data/aarguez/Normals/1981-2010/Arguez-Extended-Normals-AMS2011.pdf>

7. Why does NOAA produce Normals?

NOAA’s computation of climate Normals is in accordance with the recommendation of the World Meteorological Organization (WMO), of which the United States is a member. While the WMO mandates each member nation to compute 30-year averages of meteorological quantities at least every 30 years (1931–1960, 1961–1990, 1991–2020, etc.), the WMO recommends a decadal update, in part to incorporate newer weather stations. NOAA’s 1971–2000 Normals were calculated in accordance with this recommendation, and the 1981–2010 Normals will be as well. Further, NOAA’s NCDC has a responsibility to fulfill the mandate of Congress “... to establish and record the climatic conditions of the United States.” This responsibility stems from a provision of the Organic Act of October 1, 1890, which established the Weather Bureau as a civilian agency (15 U.S.C. 311).

8. What are Normals used for?

Meteorologists and climatologists regularly use Normals for placing recent climate conditions into a historical context. NOAA’s Normals are commonly seen on local weather news segments for comparisons with the day’s weather conditions. In addition to weather and climate comparisons, Normals are utilized in seemingly countless applications across a variety of sectors. These include: regulation of power companies, energy load forecasting, crop selection and planting times, construction planning, building design, and many others.

9. What changes are being made in the computation of the 1981–2010 Normals versus previous versions?

Several changes and additions are being incorporated into the 1981–2010 Normals. Monthly temperature and precipitation Normals will be based on underlying data values that have undergone additional quality control. Monthly temperatures have also undergone enhanced bias corrections to account for the effects of station moves, changes in instrumentation, etc. These enhancements are described in more detail in the following peer-reviewed papers:

<ftp://ftp.ncdc.noaa.gov/pub/data/ushcn/v2/monthly/menne-et al2009.pdf> and

<ftp://ftp.ncdc.noaa.gov/pub/data/ushcn/v2/monthly/menne-williams2009.pdf>.

Unlike the 1971–2000 Normals, daily data will be used extensively in the computation of daily temperature and precipitation Normals as well as heating and cooling degree day Normals, providing greater precision of intra-seasonal features. In previous installments, daily precipitation Normals were computed as a spline fit through the monthly values. For 1981–2010, this metric will be replaced with a suite of metrics, including daily probabilities of precipitation as well as month-to-date and year-to-date precipitation Normals. New for 1981–2010 will be climate Normals derived from hourly data values as well as from radiosonde observations. More details can be found in Arguez et al. (2011) (see question 6 for access).

10. What qualifies or disqualifies a station to be included in Normals products?

Normals are computed for as many NWS stations as reasonably possible. Some stations do not have sufficient data over the 1981–2010 period to be included in Normals, and this is the primary reason a station may not be included. Normals are computed for stations that are part of the NWS’s Cooperative Observer Program (COOP) Network. Some additional stations are included that have a Weather Bureau – Army – Navy (WBAN) station identification number. Normals are only computed for stations in the United States, including Alaska, Hawaii, and U.S. territories.

11. How many stations will be included in the normals?

For 1981–2010, we plan to compute precipitation normals for almost 8,000 precipitation stations; a fraction of these will have snowfall and snow depth normals as well. Temperature normals (including derived products such as degree days) will be computed for about 6,000 stations.

12. How do the 1981–2010 Normals compare with the 1971–2000 Normals?

It is common and expected for the Normals to change with each decadal installment. This is due to random processes such as sampling variability as well as systematic processes such as station moves and changes in methodology. Further, climate change can also lead to coordinated shifts in normal values. Once the 1981–2010 Normals are made available, relevant comparisons between the new version and previous versions will be highlighted. This will include direct comparisons between the 1971–2000 and the 1981–2010 Normals, as well as so-called “apples-to-apples” comparisons that account for changes in methodology between the two installments. However, observational evidence shows that the 2000–2009 timeframe is the warmest decade on record. See the State of the Climate in 2009, a special supplement to the July 2010 Bulletin of the American Meteorological Society, which can be accessed here:

<http://www.ncdc.noaa.gov/bams-state-of-the-climate/2009.php>.

In light of the observed warming, we expect that the new Normals will generally be warmer on average for many stations but not uniformly warmer for all stations and all seasons. In fact, some station Normals in certain seasons will be cooler this time. However, we expect the number of warmer normal values to significantly exceed the number of cooler normal values. In the case of precipitation, preliminary results suggest that the differences between the 1971–2000 and 1981–2010 periods, while spatially coherent within certain regions, are highly variable from region to region and season to season.

13. What do climate Normals tell us about global warming or climate change?

Climate Normals were never designed to be metrics of climate change. In fact, when the widespread practice of computing climate Normals commenced in the 1930s, the generally-accepted notion of the climate was that underlying long-term averages of climate time series were constant. Changes from one installment of climate Normals to the next do, nonetheless, provide a crude metric of climate change impacts. However, care must

be taken when interpreting changes between one Normals period and the other. For instance, a +0.2°F change may not be statistically significant. Further, changes from the 1971–2000 Normals to the 1981–2010 Normals may be due to station moves, changes in methodology, urban heating, etc. that are not reflective of real changes in the underlying climate signal.

14. How can I obtain historic Normals from previous Normal periods?

To obtain 1961–1990 climate Normals or earlier versions, please contact NCDC’s User Engagement & Services Branch.

15. What are Heating and Cooling Degree Days? What are Growing Degree Days?

Heating and cooling degree days are metrics of energy demand associated with the variation of mean temperature across space and time. Growing degree days are metrics of agricultural output, also as a function of mean temperature. The computation of degree days involves certain threshold temperatures, e.g., 65°F for heating and cooling degree days. These thresholds are referred to as base temperatures.

16. How can I obtain Heating and Cooling Degree Day Normals set to different base temperatures? And for Growing Degree Units?

While NCDC utilizes 65°F as the base temperature for the standard calculation of heating and cooling degree days, NCDC’s climate normal products include alternative computations of heating and cooling degree days for various base temperatures. In addition, growing degree days are computed for various crop-specific base temperatures. Please contact NCDC’s User Engagement & Services Branch for more information.

17. How can I obtain hourly, daily, and monthly Normals for additional weather elements such as dew point, sea level pressure, and wind?

The vast majority of weather stations utilized in Normals only routinely report air temperature and precipitation. A smaller set of stations have fairly complete records of additional variables such as dew point temperature, sea level pressure, and wind speed and direction. For about 200–300 of these stations, we are able to provide hourly Normals of temperature, dew point temperature, sea level pressure, and wind.

18. How are the new hourly Normals computed, and how are hourly data used to calculate daily and monthly Normals?

The computation of hourly climate normals is still in development, so a final description of the methodology is not available at this time. This information will be finalized and available when the hourly normals are released.

19. How does the transition to ASOS affect the computation of Normals?

Automated Surface Observing System (ASOS) stations were implemented in the mid-1990s, largely replacing human observers. As a result, there are inhomogeneities in the 1981–2010 records due to changes in observing practices. These inhomogeneities will be addressed to some degree. More information on this will be made available when the core Normals are released.

20. How do the Normals compare to Alternative Normals and Dynamic Normals?

In response to observed climate change, NOAA’s NCDC has been investigating a suite of experimental products that attempt to provide a better estimate of “normal” than the traditional 30-year average Normals of temperature and precipitation. This project is known as Alternative Normals. This project is parallel to the computation of NOAA’s official 1981–2010 Normals and is ongoing. There are no plans to discontinue the computation of official Normals every ten years in response to results obtained from the Alternative Normals project. For more

information on Alternative Normals, please contact NCDC's Anthony Arguez. Dynamic Normals refers to a tool available on NCDC's Web site that allows users to create their own Normals for a particular station by selecting customized start and end years for the averages. This tool has not been updated since 2001 and there are no plans to update this tool in the foreseeable future. For more information on Dynamic Normals, please contact NCDC's User Engagement & Services Branch.

21. NOAA's Climate Prediction Center has already changed their Normals to the 1971-2010 base period? Why are those Normals not available?

Many organizations, including NOAA's Climate Prediction Center (CPC), develop their own averages and change base periods for internal use. However, NCDC's climate Normals are the official United States Normals as recognized by the World Meteorological Organization and the main Normals made available for a variety of variables.

Below is a brief summary of changes to the CPC products due to the change in climate base period from 1971–2000 to 1981–2010:

Climate Monitoring:

- In January 2011, the CPC completed development of new climate normals based on the 1981–2010 period. This effort was done for all of the Climate Data Assimilation System (CDAS) and Global Ocean Data Assimilation (GODAS) data products that are used for real-time monitoring of the global climate system.
- This new climate base period was used to prepare numerous operational climate monitoring products, including the Climate Diagnostics Bulletin (CDB) and ocean monitoring products in February 2011. For example, the CDB and ocean products released in February 2011 that describe conditions during January, 2011 use climate anomalies based on the new climate base period.
- A notification of this change to the CPC normals was placed on the CPC website prior to the change in January 2011.

Climate Prediction:

- CPC normals for stations and climate divisions, which are used in CPC's operational forecasts, will be officially updated in mid-May.
- CPC normals for heating and cooling degree days will be updated in mid-June.

22. How can I reach NCDC's User Engagement & Services Branch? Who can I contact for more information?

For general questions about Normals or help accessing the 1971–2000 product, please contact NCDC's User Engagement & Services Branch at 828-271-4800, option 2. For questions regarding the development of the 1981–2010 Normals, please contact Anthony Arguez (Anthony.Arguez@noaa.gov).

