# New Thirty-Year Climate Normals Are Here
## What Exactly Does this Mean?

### Overview

On July 1, 2011, the National Climatic Data Center (NCDC) released the new thirty-year climate normals. These new normals will include data from 1981 to 2010, and therefore drop the 1970s, a decade marked by rather cool temperatures, and add the 2000s, which have been some of the warmest in recorded history. Therefore, many locations will probably see the new thirty-year average temperatures come in a little higher. These new normals will officially start being used on August 1, 2011.

So what is a Climate Normal? The term climatic "normal" has faced a dilemma since its introduction a century and a half ago. A climate normal is defined, by convention, as the arithmetic mean of a climatological element computed over three consecutive decades (World Meteorological Organization, 1989). Therefore, the normal value is usually not the most frequent value nor the value above or below which half the cases fall. The casual user, however, tends to (erroneously) perceive the normal as what they should expect. Dr. Helmut E. Landsberg, who became Director of Climatology of the U.S. Weather Bureau in 1954 and, later Director of the Environmental Data Service, summarized the dilemma quite well over four decades ago (Landsberg, 1955): "*The layman is often misled by the word. In his every-day language the word normal means something ordinary or frequent. However, when the meteorologist talks about 'normal', it has nothing to do with a common event. For the meteorologist the 'normal' is simply a point of departure or index which is convenient for keeping track of weather statistics. We never expect to experience 'normal' weather*."

It might be "normal" for the weather to swing radically between extremes from day to day and year to year, like it can during the winter and early spring months across the Rio Grande Valley, but the "climatic normal" is simply an arithmetic average of what has happened at such a "swinging" place. This is why it's important to use a measure of the variability of climate (such as the standard deviation and extremes) in conjunction with the climatic normal when studying the climate of a location (Guttman, 1989).

In accordance with national and international convention, the official climate normals computed for U.S. stations by the NCDC consist of the arithmetic average of a meteorological element over 30 years. The "official" normals are provided solely by NCDC, which should be noted in light of other non-official computations from a myriad of sources. In the United States, normals have been computed for 1971-2000, 1961-1990, 1951-1980, 1941-1970, 1931-1960, and 1921-1950 (not shown in Table below).

Normals are best used as a base against which climate during the following decade can be measured. Comparison of normals from one 30-year period to normals from another 30-year period, as seen in Table 1 below, may lead to erroneous conclusions about climatic change. This is due to changes over the decades in station location, in the instrumentation used, in how weather observations were made, and in how the various normals were computed.

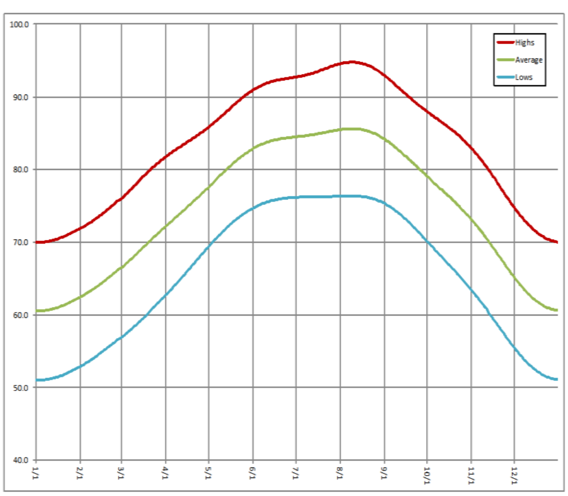
| | Years | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Avg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TEMP. | 1981-2010 | 61.1 | 64.2 | 69.3 | 74.8 | 80.3 | 83.9 | 84.9 | 85.3 | 81.8 | 76.3 | 69.4 | 62.2 | 74.5 |
| | 1971-2000 | 59.6 | 62.7 | 68.8 | 73.8 | 79.3 | 82.7 | 83.9 | 84.0 | 81.0 | 75.0 | 67.7 | 61.1 | 73.3 |
| | 1961-1990 | 59.4 | 62.4 | 68.8 | 75.3 | 79.9 | 83.0 | 84.5 | 84.5 | 81.8 | 75.7 | 68.7 | 62.1 | 73.8 |
| | 1951-1980 | 60.3 | 62.8 | 68.6 | 74.9 | 79.2 | 82.6 | 84.1 | 84.1 | 81.4 | 75.3 | 67.7 | 62.3 | 73.6 |
| | 1941-1970 | 60.3 | 63.4 | 67.7 | 74.9 | 79.3 | 82.8 | 84.4 | 84.4 | 81.6 | 75.7 | 68.1 | 62.8 | 73.8 |
| | 1931-1960 | 61.4 | 64.0 | 67.9 | 73.9 | 79.0 | 82.7 | 84.0 | 84.1 | 81.2 | 75.9 | 67.6 | 62.9 | 73.7 |

| | Years | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCPN. | 1981-2010 | 1.27 | 1.08 | 1.23 | 1.54 | 2.64 | 2.57 | 2.04 | 2.44 | 5.92 | 3.74 | 1.82 | 1.15 | 27.44 |
| | 1971-2000 | 1.36 | 1.18 | 0.93 | 1.96 | 2.48 | 2.93 | 1.77 | 2.99 | 5.31 | 3.78 | 1.75 | 1.11 | 27.55 |
| | 1961-1990 | 1.56 | 1.06 | 0.53 | 1.56 | 2.94 | 2.73 | 1.90 | 2.77 | 6.00 | 2.80 | 1.51 | 1.25 | 26.61 |
| | 1951-1980 | 1.25 | 1.55 | 0.50 | 1.57 | 2.15 | 2.70 | 1.51 | 2.83 | 5.24 | 3.54 | 1.44 | 1.16 | 25.44 |
| | 1941-1970 | 1.35 | 1.48 | 0.69 | 1.28 | 2.51 | 2.80 | 1.19 | 2.66 | 5.23 | 3.32 | 1.34 | 1.24 | 25.09 |
| | 1931-1960 | 1.35 | 1.48 | 1.04 | 1.55 | 2.36 | 2.96 | 1.68 | 2.77 | 4.99 | 3.53 | 1.32 | 1.72 | 26.75 |

***Table 1:*** Thirty-year normals for the past six decades, temperature (top) and precipitation (bottom), for Brownsville, Texas.

These changes are evident after reviewing the history of the longest site on record in the Rio Grande Valley near Brownsville. While the observation has been fixed for more than 130 years around the location of Brownsville/South Padre Island International Airport, observing methods have changed greatly over the years. Until the end of 1928, observations were taken solely by cooperative and military observers as part of the Army Signal Corps (until 1916) and the Weather Bureau (1916 to 1942). Multiple cooperative observations were taken between November 1916 and 1994/95, when the Automated Surface Observing System became the official observing platform. Through the years, the rainfall and temperature measuring instruments have changed, as has the height of the observation, ranging from 27.5 meters (89 feet) in the late 19th century to the 5.8 meters (19 feet) through the 1980s and early 1990s, to the current 7.4 meters (24 feet) today. The differences between normals due to these non-climatic changes may be similar, or larger, than the actual differences due to a true change in climate.

### A General Review of the Lower Valley Climate



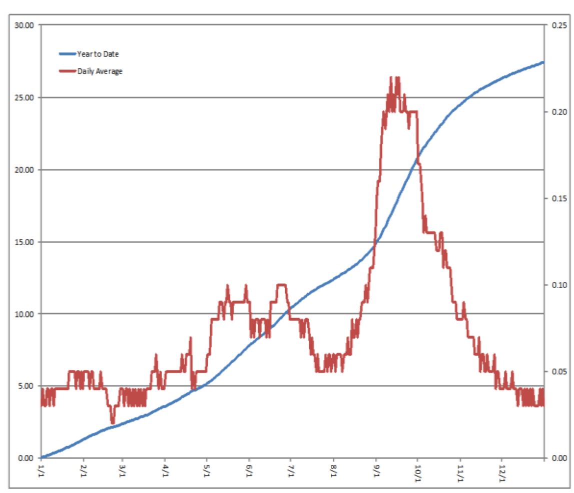




***Figure 1: At left***: Monthly temperature averages (°F) for Brownsville. ***At right***: Monthly precipitation averages (inches) for Brownsville. Click on each for a larger image.

Table 1 (above) gives average monthly temperature values (roughly, maximum + minimum ÷ 2), and average monthly precipitation, for the past six decades of 30 year normals. There has been little change in average temperatures through the decades, though the 1981-2010 averages increased significantly. This increase aligns with much of the U.S., which has had some of the warmest years on record during the decades of the 1990s and 2000s. Temperatures reflect the typical northern hemisphere seasonal cycle, with less difference between summer and winter than locations farther north in Texas. Figure 1 (left) shows the temperature cycle.

For precipitation, the annual totals have been slightly higher for the most recent two thirty year cycles (1971-2000 and 1981-2010), but monthly peaks and valleys have remained constant. Shown in Figure 1 (right) are the "dry season" (winter) lower values (January to March), the spring and early summer rise (April to June), the midsummer lull (July-early August), followed by the late summer/early autumn peak (Late August to October) before the dry season valley returns (November-December). Spring (March – May) increases in precipitation are due to the return of deeper tropical moisture to the Lower Rio Grande Valley, which is occasionally activated by frontal systems or upper level disturbances. June and early July's peak is due to a combination of the last of upper level disturbances and early season tropical activity, which favors the Gulf of Mexico and western Caribbean. Mid July through early August's lull is likely a combination of deep high pressure through the atmosphere, and ebbing of western Atlantic basin tropical activity. Mid August through early October's signal is clearly dominated by peak activity in the Atlantic tropical basin, including storm movement through the Caribbean and Gulf of Mexico. Mid October through early November's continued high, but decreasing, precipitation is most likely due to autumn's first frontal systems, which act on deep tropical moisture in place from summer to produce periodic torrential rains.

## Using Climate Normals – Carefully!

Daily, monthly, seasonal, and annual comparisons of temperature and precipitation that you'll find on our local climate page for observing locations in the Rio Grande Valley will use the 1981-2010 starting on August 1st. The comparisons, particularly for temperature, will differ based on the warmer values described earlier.

Over the next several years, someone will make a statement such as the following:

*"July 2012 was just as hot as July 2009, yet the temperature was only 2 degrees above normal in 2012, and more than 3 degrees above normal in 2009. How can that be? Are we cooling?"*

The answer is no. As Table 1 above (Brownsville) describes, and the charts for Brownsville, Harlingen, and McAllen show, the new 30 year normals from which comparisons will be made in 2012 (1981-2010) was more than one degree warmer in July than the 30 year normals used, without modification, in 2009 (1971-2000). Departures from the most recent normals will drop by the difference shown.

Relating observed temperatures to 30 year normals shows how the observed value compares with 30 year *trends*. In this case, "July 2012" would *still* be extremely hot and be on the high side of the warmer *trend* described by the 1981-2010 normals.

It is always best to compare observed temperatures with the entire *period of record*. Using a ranking system best communicates how hot, cold, wet, or dry it has been. "Hottest on record" is much easier to comprehend than "2 degrees above normal". Especially when "normal" is based on a sliding scale that changes each decade. For the case above, July 2012 would come close to the hottest on record. And that's pretty hot!

At NWS Brownsville/Rio Grande Valley, we relate hot, cold, wet, or dry periods to others in the period of record when we create climatologically driven event summaries. Check our event summary page for such reports, since 2004.

## Much More!

More graphics showing temperature and precipitation comparisons between the 1971-2000 normals and the new 1981-2010 normals for Brownsville, Harlingen (Valley), and McAllen (Miller), can be found by clicking here.

The following links also provide detailed background information on the new normals:
**The New Climate Normals: Gardeners Expect Warmer Nights (NOAA Climate Services)**
**National Climatic Data Center Fact Sheet, 1981-2010 Normals**

## Acknowledgments

Most of the information described in the Overview Section originated from Mr. Paul Close via the National Climatic Data Center. Paul is a Senior Meteorologist at National Weather Service Tampa Bay, Florida.

## References

**Guttman, N.B., 1989:** Statistical descriptors of climate, *Bulletin of the American Meteorological Society*, Vol. 70, pp. 602-607.

**Landsberg, H.E., 1955:** Weather 'normals' and normal weather, *Weekly Weather and Crop Bulletin*, 1/31/1955, pp. 7-8.

**World Meteorological Organization, 1989:** Calculation of monthly and annual standard normals, *WDCP-No. 10, WMO-TD/No. 341, Geneva: World Meteorological Organization.*