

Extreme May 2015 USCRN Precipitation Totals in the Central U.S.

Multiple episodes of heavy precipitation inundated the central U.S. from Wyoming and South Dakota south to Oklahoma and Texas during May 2015. The 25 U.S. Climate Reference Network (USCRN) stations shown in Figure 1 received enough precipitation for May 2015 to qualify as one of their five wettest months, regardless of time of year, and 9 USCRN stations experienced their wettest calendar month on record. For 22 of the 25 stations, this was their wettest May on record. The period of record for these stations varies from 7-12 years, so while these ranks might have been different if stations had longer records, the number of locations impacted coupled with the large geographic coverage of the extreme precipitation totals is particularly noteworthy.

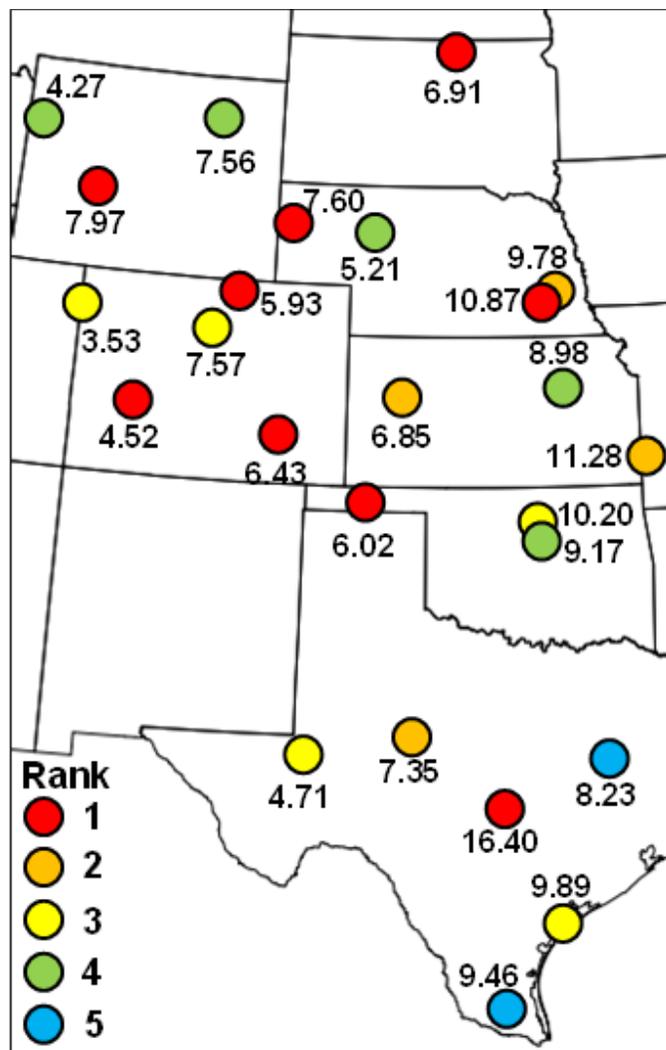


Figure 1. The dot color indicates the overall rank of May 2015 precipitation compared to all months at 25 USCRN locations with a top 5 wettest rank. Numbers are precipitation in inches.

Large swaths of Oklahoma and Texas received more than 20 inches of rain in May 2015 as indicated by denser networks of observations and radar estimates. The purpose of USCRN is not to capture every weather event or climate anomaly in every location, but to generate a representative set of statistics to measure climate change for the U.S. as the 21st Century progresses. Therefore, it is an indicator of the importance and geographic scope of the event that so many USCRN stations sustained record and near-record rainfall totals. The heaviest report came from the USCRN station near Austin, Texas, which received 16.40 inches (416.6 mm) of rain in May 2015. Figure 2 shows the trace of precipitation accumulation at the Austin USCRN station. The red-green-dark blue lines show weighing gauge depth changes from the three redundant measurements collected by USCRN; the gauge reached capacity at 23.62 inches (600 mm) and was emptied by the site host in a very timely manner so that the remaining precipitation during the month could be properly collected. The light blue line shows

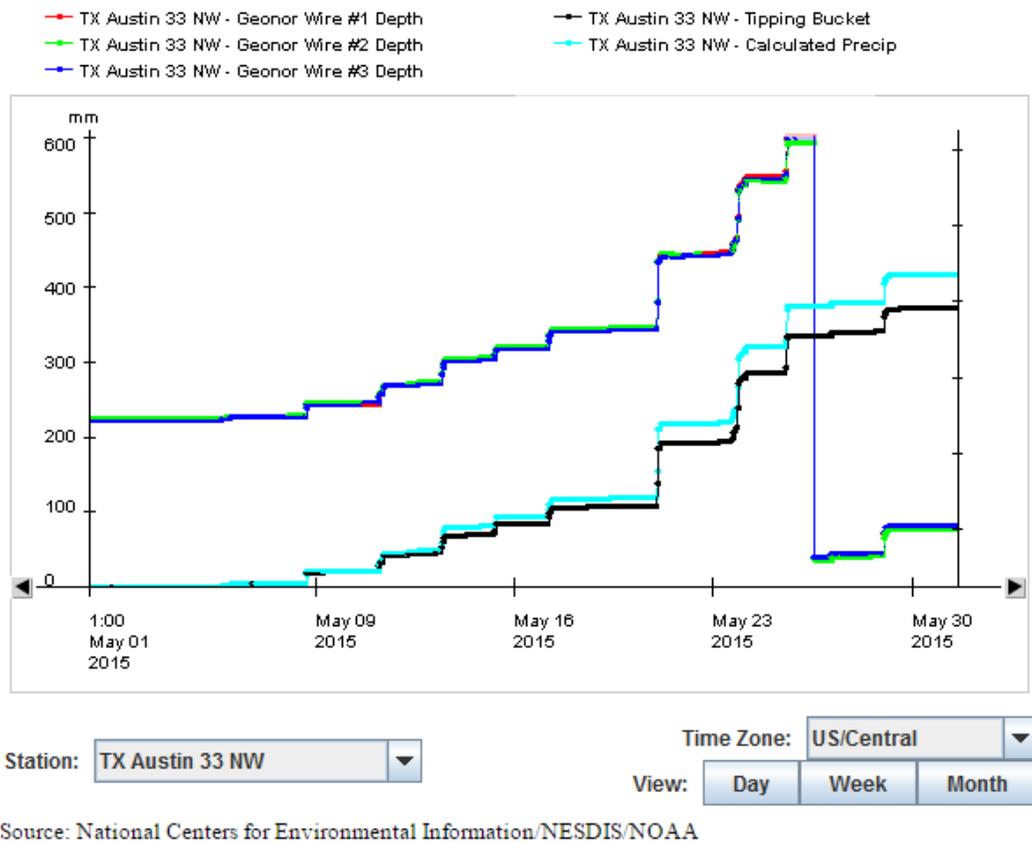


Figure 2. Accumulating precipitation totals in May 2015 at USCRN station TX Austin 33 NW.

the accumulated precipitation calculated from the three depth change records; this is the official USCRN precipitation. The black line shows the accumulation by a back-up tipping bucket gauge. It should be noted that during very intense rain events, the tipping bucket falls behind

the weighing bucket accumulation, and this added up to nearly a 2 inch difference by the end of the month. The USCRN observing system is designed to produce climate records as accurately and continuously as can be done with automated unmanned stations, and the weighing bucket is the official instrument for USCRN precipitation measurements. Table 1a lists the largest USCRN accumulated totals for May 2015 for the states with stations in Figure 1. Table 1b displays the precipitation totals for the 9 stations setting new one-month precipitation records. The latter table shows that one of the most unusual aspects of the heavy precipitation in May 2015 was its widespread nature, with most of the one-month precipitation records occurring at USCRN stations north and west of the heavily flooded areas of Oklahoma and Texas.

Table 1a. The stations with the most precipitation in each state from the set of 25 shown in Figure 1.

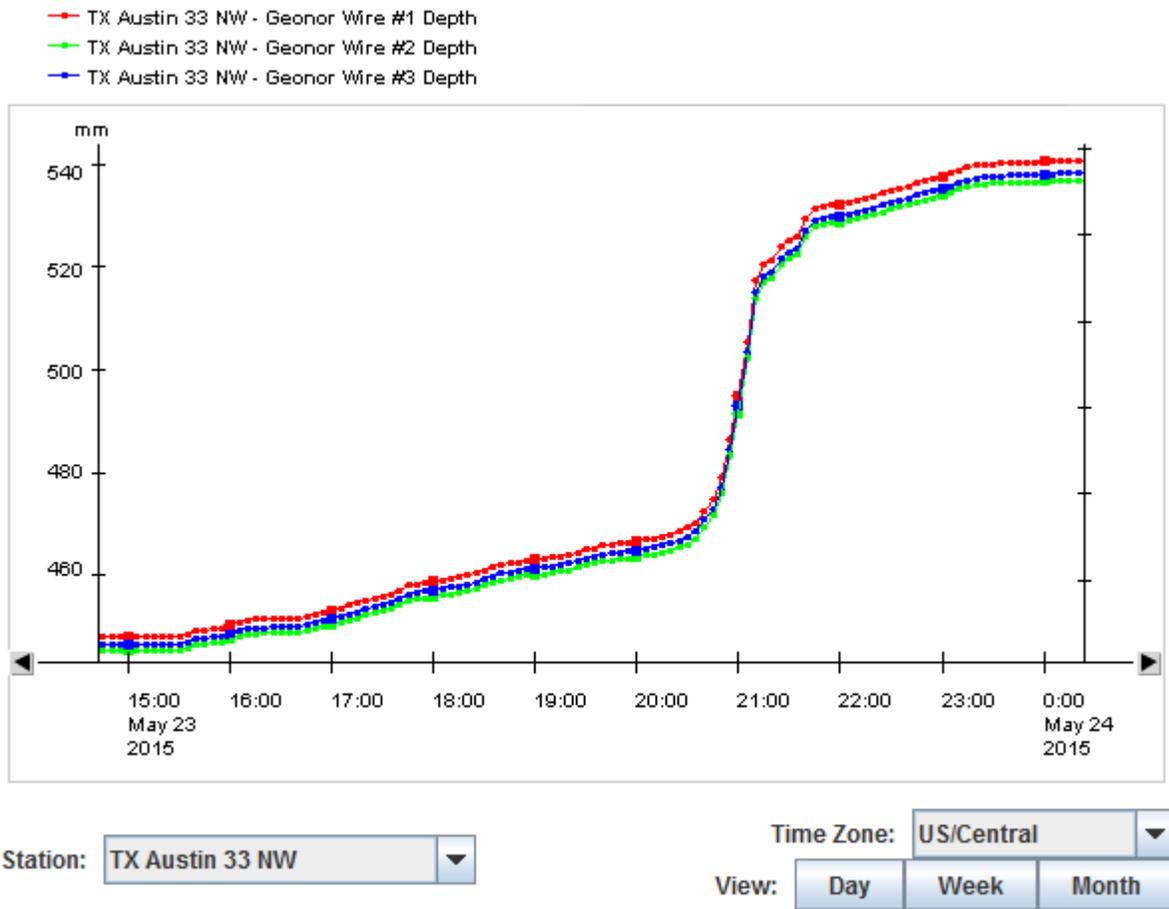
State	Station	Precipitation (inches)	Precipitation (mm)
Texas	TX Austin 33 NW	16.40	416.6
Missouri	MO Joplin 24 N	11.28	286.6
Nebraska	NE Lincoln 11 SW	10.87	276.1
Oklahoma	OK Stillwater 5 WNW	10.20	259.0
Kansas	KS Manhattan 6 SSW	8.98	228.1
Wyoming	WY Lander 11 SSE	7.97	202.4
Colorado	CO Boulder 14 W	7.57	192.2
South Dakota	SD Aberdeen 35 WNW	6.91	175.6

Table 1b. Nine stations setting new one-month precipitation records from the set of 25 shown in Figure 1.

State	Station	Precipitation (inches)	Precipitation (mm)
Texas	TX Austin 33 NW	16.40	416.6
Nebraska	NE Lincoln 11 SW	10.87	276.1
Wyoming	WY Lander 11 SSE	7.97	202.4
Nebraska	NE Harrison 20 SSE	7.60	193.0
South Dakota	SD Aberdeen 35 WNW	6.91	175.6
Colorado	CO La Junta 17 WSW	6.43	163.2
Oklahoma	OK Goodwell 2 E	6.02	153.0
Colorado	CO Nunn 7 NNE	5.93	150.7
Colorado	CO Montrose 11 ENE	4.52	114.8

The impact of the flooding rains of May 2015 in the central U.S. was very negative from the perspective of life and property casualties, with more than 30 deaths and damage in the billions of dollars. The Oklahoma City, Austin, Dallas-Fort Worth, and Houston metropolitan areas all

suffered significant damage and disruptions for many days, and some small communities were especially hard hit by flash floods and accompanying severe thunderstorms and tornadoes. During one flash flood event in the Austin area, 1.5 inches of rain fell in just 20 minutes around 9:00 PM CDT on May 23rd, indicating the dangerous nature of these heavy precipitation events (Figure 3). The 5-minute resolution of the USCRN station precipitation record was a crucial factor in characterizing these extreme event statistics, both in near-real time and as one aspect of climate change being tracked over time nationwide. The very difficult and persistent drought centered in Oklahoma and Texas over the past couple of years is now certainly over (see <http://droughtmonitor.unl.edu/>), and dwindling reservoirs have been replenished. USCRN stations in the region operated well during the month, and showed resilience in extreme conditions. For more information on USCRN as well as for access to these and other USCRN data, please see the web site at <http://www.ncdc.noaa.gov/crn>.



Source: National Centers for Environmental Information/NESDIS/NOAA

Figure 3. Increasing gauge depth during an extreme flash flood event in the area of Austin, TX, on the evening of 23 May 2015. At its peak, 1.50 inches of rain fell in 20 minutes centered on 9 PM CDT (2100 CDT).