CLIMATE CO CENTRAL

Monthly Attribution Overview – November 2024

An analysis of how climate change boosted United States temperatures in November 2024

Using Climate Central's Climate Shift Index (CSI) tool to measure the impact of climate change on daily temperatures across the United States, as well as NOAA's Applied Climate Information System (ACIS) to find daily temperature information, we have compiled a high-level overview of how climate change has affected temperature trends in November in cities across the United States.

1. High Level Findings

- November temperature anomalies in the U.S. were elevated across much of the country: 166 out of 191 analyzed cities were warmer than normal. The highest anomalies stretched from the Rocky Mountains eastwards (Figure 1).
- This was the hottest November on record in 15 cities – including all 5 cities in Louisiana – and was in the top 5 hottest Novembers for an additional 38 cities.
- The South showed particularly elevated November temperatures, where cities on average were 5.7°F warmer than average.
- Climate Shift Index (CSI) values meanwhile followed a different trend: States with coastlines along the Gulf of Mexico stood out as the states with cities experiencing the highest number of days with climate change-influenced temperatures at or above CSI 3 (temperatures made at least 3x more likely because of climate change) (Figure 2).
- In general, cities across the country did not experience many days with CSI values at or above 3. However, a CSI level 3 indicates a very strong climate influence on a day's temperatures. The high variability inherent in fall weather means that CSI levels of 3 or higher are extremely rare during November. The strong temperature anomalies and long-term warming trends during November (see our 2024 Fall Package) indicate that climate change is influencing fall conditions, although the signal is less clear at the daily scale.
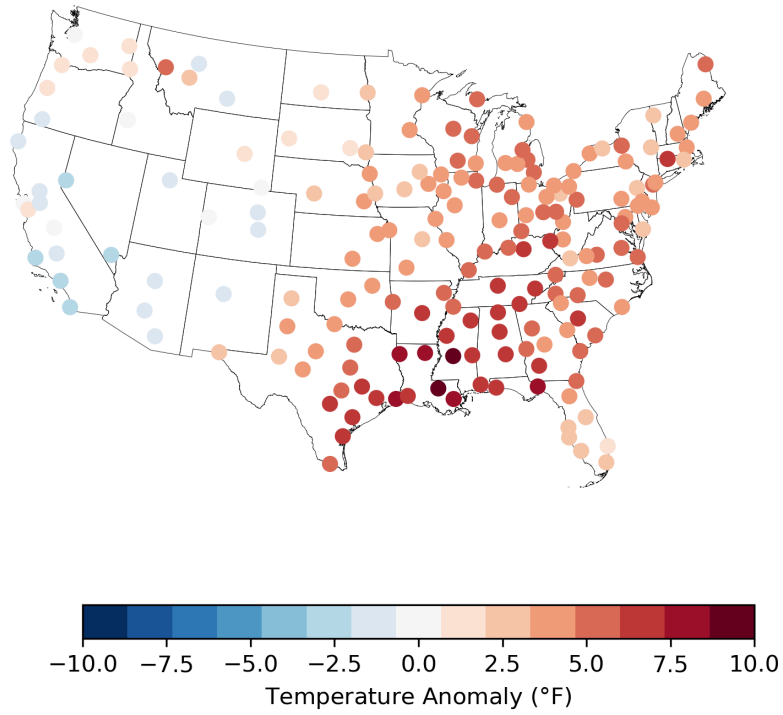
Figure 1. Threaded ACIS temperature anomalies for November 2024 relative to the 1991-2020 standard normal period. Analysis based on ACIS data.
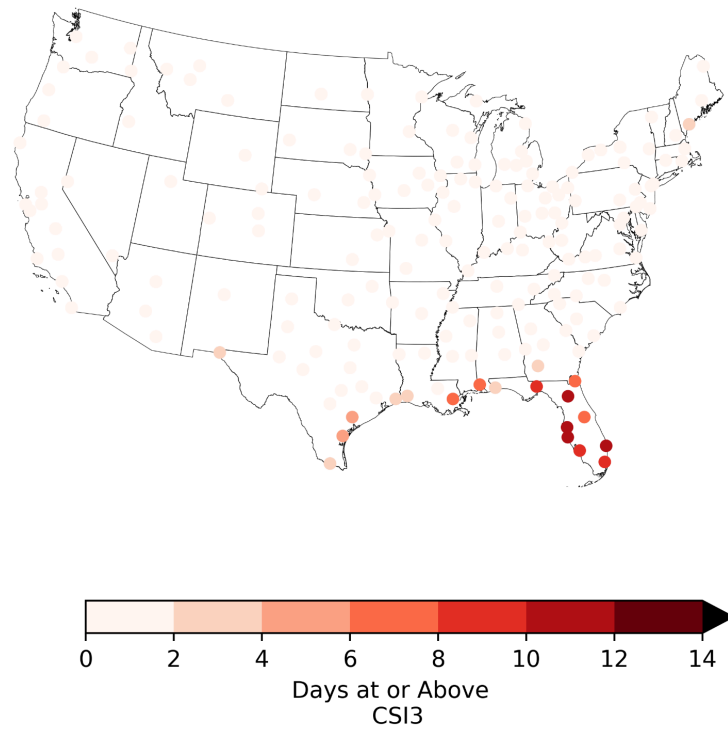
Figure 2. Days with a CSI of 3 or higher for November 2024 for ACIS threaded stations. Analysis based on ERA5 data (November 1-28) and GFS data (November 29-30).

2. Local Temperature Anomaly Analysis

- The most unusually hot city in November was Baton Rouge, Louisiana, where it was 9.7°F hotter than normal.
- 61 cities had November temperature anomalies greater than 5°F. These included 9 in Texas and all 5 in Louisiana.
- The average temperature anomaly across all cities was 3.7°F.
- 182 out of 191 ACIS stations analyzed had positive temperature trends for November, indicating that these cities have been warming on average since 1970.
- El Paso, Texas had an unusually warm November (with an average daily temperature anomaly of 2.6°F), and is the fastest-warming ACIS station for November on average, warming 6.4 °F on average since 1970.

City	State	Temperature Anomaly (°F)	Average Temperature (°F)	Warming Since 1970 (°F)
Baton Rouge	LA	9.70	69.10	2.1
Jackson	MS	8.70	64.10	1.4
Monroe	LA	8.15	63.75	2.5
Tallahassee	FL	7.91	68.17	3.2
Shreveport	LA	7.90	64.50	3.2
New Orleans	LA	7.75	70.20	3.9
Beaumont	TX	7.41	69.30	3.0
Birmingham	AL	7.20	61.20	2.9
Houston	TX	7.20	69.25	3.7
Mobile	AL	7.20	66.15	0.7

Table 1. Top 10 ACIS stations with the highest November 2024 temperature anomaly.

City	State	Warming Since 1970 (°F)	Temperature Anomaly (°F)	Average Temperature (°F)
El Paso	TX	6.4	2.62	57.12
Phoenix	AZ	6.0	-0.99	64.10
Tucson	AZ	6.0	-1.64	59.87
Las Vegas	NV	5.9	-2.25	54.95
North Platte	NE	5.7	2.69	39.68
Fargo	ND	5.5	2.41	31.90

Reno	NV	5.2	-2.42	41.43
Sioux Falls	SD	5.2	2.90	37.65
Minneapolis	MN	5.2	3.74	38.53
Colorado Springs	CO	5.1	-1.91	37.55

Table 2. Top 10 ACIS stations with the fastest warming November since 1970.

3. Local Climate Shift Index Analysis

- 12 out of 191 ACIS stations analyzed had at least one week with daily CSI values greater than or equal to 3, indicating that temperatures on those days were made at least three times as likely due to climate change in those cities.
- San Juan, Puerto Rico had 23 days at CSI 5, indicating that temperatures on these days were made at least 5 times more likely to occur because of climate change.
- 8 out of the top 10 cities with the strongest climate signal were in Florida..
- In general, cities across the country did not experience many days with CSI values at or above 3. However, a CSI level 3 indicates a very strong climate influence on a day's temperatures. The high variability inherent in fall weather means that CSI levels of 3 or higher are extremely rare during November. The strong temperature anomalies and long-term warming trends during November (see our 2024 Fall Package) indicate that climate change is influencing fall conditions, although the signal is less clear at the daily scale.

City	State	Days at CSI = 3 or higher	Days at CSI = 5	Average Temperature (°F)	Temperature Anomaly (°F)
San Juan	PR	27	23	82.50	2.00
Honolulu	HI	12	5	78.03	0.08
Sarasota	FL	11	8	72.78	2.73
Tampa	FL	11	7	72.98	3.19
West Palm Beach	FL	10	9	75.03	1.99
Gainesville	FL	10	5	66.58	3.93
Fort Myers	FL	9	4	74.02	2.47
Miami	FL	9	4	76.80	2.01
Tallahassee	FL	9	3	68.17	7.91
Mobile	AL	7	1	66.15	7.20

Jacksonville	FL	7	3	67.83	5.58

Table 3. Top 10 ACIS stations with the highest number of days at or above a CSI of 3 during November 2024.

METHODS

Calculating the Climate Shift Index

All Climate Shift Index (CSI) levels reported in this brief are based on daily average temperatures and ERA5 data from November 1 to November 28, 2024, and GFS data from November 29 to November 30, 2024. See the frequently asked questions for details on computing the Climate Shift Index, including a summary of the multi-model approach described in Gilford et al. (2022).

City Analysis

We analyzed 191 Applied Climate Information System (ACIS) stations associated with U.S. cities. For each city, we found the CSI time series from the nearest 0.25° grid cell. We calculated the number of days at CSI levels 2, 3, 4, and 5. We used ACIS data to find the average monthly temperatures, temperature anomalies, and precipitation information, and to derive average monthly warming trends for each city.