



## Review – December 2024

### Temperature

In December, average temperatures were slightly above normal in Ohio, though there were several week-to-week fluctuations. In the northern half of the state, average temperatures ranged from 30 to 35°F, while the southern half experienced averages between 35 and 40°F (Fig. 1a). Temperature departures from normal varied across Ohio, with averages 0 to 1°F warmer than usual in the east and 1 to 2°F warmer in the west (Fig. 1b). This led to most Ohio counties reaching the warmest third of their record for the month of December. The state itself recorded its 27<sup>th</sup> warmest December on record (Fig. 2). Though many Ohio residents experienced colder than average conditions through the first third of the month, a stretch of notably warm temperatures to close out December led to the results seen throughout the state. This will be discussed further in the Notable Events section.

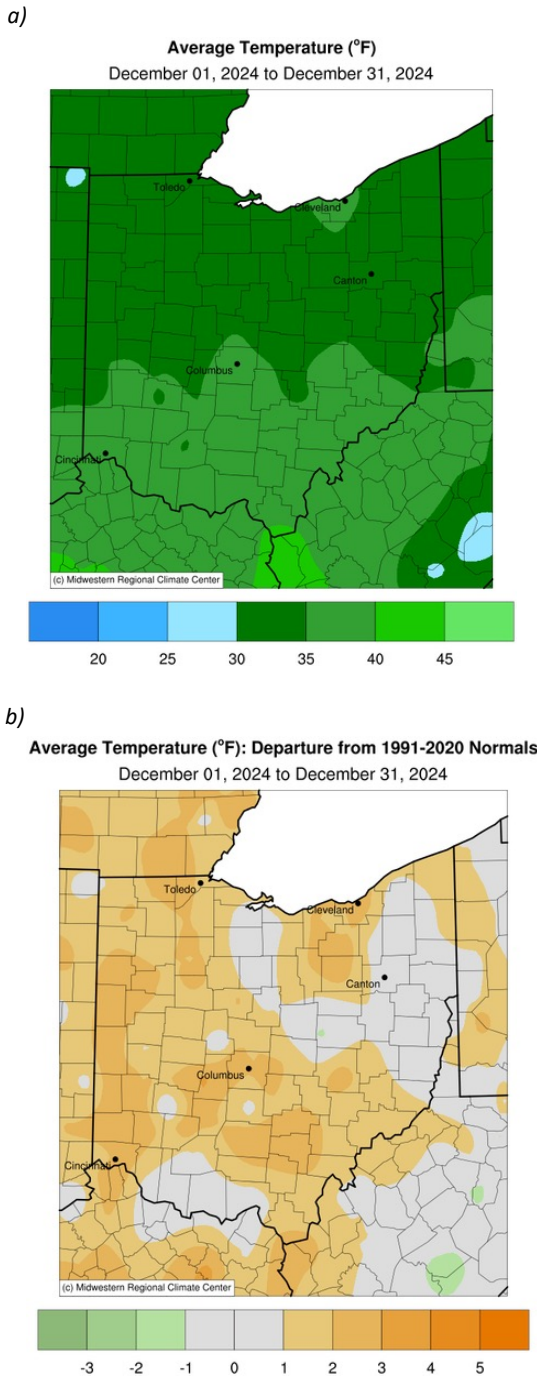


Figure 1a: Average temperature and 1b: Departure from Normal for the month of December 2024. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

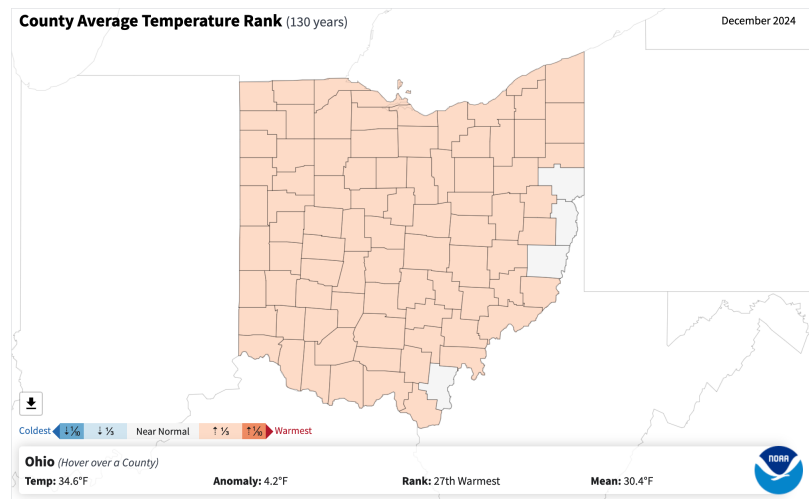


Figure 2: State of Ohio average temperature ranks by county for December 2024. Courtesy of the National Centers for Environmental Information (<https://www.ncdc.noaa.gov/sotc/>).

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### Precipitation

Across Ohio, precipitation levels were generally above average, with a narrow band of below-average values observed in the southeastern region. Most areas recorded accumulated precipitation totals between 3 and 5 inches, except for a localized area in the east where totals ranged from 2 to 3 inches (Fig. 3a). In terms of deviations from normal, the northwest half of the state experienced 0 to 2 inches above average precipitation, while the southwest reported departures of 0 to 1 inch below normal (Fig. 3b). These variations are noted within the county-level data as well, with most of Northern and Western Ohio placing in the top third of their wettest December months. Union, Sandusky, Erie, Ottawa, and other counties experienced a top-10 wettest December, while Jefferson, Harrison, Belmont, and Monroe counties in Eastern Ohio experienced a much drier month placing in the driest third of their monthly records (Fig. 4).

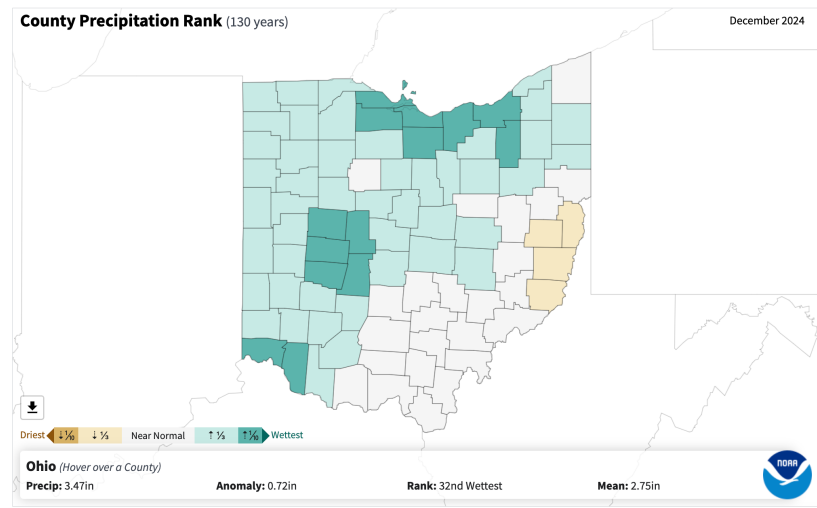
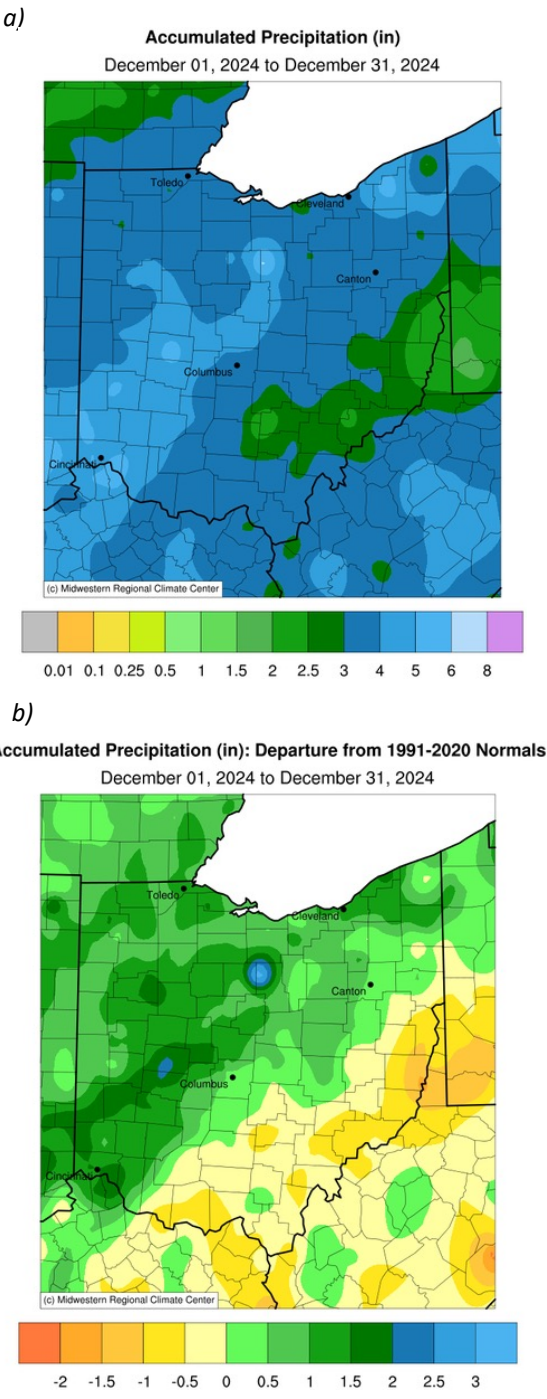


Figure 3a: Accumulated precipitation and 3b: Departures from Normal for the month of December 2024. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

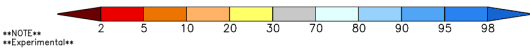
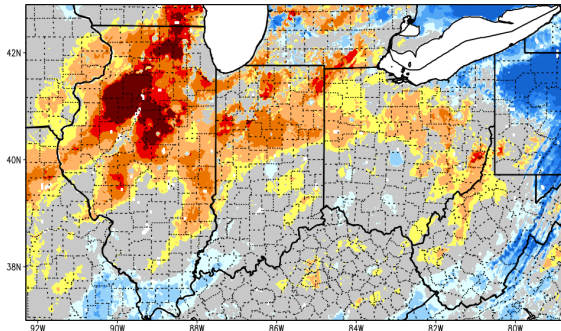
Figure 4: State of Ohio precipitation ranks by county for December 2024. Courtesy of the National Centers for Environmental Information (<https://www.ncdc.noaa.gov/sotc/>).



## Review – December 2024

a)

SPoRT-LIS 0–40 cm Soil Moisture percentile valid 31 Dec 2024



b)

SPoRT-LIS 0–200 cm Soil Moisture percentile valid 31 Dec 2024

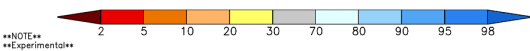
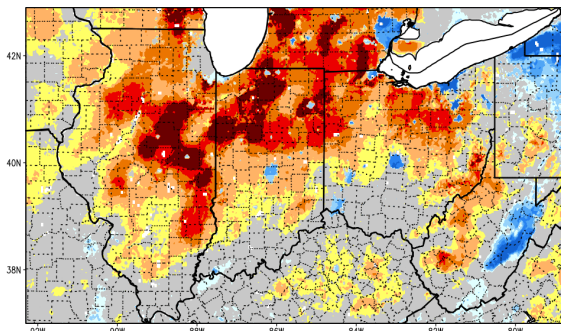


Figure 5a: 0–40 cm and 5b: 0–200 cm soil moisture percentile across the region at the end of December 2024. Courtesy of NASA SPoRTLIS ([https://weather.msfc.nasa.gov/sport/case\\_studies/lis\\_IN.html](https://weather.msfc.nasa.gov/sport/case_studies/lis_IN.html)).

## Soil and Energy

By the end of December, soil moisture levels had returned closer to normal, aligning with recent improvements in drought conditions. The 0–40 cm soil moisture map shows most of the state near normal levels, though dry soil conditions persist from the northwest through the southeast (Fig. 5a). In contrast, the 0–200 cm map indicates widespread dry soil in the north and northwest, with near-normal conditions confined to the southwest (Fig. 5b). The disparity between the two maps is largely due to recent late-December precipitation, as much of the water content has yet to percolate deeper into the soil.

In December, the number of Heating Degree Days (HDDs) was slightly below normal across the state, aligning with the slightly above-average temperatures recorded. As expected during the winter months, no Cooling Degree Days (CDDs) were observed (Fig. 6).

**Product Note:** Both NASA SPoRT LIS soil moisture products contain small pockets of inaccurate data indicating extremely wet or dry conditions. These small-scale errors can emerge in remote sensing products covering large areas or grid-spacings. For more information, please contact Geddy Davis ([davis.5694@osu.edu](mailto:davis.5694@osu.edu)).

Climate Division	Heating Degree Days	Normal	Departure	Cooling Degree Days	Normal	Departure
1	1001	1067	-66	0	0	0
2	972	1033	-60	0	0	0
3	994	1033	-40	0	0	0
4	956	1025	-68	0	0	0
5	934	990	-57	0	0	0
6	962	1024	-62	0	0	0
7	957	993	-36	0	0	0
8	907	963	-56	0	0	0
9	861	911	-50	0	0	0
10	896	957	-61	0	0	0
State	944	1000	-56	0	0	0



Figure 6: (Left) December 2024 heating & cooling degree days. (Right) Corresponding Ohio Climate Divisions. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

### Review – December 2024

#### Notable Events

In December, rather than experiencing a single significant weather event, the month was characterized by strong variability in weather patterns, resulting in a wide range of conditions. Furthermore, as drought conditions have diminished along with their associated impacts, we will now shift our focus to discussing notable weather events in greater detail. December began with the arrival of a strong cold front that brought gusty winds of up to 60 mph, below-average temperatures, and scattered flurries across the region. In the days following the cold front, temperatures gradually rose, but intermittent snowfall persisted. On December 11th, snow intensified as multiple snow squall warnings were issued for central Ohio, causing brief but hazardous whiteout conditions in affected areas (Fig. 7).

By late December, a shift in weather patterns brought unseasonably warm temperatures. Highs reached up to 60°F on December 27th and 28th, offering a brief respite from winter's chill. However, the weather turned volatile again on December 29th, as severe storms swept through the area. Record rainfall accompanied these storms, with Dayton breaking its single-day rainfall record for December 29th, accumulating 1.65 inches. The severe weather also produced an EF0 tornado in Union County and additional strong winds, underscoring the month's dramatic weather swings (Fig. 8).

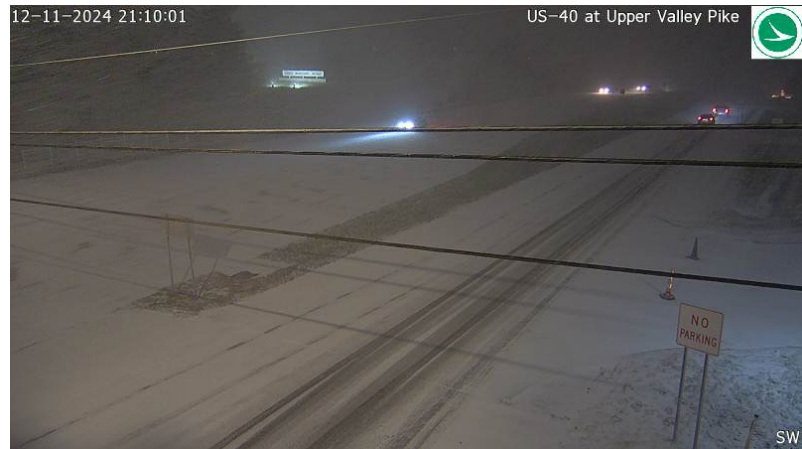


Figure 7: Rapid accumulation and low visibility are features of snow squall conditions, seen impacting the US-40 and Upper Valley Pike intersection in Springfield, OH on December, 11th. ODOT camera image shared via NWS Wilmington, OH. (<https://x.com/NWSILN/status/1867030226888429936>)

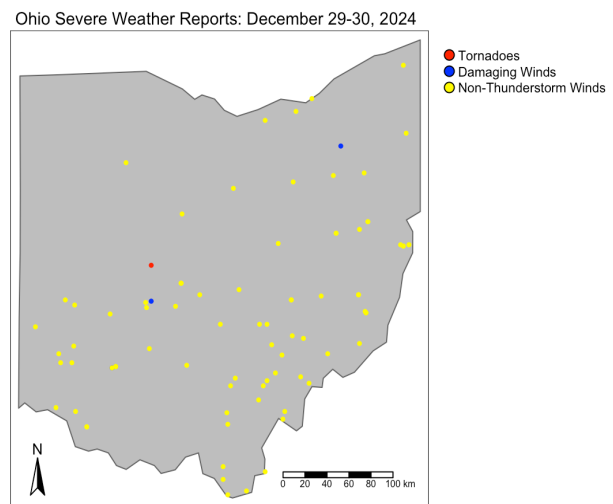


Figure 8: Statewide severe weather reports for Ohio on December 29-30th, including damaging winds and tornadoes as well as strong winds received outside of thunderstorms. Data courtesy of the National Weather Service Local Storm Report archive, accessed via Iowa Environmental Mesonet (<https://mesonet.agron.iastate.edu/>).



## Forecast: January – March 2025

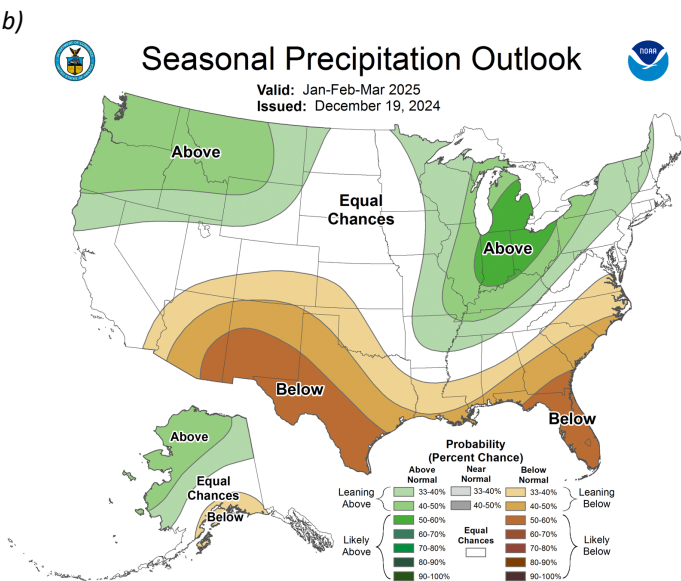
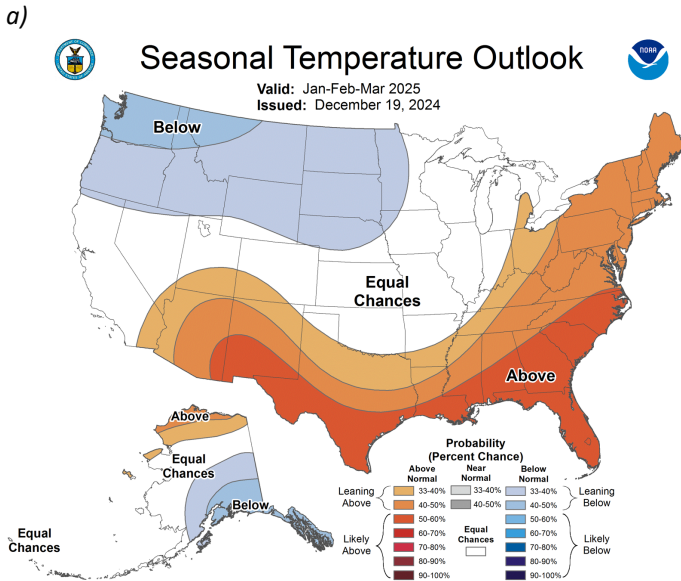


Figure 9a: Nationwide Seasonal Temperature and 9b: Precipitation Outlook for January-March. Courtesy of the Climate Prediction Center (<https://www.cpc.ncep.noaa.gov/>).

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### Looking Ahead

The Climate Prediction Center’s (CPC) 3-month outlook continues to forecast warmer and wetter-than-average conditions, consistent with last month’s projections. The seasonal temperature outlook indicates above-average temperatures across the state, with the highest confidence in the southwest (Fig. 9a). Similarly, the seasonal precipitation outlook predicts above-average rainfall statewide, with the greatest confidence in northwestern Ohio (Fig. 9b). This outlook continues to mirror the look of a La Nina pattern, where cooler than average Pacific Ocean temperatures lead to changes in the jet stream. In our case, active weather has been driven due in part to this pattern. Additionally, Ohio has now experienced multiple bursts of colder than average conditions which diverges from the seasonal outlook shown above. Moving forward, continued activity is anticipated along with swings in temperature.

*Note: these outlooks do not provide the quantity of above or below normal conditions, just the likelihood of occurrence (i.e., the probability).*