

Review – August 2023

Temperature

As August came and went, temperatures stayed fairly consistent and slightly cooler than normal throughout Ohio. Average temperatures ranged from 70-75°F in portions of southern and northwest Ohio, while most of the northeast recorded average temperatures of around 65-70°F (Fig. 1a). Most of the state saw average temperature departures of 1-2°F below normal, with departures in the south and northeast staying within a degree of normal (Fig. 1b). In a few areas across the west-central portion of Ohio, departures were as much as 3°F below normal. At the county level, most of the state recorded temperatures near historical normals, with various counties throughout the western and central thirds of the state ranking within the coolest third of all recorded Augusts (Fig. 2). Of all counties, Mercer County in western Ohio saw the greatest departure from normal, seeing it's 25th coolest August out of 129 years.

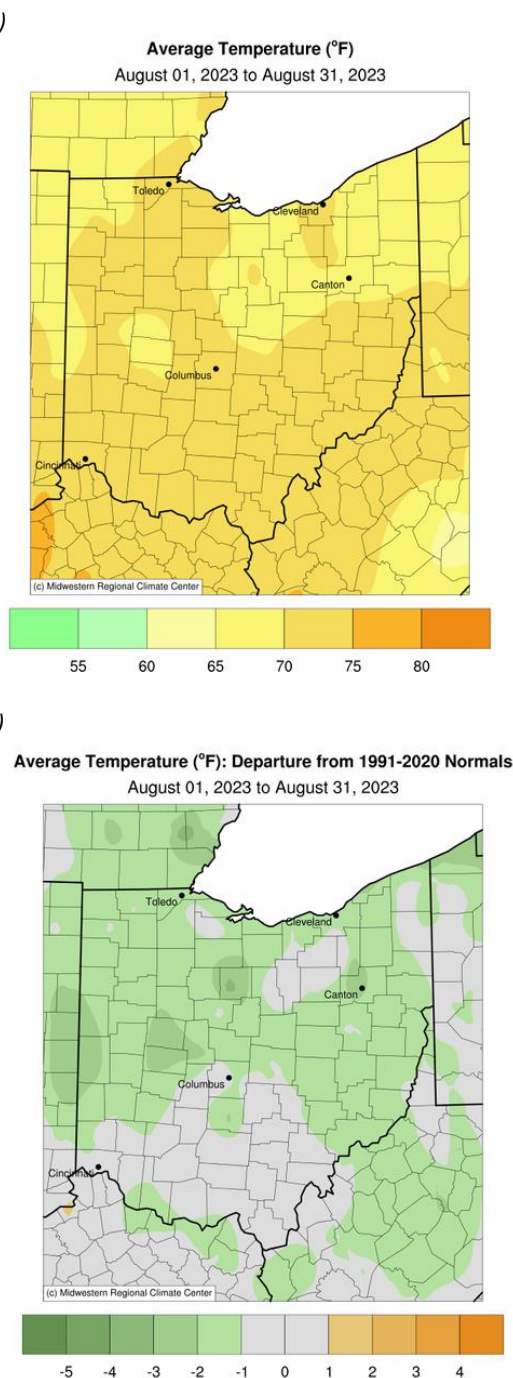


Figure 1a: Average temperature and 1b: Departure from Normal for the month of August 2023. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

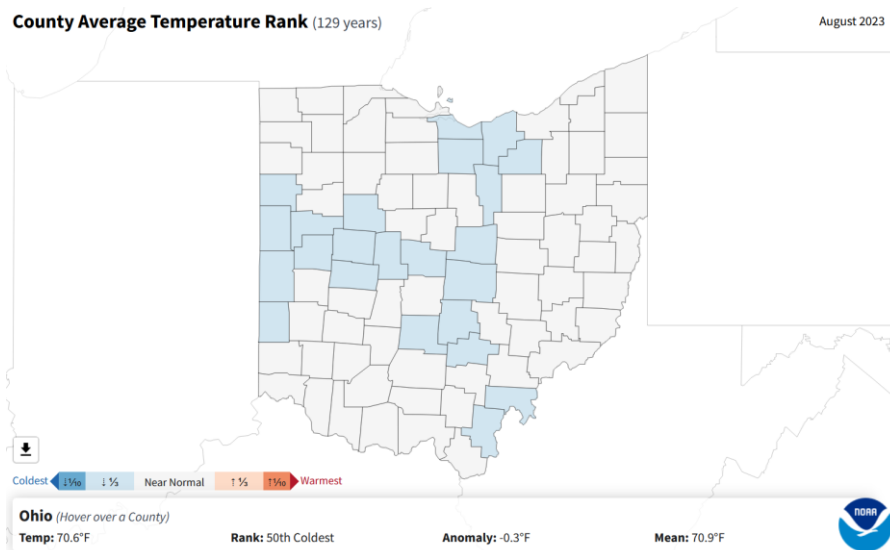


Figure 2: State of Ohio average temperature ranks by county for August 2023. Courtesy of the National Centers for Environmental Information (<https://www.ncdc.noaa.gov/sotc/>).

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Precipitation

A small but substantial number of precipitation events in August resulted varied precipitation accumulation across Ohio. Much of northeast and central Ohio recorded accumulated precipitation of 5-10 inches, while the rest of the state saw only 1.5-5 inches, with areas around Cincinnati and the northwest having the lowest total accumulation (Fig. 3a). With this, the northeast saw the greatest deviation from the record, mostly ranging from 2-4 inches above normal, along with departures of 4-6 inches above normal in north-central Ohio. While the rest of the state mostly stayed near normal, portions in the southwest and northwest saw negative departures of up to 2 inches (Fig. 3b). At the county level, the northeast stands out, as most of the region ranked within the wettest tenth of Augusts on record. The rest of the state ranked near normal, with Hamilton and Paulding Counties ranking in the drier third of the record (Fig. 4).

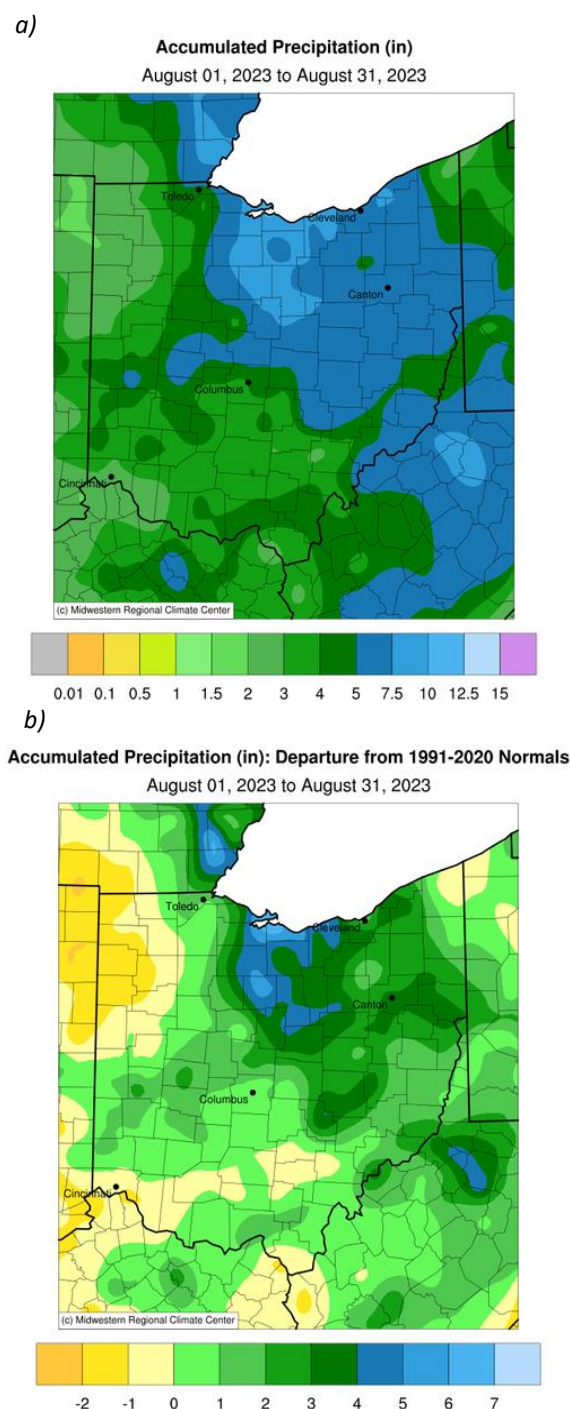


Figure 3a: Accumulated precipitation and 3b: Departures from Normal for the month of August 2023. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

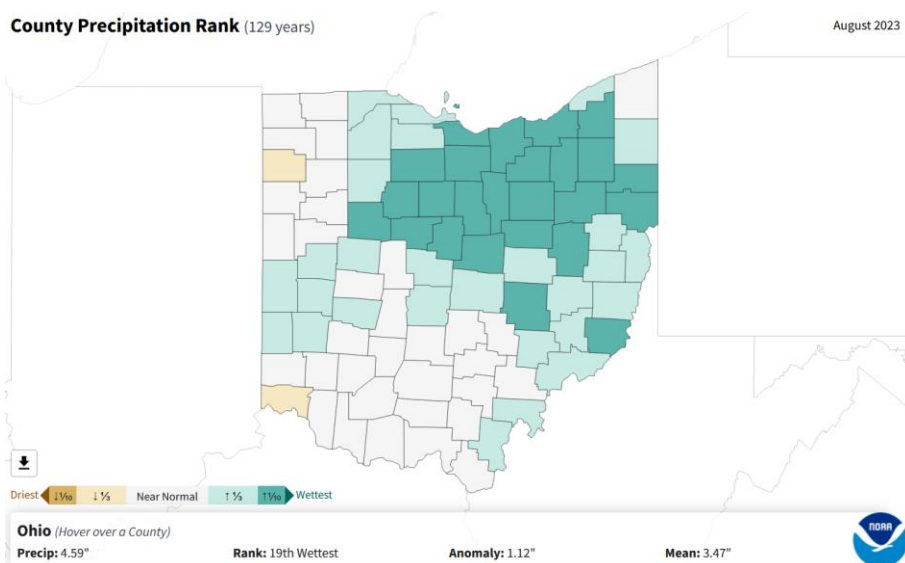
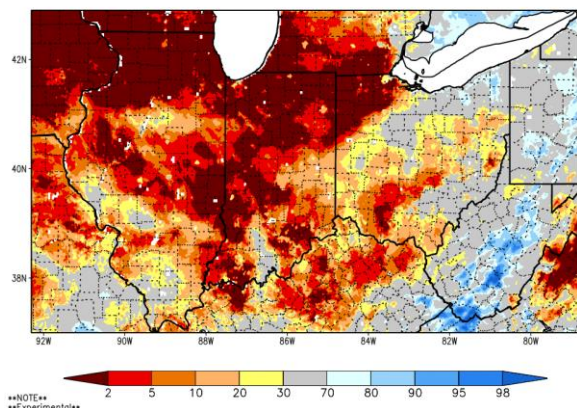


Figure 4: State of Ohio precipitation ranks by county for August 2023. Courtesy of the National Centers for Environmental Information (<https://www.ncdc.noaa.gov/sotc/>).

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a) SPoRT-LIS 0–40 cm Soil Moisture percentile valid 31 Aug 2023



b) SPoRT-LIS 0–200 cm Soil Moisture percentile valid 31 Aug 2023

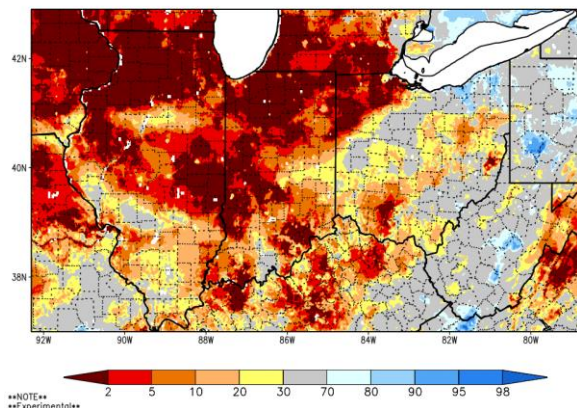


Figure 5a: 0–40 cm and 5b: 0–200 cm soil moisture percentile across the region at the end of August. Courtesy of NASA SPoRTLIS (https://weather.msfc.nasa.gov/sport/case_studies/lis_IN.html).

Climate Division	Heating Degree Days	Normal	Departure	Cooling Degree Days	Normal	Departure
1	5	8	-2	164	204	-40
2	7	6	0	168	210	-42
3	10	12	-2	125	166	-41
4	6	5	1	181	226	-44
5	4	4	0	187	233	-47
6	6	8	-2	162	193	-31
7	1	6	-5	173	205	-32
8	2	2	0	225	262	-37
9	0	2	-2	238	263	-26
10	0	4	-3	198	229	-31
Statewide	4	5	-1	184	221	-37



Figure 6: (Left) August 2023 heating & cooling degree days. (Right) Corresponding Ohio Climate Divisions. Data courtesy of the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

Soil and Energy

While soil moisture was generally varied across the state, most of Ohio stayed clear of the significant dryness observed around the Midwest. While substantial soil dryness was recorded in the northwest corner and parts of south-central of Ohio at the end of August, the rest of the state saw only slightly or moderately dry soil conditions at both 0–40cm and 0–200cm levels (Figs. 5a and 5b). While dryness can be generally unfavorable for crops still in season through August, drought-like conditions were not present and are not expected to develop in the near future.

After temperatures peaked in July, Heating Degree Days (HDDs) occurred in small numbers in August, mostly concentrated in northern Ohio. While HDDs mostly matched expectations, the same cannot be said for Ohio's Cooling Degree Days (CDDs), which saw significant negative departures throughout the state due to a relatively cool month (Fig. 6).

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Notable Events

Although Ohio experienced multiple occurrences of severe weather throughout August, the night of August 24-25 hosted the passage of a unique line of storms that impacted a large portion of the state. Due to Ohio's location in the midlatitudes, prevailing winds, and therefore most storm systems, move over the state from west to east. As the August 24-25 system moved across Michigan and over Lake Erie, it began to dip south, eventually moving towards the southwest as it crossed over Ohio, producing an organized line of storms around midnight. In addition to this unusual direction, the system also produced three EF-0, seven EF-1, and two EF-2 tornadoes across northeast Ohio, including the first tornado recorded within Cleveland city limits since 1985. In addition, a multitude of damaging wind reports were recorded across the state, though mostly concentrated in the northeast along with various hail reports (Fig. 7). Significant precipitation was also produced by the system, with north-central Ohio receiving more than 5 inches of accumulated precipitation in some areas, accounting for nearly half of the region's rain totals in August (Fig. 8). While no injuries were reported in Ohio, the storms were responsible for extensive property damage, as well as five deaths in Michigan.

Ohio Severe Weather Reports: August 24-25, 2023

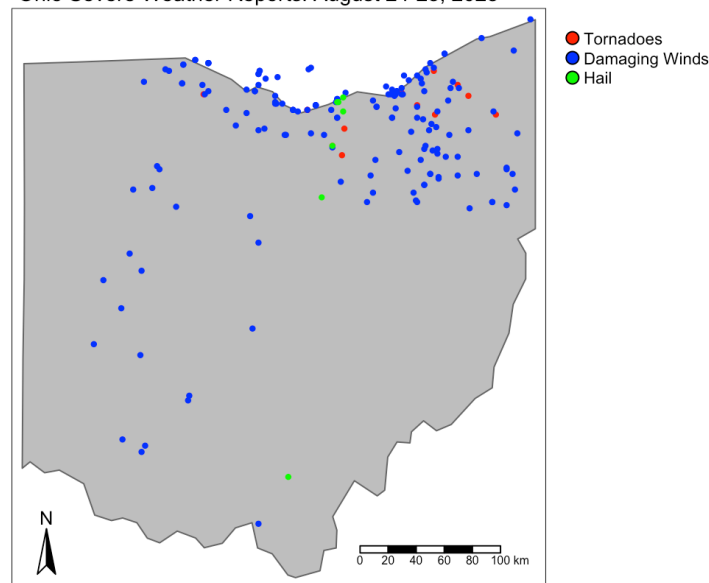
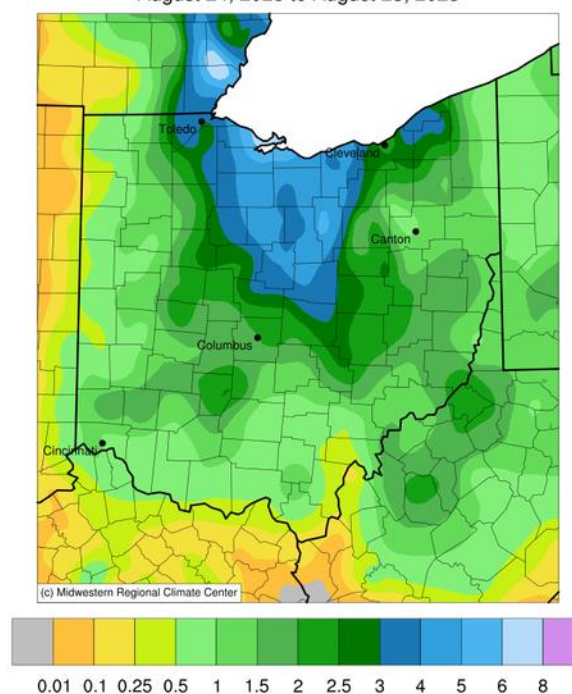


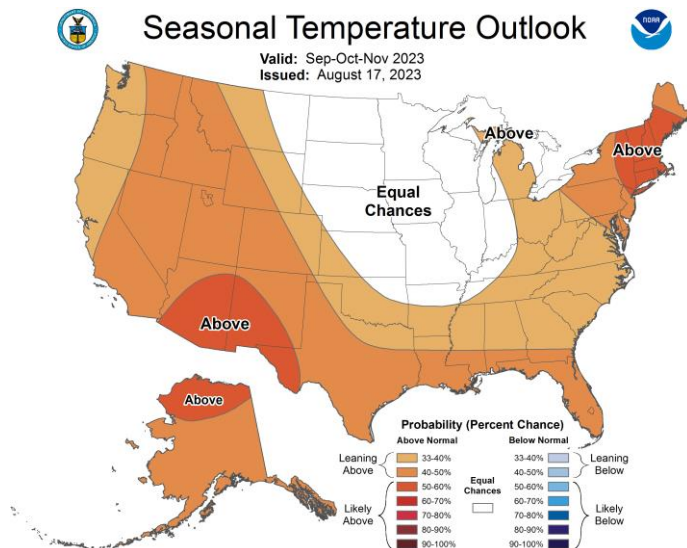
Figure 7: Statewide severe weather reports for August 24-25, 2023, including damaging winds, hail, and tornadoes (above) and Figure 8: Accumulated precipitation in Ohio for August 24-25, 2023 (below). Data courtesy of the National Weather Service Local Storm Report archive, accessed via Iowa Environmental Mesonet (<https://mesonet.agron.iastate.edu/>), and the Midwestern Regional Climate Center (<http://mrcc.purdue.edu>).

Accumulated Precipitation (in)
August 24, 2023 to August 25, 2023



Forecast: September - November 2023

a)



b)

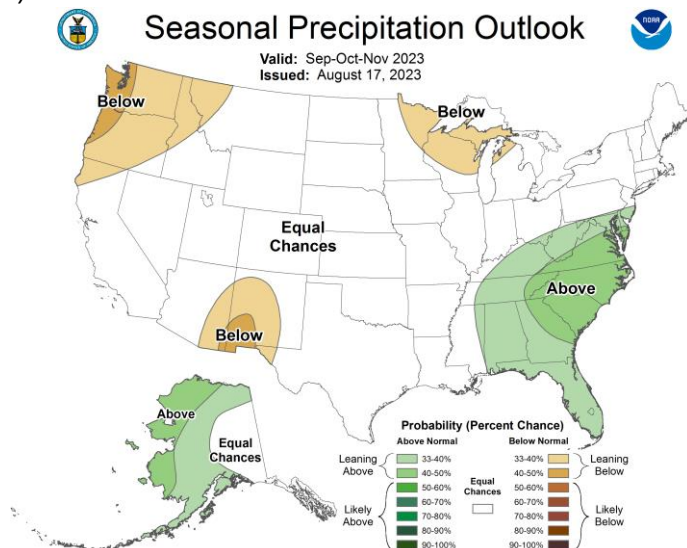


Figure 9a: Nationwide Seasonal Temperature and 9b: Precipitation Outlook for September-November. Courtesy of the Climate Prediction Center (<https://www.cpc.ncep.noaa.gov/>).

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Looking Ahead

The CPC's 3-month outlooks continue predictions of higher temperatures and uncertain precipitation trends in Ohio through November. While the entire state is forecast to have above-normal temperatures, this prediction comes with a low degree of certainty (Fig. 9a). Meanwhile, the precipitation forecast continues the summer trend of exhibiting equal chances of above- or below-normal precipitation, with a small portion of far southern Ohio having a slight probability of above-normal precipitation in the coming months (Fig. 9b). Moving into the fall months, shorter days and less incoming solar radiation will lead to a drawdown in temperatures even if above-average warmth occurs. Additionally, while the frequency of damaging storms and tornado events tends to decrease during the autumn months, 2023 has been an active year so far, and storm systems will continue to influence important trends heading into harvest time.

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