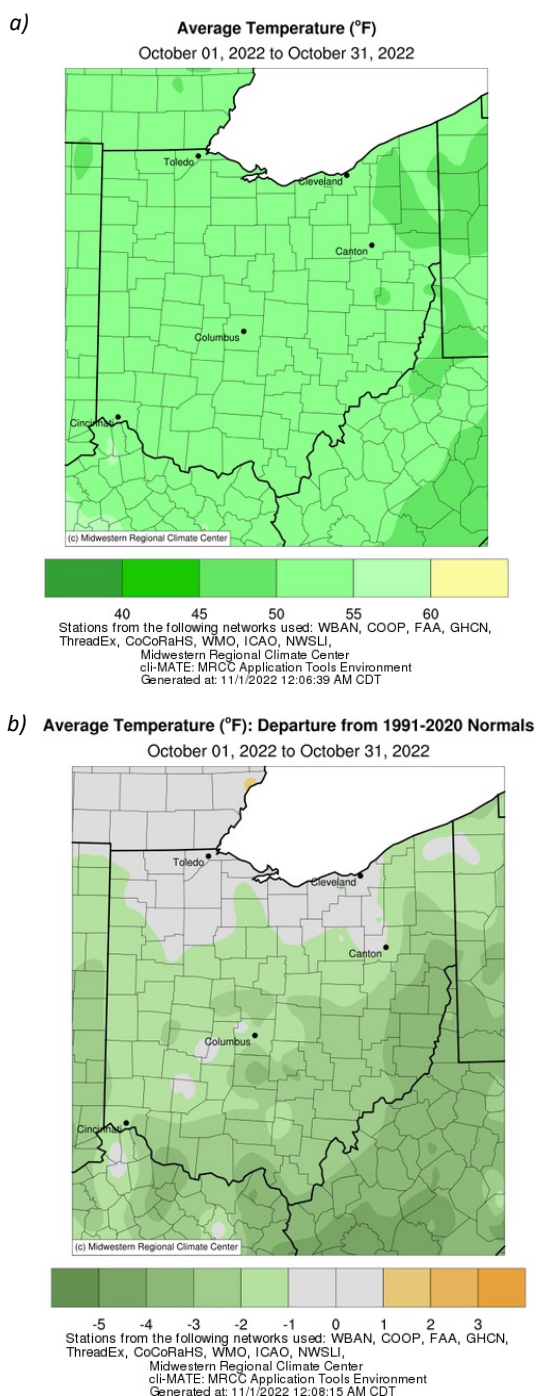a)

b)

Figure 1a: Average temperature and 1b: Departure from Normal for the month of October 2022. Data courtesy of the Midwestern Regional Climate Center (http://mrcc.purdue.edu).
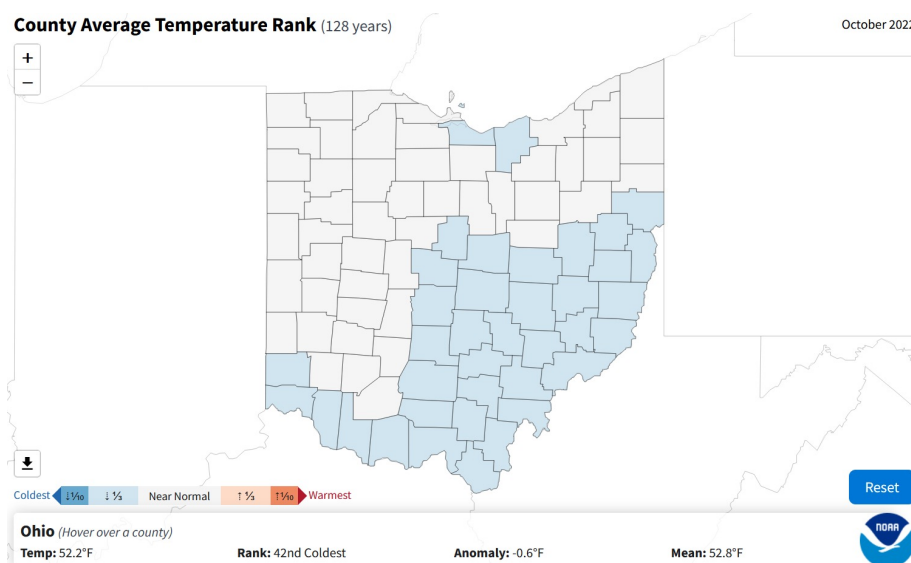
Temperature

October gave a preview of the cold temperatures to come, as a shift in the overall weather patterns introduced chilly conditions throughout the month. After a slightly below-average start, a substantial dip in the jet stream introduced a polar airmass to the region in the middle of the month, maintaining a trend of chilly temperatures that triggered frost advisories and freeze warnings throughout October. This resulted in a widespread average temperature range of 50-55°F (Fig. 1a). Though close to the long-term near average across the north and west, temperatures ran about 2-3°F below normal for the rest of the state (Fig. 1b). Many counties across the south and east experienced an October in the cooler third of their historical record (Fig. 2).
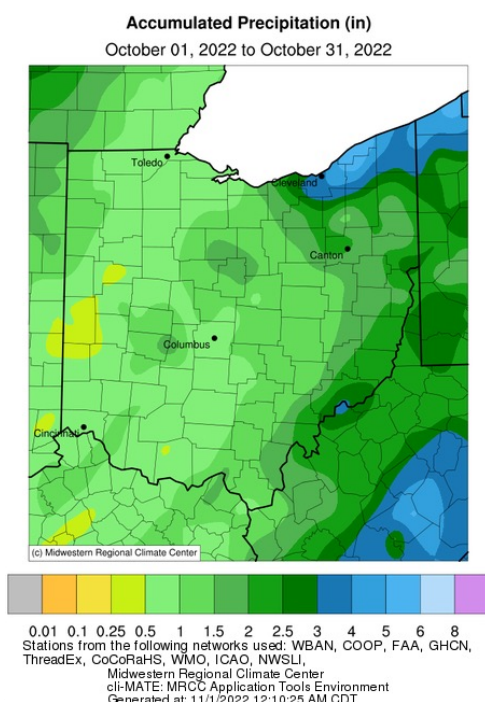

Figure 2: State of Ohio average temperature ranks by county for October 2022. Courtesy of the National Centers for Environmental Information (https://www.ncdc.noaa.gov/sotc/).

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a)

Accumulated Precipitation (in)
October 01, 2022 to October 31, 2022

0.01 0.1 0.25 0.5 1 1.5 2 2.5 3 4 5 6 8
Stations from the following networks used: WBAN, COOP, FAA, GHCN, ThreadEx, CoCoRaHS, WMO, ICAO, NWSLI,
Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 11/1/2022 12:10:25 AM CDT

b)

Accumulated Precipitation (in): Departure from 1991-2020 Normals
October 01, 2022 to October 31, 2022

-3 -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5
Stations from the following networks used: WBAN, COOP, FAA, GHCN, ThreadEx, CoCoRaHS, WMO, ICAO, NWSLI,
Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
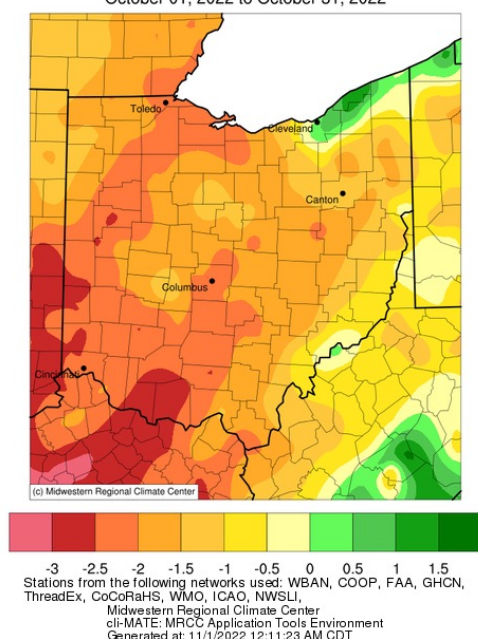Generated at: 11/1/2022 12:11:23 AM CDT

Figure 3a: Accumulated precipitation and 3b: Departures from Normal for the month of October 2022. Data courtesy of the Midwestern Regional Climate Center (http://mrcc.purdue.edu).

Precipitation

While the northeast corner of Ohio received nearly 6 inches of liquid-equivalent precipitation (due to the lake effect enhancing three precipitation events over the month), the same cannot be said for the rest of the state. Eastern Ohio picked up 1-2 inches of rain for the month, while western Ohio only received 0.25-1 inch of precipitation (Fig. 3a). With these deficits, most of the state ended the month 1-2 inches below the normal, with parts of the southwest receiving up to 3 inches less than expected (Fig. 3b). For most counties in the western part of the state, this represents a top ten driest October on record (Fig. 4). This culminated as Ohio's 17th driest October for the period 1895-2022, with Darke County notably experiencing conditions dry enough to reach their 4th driest October.
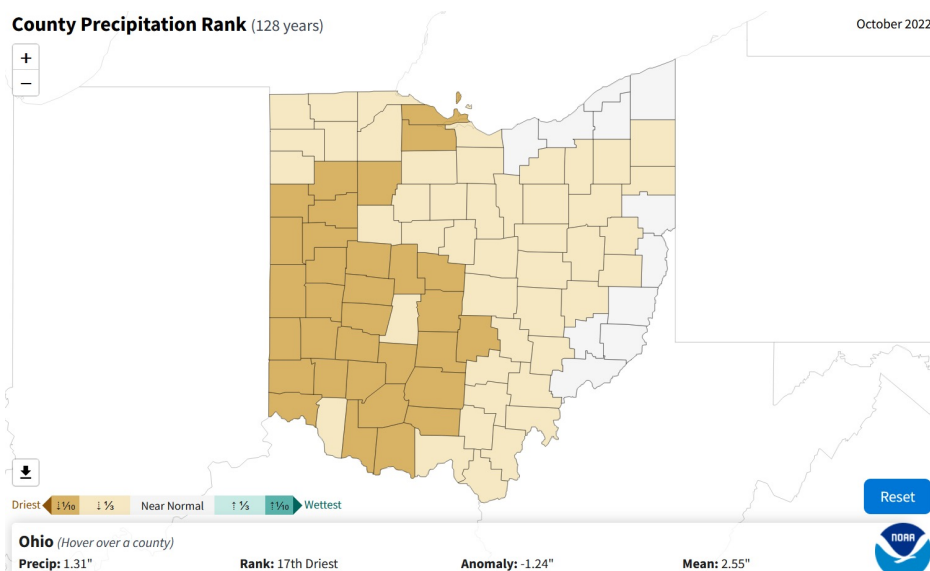
County Precipitation Rank (128 years)   October 2022

Driest ↓1⁄10 ↓1⁄3   Near Normal   ↑1⁄3 ↑1⁄10 Wettest

Ohio *(Hover over a county)*
Precip: 1.31"   **Rank:** 17th Driest   **Anomaly:** -1.24"   **Mean:** 2.55"

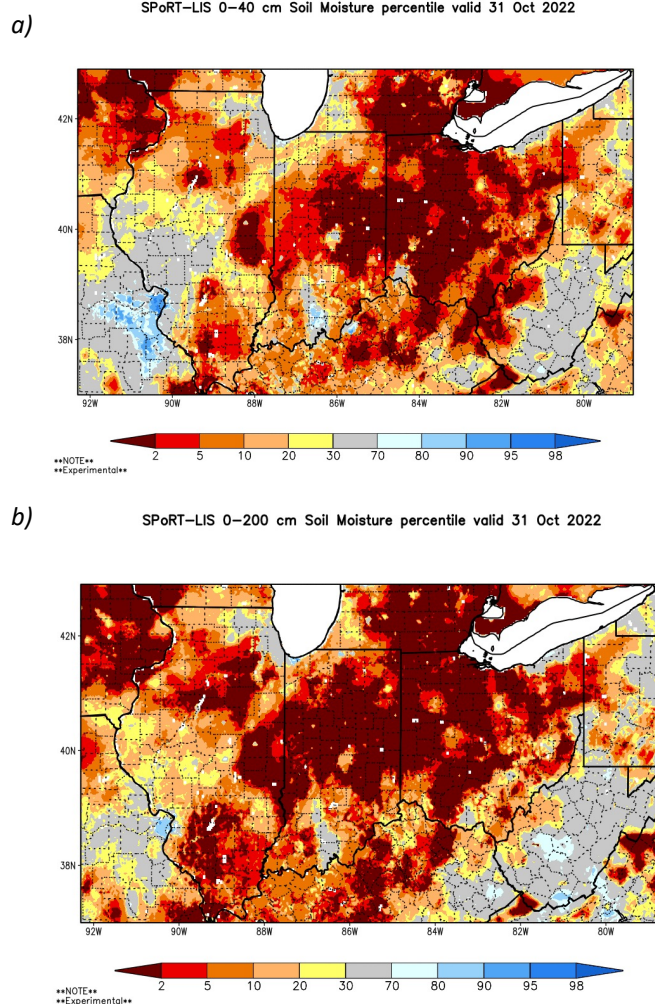*Figure 4: State of Ohio precipitation ranks by county for October 2022. Courtesy of the National Centers for Environmental Information (https://www.ncdc.noaa.gov/sotc/).*

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a)

SPoRT–LIS 0–40 cm Soil Moisture percentile valid 31 Oct 2022

NOTE
Experimental

b)

SPoRT–LIS 0–200 cm Soil Moisture percentile valid 31 Oct 2022

NOTE
Experimental

Soil and Energy

Infrequent precipitation paired with seasonal changes allowed for thoroughly dry ground conditions throughout the state by the end of the month. Dryness was most apparent in western Ohio at both 0-40cm (Fig. 5a) and 0-200cm (Fig. 5b) levels, while the east retained somewhat varied degrees of soil moisture. Expectations of regular autumn drying minimized impacts as harvest came to fruition for most crops in September and October, although western Ohio began to see some stresses on vegetation and crops still in circulation as well as slightly decreased streamflows resulting from below-average precipitation near the end of the month.

Although cooling degree days (CDDs) are commonly sparse this time of year, below average temperatures throughout the month resulted in no CDDs recorded anywhere in the state. Heating degree days (HDDs) were correspondingly higher than normal, with the southernmost divisions seeing the most significant departures (Fig. 6).

Figure 5a: 0-40 cm and 5b: 0-200 cm soil moisture percentile across the region at the end of October. 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	400	392	8	0	9	-9
2	385	380	5	0	11	-11
3	449	414	35	0	7	-7
4	393	364	29	0	12	-12
5	406	357	49	0	13	-13
6	414	397	17	0	9	-9
7	434	380	54	0	9	-9
8	383	331	51	0	15	-15
9	394	322	72	0	14	-14
10	424	357	67	0	11	-11
Statewide	408	367	40	0	11	-11

Figure 6: (Left) October 2022 heating & cooling degree days. (Right) Corresponding Ohio Climate Divisions. Data courtesy of the Midwestern Regional Climate Center (http://purdue.mrcc.edu).

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Notable Events

With generally calm weather throughout the month, chilly conditions stood out as the most prominent trend for October. The most noteworthy example took place on October 16th-20th, when an upper-level low pressure system pushed the jet stream south of Ohio, introducing a polar airmass and rapidly dropping temperatures across the state. At the height of the event on October 18th-19th, daily average temperatures fell to 35-45°F, resulting in widespread departures of 10-15°F below normal (Figs. 7a and 7b). Notably, Columbus tied its lowest recorded maximum temperature for October 18th, only warming to a daytime high of 44°F.

The system also brought with it some precipitation which, paired with the chilly environment, brought the first snowfall of the season for much of the northeast. With amplification caused by the lake effect, some areas east of Cleveland saw accumulating snow totals of up to 1.5 inches (Fig. 8).
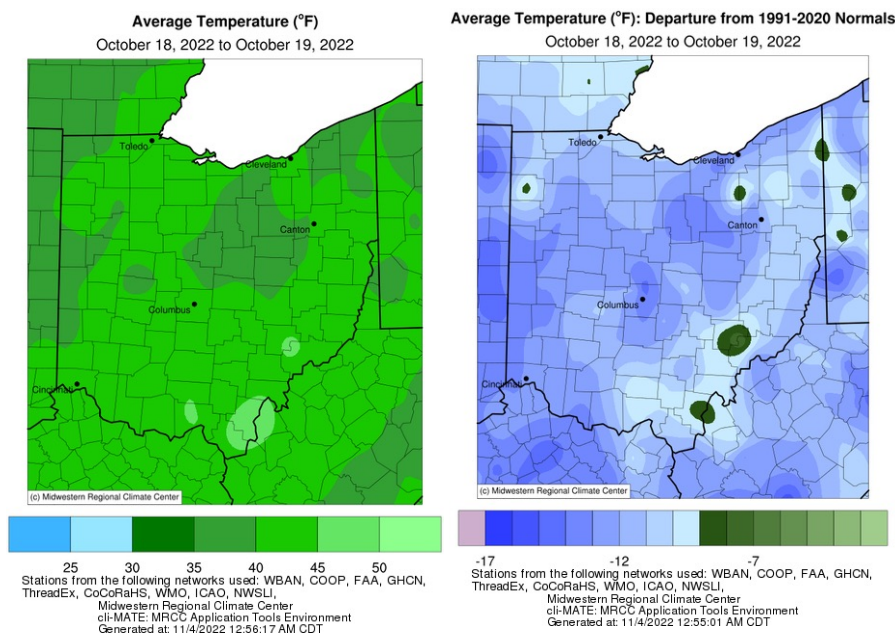

Figure 7a: Average temperature (left) and 7b: Departure from Normal (right) across Ohio on October 18th-19th, 2022. Data courtesy of the Midwestern Regional Climate Center (http://mrcc.purdue.edu).
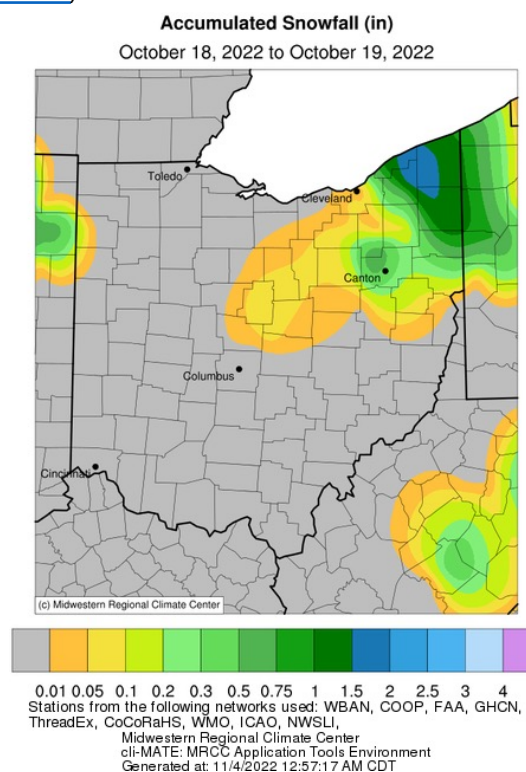

Figure 8: Accumulated snowfall across Ohio on October 18th-19th, 2022. Data courtesy of the Midwestern Regional Climate Center (http://mrcc.purdue.edu).

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Forecast: Nov 2022-Jan 2023

a)

Seasonal Temperature Outlook
Valid: Nov-Dec-Jan 2022-23
Issued: October 20, 2022

b)

Seasonal Precipitation Outlook
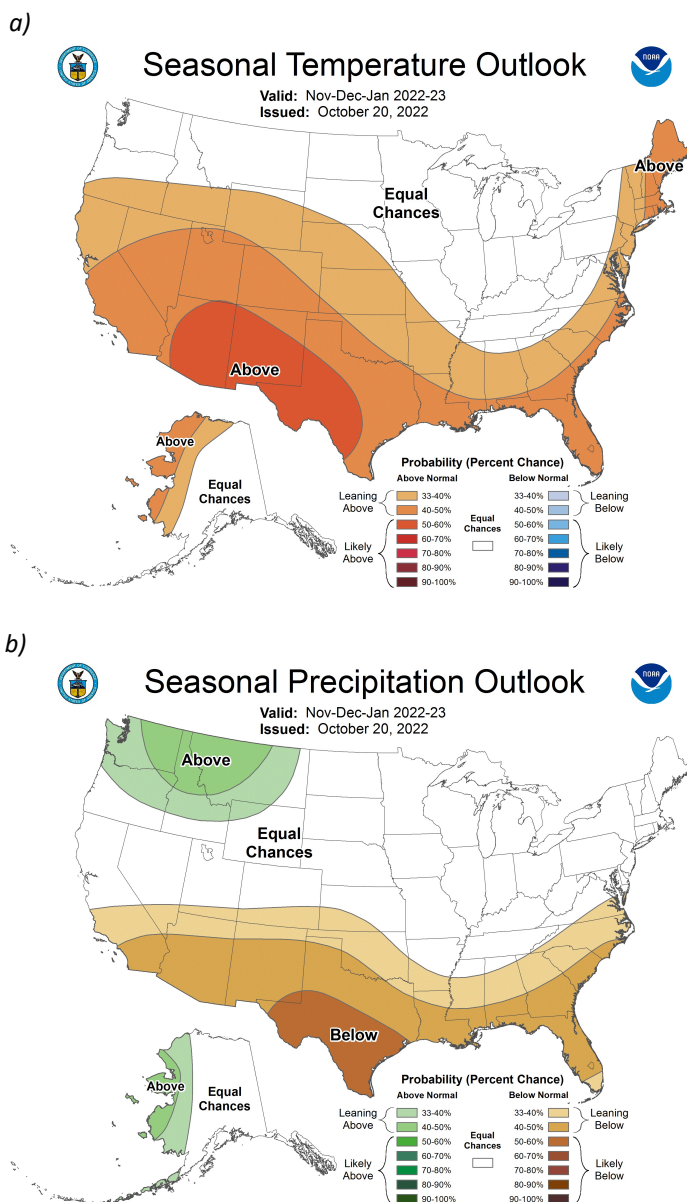Valid: Nov-Dec-Jan 2022-23
Issued: October 20, 2022

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

Looking Ahead

The Climate Prediction Center's outlook for the upcoming months lacks consensus, as both the seasonal temperature (Fig. 9a) and precipitation (Fig. 9b) outlooks illustrate uncertainty for Ohio. With both products exhibiting equal chances of above and below-average conditions for the state, it is difficult to definitively predict what can be expected over the following months. Though uncertain, recent forecasts indicate slight favorability towards La Niña development in the Pacific, during which Ohio could see average temperatures paired with above-average precipitation throughout the winter months. The way in which conditions develop in the coming months will help to create a higher degree of certainty, but in the meantime, we can anticipate a decrease in temperatures common for this time of year. Though precipitation chances are equal, another month of below-average rainfall could serve to push the state further into drought conditions, possibly impacting the health of year-round vegetation.

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

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