Maryland Climate Bulletin
May 2024

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ATMOSPHERIC &
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Maryland
State
Climatologist
Office

Summary

Statewide averages show that May 2024 was warmer and drier than normal (i.e., 1991-2020 averages). Monthly mean temperatures were in the 61−69°F range; maximum temperatures were between 70 and 79°F, and minimum temperatures were in the 49−61°F range. Monthly total precipitation was between 2.4 and 5.4 inches.

Maryland Regional Features (Figures 1-6, C1, and D1)

- The mean temperature was warmer than normal throughout the state, especially over Garrett County (around 4.5°F), the southern parts of Calvert, Saint Mary's, and Dorchester counties (3.3−3.6°F), and parts of Washington, Frederick, Carroll, Baltimore, and Harford counties (3.0−3.3°F).

- The maximum temperature was warmer than normal almost everywhere in the state, particularly in Garrett County (around 3.9°F), Allegany County (2.1−2.4°F), and portions of Carroll, Frederick, Calvert, and Saint Mary's counties (around 2.1°F). Slightly colder than normal temperatures appeared over the eastern shore in portions of Kent, Queen Anne's, and Caroline counties (−0.6°F).

- The minimum temperature was also warmer than normal everywhere in the state, especially in the southern parts of Calvert, Saint Mary's, and Dorchester counties (5.2−5.5°F), Garrett County (5.2°F), portions of Talbot and Dorchester counties (4.9−5.2), and parts of Montgomery, Frederick, Carroll, Baltimore, and Harford counties (4.0−4.3°F).

- Precipitation was below normal over most of the state. In particular, parts of Harford and Cecil counties (1.2−1.4 inches deficit), which got around 60−65% of their climatological precipitation, and parts of Caroline, Dorchester, and Wicomico counties (0.8−1.0 inches deficit) that received around 75 percent of their climatological precipitation. Above-normal precipitation occurred only over Washington and Frederick counties (0.2−0.6 inches) and parts of Allegany and Prince George's counties (inches).

- For the first time in the year, abnormally dry conditions appeared in the state over Dorchester, Wicomico, Somerset, and Worcester counties. While most of the creeks and rivers had normal streamflow, some creeks and rivers in this region also showed below-normal streamflow; some creeks and rivers over the Piedmont and western Maryland also showed below-normal streamflow.

Maryland Climate Divisions (Figures 7-8, B1, and B2)

- All eight climate divisions were warmer and drier than normal. While the Central Eastern Shore, Climate Division 2, was the driest (0.71 inches below normal), the Allegany Plateau, Climate Division 8, was the warmest (4.2°F above normal). Notably, anomalies in the minimum temperatures were larger than in the maximum temperatures in all Climate Divisions.

- The statewide temperature was warmer than normal for the sixth consecutive month since December 2023. The statewide precipitation anomalies remained below normal in May after a wetter-than-normal March.

Historical Context (Figure 9, Tables A1 and A2)

- Mean, maximum, and minimum statewide temperatures in May (66.1, 75.6, and 56.6°F) were above the long-term (1895-2023) averages. Except for the maximum temperature, the mean and minimum temperatures were among the 10% of the highest values on record for the month but still far from the historical maximum records of 69.3 and 58.8°F established in 2004; the warmest maximum temperature on record of 82.2°F, was set in 1991. May's statewide precipitation (3.66 inches) was just below the long-term average, far from the driest May on record of 0.82 inches in 1964.

- Mean temperatures indicate that May 2024 was the ninth warmest May in Garrett and Saint Mary's counties and the tenth in Harford County.

- Minimum temperatures show that May 2024 was the sixth warmest May statewide. Except for Wicomico, Somerset, and Worcester, the minimum temperatures in the remaining counties and Baltimore City ranked within the upper ten warmest on record. May was the fourth warmest in Harford, Calvert, Saint Mary's, and Talbot counties and the fifth warmest in Dorchester County.

Century-Plus Trends, 1895-2024 (Figures 10, 11)

- Statewide mean temperature, heating, and cooling degree−days in May showed significant trends: a warming trend (1.1°F/century), a decreasing trend (−20.0°FDD/century), and an increasing trend (17.1°FDD/century), respectively. Statewide precipitation also had a significant wetting trend (0.75 in/century).

- Regionally, mean temperatures in May showed significant warming trends almost everywhere. In particular, over Baltimore City (2.0°F/century), Baltimore County, and parts of Caroline, Talbot, Dorchester, Somerset, Wicomico, and Worcester counties (1.6–1.8°F/century).

- Regionally, May precipitation had significant wetting trends over the northern counties west of Bay and counties over the southern eastern shore. In particular, over areas of Garrett, Montgomery, Howard, Carol, and Baltimore counties (1.1–1.2 inches/century), and Somerset and Worcester counties (0.7−0.8 in/century).

Contents

1.   Introduction

The Maryland Climate Bulletin is issued by the Maryland State Climatologist Office (MDSCO), which resides in the Department of Atmospheric and Oceanic Science at the University of Maryland, College Park. It documents the surface climate conditions observed across the state in a calendar month and is issued in the second week of the following month.

Maryland's geography is challenging, with the Allegheny and Blue Ridge mountains to the west, Piedmont Plateau in the center, the Chesapeake Bay, and the Atlantic Coastal Plain to the east. The range of physiographic features and the eastern placement of the state within the expansive North American continent contribute to a comparatively wide range of climatic conditions.

The bulletin seeks to document and characterize monthly surface climate conditions statewide, and climate division and county-wise, placing them in the context of regional and continental climate variability and change to help Marylanders interpret and understand recent climate conditions.

The monthly surface climate conditions for May 2024 are presented via maps of key variables, such as average surface air temperature, maximum surface air temperature, minimum surface air temperature, total precipitation, and their anomalies (i.e., departures from normal); they are complemented by drought conditions for the state, as given by the U.S. Drought Monitor, and streamflow anomalies as given by the U.S. Geological Survey Water Watch (Section 3). Statewide and climate division averages for the month are compared against each other via scatter plots (Section 4). The monthly statewide averages are placed in the context of the historical record via box and whisker plots in Section 5. Century-plus trends in statewide air temperature, heating degree-days, cooling degree-days, precipitation, and state maps of air temperature and precipitation are presented in Section 6. Ancillary statewide, climate division, and county-level information is provided via tables and plots in Appendices A-B; climatology and variability maps are in Appendices C-D, including the percent of normal precipitation and normalized anomalies for the month.

2.   Data

Surface air temperatures, total precipitation, and heating degree-days data in this report are from the following sources:

- NOAA Monthly U.S. Climate *Gridded* Dataset at 5-km horizontal resolution (NClimGrid – Vose et al. 2014). It is available in a preliminary status at https://www.ncei.noaa.gov/data/nclimgrid-monthly/access/ Data was downloaded on 6/18/2024.

- NOAA Monthly U.S. Climate *Divisional* Dataset (NClimDiv – Vose et al. 2014). It is available in a preliminary status (v1.0.0-20240606) at:

https://www.ncei.noaa.gov/pub/data/cirs/climdiv/
Data was downloaded on 6/10/2024.

Drought conditions are from the U.S. Drought Monitor website:
https://droughtmonitor.unl.edu/Maps/MapArchive.aspx

Streamflow conditions are from the U.S. Geological Survey Water Watch website:
https://waterwatch.usgs.gov/index.php

Some definitions:

About the anomalies: Anomalies for a given month (e.g., May 2024) are the departures of the monthly value from the corresponding month's 30-year average (i.e., from the average of 30 Mays) during 1991-2020; the 30-year average (or mean) is the climate normal, or just the climatology. When the observed monthly value exceeds its climatological value, it is referred to as above normal (e.g., warmer than normal or wetter than normal) or a positive anomaly. In contrast, when this value is smaller than its climatological value, it is referred to as below normal (e.g., colder than normal or drier than normal) or negative anomaly.

About NOAA's Climate Divisions. The term "climate division" refers to one of the eight divisions in the state that represent climatically homogeneous regions, as determined by NOAA: https://www.ncei.noaa.gov/access/monitoring/dyk/us-climate-divisions

The eight climate divisions in Maryland are:

- Climate Division 1: Southeastern Shore. It includes the counties of Somerset, Wicomico, and Worcester.
- Climate Division 2: Central Eastern Shore. It includes the counties of Caroline, Dorchester, and Talbot.
- Climate Division 3: Lower Southern. It includes the counties of Calvert, Charles, and St. Mary's.
- Climate Division 4: Upper Southern. It includes the counties of Anne Arundel and Prince George's.
- Climate Division 5: Northeastern Shore. It includes the counties of Kent and Queen Anne's.
- Climate Division 6: North Central. It includes the counties of Baltimore, Carroll, Cecil, Frederick, Harford, Howard, Montgomery, and the city of Baltimore.
- Climate Division 7: Appalachian Mountains. It includes the counties of Allegany and Washington.
- Climate Division 8: Allegheny Plateau. It includes Garrett County.

Note that these Climate Divisions do not correspond with the *Physiographic Provinces* in the state, as the former follow county lines. Climate Division 8 follows the *Appalachian Plateau Province*, Climate Division 7 follows the *Ridge and Valley Province*; however, Climate Division 6 includes the *Blue Ridge and the Piedmont Plateau provinces,* Climate Divisions 3, 4, and a portion of 6 include the *Upper Coastal Plain Province*, and Climate Divisions 1, 2, 5, and a portion of 6 include the *Lower Coastal Plain (or Atlantic Continental Shelf) Province*.

About heating and cooling degree-days. Degree days are the difference between the daily mean temperature (high temperature plus low temperature divided by two) and a base temperature of 65°F as it is assumed that when the exterior temperature is 65°F, heating or cooling is not necessary to be comfortable. If the mean temperature is above 65°F, the base temperature of 65°F is subtracted from the mean temperature, and the difference defines cooling degree-days. If, on the other hand, the mean temperature is below 65°F, the mean temperature is subtracted from the base temperature of 65°F, and the difference defines heating degree-days. Degree-days give a general idea of how much energy is required to warm or cool buildings; because energy demand is cumulative, degree-day totals for a month are the sum of each day's degree-day total (CPC, 2023).
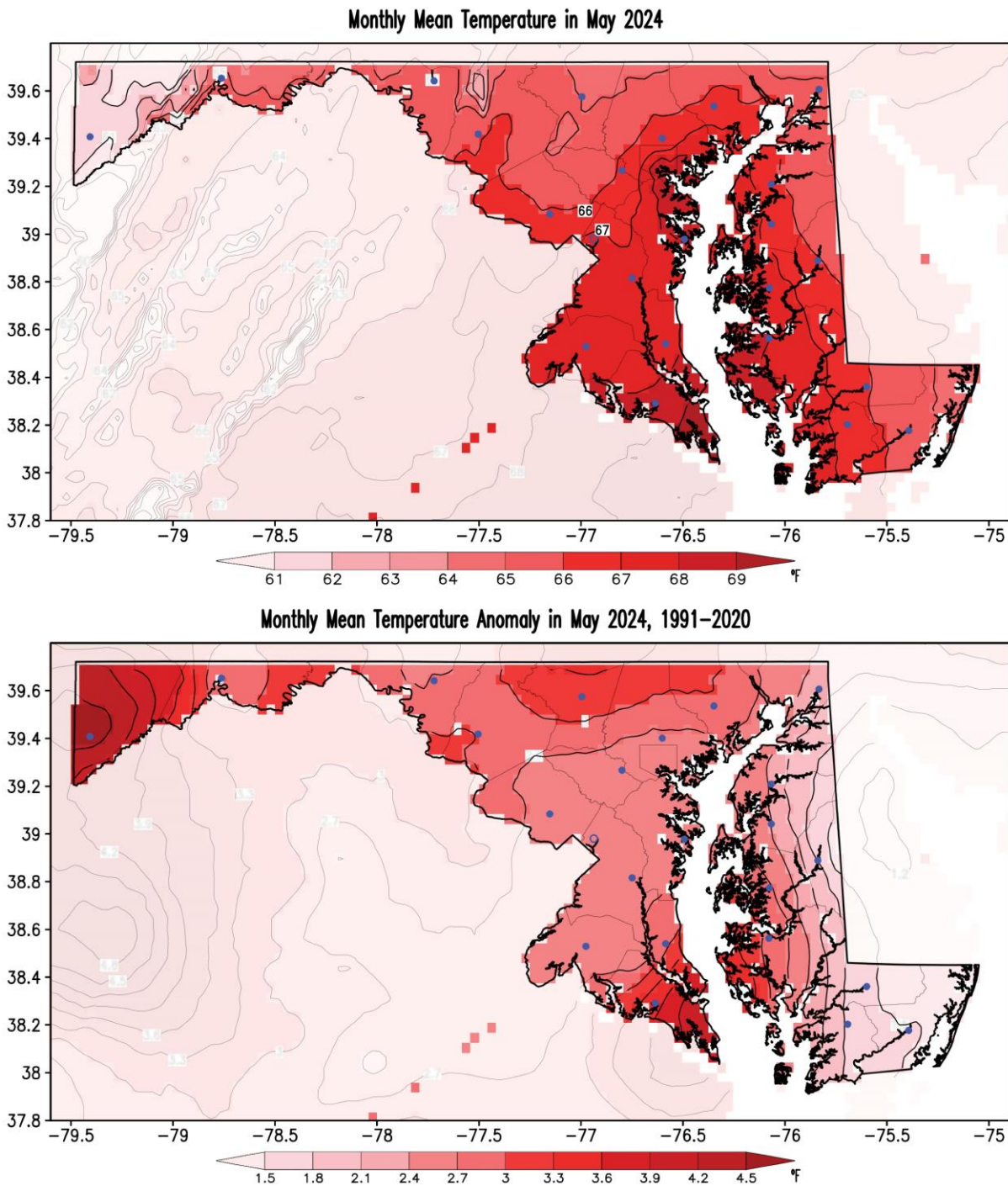
3. May 2024 Maps

A. Mean Temperatures

Figure 1. Monthly mean surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for May 2024. Temperatures are in °F following the color bar. Red shading in the anomaly map marks warmer than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

B.   Maximum Temperatures

Figure 2. Monthly maximum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for May 2024. Temperatures are in °F following the color bar. Blue/red shading in the anomaly map marks colder/warmer than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.
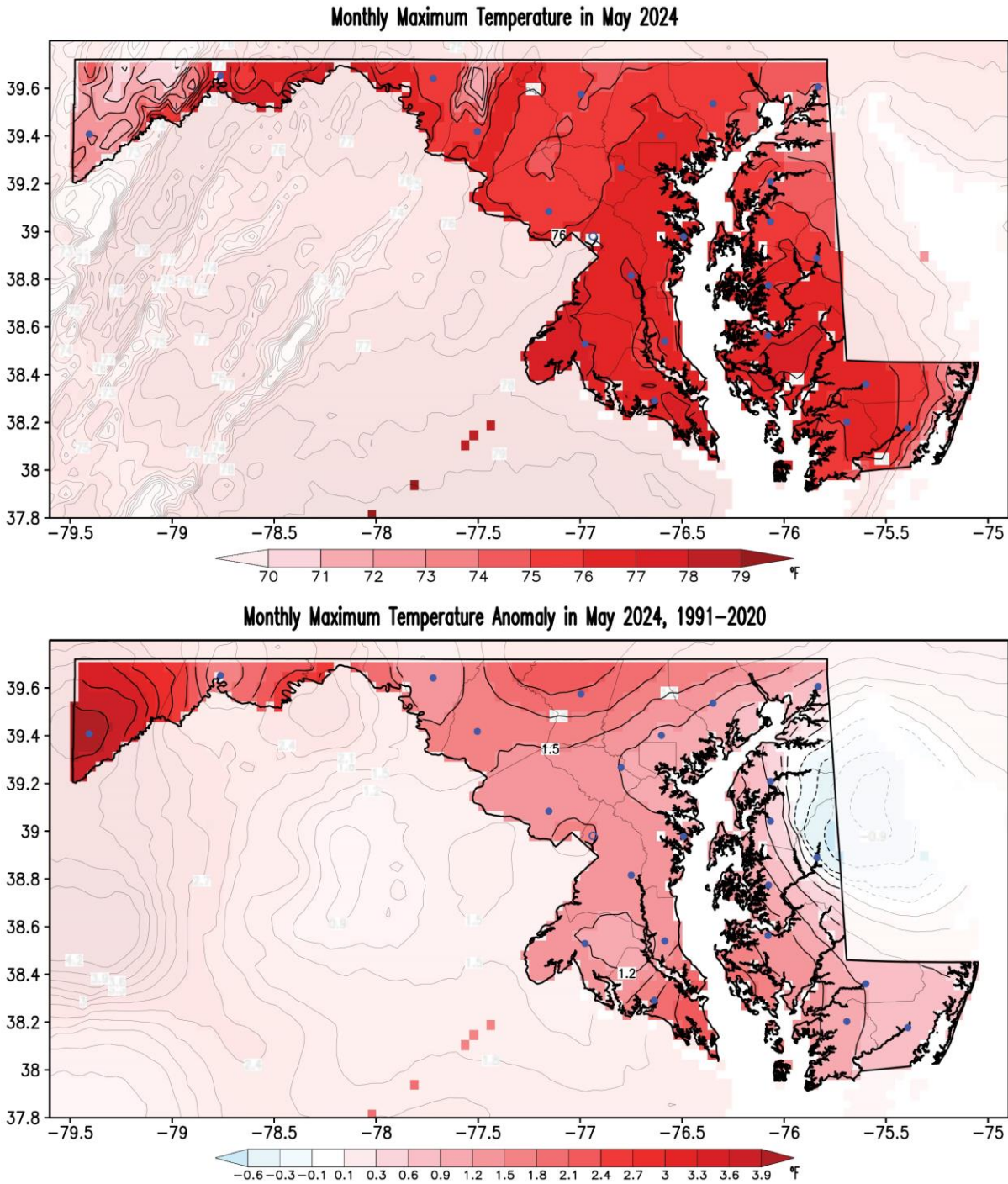
C.   Minimum Temperatures

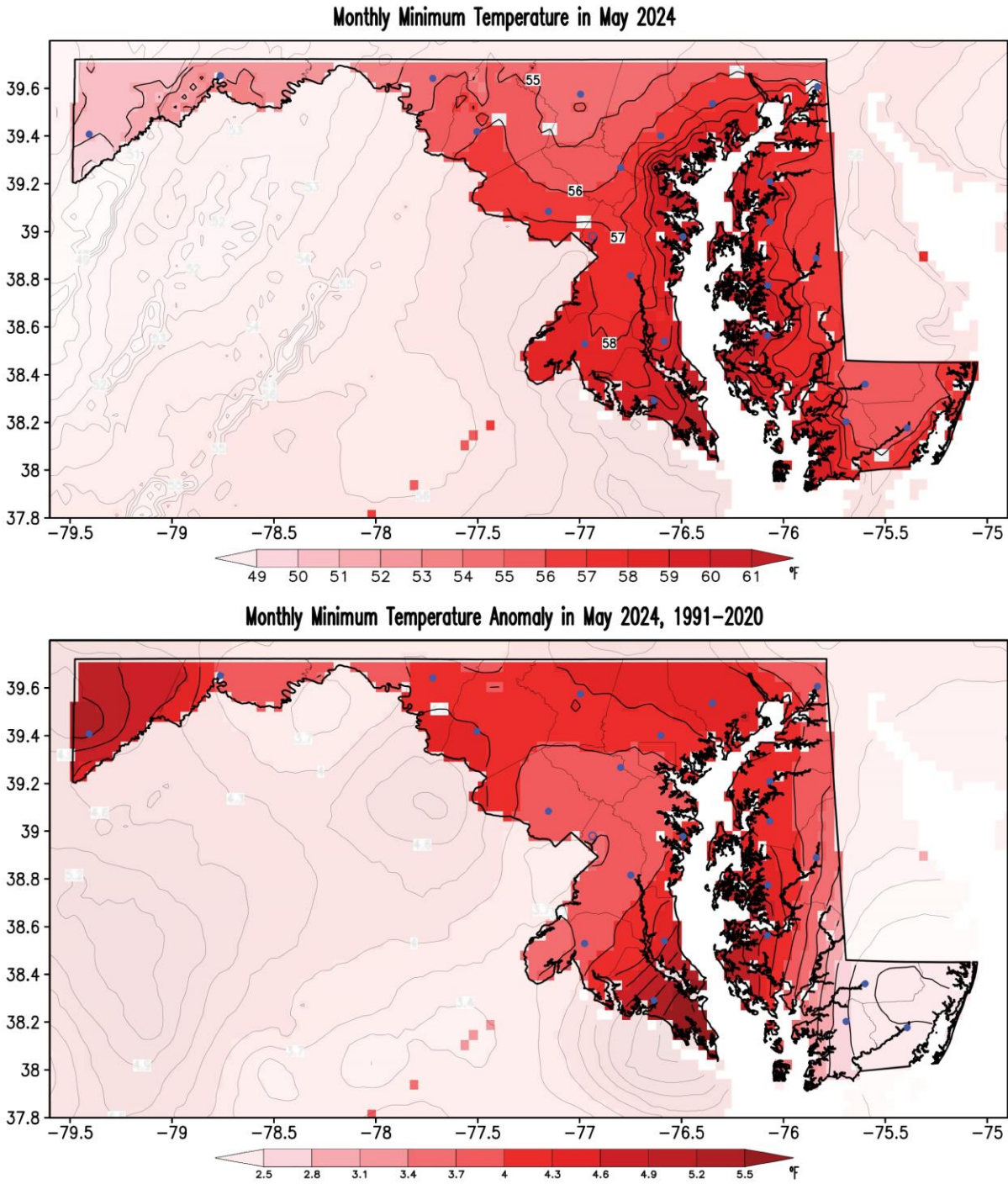**Figure 3.** Monthly minimum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for May 2024. Temperatures are in °F following the color bar. Red shading in the anomaly map marks warmer than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

D.   Precipitation

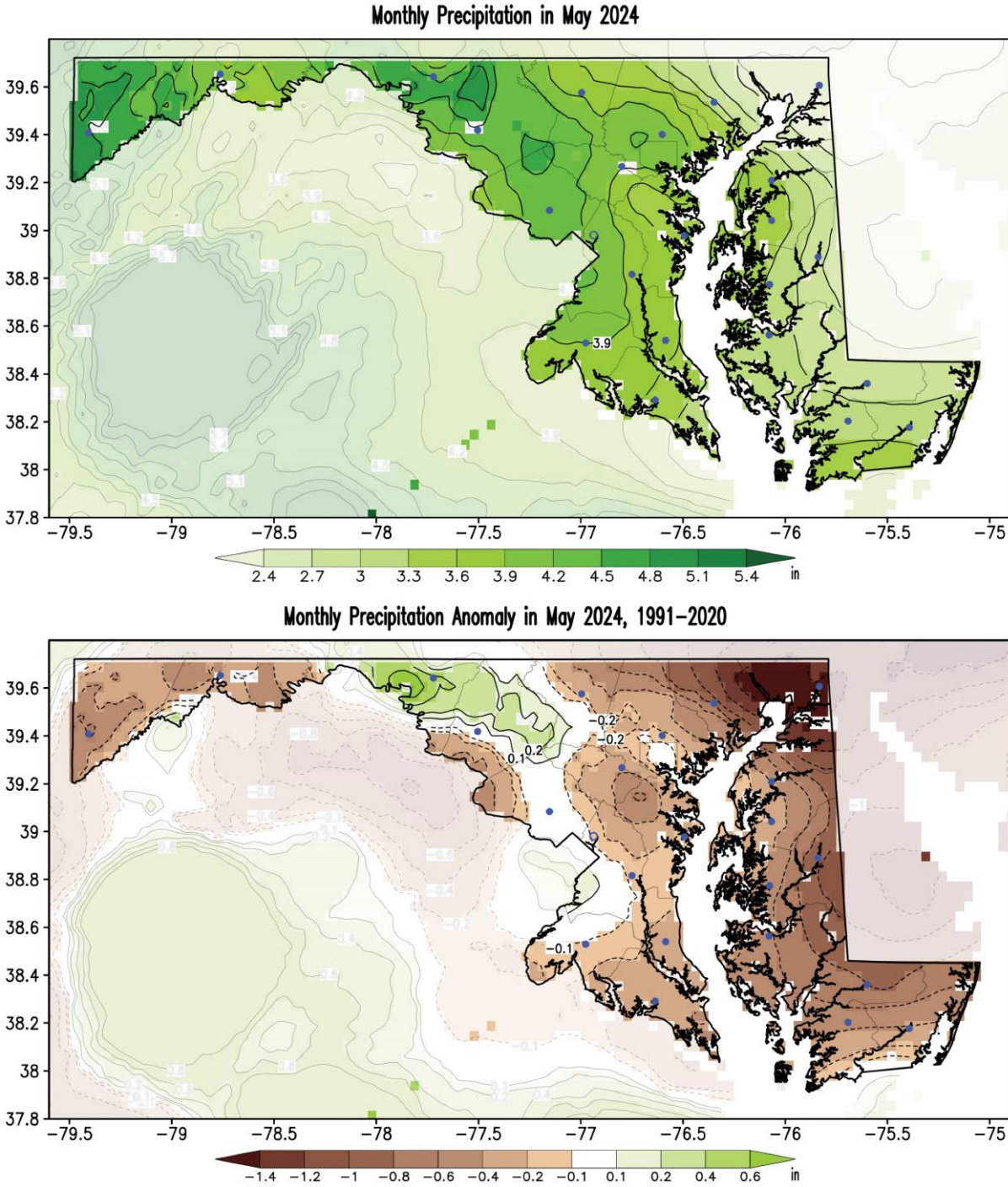**Figure 4.** Monthly total precipitation (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for May 2024. Precipitation is in inches following the color bar. Brown/green shading in the anomaly map marks drier/wetter than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.
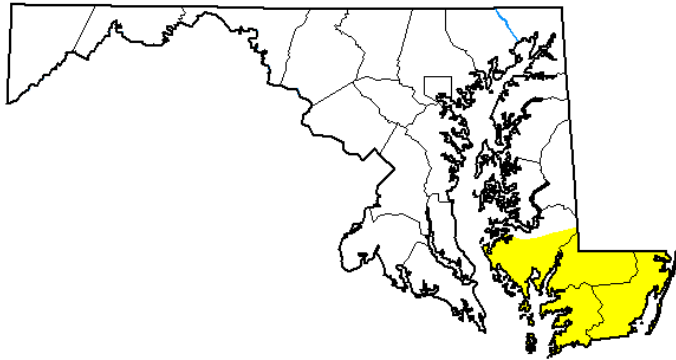
E. Drought

U.S. Drought Monitor
Maryland

May 28, 2024
(Released Thursday, May. 30, 2024)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	83.95	16.05	0.00	0.00	0.00	0.00
Last Week 05-21-2024	83.95	16.05	0.00	0.00	0.00	0.00
3 Months Ago 02-27-2024	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-02-2024	70.35	29.65	0.00	0.00	0.00	0.00
Start of Water Year 09-26-2023	63.11	33.59	2.83	0.47	0.00	0.00
One Year Ago 05-30-2023	33.92	45.96	20.11	0.00	0.00	0.00

Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate Drought	D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions.
Local conditions may vary. For more information on the
Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

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droughtmonitor.unl.edu

Figure 5. Drought conditions as reported by the U.S. Drought Monitor on May 28, 2024. At this time, the state has abnormally dry conditions for the first time in the year; this is the second consecutive month that the southern eastern shore has below normal precipitation.

F.   Streamflow
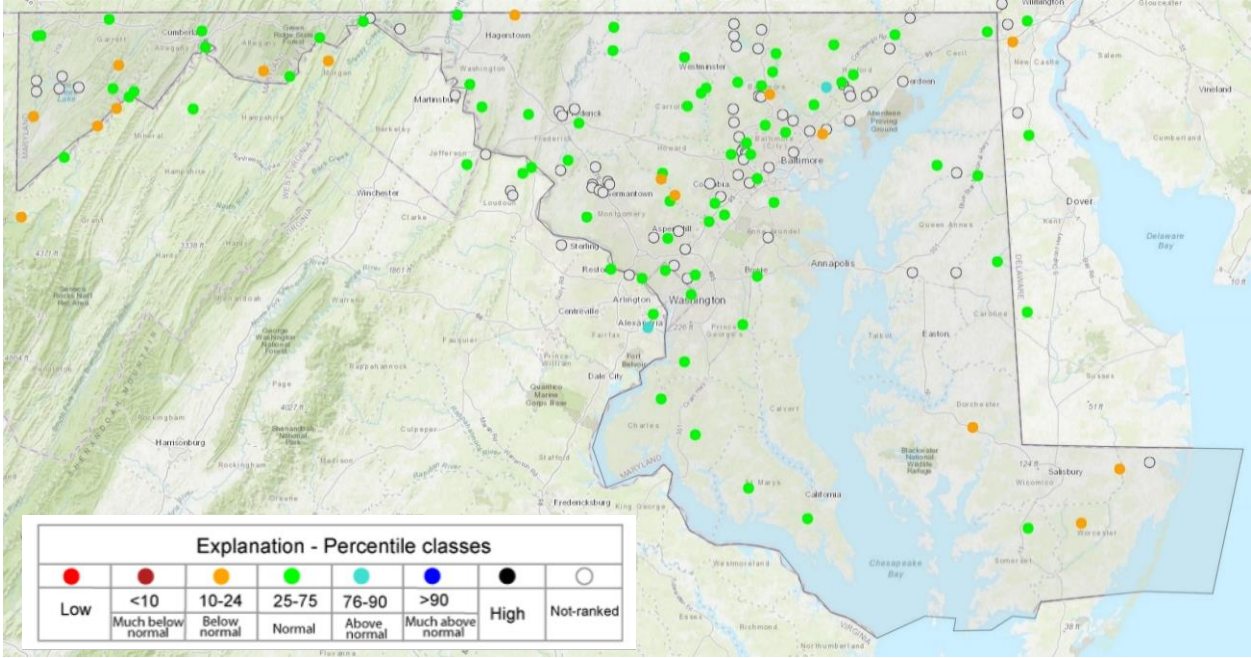
Figure 6. Monthly averaged streamflow class anomalies as reported by the U.S. Geological Survey (USGS) Water Watch for May 2024. Orange to red-filled circles denote below-normal streamflow conditions, cyan to black-filled circles denote above-normal streamflow conditions, and green-filled circles represent normal streamflow conditions. Below normal conditions are present in the state for the first time in the year; those in the southern eastern shore are within the abnormally dry conditions indicated by the US Drought monitor.

4. May and MAM 2024 Climate Divisions Averages

A. May 2024 Scatter Plots

Figure 7. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for May 2024. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect to the 1991-2020 climatology. Temperatures are in °F and precipitation is in inches. The size of the circles is proportional to the total precipitation scaled down by the maximum precipitation (4.72 inches in CD8, top panel) and by the maximum precipitation anomaly (|−0.71| inches in CD2, bottom panel) among the nine regions. Note that the color of the filled circles corresponds to the color in the Climate Divisions according to the inset map.
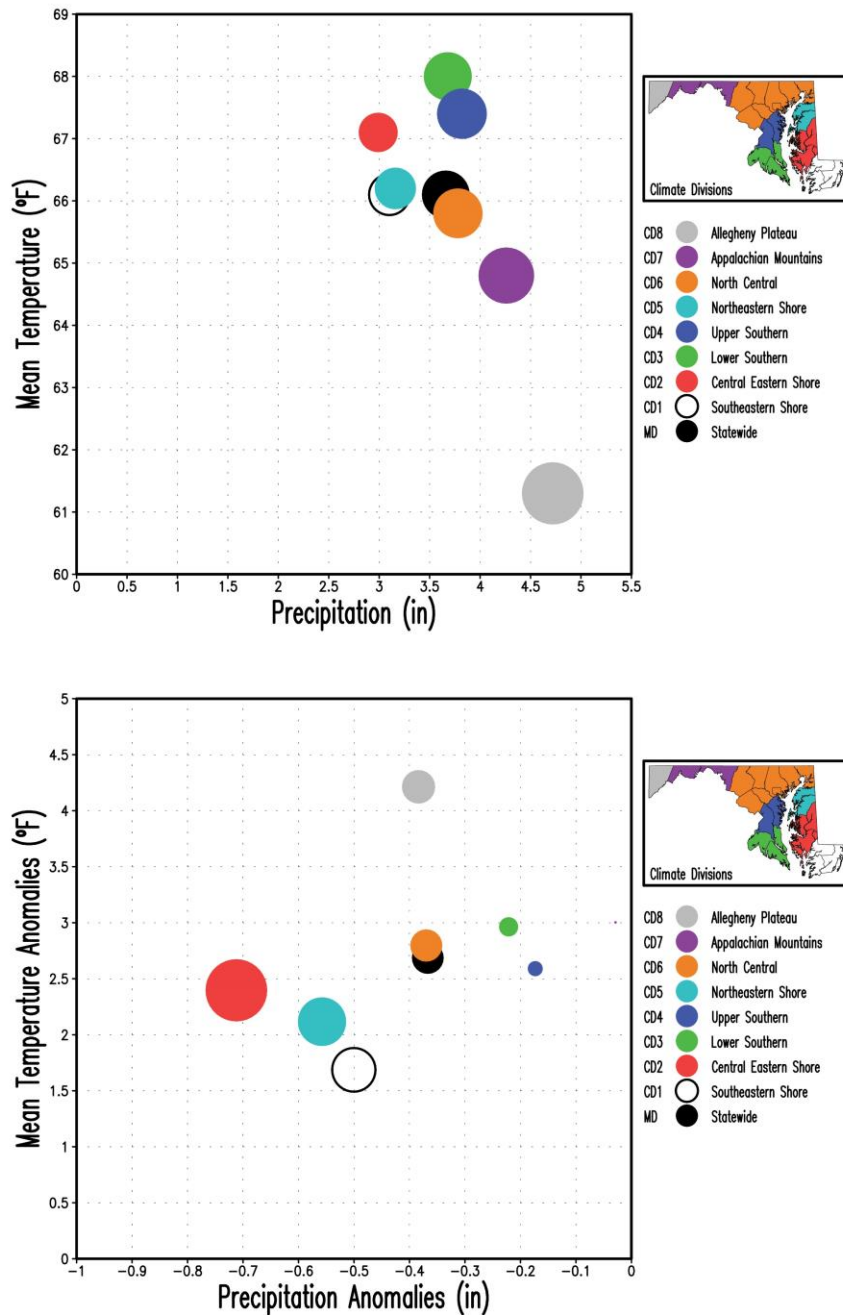
B.   March – May 2024 Scatter Plots
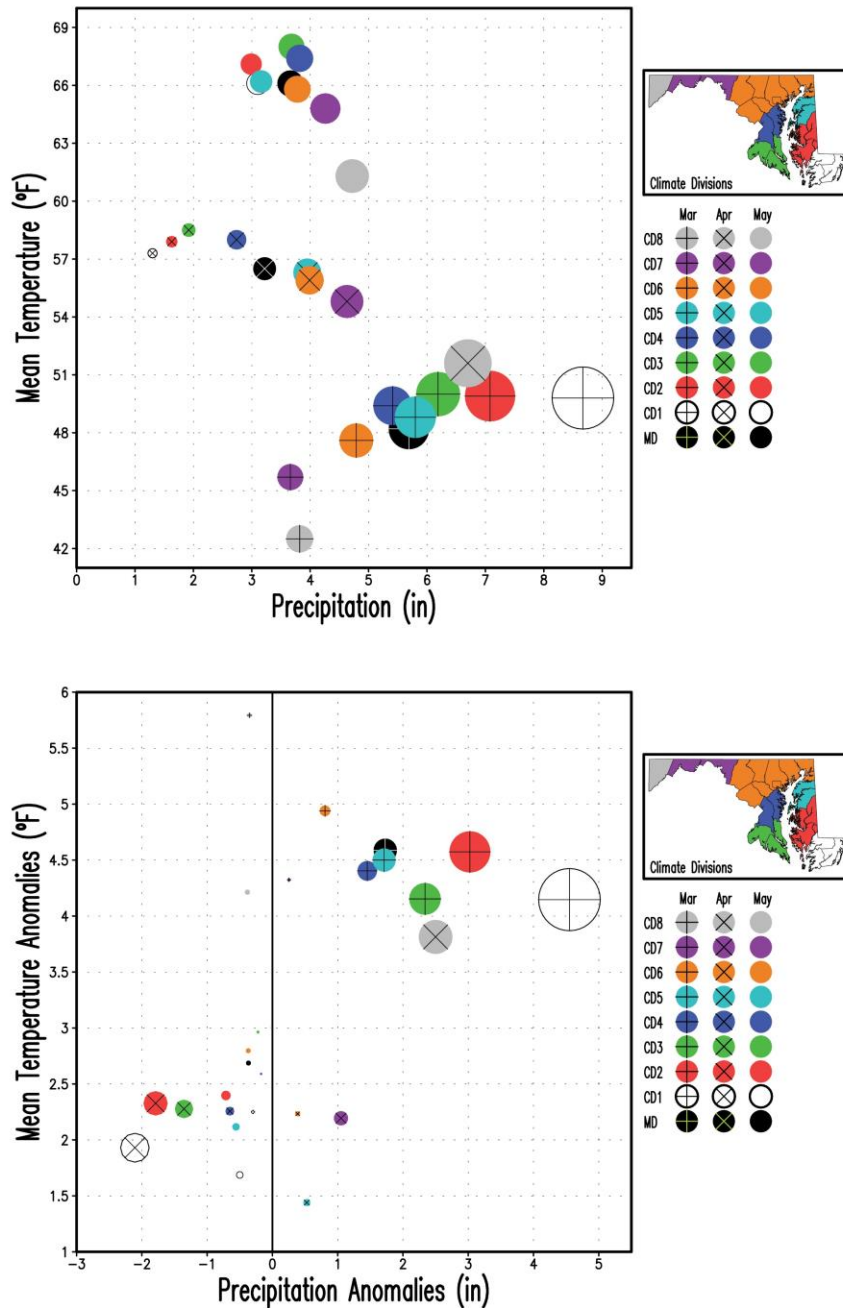
Figure 8. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for March, April and May 2024. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect to the 1991-2020 climatology. Temperatures are in °F, and precipitation is in inches. The size of the circles is proportional to the total precipitation scaled down by the maximum precipitation (8.67 inches in CD1 in March, top panel) and by the maximum precipitation anomaly (4.55 inches in CD1 in March, bottom panel) among the nine regions and three months. May is displayed with filled circles only, while April and March are displayed with superposed multiplication and addition signs, respectively.

5. May 2024 Statewide Averages in the Historical Record

A. Box and Whisker Plots
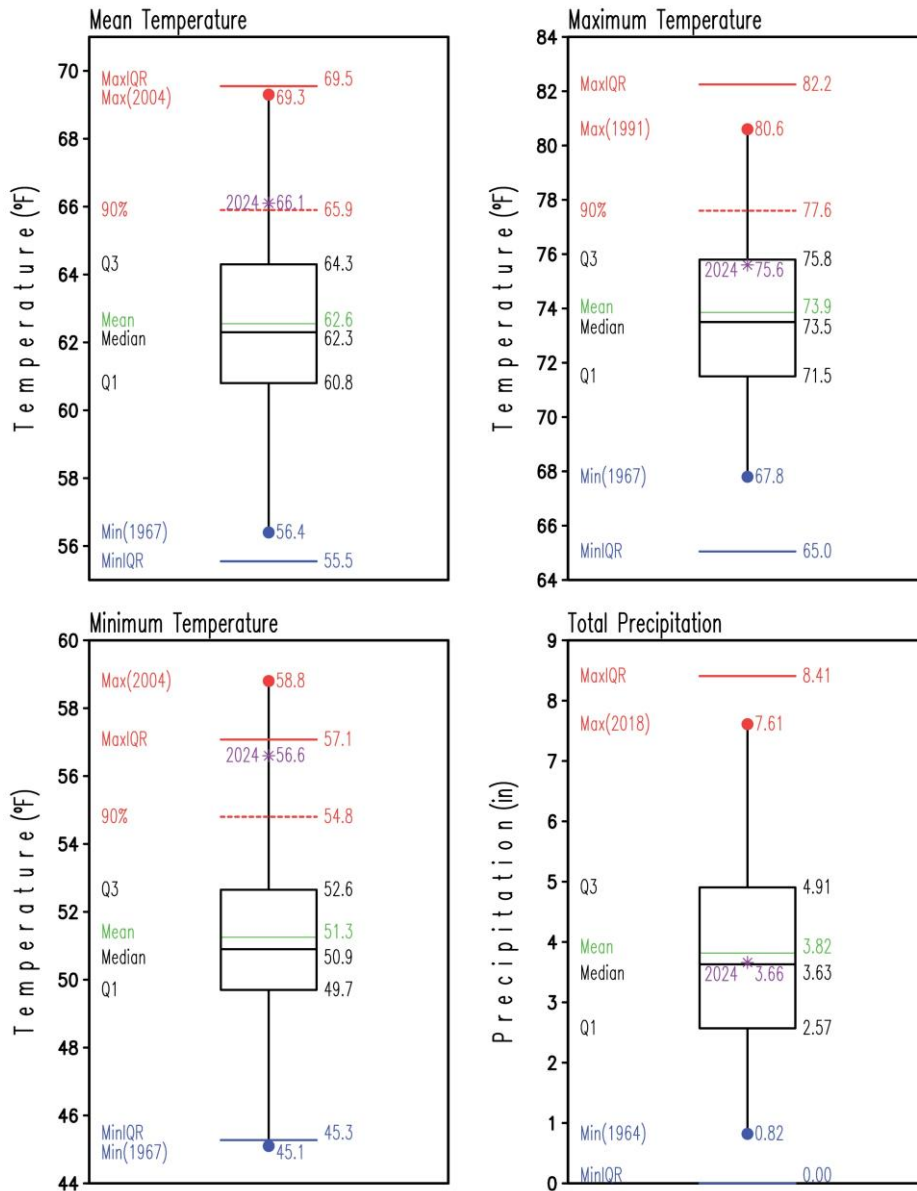
Figure 9. Box and Whisker plots of Maryland (statewide) monthly mean (upper left), maximum (upper right), minimum (lower left) surface air temperatures, and total precipitation (lower right) for May for the period 1895-2023. The label and asterisk in purple represent conditions for May 2024. Statistics for the period 1895-2023 are labeled at the left side of each box and whisker plot and their values at their right. Temperatures are in °F, and precipitation is in inches. The mean is the green line within the box, while the median is the black line within the box. The lower (Q1) and upper (Q3) quartiles, indicating the values of the variable that separate 25% of the smallest and largest values, are the lower and upper horizontal black lines of the box, respectively. The threshold indicating the upper 10% values is marked by the dashed red line.The blue and red dots mark the minimum and maximum values in the period at the end of the whiskers; the year of occurrence is shown in parenthesis. The blue and red horizontal lines represent extreme values defined by Q1-1.5×(Q3-Q1) and Q3+1.5×(Q3-Q1), respectively.

6.   1895-2024 May Trends

A.   Statewide Mean Temperature, Heating Degree-Days, Cooling Degree-Bays, and Precipitation

Figure 10. Maryland (statewide) mean surface air temperature, heating degree-days, cooling degree days, and precipitation in May for the period 1895-2024. Temperature is in °F, heating/cooling degree-days is in °F degree-days (°FDD), and precipitation is in inches. The thin, continuous black lines in each panel display the long-term means (62.6°F, 121.9°FDD, 56.0°FDD and 3.81 in, 1895-2024), and the double thin, continuous gray lines indicate the standard deviation (2.6°F, 47.9°FDD, 34.0°FDD and 1.51 in) above/below the long-term mean. The thick dashed black lines show the long-term linear trend. The warming temperature trend (1.1°F/century), the decreasing heating degree-days trend (−20.0°FDD/century), the increasing cooling degree-days trend (17.1°FDD/century), and the increasing precipitation trend (0.75 in/century) are statistically significant at the 95% level (*Student's t-test* −Santer et al. 2000).

B.   Temperature and Precipitation Maps
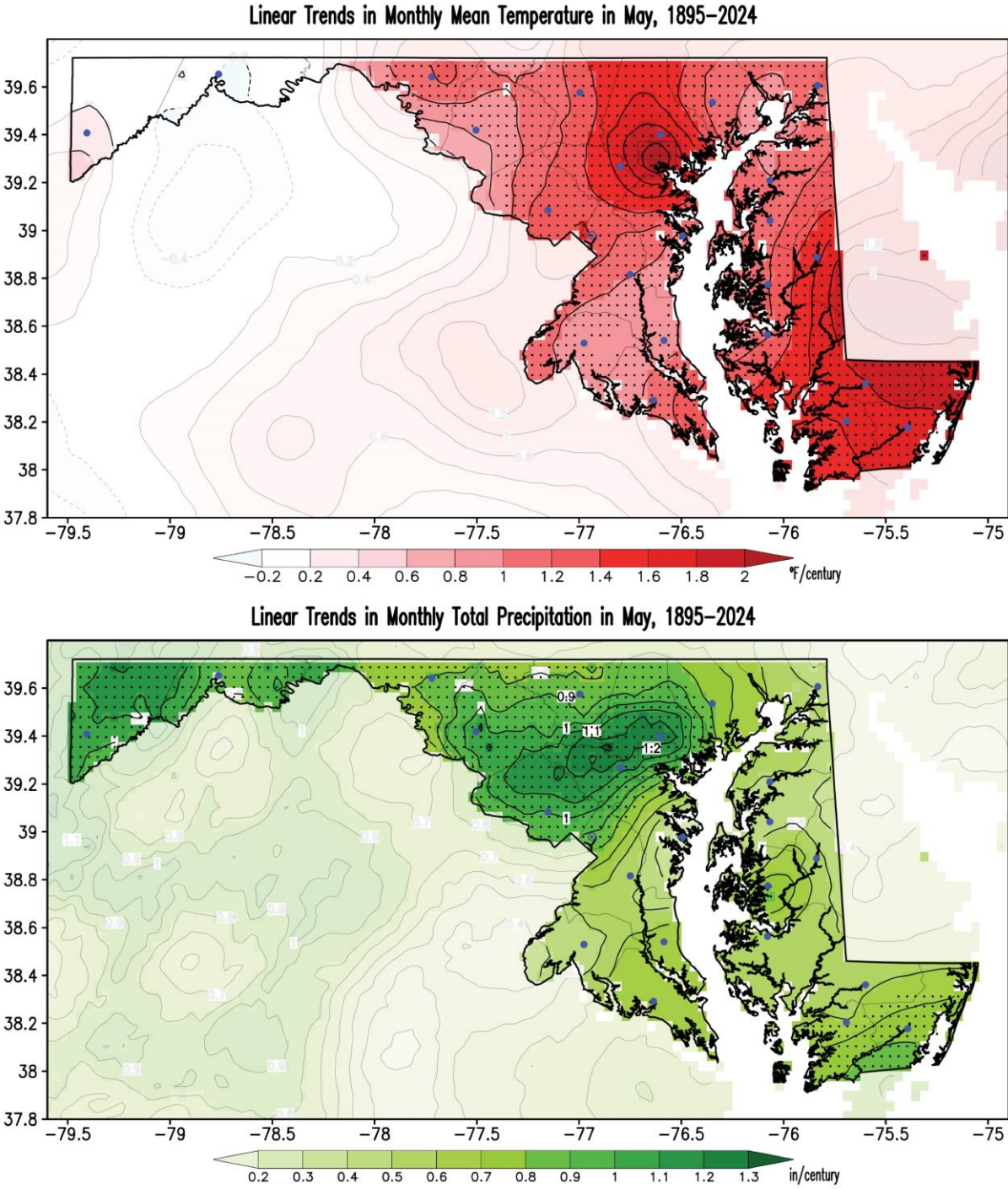
Figure 11. Linear trends in surface air mean temperature and precipitation in May for the period 1895-2024. Temperatures are in °F/century, and precipitation is in inches/century following the color bars. Blue/red shading in the temperature map marks cooling/warming trends. Green shading in the precipitation map shows wetting trends. Stippling in the maps shows regions where trends are statistically significant at the 95% level (*Student's t-test* −Santer et al. 2000). Note that shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

Appendix A. May 2024 Data Tables: Statewide, Climate Divisions, and Counties

A. Mean Temperature and Precipitation

Region	Mean Air Temperature (°F)	Rank (#)	Region	Total Precipitation (in)	Rank (#)
Statewide	66.1	118	**Statewide**	3.66	67
Climate Division 1	66.1	113	**Climate Division 1**	3.10	63
Climate Division 2	67.1	115	**Climate Division 2**	2.99	51
Climate Division 3	68.0	119	**Climate Division 3**	3.68	65
Climate Division 4	67.4	116	**Climate Division 4**	3.82	72
Climate Division 5	66.2	115	**Climate Division 5**	3.16	51
Climate Division 6	65.8	119	**Climate Division 6**	3.78	69
Climate Division 7	64.8	117	**Climate Division 7**	4.26	77
Climate Division 8	61.3	122	**Climate Division 8**	4.72	74
Allegany	64.4	115	**Allegany**	4.05	73
Anne Arundel	67.6	116	**Anne Arundel**	3.61	68
Baltimore	66.1	120	**Baltimore**	3.81	71
Baltimore City	67.6	117	**Baltimore City**	4.08	78
Calvert	67.8	119	**Calvert**	3.61	60
Caroline	66.1	113	**Caroline**	2.81	45
Carroll	65.1	119	**Carroll**	3.95	74
Cecil	65.4	116	**Cecil**	2.32	26
Charles	67.8	116	**Charles**	3.86	70
Dorchester	67.7	119	**Dorchester**	3.05	58
Fredrick	65.5	118	**Fredrick**	4.41	80
Garrett	61.3	122	**Garrett**	4.72	74
Harford	66.2	121	**Harford**	2.91	45
Howard	65.7	117	**Howard**	4.10	74
Kent	66.3	116	**Kent**	3.11	51
Montgomery	66.1	118	**Montgomery**	4.27	79
Prince George's	67.2	116	**Prince George's**	3.98	75
Queen Anne's	66.4	115	**Queen Anne's**	3.25	58
Saint Mary's	68.5	122	**Saint Mary's**	3.48	64
Somerset	66.9	113	**Somerset**	3.27	73
Talbot	67.5	117	**Talbot**	3.27	62
Washington	65.2	117	**Washington**	4.46	84
Wicomico	66.2	112	**Wicomico**	2.90	48
Worcester	65.4	112	**Worcester**	3.12	65

Table A1. Monthly mean surface air temperature (left) and total precipitation (right) at Maryland (statewide), climate division, and county levels for May 2024. Temperatures are in °F, and precipitation is in inches. The rank is the order that the variable for May 2024 occupies among the 130 Mays after the 130 values have been arranged from the lowest to the highest in the *standard competition ranking method*. The closer to 130 the rank is, the larger (i.e., the warmer/wetter) the value of the surface variable is in the record; similarly, the closer to 1 the rank is, the smaller (i.e., the colder/drier) the value of the surface variable is in the record.

B.   Maximum and Minimum Temperatures

Region	Maximum Air Temperature (°F)	Rank (#)	Region	Minimum Air Temperature (°F)	Rank (#)
Statewide	75.6	93	**Statewide**	56.6	125
Climate Division 1	75.5	96	**Climate Division 1**	56.7	119
Climate Division 2	76.3	91	**Climate Division 2**	57.9	126
Climate Division 3	76.9	101	**Climate Division 3**	59.2	126
Climate Division 4	76.6	88	**Climate Division 4**	58.2	124
Climate Division 5	75.0	72	**Climate Division 5**	57.6	125
Climate Division 6	75.4	92	**Climate Division 6**	56.1	124
Climate Division 7	76.0	91	**Climate Division 7**	53.6	123
Climate Division 8	72.1	103	**Climate Division 8**	50.6	125
Allegany	76.1	95	**Allegany**	52.6	122
Anne Arundel	76.5	89	**Anne Arundel**	58.7	124
Baltimore	75.9	94	**Baltimore**	56.3	124
Baltimore City	76.7	88	**Baltimore City**	58.6	125
Calvert	76.2	94	**Calvert**	59.3	127
Caroline	75.7	75	**Caroline**	56.5	125
Carroll	75.4	99	**Carroll**	54.8	124
Cecil	74.1	80	**Cecil**	56.6	125
Charles	77.1	89	**Charles**	58.4	123
Dorchester	76.8	96	**Dorchester**	58.5	126
Fredrick	75.4	99	**Fredrick**	55.6	125
Garrett	72.1	103	**Garrett**	50.6	125
Harford	75.3	87	**Harford**	57.0	127
Howard	75.8	95	**Howard**	55.7	125
Kent	74.7	72	**Kent**	57.9	125
Montgomery	75.6	93	**Montgomery**	56.5	123
Prince George's	76.8	88	**Prince George's**	57.6	123
Queen Anne's	75.1	72	**Queen Anne's**	57.6	125
Saint Mary's	76.9	102	**Saint Mary's**	60.1	127
Somerset	76.1	98	**Somerset**	57.8	120
Talbot	76.1	92	**Talbot**	58.8	127
Washington	75.9	90	**Washington**	54.5	123
Wicomico	76.4	96	**Wicomico**	56.1	120
Worcester	74.5	95	**Worcester**	56.2	118

Table A2. Monthly maximum (left) and minimum (right) surface air temperatures at Maryland (statewide), climate division, and county levels for May 2024. Temperatures are in °F. The rank is the order that the variable for May 2024 occupies among the 130 Mays after the 130 values have been arranged from the lowest to the highest using the *standard competition ranking method*. The closer to 130 the rank is, the larger (i.e., the warmer) the value of the surface variable is in the record; similarly, the closer to 1 the rank is, the smaller (i.e., the colder) the value of the surface variable is in the record.

Appendix B. May 2024 Bar Graphs: Statewide, Climate Divisions, and Counties

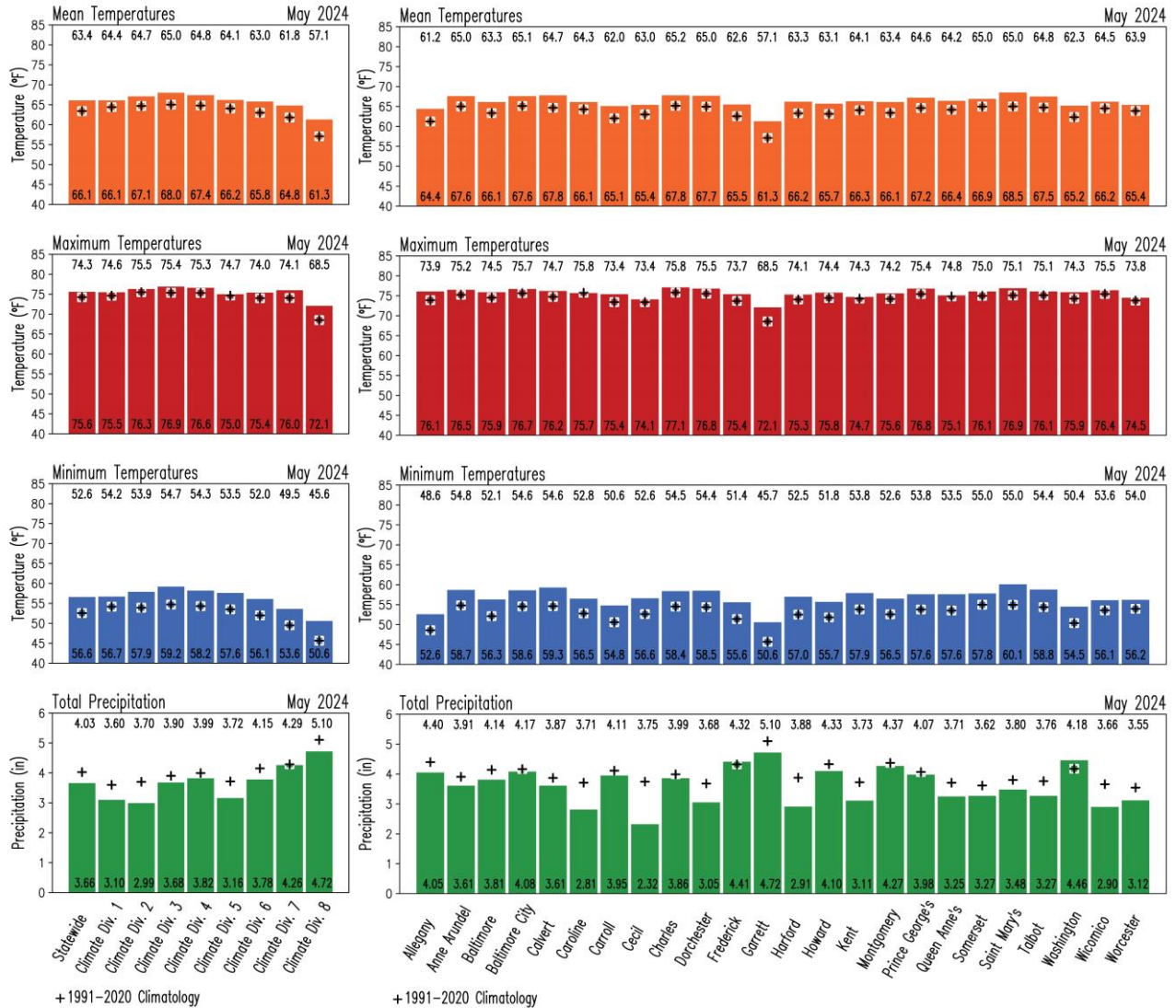A.   Temperatures and Precipitation

Figure B1. Monthly surface variables in Maryland for May 2024. Color bars represent the variables as follows: mean surface air temperature (orange), maximum surface air temperature (red), minimum surface air temperature (blue) and total precipitation (green) at statewide and climate division (left column), and at county (right column) levels. Temperatures are in °F and precipitation is in inches. The numbers at the base of the bars indicate the magnitude of the variable for May 2024. For comparison, the corresponding 1991-2020 climatological values for May are displayed as black addition signs, and their magnitudes are shown at the top of the panels.

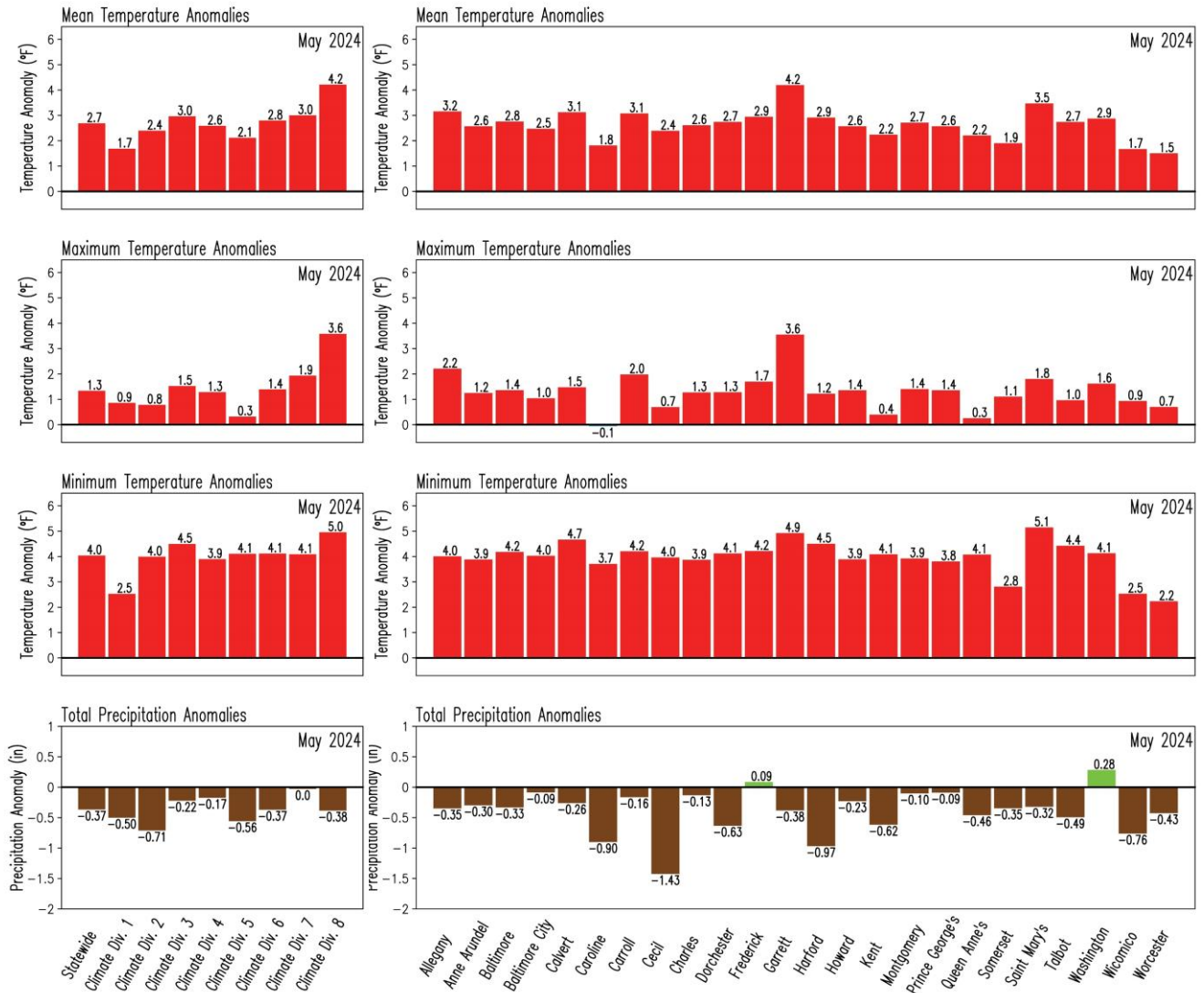### B. Temperatures and Precipitation Anomalies

Figure B2. Anomalies of the monthly surface variables in Maryland for May, 2024. Anomalies are with respect to the 1991-2020 climatology. Red color represents positive (warmer than normal) anomalies for mean surface air temperature (upper row), maximum surface air temperature (second row from top), and minimum surface air temperature (third row from top), while green/brown color indicates positive/negative (wetter/drier than normal) anomalies in total precipitation (bottom row) at statewide and climate division (left column), and at county (right column) levels. Temperatures are in °F, and precipitation is in inches. The numbers outside of the bars indicate the magnitude of the anomaly for May 2024.

Appendix C. May 1991-2020 Climatology Maps and May 2024 Precipitation as Percentage of Climatology
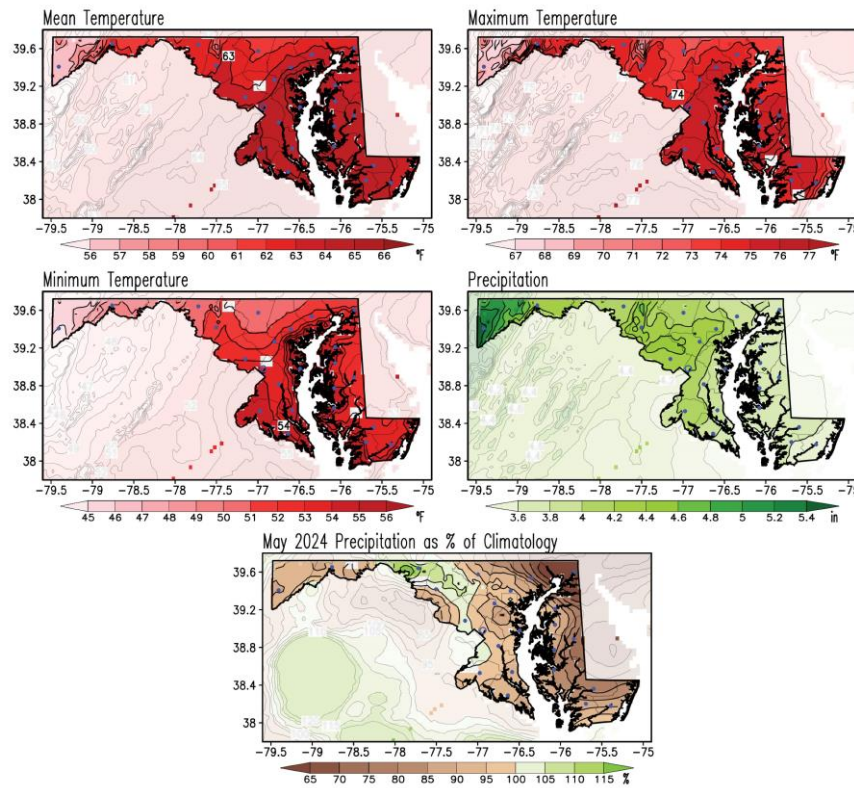

Figure C1. May climatology of the monthly mean, maximum and minimum surface air temperatures, and total precipitation for the period 1991-2020 (upper and middle rows), and precipitation in May 2024 as a percentage of climatology (bottom row). Temperatures are in °F, and precipitation is in inches according to the color bars. This is the current climate normal against which the May 2024 conditions are compared to obtain the May 2024 anomalies (from Figure 1 to 4). The precipitation as a percentage is obtained by dividing the total precipitation (from Figure 4) by the climatology (from the middle right panel) and multiplying that ratio by 100 so units are in percent of climatology (%); brown/green shading in this map shows drier/wetter than normal conditions. Note that shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

Weather and climate are closely related, but they are not the same. Weather represents the state of the atmosphere (temperature, precipitation, etc.) at any given time. On the other hand, climate refers to the time average of the weather elements when the average is over long periods. If the average period is long enough, we can start to characterize the climate of a particular region.

It is customary to follow the World Meteorological Organization (WMO) recommendation and use 30 years for the average. The 30-year averaged weather data is traditionally known as Climate Normal (Kunkel and Court 1990), which is updated every ten years (WMO 2017). Establishing a climate normal or climatology is important as it allows one to compare a specific day, month, season, or even another normal period with the current normal. Such comparisons characterize anomalous weather and climate conditions, climate variability and change, and help define extreme weather and climate events (Arguez et al. 2012).

Appendix D. May Standard Deviation and May 2024 Standardized Anomalies Maps
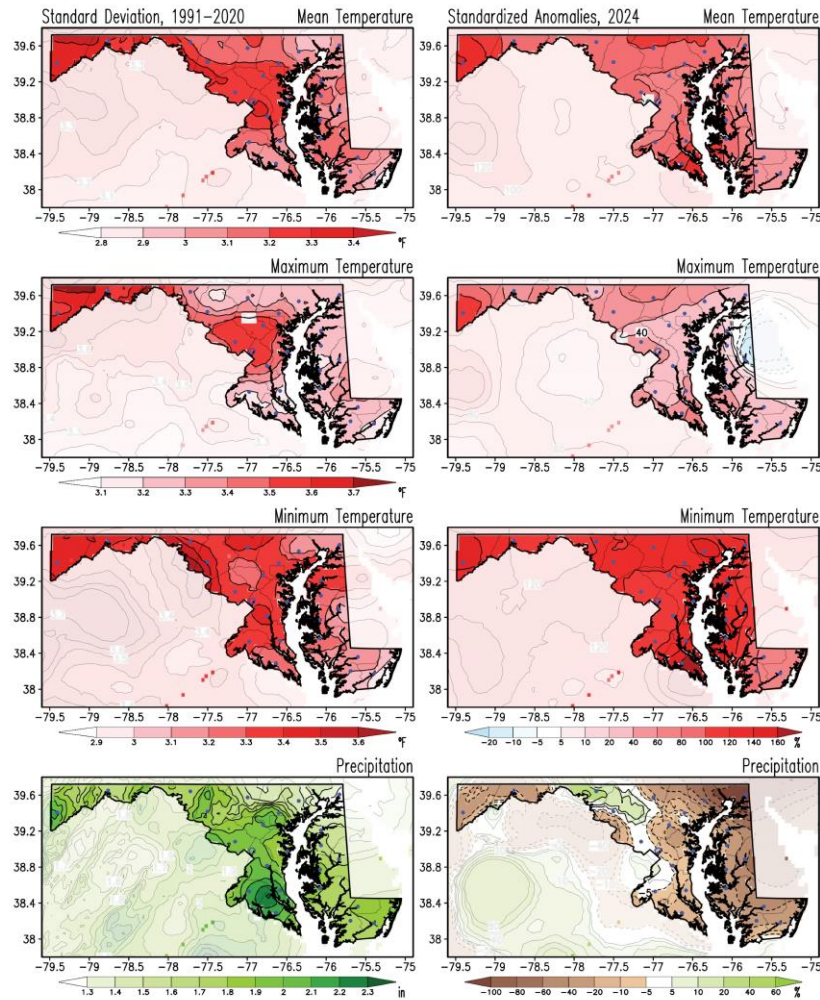

Figure D1. Standard deviation for May and standardized anomalies of temperatures and precipitation for May 2024. Standard deviations for monthly mean, maximum, and minimum surface air temperatures and total precipitation were obtained for the 1991-2020 period (left column). Anomalies for May 2024 (right column) are obtained as a percentage of the standard deviations. The standard deviations in temperatures are in °F, and those in precipitation are in inches according to the color bars. Blue/red shading in the anomaly temperature maps marks colder/warmer than normal conditions; brown/green shading in the anomaly precipitation map marks drier/wetter than normal conditions. The standardized anomalies are obtained by dividing the raw anomalies (from Figures 1 to 4) by the standard deviation (from left column panels) and multiplying that ratio by 100; hence, units are in percent (%). Note that shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

The monthly standard deviation measures a climate variable's year-to-year, or interannual, variability. Anomalies are sometimes compared against that variability to identify extremes in the climate record. When the anomalies are divided by the standard deviation, they are named *standardized anomalies*.

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