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Maryland Climate Bulletin
April 2024

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DEPARTMENT OF ATMOSPHERIC & OCEANIC SCIENCE
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Maryland State Climatologist Office

Summary

Statewide averages show that April 2024 was warmer and drier than normal (i.e., 1991-2020 averages). Monthly mean temperatures were between 49 and 59°F; maximum temperatures were in the 60−71°F range, and minimum temperatures were between 39 and 49°F. Monthly total precipitation was in the 1.5−7 inches range.

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

- The mean temperature was warmer than normal everywhere, especially over Garrett County (around 4.2°F) and portions of Montgomery and Frederick counties (3.3−3.6°F).

- The maximum temperature was warmer than normal almost everywhere in the state, particularly in Garrett County (around 3.6°F) and parts of Montgomery, Prince George's, Anne Arundel, Saint Mary's, Calvert, Dorchester, Wicomico, Somerset, and Worcester, counties (2.1−2.4°F). Slightly colder than normal temperatures appeared over portions of Harford, Cecil, and Kent counties (-0.1°F).

- The minimum temperature was also warmer than normal throughout the state, especially over portions of Frederick and Montgomery counties (above 4.5°F), Garrett County (around 4.5°F), and Washington, Carroll, Howard, Baltimore, Anne Arundel, and Prince George's counties (3.3−3.9°F).

- Precipitation was above normal over the state's northern counties, particularly Garrett County (2.5 inches) and parts of Harford, Cecil, and Kent counties (around 1.5 inches). Below-normal precipitation was found over the rest of the state, especially over parts of Caroline, Dorchester, Wicomico, Somerset, and Worcester counties (2 inches deficit) that received around forty percent of their climatological precipitation.

- For the fourth month in a row, drought conditions were absent, and above-normal streamflow was present throughout the state at the end of April 2024.

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

- All eight climate divisions were warmer than normal, especially the western Climate Division 8 (3.8°F). The southern coastal Climate Divisions 1 to 4 were drier than normal, particularly Climate Division 1 (2.16 inches deficit); the rest were wetter than normal this month, especially Climate Division 8 (2.17 inches).

- The statewide temperature was warmer than normal for a fifth consecutive month since December 2023. However, the statewide precipitation anomalies returned below normal in April after a wetter-than-normal March and a drier-than-normal February.

Historical Context (Figure 9, Tables A1 and A2)

- Mean, maximum, and minimum statewide temperatures in April (56.6, 67.2, and 46.0°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 59.5 and 48.8°F established in 2017; the warmest maximum temperature on record is 70.4°F, which was set in 2023. April's statewide precipitation (3.23 in) was just below the long-term average, far from the driest April on record of 0.67 inches in 1985.

- Mean temperatures indicate that April 2024 was the fourth warmest April in Garrett County, the seventh warmest in Howard and Montgomery counties, the eighth warmest in Frederick, and the ninth warmest in Anne Arundel and Prince George's counties. It was also the fifth driest April in Wicomico County, the seventh driest in Somerset and Worcester counties, and the eighth in Dorchester County.

- Minimum temperatures show that April 2024 was the fourth warmest April statewide and ranked in the upper ten warmest among the different counties and Baltimore City. Among them, April was the second warmest in Frederick, Montgomery, and Washington counties; the third warmest in Allegany, Garrett, Howard, and Prince George's counties; the fourth warmest in Carroll County; and the fifth warmest in Anne Arundel County.

Century-Plus Trends, 1895-2024 (Figures 11, 12)

- Statewide mean temperature and heating degree days in April showed significant trends: a warming trend (2.9°F/century) and a decreasing trend (–86.3°FDD/century). Statewide precipitation had a small, non-significant wetting trend (0.08 in/century).

- Regionally, April mean temperatures showed significant warming trends everywhere, especially in the Piedmont over Baltimore City (4.0°F/century), Howard County, and parts of Baltimore, Carroll, Frederik, Montgomery, Prince George's, and Anne Arundel counties (3-3.8°F/century), and over Caroline, Talbot, Dorchester, Somerset, Wicomico and Worcester counties (3-3.2°F).

- Regionally, April precipitation had significant wetting trends only in the western counties of Allegany and Garrett (0.6−0.7 in/century). Non-significant wetting trends are found in the northern counties of the Piedmont (0.1−0.3 in/century); non-significant drying trends are found over Charles, Saint Mary's Calvert, Prince George's, Anne Arundel, Kent, and Queen Anne's and Talbot counties of (0.1−0.3 in/century).

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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 April 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, 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 5/10/2024.

- NOAA Monthly U.S. Climate *Divisional* Dataset (NClimDiv – Vose et al. 2014). It is available in a preliminary status (v1.0.0-20240506) at:

https://www.ncei.noaa.gov/pub/data/cirs/climdiv/
Data was downloaded on 5/10/2024.

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., April 2024) are the departures of the monthly value from the corresponding month's 30-year average (i.e., from the average of 30 Aprils) 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 degree-days. Degree-days are the difference between the daily mean temperature (high temperature plus low temperature divided by two) and 65°F. It gives a general idea of how much energy is required to warm 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. April 2024 Maps

A. Mean Temperatures

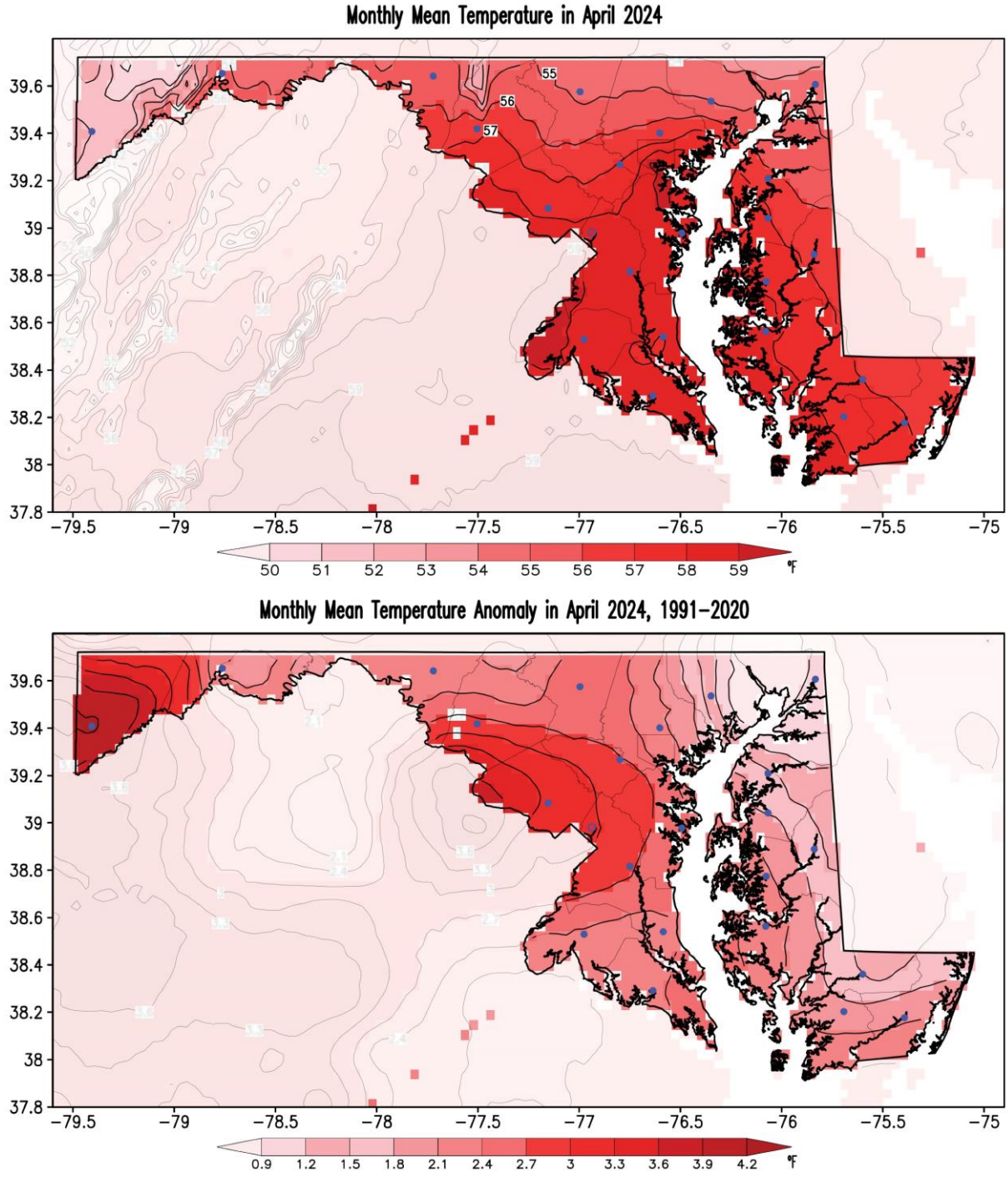

Figure 1. Monthly mean surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for April 2024. Temperatures are in °F following the color bar. Red shading in the anomaly map marks warmer than normal conditions. Note shading outside the state has been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

B. Maximum Temperatures

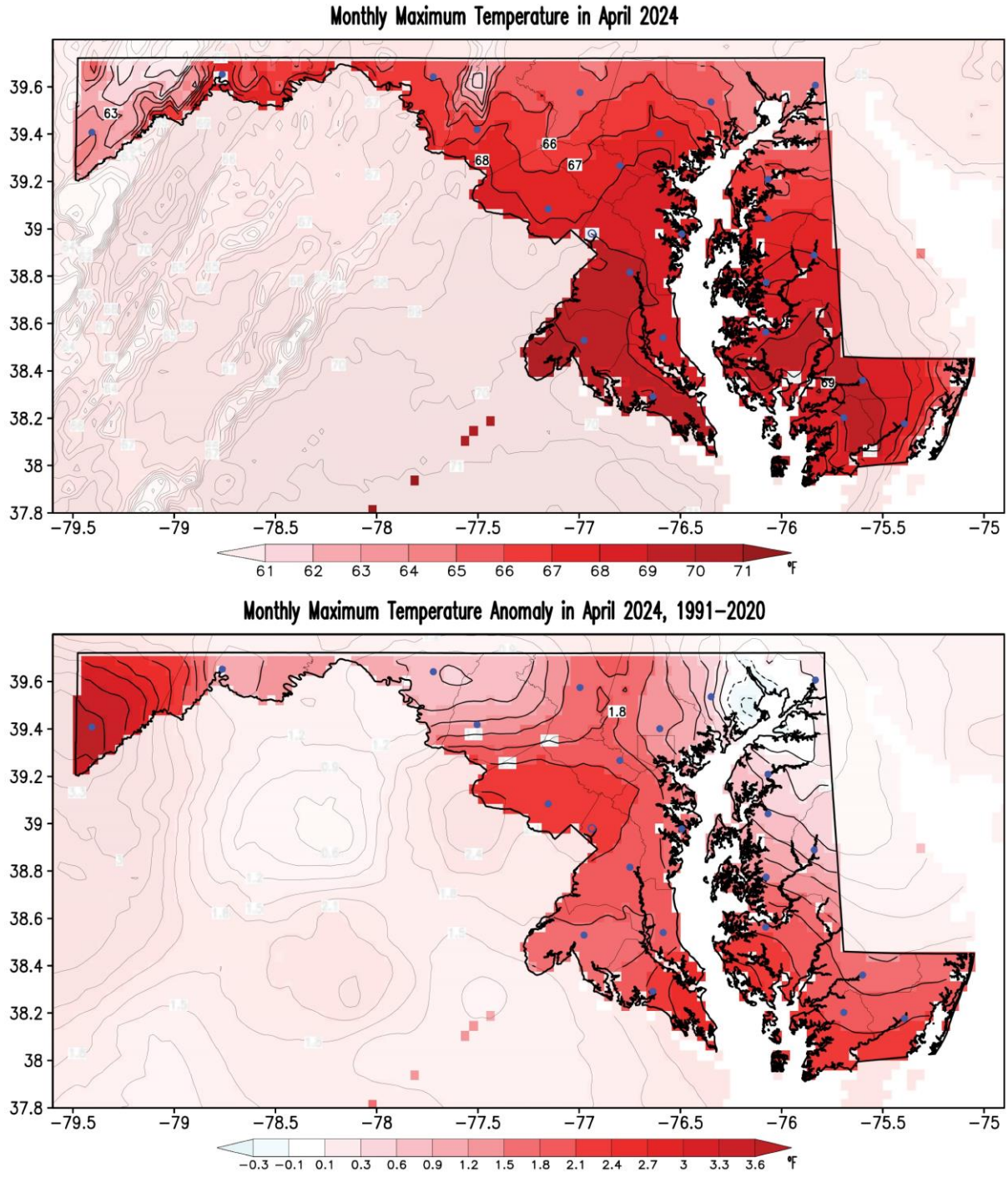

Figure 2. Monthly maximum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for April 2024. Temperatures are in °F following the color bar. Blue/red shading in the anomaly map marks colder/warmer than normal conditions. Note shading outside the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

C. Minimum Temperatures

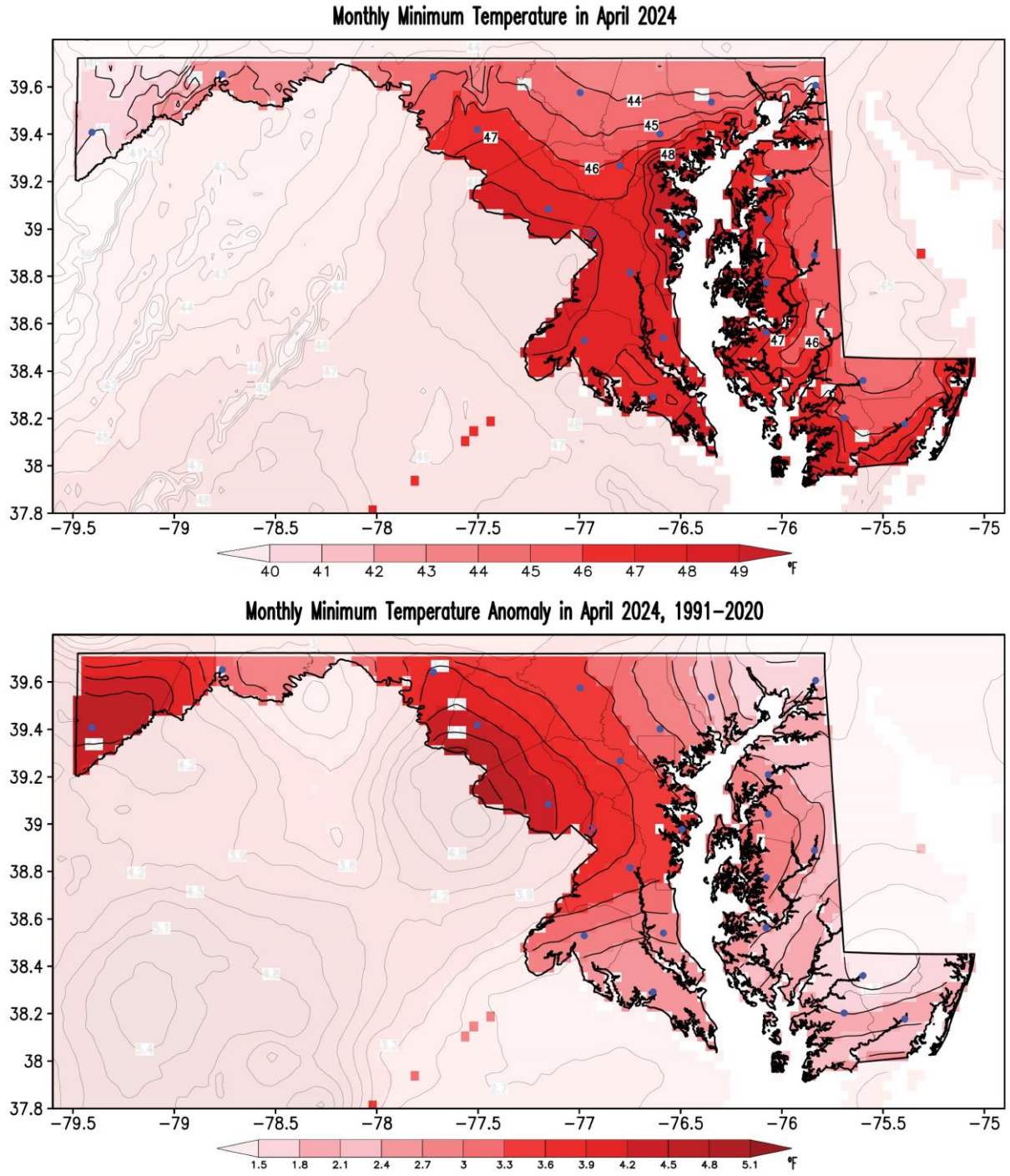

Figure 3. Monthly minimum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for April 2024. Temperatures are in °F following the color bar. Red shading in the anomaly map marks warmer than normal conditions. Note shading outside the state has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

D. Precipitation

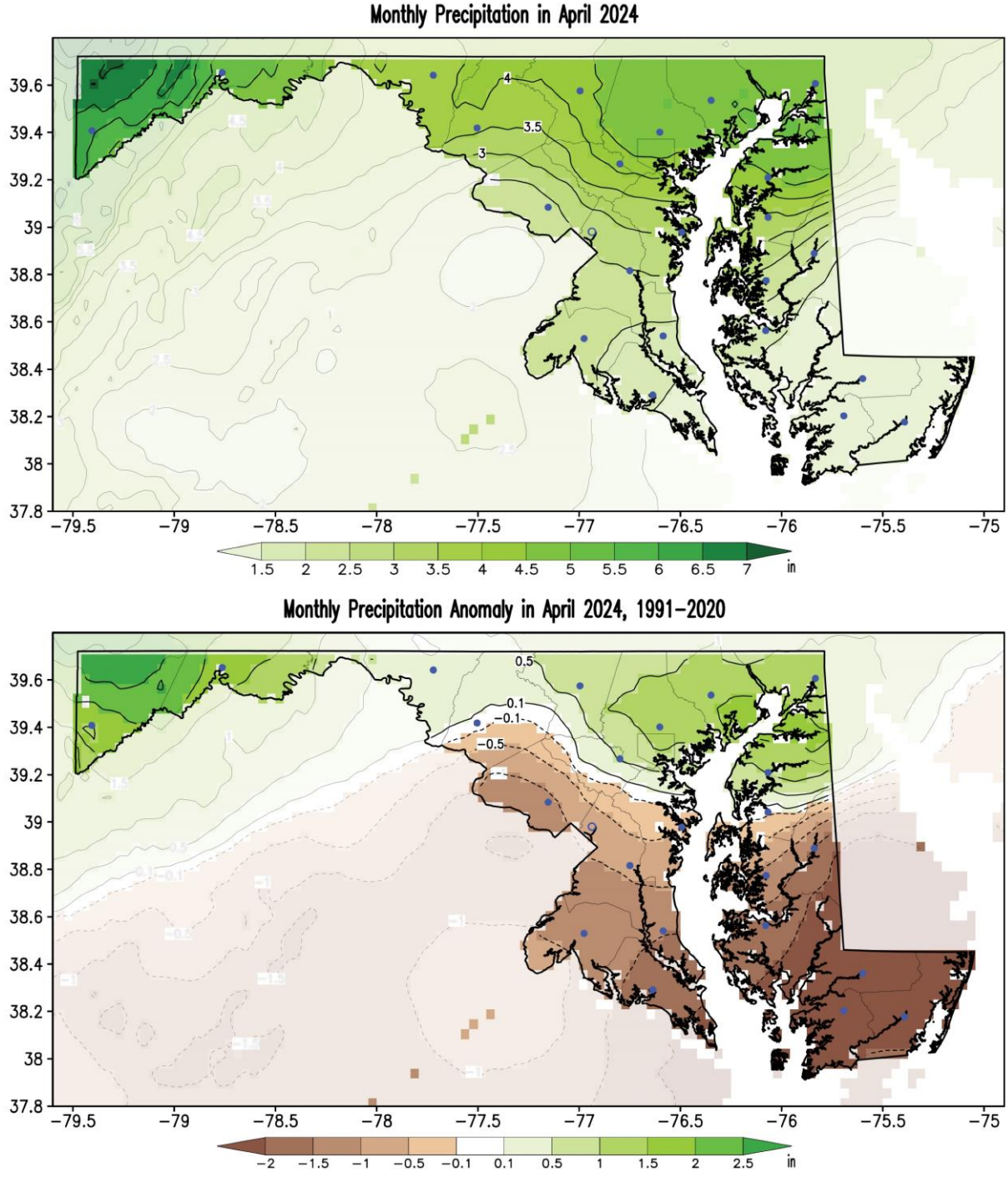

Figure 4. Monthly total precipitation (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for April 2024. Precipitation is in inches following the color bar. Brown/green shading in the anomaly map marks drier/wetter than normal conditions. Note shading outside the state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

E. Drought

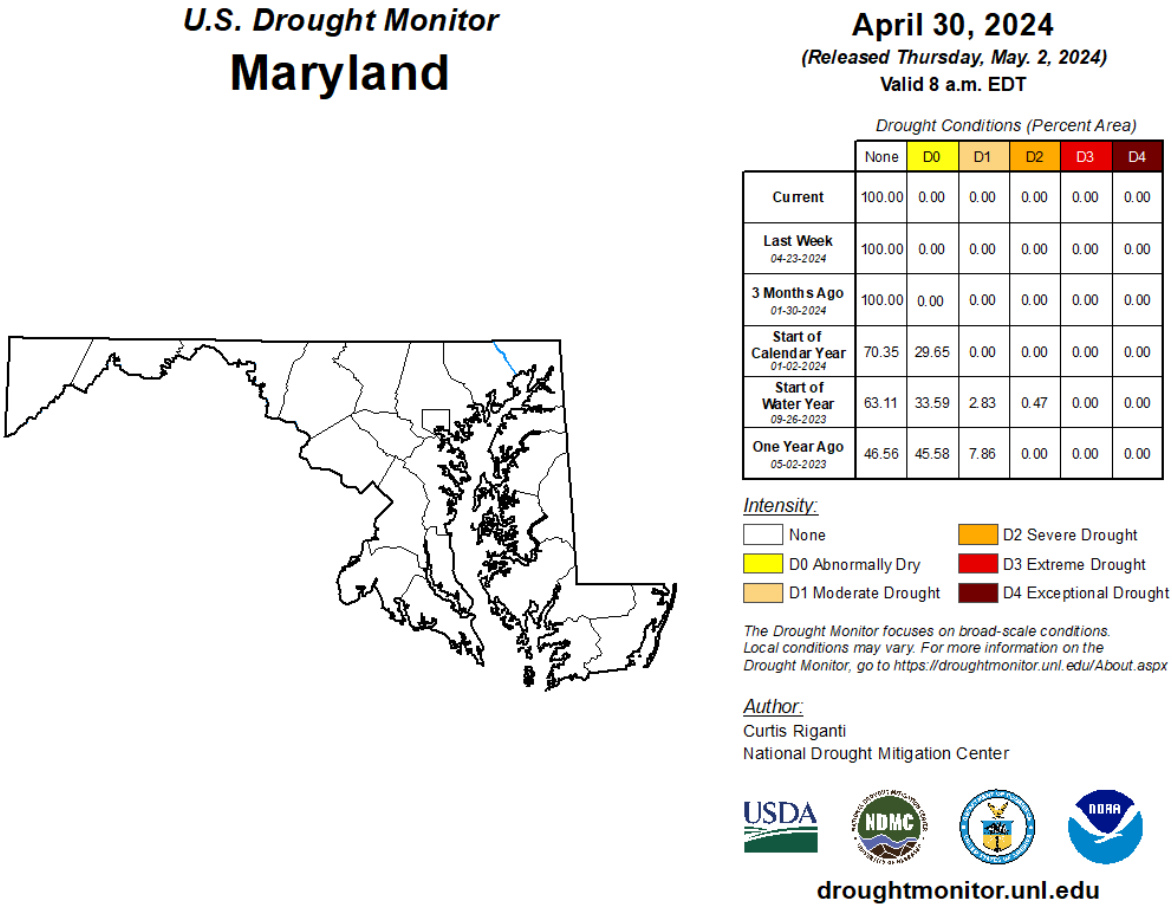

Figure 5. Drought conditions as reported by the U.S. Drought Monitor on April 30, 2024. At this time, the state is still drought-free for the fourth month in a row.

F. Streamflow

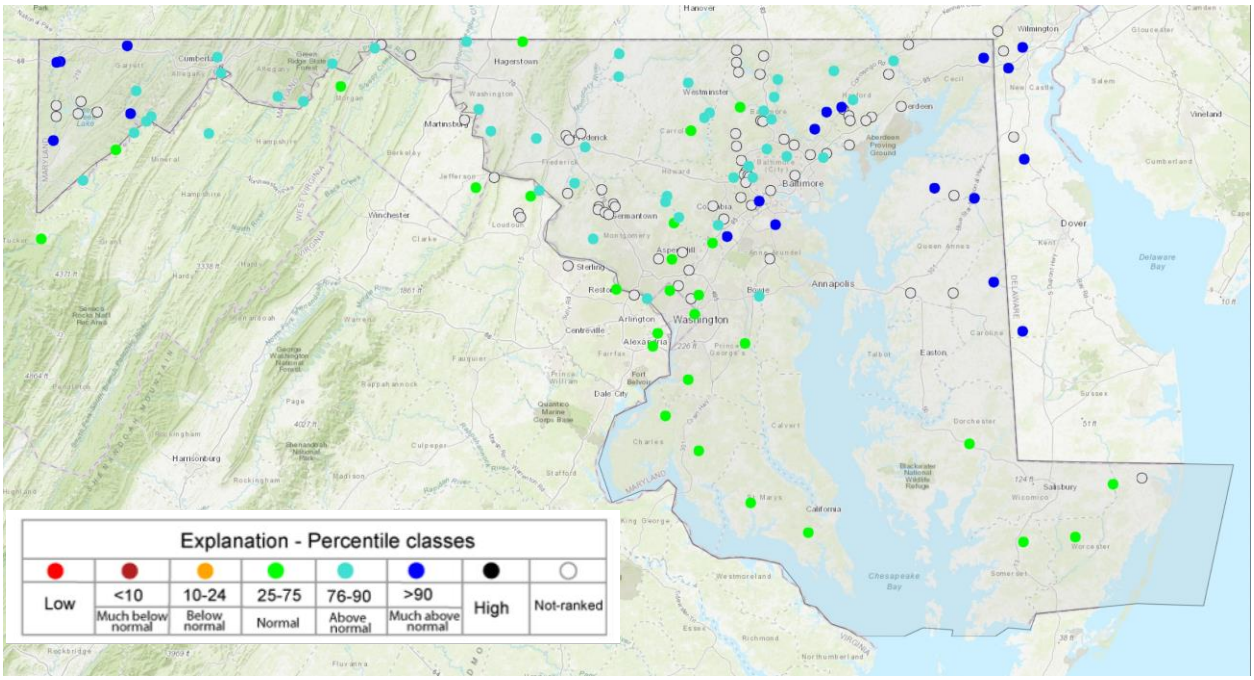

Figure 6. Monthly averaged streamflow class anomalies as reported by the U.S. Geological Survey (USGS) Water Watch for April 2024. Orange to red-filled circles denote below-normal streamflow conditions, cyan to black-filled circles denote above-normal streamflow conditions, and green-filled circles represent normal streamflow conditions. Normal to above normal conditions are present throughout the state.

4. April and FMA 2024 Climate Divisions Averages

A. April 2024 Scatter Plots

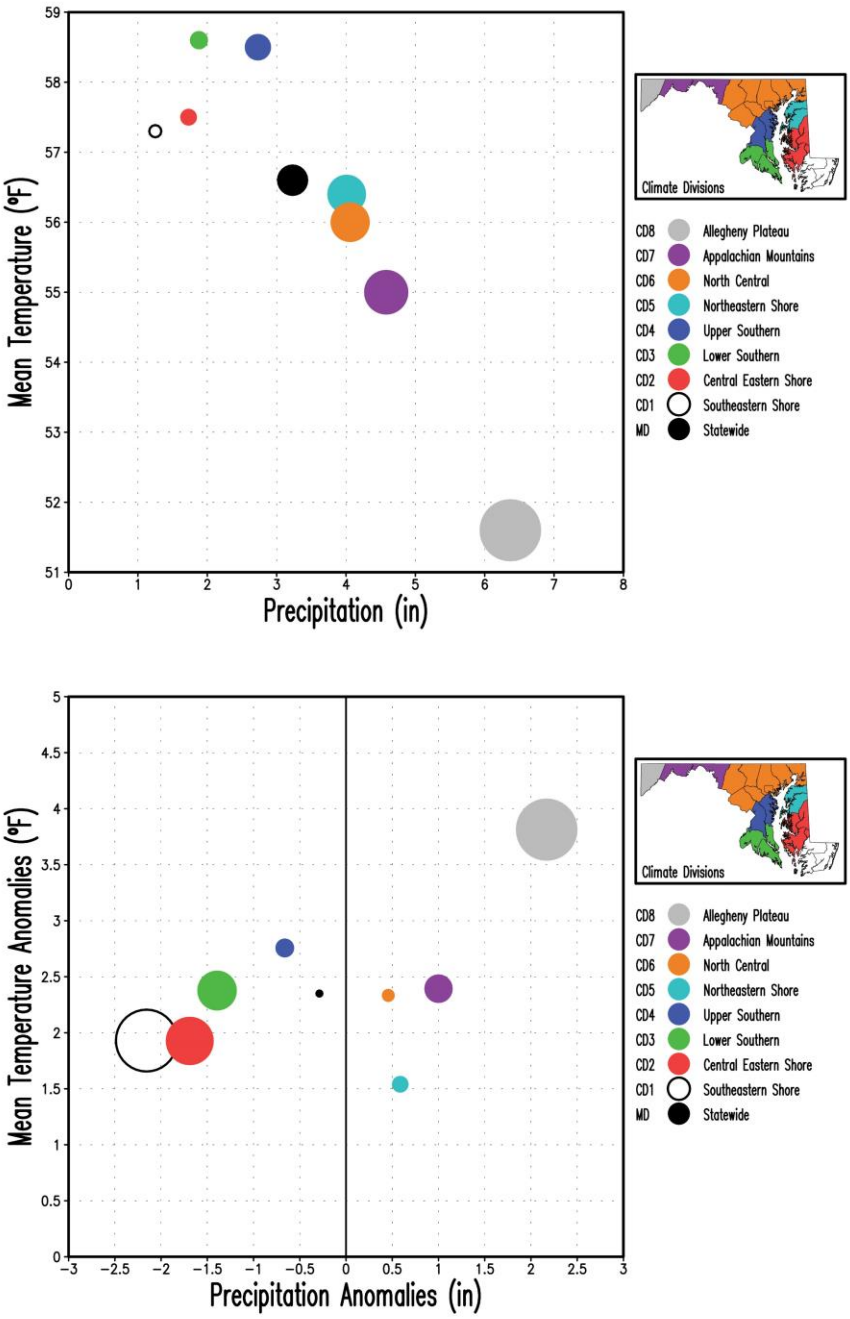

Figure 7. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for April 2024. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect to the 1991-2020 climatology. 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 (6.37 inches in CD8, top panel) and by the maximum precipitation anomaly (2.17 inches in CD8, 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. February – April 2024 Scatter Plots

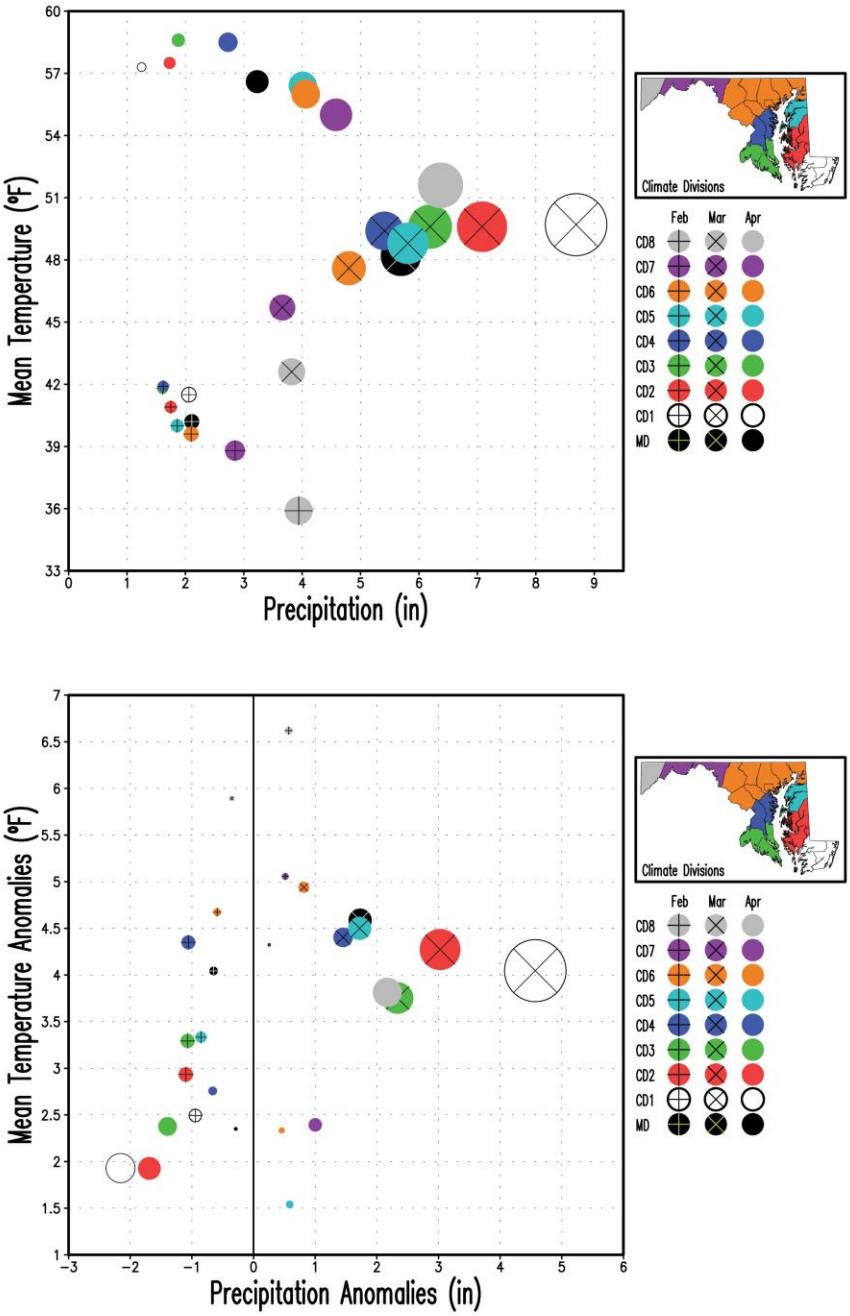

Figure 8. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for February, March and April 2024. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect to 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 (8.69 inches in CD1 in March, top panel) and by the maximum precipitation anomaly (4.57 inches in CD1 in March, bottom panel) among the nine regions and three months. April is displayed with filled circles only, while March and February are displayed with superposed multiplication and addition signs, respectively.

5. April 2024 Statewide Averages in the Historical Record

A. Box and Whisker Plots

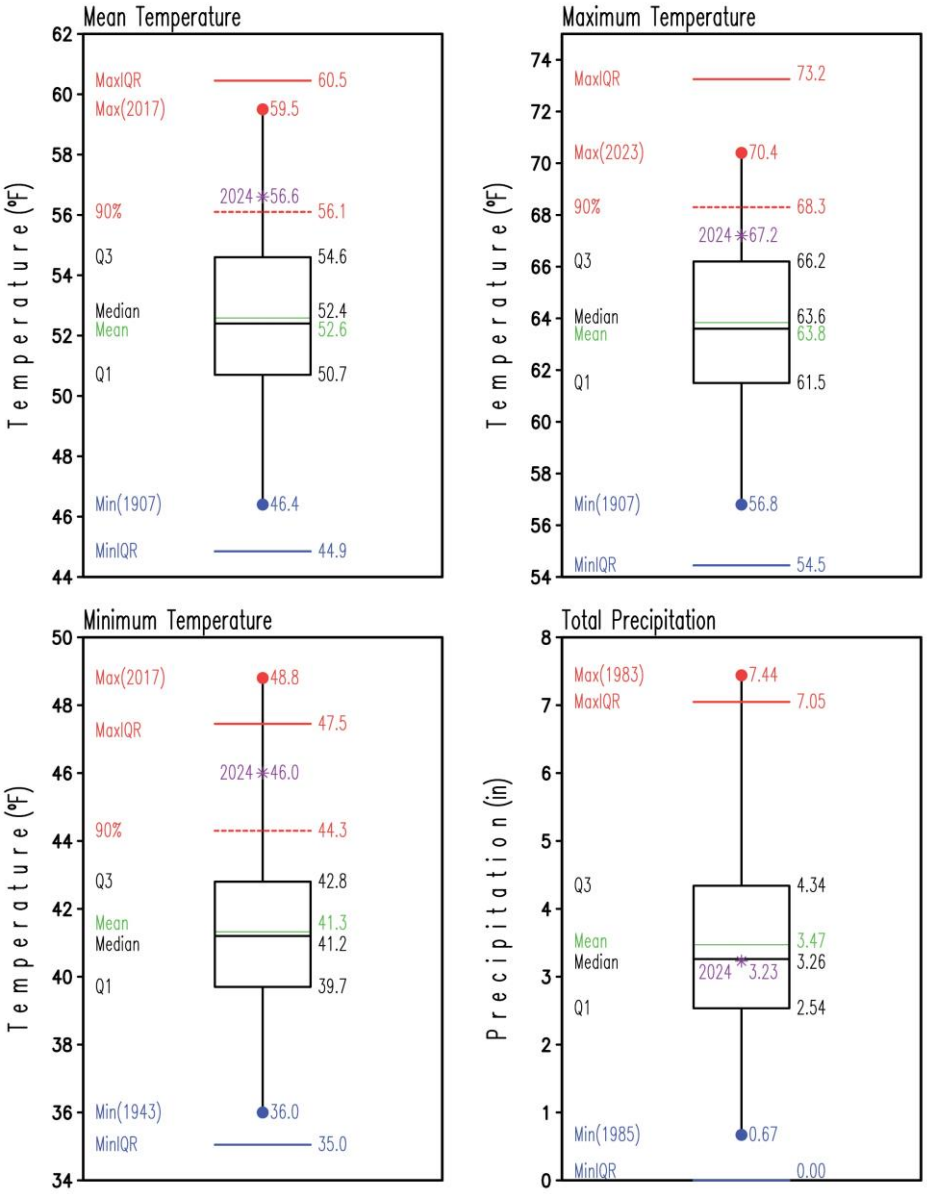

Figure 9. Box and Whisker plots of Maryland (statewide) monthly mean (upper left), maximum (upper right), minimum (lower left) surface air temperatures, and total precipitation (lower right) for April for the period 1895-2023. The label and asterisk in purple represent conditions for April 2024. Statistics 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 April Trends

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

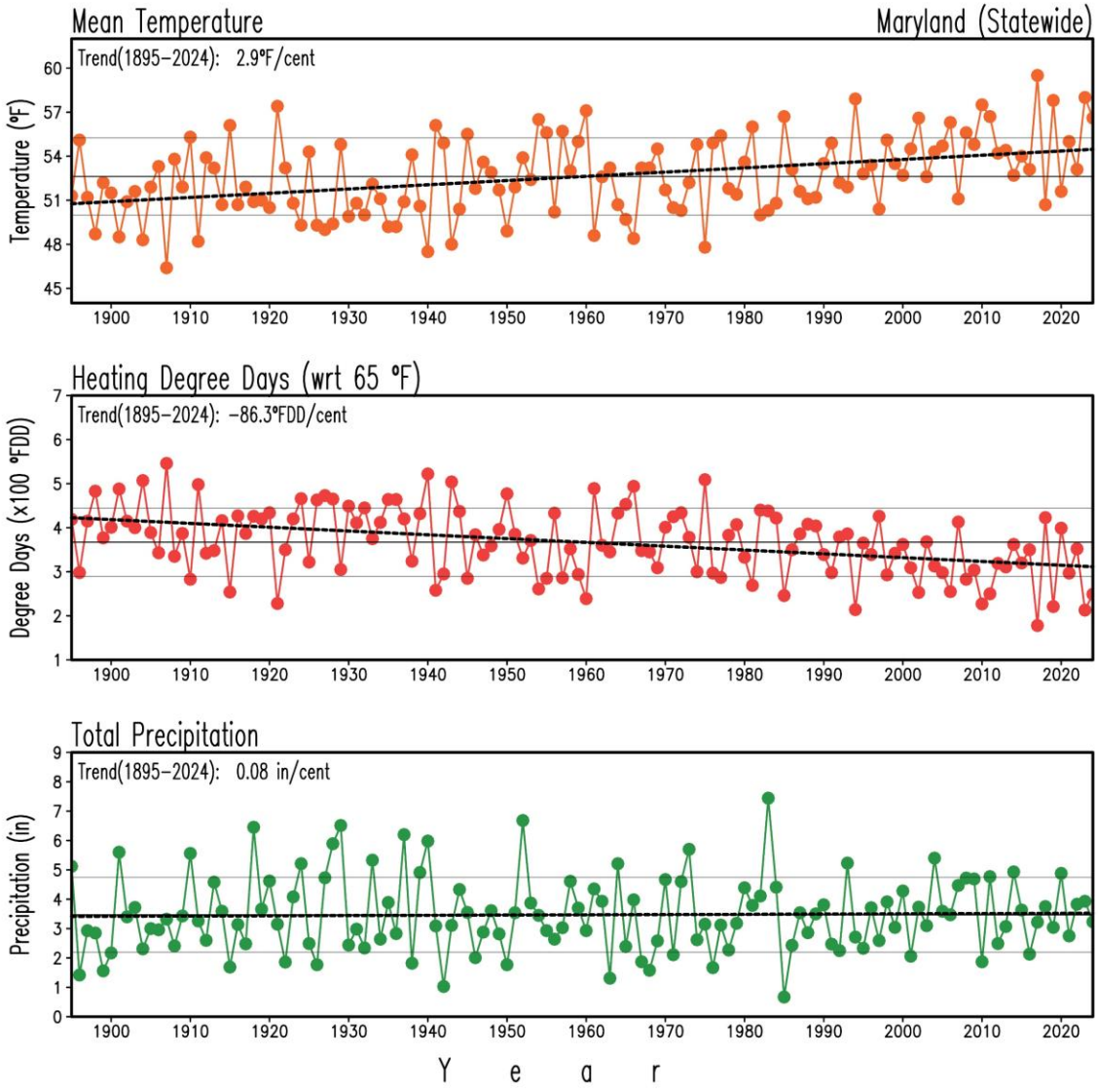

Figure 11. Maryland (statewide) mean surface air temperature, heating degree-days, and precipitation in April for the period 1895-2024. Temperature is in °F, heating degree-days is in °F degree-days (°FDD), and precipitation is in inches. The thin, continuous black lines in each panel display the long-term means 52.6°F, 367.1°FDD, and 3.47 in, 1895-2024), and the double thin, continuous gray lines indicate the standard deviation (2.6°F, 77.2°FDD, and 1.28 in) above/below the long-term mean. The thick dashed black lines show the long-term linear trend. The warming temperature trend (2.9°F/century), and the decreasing heating degree-days trend (−86.3°FDD/century) are statistically significant at the 95% level (*Student's t-test* −Santer et al. 2000) but not the small precipitation wetting trend (0.08 in/century).

B. Temperature and Precipitation Maps

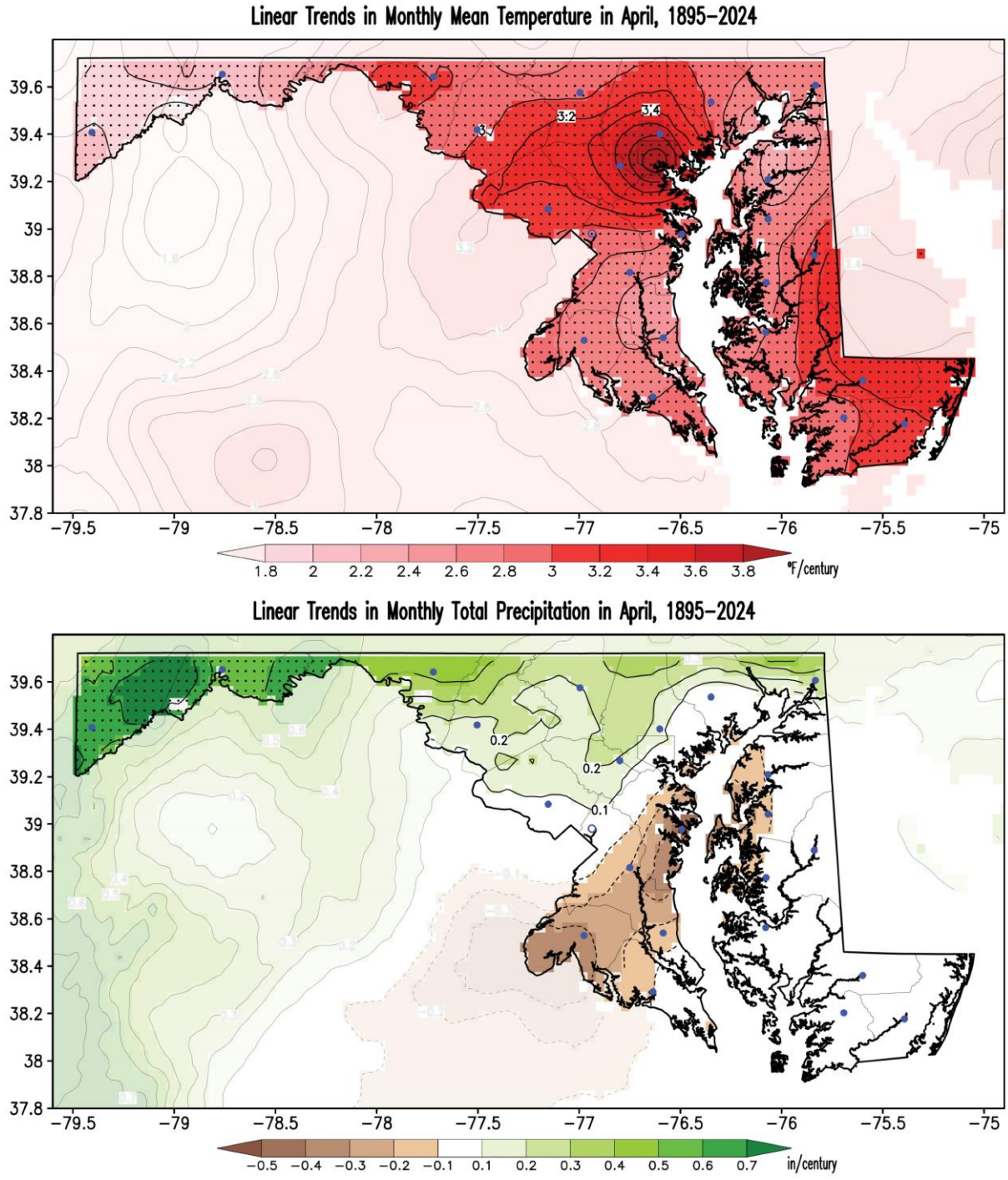

Figure 12. Linear trends in surface air mean temperature and precipitation in April for the period 1895-2024. Temperatures are in °F/century, and precipitation is in inches/century following the color bars. Red shading in the temperature map marks warming trends. Brown/green shading in the precipitation map shows drying/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. April 2024 Data Tables: Statewide, Climate Divisions, and Counties

A. Mean Temperature and Precipitation

Region	Mean Air Temperature (°F)	Rank (#)
Statewide	56.6	120
Climate Division 1	57.3	119
Climate Division 2	57.5	119
Climate Division 3	58.6	120
Climate Division 4	58.5	123
Climate Division 5	56.4	114
Climate Division 6	56.0	119
Climate Division 7	55.0	119
Climate Division 8	51.6	128
Allegany	54.5	118
Anne Arundel	58.5	122
Baltimore	56.0	118
Baltimore City	58.0	119
Calvert	58.2	121
Caroline	56.8	117
Carroll	55.1	120
Cecil	54.5	103
Charles	58.8	120
Dorchester	57.9	119
Fredrick	56.0	123
Garrett	51.6	127
Harford	54.9	106
Howard	56.8	124
Kent	56.2	113
Montgomery	57.7	124
Prince George's	58.4	122
Queen Anne's	56.7	115
Saint Mary's	58.4	119
Somerset	58.0	119
Talbot	57.9	119
Washington	55.5	119
Wicomico	57.1	118
Worcester	56.8	120

Region	Total Precipitation (in)	Rank (#)
Statewide	3.23	65
Climate Division 1	1.25	6
Climate Division 2	1.73	13
Climate Division 3	1.88	18
Climate Division 4	2.73	46
Climate Division 5	4.01	91
Climate Division 6	4.06	92
Climate Division 7	4.58	106
Climate Division 8	6.37	123
Allegany	5.30	112
Anne Arundel	3.11	62
Baltimore	4.71	101
Baltimore City	4.54	98
Calvert	1.85	19
Caroline	2.05	20
Carroll	4.17	92
Cecil	4.91	105
Charles	2.13	26
Dorchester	1.44	8
Fredrick	3.65	78
Garrett	6.37	123
Harford	4.84	104
Howard	3.70	79
Kent	4.50	100
Montgomery	2.58	39
Prince George's	2.48	37
Queen Anne's	3.69	80
Saint Mary's	1.55	12
Somerset	1.31	7
Talbot	2.28	26
Washington	3.90	93
Wicomico	1.23	5
Worcester	1.23	7

Table A1. Monthly mean surface air temperature (left) and total precipitation (right) at Maryland (statewide), climate division, and county levels for April 2024. Temperatures are in °F, and precipitation is in inches. The rank is the order that the variable for April 2024 occupies among the 130 Aprils 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 (#)
Statewide	67.2	111
Climate Division 1	68.0	113
Climate Division 2	68.5	112
Climate Division 3	69.4	114
Climate Division 4	68.7	113
Climate Division 5	66.4	94
Climate Division 6	66.3	107
Climate Division 7	66.2	100
Climate Division 8	62.8	114
Allegany	66.2	101
Anne Arundel	68.4	111
Baltimore	66.8	109
Baltimore City	68.1	111
Calvert	68.6	112
Caroline	67.9	102
Carroll	65.7	109
Cecil	64.4	90
Charles	69.8	112
Dorchester	69.0	116
Fredrick	66.0	109
Garrett	62.8	114
Harford	65.3	89
Howard	67.4	114
Kent	65.9	93
Montgomery	67.8	113
Prince George's	69.1	113
Queen Anne's	66.8	95
Saint Mary's	69.2	114
Somerset	68.6	114
Talbot	68.0	108
Washington	66.2	101
Wicomico	68.7	113
Worcester	67.1	115

Region	Minimum Air Temperature (°F)	Rank (#)
Statewide	46.0	127
Climate Division 1	46.5	122
Climate Division 2	46.6	123
Climate Division 3	47.8	125
Climate Division 4	48.2	128
Climate Division 5	46.4	125
Climate Division 6	45.6	127
Climate Division 7	43.7	129
Climate Division 8	40.3	128
Allegany	42.7	128
Anne Arundel	48.6	126
Baltimore	45.3	125
Baltimore City	47.9	125
Calvert	47.7	125
Caroline	45.6	123
Carroll	44.4	127
Cecil	44.6	121
Charles	47.8	125
Dorchester	46.8	123
Fredrick	46.0	129
Garrett	40.3	128
Harford	44.6	124
Howard	46.2	128
Kent	46.5	125
Montgomery	47.6	129
Prince George's	47.8	128
Queen Anne's	46.6	125
Saint Mary's	47.7	124
Somerset	47.5	122
Talbot	47.7	125
Washington	44.7	129
Wicomico	45.5	121
Worcester	46.5	121

Table A2. Monthly maximum (left) and minimum (right) surface air temperatures at Maryland (statewide), climate division, and county levels for April 2024. Temperatures are in °F. The rank is the order that the variable for April 2024 occupies among the 130 Aprils 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. April 2024 Bar Graphs: Statewide, Climate Divisions, and Counties

A. Temperatures and Precipitation

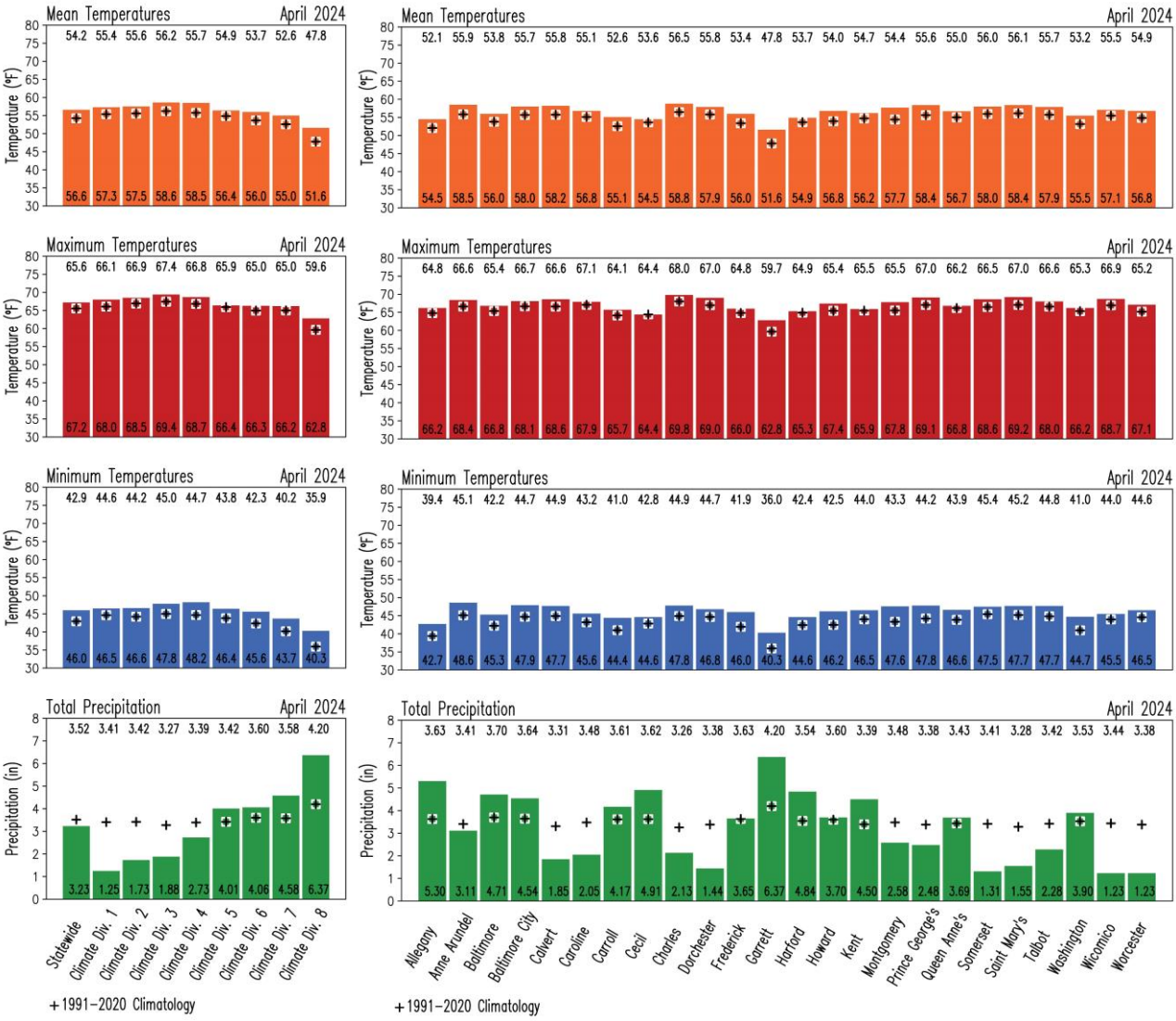

Figure B1. Monthly surface variables in Maryland for April 2024. Color bars represent the variables as follows: mean surface air temperature (orange), maximum surface air temperature (red), minimum surface air temperature (blue) and total precipitation (green) at statewide and climate division (left 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 April 2024. For comparison, the corresponding 1991-2020 climatological values for April are displayed as black addition signs, and their magnitudes are shown at the top of the panels.

B. Temperatures and Precipitation Anomalies

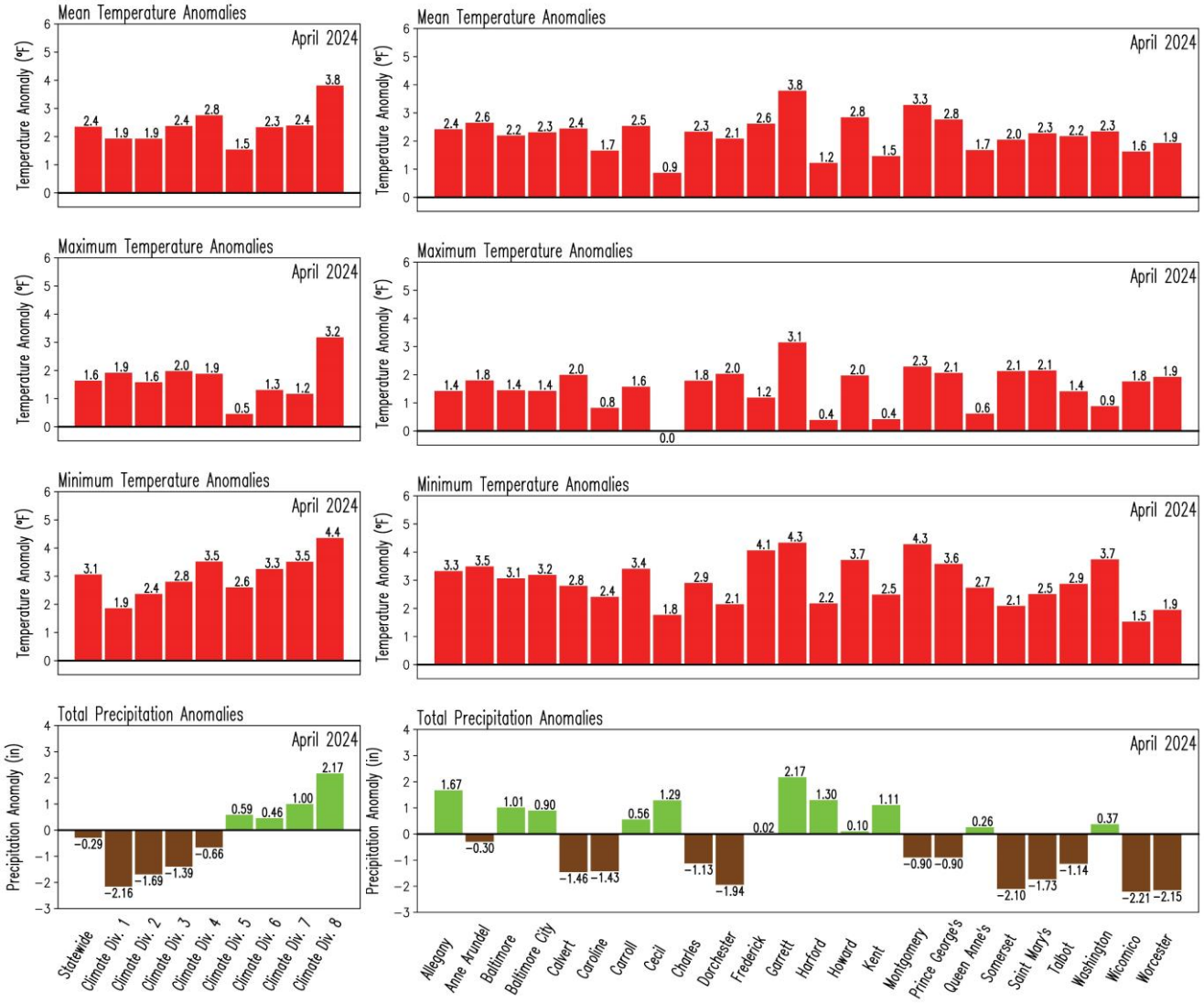

Figure B2. Anomalies of the monthly surface variables in Maryland for April, 2024. Anomalies are with respect to the 1991-2020 climatology. Red color represents positive (warmer than normal) anomalies for mean surface air temperature (upper row), maximum surface air temperature (second row from top), 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 April 2024.

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

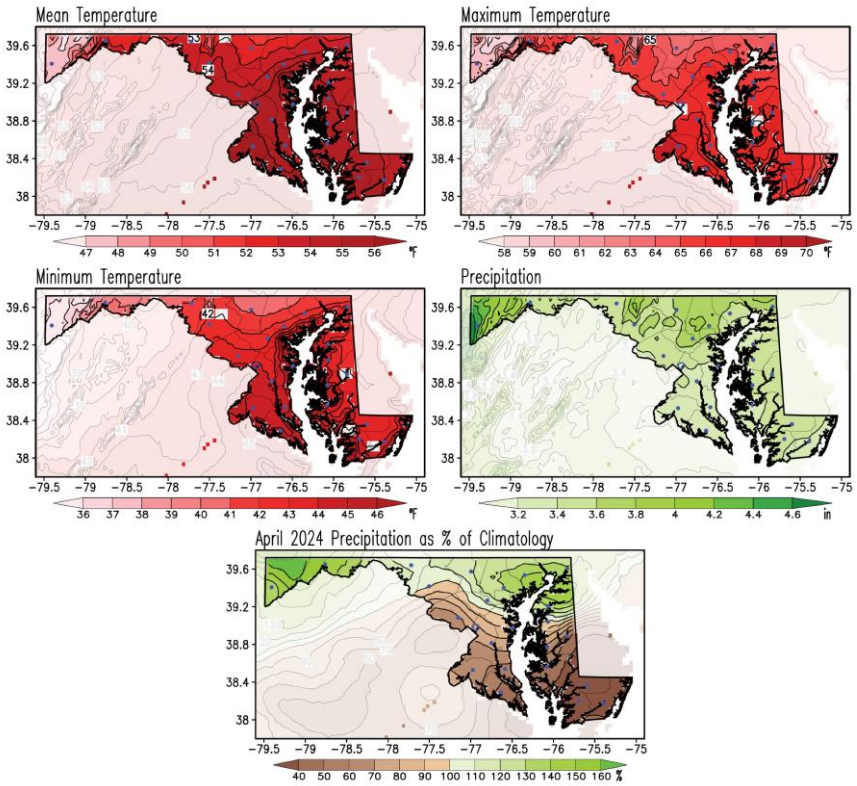

Figure C1. April climatology of the monthly mean, maximum and minimum surface air temperatures, and total precipitation for the period 1991-2020 (upper and middle rows), and precipitation in April 2024 as a percentage of climatology (bottom row). Temperatures are in °F, and precipitation is in inches according to the color bars. This is the current climate normal against which the April 2024 conditions are compared to obtain the April 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. April Standard Deviation and April 2024 Standardized Anomalies Maps

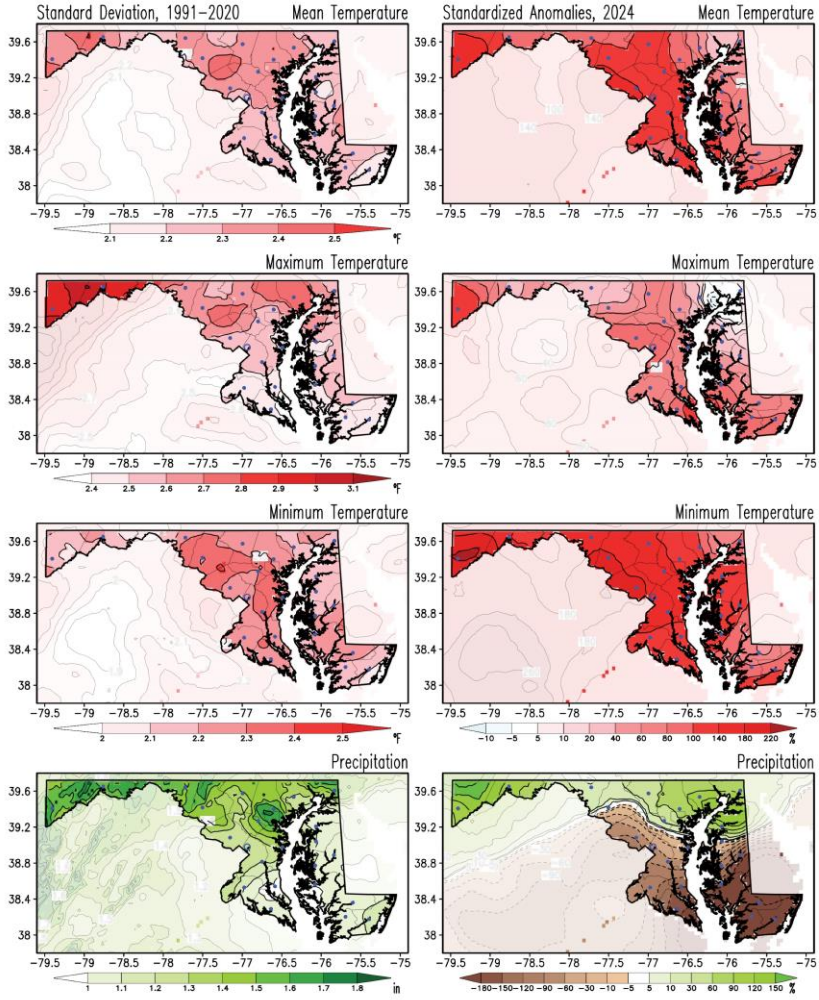

Figure D1. Standard deviation for April and standardized anomalies of temperatures and precipitation for April 2024. Standard deviations for monthly mean, maximum, and minimum surface air temperatures and total precipitation were obtained for the 1991-2020 period (left column). Anomalies for April 2024 (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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