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Maryland Climate Bulletin
June 2024

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DEPARTMENT OF ATMOSPHERIC & OCEANIC SCIENCE
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Summary

Statewide averages show that June 2024 was warmer and drier than normal (i.e., 1991-2020 averages). Monthly mean temperatures were between 65 and 78°F; maximum temperatures were in the 77−89°F range, and minimum temperatures were between 54 and 68°F. Monthly total precipitation was in the 0.4−5.6 inches range.

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

- The mean temperature was warmer than normal everywhere in the state, particularly over the shared boundary region of Baltimore, Howard, and Anne Arundel counties (3.6°F), the southern parts of Calvert and Saint Mary's (around 3.0°F), and the rest of the counties of the coastal plains (around 2.7°F).

- The maximum temperature was also warmer than normal throughout the state, especially over parts of Allegany and Washington counties and the southern parts of Calvert and Saint Mary's counties (4.8−5.1°F), and the shared boundary region of Baltimore, Howard, and Anne Arundel counties (4.8°F).

- The minimum temperature was warmer than normal over most of the state, particularly in the shared boundary region of Baltimore City, Baltimore, Howard, and Anne Arundel counties (2.7°F), and Frederick and Washington counties (2.1−2.4°F). Slightly colder than normal temperatures appeared over Garrett and Allegany counties (−0.3 to −0.6°F).

- Precipitation was below normal over much of the state, especially in western Prince George's and Montgomery counties (3.0 in deficit), Allegany and Washington counties (2.7 in deficit), and counties in the central and southern coastal plains, Piedmont and west (above 2.1 in deficit). These regions had 30 to 60% of their monthly climatological precipitation. Above-normal precipitation occurred over Kent County and parts of Cecil, Harford, and Queen Anne's counties (1.2−1.5 in or around 10 to 30% more than their climatological precipitation) and parts of Worcester, Carroll, and Baltimore counties.

- Drought conditions expanded and intensified this month. The extent of the surface in the state under drought conditions increased from around 16% at the end of May to 94% at the end of June. Severe drought affects large areas of Allegany, Washington, Garret counties, and western Montgomery County. Moderate drought impacts the central and southern coastal plains and western Piedmont. Abnormally dry conditions affect the central Piedmont and parts of the central and eastern shore. Most of the creeks and rivers in the moderate-to-severe drought areas had below-to-much-below-normal streamflow.

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

- All eight climate divisions were warmer and drier than normal again. While the Lower Southern, Climate Division 3, was the driest (2.74 inches below normal), the Upper Southern, Climate Division 4, was the warmest (3.2°F above normal) and almost as dry as Climate Division 3. Notably, anomalies in the maximum temperatures were larger than in the minimum temperatures in all Climate Divisions.

- Statewide temperature was warmer than normal for the seventh consecutive month since December 2023. Statewide precipitation was below normal for the third month since April.

Historical Context (Figure 9, Tables A1 and A2)

- Statewide mean, maximum, and minimum temperatures in June 2024 (74.8, 86.4, 63.2°F) were above the long-term (1895-2023) means. Except for the minimum temperature, the mean and maximum temperatures were among the 5% of the warmest on record and close to the historical records of 76.6 and 87.7°F set in 1943 and 1925; the warmest minimum temperature on record of 65.9°F was established in 1943. Statewide precipitation (2.54 in) in June was among the 25% of the driest Junes on record but still far from the record of 0.93 inches of 1988. Mean and maximum temperatures were the fourth warmest on record, while minimum temperature was the eighth warmest.

- Mean temperatures indicated that June 2024 was among the five warmest Junes on record for nineteen of the twenty-three counties, with Anne Arundel, Baltimore, and Howard counties reaching the third warmest. Similarly, maximum temperatures were also among the five warmest on record in eighteen counties, with Somerset reaching the second warmest and Anne Arundel, Carroll, Frederick, Howard, and Montgomery counties reaching the third warmest. Minimum temperatures were among the five warmest in nine counties, with Anne Arundel reaching the third warmest June.

- Precipitation showed that June 2024 was among the ten driest Junes on record for eight of the twenty-three counties. Charles County had the driest June on record.

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

- Statewide mean temperature and cooling degree−days in June showed a significant warming trend (1.8°F/century) and an increasing cooling trend (51.8°FDD/century). Statewide precipitation had a minuscule, no significant wetting trend (0.02 in/century).

- Regionally, June temperatures showed significant warming trends everywhere except in western Maryland. The largest trend is in Baltimore City (3.0°F/century), as it has been since March. Trends above 2.0°F/century are evident in the counties of central Piedmont and the central and southern eastern shore.

- Regionally, June precipitation has a small area of significant wet trends over northern Cecil County (around 0.7 in/century). The largest no significant wet trends (around 0.6 in/century) are over Harford, Cecil, and Kent counties, while the largest no significant drying trends (0.5-0.6 7 in/century range) are over Washington County; however, the western tip of Charles County had significant drying trends (around 0.7 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, the 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, by 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 June 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, 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 and Definitions

Surface air temperatures, total precipitation, and cooling 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 7/12/2024.

- NOAA Monthly U.S. Climate *Divisional* Dataset (NClimDiv – Vose et al. 2014). It is available in a preliminary status (v1.0.0-20240705) at:
  https://www.ncei.noaa.gov/pub/data/cirs/climdiv/
  Data was downloaded on 7/12/2024.

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 climate and climatology. 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). The current climate normal, or just the climatology, is defined for 1991-2020.

About the anomalies: Anomalies for a given month (e.g., June 2024) are the departures of the monthly value from the corresponding month's 30-year average (i.e., from the average of 30 Junes during 1991-2020). 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 variability. The monthly standard deviation of a climate variable measures its dispersion relative to its monthly mean and assesses its 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*.

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. June 2024 Maps

A. Mean Temperatures

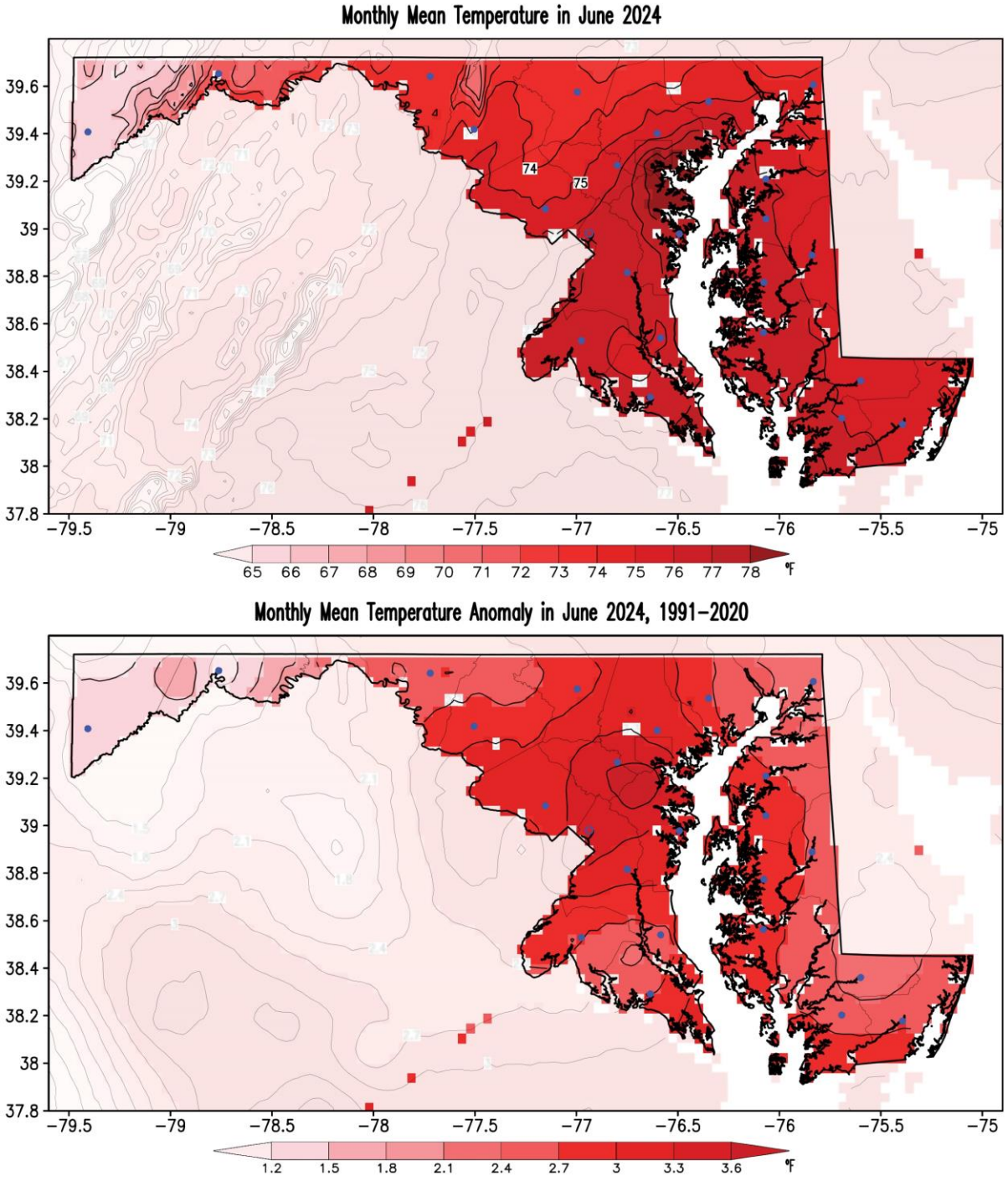

Figure 1. Monthly mean surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for June 2024. Temperatures are in °F following the color bar. Red shading in the anomaly map marks warmer than normal conditions. Note shading outside the state has been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

B. Maximum Temperatures

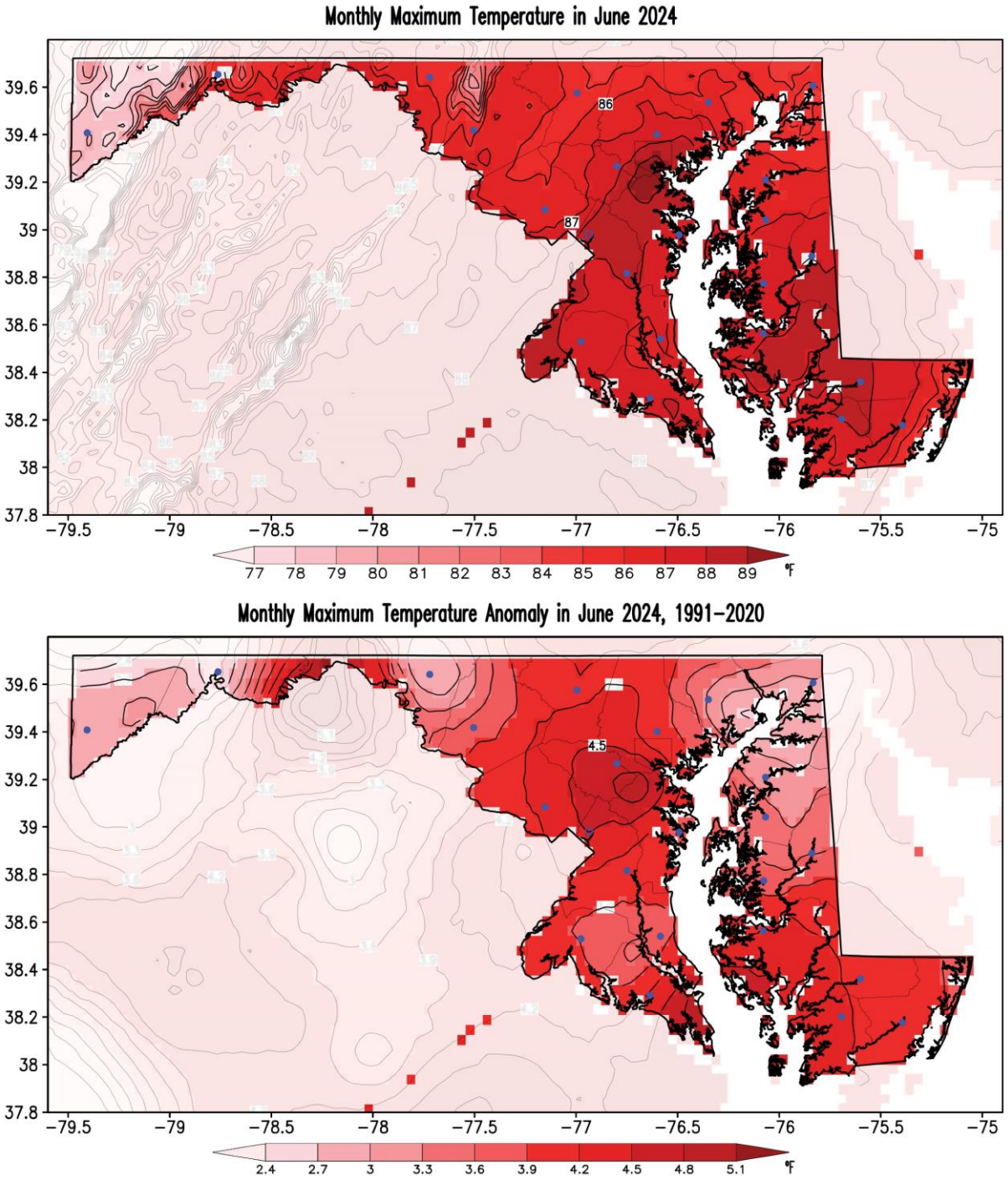

Figure 2. Monthly maximum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for June 2024. Temperatures are in °F following the color bar. Red shading in the anomaly map marks warmer than normal conditions. Note shading outside the state has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

C. Minimum Temperatures

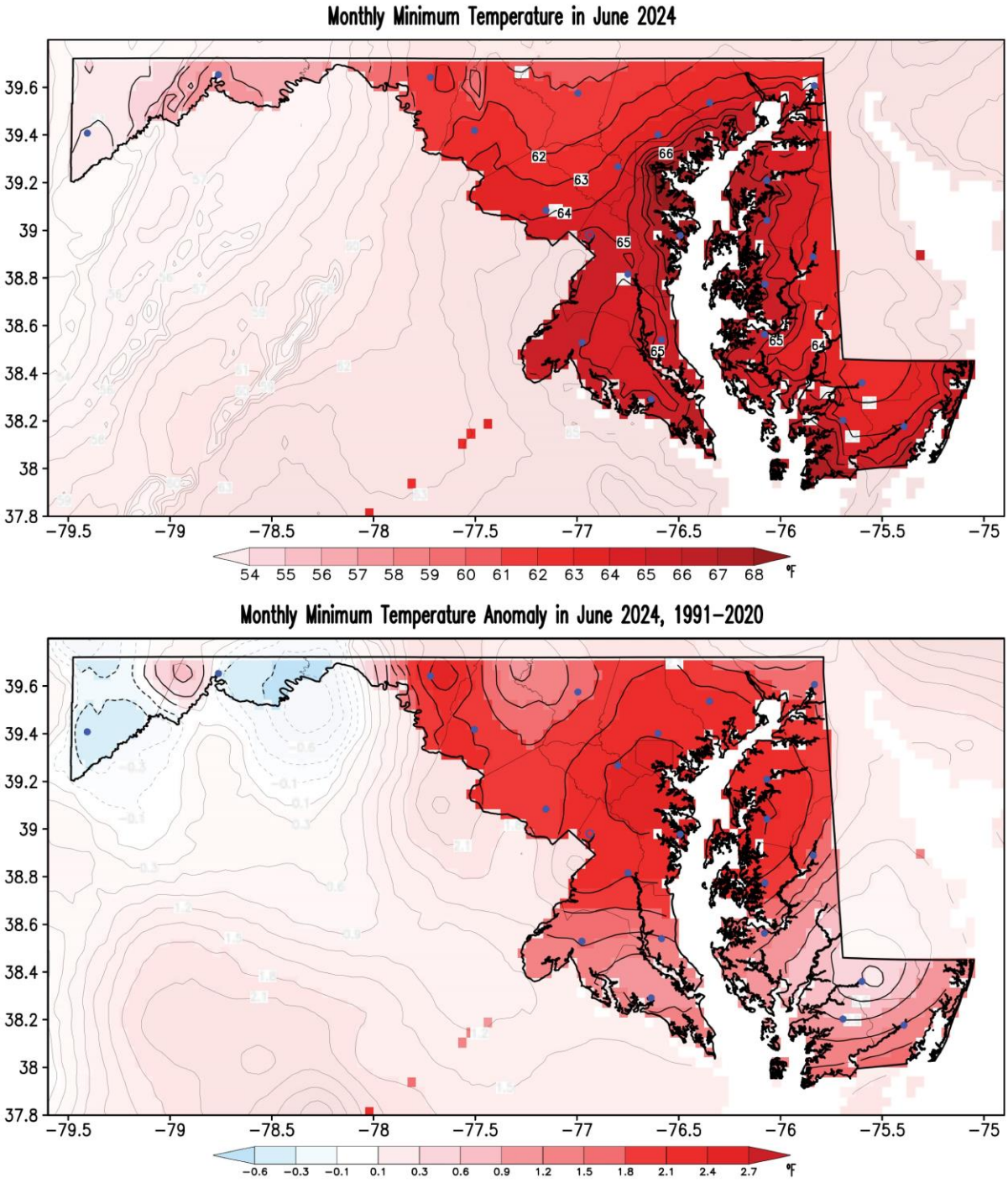

Figure 3. Monthly minimum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for June 2024. Temperatures are in °F following the color bar. Blue/red shading in the anomaly map marks colder/warmer than normal conditions. Note shading outside the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

D. Precipitation

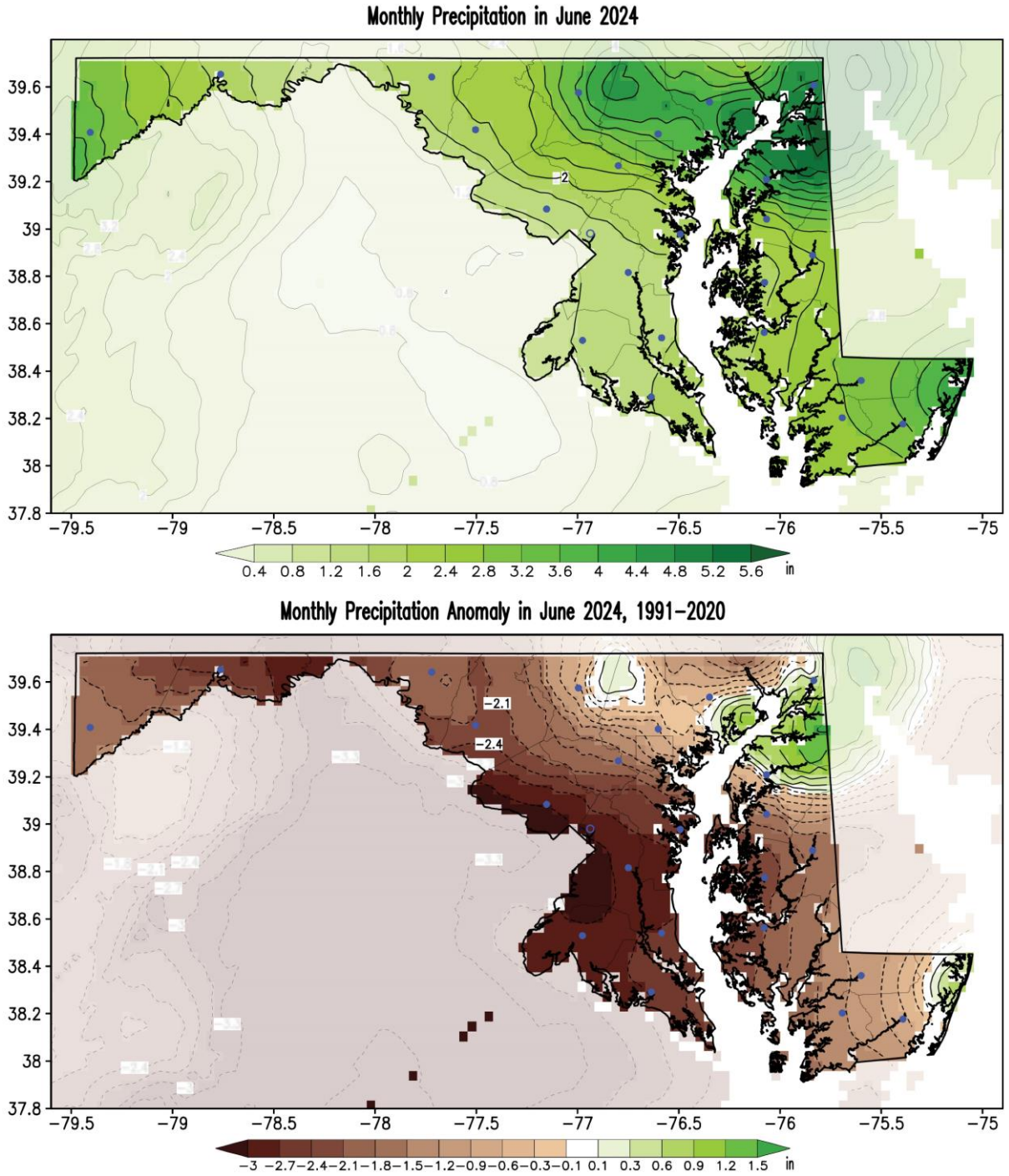

Figure 4. Monthly total precipitation (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for June 2024. Precipitation is in inches following the color bar. Brown/green shading in the anomaly map marks drier/wetter than normal conditions. Note shading outside the state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

E. Drought

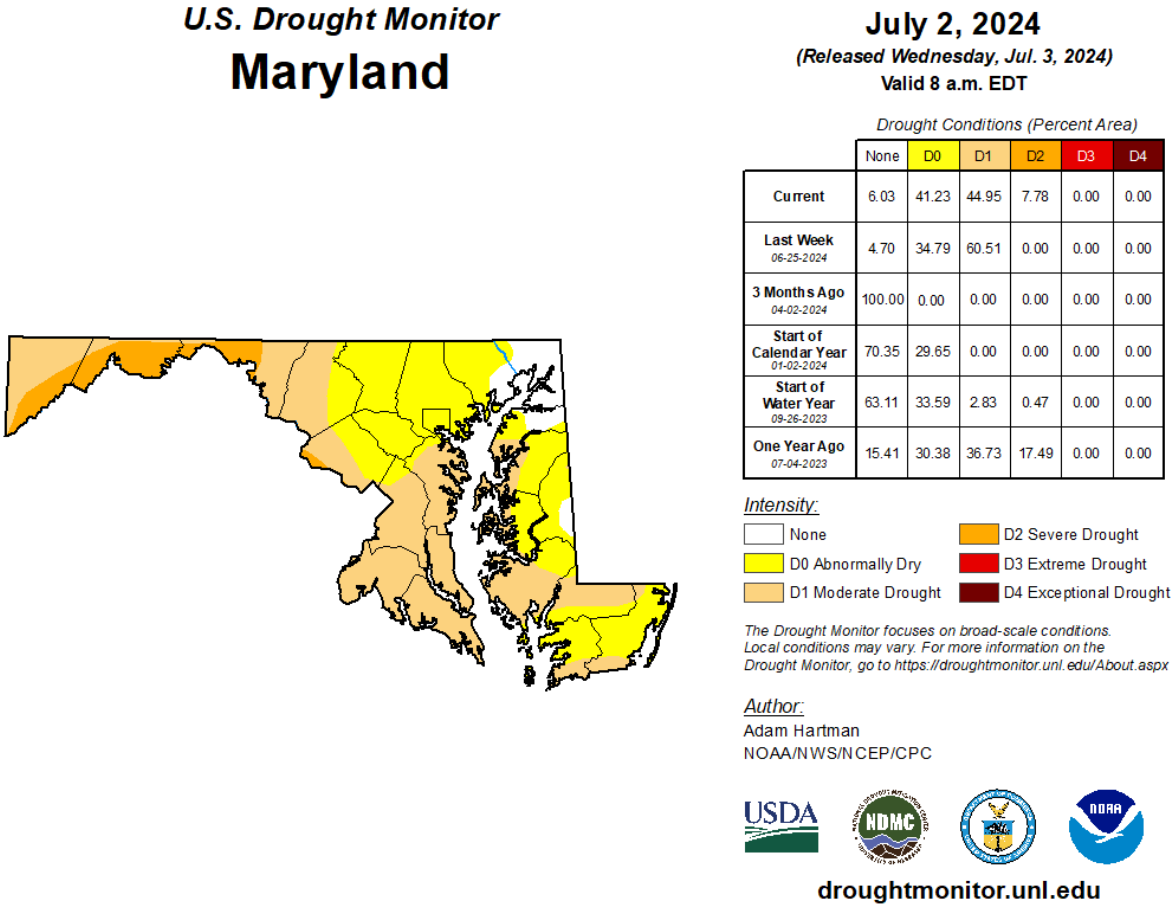

Figure 5. Drought conditions as reported by the U.S. Drought Monitor on July 2, 2024. At this time, around 94% of the state is under some drought category. Yellow shading indicates abnormally dry regions, light orange shading shows regions under a moderate drought, and darker orange marks regions under severe drought according to the drought intensity key. Numbers in the table indicate the percentage of the state covered under the particular drought conditions at the time (in the left column. Areas shown in yellow (Abnormally Dry) indicate land that is going into or coming out of drought. Light orange areas (Moderate Drought) show areas that may experience low water supply and damage to crops and pastures. Orange areas (Severe Drought) highlight areas with water shortages and increased likelihood of crop and pasture losses. Current conditions can be monitored from the U. S. Drought Monitor website.

F. Streamflow

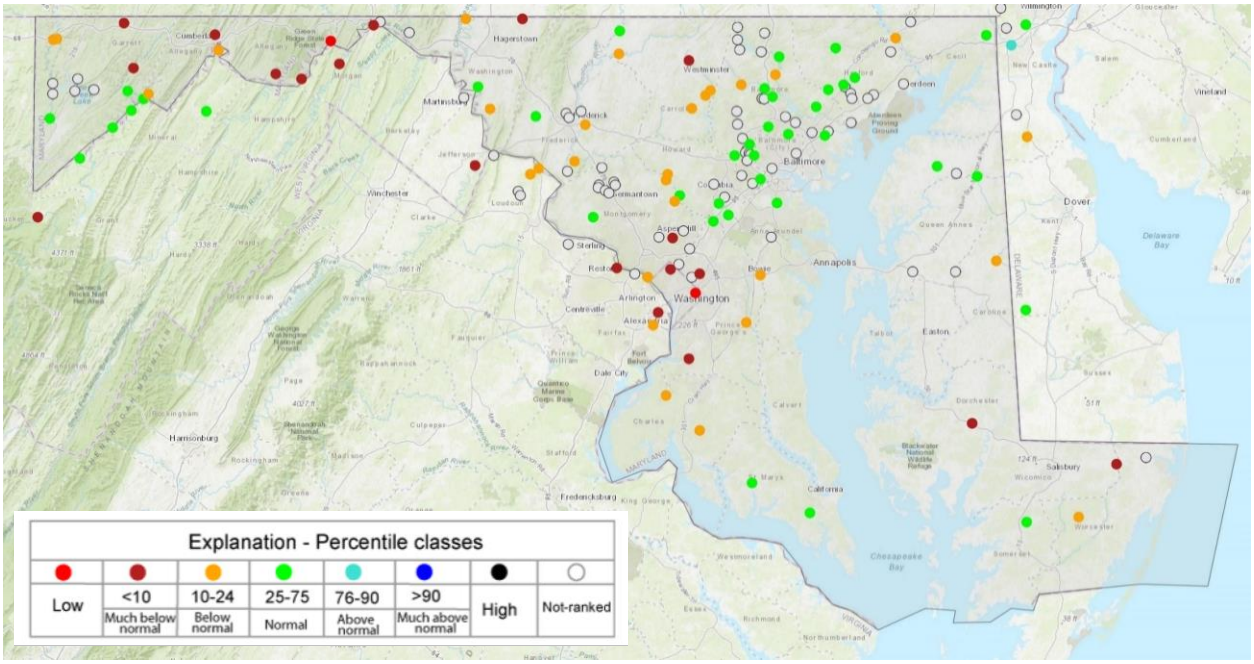

Figure 6. Monthly averaged streamflow class anomalies as reported by the U.S. Geological Survey (USGS) Water Watch for June 2024. Orange to red-filled circles denote below-normal streamflow conditions, cyan to black-filled circles denote above-normal streamflow conditions, and green-filled circles represent normal streamflow conditions. Springs and rivers had Below-to-Much-Below normal streamflow in the drought-stricken areas of the state. Current conditions can be monitored from the U. S. Geological Survey website.

4. June and AMJ 2024 Climate Divisions Averages

A. June 2024 Scatter Plots

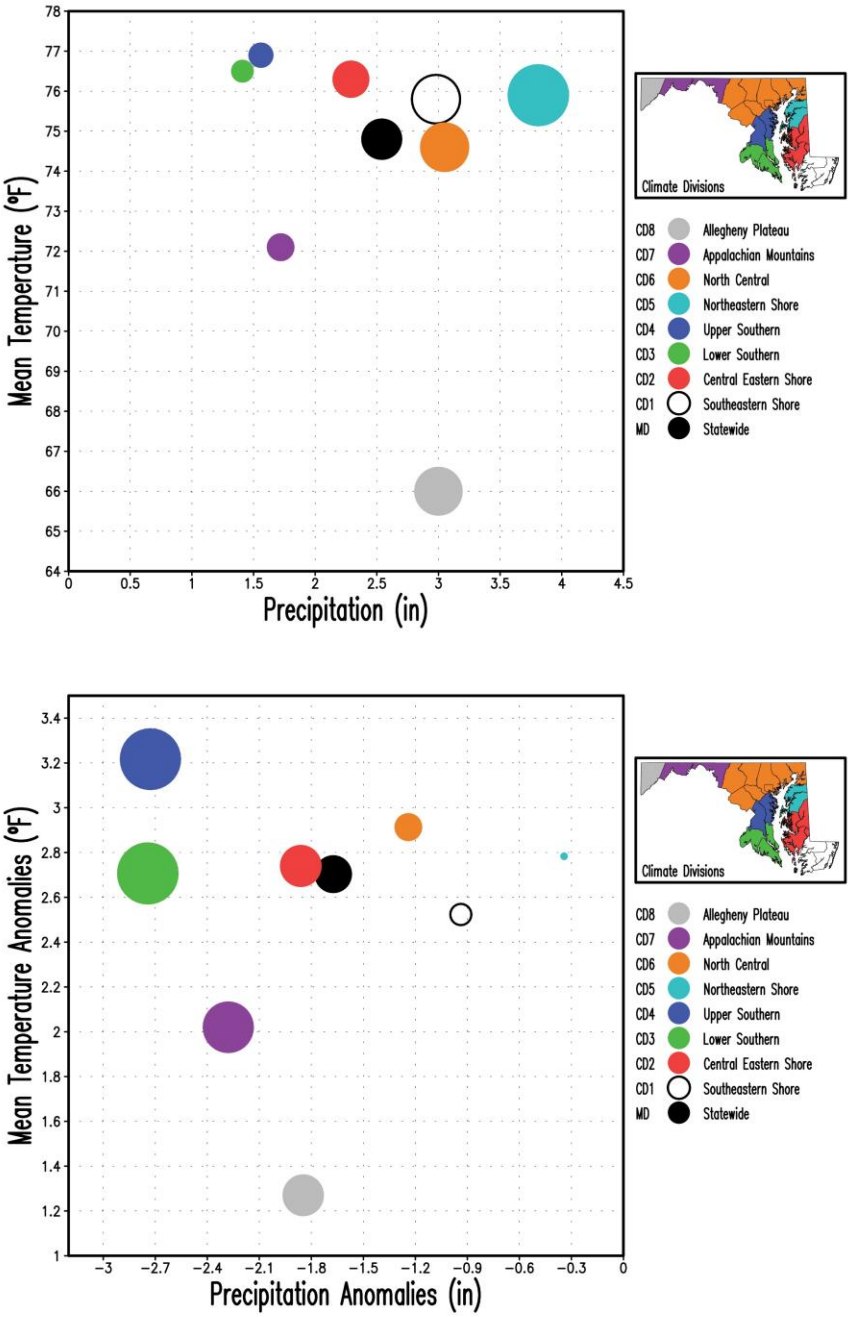

Figure 7. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for June 2024. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect to the 1991-2020 climatology. 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 (3.81 inches in CD5, top panel) and by the maximum precipitation anomaly (|−2.74| inches in CD3, 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. April – June 2024 Scatter Plots

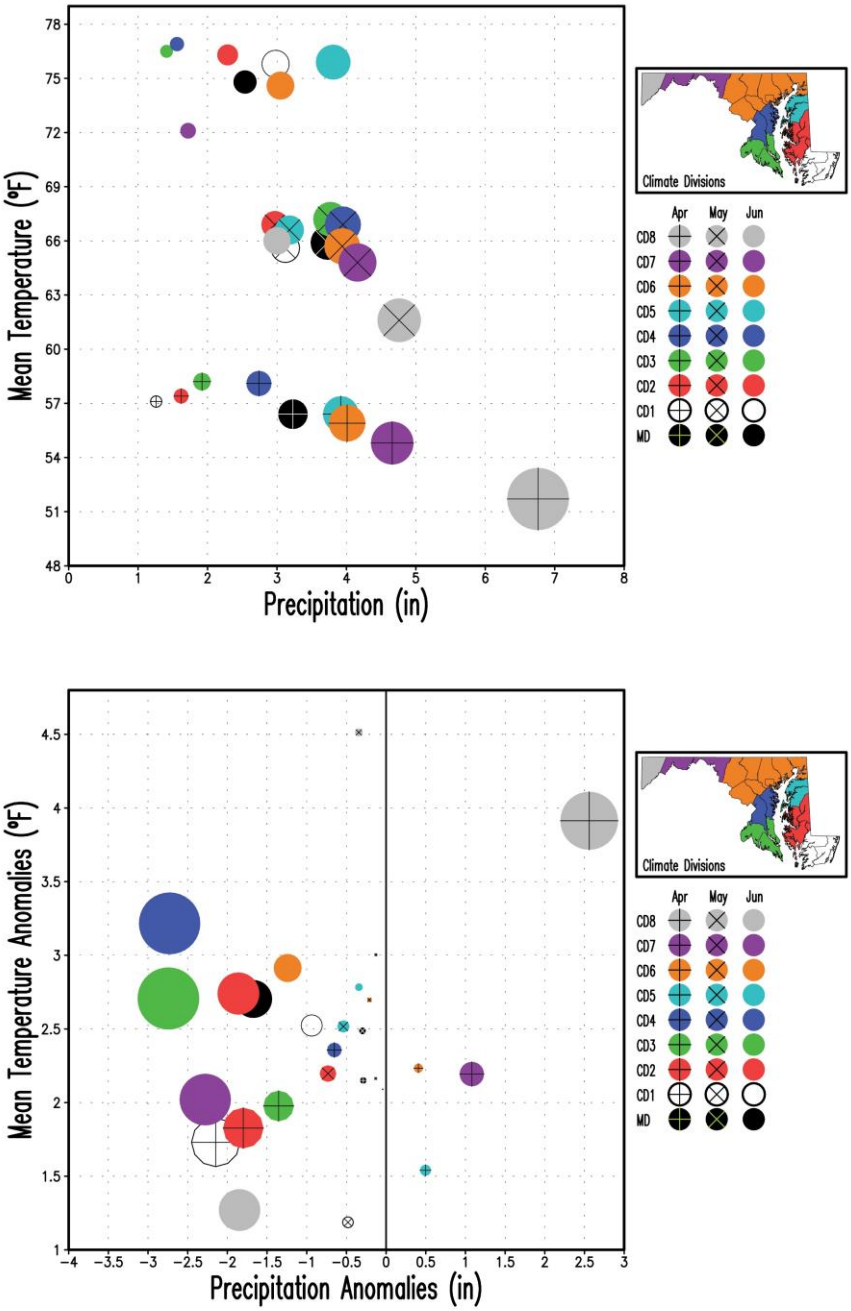

Figure 8. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for April, May and June 2024. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect to the 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 (6.76 inches in CD8 in April, top panel) and by the maximum precipitation anomaly (|−2.74| inches in CD3 in June, bottom panel) among the nine regions and three months. June is displayed with filled circles only, while May and April are displayed with superposed multiplication and addition signs, respectively.

5. June 2024 Statewide Averages in the Historical Record

A. Box and Whisker Plots

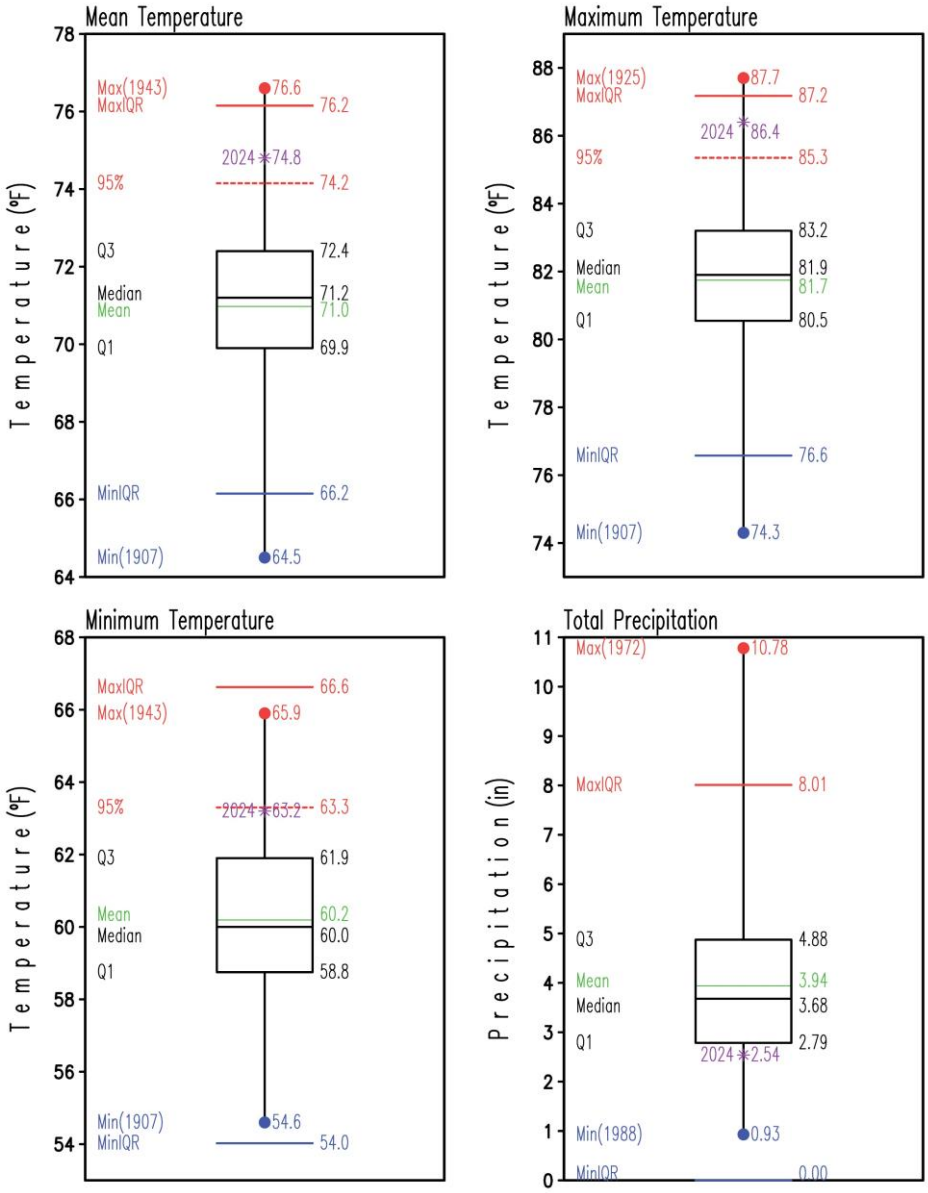

Figure 9. Box and Whisker plots of Maryland (statewide) monthly mean (upper left), maximum (upper right), minimum (lower left) surface air temperatures, and total precipitation (lower right) for June for the period 1895-2023. The label and asterisk in purple represent conditions for June 2024. Statistics 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 5% 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 June Trends

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

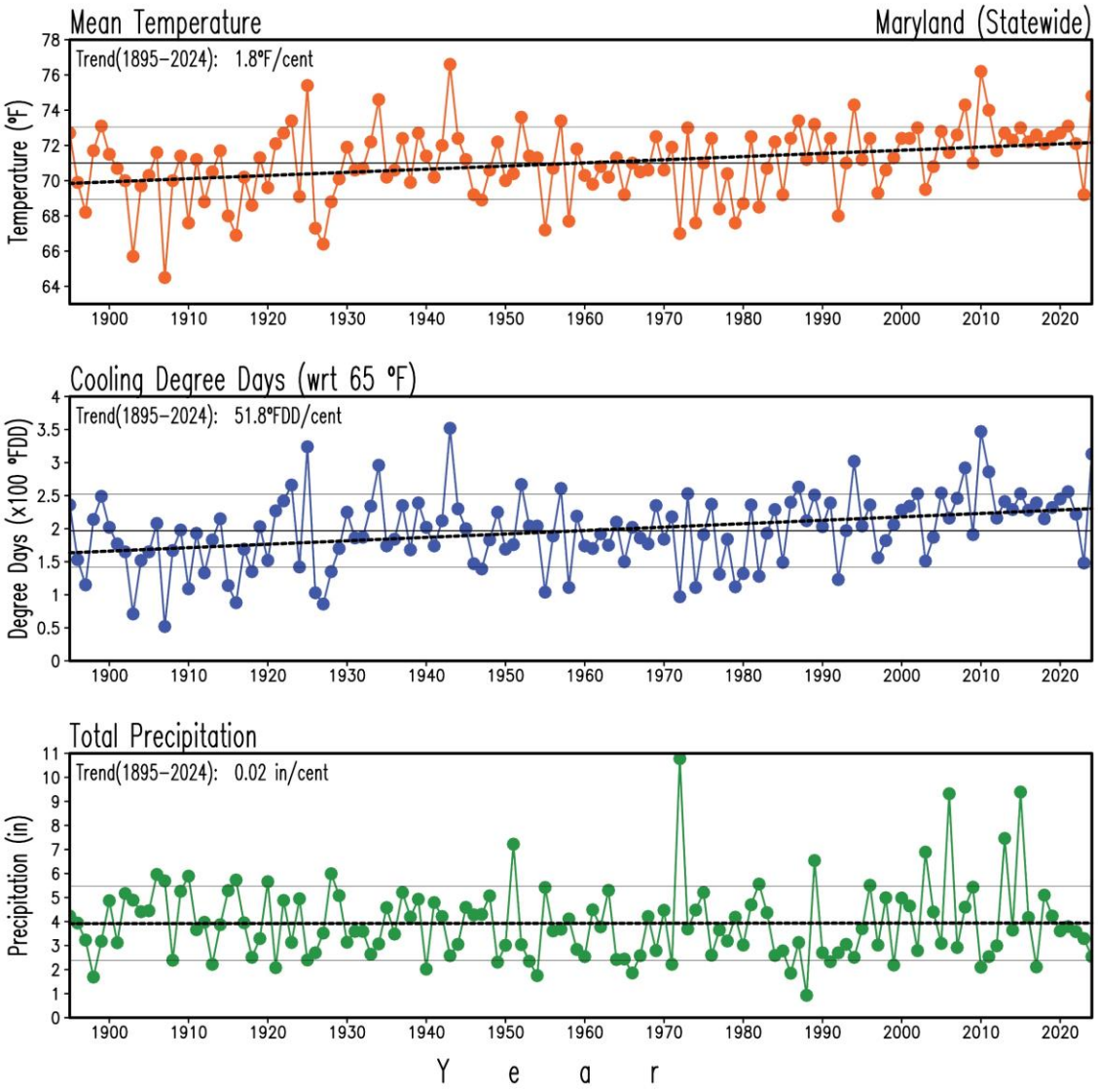

Figure 10. Maryland (statewide) mean surface air temperature, cooling degree days, and precipitation in June for the period 1895-2024. Temperature is in °F, cooling degree-days is in °F degree-days (°FDD), and precipitation is in inches. The thin, continuous black lines in each panel display the long-term means (71.0°F, 196.9°FDD and 3.93 in, 1895-2024), and the double thin, continuous gray lines indicate the standard deviation (2.1°F, 55.1°FDD and 1.55 in) above/below the long-term mean. The thick dashed black lines show the long-term linear trend. The warming temperature trend (1.8°F/century) and the increasing cooling degree-days trend (51.8°FDD/century) are statistically significant at the 95% level (*Student's t-test* −Santer et al. 2000) but no the small precipitation trend (0.02 in/century).

B. Temperature and Precipitation Maps

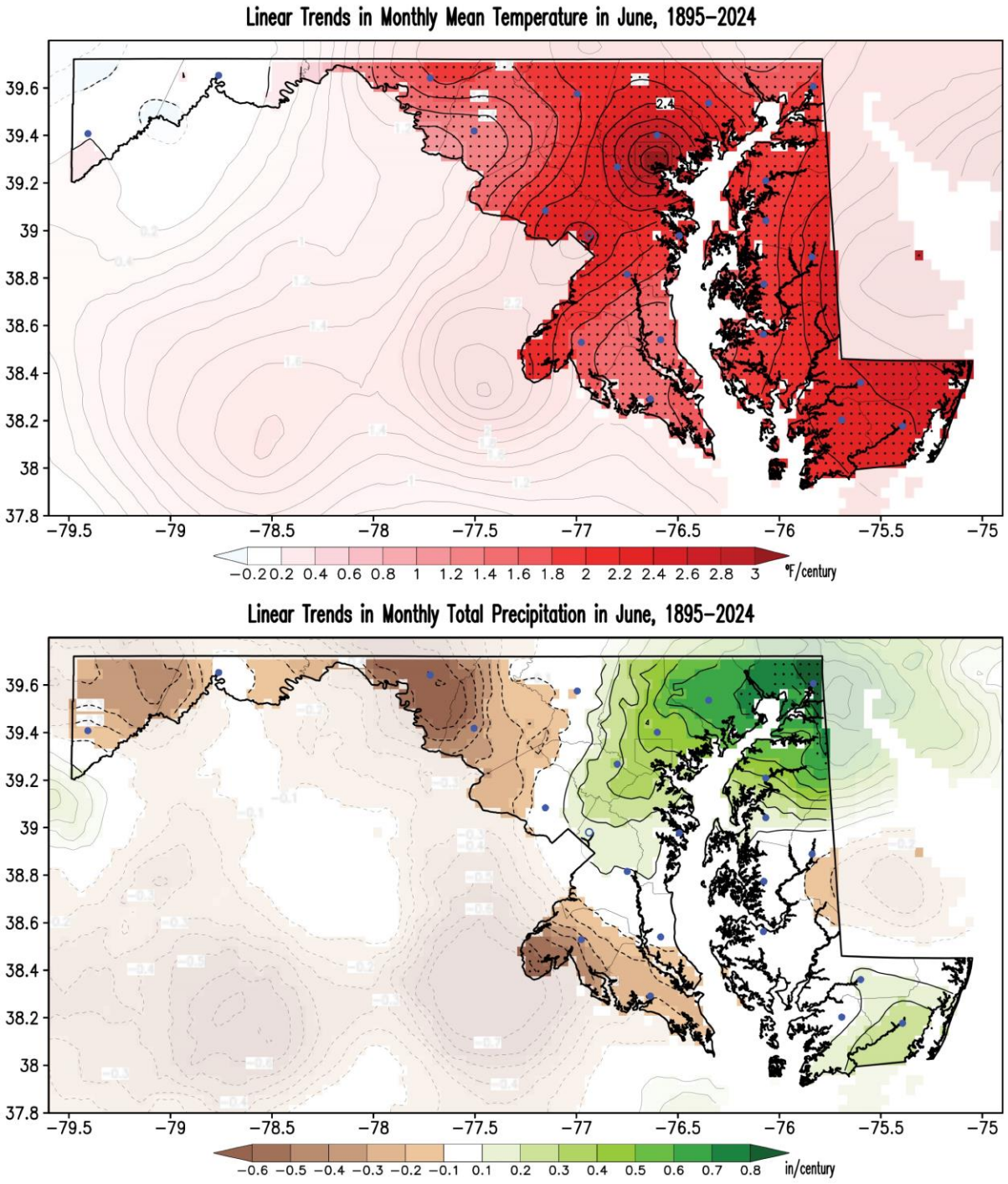

Figure 11. Linear trends in surface air mean temperature and precipitation in June for the period 1895-2024. Temperatures are in °F/century, and precipitation is in inches/century following the color bars. Blue/red shading in the temperature map marks cooling/warming trends. Brown/green shading in the 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. June 2024 Data Tables: Statewide, Climate Divisions, and Counties

A. Mean Temperature and Precipitation

Region	Mean Air Temperature (°F)	Rank (#)
Statewide	74.8	127
Climate Division 1	75.8	127
Climate Division 2	76.3	127
Climate Division 3	76.5	126
Climate Division 4	76.9	127
Climate Division 5	75.9	127
Climate Division 6	74.6	127
Climate Division 7	72.1	120
Climate Division 8	66.0	102
Allegany	70.8	108
Anne Arundel	77.3	128
Baltimore	75.2	128
Baltimore City	77.4	128
Calvert	76.3	126
Caroline	75.8	127
Carroll	73.5	127
Cecil	74.5	124
Charles	76.6	126
Dorchester	76.5	127
Fredrick	73.8	125
Garrett	66.1	103
Harford	75.0	124
Howard	75.1	128
Kent	75.9	127
Montgomery	75.1	127
Prince George's	76.6	127
Queen Anne's	76.0	127
Saint Mary's	76.6	127
Somerset	76.5	127
Talbot	76.6	127
Washington	73.4	126
Wicomico	75.7	127
Worcester	75.4	126

Region	Total Precipitation (in)	Rank (#)
Statewide	2.54	22
Climate Division 1	2.98	53
Climate Division 2	2.29	22
Climate Division 3	1.41	4
Climate Division 4	1.56	5
Climate Division 5	3.81	75
Climate Division 6	3.05	42
Climate Division 7	1.72	6
Climate Division 8	3.00	18
Allegany	1.78	9
Anne Arundel	1.78	9
Baltimore	3.84	72
Baltimore City	3.17	50
Calvert	1.58	8
Caroline	2.57	32
Carroll	3.32	48
Cecil	4.66	89
Charles	1.20	1
Dorchester	2.25	23
Fredrick	2.08	18
Garrett	2.99	18
Harford	4.02	75
Howard	2.36	26
Kent	4.46	90
Montgomery	1.55	7
Prince George's	1.41	5
Queen Anne's	3.27	62
Saint Mary's	1.60	8
Somerset	2.58	33
Talbot	1.94	12
Washington	1.66	10
Wicomico	2.91	50
Worcester	3.35	62

Table A1. Monthly mean surface air temperature (left) and total precipitation (right) at Maryland (statewide), climate division, and county levels for June 2024. Temperatures are in °F, and precipitation is in inches. The rank is the order that the variable for June 2024 occupies among the 130 Junes 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	86.4	127
Climate Division 1	87.1	128
Climate Division 2	87.9	127
Climate Division 3	87.7	127
Climate Division 4	88.0	127
Climate Division 5	86.5	125
Climate Division 6	86.2	127
Climate Division 7	85.4	125
Climate Division 8	78.4	115
Allegany	84.8	120
Anne Arundel	88.2	128
Baltimore	87.0	127
Baltimore City	88.7	129
Calvert	87.2	127
Caroline	87.8	127
Carroll	85.8	128
Cecil	85.1	123
Charles	88.0	127
Dorchester	88.2	127
Fredrick	85.8	128
Garrett	78.5	116
Harford	86.0	124
Howard	87.1	128
Kent	86.2	125
Montgomery	86.5	128
Prince George's	88.0	127
Queen Anne's	86.7	126
Saint Mary's	87.7	127
Somerset	87.5	129
Talbot	87.4	127
Washington	86.1	127
Wicomico	87.9	127
Worcester	86.3	128

Region	Minimum Air Temperature (°F)	Rank (#)
Statewide	63.2	123
Climate Division 1	64.5	111
Climate Division 2	64.6	118
Climate Division 3	65.3	118
Climate Division 4	65.8	127
Climate Division 5	65.2	126
Climate Division 6	63.0	126
Climate Division 7	58.8	98
Climate Division 8	53.6	80
Allegany	56.8	78
Anne Arundel	66.5	128
Baltimore	63.4	127
Baltimore City	66.2	128
Calvert	65.4	119
Caroline	63.8	122
Carroll	61.3	122
Cecil	63.9	123
Charles	65.2	120
Dorchester	64.7	113
Fredrick	61.9	121
Garrett	53.6	80
Harford	64.0	127
Howard	63.1	127
Kent	65.5	126
Montgomery	63.6	126
Prince George's	65.2	127
Queen Anne's	65.2	126
Saint Mary's	65.4	116
Somerset	65.6	116
Talbot	65.8	125
Washington	60.8	119
Wicomico	63.4	109
Worcester	64.6	118

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

A. Temperatures and Precipitation

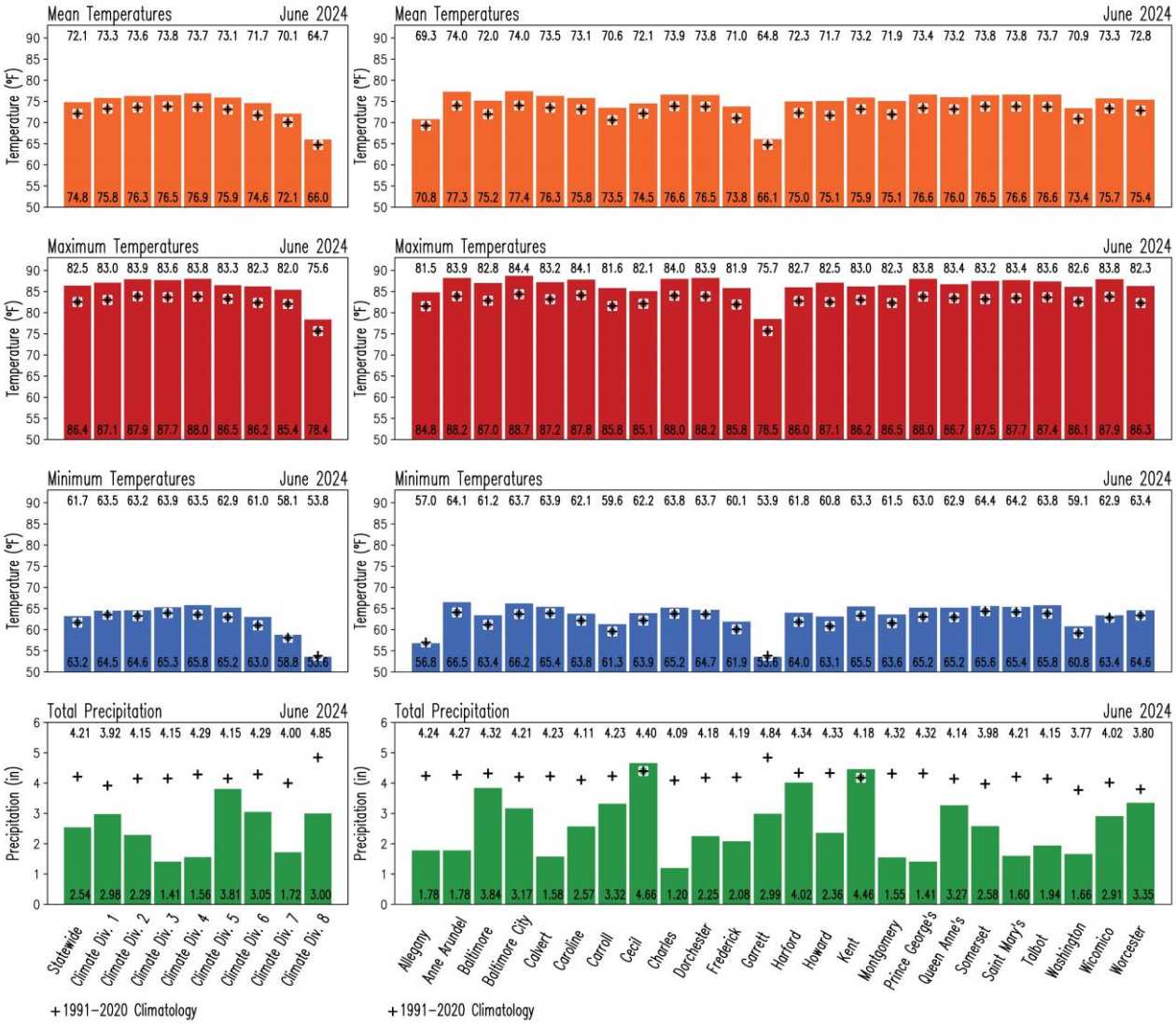

Figure B1. Monthly surface variables in Maryland for June 2024. Color bars represent the variables as follows: mean surface air temperature (orange), maximum surface air temperature (red), minimum surface air temperature (blue) and total precipitation (green) at statewide and climate division (left column),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

B. Temperatures and Precipitation Anomalies

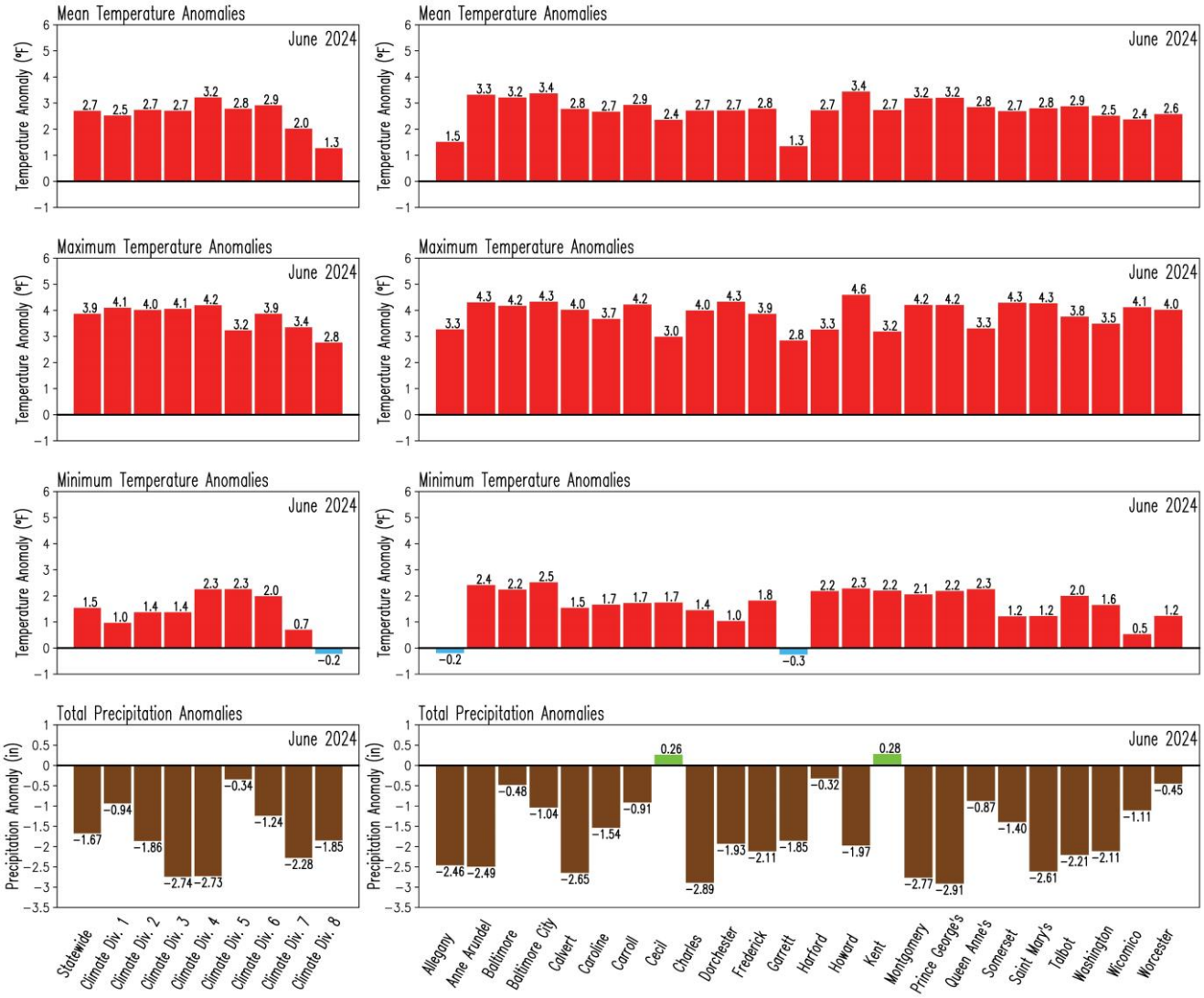

Figure B2. Anomalies of the monthly surface variables in Maryland for June, 2024. Anomalies are with respect to the 1991-2020 climatology. Red/blue color represents positive/negative (warmer/colder than normal) anomalies for mean surface air temperature (upper row), maximum surface air temperature (second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

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

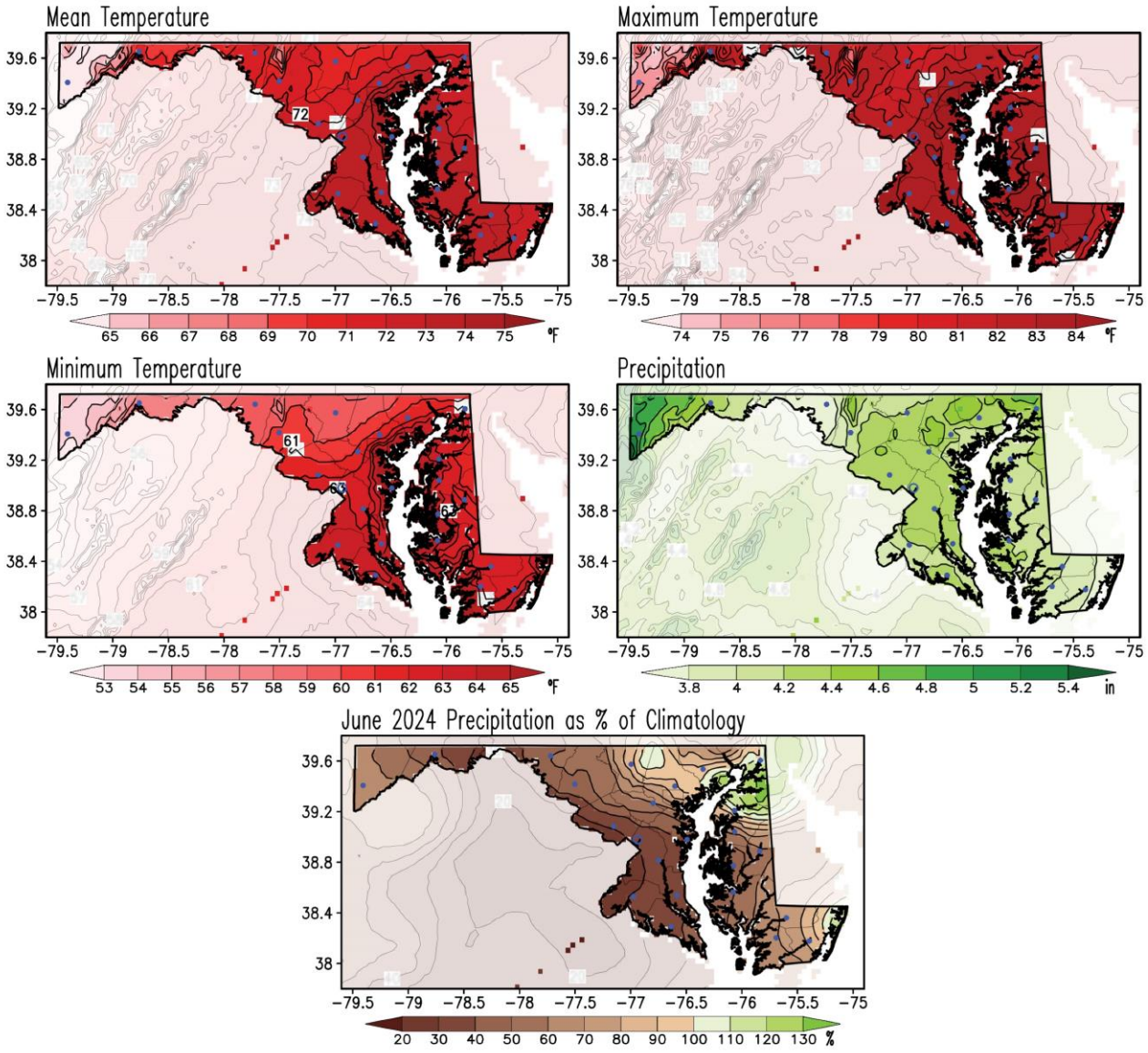

Figure C1. June climatology of the monthly mean, maximum and minimum surface air temperatures, and total precipitation for the period 1991-2020 (upper and middle rows), and precipitation in June 2024 as a percentage of climatology (bottom row). Temperatures are in °F, and precipitation is in inches according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

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

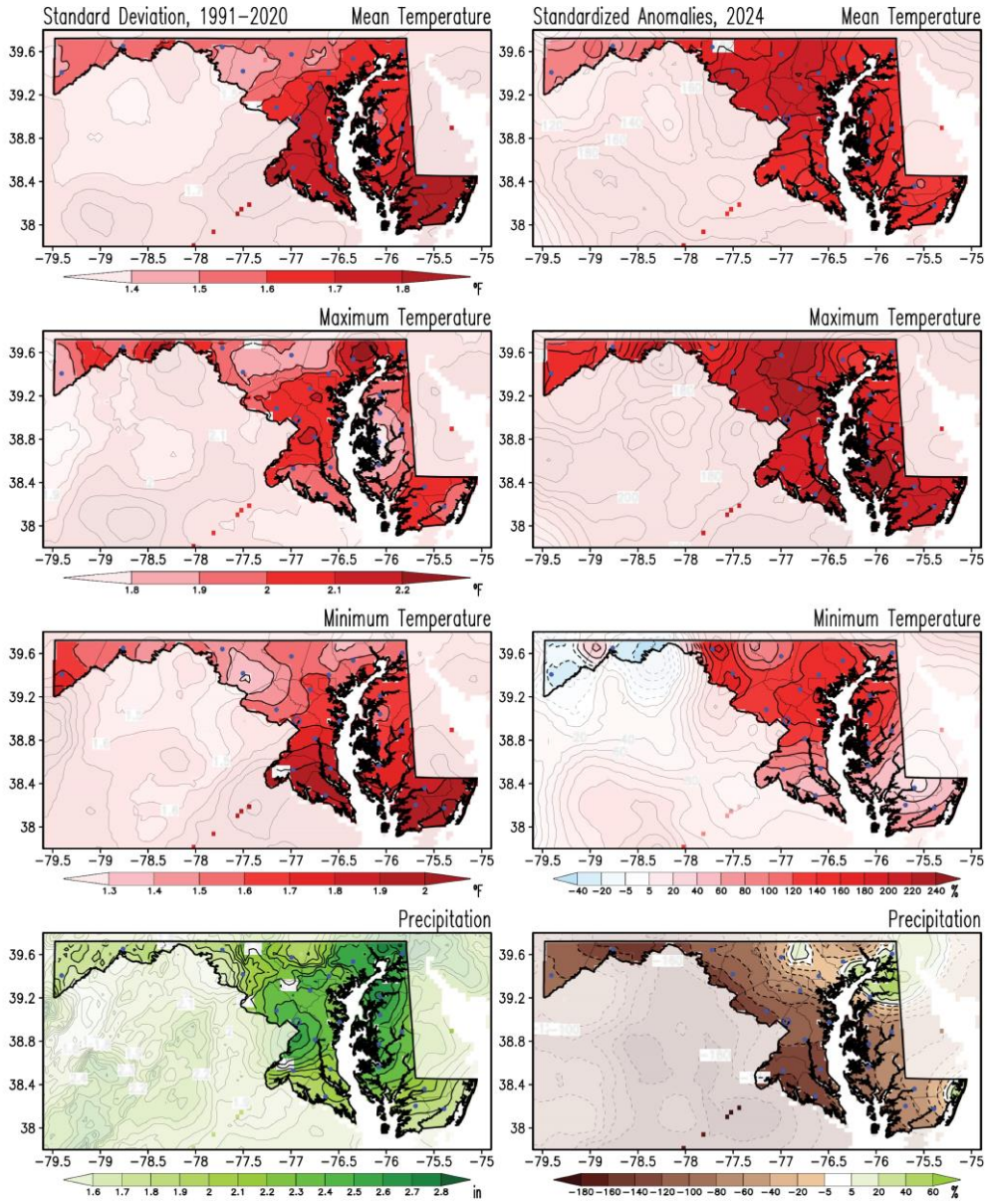

Figure D1. Standard deviation for June and standardized anomalies of temperatures and precipitation for June 2024. Standard deviations for monthly mean, maximum, and minimum surface air temperatures and total precipitation were obtained for the 1991-2020 period (left column). Anomalies for June 2024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

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