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Maryland Climate Bulletin December 2024

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DEPARTMENT OF ATMOSPHERIC & OCEANIC SCIENCE
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Summary

Statewide averages indicate that December 2024 was colder and drier than normal (i.e., 1991-2020 averages). Monthly mean temperatures were between 30 and 41°F; maximum temperatures were in the 38−50°F range, and minimum temperatures were between 23 and 32°F. Monthly total precipitation was in the 2.0−3.8 inches range.

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

- The mean temperature was colder than normal over most of the state, particularly over Harford, Cecil, and Kent counties (1.2 to 1.5°F lower), over the counties of the Piedmont and Coastal Plains, and between Garrett and Allegany counties. Warmer than normal temperatures were found over western Garrett County (0.9°F), Washington, and eastern Allegany counties.

- The maximum temperature was colder than normal over large areas in the state, especially between Garrett and Allegany counties (1.8°F), Harford County (1.5°F), and the northern half of the state from central Garrett County to the northern half of the Eastern Shore; Calvert, Charles, Saint Mary's and western Dorchester counties also had colder than normal temperatures. Warmer than normal temperatures appeared over Worcester County (0.6−0.9°F), Somerset, Wicomico, parts of Caroline, Dorchester counties, Prince George's, Anne Arundel counties, and western Garrett County.

- The minimum temperature was colder than normal over much of the state, notably over Wicomico, Somerset, and Worcester counties (2.4 to 2.7°F lower) and, in general, the counties of the Coastal Plains, the eastern half of the Piedmont and eastern Washington County. Warmer than normal temperatures were found over western Montgomery, Frederick, and Washington counties, Allegany County, and Garrett County (1.2−1.5°F).

- Precipitation was below normal in the entire state, notably over Caroline, Talbot, Dorchester, and Wicomico counties (1.4 to 1.6 inches deficit), southern Calvert and Saint Mary's counties (1.4 inches deficit). These counties received between 55 and 65% of their climatological rainfall for the month, while the rest around the Bay did not get more than 70−75% of their climatological rainfall. Allegany and western Washington counties also received 70−75% of their climatological rainfall.

- Drought conditions covered almost the whole state at the end of December. Extreme drought conditions are no longer present, but moderate to severe drought conditions still affect ~95% of the state. Severe drought conditions affect the counties around the Bay, while moderate drought impacts the western Piedmont and the western counties. The severe drought conditions over Garrett County at the end of November improved to three categories from west to east: no drought, abnormally dry, and moderate drought. Streams and rivers had below-normal streamflow in the severe drought areas along both sides of the Bay and western Maryland; above-normal streamflow was observed in some of the streams of Garrett County and central Piedmont.

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

- Except for the Allegheny Plateau, Climate Division 8, which was warmer than normal (0.3°F), the other climate divisions were colder than normal. The Southeastern and Northeastern Shore Climate Divisions 1 and 5 had the coldest anomalies (0.9°F below normal). On the other hand, all climate divisions were drier than normal. The Central Easter Shore, Climate Division 2, had the driest anomaly (1.68 inches below normal).

- Statewide temperature was colder than normal (0.6°F below) for the first time since December 2023. Statewide precipitation was below normal (1.04 inches deficit) for the eighth time since April, similar to November's anomaly of around one inch deficit.

Extreme daily minimum temperatures and precipitation (Figures 9-10)

- Statewide minimum daily temperatures indicated that the number of freezing days with temperatures below 32, 28, and 24°F (the 28th, 19th, and 12th percentiles in 1951−2000) and their number of freezing spells (consecutive days with freezing days) were fewer than normal by the end of December for the calendar year. There were 22 fewer days with minimum temperatures colder than 32°F (68 vs. 90) and 3 fewer spells (11 vs. 14) than normal; 14 fewer days with minimum temperatures colder than 28°F (45 vs. 59) and 2 fewer spells (10 vs. 12) than normal; and 14 fewer days with minimum temperatures colder than 24°F (21 vs. 35) and 4 fewer spells (4 vs. 8) than normal.

- Statewide daily total precipitation showed that the number of days with extreme precipitation (at least 0.64 inches; the 95th percentile in 1951−2000) was fewer than normal by 2 days (17 vs. 19) by the end of December for the calendar year. The number of dry spells (consecutive days with daily precipitation of no more than 0.04 inches) was less than normal by 10 dry spells (38 vs. 48) by the end of the month. However, the mean duration of the dry spells was larger than normal by 1 day (6 vs. 5).

Historical Context (Figure 11, Tables A1 and A2)

- Statewide mean, maximum, and minimum temperatures in December 2024 (37.5, 46.3, 28.7°F) were above their long-term (1895-2023) mean but very far from their historical records of 48.6, 57.3, and 40.0°F set in 2015, respectively. Statewide precipitation (2.64 inches) in December was below the long-term mean but still far from the record of 0.50 inches in 1955.

- Statewide mean, maximum, and minimum temperatures showed that December 2024 was the forty-eighth, forty-ninth, and forty-eighth hottest December, respectively.

- Statewide precipitation indicated that December 2024 was the forty-ninth driest month.

Century-Plus Trends, 1895-2024 (Figures 12, 13)

- Statewide mean temperature and heating degree−days in December showed a significant warming trend (3.9°F/century) and a significant decreasing heating trend (–126.5°FDD/century). Statewide precipitation had a non-significant wetting trend (0.49 in/century).

- Regionally, December temperatures showed significant warming trends everywhere in the state. The largest trend is over northeastern Cecil County (4.4−4.6°F/century), with secondary maxima over southwestern Baltimore County, northern Baltimore, and Harford counties (4.4°F/century). Large trends (around 4.0−4.2°F/century) are also evident in the counties of the Piedmont and the eastern half of the Eastern Shore.

- Regionally, December precipitation displayed significant wetting trends over a few regions. The largest trends are found over western Dorchester County (0.7−0.8 in/century), Calvert and Saint Mary's counties (0.6−0.7 in/century), and central Piedmont over Harford and Baltimore counties and northwestern Frederick County (0.6 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, the Piedmont Plateau in the center, the Chesapeake Bay, and the Atlantic Coastal Plain to the east. The range of physiographic features and the state's eastern placement 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 in the state, 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 December 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 in Section 3. Statewide and climate division averages for the month are compared against each other via scatter plots in Section 4. Extreme daily minimum temperatures and precipitation are presented from the analysis of daily statewide averaged temperatures and precipitation in Section 5. Monthly statewide averages are placed in the context of the historical record via box and whisker plots in Section 6. Century-plus trends in statewide air temperature, heating degree days, precipitation, and state maps of air temperature and precipitation are presented in Section 7. 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 & Methods

Surface air temperatures, total precipitation, and 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 1/11/2025.

- NOAA Monthly U.S. Climate *Divisional* Dataset (NClimDiv – Vose et al., 2014). It is available in a preliminary status (v1.0.0-20250107) at:

https://www.ncei.noaa.gov/pub/data/cirs/climdiv/
Data was downloaded on 1/11/2025.

- NOAA area averages of daily temperatures and precipitation dataset (nClimGrid−Daily −Durre et al., 2022). It is available in a preliminary status, v1.0.0, at: https://www.ncei.noaa.gov/products/land-based-station/nclimgrid-daily
  Data labeled as "scaled" was downloaded on 1/10/2025.

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., December 2024) are the departures of the monthly value from the corresponding month's 30-year average (i.e., from the average of 30 Decembers) 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 freezing days. Freezing temperatures affect people's health, comfort, and livelihood by impacting crops, livestock, infrastructure, water and energy resources, etc. Here, freezing temperatures are tracked by the count of days when daily minimum temperatures are equal to or below 32°F, 28°F, and 24°F (originally used to categorize agricultural impacts USDA, 2024) and their consecutive occurrence. When these conditions persist for two or more days, they define freezing day spells. These threshold values correspond to the 28th, 19th, and 12th percentiles of statewide daily minimum temperature for the period 1951−2000.

About degree days. Degree days are the difference between the daily mean temperature (high temperature plus low temperature divided by two) and a predefined base temperature; because energy demand is cumulative, degree-day totals are usually calculated on a daily, monthly, seasonal, and annual basis.

- *Heating and cooling degree days.* These are used to get a general idea of how much energy is required to warm or cool buildings. The base temperature used for this purpose is 65°F, which is considered tolerable for human comfort (CPC, 2023).

About extreme precipitation. This is defined as the yearly number of days with statewide averaged daily total precipitation equal to or greater than 0.64 inches. This threshold value represents the 95th percentile of statewide averaged daily total precipitation for 1951-2000.

About the dry day spells. A dry day is defined as a day with precipitation below 0.04 inches. These conditions are named dry spells if they persist for two or more days. The number of dry spells and their duration are particularly important during the vegetation period (Tschurr et al., 2020).

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*.

3. December 2024 Maps

A. Mean Temperatures

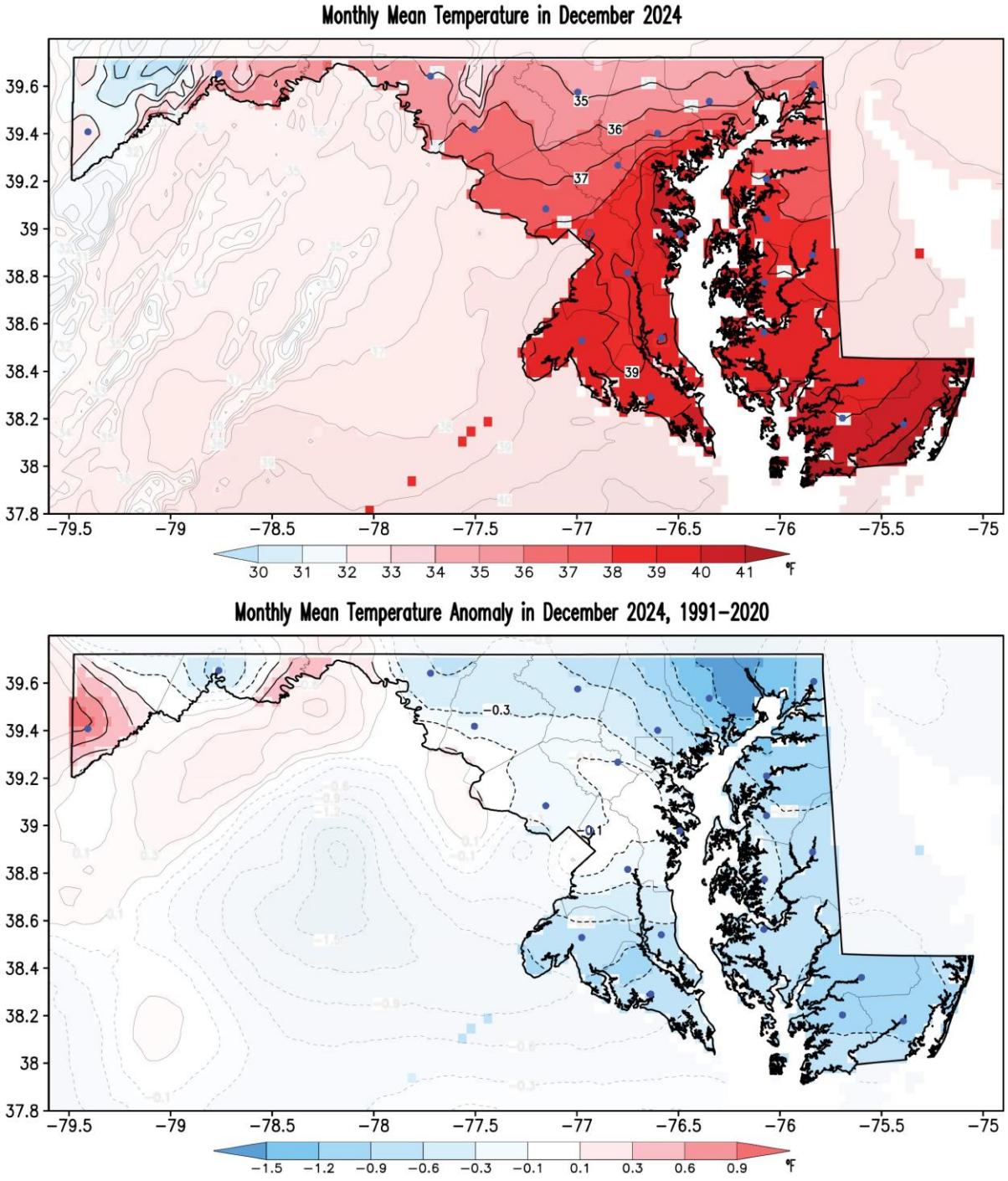

Figure 1. Monthly mean surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for December 2024. Temperatures are in °F following the color bar. Blue/red shading in the temperature map shows temperatures below/above 32°F. Blue/red shading in the anomaly 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.

B. Maximum Temperatures

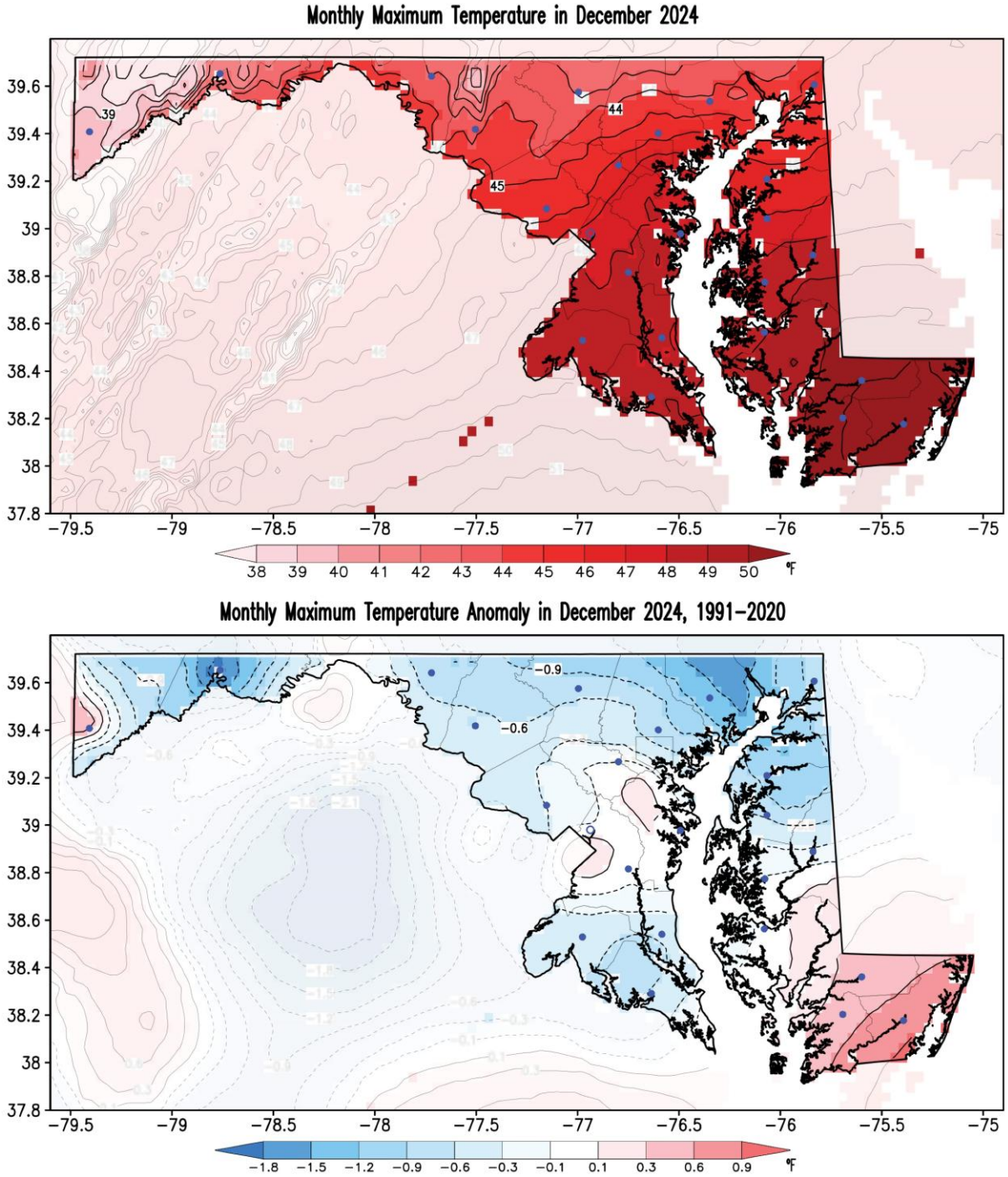

Figure 2. Monthly maximum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for December 2024. Temperatures are in °F following the color bar. Blue/red shading in the anomaly map marks colder/warmer than normal conditions. Note shading outside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

C. Minimum Temperatures

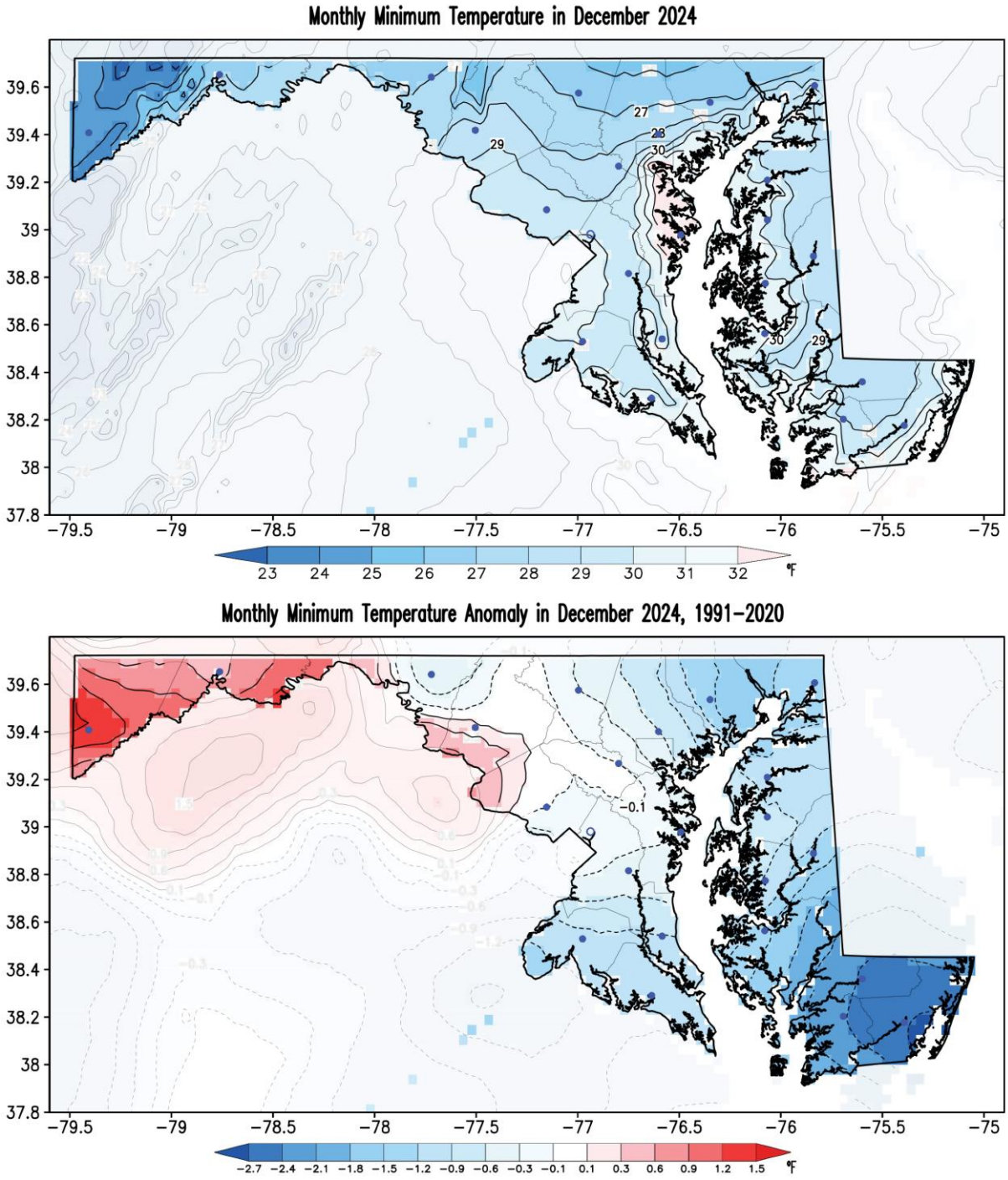

Figure 3. Monthly minimum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for December 2024. Temperatures are in °F following the color bar. Blue/red shading in the temperature map shows temperatures below/above 32°F. Blue/red shading in the 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

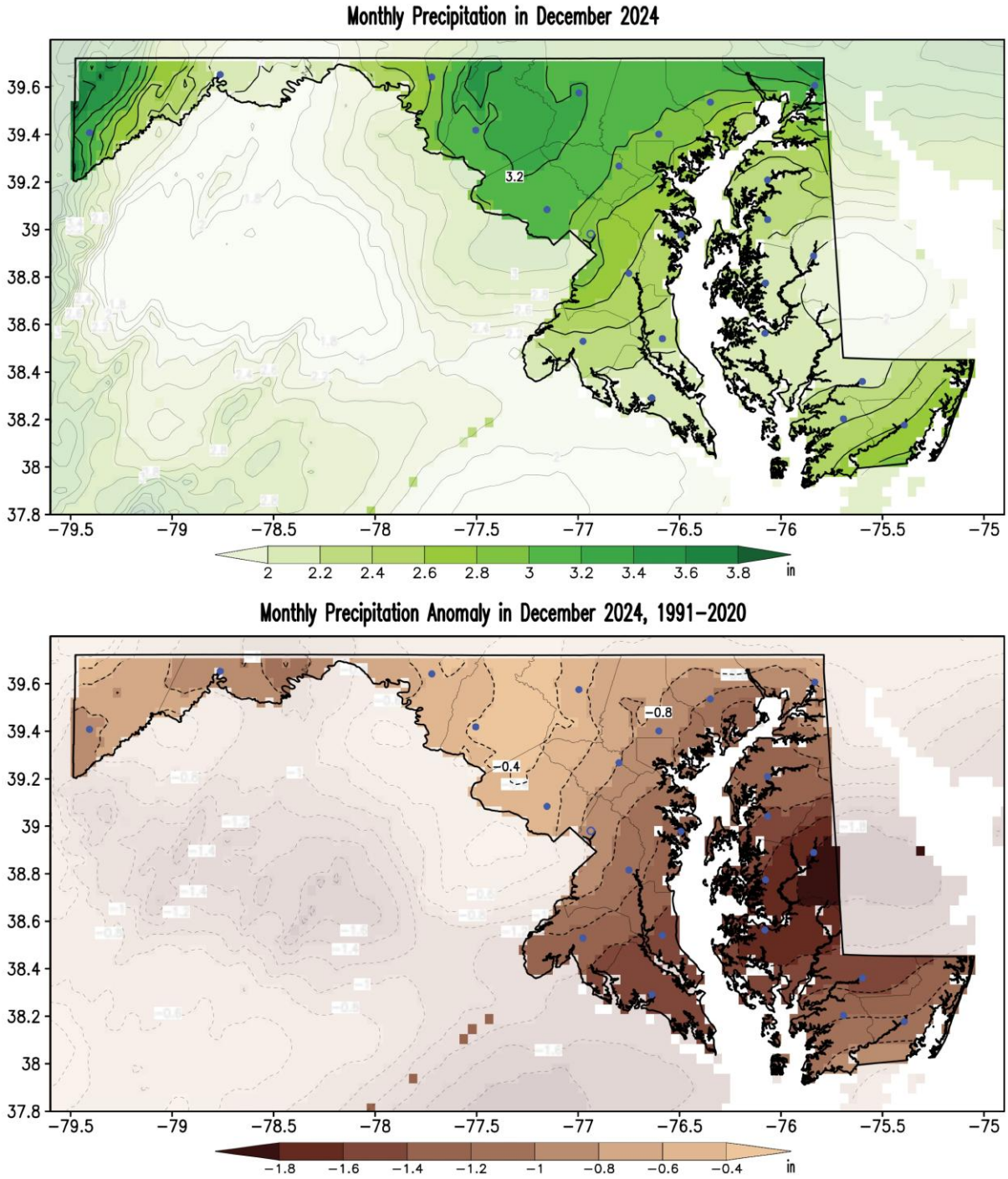

Figure 4. Monthly total precipitation (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for December 2024. Precipitation is in inches following the color bar. Brown shading in the anomaly map marks drier than normal conditions. Note shading outside the state has been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

E. Drought

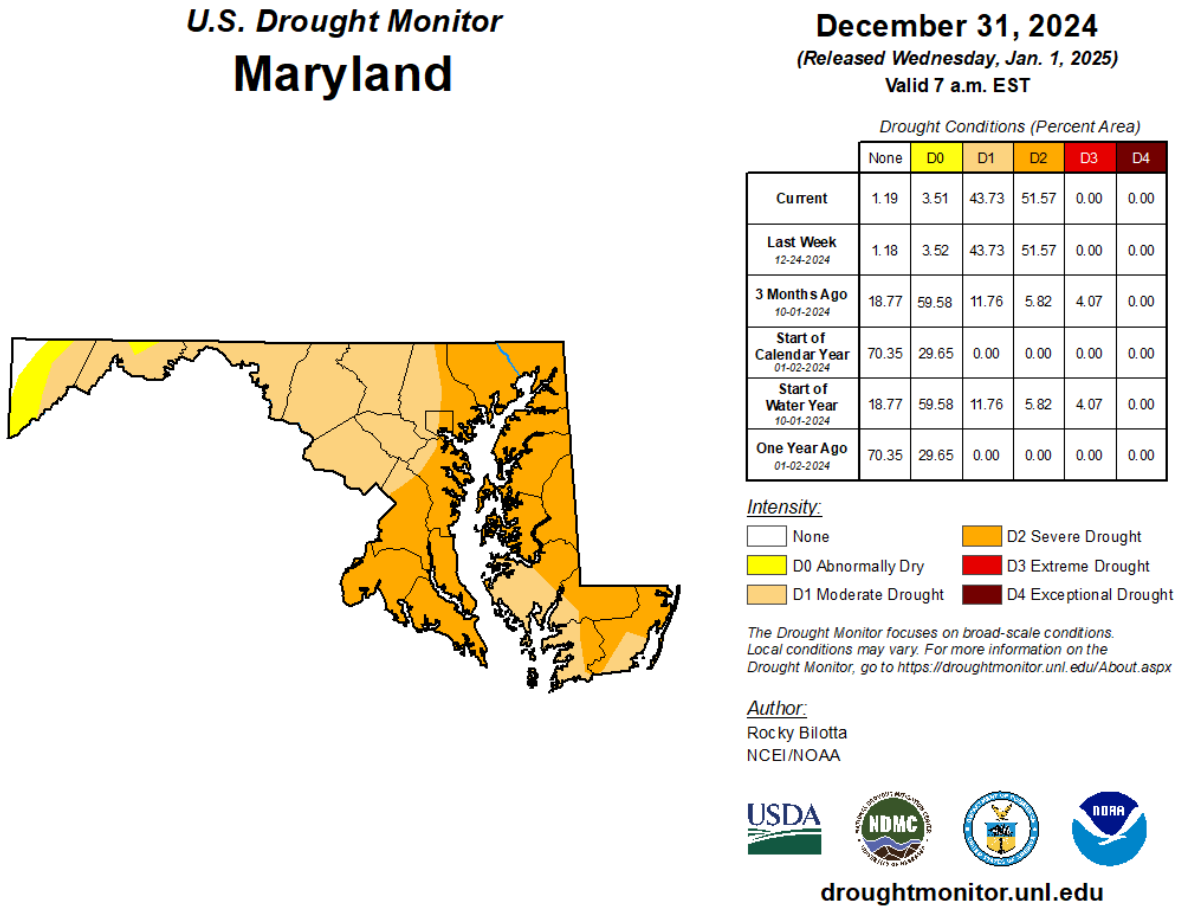

Figure 5. Drought conditions as reported by the U.S. Drought Monitor on December 31, 2024. At this time, around 99% of the state is under some drought category. Drought conditions in Garrett County improved from the severe drought of November to no drought, abnormally dry, and moderate drought conditions. Extreme drought conditions are no longer present, but moderate to severe drought conditions still affect 95% of the state. Yellow shading indicates abnormally dry regions, light orange shading shows regions under a moderate drought, and darker orange shading 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) highlight land that may experience low water supply and damage to crops and pastures. Orange areas (Severe Drought) show land with water shortages and an increased likelihood of crop and pasture losses. Current conditions can be monitored from the U. S. Drought Monitor website.

F. Streamflow

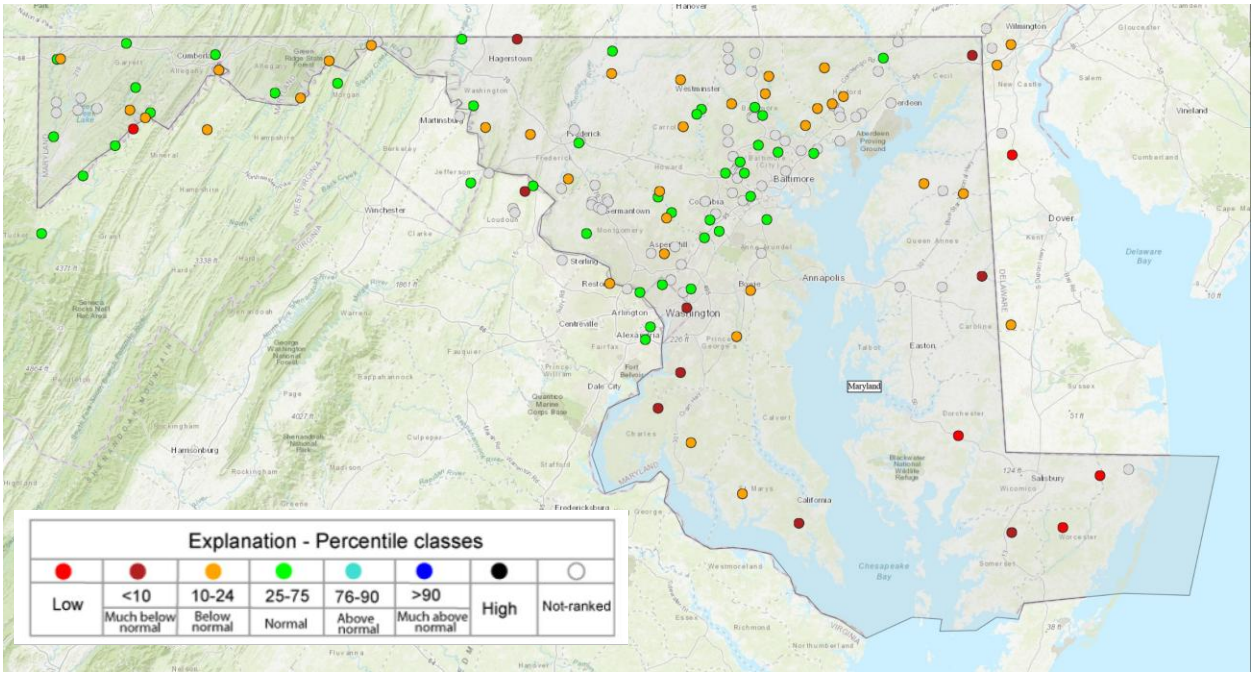

Figure 6. Monthly averaged streamflow class anomalies as reported by the U.S. Geological Survey (USGS) Water Watch for December 2024. Orange to red-filled circles denote below-normal streamflow conditions, cyan to black-filled circles denote above-normal streamflow conditions, and green-filled circles represent normal streamflow conditions. Streams and rivers had below-normal streamflow in the severe drought areas along both sides of the Bay and western counties. Current conditions can be monitored from the U. S. Geological Survey website.

4. December and OND 2024 Climate Divisions Averages

A. December 2024 Scatter Plots

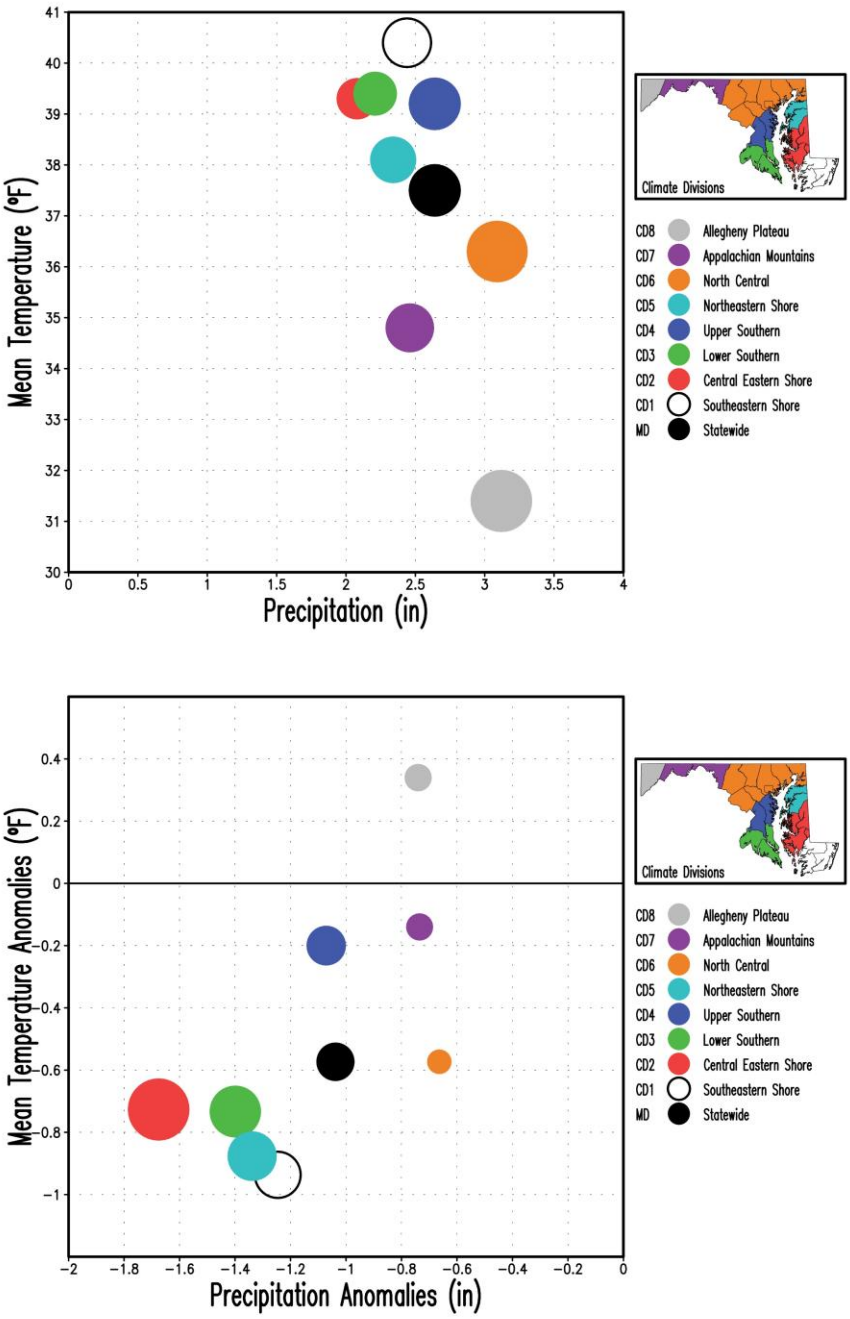

Figure 7. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for December 2024. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect to the 1991-2020 climatology. 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 (3.12 inches in CD8, top panel) and by the maximum precipitation anomaly (|−1.68| 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. October – December 2024 Scatter Plots

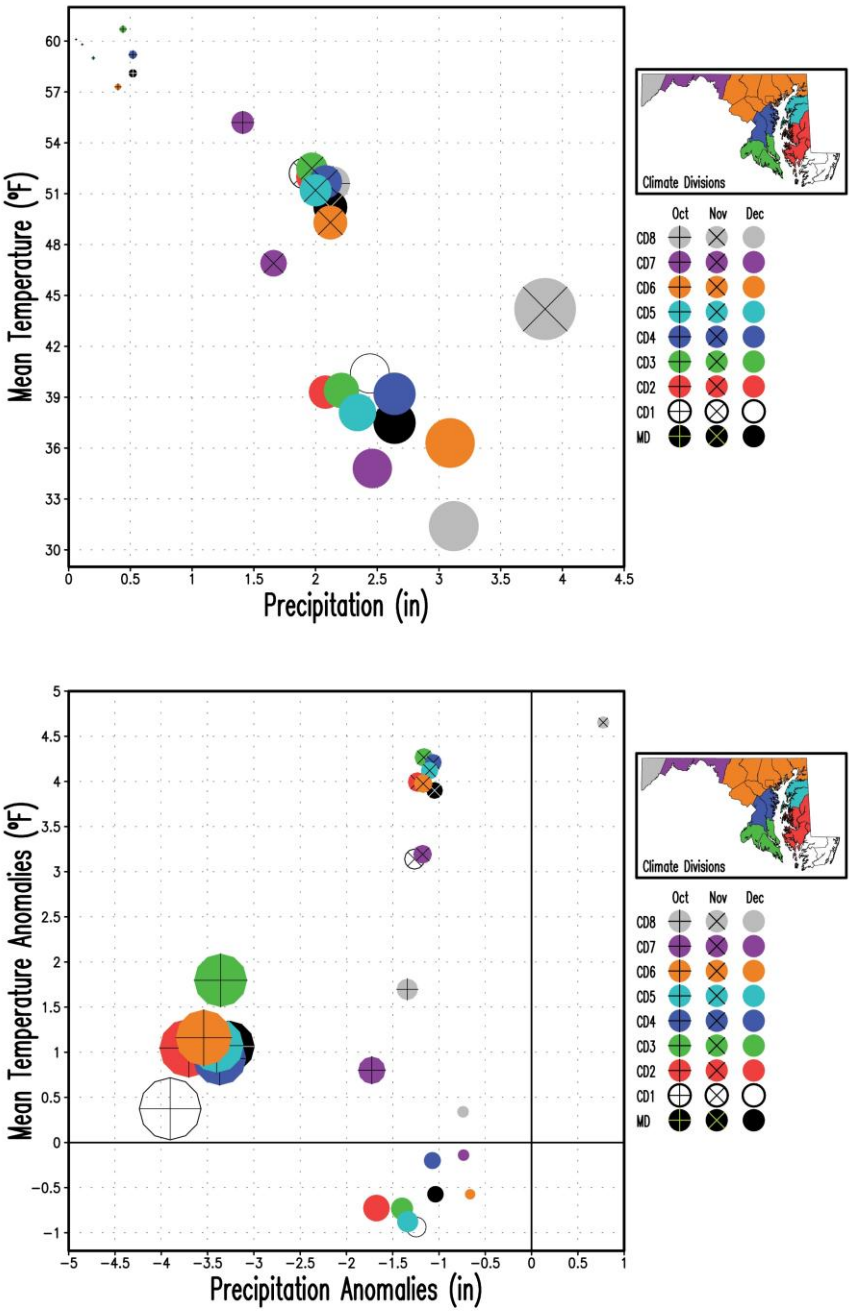

Figure 8. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for October, November, and December 2024. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect 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 (3.86 inches in CD8 in November, top panel) and by the maximum precipitation anomaly (|−3.90| inches in CD1 in October, bottom panel) among the nine regions and three months. December is displayed with filled circles only, while November and October are displayed with superposed multiplication and addition signs, respectively.

5. Extremes

A. Freezing Days

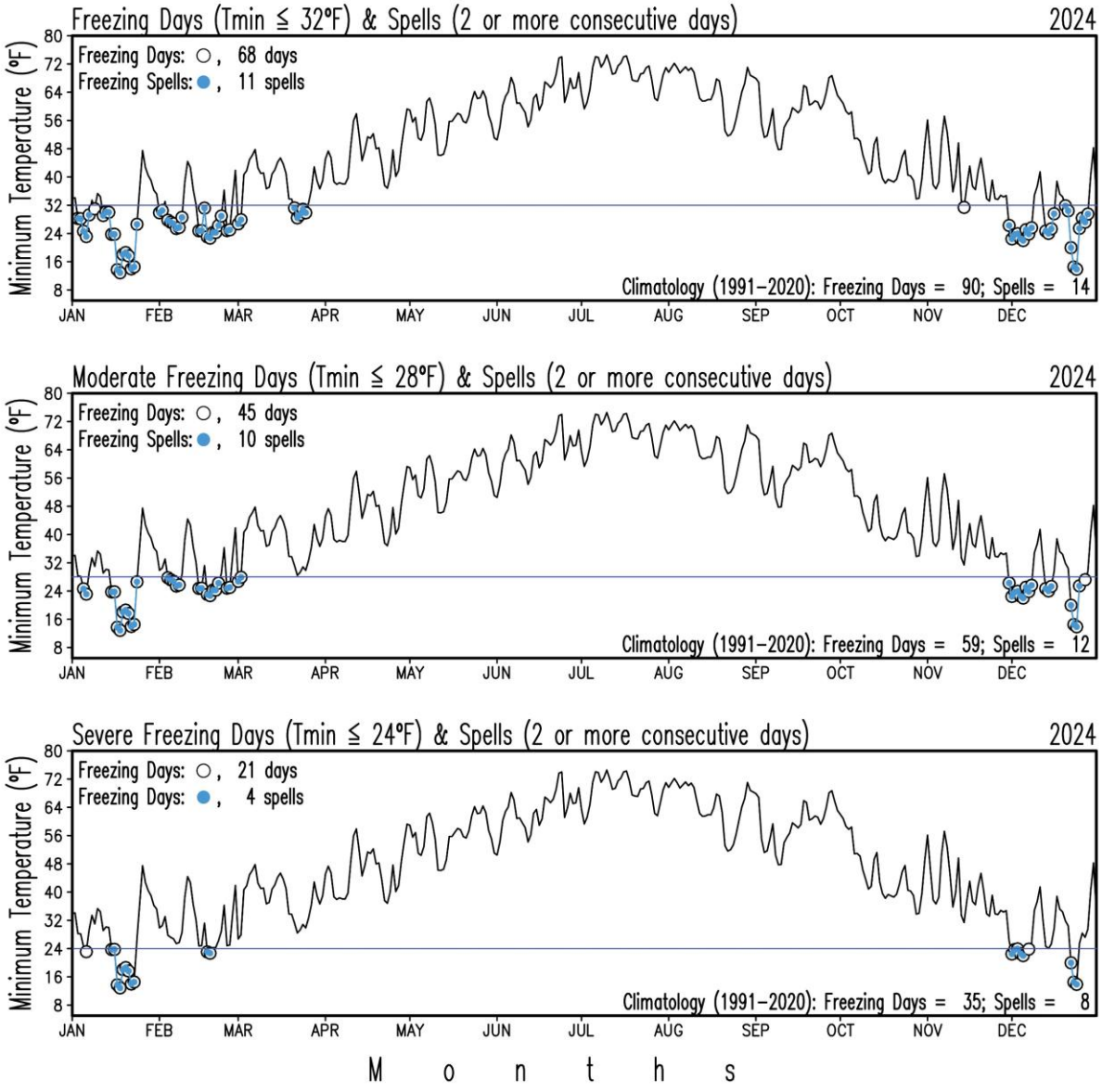

Figure 9. Maryland (statewide) number of freezing days, and their consecutive occurrence for the period January 1 - December 31, 2024. The panels show freezing days in open circles and spells of freezing days in blue-filled circles from statewide daily minimum temperatures. The upper panel displays freezing days and spells when statewide daily minimum temperatures are equal to or below 32°F. The middle panel shows freezing days and spells when statewide daily minimum temperatures are equal to or lower than 28°F. The lower panel shows freezing days and spells when statewide daily minimum temperatures are equal to or below 24°F. The blue line in each panel marks the threshold temperatures of 32°F, 28°F, and 24°F for each case. Figures at the county and climate division level and summary tables can be found on the MDSCO website.

B. Extreme Precipitation and Dry Spells

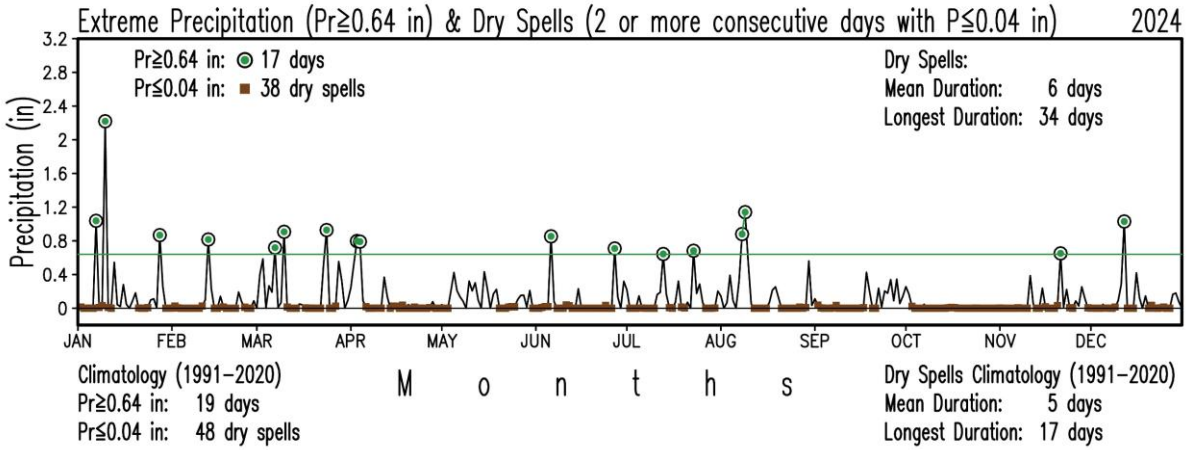

Figure 10. Maryland (statewide) number of days with extreme precipitation and dry day spells for the period January 1 - December 31, 2024. Extreme precipitation days (precipitation equal to or larger than 0.64 in) are identified by the green-filled circles. Dry spells (consecutive days with daily total precipitation less than or equal to 0.04 in) are shown by brown-filled squares. Both extremes are identified from the statewide area-averaged total daily precipitation. Figures at the county and climate division level and summary tables can be found on the MDSCO website.

6. December 2024 Statewide Averages in the Historical Record

A. Box and Whisker Plots

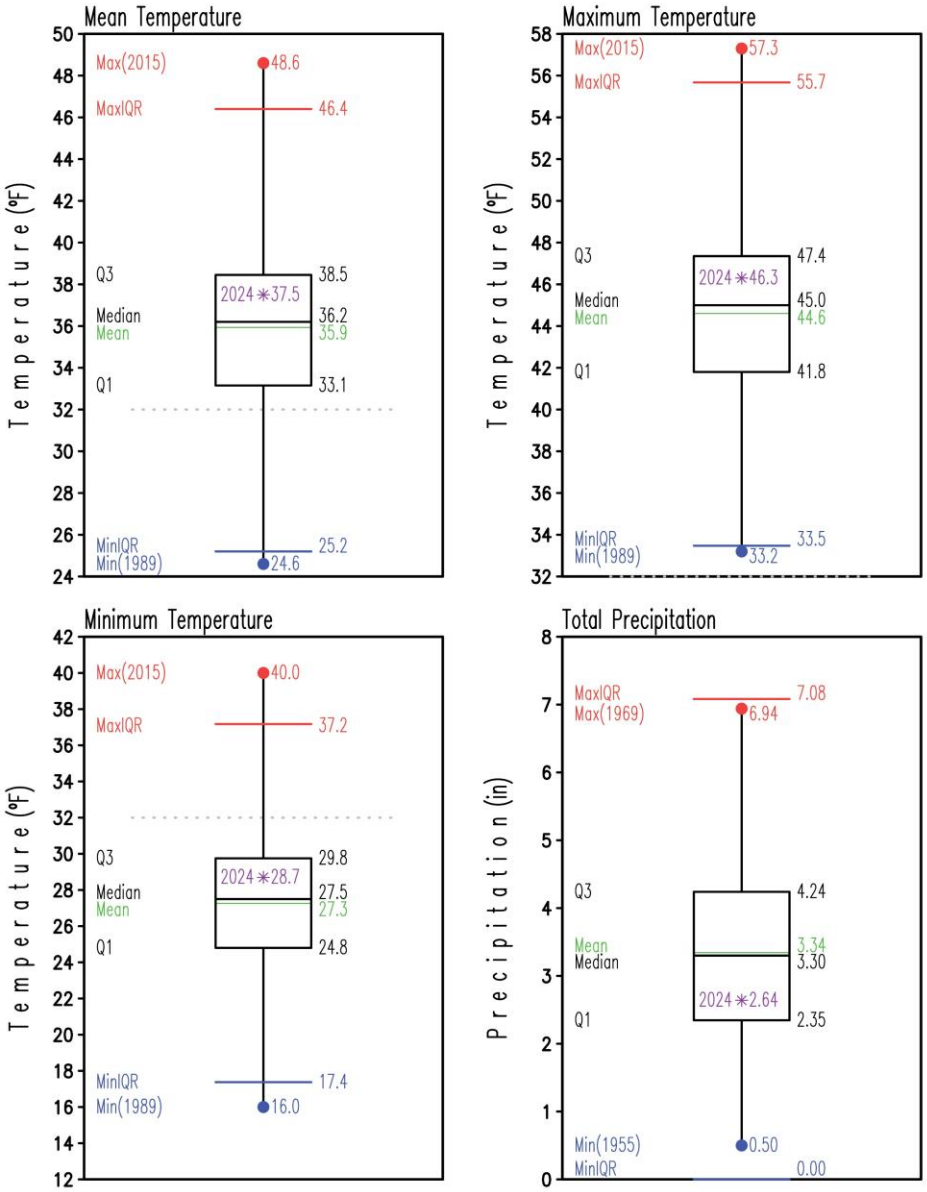

Figure 11. Box and Whisker plots of Maryland (statewide) monthly mean (upper left), maximum (upper right), minimum (lower left) surface air temperatures, and total precipitation (lower right) for December for the period 1895-2023. The label and asterisk in purple represent conditions for December 2024. 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. For reference, the 32°F temperature is displayed with a horizontal dotted, gray 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.

7. 1895-2024 December Trends

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

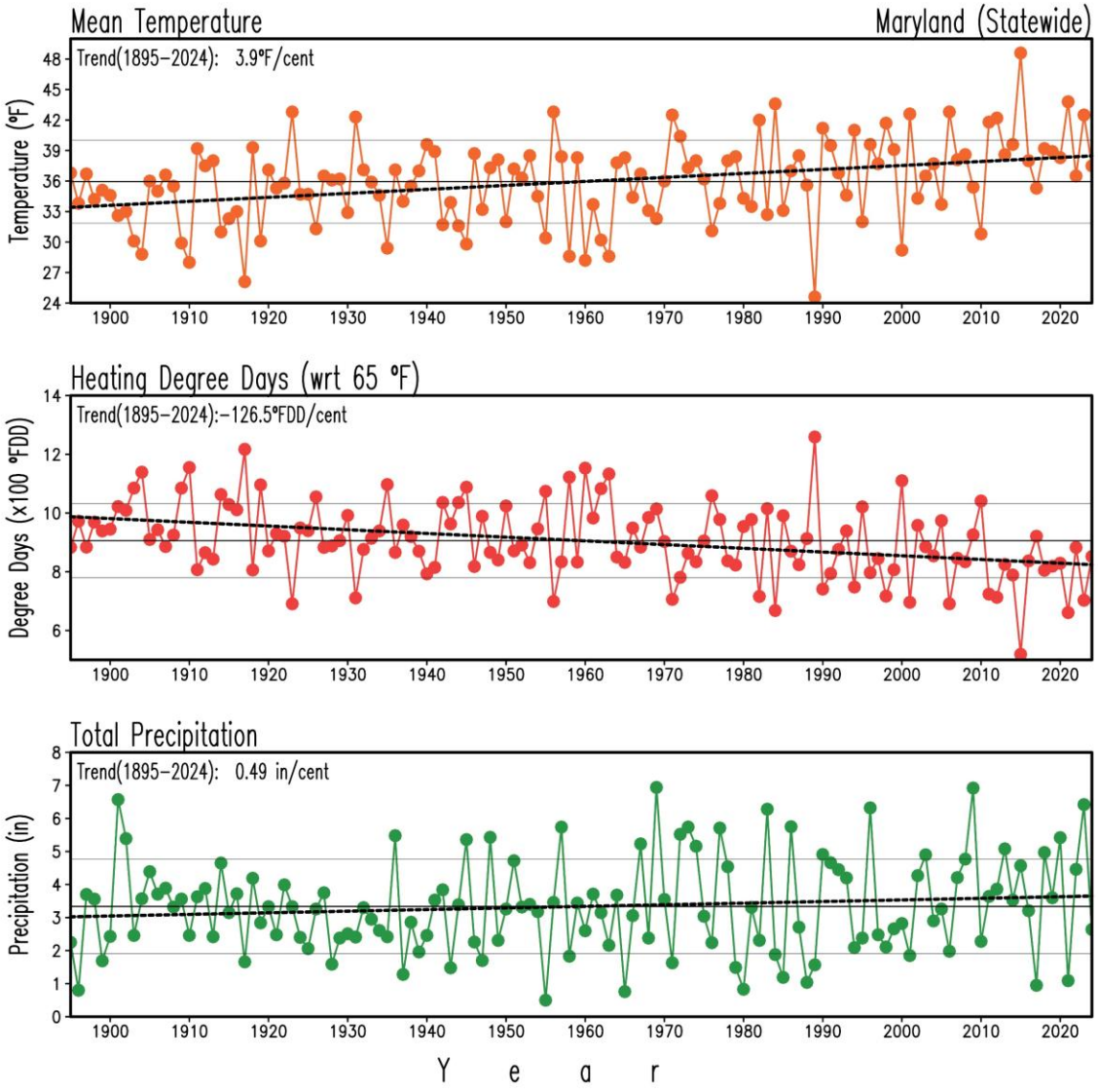

Figure 12. Maryland (statewide) mean surface air temperature, heating degree days, and precipitation in December for the period 1895-2024. Temperature is in °F, heating degree-days is in °F degree-days (°FDD), and precipitation is in inches. The thin, continuous black lines in each panel display the long-term means (35.9°F, 905.8°FDD and 3.34 in, 1895-2024), and the double thin, continuous gray lines indicate the standard deviation (4.1°F, 126.3°FDD and 1.43 in) above/below the long-term mean. The thick dashed black lines show the long-term linear trend. The warming temperature trend (3.9°F/century), and the decreasing heating degree-days trend (−126.5°FDD/century) are statistically significant at the 95% level (*Student's t-test* −Santer et al. 2000), but not the precipitation wetting trend (0.49 in/century).

B. Temperature and Precipitation Maps

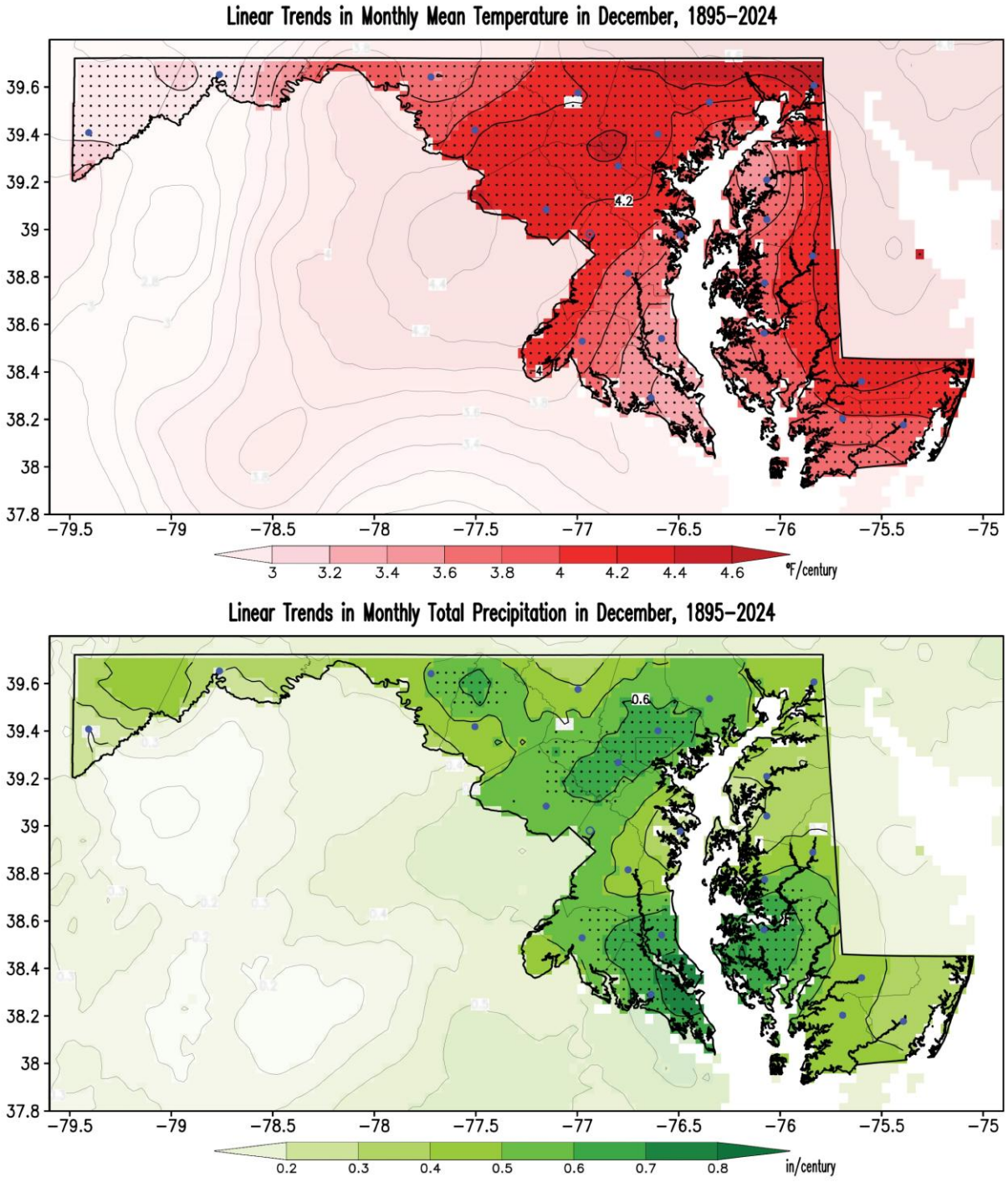

Figure 13. Linear trends in surface air mean temperature and precipitation in December for the period 1895-2024. Temperatures are in °F/century, and precipitation is in inches/century following the color bars. Red shading in the temperature map marks warming trends. Green shading in the precipitation 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. December 2024 Data Tables: Statewide, Climate Divisions, and Counties

A. Mean Temperature and Precipitation

Region	Mean Air Temperature (°F)	Rank (#)
Statewide	37.5	83
Climate Division 1	40.4	78
Climate Division 2	39.3	79
Climate Division 3	39.4	78
Climate Division 4	39.2	87
Climate Division 5	38.1	75
Climate Division 6	36.3	85
Climate Division 7	34.8	88
Climate Division 8	31.4	85
Allegany	34.2	83
Anne Arundel	39.5	88
Baltimore	36.4	82
Baltimore City	38.7	85
Calvert	39.3	77
Caroline	38.6	79
Carroll	35.2	87
Cecil	36.4	78
Charles	39.2	79
Dorchester	39.6	78
Fredrick	35.7	88
Garrett	31.4	85
Harford	35.8	70
Howard	37.0	89
Kent	37.9	75
Montgomery	37.4	87
Prince George's	39.0	87
Queen Anne's	38.4	76
Saint Mary's	39.7	77
Somerset	40.6	78
Talbot	39.5	82
Washington	35.3	88
Wicomico	39.8	75
Worcester	40.8	79

Region	Total Precipitation (in)	Rank (#)
Statewide	2.64	49
Climate Division 1	2.44	39
Climate Division 2	2.08	27
Climate Division 3	2.21	29
Climate Division 4	2.64	48
Climate Division 5	2.34	34
Climate Division 6	3.09	60
Climate Division 7	2.46	53
Climate Division 8	3.12	54
Allegany	2.13	44
Anne Arundel	2.59	47
Baltimore	2.99	54
Baltimore City	2.87	54
Calvert	2.26	32
Caroline	2.03	25
Carroll	3.20	65
Cecil	3.08	58
Charles	2.28	37
Dorchester	2.09	28
Fredrick	3.26	69
Garrett	3.12	55
Harford	2.93	49
Howard	3.05	60
Kent	2.42	38
Montgomery	3.10	65
Prince George's	2.68	50
Queen Anne's	2.30	32
Saint Mary's	2.11	26
Somerset	2.44	44
Talbot	2.15	28
Washington	2.77	67
Wicomico	2.20	27
Worcester	2.61	42

Table A1. Monthly mean surface air temperature (left) and total precipitation (right) at Maryland (statewide), climate division, and county levels for December 2024. Temperatures are in °F, and precipitation is in inches. The rank is the order that the variable for December 2024 occupies among the 130 Decembers 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	46.3	82
Climate Division 1	50.9	97
Climate Division 2	49.0	89
Climate Division 3	48.6	81
Climate Division 4	47.9	84
Climate Division 5	46.8	77
Climate Division 6	44.5	80
Climate Division 7	42.7	73
Climate Division 8	38.6	72
Allegany	41.7	65
Anne Arundel	48.0	84
Baltimore	44.9	78
Baltimore City	46.9	88
Calvert	48.2	79
Caroline	48.5	88
Carroll	43.4	78
Cecil	44.8	81
Charles	48.5	82
Dorchester	49.4	90
Fredrick	43.5	83
Garrett	38.6	72
Harford	44.2	70
Howard	45.6	84
Kent	46.3	75
Montgomery	45.4	83
Prince George's	47.9	84
Queen Anne's	47.1	79
Saint Mary's	48.8	82
Somerset	50.6	97
Talbot	48.4	89
Washington	43.5	81
Wicomico	50.6	93
Worcester	51.3	98

Region	Minimum Air Temperature (°F)	Rank (#)
Statewide	28.7	83
Climate Division 1	30.0	59
Climate Division 2	29.6	73
Climate Division 3	30.2	83
Climate Division 4	30.5	89
Climate Division 5	29.4	80
Climate Division 6	28.1	90
Climate Division 7	26.9	97
Climate Division 8	24.1	97
Allegany	26.7	98
Anne Arundel	31.1	89
Baltimore	27.9	83
Baltimore City	30.5	83
Calvert	30.4	80
Caroline	28.7	77
Carroll	27.0	91
Cecil	28.1	82
Charles	29.9	84
Dorchester	29.8	66
Fredrick	27.9	94
Garrett	24.1	97
Harford	27.5	77
Howard	28.4	90
Kent	29.5	78
Montgomery	29.3	93
Prince George's	30.0	91
Queen Anne's	29.6	82
Saint Mary's	30.5	77
Somerset	30.5	60
Talbot	30.6	78
Washington	27.1	92
Wicomico	29.0	60
Worcester	30.2	58

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

A. Temperatures and Precipitation

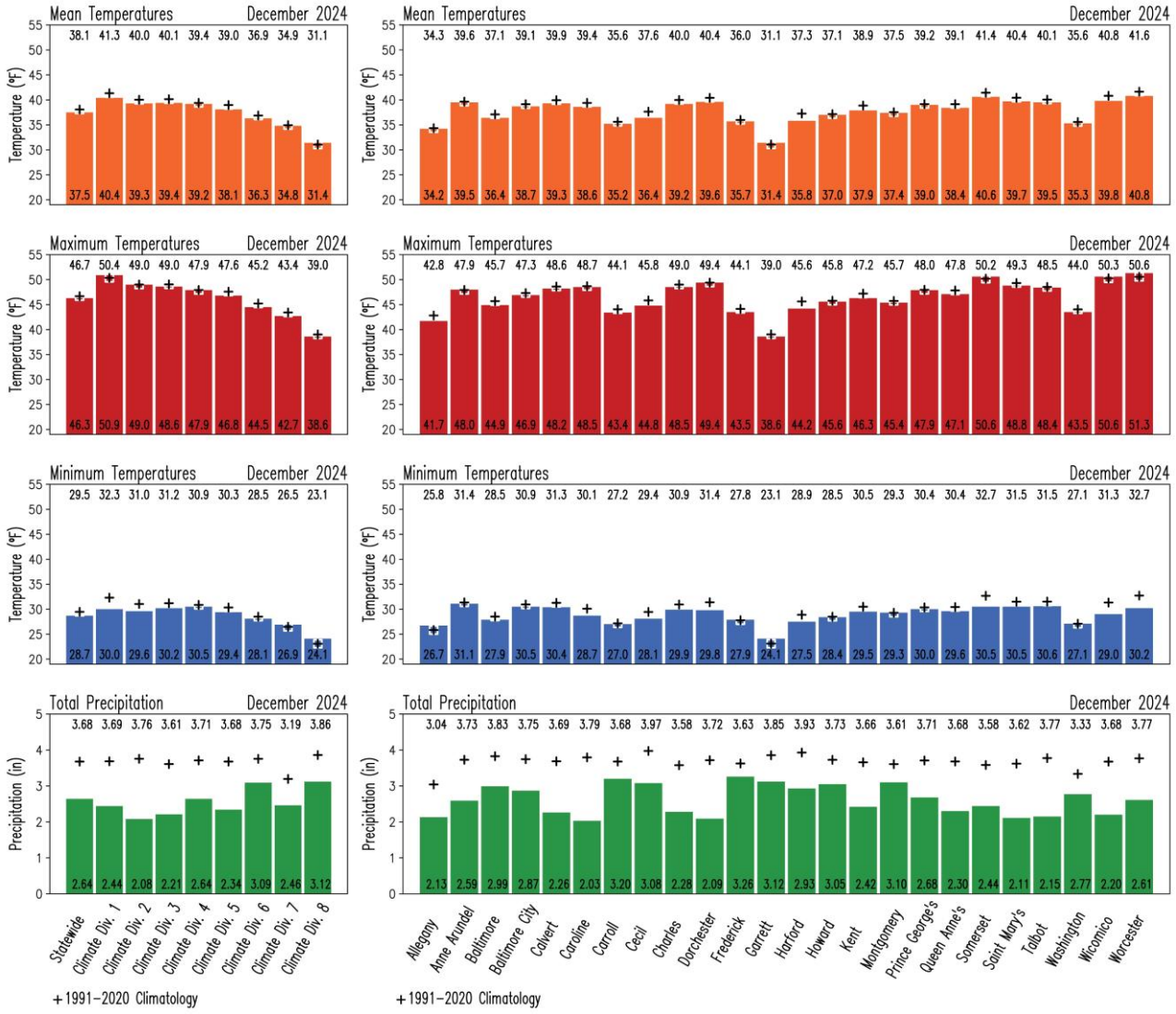

Figure B1. Monthly surface variables in Maryland for December 2024. Color bars represent the variables as follows: mean surface air temperature (orange), maximum surface air temperature (red), minimum surface air temperature (blue), and total precipitation (green) at statewide and climate division (left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

B. Temperatures and Precipitation Anomalies

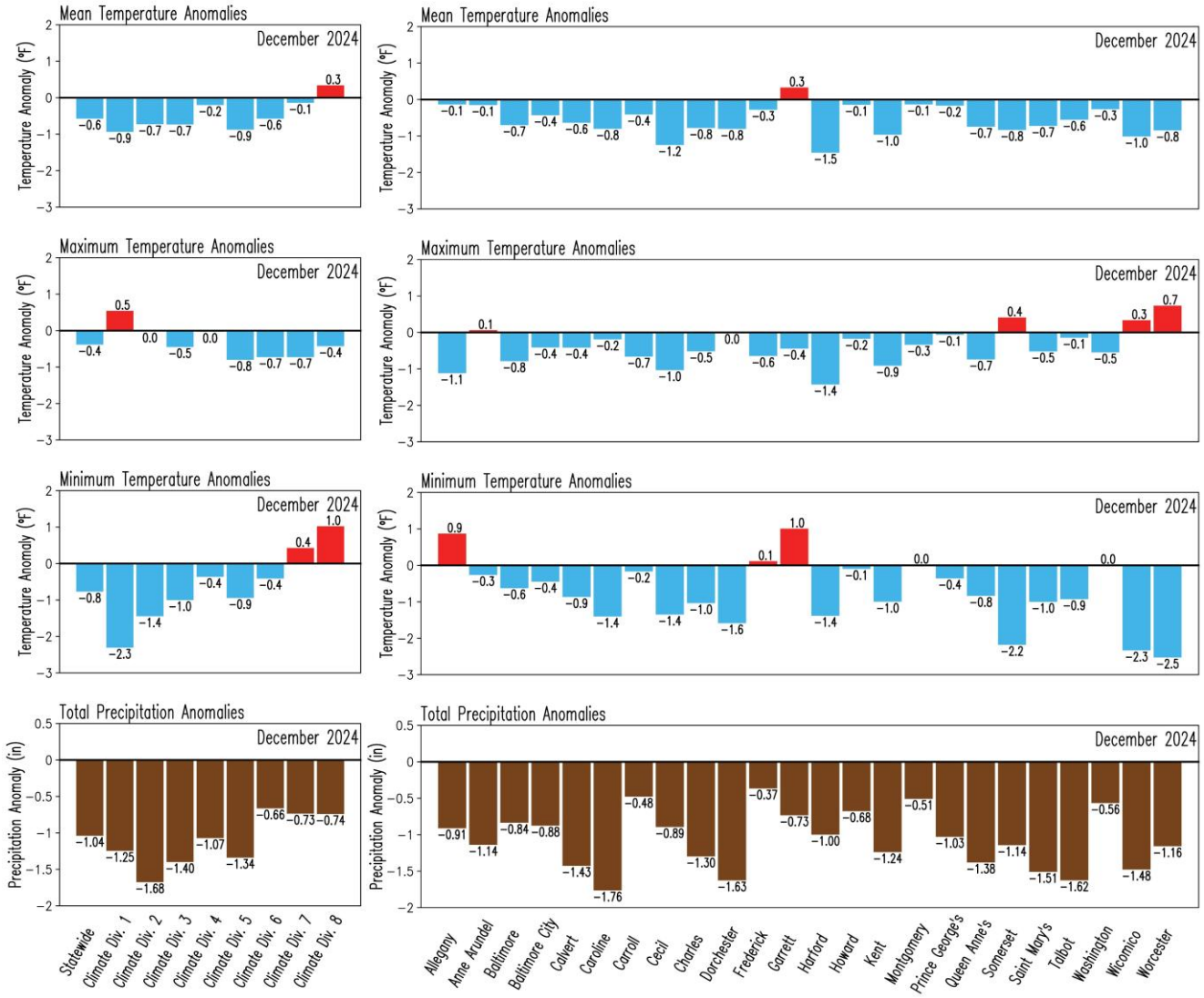

Figure B2. Anomalies of the monthly surface variables in Maryland for December 2024. Anomalies are with respect to the 1991-2020 climatology. Red/blue color represents positive/negative (warmer/colder than normal) anomalies for mean surface air temperature (upper row), maximum surface air temperature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

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

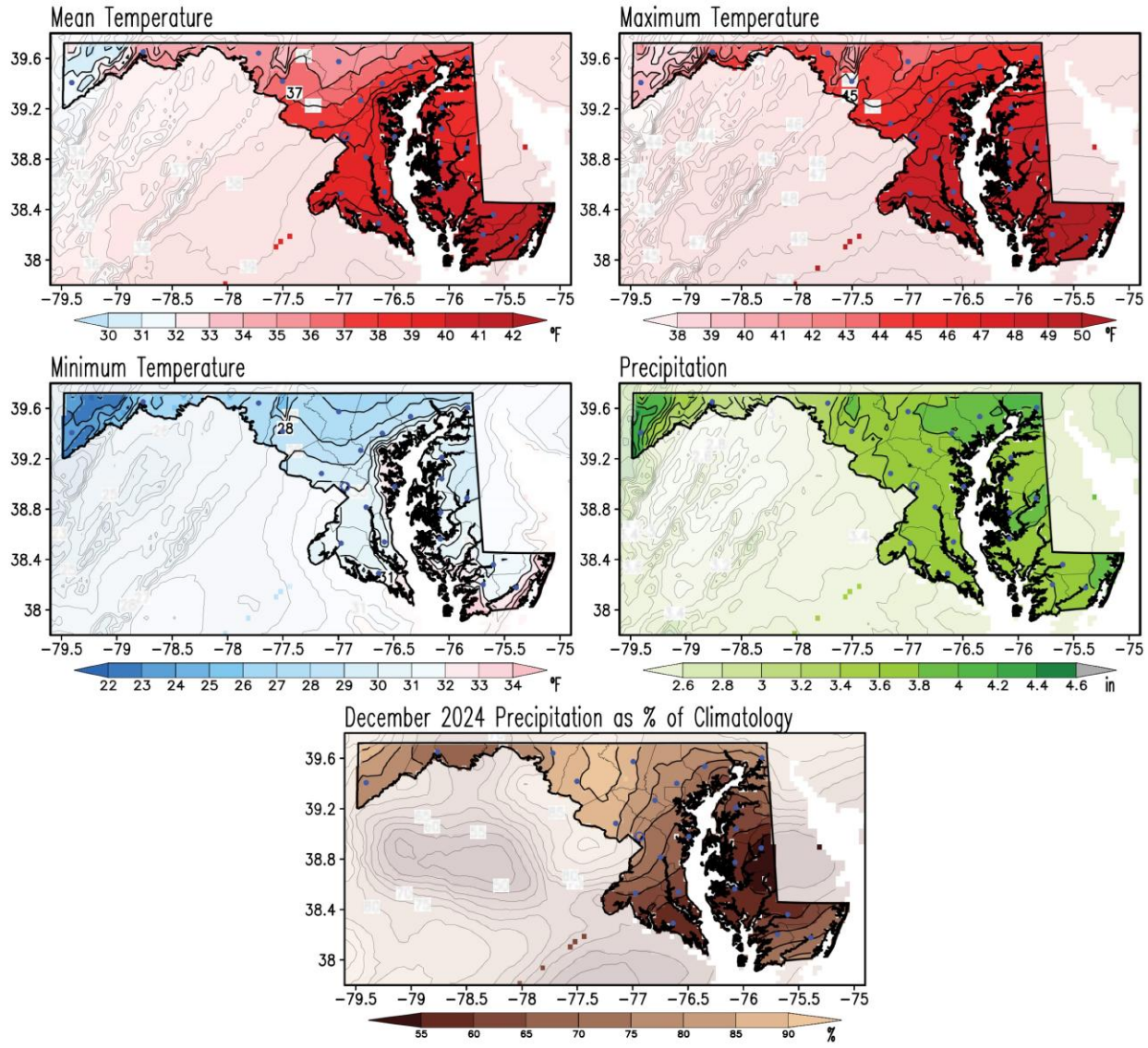

Figure C1. December climatology of the monthly mean, maximum and minimum surface air temperatures, and total precipitation for the period 1991-2020 (upper and middle rows), and precipitation in December 2024 as a percentage of climatology (bottom row). Temperatures are in °F, and precipitation is in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

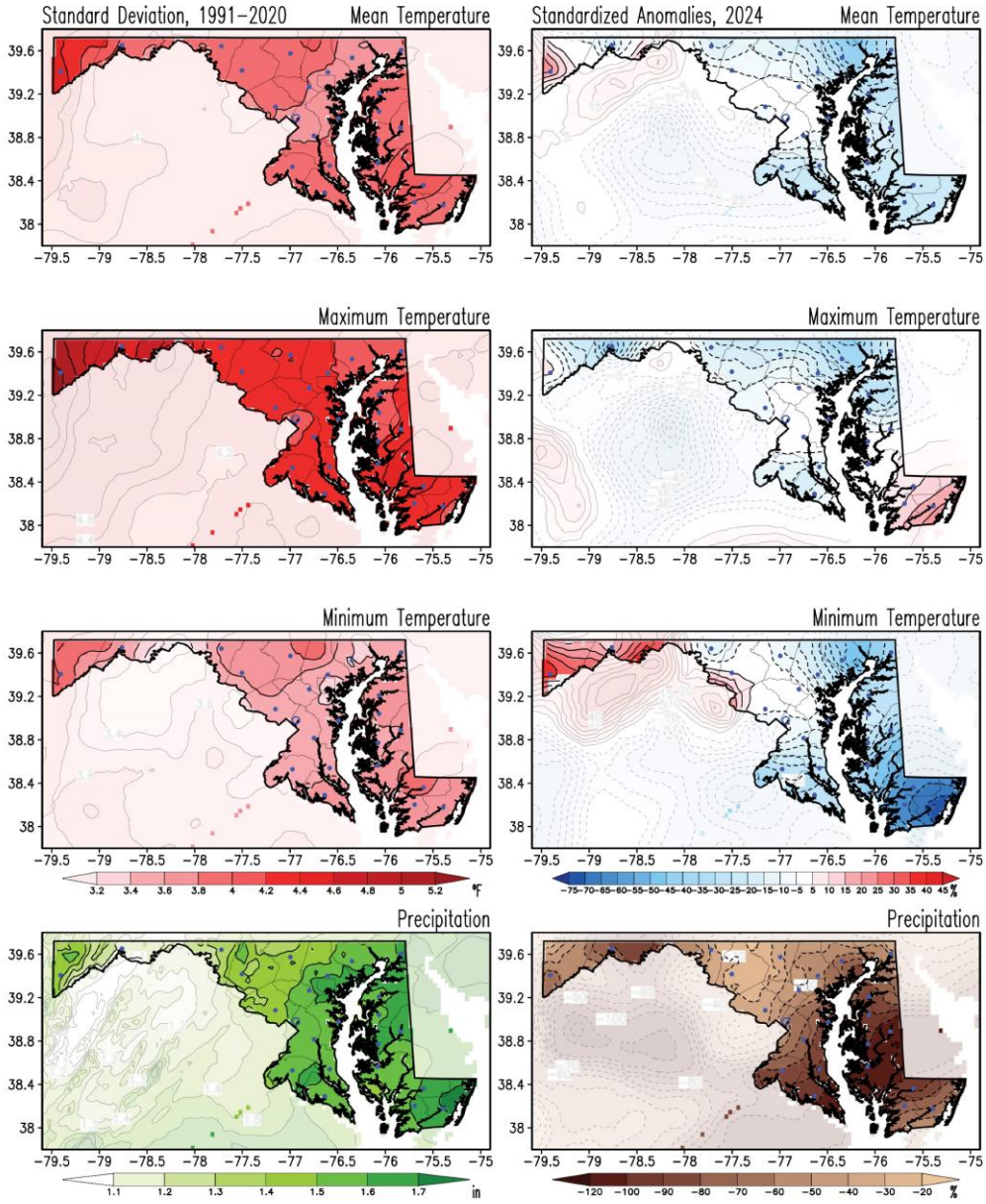

Figure D1. Standard deviation for December and standardized anomalies of temperatures and precipitation for December 2024. Standard deviations for monthly mean, maximum, and minimum surface air temperatures and total precipitation were obtained from the 1991-2020 period (left column). Anomalies for December 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 shading in the anomaly precipitation map marks drier 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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