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Maryland Climate Bulletin

November 2023

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This publication is available from:
<https://www.atmos.umd.edu/~climate/Bulletin/>



Summary

Statewide averages show that November 2023 was colder and drier than normal (i.e., 1991-2020 averages). Monthly mean temperatures were in the 38 to 49°F range; maximum temperatures were between 49 and 60°F, and minimum temperatures were in the 26 and 39°F range. Monthly total precipitation was in the 2.1 to 3.5 inches range.

Maryland Regional Features (Figures 1-5, C1, and D1)

- Mean temperature was colder than normal almost everywhere, especially over portions of Washington, Harford, Cecil, and Kent counties (above 1.8°F). The mean temperature was slightly above normal over the southern tips of Saint Mary's and Calvert counties.
- Maximum temperature, on the other hand, was warmer than normal over large areas of the state, particularly over Garret County (around 1.8°F) and parts of Montgomery, Carroll, Baltimore, Howard, Anne Arundel, Prince George's, Dorchester, Wicomico, Somerset, Saint Mary's and Calvert counties (above 0.9°F). Below-normal maximum temperatures were found over Washington, Harford, Cecil, and Kent counties (around 0.6°F).
- Minimum temperature was colder than normal everywhere, especially over Garrett, Washington, Harford, Cecil, and Kent counties (above 3.6°F).
- Precipitation was below normal almost everywhere, particularly over the eastern shore counties of Caroline, Dorchester, Wicomico, Somerset, and Worcester (above 0.8 in), and the northern central counties of the Piedmont, especially over Montgomery, Frederick, Carroll, Howard, and Baltimore counties (above 0.6 in). Precipitation was slightly above normal over southern Harford, Cecil, and Kent counties. This was the second month in a row with below-normal precipitation over the drought-impacted regions of the Piedmont and coastal plains.
- The extent of the surface in the state under drought conditions increased from around 52% at the end of October to around 90% at the end of November. This increase in the extent of drought conditions is largely due to the increase in moderate drought conditions, which only occupied around 3% of the state at the end of last month. Moderate drought conditions have spread to practically all the Piedmont, the coastal counties west of the Bay, and portions of Dorchester, Somerset, and Worcester counties. At the same time, severe drought conditions expanded over the Blue Ridge. Abnormally dry conditions have extended over western Maryland, Montgomery, Prince George's, Charles counties, and the coastal counties of the eastern shore. The persistence of below-normal precipitation over almost the whole state seems to be behind the worsening drought conditions.



Maryland Climate Divisions (Figures 6-7, B1, and B2)

- All eight climate divisions were colder and drier than normal in November.
- The statewide temperature was colder than normal after being warmer than normal since August. On the other hand, the statewide precipitation anomalies have been below normal since October.

Historical Context (Figure 8, Tables A1 and A2)

- Mean and maximum statewide temperatures in November (45.4, 56.7°F) were above the long-term (1895-2022) averages, while the minimum temperature was below it (34.2°F). November's precipitation (2.69 in) was slightly below the long-term average. None of them were close to the records.

Century-Plus Trends, 1895-2023 (Figures 9, 10)

- Statewide mean temperature and heating degree days in November showed significant trends: a warming trend (2.4°F/century) and a decreasing trend (−75.36°FDD/century), respectively. Statewide precipitation had a significant wetting trend (0.64 in/century).
- Regionally, November mean temperatures showed significant warming trends everywhere in the state. Notably, the largest trend is between northeastern Howard County and southwestern Baltimore County (3.0°F/century). Trends around 2.6°F/century are also evident over counties of the Piedmont from Montgomery to Cecil counties and portions of Charles, Prince George's, Wicomico, and Worcester counties.
- Regionally, November precipitation had significant wetting trends over large regions in the state. In particular, over Baltimore City, south-central Baltimore, Howard counties, and portions of Calvert and Saint Mary's counties (0.8 in/century). Significant trends of around 0.6 in/century are found over counties of the Piedmont from Montgomery to Baltimore counties, parts of Allegany, Washington, Frederick counties, Charles, southern Prince George's, Dorchester, Wicomico, and Somerset counties.



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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 November 2023 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 (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.

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), which is available in a preliminary status at <https://www.ncei.noaa.gov/data/nclimgrid-monthly/access/>
Data was downloaded on 12/14/2023.
- NOAA Monthly U.S. Climate *Divisional* Dataset (NClimDiv – Vose et al. 2014), which is available in a preliminary status (v1.0.0-20231206) at: <https://www.ncei.noaa.gov/pub/data/cirs/climdiv/>
Data was downloaded on 12/11/2023.



The drought conditions are from the U.S. Drought Monitor website:

<https://droughtmonitor.unl.edu/Maps/MapArchive.aspx>

Some definitions:

About the anomalies: Anomalies for a given month (e.g., November 2023) are the departures of the monthly value from the corresponding month's 30-year average (i.e., from the average of 30 Novembers) 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*.



3. November 2023 Maps

A. Mean Temperatures

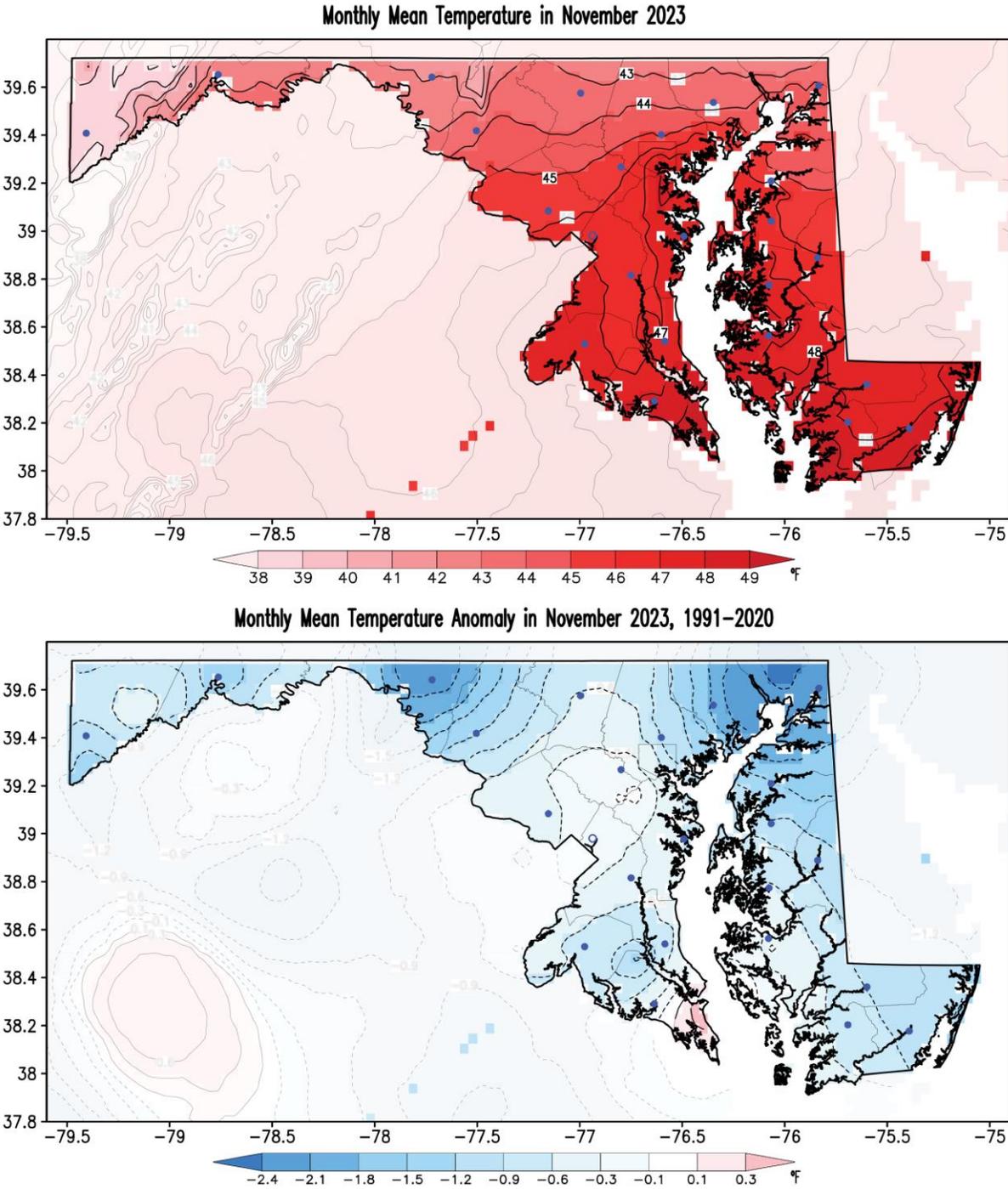


Figure 1. Monthly mean surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for November 2023. Temperatures are in °F following the color bar. Blue/red shading in the anomaly map marks colder/warmer than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

B. Maximum Temperatures

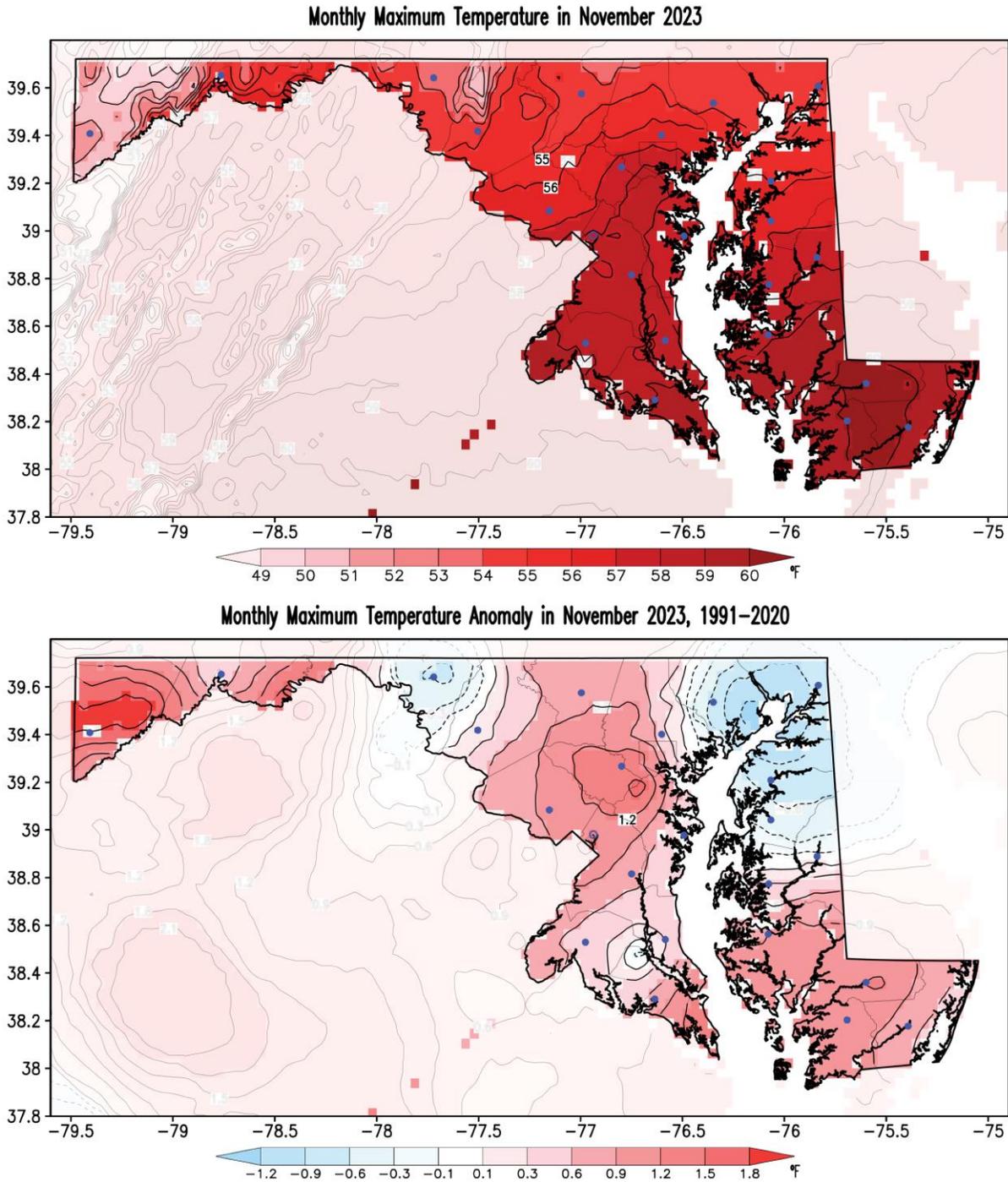


Figure 2. Monthly maximum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for November 2023. Temperatures are in °F following the color bar. Blue/red shading in the anomaly map marks colder/warmer than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.



C. Minimum Temperatures

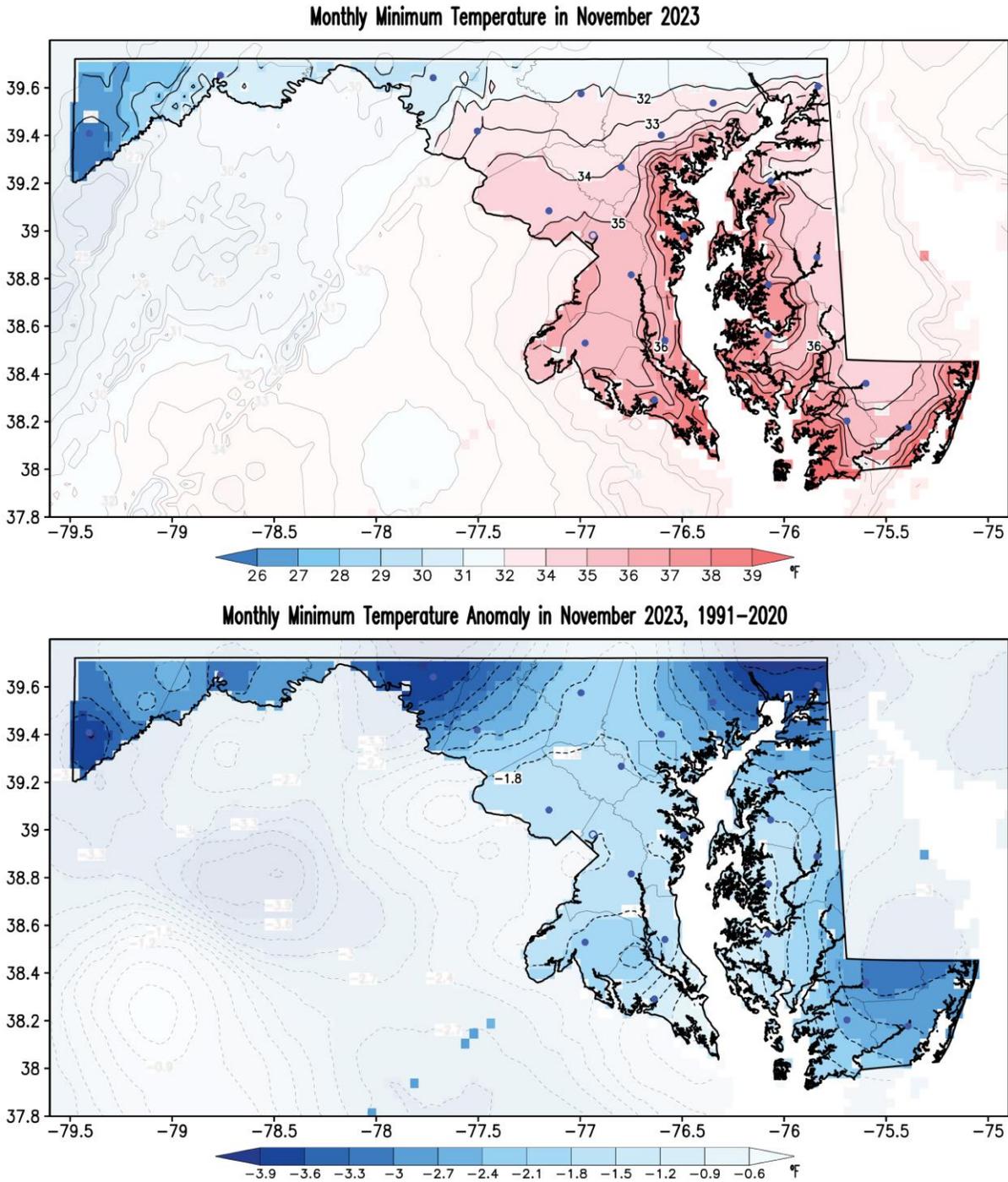


Figure 3. Monthly minimum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for November 2023. Temperatures are in °F following the color bar. Blue/red shading in the temperature map shows temperatures below/above 32°F, while blue shading in the anomaly map marks colder 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

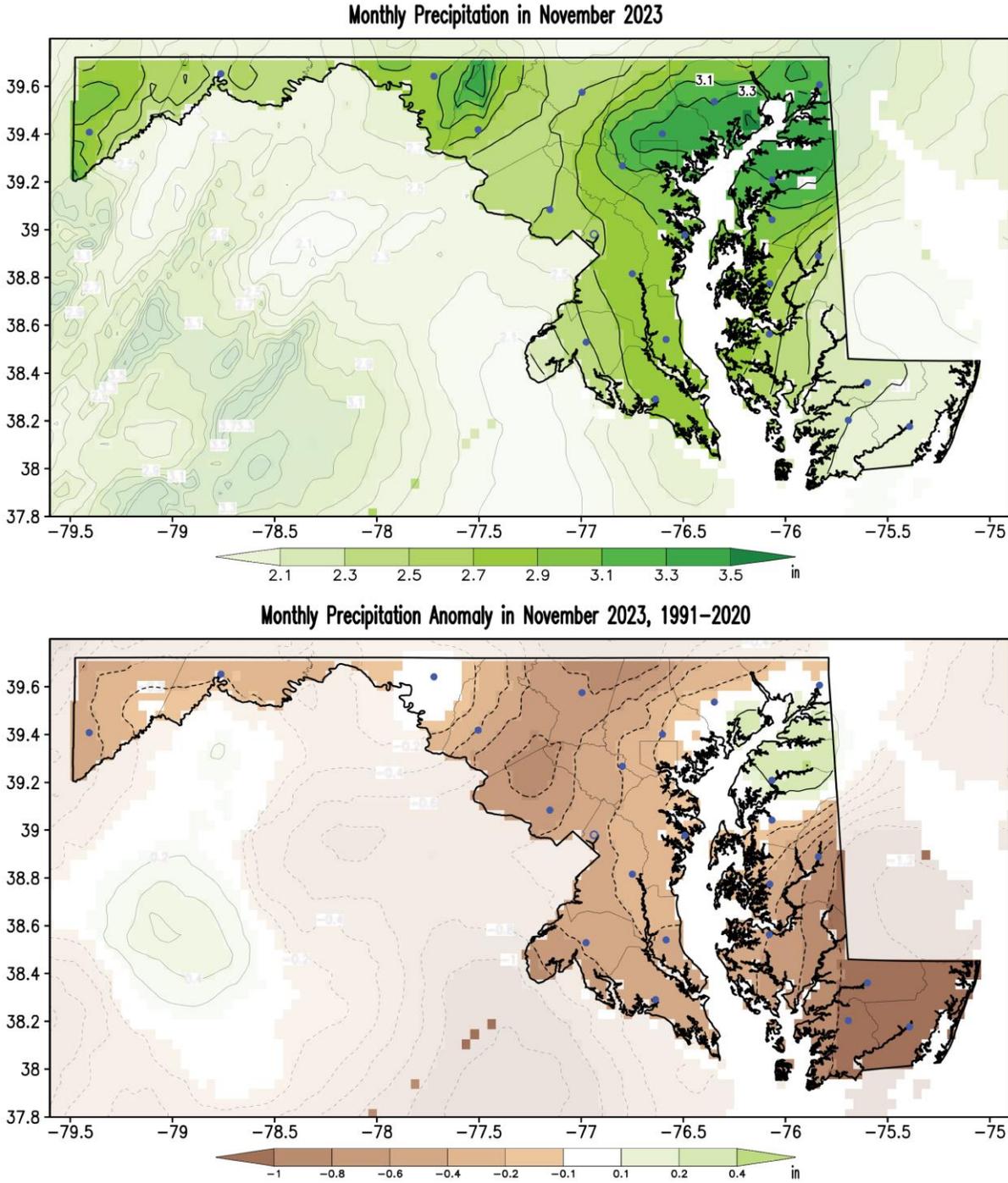


Figure 4. Monthly total precipitation (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for November 2023. Precipitation is in inches following the color bar. Brown/green shading in the anomaly map marks drier/wetter than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.



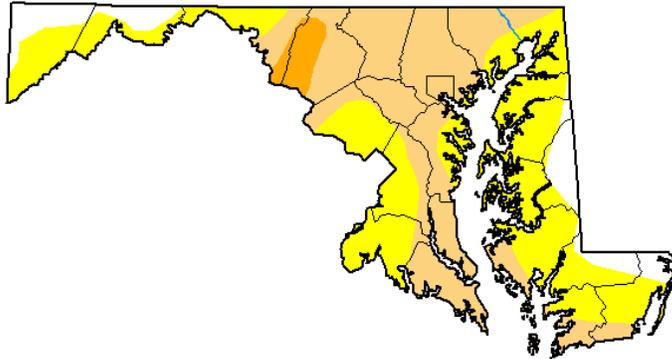
E. Drought

**U.S. Drought Monitor
Maryland**

November 28, 2023

(Released Thursday, Nov. 30, 2023)

Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0	D1	D2	D3	D4
Current	10.43	46.13	40.18	3.26	0.00	0.00
Last Week 11-21-2023	5.89	41.96	48.93	3.22	0.00	0.00
3 Months Ago 08-29-2023	73.72	10.49	15.78	0.00	0.00	0.00
Start of Calendar Year 01-03-2023	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-26-2023	63.11	33.59	2.83	0.47	0.00	0.00
One Year Ago 11-29-2022	92.80	7.20	0.00	0.00	0.00	0.00

Intensity:

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

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

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Western Regional Climate Center



droughtmonitor.unl.edu

Figure 5. Drought conditions as reported by the U.S. Drought Monitor on November 28, 2023. Yellow shading indicates *abnormally dry* regions, light orange shading shows regions under *moderate drought*, and darker orange shows areas under *severe drought*. Numbers in the table indicate the percentage of the state covered under the particular drought condition at the cited time in the left column. At this time, 89.57% of the state was under some drought category, which was an increase of around 38% with respect to the beginning of the month. This increase in the extent of drought conditions is largely due to the increase in moderate drought conditions which occupied around 3% of the state at the end of last month.



4. November and SON 2023 Climate Divisions Averages

A. November 2023 Scatter Plots

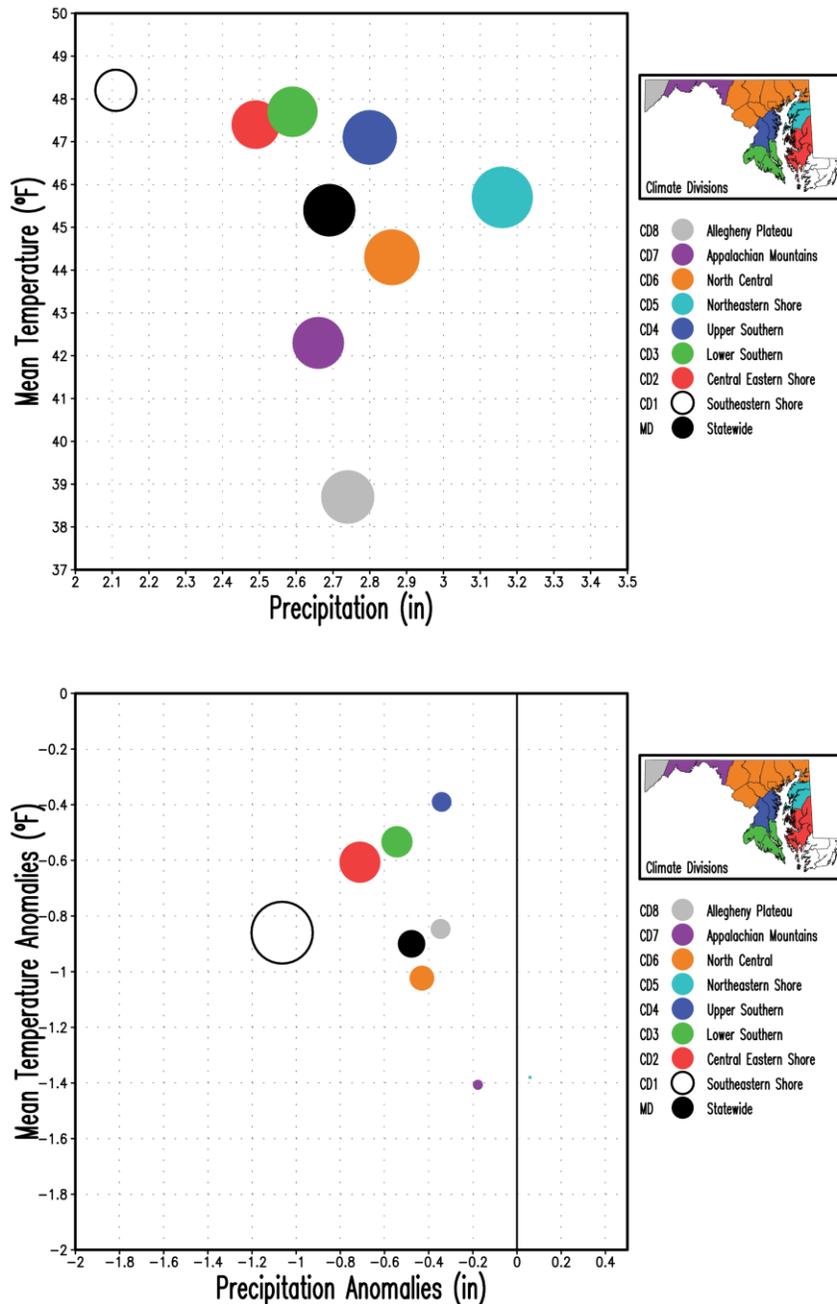


Figure 6. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for November 2023. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect to the 1991-2020 climatology. 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 (3.16 inches in CD5, top panel) and by the maximum precipitation anomaly (|-1.06| inches in CD1, 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. September-November 2023 Scatter Plots

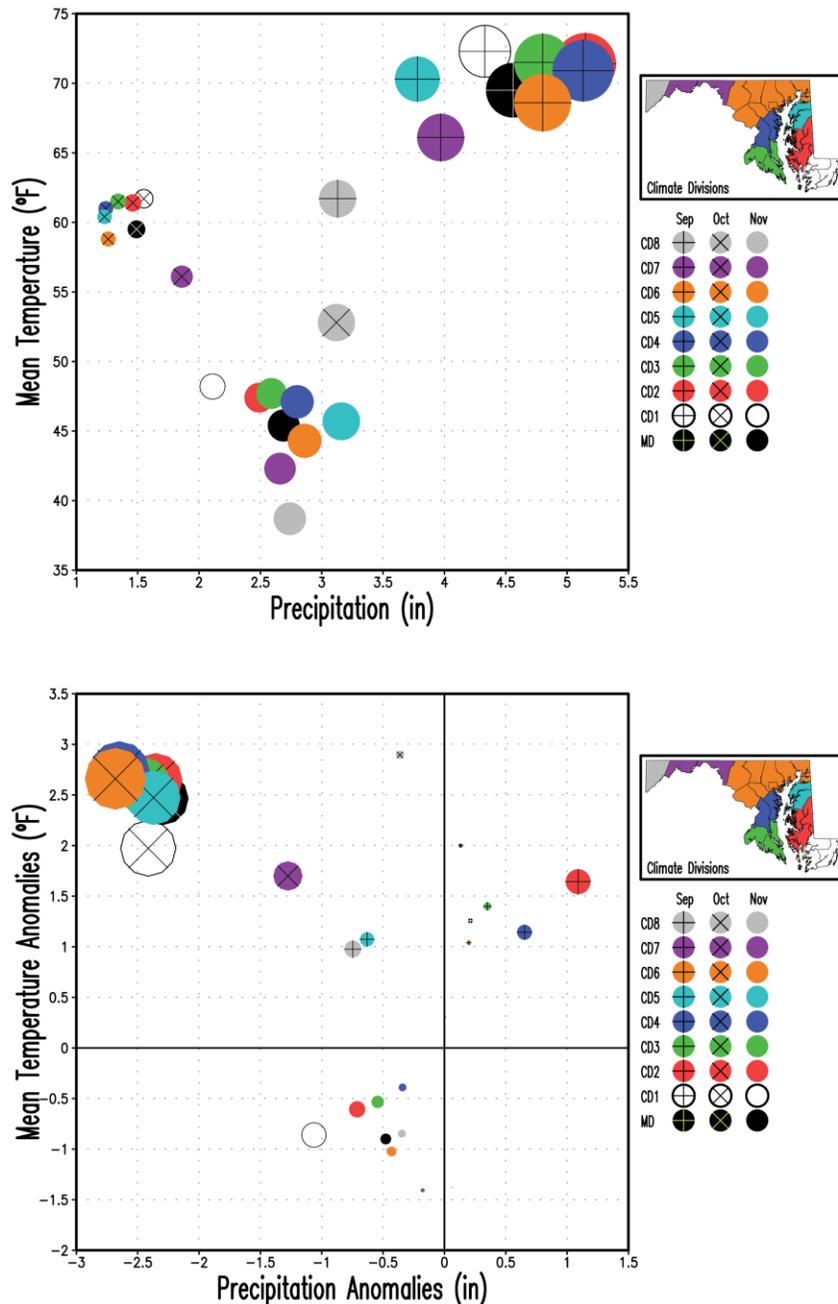


Figure 7. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for September, October, and November 2023. The upper panel shows the mean temperature and total precipitation, and the bottom panel displays their anomalies with respect 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 (5.15 inches in CD2 in September, top panel) and by the maximum precipitation anomaly ($|-2.68|$ inches in CD6 in October, bottom panel) among the nine regions and three months. November is displayed with filled circles only, while October and September are displayed with superposed multiplication and addition signs, respectively.



5. November 2023 Statewide Averages in the Historical Record

A. Box and Whisker Plots

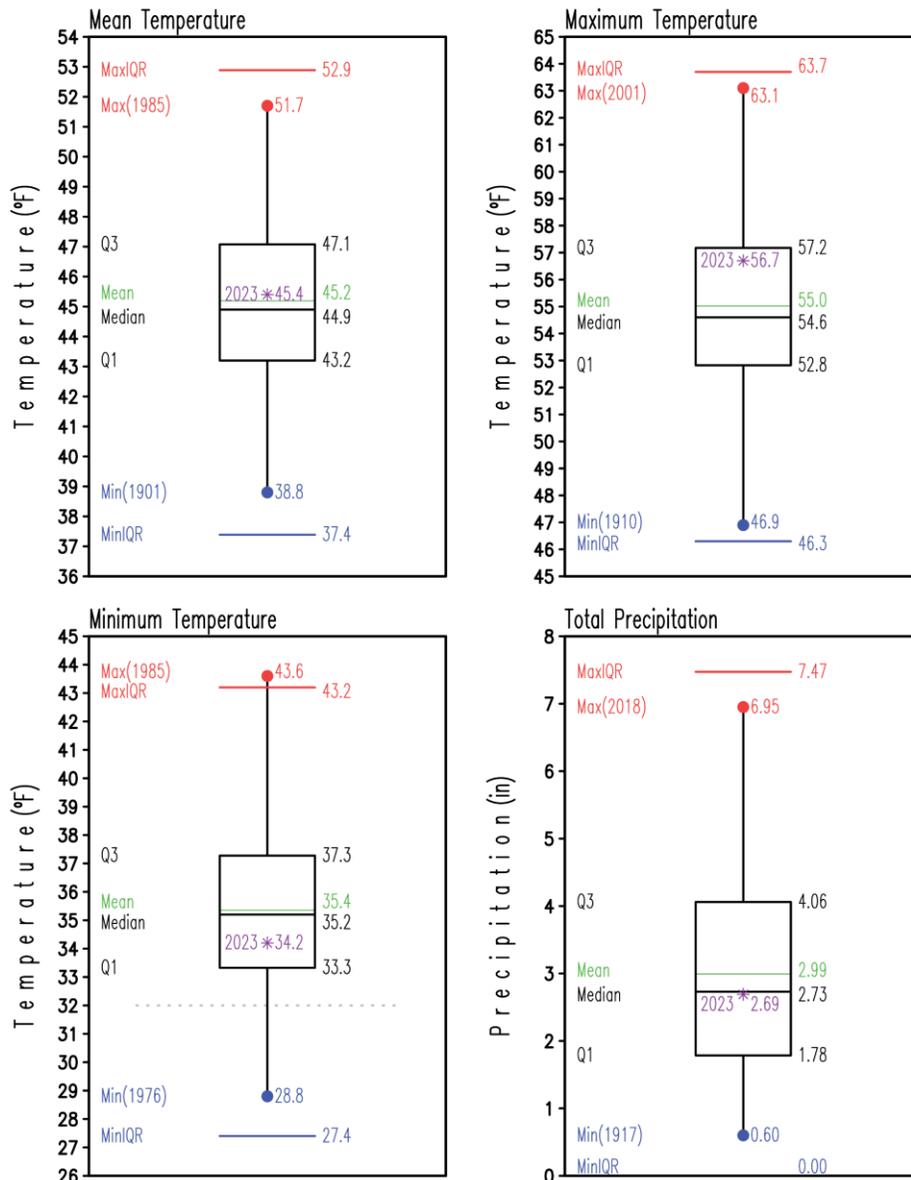


Figure 8. Box and Whisker plots of Maryland (statewide) monthly mean (upper left), maximum (upper right), minimum (lower left) surface air temperatures, and total precipitation (lower right) for November for the period 1895-2022. The label and asterisk in purple represent conditions for November 2023. Statistics for the period 1895-2022 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 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 $Q1 - 1.5 \times (Q3 - Q1)$ and $Q3 + 1.5 \times (Q3 - Q1)$, respectively.



6. 1895-2023 November Trends

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

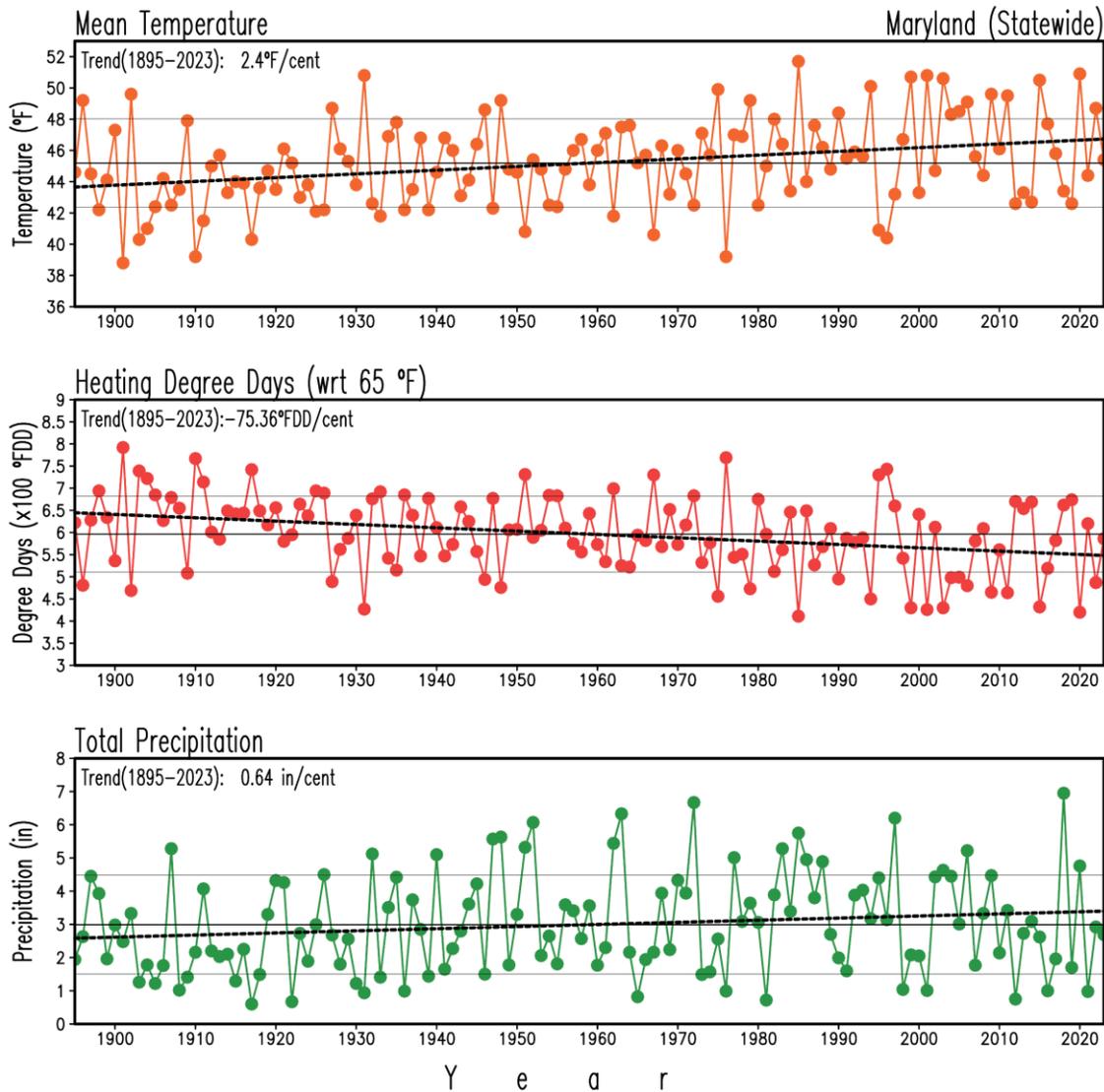


Figure 9. Maryland (statewide) mean surface air temperature, heating degree-days, and precipitation in November for the period 1895-2023. Temperature is in °F, heating degree-days is in °F degree-days (°FDD), and precipitation is in inches. The thin, continuous black lines in each panel display the long-term means (45.2°F, 596.38°FDD, and 2.99 in, 1895-2023), and the double thin, continuous gray lines indicate the standard deviation (2.8°F, 85.43°FDD, and 1.49 in) above/below the long-term mean. The thick dashed black lines show the long-term linear trend. 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 individual day's degree-day total (CPC, 2023). The warming temperature trend (2.4°F/century), the decreasing heating degree-days trend (-75.36°FDD/century) and the precipitation wetting trend (0.64 in/century) are statistically significant at the 95% level (*Student's t-test* –Santer et al. 2000).



B. Temperature and Precipitation Maps

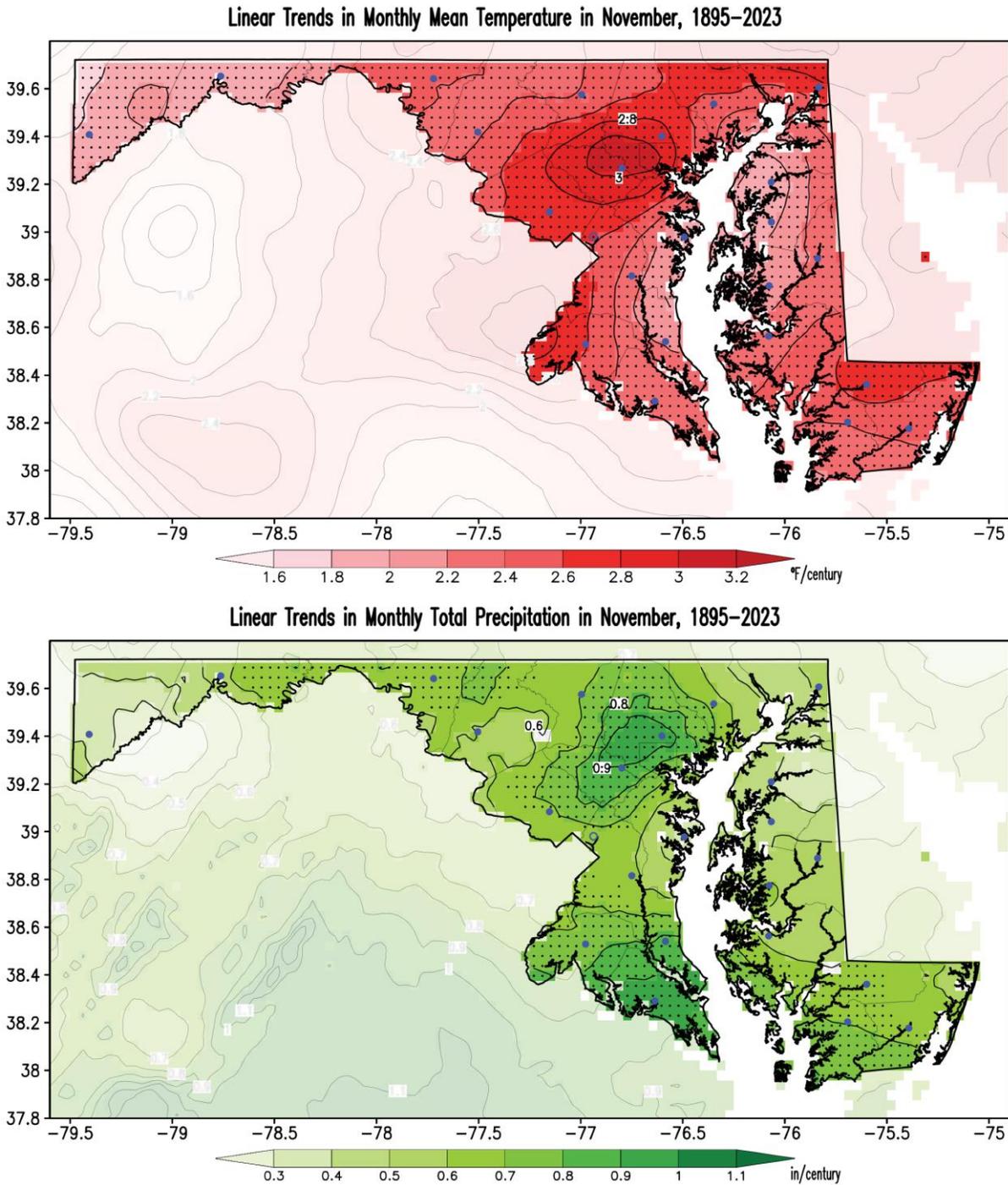


Figure 10. Linear trends in surface air mean temperature and precipitation in November for the period 1895–2023. Temperatures are in °F/century, and precipitation is in inches/century following the color bars. Red shading in the temperature map marks warming trends. Green shading in the precipitation 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. November 2023 Data Tables: Statewide, Climate Divisions, and Counties

A. Mean Temperature and Precipitation

Region	Mean Air Temperature (°F)	Rank (#)	Region	Total Precipitation (in)	Rank (#)
Statewide	45.4	70	Statewide	2.69	63
Climate Division 1	48.2	71	Climate Division 1	2.11	45
Climate Division 2	47.4	74	Climate Division 2	2.49	57
Climate Division 3	47.7	77	Climate Division 3	2.59	67
Climate Division 4	47.1	75	Climate Division 4	2.80	73
Climate Division 5	45.7	61	Climate Division 5	3.16	77
Climate Division 6	44.3	70	Climate Division 6	2.86	70
Climate Division 7	42.3	62	Climate Division 7	2.66	68
Climate Division 8	38.7	64	Climate Division 8	2.74	57
Allegany	42.3	67	Allegany	2.46	68
Anne Arundel	47.3	77	Anne Arundel	2.91	77
Baltimore	44.6	72	Baltimore	3.10	72
Baltimore City	46.7	78	Baltimore City	3.24	79
Calvert	47.6	73	Calvert	2.84	72
Caroline	46.2	67	Caroline	2.46	58
Carroll	43.4	73	Carroll	2.53	55
Cecil	43.9	55	Cecil	3.28	76
Charles	47.4	76	Charles	2.40	63
Dorchester	48.0	76	Dorchester	2.47	53
Fredrick	43.5	64	Fredrick	2.69	65
Garrett	38.7	64	Garrett	2.74	57
Harford	43.8	55	Harford	3.22	73
Howard	45.3	88	Howard	2.81	70
Kent	45.5	58	Kent	3.31	78
Montgomery	45.5	83	Montgomery	2.46	62
Prince George's	46.8	78	Prince George's	2.73	72
Queen Anne's	46.0	66	Queen Anne's	3.08	77
Saint Mary's	48.2	77	Saint Mary's	2.74	68
Somerset	48.6	73	Somerset	2.14	47
Talbot	47.5	72	Talbot	2.74	67
Washington	42.4	60	Washington	2.86	73
Wicomico	47.7	73	Wicomico	2.14	43
Worcester	48.2	65	Worcester	2.06	45

Table A1. Monthly mean surface air temperature (left) and total precipitation (right) at Maryland (statewide), climate division, and county levels for November 2023. Temperatures are in °F, and precipitation is in inches. The rank is the order that the variable for November 2023 occupies among the 129 Novembers after the 129 values have been arranged from the lowest to the highest in the *standard competition ranking method*. The closer to 129 the rank is, the larger (i.e., the warmer/wetter) the value of the surface variable is in the record; similarly, the closer to 1 the rank is, the smaller (i.e., the colder/drier) the value of the surface variable is in the record.



B. Maximum and Minimum Temperatures

Region	Maximum Air Temperature (°F)	Rank (#)	Region	Minimum Air Temperature (°F)	Rank (#)
Statewide	56.7	94	Statewide	34.2	47
Climate Division 1	59.8	101	Climate Division 1	36.7	39
Climate Division 2	58.6	93	Climate Division 2	36.2	50
Climate Division 3	58.9	92	Climate Division 3	36.5	55
Climate Division 4	58.0	94	Climate Division 4	36.2	60
Climate Division 5	56.3	76	Climate Division 5	35.1	41
Climate Division 6	55.4	93	Climate Division 6	33.2	47
Climate Division 7	54.3	89	Climate Division 7	30.2	32
Climate Division 8	50.6	94	Climate Division 8	26.9	35
Allegany	54.5	89	Allegany	30.0	37
Anne Arundel	57.9	94	Anne Arundel	36.7	58
Baltimore	55.8	95	Baltimore	33.4	48
Baltimore City	57.5	97	Baltimore City	36.0	51
Calvert	58.3	89	Calvert	36.8	51
Caroline	57.8	83	Caroline	34.6	45
Carroll	54.8	94	Carroll	32.1	52
Cecil	54.7	84	Cecil	33.1	26
Charles	58.9	91	Charles	35.9	57
Dorchester	59.3	97	Dorchester	36.8	53
Fredrick	54.6	91	Fredrick	32.5	44
Garrett	50.6	93	Garrett	26.9	35
Harford	54.7	77	Harford	32.9	29
Howard	56.7	97	Howard	33.9	62
Kent	55.9	73	Kent	35.2	41
Montgomery	56.4	95	Montgomery	34.6	58
Prince George's	58.1	93	Prince George's	35.6	61
Queen Anne's	56.6	76	Queen Anne's	35.4	44
Saint Mary's	59.2	95	Saint Mary's	37.3	54
Somerset	59.8	101	Somerset	37.5	45
Talbot	57.8	87	Talbot	37.1	51
Washington	54.2	85	Washington	30.5	30
Wicomico	60.0	101	Wicomico	35.4	38
Worcester	59.6	96	Worcester	36.9	35

Table A2. Monthly maximum (left) and minimum (right) surface air temperatures at Maryland (statewide), climate division, and county levels for November 2023. Temperatures are in °F. The rank is the order that the variable for November 2023 occupies among the 129 Novembers after the 129 values have been arranged from the lowest to the highest using the *standard competition ranking method*. The closer to 129 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. November 2023 Bar Graphs: Statewide, Climate Divisions, and Counties

A. Temperatures and Precipitation

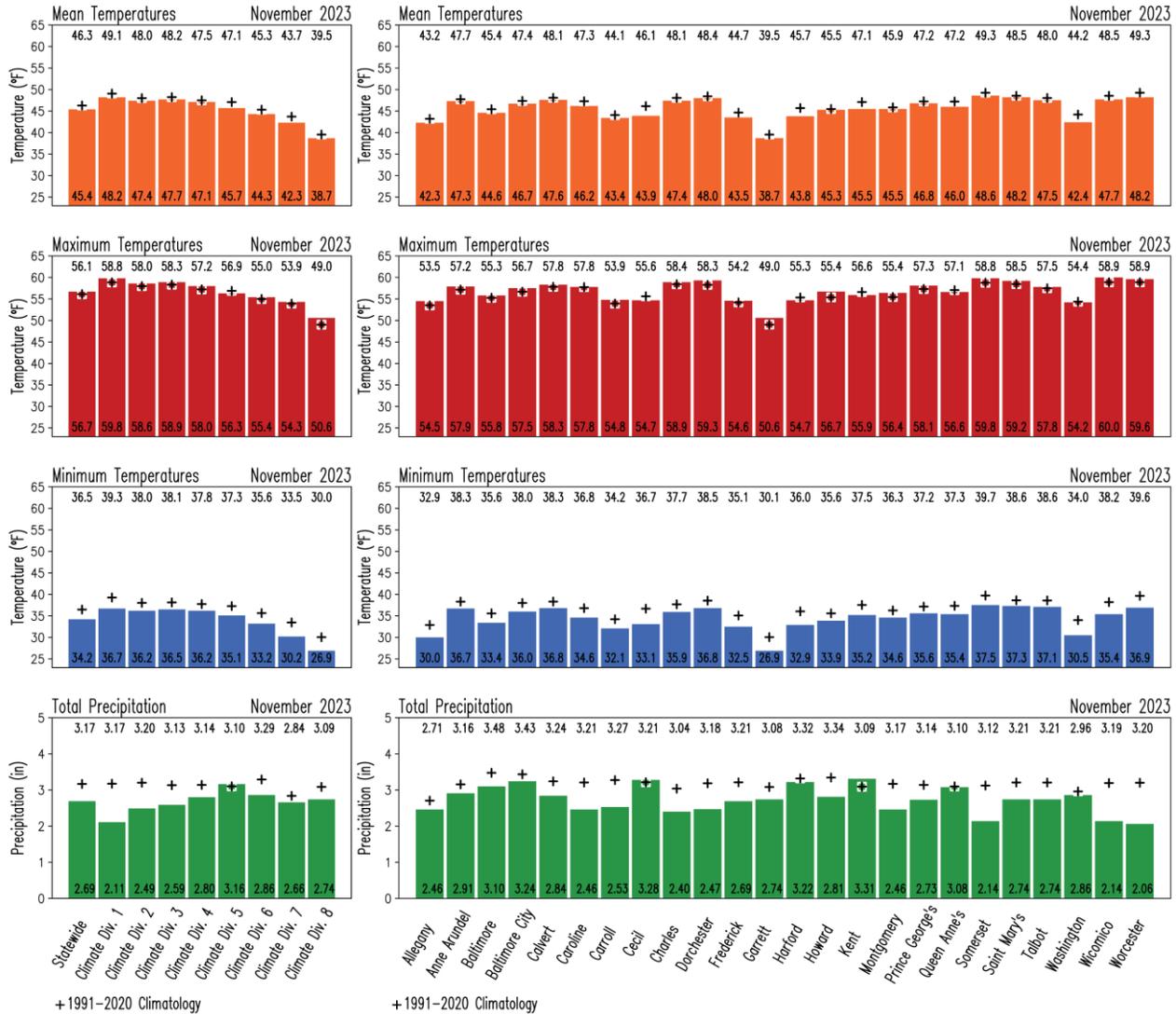


Figure B1. Monthly surface variables in Maryland for November 2023. Color bars represent the variables as follows: mean surface air temperature (orange), maximum surface air temperature (red), minimum surface air temperature (blue) and total precipitation (green) at statewide and climate division (left 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 November 2023. For comparison, the corresponding 1991-2020 climatological values for November are displayed as black addition signs, and their magnitude are shown at the top of the panels.



B. Temperatures and Precipitation Anomalies

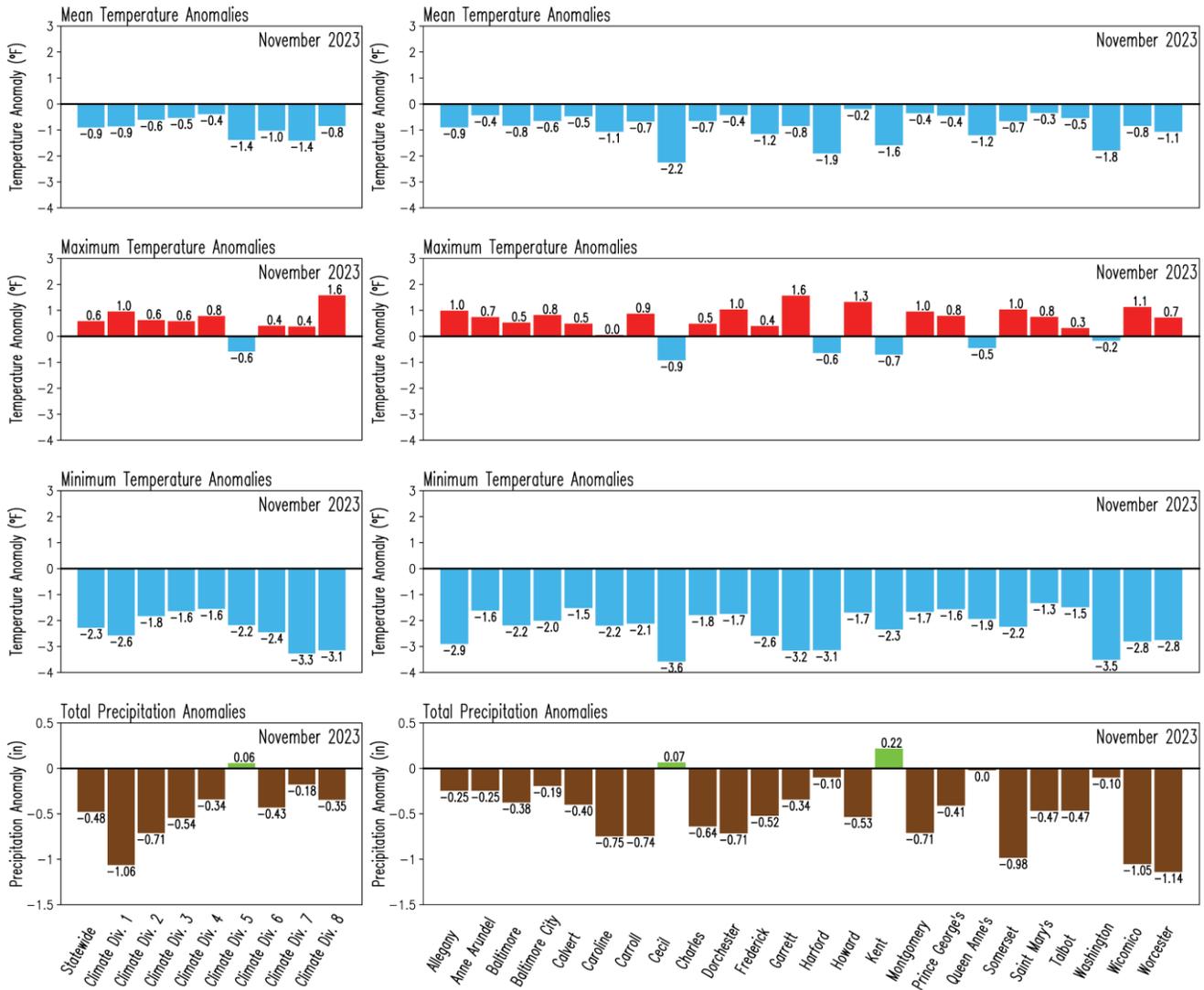


Figure B2. Anomalies of the monthly surface variables in Maryland for November 2023. Anomalies are with respect to the 1991-2020 climatology. Red/blue color represents positive/negative (warmer/colder than normal) anomalies for mean surface air temperature (upper row), maximum surface air temperature (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 November 2023.



Appendix C. November 1991-2020 Climatology Maps

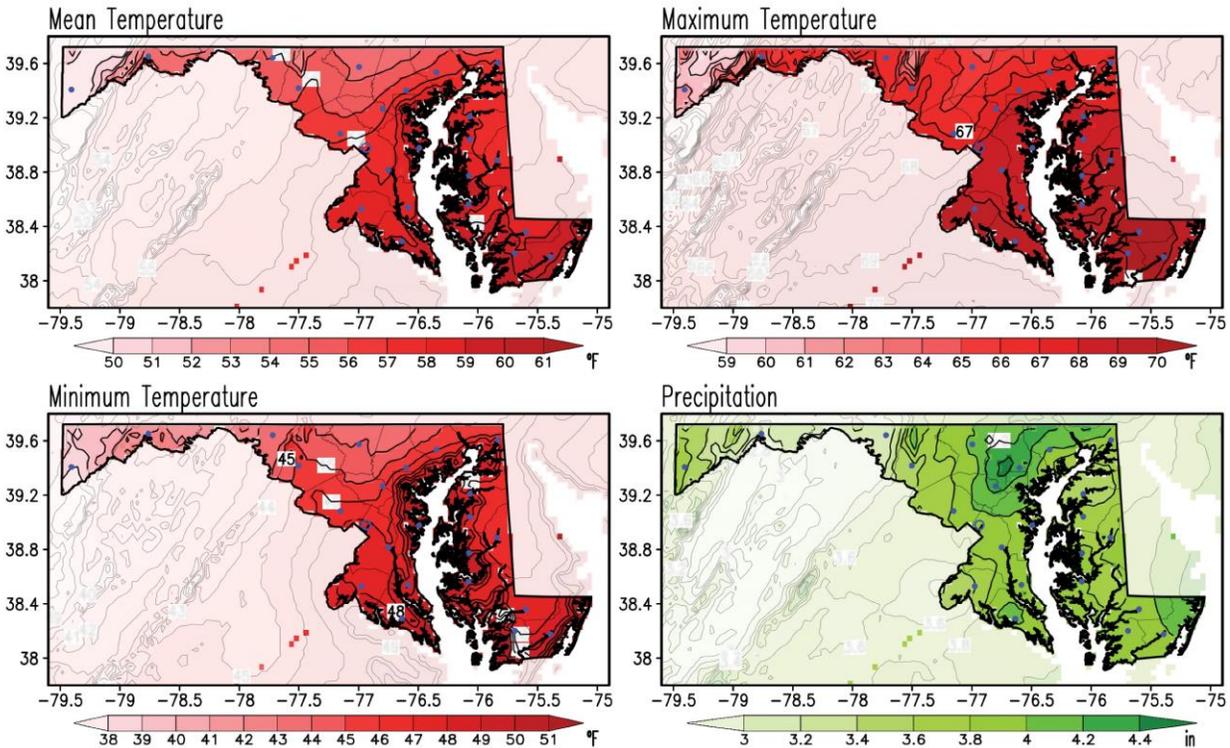


Figure C1. November climatology of the monthly mean, maximum and minimum surface air temperatures, and total precipitation for the period 1991-2020. Temperatures are in °F, and precipitation is in inches according to the color bars. This is the current climate normal against which the November 2023 conditions are compared to obtain the November 2023 anomalies. 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, humidity, wind, sunshine, cloudiness, 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. November Standard Deviation and November 2023 Standardized Anomalies Maps

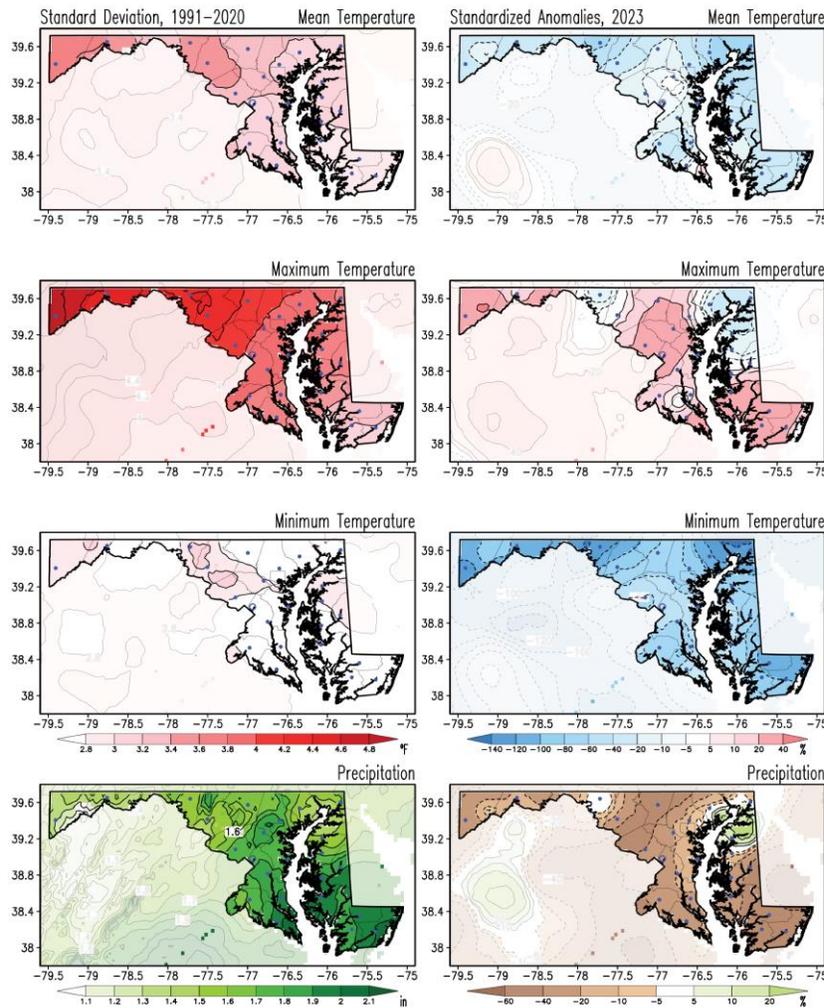


Figure D1. Standard deviation for November and standardized anomalies of temperatures and precipitation for November 2023. Standard deviations for monthly mean, maximum, and minimum surface air temperatures and total precipitation were obtained for the 1991-2020 period (left column). Anomalies for November 2023 (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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