Maryland Climate Bulletin December 2023

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DEPARTMENT OF
**ATMOSPHERIC &
OCEANIC SCIENCE**
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Maryland
State
Climatologist
Office

Summary

Statewide averages show that December 2023 was much warmer and wetter than normal (i.e., 1991-2020 averages). Monthly mean temperatures were between 36 and 47°F; maximum temperatures were in the 44 – 56°F range and minimum temperatures were between 28 and 38°F. Monthly total precipitation was between 2.5 to 8.5 inches.

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

- Mean temperature was warmer than normal everywhere, especially over Garrett County (above 6°F) and over Carroll, Howard, Baltimore, Dorchester, and Wicomico counties (above 4.8°F).

- Maximum temperature was also warmer than normal over the entire state, especially over Garret County (above 6.8°F), Talbot, Dorchester, Caroline, Wicomico, Somerset, and Worcester counties (above 5.4°F), and parts of Montgomery, Carroll, Baltimore, Howard, Anne Arundel, and Prince George's, (around 5.0°F) counties.

- Minimum temperature was warmer than normal everywhere, too, particularly over Garrett and western Allegany counties (above 5.4°F), and Carroll, Howard, and parts of Baltimore, Frederick, Anne Arundel, and Prince George's counties (above 4.5°F).

- Precipitation was above normal almost everywhere, especially over portions of Harford, Cecil, Kent, Queen Ann, and Caroline counties (around 4.5 in) and the rest of the coastal counties around the Bay (above 3 in). Below-normal precipitation was found over Garrett and western Allegany counties and a small area in northeastern Carroll County.

- The extent of the surface in the state under drought conditions decreased from around 90% at the end of November to around 30% at the start of January 2024. The state was under abnormally dry conditions; moderate and severe drought conditions were no longer present. Abnormally dry conditions were present in Frederick and Carroll counties and portions of Garrett, Allegany, Washington, Baltimore, Howard, Montgomery, Dorchester, Somerset, and Worcester counties. The above-normal precipitation over most of the state has helped lessen the drought conditions. The below-normal precipitation over western Maryland hasn't worsened the abnormally dry conditions in that region.

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

- All eight climate divisions were warmer than normal, and except for Climate Division 1, which was drier than normal, the rest were wetter than normal in December.
- The statewide temperature anomalies were warmer than normal in December after they were colder than normal in November and were warmer than normal in October. The statewide precipitation anomalies were wetter than normal after November and October have been below normal.

Historical Context (Figure 8, Tables A1 and A2)

- Mean, maximum, and minimum statewide temperatures in December (42.7, 51.7, and 33.7°F) were above the long-term averages and among the 10% of the highest values (1895-2022). Similarly, December's precipitation (6.37 in) was above the long-term average and within 10% of the highest values. December 2023 was the seventh warmest and the fourth wettest December on record.
- December 2023 mean temperatures show this was the fourth warmest December on record in Howard County and Baltimore City and the fifth warmest in Garrett, Montgomery, Talbot, and Dorchester counties.
- December 2023 minimum temperatures show that this was the third warmest on record in Allegany, Howard, and Talbot counties; the fourth warmest in Baltimore City, Baltimore, Carroll, Garrett, and Queen Anne's counties, and the fifth warmest in Anne Arundel, Caroline, Dorchester, Kent, and Montgomery counties.
- December 2023 was the wettest December on record in Anne Arundel, Harford, Cecil, Talbot, and Caroline counties; it was the second wettest in Calvert, Kent, and Queen Ann counties; the third wettest in Saint Mary's, Prince George's, Dorchester, and Somerset counties; the fourth wettest in Baltimore City, Baltimore, and Worcester counties; and the fifth wettest December in Wicomico County.

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

- Statewide mean temperature and heating degree days in December showed significant trends: a warming trend (4.0°F/century) and a decreasing trend (–127.66°FDD/century), respectively. Statewide precipitation had a non-significant wetting trend (0.52 in/century).
- Regionally, December mean temperatures showed significant warming trends everywhere in the state. Notably, in the Piedmont over portions of Montgomery, Howard, Baltimore, Harford, and Cecil counties (around 4.4°F/century), and in the eastern shore over parts of Kent, Queen Anne's, Caroline, Dorchester, Wicomico, and Worcester counties (around 4.2°F/century).
- Regionally, December precipitation had significant wetting trends over a few regions in the state. In particular, in portions of the southern counties of Saint Mary's, Calvert, Talbot, and Dorchester (around 0.7 in/century), over the Piedmont counties of Montgomery, Howard, Baltimore, Harford counties (around 0.6 in/century), and over the Blue Ridge counties of Frederick and Washington (around 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, 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 December 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 1/11/2024.

- NOAA Monthly U.S. Climate *Divisional* Dataset (NClimDiv – Vose et al. 2014), which is available in a preliminary status (v1.0.0-20240105) at: https://www.ncei.noaa.gov/pub/data/cirs/climdiv/
Data was downloaded on 1/11/2024.

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., December 2023) 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; 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
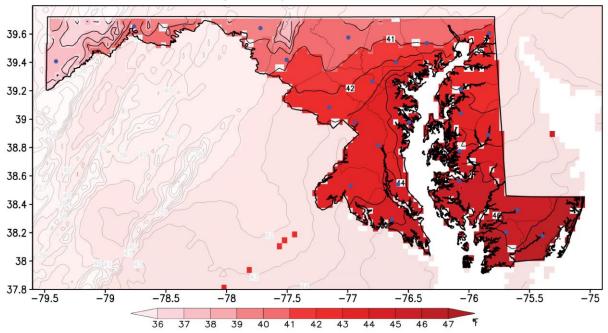
portion of 6 include the *Upper Coastal Plain Province*, and Climate Divisions 1, 2, 5, and a portion of 6 include the *Lower Coastal Plain (or Atlantic Continental Shelf) Province*.

3. December 2023 Maps

A. Mean Temperatures

Monthly Mean Temperature in December 2023

Monthly Mean Temperature Anomaly in December 2023, 1991−2020

Figure 1. Monthly mean surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for December 2023. 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 December 2023. 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

Monthly Minimum Temperature in December 2023

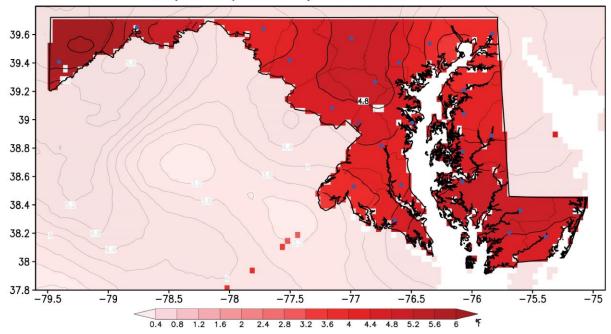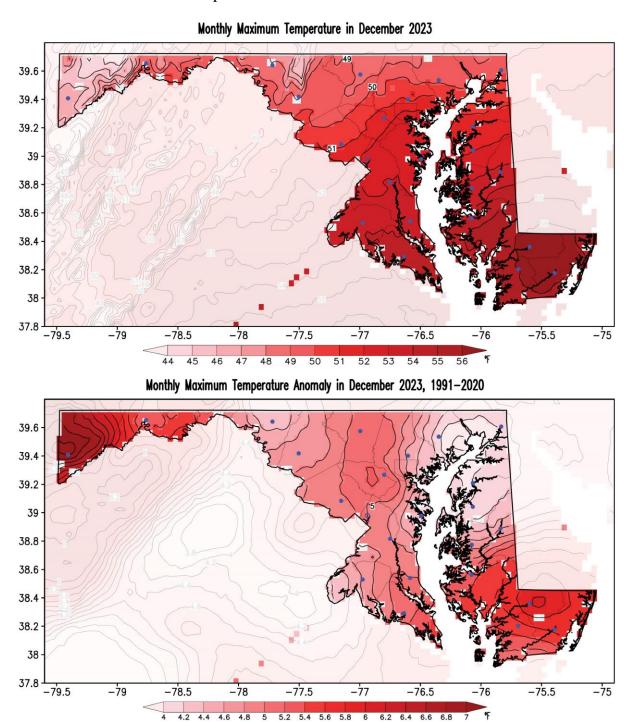Monthly Minimum Temperature Anomaly in December 2023, 1991–2020

Figure 3. Monthly minimum surface air temperature (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for December 2023. Temperatures are in °F following the color bar. Blue/red shading in the temperature map shows temperatures below/above 32°F, while red shading in the anomaly map marks warmer than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

D. Precipitation

Figure 4. Monthly total precipitation (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for December 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.
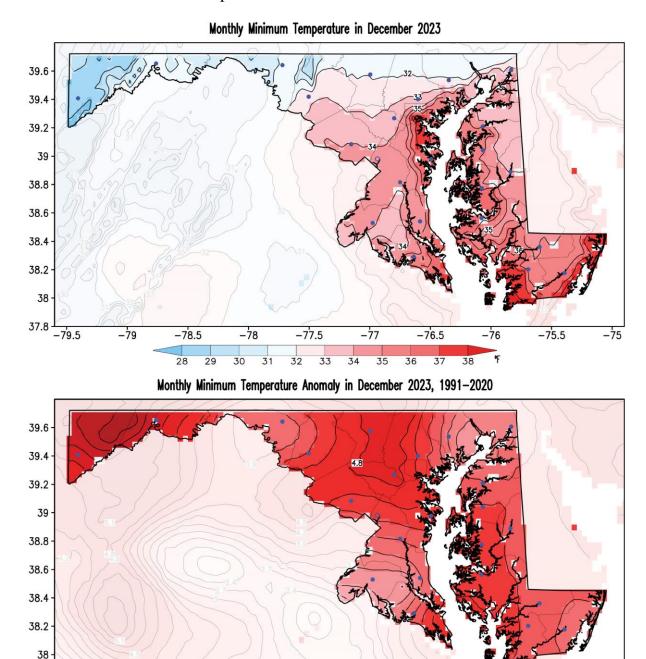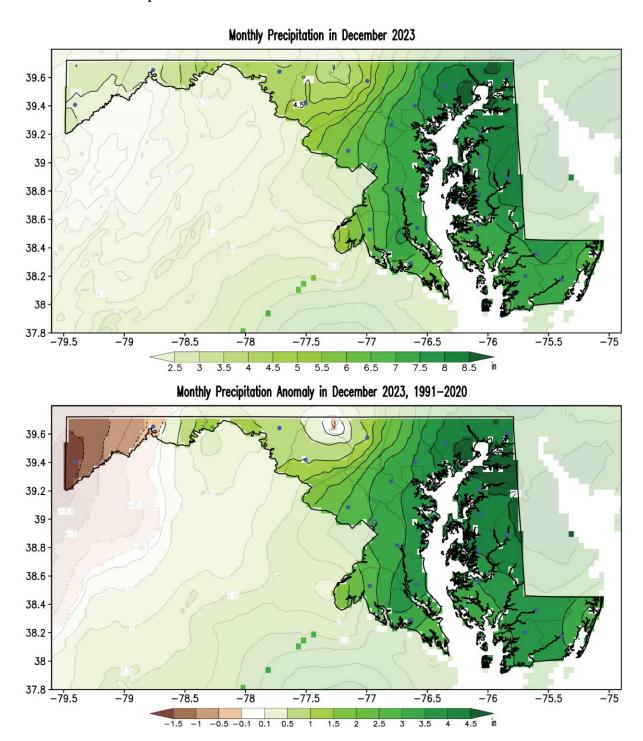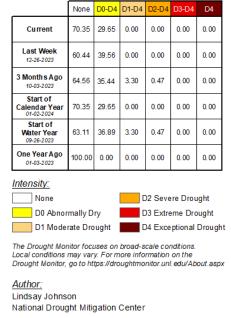
E.   Drought

U.S. Drought Monitor
Maryland

January 2, 2024
(Released Thursday, Jan. 4, 2024)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	70.35	29.65	0.00	0.00	0.00	0.00
Last Week 12-26-2023	60.44	39.56	0.00	0.00	0.00	0.00
3 Months Ago 10-03-2023	64.56	35.44	3.30	0.47	0.00	0.00
Start of Calendar Year 01-02-2024	70.35	29.65	0.00	0.00	0.00	0.00
Start of Water Year 09-26-2023	63.11	36.89	3.30	0.47	0.00	0.00
One Year Ago 01-03-2023	100.00	0.00	0.00	0.00	0.00	0.00

Intensity:

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

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

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USDA   NDMC   NOAA

droughtmonitor.unl.edu

Figure 5. Drought conditions as reported by the U.S. Drought Monitor on January 2, 2024. Yellow shading indicates *abnormally dry* regions. 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, only abnormally dry conditions are present and occupy 29.65% of the state, which was a reduction of around 60% with respect to the end of last month. Moderate and severe drought conditions are no longer present, and the extent of abnormally dry conditions was reduced by around 16% with respect to the conditions at the end of November.

4. December and OND 2023 Climate Divisions Averages
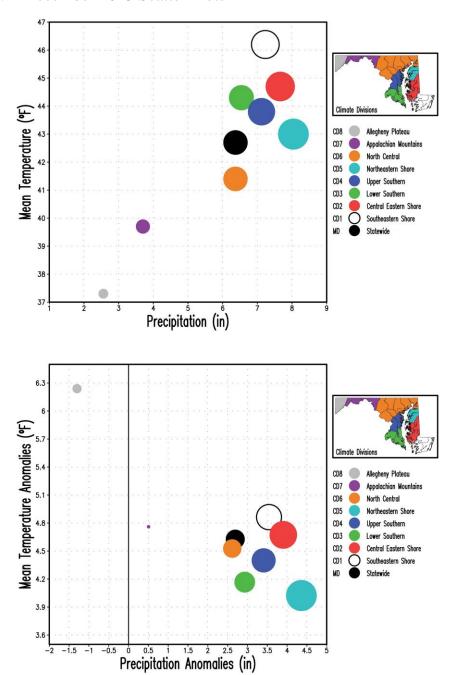
A. December 2023 Scatter Plots

Figure 6. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for December 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 (8.04 inches in CD5, top panel) and by the maximum precipitation anomaly (4.36 inches in CD5, 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.
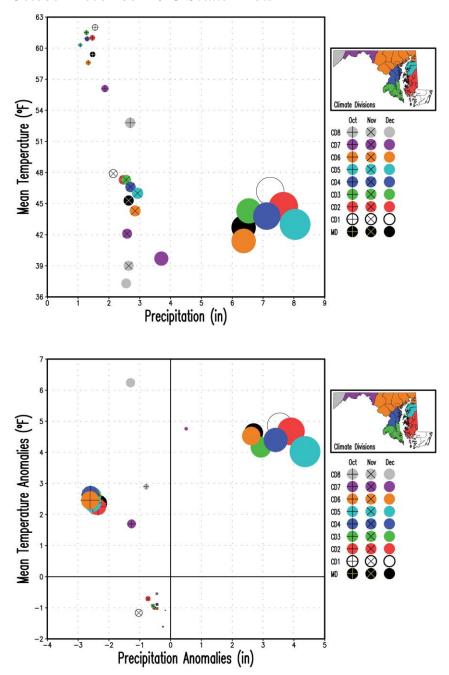
B.   October-December 2023 Scatter Plots

Figure 7. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for October, November, and December 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 (8.04 inches in CD5 in December, top panel) and by the maximum precipitation anomaly (4.36 inches in CD5 in December, 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. December 2023 Statewide Averages in the Historical Record
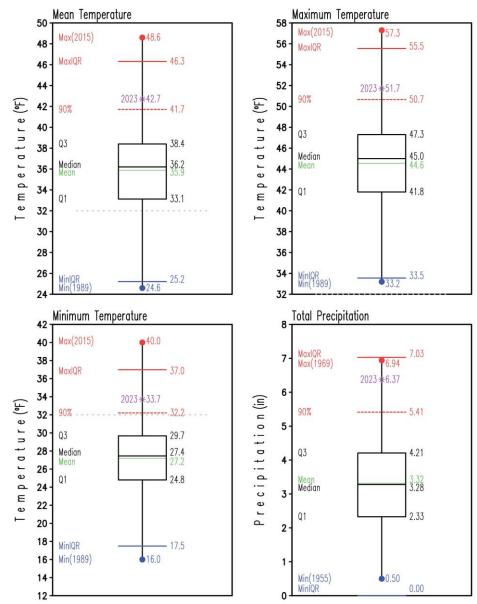
A. Box and Whisker Plots

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 December for the period 1895-2022. The label and asterisk in purple represent conditions for December 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 threshold indicating the upper 10% values is marked by the dashed red line, while the the 32°F temperature is the dashed 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.

6. 1895-2023 December Trends

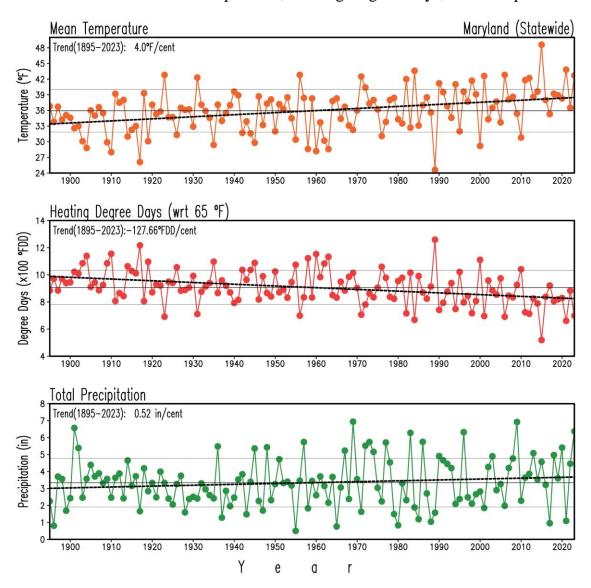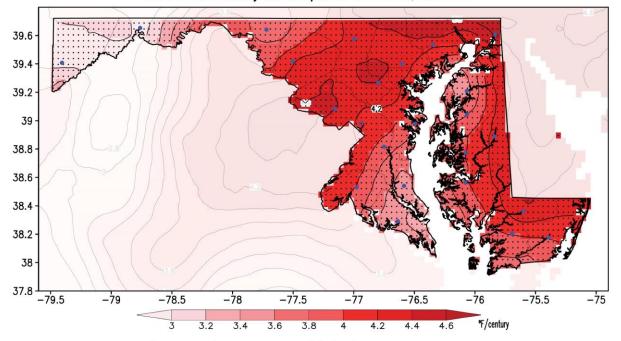### A. Statewide Mean Temperature, Heating Degree-Days, and Precipitation

Figure 9. Maryland (statewide) mean surface air temperature, heating degree-days, and precipitation in December 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 (35.9°F, 906.22°FDD, and 3.34 in, 1895-2023), and the double thin, continuous gray lines indicate the standard deviation (4.1°F, 126.72°FDD, and 1.43 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 (4.0°F/century), and the decreasing heating degree-days trend (−127.66°FDD/century) are statistically significant at the 95% level (*Student's t-test* −Santer et al. 2000), but no the precipitation wetting trend (0.52 in/century).

B.   Temperature and Precipitation Maps

Figure 10. Linear trends in surface air mean temperature and precipitation in December 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. December 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	42.7	123	Statewide	6.37	126
Climate Division 1	46.2	123	Climate Division 1	7.23	126
Climate Division 2	44.7	125	Climate Division 2	7.66	129
Climate Division 3	44.3	121	Climate Division 3	6.54	126
Climate Division 4	43.8	121	Climate Division 4	7.12	127
Climate Division 5	43.0	120	Climate Division 5	8.04	128
Climate Division 6	41.4	123	Climate Division 6	6.37	123
Climate Division 7	39.7	122	Climate Division 7	3.70	99
Climate Division 8	37.3	125	Climate Division 8	2.56	36
Allegany	39.7	123	Allegany	3.10	88
Anne Arundel	44.2	124	Anne Arundel	7.35	129
Baltimore	41.8	124	Baltimore	7.09	126
Baltimore City	43.7	126	Baltimore City	7.26	126
Calvert	44.4	121	Calvert	7.21	128
Caroline	43.8	123	Caroline	8.15	129
Carroll	40.6	124	Carroll	5.03	108
Cecil	41.4	123	Cecil	8.42	129
Charles	43.8	118	Charles	6.16	124
Dorchester	45.3	125	Dorchester	7.27	127
Fredrick	40.6	122	Fredrick	4.47	103
Garrett	37.3	125	Garrett	2.56	37
Harford	41.1	120	Harford	8.12	129
Howard	42.1	126	Howard	6.65	124
Kent	42.8	119	Kent	8.06	128
Montgomery	42.3	125	Montgomery	5.97	122
Prince George's	43.6	121	Prince George's	6.93	127
Queen Anne's	43.3	121	Queen Anne's	7.99	128
Saint Mary's	44.9	121	Saint Mary's	6.76	127
Somerset	46.2	123	Somerset	7.13	127
Talbot	44.6	125	Talbot	7.76	129
Washington	39.8	121	Washington	4.26	109
Wicomico	45.7	124	Wicomico	7.44	125
Worcester	46.4	123	Worcester	7.16	126

Table A1. Monthly mean surface air temperature (left) and total precipitation (right) at Maryland (statewide), climate division, and county levels for December 2023. Temperatures are in °F, and precipitation is in inches. The rank is the order that the variable for December 2023 occupies among the 129 Decembers 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	51.7	121	**Statewide**	33.7	123
Climate Division 1	56.0	125	**Climate Division 1**	36.3	121
Climate Division 2	54.1	122	**Climate Division 2**	35.3	126
Climate Division 3	53.9	119	**Climate Division 3**	34.7	118
Climate Division 4	52.7	119	**Climate Division 4**	35.0	123
Climate Division 5	51.7	119	**Climate Division 5**	34.4	126
Climate Division 6	49.9	120	**Climate Division 6**	32.9	125
Climate Division 7	48.5	119	**Climate Division 7**	31.0	126
Climate Division 8	45.8	123	**Climate Division 8**	28.7	126
Allegany	48.4	119	**Allegany**	31.0	127
Anne Arundel	52.6	117	**Anne Arundel**	35.7	125
Baltimore	50.4	121	**Baltimore**	33.1	126
Baltimore City	52.0	121	**Baltimore City**	35.5	126
Calvert	53.6	118	**Calvert**	35.0	119
Caroline	53.4	122	**Caroline**	34.2	125
Carroll	49.1	120	**Carroll**	32.0	126
Cecil	49.9	121	**Cecil**	32.9	124
Charles	53.6	119	**Charles**	34.0	119
Dorchester	54.8	123	**Dorchester**	35.7	125
Fredrick	48.9	119	**Fredrick**	32.2	124
Garrett	45.8	123	**Garrett**	28.8	126
Harford	49.8	120	**Harford**	32.5	122
Howard	50.9	124	**Howard**	33.3	127
Kent	51.3	118	**Kent**	34.4	125
Montgomery	50.7	122	**Montgomery**	33.8	125
Prince George's	52.8	119	**Prince George's**	34.3	121
Queen Anne's	52.0	118	**Queen Anne's**	34.6	126
Saint Mary's	54.5	119	**Saint Mary's**	35.4	118
Somerset	55.5	124	**Somerset**	36.8	124
Talbot	53.3	121	**Talbot**	35.9	127
Washington	48.6	119	**Washington**	31.0	123
Wicomico	56.1	127	**Wicomico**	35.4	122
Worcester	56.2	124	**Worcester**	36.6	121

Table A2. Monthly maximum (left) and minimum (right) surface air temperatures at Maryland (statewide), climate division, and county levels for December 2023. Temperatures are in °F. The rank is the order that the variable for December 2023 occupies among the 129 Decembers 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. December 2023 Bar Graphs: Statewide, Climate Divisions, and Counties
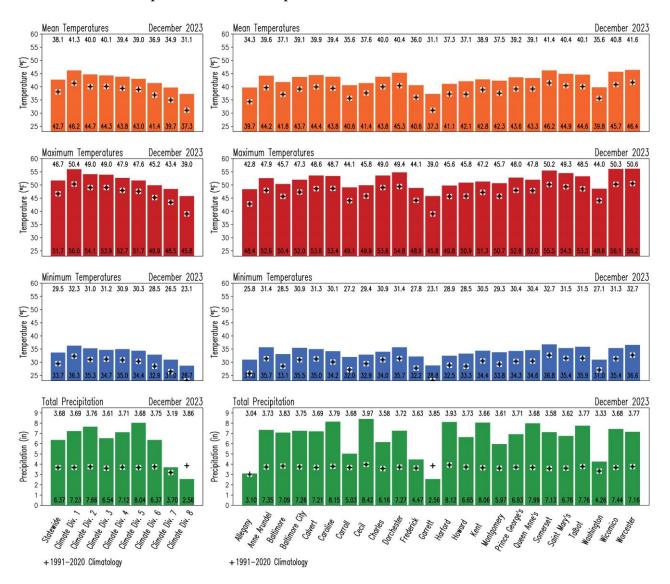
A. Temperatures and Precipitation

Figure B1. Monthly surface variables in Maryland for December 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 December 2023. For comparison, the corresponding 1991-2020 climatological values for December are displayed as black addition signs, and their magnitude are shown at the top of the panels.
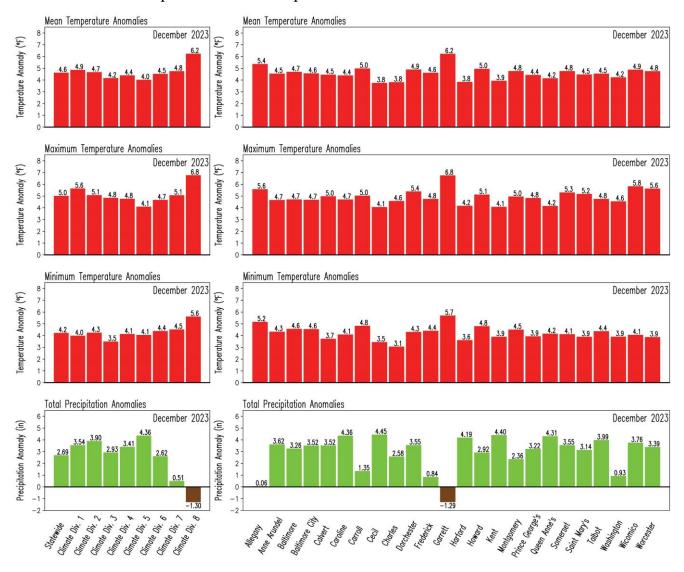
B.   Temperatures and Precipitation Anomalies

Figure B2. Anomalies of the monthly surface variables in Maryland for December 2023. Anomalies are with respect to the 1991-2020 climatology. Red color represents positive (warmer than normal) anomalies for mean surface air temperature (upper row), maximum surface air temperature (second row from top), and minimum surface air temperature (third row from top), while green/brown color indicates positive/negative (wetter/drier than normal) anomalies in total precipitation (bottom row) at statewide and climate division (left column), and at county (right column) levels. Temperatures are in °F, and precipitation is in inches. The numbers outside of the bars indicate the magnitude of the anomaly for December 2023.
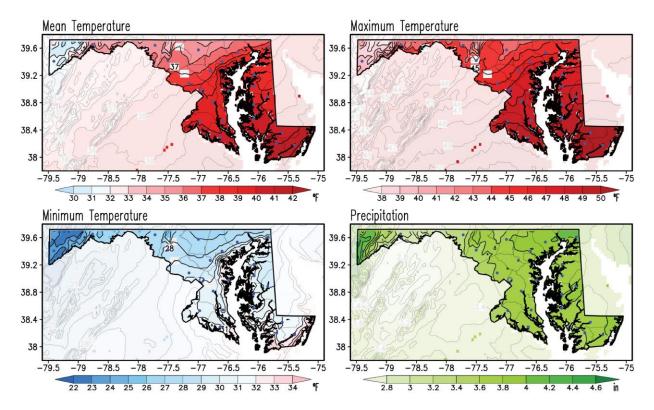
Appendix C. December 1991-2020 Climatology Maps

Figure C1. December 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 December 2023 conditions are compared to obtain the December 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. December Standard Deviation and December 2023 Standardized Anomalies Maps
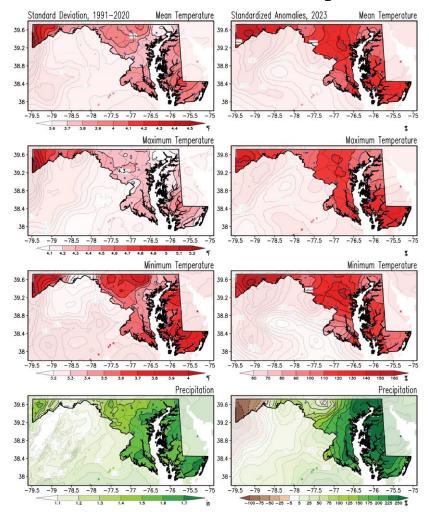

Figure D1. Standard deviation for December and standardized anomalies of temperatures and precipitation for December 2023. Standard deviations for monthly mean, maximum, and minimum surface air temperatures and total precipitation were obtained for the 1991-2020 period (left column). Anomalies for December 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. Red shading in the anomaly temperature maps marks 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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