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Maryland Climate Bulletin

August 2025

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<https://www.atmos.umd.edu/~climate/Bulletin/>



Summary

Statewide averages indicate that August 2025 was colder and drier than normal (i.e., 1991-2020 averages). Regionally, monthly mean temperatures were between 65 and 75°F, maximum temperatures were in the 74–84°F range, and minimum temperatures were between 54 and 68°F. Monthly total precipitation was in the 0.9–3.5 inches range.

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

- The mean temperature was colder than normal over all the state, particularly over Caroline and Dorchester counties (3.6 to 3.9°F below), and counties in the central Piedmont and coastal plains (3.0 to 3.3°F below).
- The maximum temperature was colder than normal throughout the state, too, notably over Caroline, Dorchester, and Wicomico counties (4.2 to 4.5°F below), counties of the central Piedmont and central-to-southern coastal plains (3.0 to 3.9°F below), and Allegany County (3.0 to 3.3°F below).
- The minimum temperature was also colder than normal in the entire state, especially over Caroline, and parts of Cecil, Baltimore, and Carroll counties (3.3°F below), and counties of the central Piedmont and central-to-northern coastal plains (3.0°F below).
- Precipitation was below normal all over the state after the below normal precipitation, particularly from the southern halves of Prince George's and Anne Arundel counties to Charles, Calvert, and Saint Mary's counties (3.0 to 3.6 inches deficit), Caroline, Talbot, Dorchester, and western Wicomico counties (3.0 to 3.3 inches deficit), and western Piedmont (2.4 to 2.7 inches deficit). The first of these regions, over the southwestern coastal plain, received between 20 and 30% of its climatological rainfall for the month, while the other two regions, over the Eastern Shore and western Piedmont, got 30 to 40% of theirs.
- Drought conditions returned to the state in August, with around 70% of the state experiencing Abnormally Dry conditions. Drought-free conditions were present only over Cecil, Harford, Dorchester, and portions of Queen Anne's, Talbot, Wicomico, Worcester, Allegany, and Garrett counties. Abnormally Dry conditions can be a precursor to drought if rainfall continues to be below normal. The majority of streams and rivers had normal streamflow throughout the state, with a few already showing below-normal streamflow in western Maryland, the central Piedmont, and the southeastern Eastern Shore.

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

- All climate divisions were colder than normal, with Climate Division 2, Central Eastern Shore, being the coldest (3.6°F below). On the other hand, all the climate divisions were drier than normal, with Climate Division 3, Lower Southern, being the driest (3.38 inches deficit).



- The statewide temperature was colder than normal (3.0°F below) in August 2025, after warmer-than-normal June and July, for the second time since January. Statewide precipitation was below normal (2.52 inches deficit) in August, following a wetter-than-normal July and a drier-than-normal June.

Extreme daily temperatures, precipitation, and growing degree days (Figures 9-11)

- Statewide maximum daily temperatures from January 1 to August 31, 2025, indicated that the number of days with extreme temperatures has been less than normal. On the other hand, statewide minimum daily temperatures showed that the number of days with extreme temperatures has been larger than normal. There was one fewer hot day (maximum temperatures larger than 86°F) than normal (43 vs. 44), but one more heat wave than normal (9 vs. 8); the mean temperature of all the hot days was 90.4°F. There were five fewer warm days (maximum temperature larger than 80°F) than normal (82 vs. 87), but a normal number of warm day spells (9); the mean temperature of all the warm days was 87.0°F. There were thirteen more warm nights (minimum temperature larger than 68°F) than normal (38 vs. 25), and a normal number of warm night spells (5) by the end of August; the mean temperature of all the warm nights was 71.7°F.
- Statewide daily total precipitation from January 1 to August 31 showed a normal number of days with extreme precipitation (12; at least 0.64 inches –the 95th percentile in 1951–2000), with the last one occurring on August 1. The number of dry spells (two or more consecutive days with daily precipitation of no more than 0.04 inches) from January 1 to August 31 was fewer than normal by five spells (28 vs. 33), with three of them occurring in August, lasting 12, 2, and 10 days. The mean duration of the dry spells to date was longer-than-normal by one day (5 vs. 4).
- The cumulative calendar year (January 1 to August 31) modified growing degree days (base 86/50°F) reached 3219°FDD and had a departure from normal of 190°FDD by the end of August. Similarly, growing degree days (base 50°F) reached 3110°FDD and a departure from normal of 207°FDD by the end of August. The curve of the cumulative modified growing degree days in the summer months has been very similar to that in 2024.

Historical Context (Figure 12, Tables A1 and A2)

- Statewide mean, maximum, and minimum temperatures in August 2025 (71.8, 81.6, 62.0°F) were below their long-term means (1895-2024), with the mean and maximum temperatures within the 25% of their lowest values on record. All three temperatures were far from their coldest records of 68.2, 77.7, and 58.8°F set in 1927, respectively.



- Statewide mean, maximum, and minimum temperatures indicated that August 2025 was the twenty-fifth, nineteenth, and thirty-seventh coldest August since 1895, respectively. Three counties experienced maximum temperatures among the ten coldest on record: Calvert had its eighth coldest, while Dorchester and Saint Mary's had their ninth coldest.
- Statewide precipitation showed that August 2025 (1.66 in) was below its long-term mean and within the 5% of its lowest values on record. It was close to its record of 1.00 inches set in 1930. This was the seventh driest August since 1895. Thirteen counties had rainfall within the ten driest, and nine of them within the five driest on record: Carroll and Frederick counties had their driest August; Charles had its second driest, Saint Mary's had its third driest, Calvert had its fourth driest, while Anne Arundel, Garrett, Montgomery, and Prince George's had their fifth driest; Talbot had its sixth driest August on record, while Dorchester, Howard and Washington had their seventh driest.

Century-Plus Trends, 1895-2025 (Figures 13, 14)

- Statewide mean temperature and cooling degree days in August showed significant trends: a warming trend (1.9°F/century) and an increasing cooling trend (66.0°FDD/century). Statewide precipitation had a small, non-significant drying trend (–0.38 in/century).
- Regionally, mean temperatures in August showed significant warming trends everywhere in the state. The largest warming trends were observed over Baltimore City (3.3°F/century) and the central Piedmont counties (2.4–3.0°F/century).
- Regionally, August precipitation had significant drying trends over parts of the Blue Ridge and western Piedmont. The largest drying trends appeared over Frederick and Carroll counties (–0.9 to –1.1 in/century). Non-significant drying trends were found over the Eastern Shore.

Chesapeake Bay Sea Surface Temperatures (Figures 15, 16, E1)

- Sea surface temperatures in the Chesapeake Bay in August 2025 were in the 78–81°F range. Regionally, they were below their 2007-2020 mean, following statewide air temperatures that were below normal (even when compared with the 2007-2020 mean). The coldest anomalies were found in the southeastern Lower Bay, including the Tangier Sound waters along the coasts of Somerset, Wicomico, and Dorchester counties, as well as in the narrow strip of water in front of Worcester County's Sinepuxent Bay (1.8–2.7°F below). The current all-basin mean temperature of 79.5°F was far from the coldest August temperature in the 19-year data set (2007-2025), which was 77.8°F in 2013.

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1. Introduction

The Maryland Climate Bulletin is issued by the Maryland State Climatologist Office (MDSCO), which resides in the Department of Atmospheric and Oceanic Science at the University of Maryland, College Park. It documents the surface climate conditions observed across the state in a calendar month and is issued in the second week of the following month.

Maryland's geography is challenging, with the Allegheny and Blue Ridge mountains to the west, the Piedmont Plateau in the center, the Chesapeake Bay, and the Atlantic Coastal Plain to the east. The range of physiographic features and the state's eastern placement within the expansive North American continent contribute to a comparatively wide range of climatic conditions.

The bulletin aims to document and characterize monthly surface climate conditions in the state, situating them within 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 August 2025 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 warm daily maximum and minimum temperatures and precipitation, as well as growing degree days, 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, cooling degree days, precipitation, and state maps of air temperature and precipitation are presented in Section 7. Monthly sea surface temperatures (SST) in the Chesapeake Bay are presented in Section 8. Ancillary statewide, climate division, and county-level information for air temperatures and precipitation are provided in tables and plots in Appendices A and B; climatology and variability maps are included in Appendices C and D, along with the percentage of normal precipitation and normalized anomalies; mean and variability of the sea surface temperatures in the Chesapeake Bay are displayed in Appendix E.

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) for 1895-present. Available in preliminary status at: <https://www.ncei.noaa.gov/data/ncimgrid-monthly/access/>
Data was downloaded on September 18, 2025.

- NOAA Monthly U.S. Climate *Divisional* Dataset (NClimDiv – Vose et al., 2014) for 1895-present. Available in preliminary status (v1.0.0-20250905) at:
<https://www.ncei.noaa.gov/pub/data/cirs/climdiv/>
Data was downloaded on September 10, 2025.
- NOAA area averages of daily temperatures and precipitation dataset (nClimGrid–Daily –Durre et al., 2022) for 1951-present. 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 September 16, 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>

Data and sources for the Chesapeake Bay are the following:

- Satellite-based sea surface temperatures from NOAA’s CoastWatch Program. The data was made available by the Program’s [East Coast Node](#). This satellite-based sea surface temperature data uses data from the Advanced Very High Resolution Radiometer (AVHRR) on the European MetOp satellites, and the Visible Infrared Imaging Radiometer Suite (VIIRS) on the U.S. SNPP and NOAA JPSS satellites. In creating this product, nighttime overpasses for the U.S. East Coast are used, thereby avoiding daytime solar heating of the ocean surface and the associated warm bias in the data. In particular, the product acquired is the monthly sea surface temperatures for the Chesapeake and Delaware Bays, which have a nominal horizontal resolution of 750 km for 2007-present. Available at:
<https://eastcoast.coastwatch.noaa.gov/data/avhrr-viirs/sst-ngt>
Data was downloaded on September 2, 2025.
- A shapefile of watersheds for the state from the Maryland Department of the Environment and the Department of Natural Resources: the Maryland Watersheds – 8 Digit Watersheds. It contains 138 separate watersheds, identified with an 8-digit numeric code from which three are on the main stem of the Chesapeake Bay: the Upper Chesapeake Bay (code: 02139996; from the mouth of the Susquehanna River to northern side of the mouth of the Gunpowder River), the Middle Chesapeake Bay (code: 02139997; from the Gunpowder River to the mouth of the Chester River), and the Lower Chesapeake Bay (code: 02139998; from the south side of the mouth of the Chester River to the mouth of the Potomac River), which in turn are used to create a one-watershed shapefile for the entire basin. These four watersheds are used to create area-averaged sea surface temperatures for the Bay. Available at:
<https://data.imap.maryland.gov/datasets/maryland::maryland-watersheds-8-digit-watersheds/about>

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 average weather data is traditionally known as Climate Normal (Kunkel and Court, 1990) and 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 simply the climatology, is defined for the period 1991–2020.

It should be noted that the satellite-based sea surface temperature data set has a short temporal coverage of 19 years, from 2007 to the present, which prevents the calculation of its current climate normal (1991-2020). In this case, a 2007-2020 mean is used as a base of comparison in the calculation of anomalies. This will be referred to as the 2007-2020 mean and not as a climatology.

About the anomalies: Anomalies for a given month (e.g., August 2025) are the departures of the monthly value from the corresponding month's 30-year average (i.e., from the average of 30 Augusts) 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 a 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 anomalies are divided by the standard deviation, they are referred to as standardized anomalies.

About hot days, warm days, and warm nights. Extreme heat, detrimental to crops without irrigation and to populations lacking air conditioning, is tracked by the count of hot days, warm days and nights, and their consecutive occurrence (e.g., Tschurr et al. 2020, Barriopedro et al. 2023). A hot day is defined as one when the maximum temperature is greater than 86°F, a warm day is when the maximum temperature is greater than 80°F, while a warm night is when the minimum temperature is greater than 68°F. When these conditions persist for two or more days, they are referred to as heat waves for the hot days and warm spells for the warm days and nights. These threshold values correspond to the 89th and 75th percentiles of statewide daily maximum

temperatures and the 95th percentile of statewide daily minimum temperatures for the period 1951- 2000.

About degree days. Degree days represent the difference between the daily mean temperature (calculated by averaging the high and low temperatures) and a predefined base temperature. Since energy demand is cumulative, degree-day totals are typically calculated on a daily, monthly, seasonal, and annual basis.

- *Heating and cooling degree days.* These are used to get a general idea of the amount of energy 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).
- *Growing Degree Days.* These are used to estimate the growth and development of plants and insects during the growing season, under the assumption that development will only occur if the temperature exceeds a minimum development threshold temperature, or, in other words, if enough warmth is accumulated. Because actual development varies among different plants and insects, and the presence of weeds and precipitation can influence development, a base temperature of 50°F is generally considered acceptable for all plants and insects (OSU, 2024). However, this base temperature is best suited for the development of specific crops, such as corn, sweet corn, soybeans, tomatoes, and a few others.
 - *Modified Growing degree days.* The modified growing degree days are calculated by establishing base temperatures for the daily maximum and minimum temperatures before determining the daily mean temperature. When the base temperature for the daily maximum temperature is set to 86°F, and the base temperature for the daily minimum temperature is set to 50°F, the growing degree days are specific to corn development, as no appreciable growth is detected with temperatures lower than 50°F or greater than 86°F.

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 referred to as dry spells if they persist for two or more consecutive days. The number and duration of dry spells 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. August 2025 Maps

A. Mean Temperatures

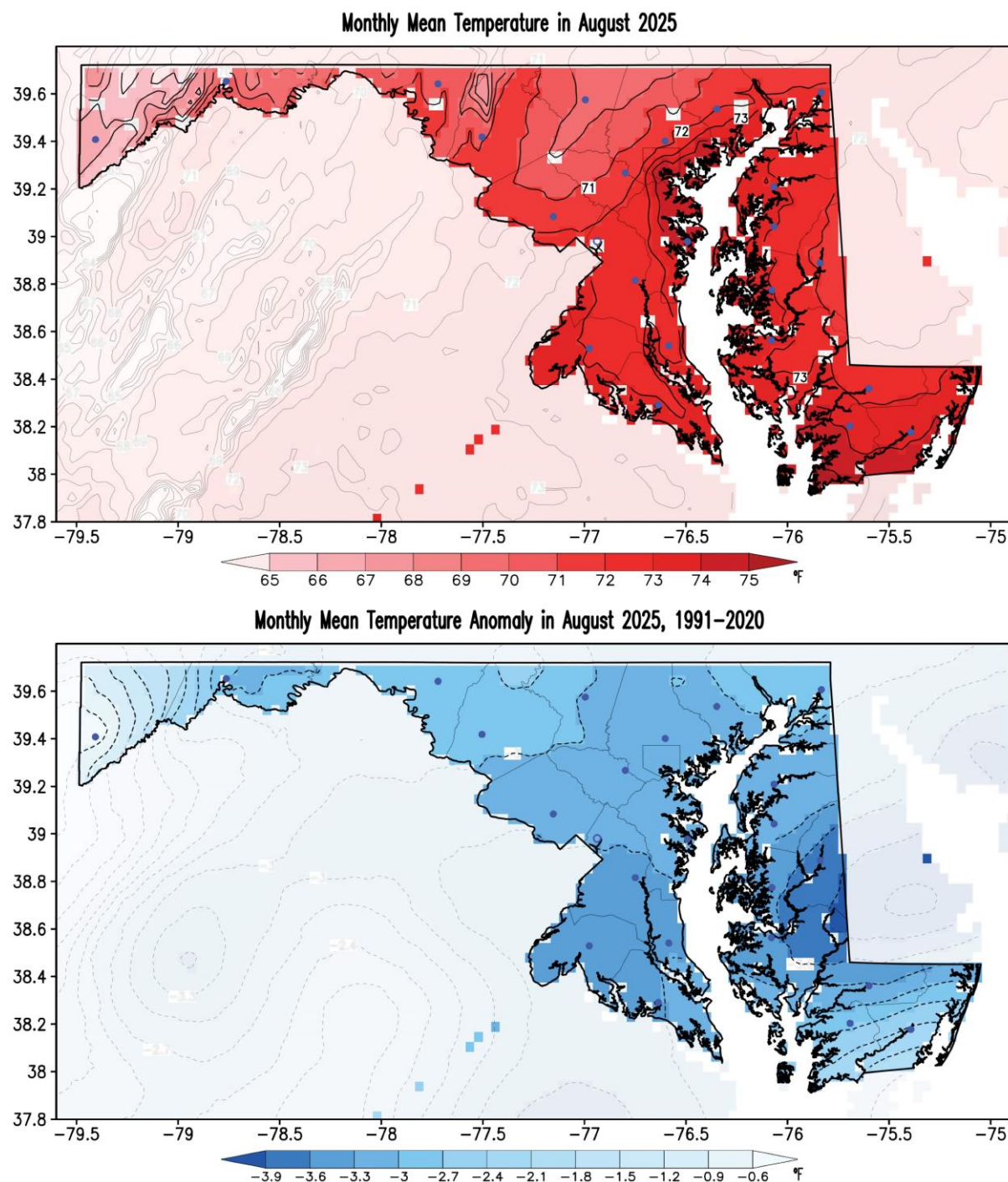


Figure 1. Monthly mean surface air temperature (top panel) and its anomaly with respect to the 1991–2020 climatology (bottom panel) for August 2025. Temperatures are in °F following the color bar. Blue shading in the anomaly map marks colder than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

B. Maximum Temperatures

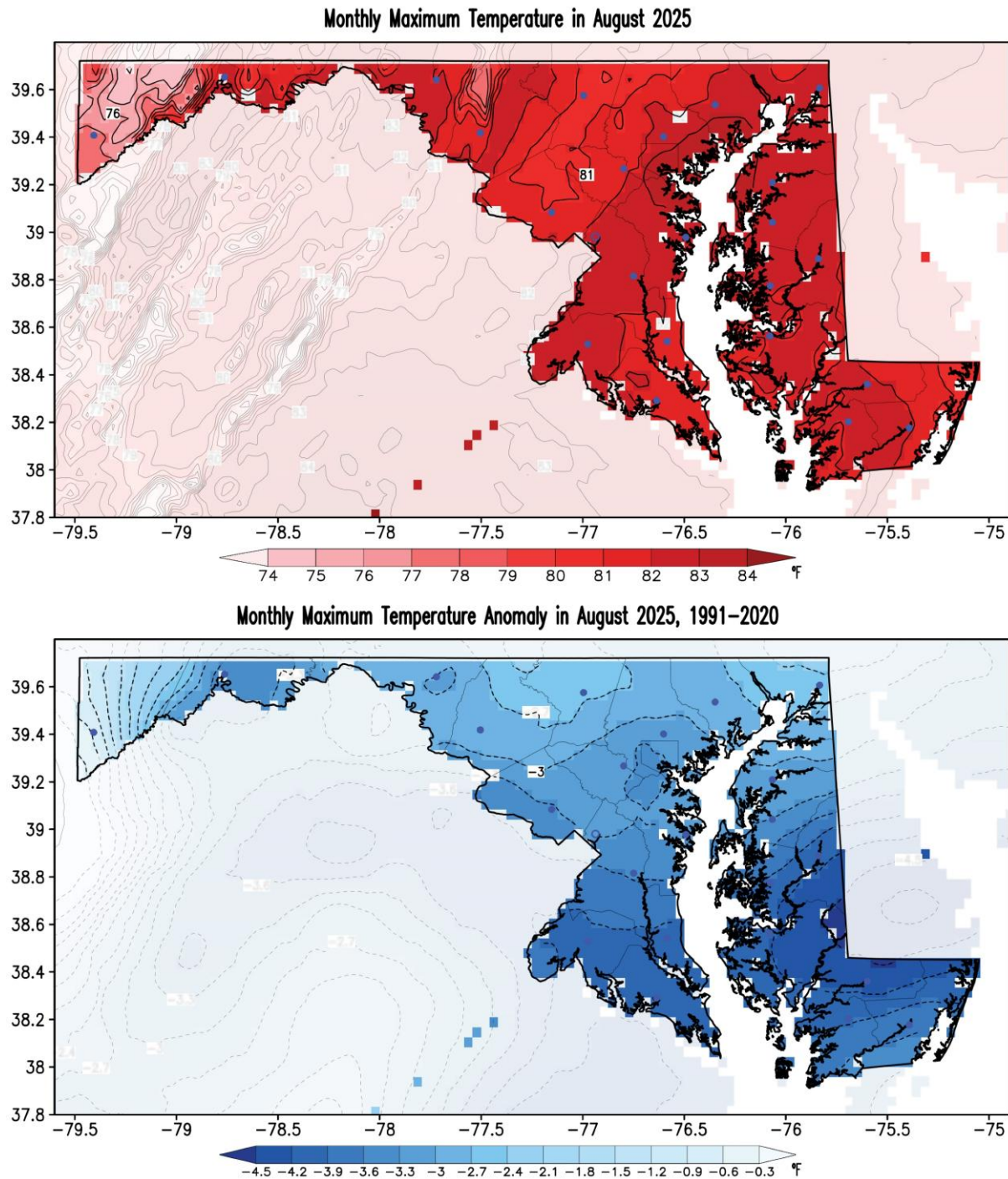


Figure 2. Monthly maximum surface air temperature (top panel) and its anomaly with respect to the 1991–2020 climatology (bottom panel) for August 2025. Temperatures are in °F following the color bar. Blue shading in the anomaly map marks colder than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

C. Minimum Temperatures

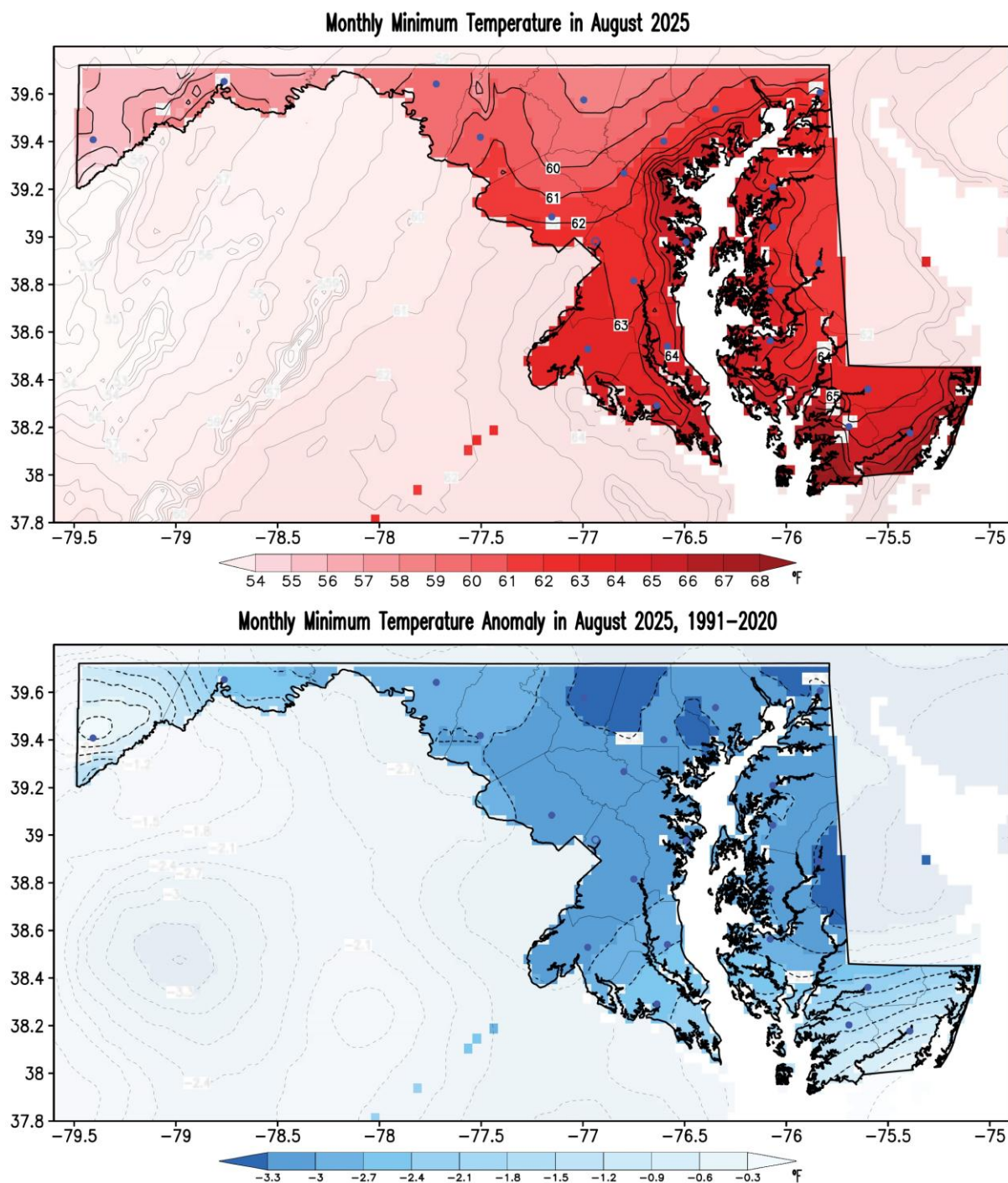


Figure 3. Monthly minimum surface air temperature (top panel) and its anomaly with respect to the 1991–2020 climatology (bottom panel) for August 2025. Temperatures are in °F following the color bar. Blue shading in the anomaly map marks colder than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

D. Precipitation

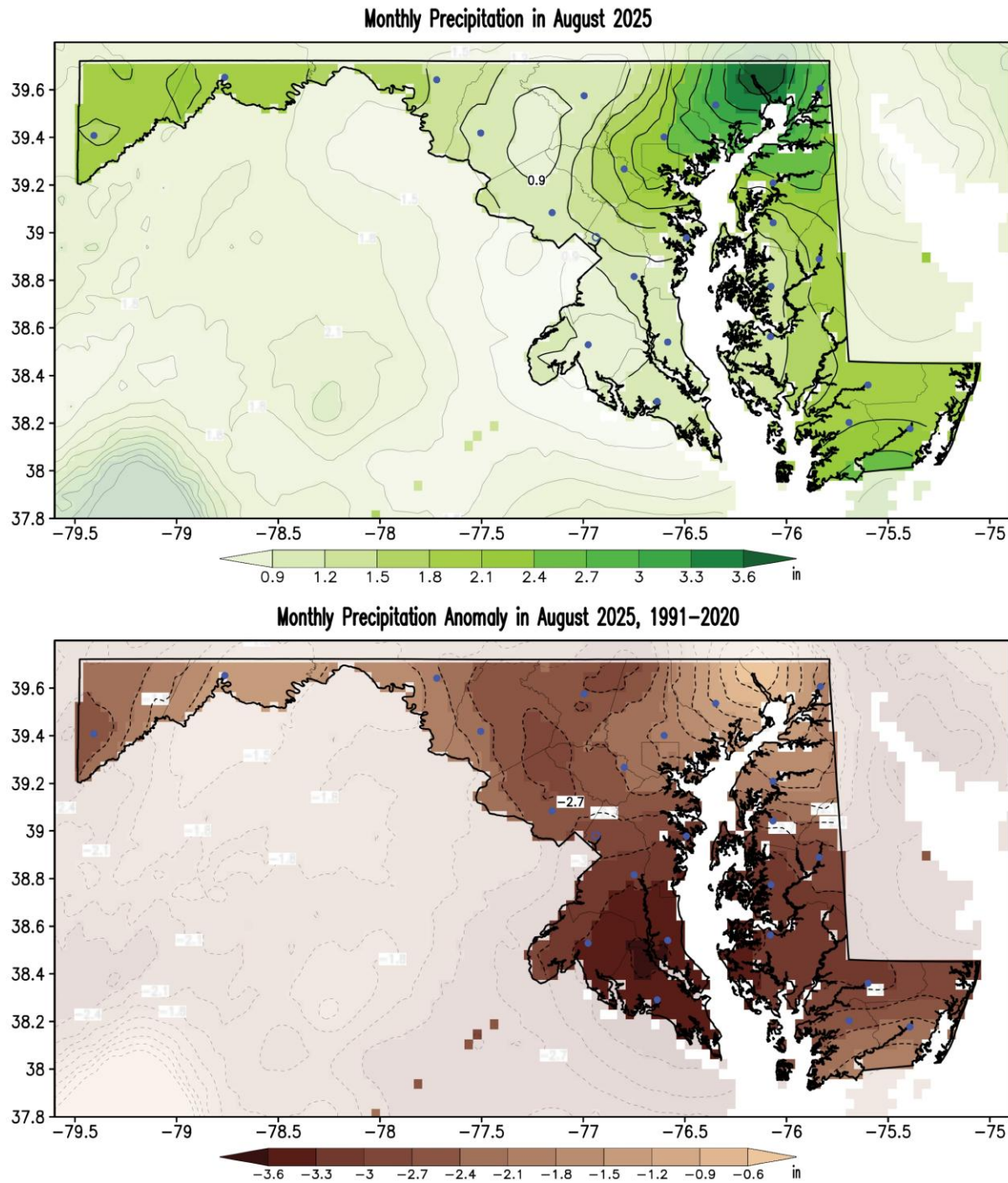


Figure 4. Monthly total precipitation (top panel) and its anomaly with respect to the 1991-2020 climatology (bottom panel) for August 2025. Precipitation is measured in inches, as indicated by the color bar. Brown shading in the anomaly map marks drier than normal conditions. Note shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

E. Drought

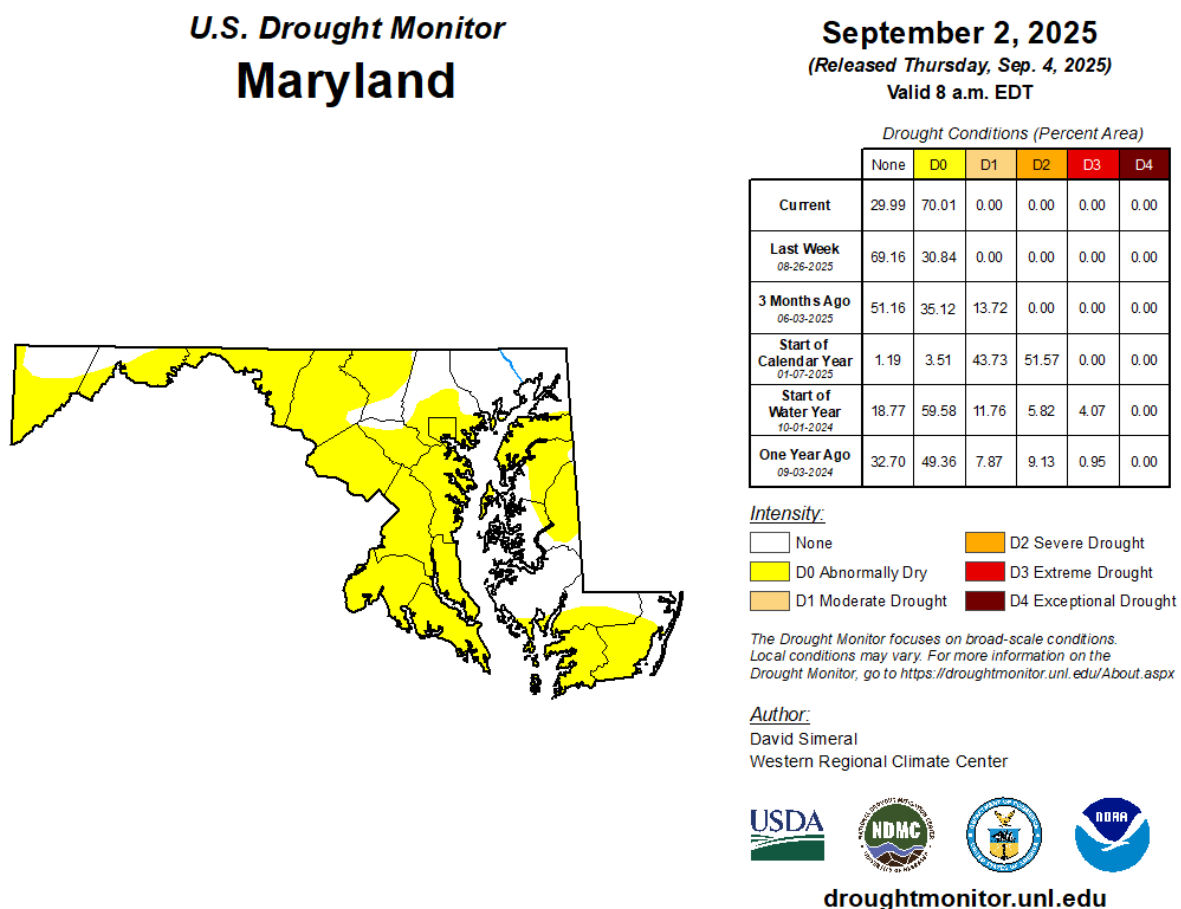


Figure 5. Drought conditions as reported by the U.S. Drought Monitor on September 2, 2025. Conditions deteriorated in August, as 70% of the state was under abnormally dry conditions. Yellow shading indicates abnormally dry regions. Numbers in the table indicate the percentage of the state covered under the particular drought category at the time (in the left column). Areas shown in yellow (Abnormally Dry) indicate land that is going into or coming out of drought. Current conditions can be monitored on the [U. S. Drought Monitor website](https://droughtmonitor.unl.edu/). If interested, you can help monitor drought conditions by submitting a report of your local soil conditions through the National Drought Mitigation Center’s Drought Impact Toolkit by using the [Condition Monitoring Observer Reports](#) system.

F. Streamflow

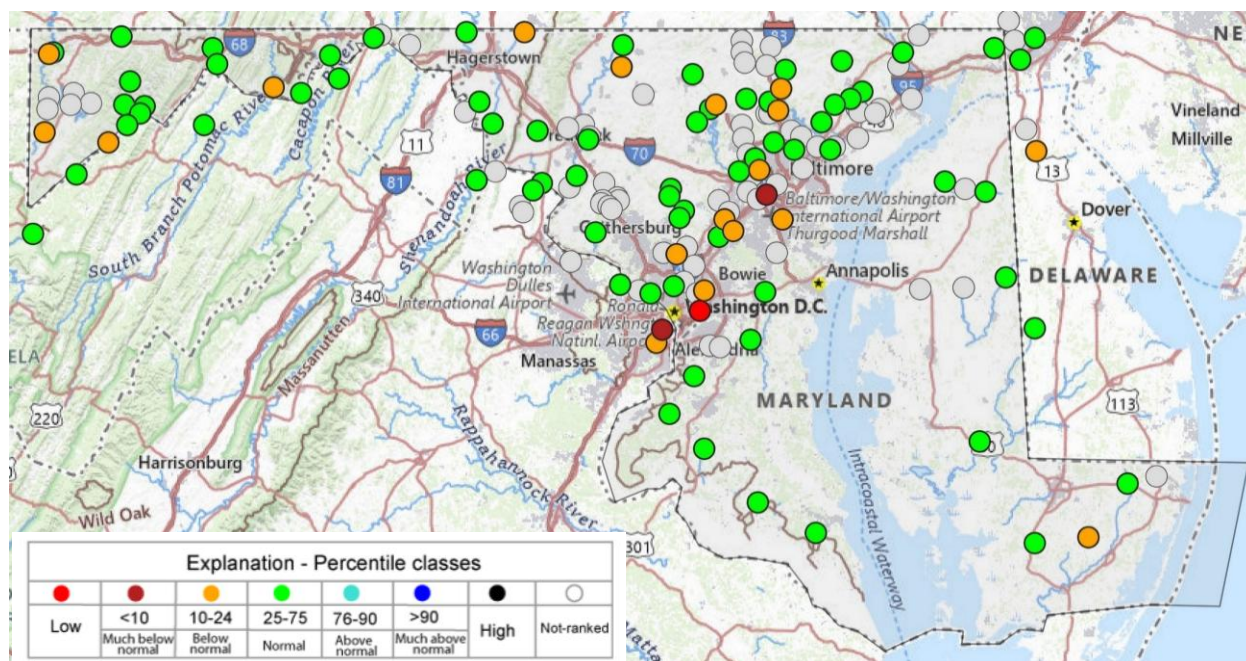


Figure 6. Monthly averaged streamflow class anomalies as reported by the U.S. Geological Survey (USGS) Water Watch for August 2025. Green-filled circles represent Normal streamflow conditions, while orange to red-filled circles denote Below-normal and Much below-normal streamflow conditions. The majority of streams and rivers had normal streamflow. Current conditions can be monitored on the [U. S. Geological Survey website](https://waterwatch.usgs.gov/).

4. August and JJA 2025 Climate Divisions Averages

A. August 2025 Scatter Plots

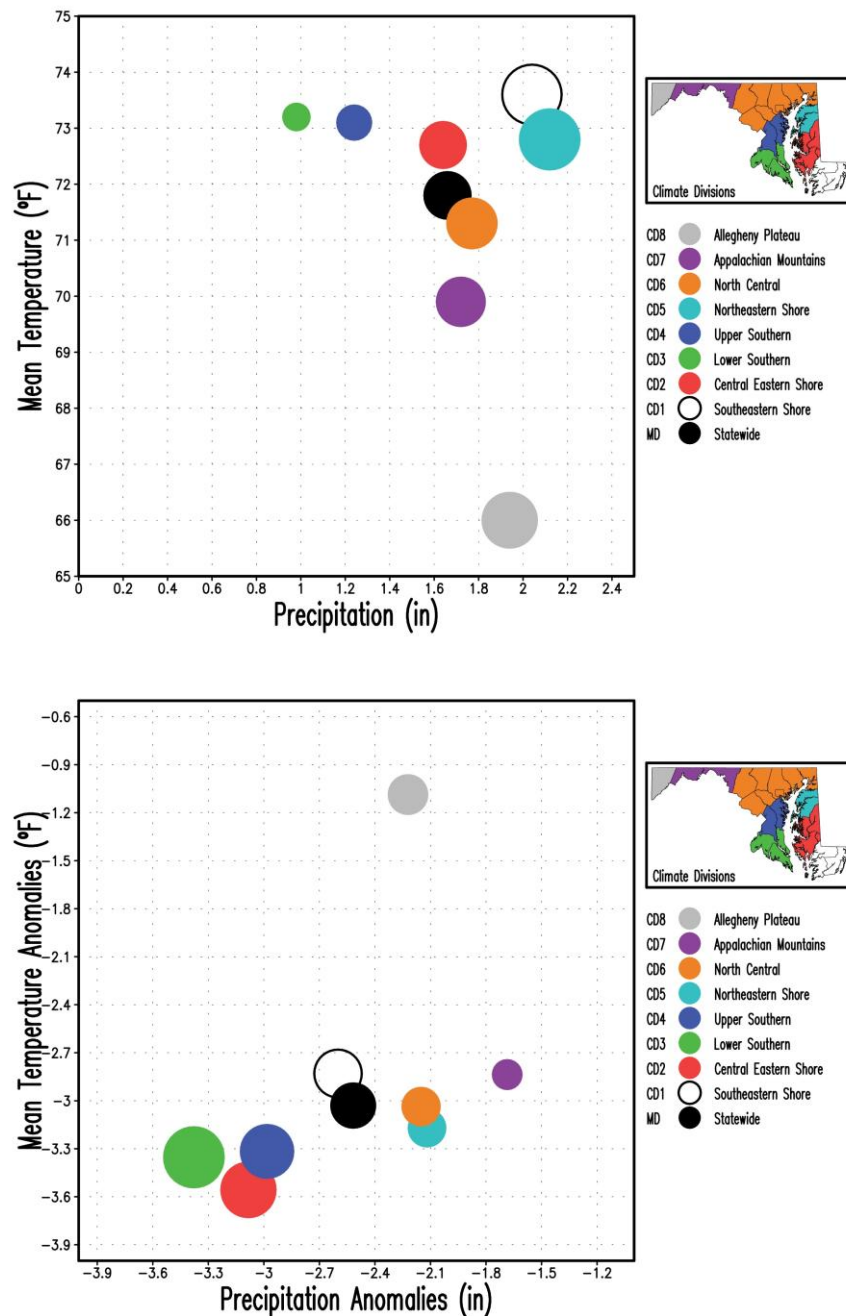


Figure 7. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for August 2025. The upper panel displays the mean temperature and total precipitation, while the bottom panel displays their anomalies relative to the 1991-2020 climatology. 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 (2.12 inches in CD5, top panel) and by the maximum precipitation anomaly (|-3.38| inches in CD3, bottom panel) among the nine regions. Note that the color of the filled circles corresponds to the color in the Climate Divisions according to the inset map.

B. June – August 2025 Scatter Plots

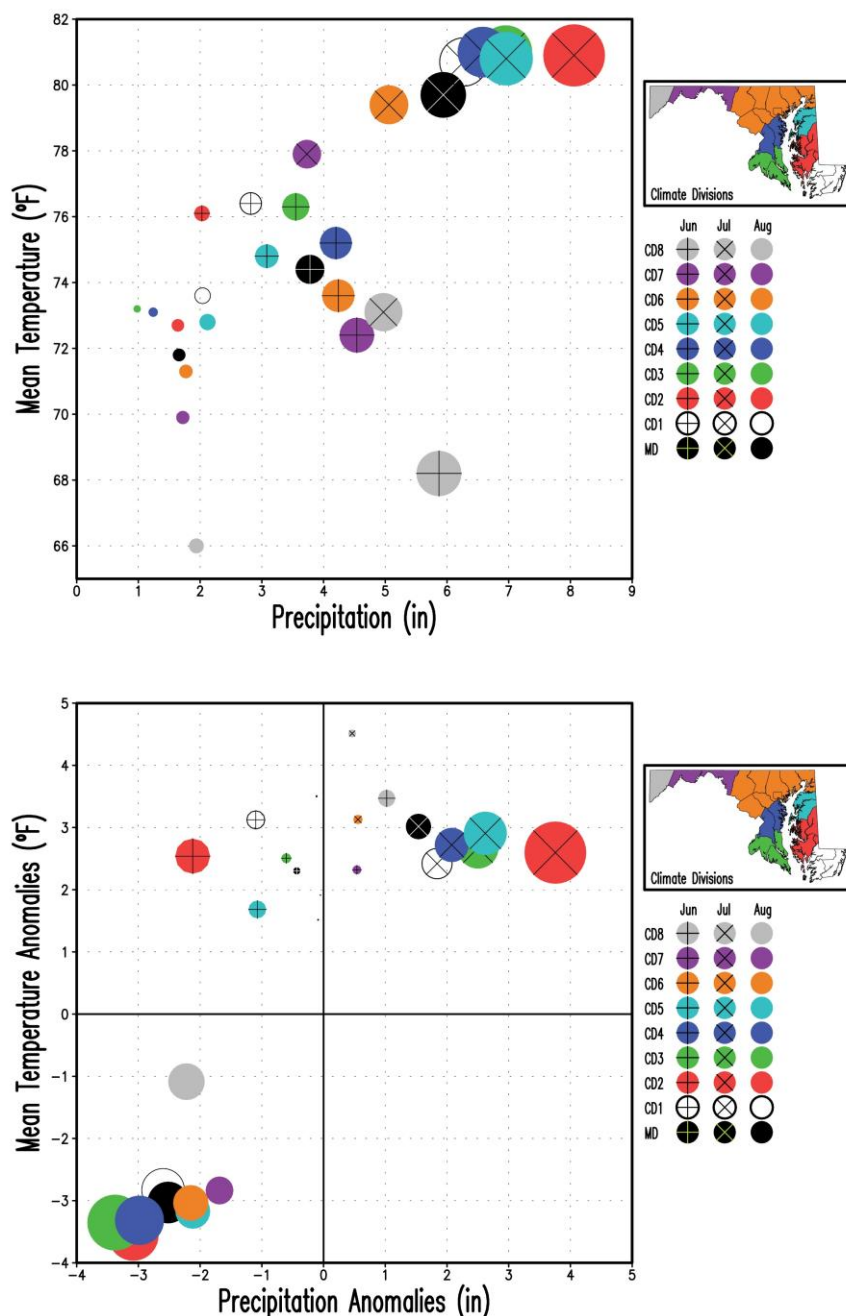


Figure 8. Scatter plots of Maryland (statewide) and Climate Divisions (CD#) monthly mean surface air temperature vs. total precipitation for June, July and August 2025. The upper panel displays the mean temperature and total precipitation, while the bottom panel shows their anomalies relative to the 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 (8.06 inches in CD2 in July, top panel) and by the maximum precipitation anomaly (3.76 inches in CD2 in July, bottom panel) among the nine regions and three months. August is displayed with filled circles only, while July and June are displayed with superposed multiplication and addition signs, respectively.

5. Extremes & Growing Degree Days

A. Hot Days, Warm Days, and Warm Nights

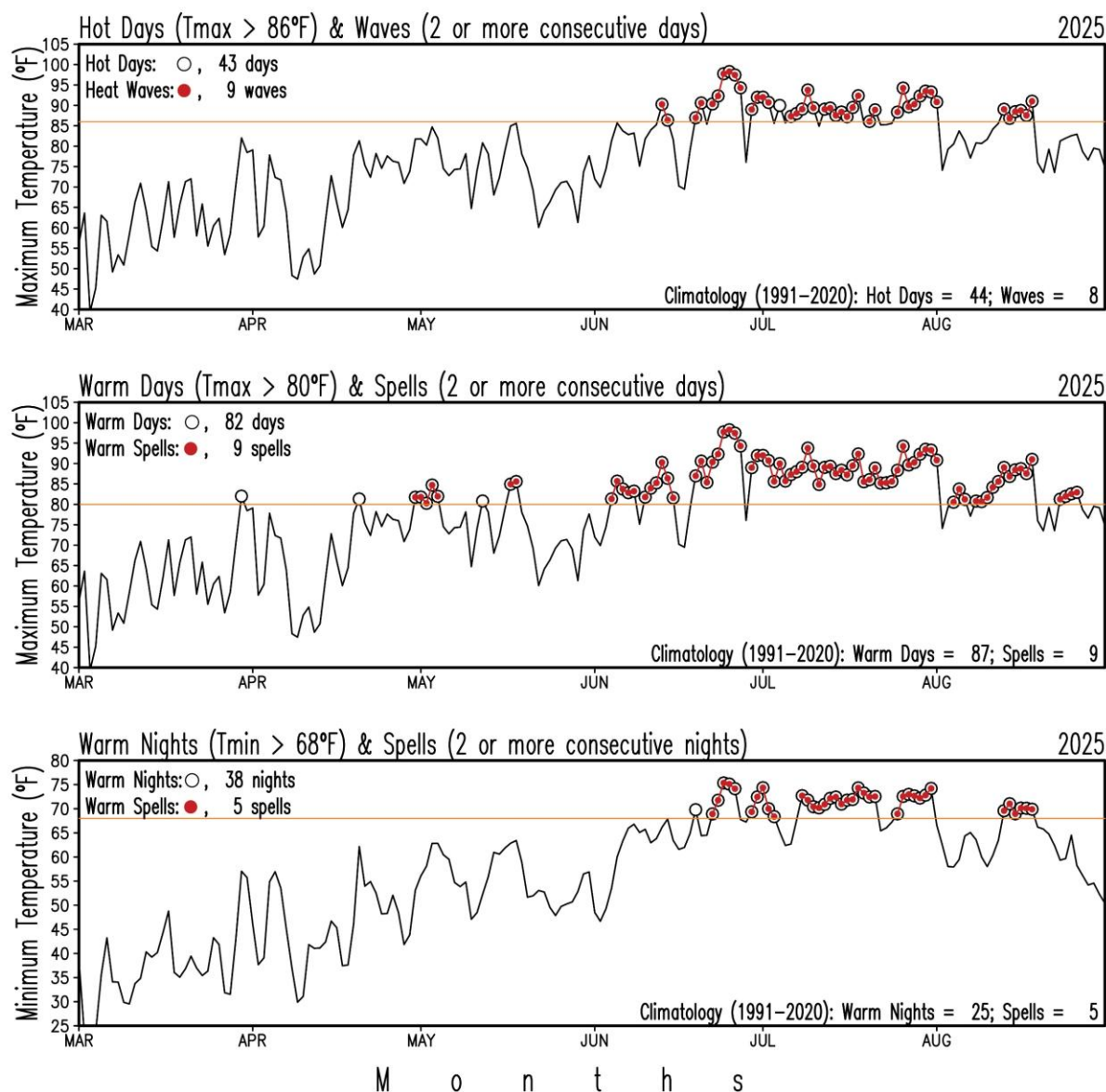


Figure 9. Maryland (statewide) number of hot days, warm days, warm nights, and their consecutive occurrence for the period January 1 – August 31, 2025. The upper panel displays hot days in open circles and heat waves in red-filled circles from statewide daily maximum temperatures. The middle panel shows warm days in open circles and warm day spells in red-filled circles from statewide daily maximum temperatures. The bottom panel displays warm nights in open circles and warm night spells in red-filled circles from statewide daily minimum temperatures. The orange line in each panel marks the threshold temperatures of 86°F, 80°F, and 68°F for each case. Figures at the county and climate division levels, as well as summary tables, are available on the [MDSCO website](#).

B. Extreme Precipitation and Dry Spells

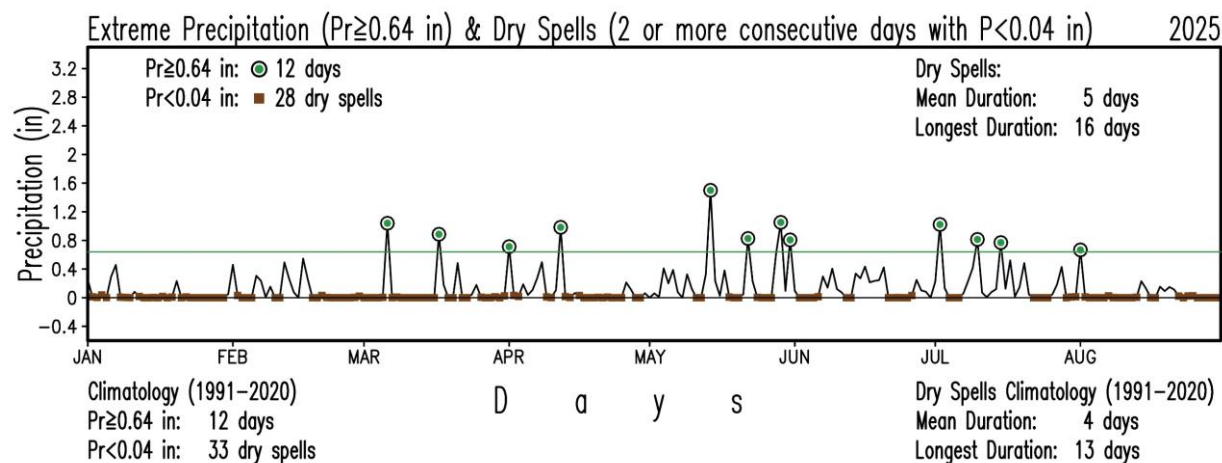


Figure 10. Maryland (statewide) number of days with extreme precipitation and dry day spells for the period January 1 – August 31, 2025. Extreme precipitation days (precipitation equal to or larger than 0.64 in) are identified by green-filled circles. Dry spells (consecutive days with daily total precipitation less than 0.04 in) are shown by brown-filled squares. Both extremes are identified from the statewide total daily precipitation. Figures at the county and climate division levels, as well as summary tables, are available on the [MDSCO website](#).

C. Growing Degree Days

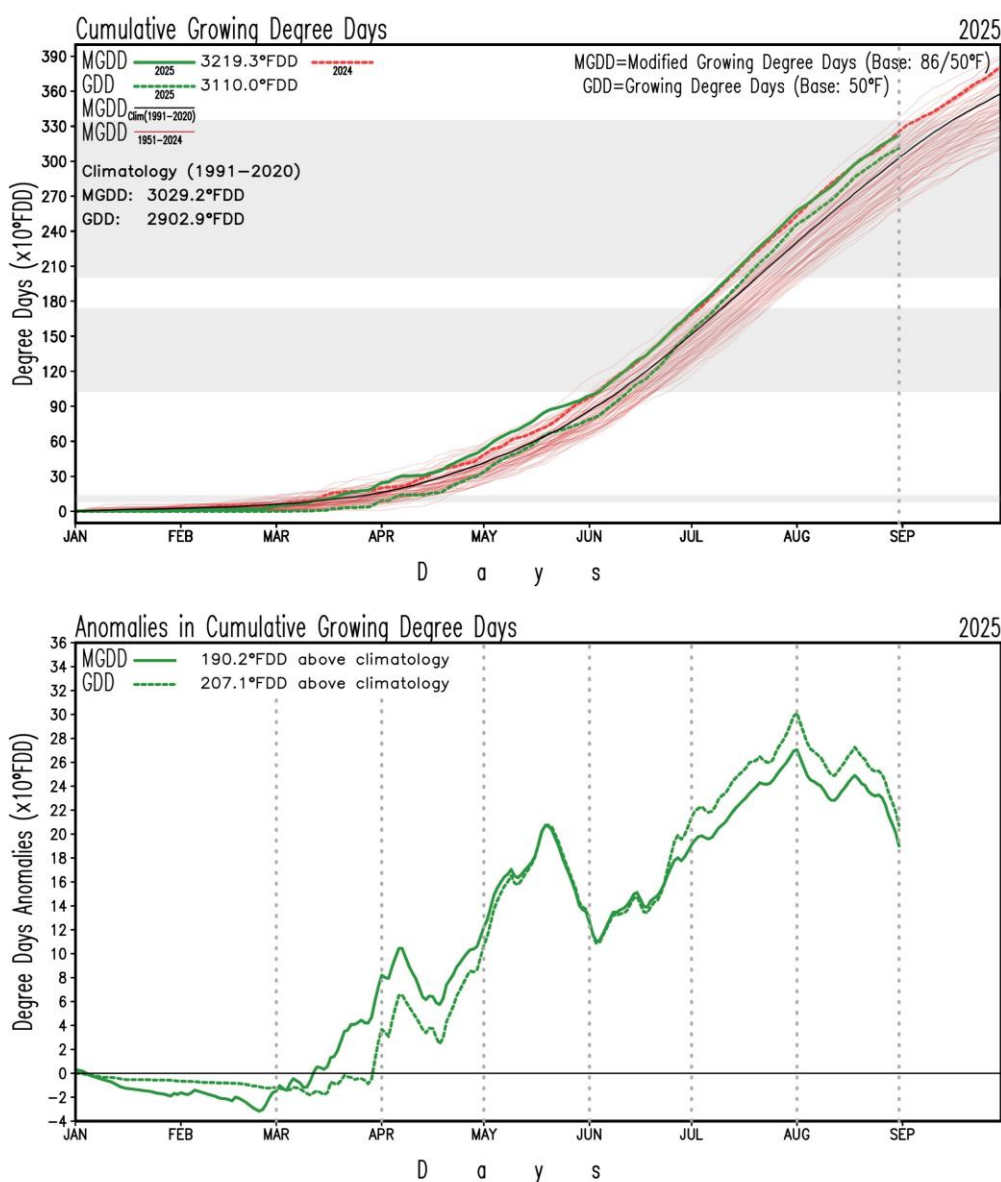


Figure 11. Maryland (statewide) cumulative growing degree days (upper panel) and its anomaly with respect to the 1991-2020 climatology (lower panel) for the period January 1 - August 31, 2025. The growing degree days are displayed with the dashed green line, while the modified growing degree days are shown with the continuous green line in the upper panel; for reference the modified growing degree days for 2024 are displayed with a dashed red line; the black line shows the 1991-2020 climatology of the cumulative modified growing degree days; the thin red lines display the cumulative modified growing degree days every year from 1951 to 2023. The gray shaded areas mark a range of values for emergence (82-140), tassel-silk (1024-1740), and physiological maturity (2000-3350) in corn development (IPAD, 2023). Anomalies with respect to the 1991-2020 climatology in the cumulative modified growing degree days (bottom panel) are displayed with the continuous green line, while those for the cumulative growing degree days are shown with the dashed green line. The vertical dotted gray lines mark the start of the months since March. The accumulated growing degree days and their anomalies as of August 31 are displayed at the top left of each panel. Analysis is from statewide daily maximum and minimum temperatures. Figures at the county and climate division levels, as well as summary tables, are available on the [MDSCO website](https://www.mdsco.org/).

6. August 2025 Statewide Averages in the Historical Record

A. Box and Whisker Plots

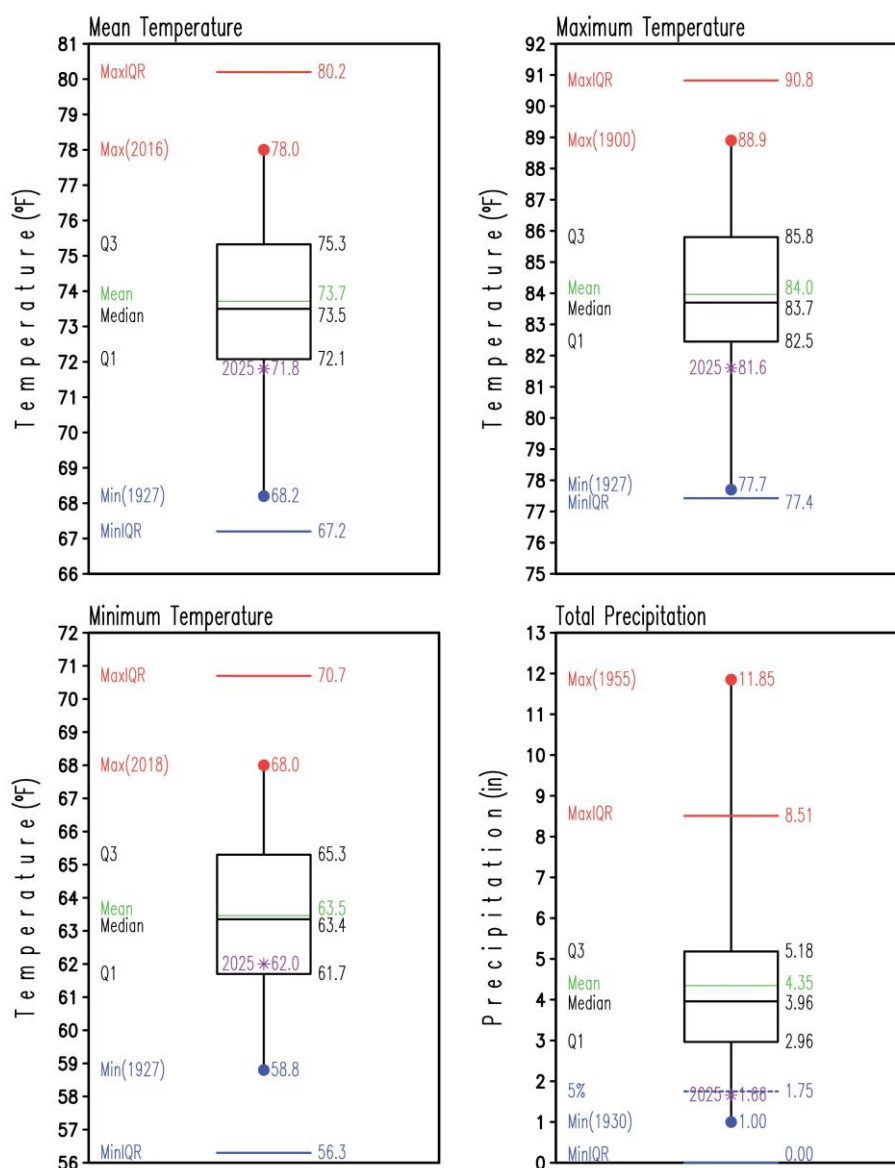


Figure 12. Box and Whisker plots of Maryland (statewide) monthly mean (upper left), maximum (upper right), minimum (lower left) surface air temperatures, and total precipitation (lower right) for August for the period 1895-2024. The label and asterisk in purple represent conditions for August 2025. Statistics for the period 1895-2024 are labeled at the left side of each box and whisker plot, and their values are 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 5th percentile in precipitation is displayed with a blue dashed 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 parentheses. 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.

7. 1895-2025 August Trends

A. Mean Temperature, Cooling Degree-Days, and Precipitation

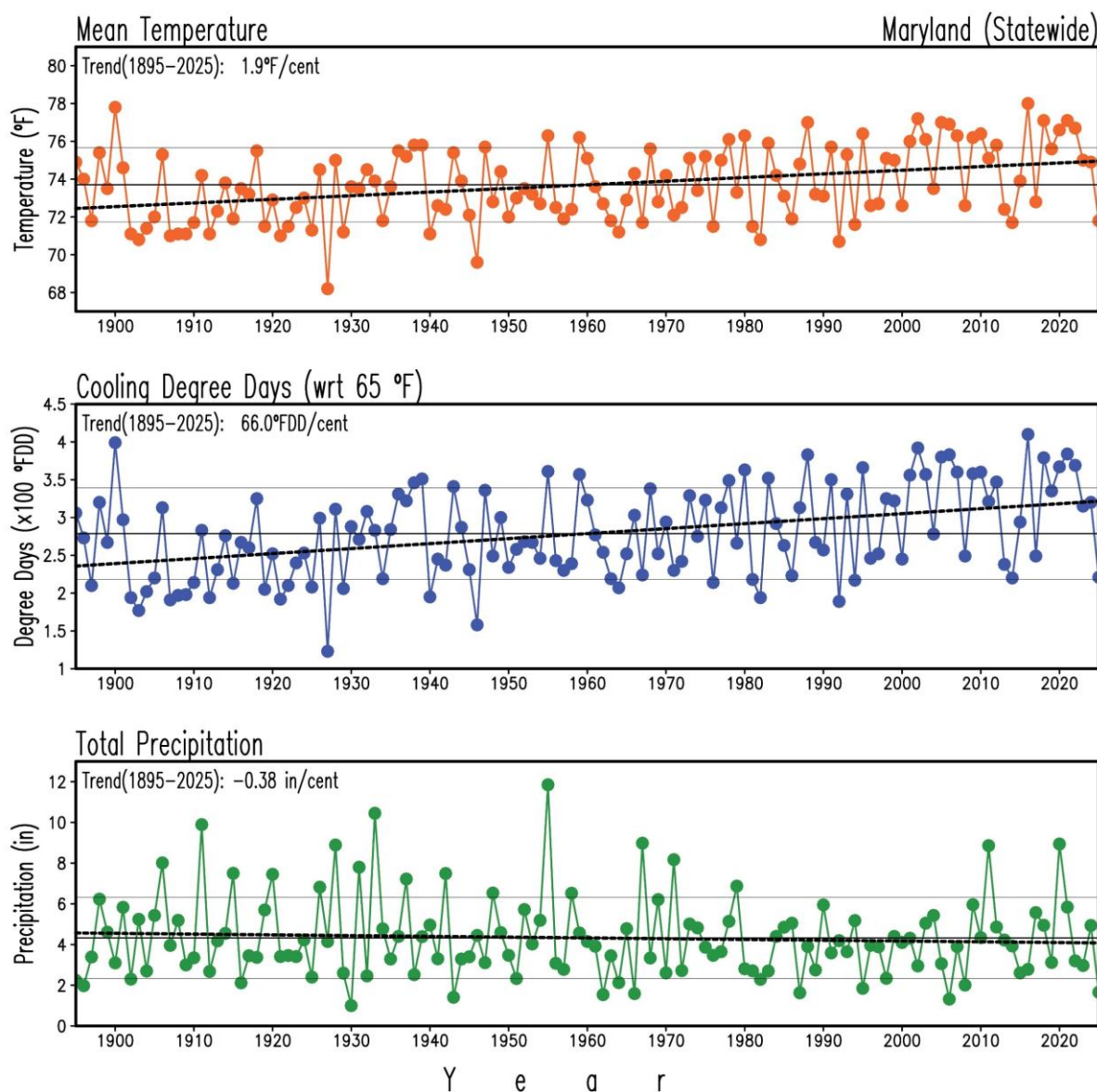


Figure 13. Maryland (statewide) mean surface air temperature, cooling degree days, and precipitation in August for the period 1895-2025. Temperature is in °F, degree-days are in °F degree-days (°FDD), and precipitation is in inches. The thin, continuous black lines in each panel display the long-term means (73.7°F, 278.7°FDD, and 4.33 in, 1895-2025), and the double thin, continuous gray lines indicate the standard deviation (2.0°F, 60.5°FDD, and 1.99 in) above/below the long-term mean. The thick dashed black lines show the long-term linear trend. The warming temperature trend (1.9°F/century) and the increasing cooling degree-days trend (66.0°FDD/century) are statistically significant at the 95% level (*Student's t-test* –Santer et al. 2000), but not the precipitation drying trend (–0.38 in/century).

B. Temperature and Precipitation Maps

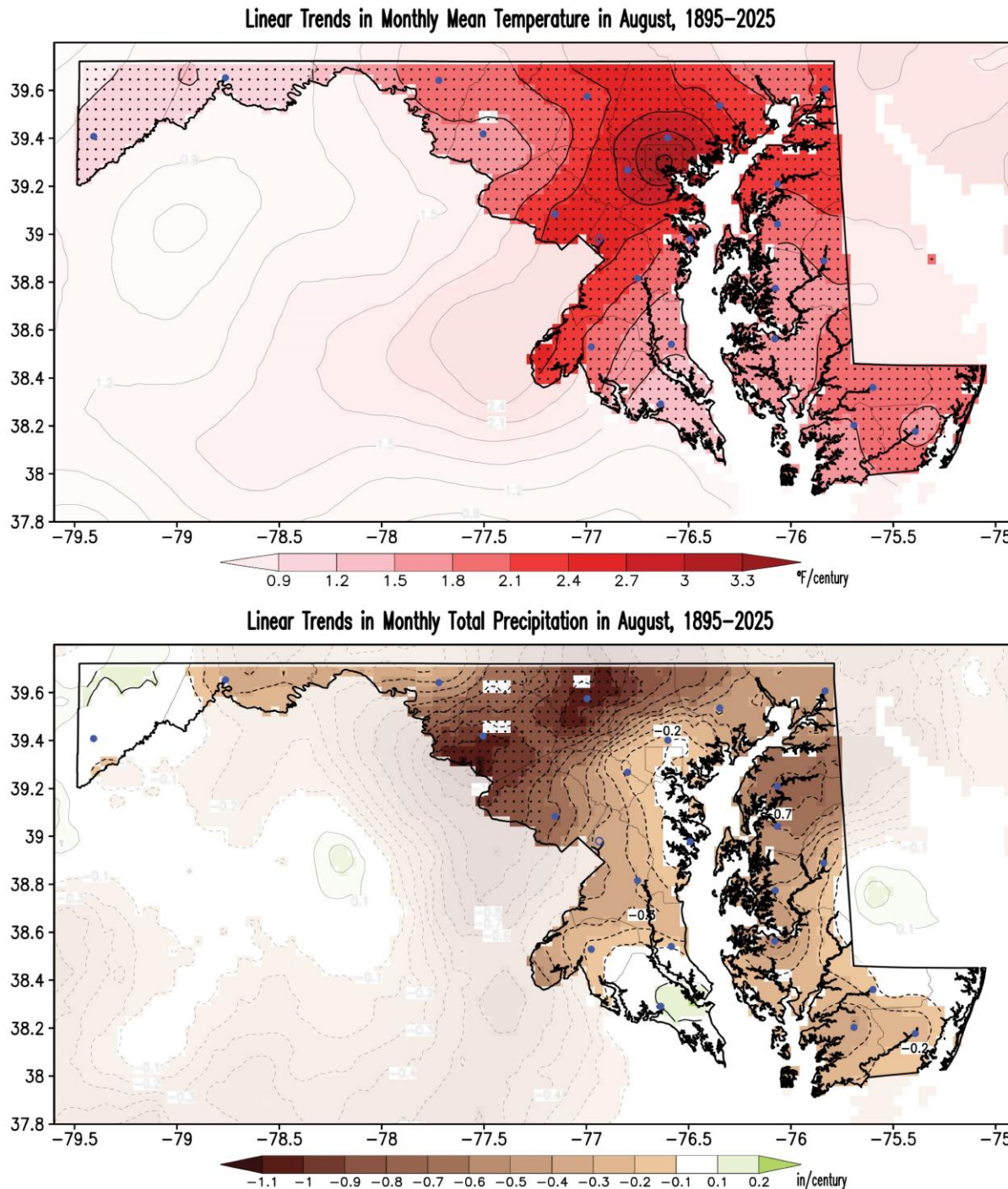


Figure 14. Linear trends in surface air mean temperature and precipitation in August for the period 1895–2025. Temperatures are in °F/century, and precipitation is in inches/century following the color bars. Red shading in the temperature map marks warming trends. Brown/green shading in the precipitation map shows drying/wetting trends. Stippling in the maps indicates 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.

8. Chesapeake Bay's Satellite Sea Surface Temperatures

A. Maps

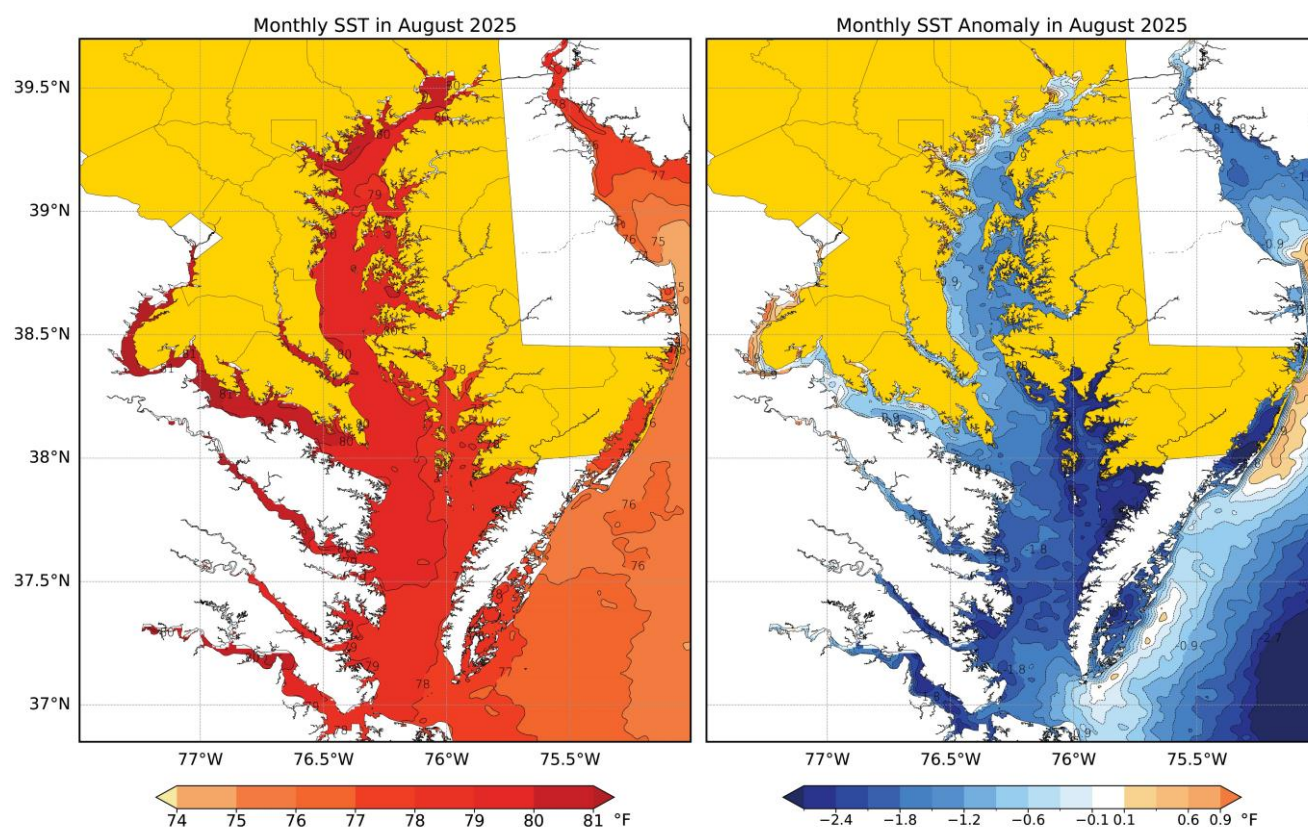


Figure 15. Monthly sea surface temperature (left panel) and its anomaly (right panel) in the Chesapeake Bay and surrounding coastal areas in August 2025. Temperatures are in °F following the color bar. Blue/orange shading in the anomaly map marks colder/warmer temperatures than the 2007-2020 mean. For clarity, the temperatures and their anomalies have been smoothed using a 9-point spatial smoother applied four times. Note that Maryland has been shaded yellow to facilitate focusing on the state waters.

B. Upper, Middle, Lower, and Entire Basins

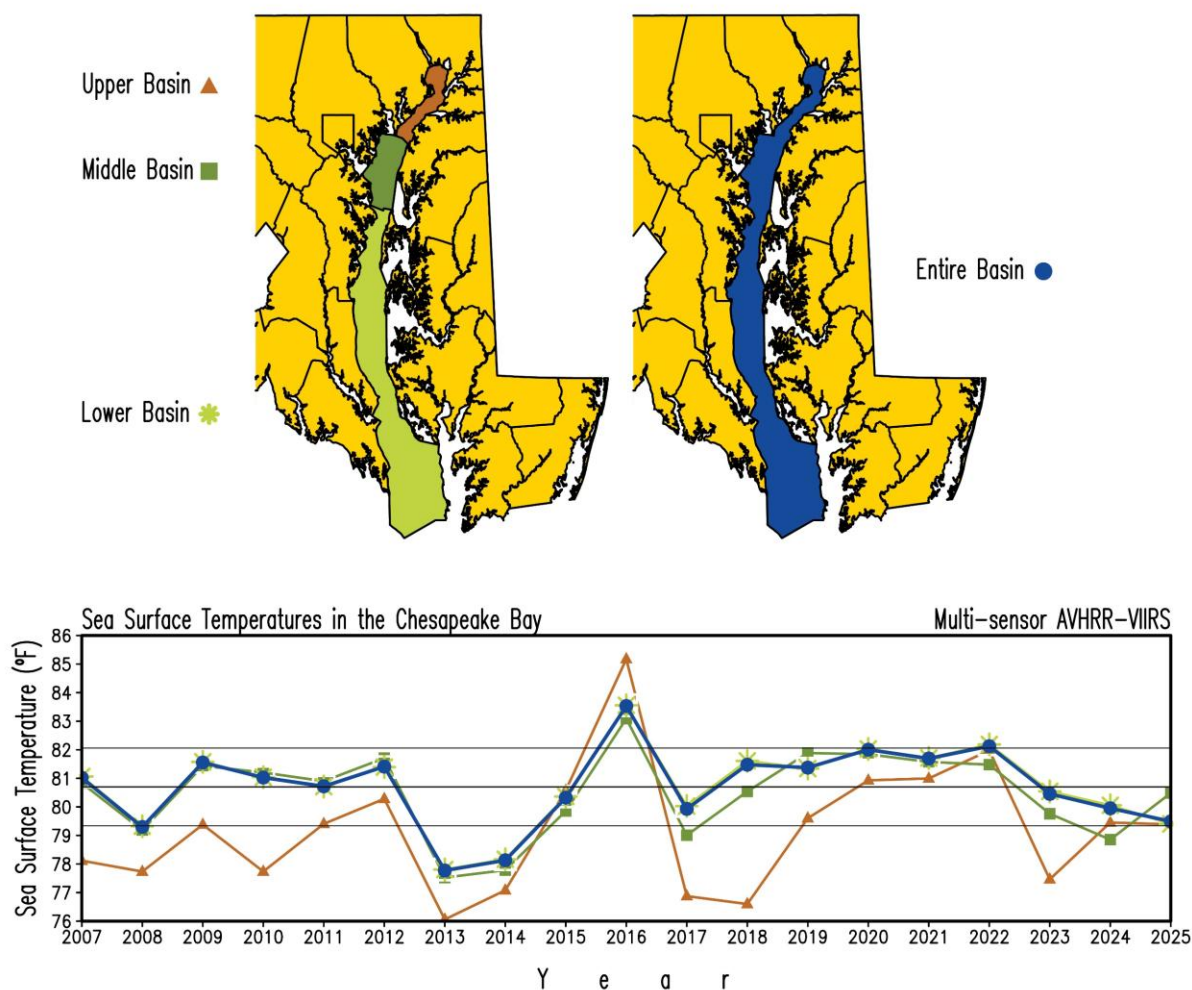


Figure 16. Watersheds in the Chesapeake Bay (top panel) and their area-averaged sea surface temperatures in August for the period 2007-2025 (bottom panel). Temperatures are in °F. The color of the lines corresponds to the color of the watersheds in the Bay, as indicated on the maps: Brown for the Upper Bay, dark green for the Middle Bay, light green for the Lower Bay, and Navy Blue for the Entire Bay. The mean temperature for the Entire basin in August 2025 was 79.5°F, while for the Upper, Middle, and Lower basins was 79.4, 80.5, and 79.4°F, respectively. The thin, continuous black line in the lower panel displays the 2007-2025 mean for the Entire Basin (80.7°F), and the double thin, continuous gray lines indicate the standard deviation (1.4°F) above/below the long-term mean. The 2007-2025 mean temperatures for the Upper, Middle, and Lower basins in August were 79.2, 80.5, and 80.7°F, respectively, while their standard deviations were 2.2, 1.4, and 1.4°F, respectively.

Appendix A. August 2025 Data Tables: Statewide, Climate Divisions, and Counties

A. Mean Temperature and Precipitation

Region	Mean Air Temperature (°F)	Rank (#)	Region	Total Precipitation (in)	Rank (#)
Statewide	71.8	25	Statewide	1.66	7
Climate Division 1	73.6	30	Climate Division 1	2.04	10
Climate Division 2	72.7	12	Climate Division 2	1.64	10
Climate Division 3	73.2	16	Climate Division 3	0.98	3
Climate Division 4	73.1	24	Climate Division 4	1.24	5
Climate Division 5	72.8	23	Climate Division 5	2.12	19
Climate Division 6	71.3	28	Climate Division 6	1.77	10
Climate Division 7	69.9	24	Climate Division 7	1.72	10
Climate Division 8	66.0	62	Climate Division 8	1.94	5
Allegany	69.2	20	Allegany	2.00	18
Anne Arundel	73.5	25	Anne Arundel	1.50	5
Baltimore	71.5	31	Baltimore	2.03	15
Baltimore City	73.5	37	Baltimore City	2.27	26
Calvert	73.0	15	Calvert	1.00	4
Caroline	72.0	11	Caroline	1.94	14
Carroll	70.1	28	Carroll	1.06	1
Cecil	72.2	32	Cecil	3.07	43
Charles	73.2	22	Charles	0.89	2
Dorchester	73.0	11	Dorchester	1.52	7
Fredrick	70.8	29	Fredrick	1.03	1
Garrett	66.0	62	Garrett	1.95	5
Harford	72.1	28	Harford	3.02	40
Howard	71.0	27	Howard	1.51	7
Kent	73.1	27	Kent	2.35	27
Montgomery	71.4	23	Montgomery	1.11	5
Prince George's	72.7	24	Prince George's	1.05	5
Queen Anne's	72.8	23	Queen Anne's	1.90	17
Saint Mary's	73.3	14	Saint Mary's	1.07	3
Somerset	74.3	34	Somerset	2.13	13
Talbot	73.0	13	Talbot	1.39	6
Washington	70.6	25	Washington	1.46	7
Wicomico	73.0	20	Wicomico	1.87	11
Worcester	73.7	33	Worcester	2.09	14

Table A1. Monthly mean surface air temperature (left) and total precipitation (right) at Maryland (statewide), climate division, and county levels for August 2025. Temperatures are in °F, and precipitation is in inches. The rank is the order in which the variable for August 2025 is positioned among the 131 Augusts, after the 131 values have been arranged from the lowest to the highest in the *standard competition ranking method*. The closer to 131 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	81.6	19	Statewide	62.0	37
Climate Division 1	81.9	14	Climate Division 1	65.4	53
Climate Division 2	82.1	9	Climate Division 2	63.2	23
Climate Division 3	82.1	9	Climate Division 3	64.2	36
Climate Division 4	82.6	17	Climate Division 4	63.6	31
Climate Division 5	82.7	20	Climate Division 5	62.9	32
Climate Division 6	81.7	28	Climate Division 6	60.9	30
Climate Division 7	81.5	20	Climate Division 7	58.4	40
Climate Division 8	76.2	41	Climate Division 8	55.7	75
Allegany	80.9	17	Allegany	57.5	45
Anne Arundel	82.7	16	Anne Arundel	64.3	32
Baltimore	81.9	26	Baltimore	61.0	36
Baltimore City	83.1	32	Baltimore City	63.9	40
Calvert	81.7	8	Calvert	64.3	35
Caroline	82.3	14	Caroline	61.7	22
Carroll	81.0	28	Carroll	59.1	29
Cecil	82.4	33	Cecil	62.1	33
Charles	82.4	11	Charles	63.8	36
Dorchester	82.1	9	Dorchester	64.0	28
Fredrick	81.4	29	Fredrick	60.1	27
Garrett	76.3	42	Garrett	55.7	75
Harford	82.4	30	Harford	61.8	31
Howard	81.4	28	Howard	60.7	30
Kent	82.8	23	Kent	63.4	36
Montgomery	81.3	23	Montgomery	61.5	33
Prince George's	82.4	12	Prince George's	63.0	33
Queen Anne's	82.6	19	Queen Anne's	62.9	31
Saint Mary's	81.8	9	Saint Mary's	64.7	33
Somerset	82.2	14	Somerset	66.4	56
Talbot	82.2	11	Talbot	63.8	22
Washington	82.0	26	Washington	59.1	36
Wicomico	82.0	11	Wicomico	63.9	42
Worcester	81.6	19	Worcester	65.8	57

Table A2. Monthly maximum (left) and minimum (right) surface air temperatures at Maryland (statewide), climate division, and county levels for August 2025. Temperatures are in °F. The rank is the order in which the variable for August 2025 is positioned among the 131 Augusts, after the 131 values have been arranged from lowest to highest using the *standard competition ranking method*. The closer to 131 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. August 2025 Bar Graphs: Statewide, Climate Divisions, and Counties

A. Temperatures and Precipitation

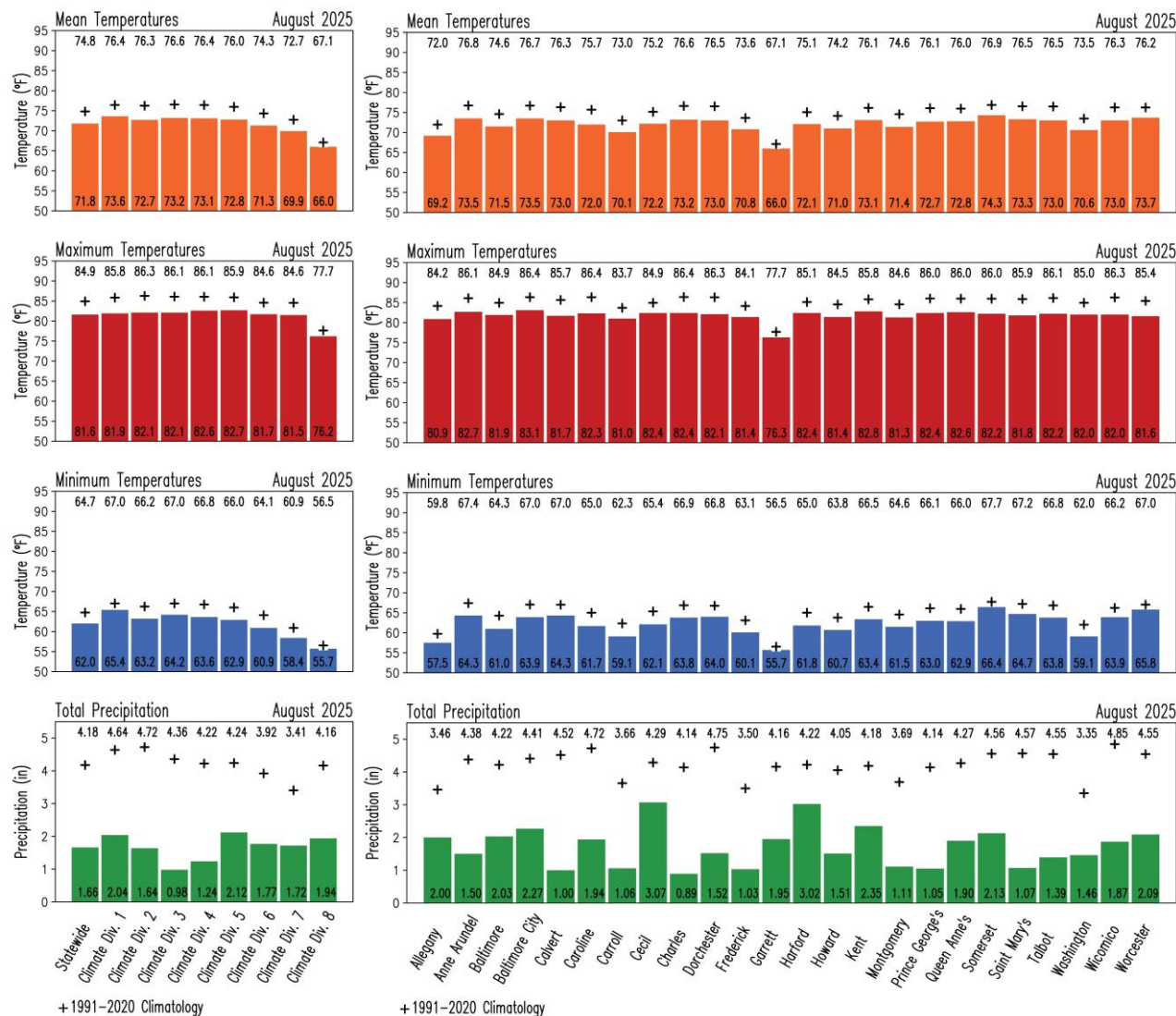


Figure B1. Monthly surface variables for Maryland in August 2025. Color bars represent the variables as follows: mean surface air temperature (orange), maximum surface air temperature (red), minimum surface air temperature (blue), and total precipitation (green) at statewide and climate division (left 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 August 2025. For comparison, the corresponding 1991-2020 climatological values for August are displayed as black addition signs, and their magnitudes are shown at the top of the panels.

B. Temperatures and Precipitation Anomalies

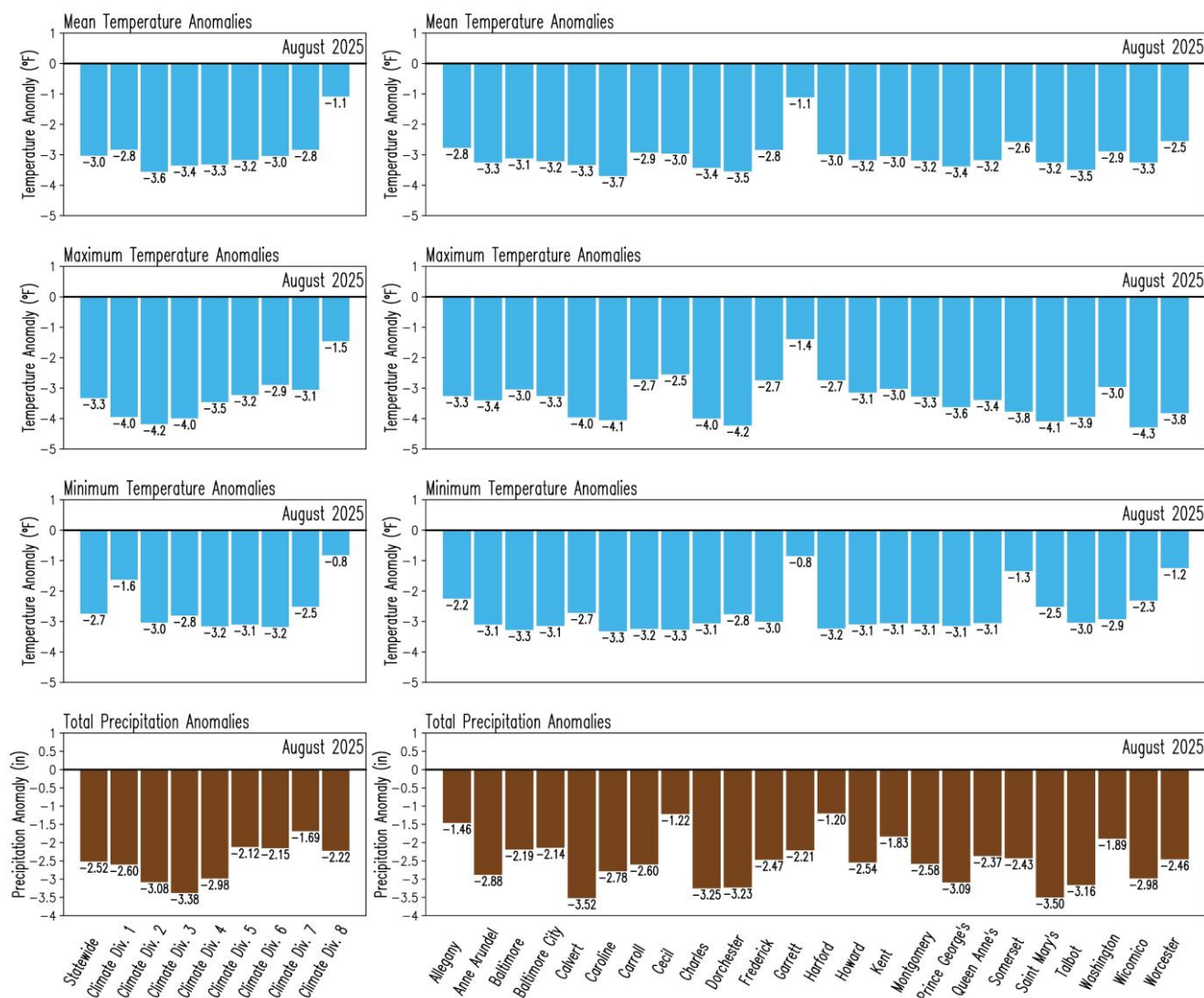


Figure B2. Anomalies in the monthly surface variables for Maryland in August 2025. Anomalies are with respect to the 1991-2020 climatology. Blue color represents negative (colder than normal) anomalies for mean surface air temperature (upper row), maximum surface air temperature (second row from top), 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 August 2025.

Appendix C. August 1991-2020 Climatology Maps and August 2025 Precipitation as Percentage of Climatology

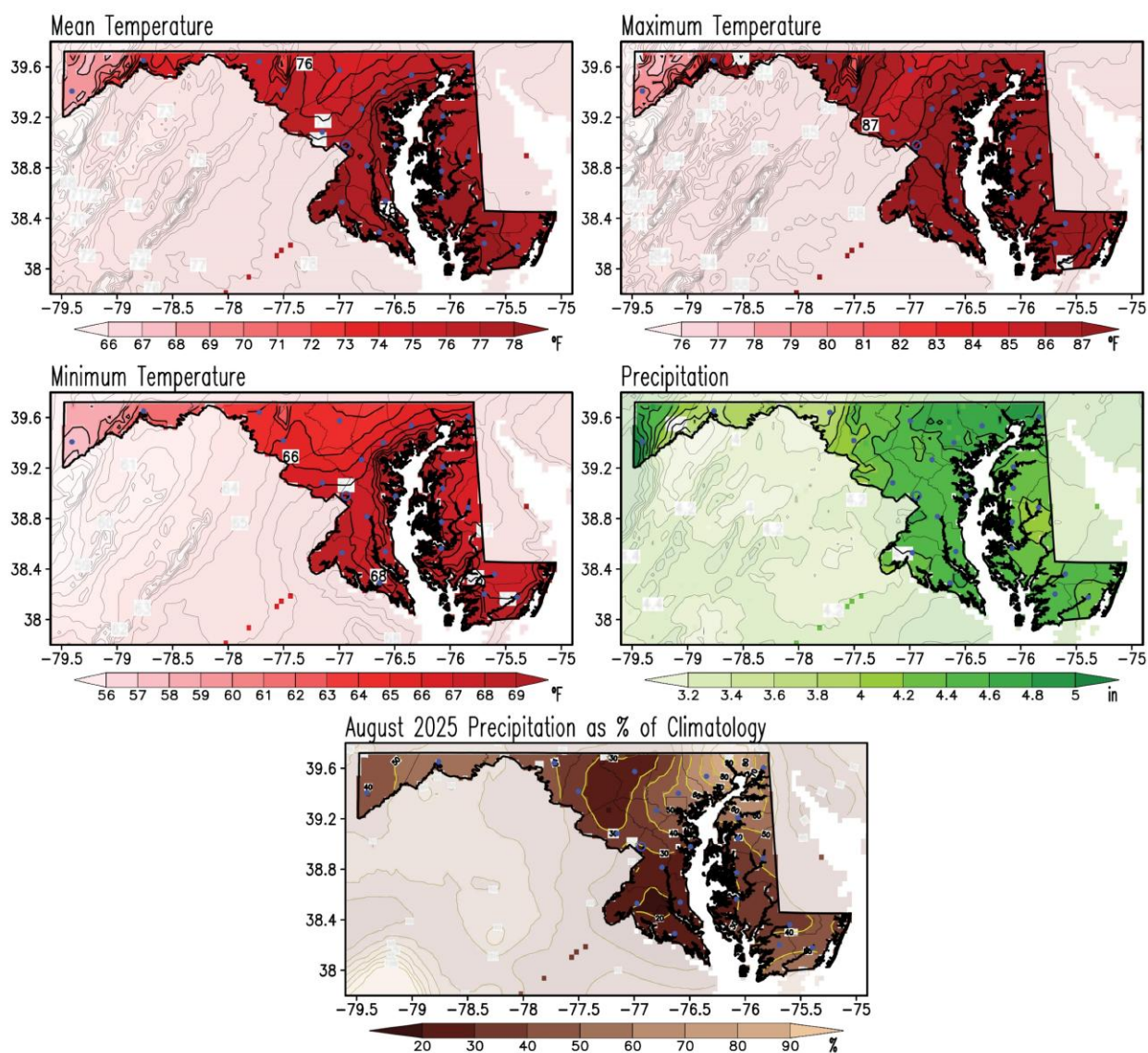


Figure C1. August climatology of the monthly mean, maximum, and minimum surface air temperatures, and total precipitation for the period 1991-2020 (upper and middle rows), and precipitation in August 2025 as a percentage of climatology (bottom row). Temperatures are in °F, and precipitation is in inches according to the color bars. This is the current climate normal against which the August 2025 conditions are compared to obtain the August 2025 anomalies (from Figures 1 to 4). Precipitation as a percentage is calculated by dividing the total precipitation (from Figure 4) by the climatology (from the middle right panel) and multiplying that ratio by 100, so the units are expressed as a percentage of the climatology (%); the brown shading in this map indicates drier than normal conditions, and yellow isolines are for percentages equal to or less than 50%. Note that shading outside the state has been washed out to facilitate focusing on Maryland. Filled blue circles mark the county seats.

Appendix D. August Standard Deviation and August 2025 Standardized Anomalies Maps

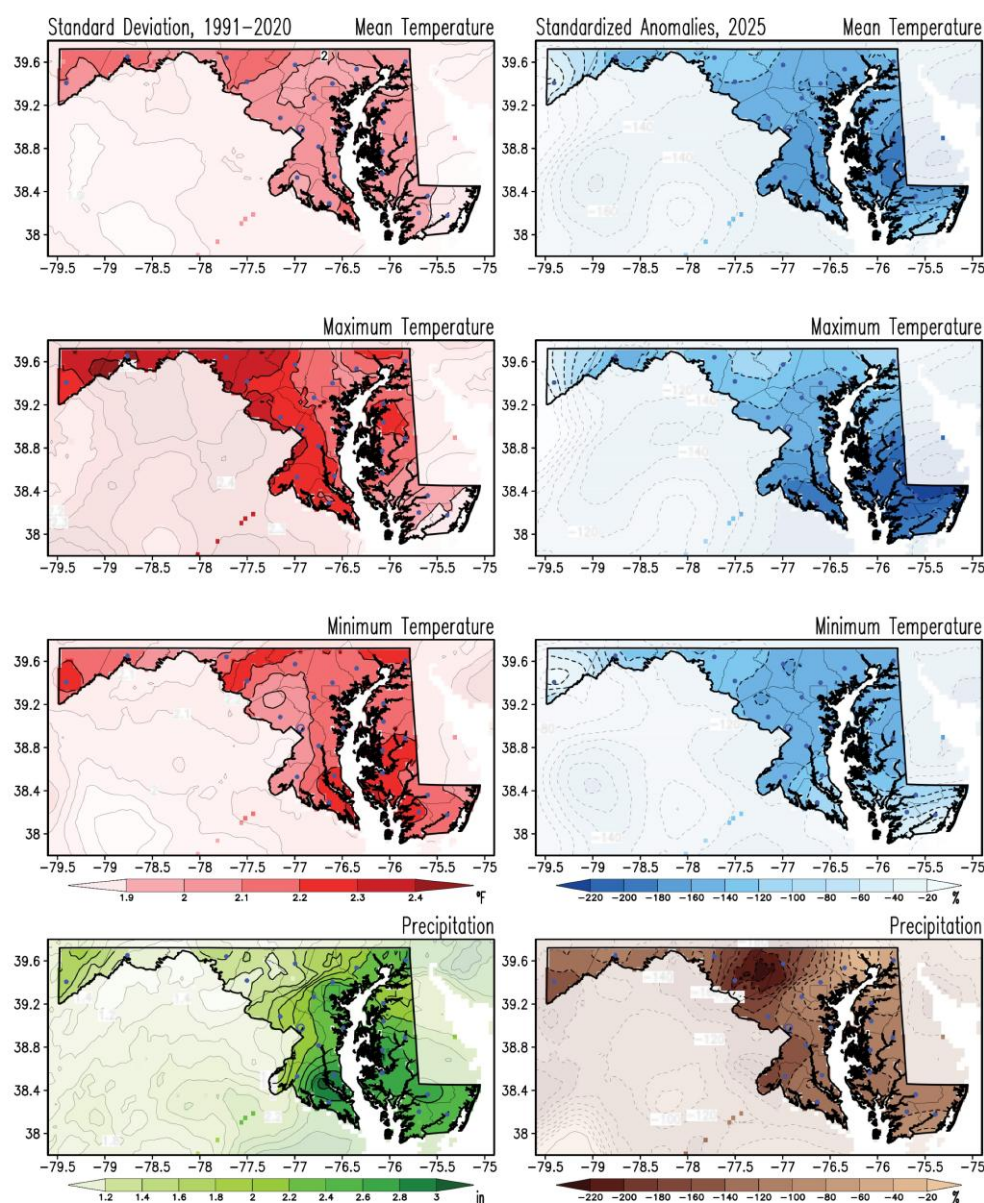


Figure D1. Standard deviation for August and standardized anomalies of temperatures and precipitation for August 2025. Standard deviations for monthly mean, maximum, and minimum surface air temperatures and total precipitation were obtained from the 1991-2020 period (left column). Anomalies for August 2025 (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 shading in the anomaly temperature maps marks colder 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.

Appendix E. 2007-2020 Mean and Standard Deviation of Sea Surface Temperatures in August

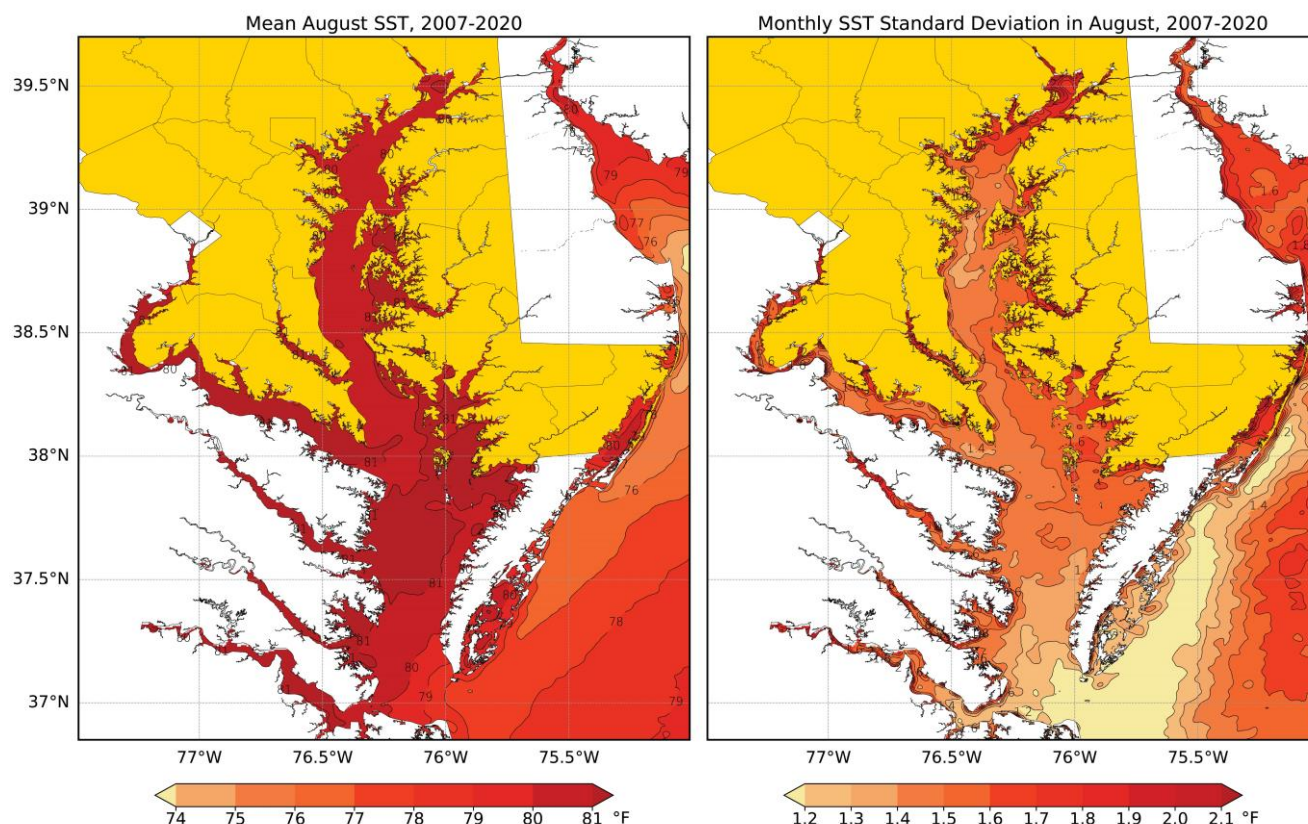


Figure E1. Mean (left panel) and standard deviation (right panel) of sea surface temperatures in the Chesapeake Bay and surrounding coastal areas in August for the period 2007-2020. The mean and standard deviation of the temperatures are in °F according to the color bars. The mean temperature map is the current mean against which the August 2025 conditions are compared to obtain the August 2025 anomalies (from Figure 15). For clarity, the temperature mean and standard deviation have been smoothed using a 9-point spatial smoother applied four times. Note that Maryland has been shaded yellow to facilitate focusing on the state waters.

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