June 12, 2019

MEMORANDUM FOR: Derek S. Arndt
Chief, Climate Monitoring Section, Center for Weather and Climate
National Centers for Environmental Information

FROM: Ray Martin
Senior Meteorologist, National Weather Service Baltimore/Washington

SUBJECT: SCEC Report for Maryland Maximum Annual Precipitation in 2018

Summary:

On 21 March 2019, a State Climate Extremes Committee (SCEC) convened to verify / validate an annual precipitation accumulation of 84.56" reported at a CoCoRaHS (Community Collaborative Rain, Hail & Snow Network) station in Catonsville, MD for the calendar year of 2018. Although there is no SCEC-recognized annual precipitation record for Maryland, the known candidates to have held the record included Bachman's Valley, which recorded 78.32" in 1903; Towson, which recorded 76.52" in 1971; and Catoctin Mountain Park, which recorded 75.13" in 2003. A total of ten sites in Maryland, eight within the CoCoRaHS network and two within the National Weather Service (NWS) Cooperative Observer network, reported annual values in 2018 which exceeded all prior annual totals which may have been the previous record (Figure 1). The following observation was examined by the SCEC to determine its validity and potential status of the greatest annual precipitation total ever observed and verified in Maryland:

- **LOCATION: Catonsville 1.2 NW (MD-BL-39)**
- **YEAR: Calendar Year 2018**
- **PRECIPITATION TOTAL: 84.56"**

The committee considered the meteorological plausibility and reviewed the gauge and observing practices which measured the record in question. After reviewing the observational evidence, **the SCEC unanimously agreed that the Catonsville annual precipitation total of 84.56" would set the inaugural record for the State of Maryland.**

Sequence of Events, Examination & Decision

Background & Meteorological Plausibility

Due to persistent storms and copious tropical moisture, much of the eastern United States experienced unusually excessive precipitation during 2018. Nine states from Tennessee to Massachusetts recorded their wettest year on record, and many stations within this region experienced their wettest year on record (Figure 2), including the long-term climate stations in Washington, D.C. and Baltimore.

In Maryland, a total of 10 stations exceeded the existing highest amount from Bachman's Valley from 1903. These stations were located in several different parts of the state, but a clustering is noted in the vicinity of Ellicott City in central Maryland. The wide spacing of some of these sites points to the widespread heavy precipitation the state experienced in 2018.

The St. Inigoes station, as part of the old Smithsonian Institution voluntary observer network, recorded an annual precipitation value of 88.5” in 1872. This station was operational between Sept. 1871 and Feb. 1879 but the gauge used for observations and its siting are unknown. As a result, the St. Inigoes observation cannot be validated as the greatest annual precipitation value.

Review of Observing Practices & Equipment

The Climate Program Leader at NWS Weather Forecast Office Baltimore / Washington visited the station with the highest total, Catonsville 1.2 NW, in February 2019. The visit was delayed due to the Federal Government Shutdown of December 2018-January 2019. Catonsville is located in central Maryland, just southwest of Baltimore (Figure 3). This station is part of the CoCoRaHS network, a network of volunteers who measure and report daily precipitation accumulations on-line in an effort to increase the density of precipitation data across the nation. The observer at this station is a NOAA contractor with both a bachelor’s and master’s degree in meteorology. The observer made a report all but two days in 2018, and the readings from those two missing days were incorporated into a subsequent multi-day precipitation report. The rain gauge is located 4 feet above ground attached to a wooden post in the observer’s back yard, with some small holly trees located 15 feet west and northwest, and a 5 foot fence to the north (Figure 4). The gauge is located near the base of a small incline as the land slopes downward from the neighboring one to the flat main portion of the observer’s yard. The obstructions present are not believed to be of significance in influencing the rain gauge measurements.

The gauge position on the wooden post is not quite ideal, as the top of the funnel is only an inch or so above the top of the post. However, comparison of the station’s data to surrounding readings suggests this did not have a significant impact justifying invalidation of the observations (Figure 5 and Figure 6).

The largest difference in measurements between this station and surrounding stations was the heavy rainfall which occurred in late May which produced severe flooding in neighboring Ellicott City. Radar estimates from this date were compared to this station’s measurement and surrounding stations’ measurements, and the readings showed little if any bias, suggesting the higher total at the Catonsville 1.2 NW station was accurate (Figure 7). In summation, the SCEC believes the observation practices and gauge setting are within acceptable standards.

Finding of the Committee

All of the above evidence was reviewed by the SCEC leading to a teleconference call on 21 March 2019. Based upon the documented evidence, the SCEC agreed unanimously (by a vote of 5-0) that the annual precipitation value for Catonsville 1.2 NW, MD CoCoRaHS station in 2018 is valid and **recommends the NCEI Climate Monitoring Chief approve the SCEC action to acknowledge the 84.56" annual precipitation accumulation for 2018 in Catonsville as the state record annual precipitation value for Maryland**.

NCEI Climate Monitoring Chief Decision Approved (as recommended in boldface above):

Signed ARNDT.DEREK.SHANE.1384496519 Digitally signed by ARNDT.DEREK.SHANE.1384496519 Date: 2019.06.13 22:17:45 -04'00' Date: ___________

Not approved (will be returned to SCEC with no action taken): Signed

____ Date: ___________

Voting Members of the State Climate Extremes Committee:

Ray Martin, Senior Meteorologist, National Weather Service (NWS) Baltimore/Washington
Dr. Konstantin Vinnikov, Maryland State Climatologist
Keith Eggleston, Regional Climatologist, Northeastern Regional Climate Center (NRCC) Christopher Stachelski, Climate Services Program Manager, System Operations Division, NWS Eastern Region Headquarters
Karin Gleason, Meteorologist, National Centers for Environmental Information (NCEI)

Additional teleconference participants:

Steven Zubrick, Science and Operations Officer, NWS Baltimore/Washington
Phillip Stratton, Assistant Maryland State Climatologist
Bryant Korzeniewski, Meteorologist/Datzilla Programmer, NCEI
Tamara Houston - National Partnership Liaison, NCEI

Figure 1 - Table showing the stations which exceeded the previous highest annual precipitation measurement in Maryland during 2018

Maximum 1-Year Total Precipitation for Maryland

Click column heading to sort ascending, click again to sort descending.

Name	Station Type	Value	Ending Date	Missing Days	Valid Date Range
CATONSVILLE 1.2 NW	CoCoRaHS	84.56	2018-12-31	0	2015-07-27 to 2019-05-31
THURMONT 3.0 N	CoCoRaHS	84.35	2018-12-31	0	2017-10-01 to 2019-06-01
TOWSON 0.8 SW	CoCoRaHS	80.86	2018-12-31	0	2008-06-06 to 2019-06-01
MECHANICSVILLE 5 NE	COOP	80.78	2018-12-31	0	1927-07-10 to 2019-06-03
ELDERSBURG 0.9 E	CoCoRaHS	80.57	2018-12-31	0	2014-10-16 to 2019-06-01
KINGSVILLE 2.5 NNE	CoCoRaHS	79.41	2018-12-31	5	2006-07-13 to 2019-06-01
MILLERS 4 NE	COOP	79.35	2018-12-31	0	1988-03-01 to 2019-06-02
ELLICOTT CITY 1.3 WSW	CoCoRaHS	79.00	2018-12-31	12	2006-04-30 to 2019-05-31
KINGSVILLE 1.2 E	CoCoRaHS	78.72	2018-12-31	0	2010-08-01 to 2019-05-31
LINTHICUM 0.4 ENE	CoCoRaHS	78.38	2018-12-31	217	2009-04-20 to 2019-05-29

Figure 2 - Precipitation rankings from 2018

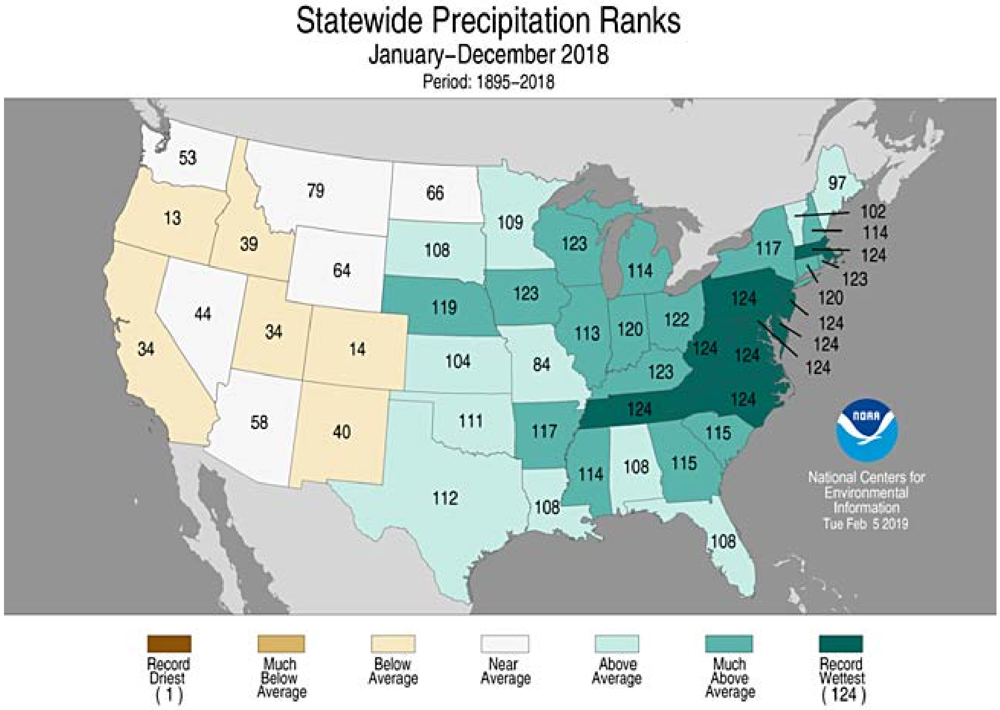

Figure 3 - Map of Maryland, with Catonsville's location noted by a red circle

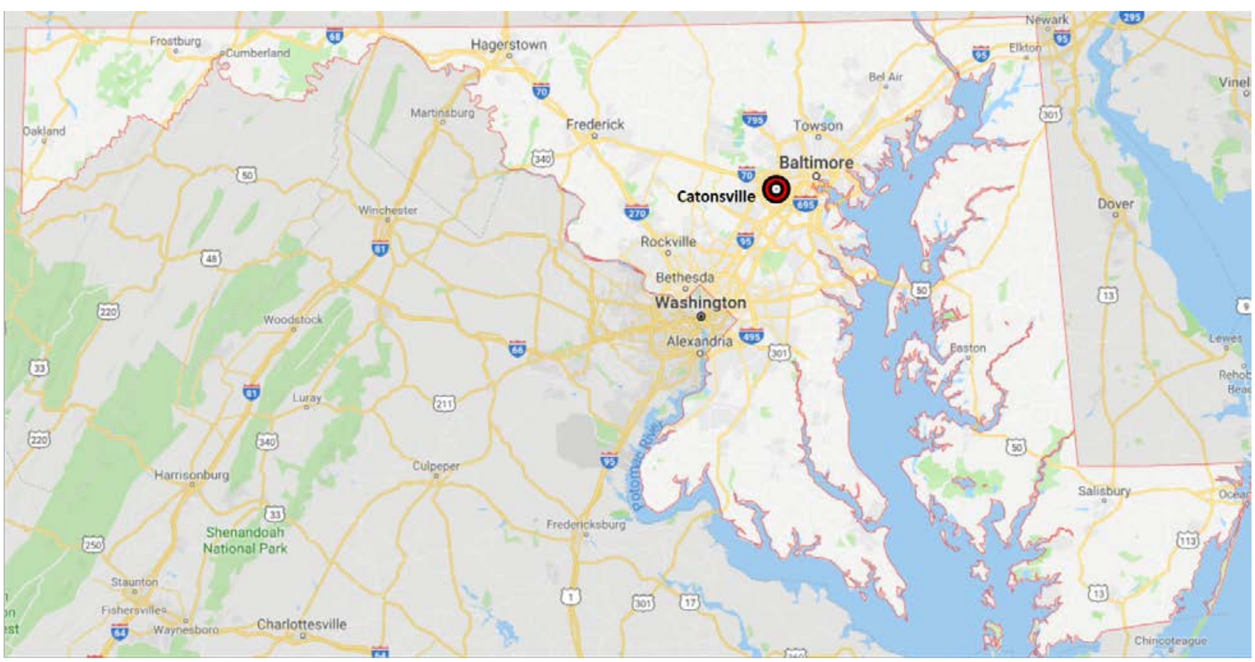

Figure 4 - Photographs of the rain gauge

Figure 5 - 2017 annual totals from surrounding stations plotted on the National Weather Service Advanced Hydrologic Prediction Service precipitation estimate for 2017

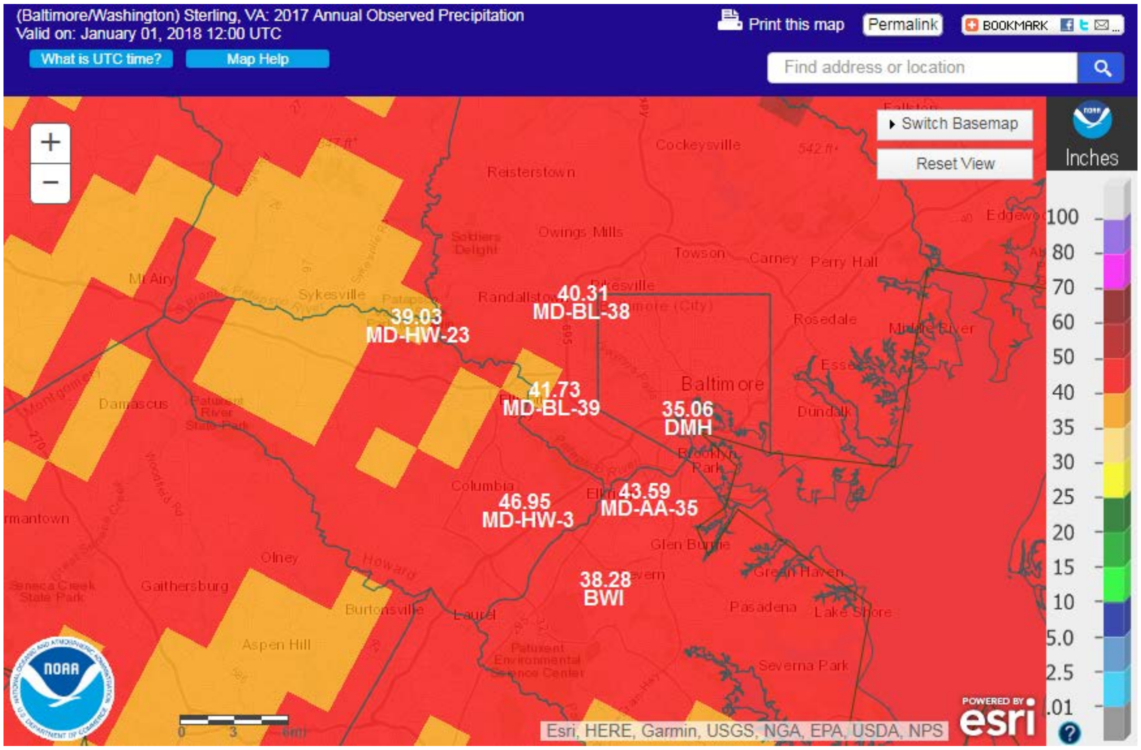

Figure 6 - 2018 annual totals from surrounding stations plotted on the National Weather Service Advanced Hydrologic Prediction Service precipitation estimate for 2018

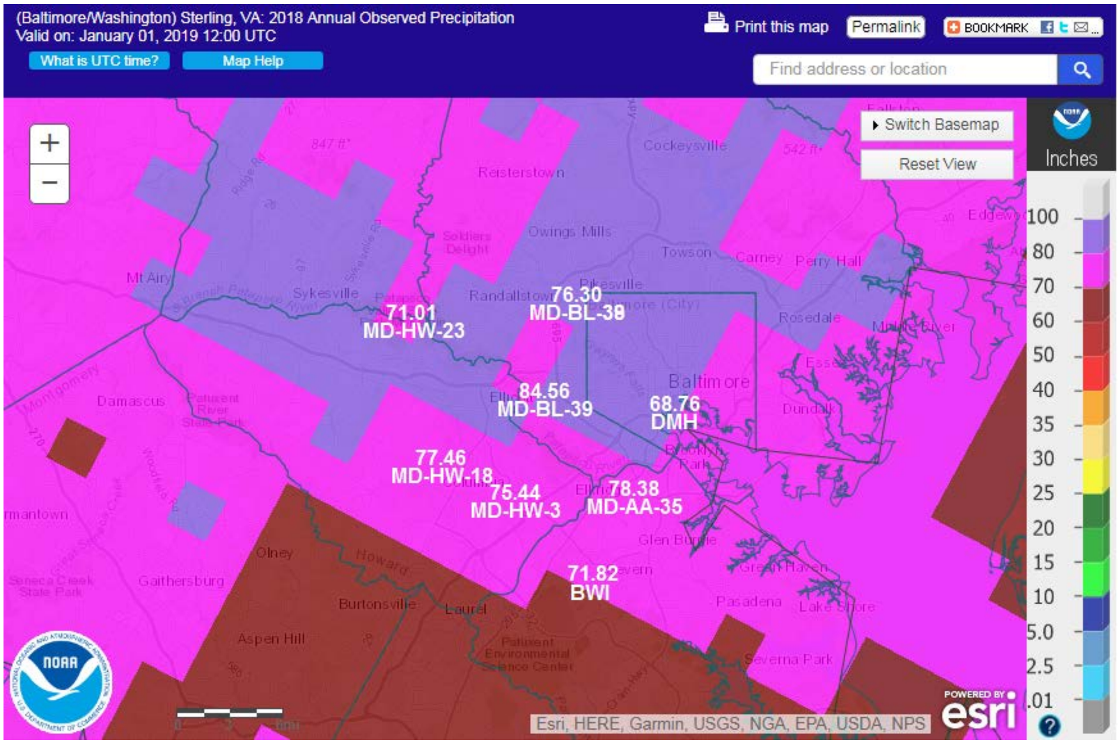

Figure 7 - Radar estimated precipitation and station totals from May 27, 2018