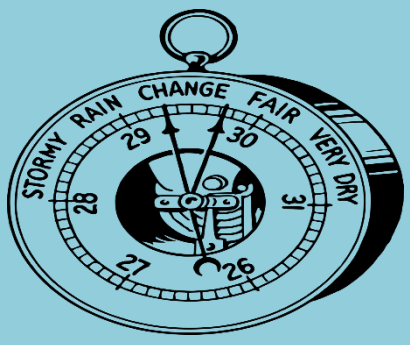


Blue Ridge Barometer

Welcome to the Fall 2021 edition of Blue Ridge Barometer, the biannual newsletter of the National Weather Service (NWS) office in Blacksburg, VA! In this issue, you will find articles of interest about the weather and climate of our County Warning Area (CWA), including highlights of this year's tropical season, the impact of Hurricane Ida on our region, and the climate changes our area has seen over the past thirty years. You'll also learn about some important revisions to our flood watches, warnings, and advisories, and how you can measure snow in your backyard this winter. Finally, we've included a couple of staffing updates, and an introduction from our new Meteorologist-in-Charge. We wish all of you a safe and joy-filled Fall and Winter season!

Inside this Issue:

From the Desk of the Meteorologist-in-Charge

Doug Butts, MIC

Hi there! My name is Doug Butts and I'm the new Meteorologist-in-Charge of the National Weather Service in Blacksburg. I replace Dave Wert, who retired at the start of 2020 after approximately 17 years in the position.

So who am I? I'm a lifelong weather nut from Cullman, AL. I remember having an interest as early as five or six years old! After high school, I packed my bags and moved to the Gulf Coast, where I obtained my undergraduate meteorology degree from the University of South Alabama. I then headed west to get my graduate degree from Texas A&M University.

In my admittedly somewhat insane career path to get to Blacksburg (ask me sometime), I've had the opportunity to work with lots of awesomely dedicated folks. That included my (now) wife, who I met while working at the Jackson, MS office. We have three school-age children who keep us preoccupied in our spare time. Even though we're still getting settled, my whole family is happy to be here!

Speaking of awesomely dedicated folks, "Team Blacksburg" is no exception! Even with the trials we've all endured since early 2020 with the pandemic, our team continues to put the heart of the National Weather Service mission ("protection of life and property") first in all we do. This is regardless of whether we're talking about issuing warnings, providing impact-based decision support to our partners, giving you the most accurate forecast possible, or helping you prepare for the next big weather event. You'll read about some of these activities in this newsletter.

I can't wait to get out and formally introduce myself to our many partners as time and restrictions allow. In the meantime, if there's anything I can ever do to help you, please don't hesitate to send me an email at Douglas.Butts@noaa.gov.

Another Active Tropical Season for Our Forecast Area – But Nothing Like 2020

Robert Anthony Beasley, Lead Forecaster

After the tropical season of 2020, when a record nine tropical cyclones impacted the Blacksburg National Weather Service (NWS) forecast area with heavy rain and even damaging wind in one case, the 2021 season may have seemed a bit more benign. Nonetheless, it was still quite busy, with five tropical systems impacting the forecast area between June and October. Furthermore, unlike the 2020 season when heavy rain, flooding, and wind, were the main tropical cyclone hazards impacting the forecast area, this year brought tropical cyclone-induced tornadoes to the forecast area as well (see related article by William Perry in this edition of the Blue Ridge Barometer).

Tropical season is designated annually as the period from May 1st to November 30th each year. Meteorologically, tropical season peaks around September 10th. Calendar year 2021 has so far brought the remnants of at least one tropical storm each month from June through September to the Blacksburg forecast area. True to form, August and September were the most active for our area. The named storms which impacted the Blacksburg NWS forecast area during 2021 (through October 15, 2021) were Claudette (June), Elsa (July), Fred (August), Ida (August into September), and Nicholas (September). Figure 1 below depicts the location and track of 2021 Atlantic Basin Tropical Cyclones (as of October 15, 2021), while Table 1 provides a list of all of the 2021 Atlantic Basin Tropical Cyclones, highlighting those that specifically impacted the Blacksburg NWS forecast area, as well as listing the type of impacts (i.e., heavy rainfall/flooding, wind, and tornadoes). It is important to note that the effects of tropical

cyclones in terms of flooding rainfall, wind, and tornadoes can occur well away from the center of the storm. One of the most significant dangers from land-falling hurricanes is that of flooding rainfall, which is especially dangerous in and near the Appalachian Mountains that comprise much of the Blacksburg NWS forecast area.

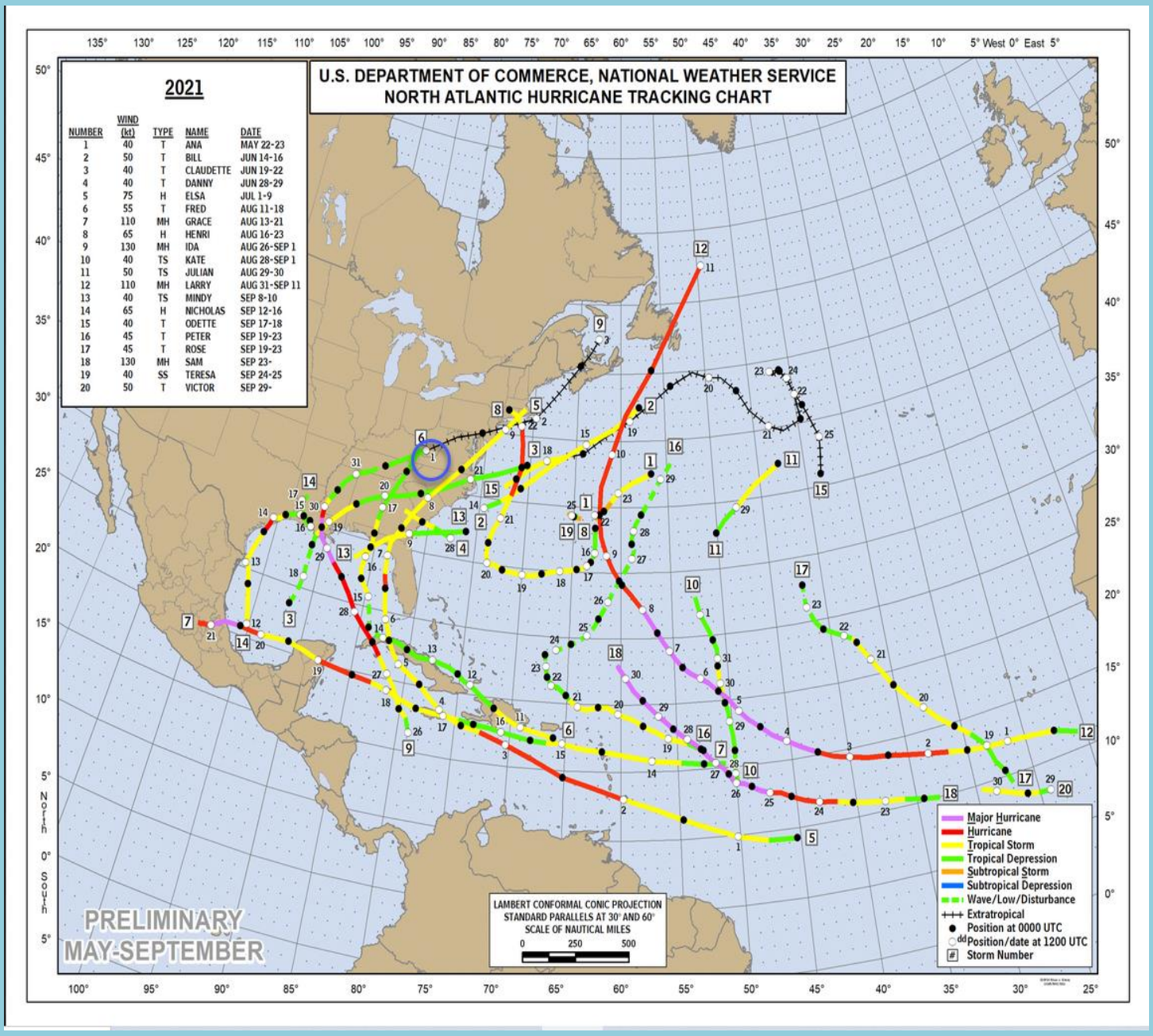


Figure 1a. *Tracks, intensities, and dates of named tropical cyclones during the 2021 tropical cyclone season. Note: The blue circle identifies the approximate area covered by the Blacksburg National Weather Service forecast office.*

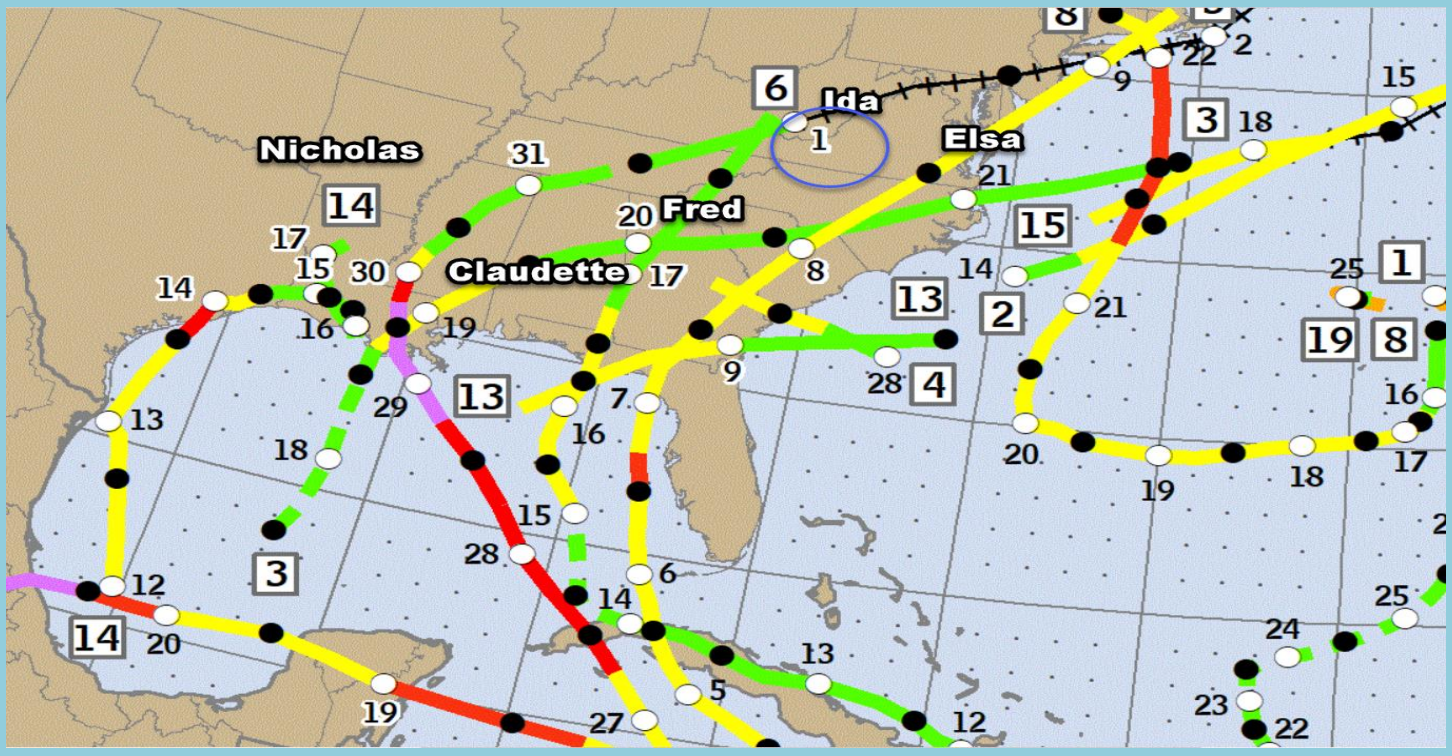


Figure 1b. *A close-up image of the tracks and intensities of named tropical cyclones during the 2021 tropical cyclone season. Names are noted of those which impacted the Blacksburg NWS forecast area. Note: The blue circle identifies the approximate area covered by the Blacksburg National Weather Service forecast office.*

Summary Table

Name	Dates	Max Wind (mph)
TS Ana	22–23 May	45*
TS Bill	14–15 Jun	65*
TS Claudette	19–22 Jun	45
TS Danny	28–29 Jun	45
H Elsa	1–9 Jul	85
TS Fred	11–18 Aug	65
MH Grace	13–21 Aug	125
H Henri	16–23 Aug	75
MH Ida	26 Aug–2 Sep	150
TS Kate	28 Aug–1 Sep	45
TS Julian	29–30 Aug	60
MH Larry	31 Aug–11 Sep	125
TS Mindy	8–10 Sep	45
H Nicholas	12–17 Sep	75
TS Odette	17–18 Sep	45
TS Peter	18–22 Sep	50
TS Rose	19–23 Sep	50
MH Sam	22 Sep–	150
STS Teresa	24–25 Sep	45
TS Victor	29 Sep–	60

Table 1. *2021 Tropical Cyclones through October 15, 2021, along with their intensity levels, beginning and ending dates, and maximum sustained winds. Note: TS=Tropical Storm, H=Hurricane, MH=Major Hurricane, SS=Subtropical Storm. Yellow highlighted names indicate those that impacted the Blacksburg NWS forecast area.*

The most significant tropical cyclone to impact the Blacksburg NWS forecast area during the 2021 tropical season was Ida. Ida was a major category 4 hurricane which tracked from the Louisiana coast northeast into the western part of our forecast area during the last week of August and the first couple of days of September. This track brought not only flooding rainfall to our region, but a couple of tropical tornadoes in the New River Valley of Virginia, one just outside of our office in Blacksburg, VA. Tropical cyclone, Fred, just a couple of weeks prior to Ida, also spawned a couple of tornadoes within the NC portion of the Blacksburg NWS forecast area. However, rainfall from the remnants of Fred was particularly problematic occurring after what was a wet June and July across the region.

The remnants of Hurricane Nicholas, which meandered and lingered for nearly two weeks between Louisiana and the southern Appalachians in early mid-September, also brought several inches of rainfall and areas of significant flooding to the forecast area. This occurred even well after it lost its tropical characteristics. Claudette and Elsa were weaker storms earlier in the season and had less impact on the region than did Fred, Ida, and Nicholas. Claudette impacted mainly the western NC mountains with heavy rainfall, while Elsa brought heavy rainfall to the Piedmont and eastern Virginia. None of the tropical systems so far this year have brought tropical storm force winds to the Blacksburg NWS forecast area. Below are several images depicting the impacts of the 2021 tropical cyclones to date within the Blacksburg NWS forecast area between June and mid-October.

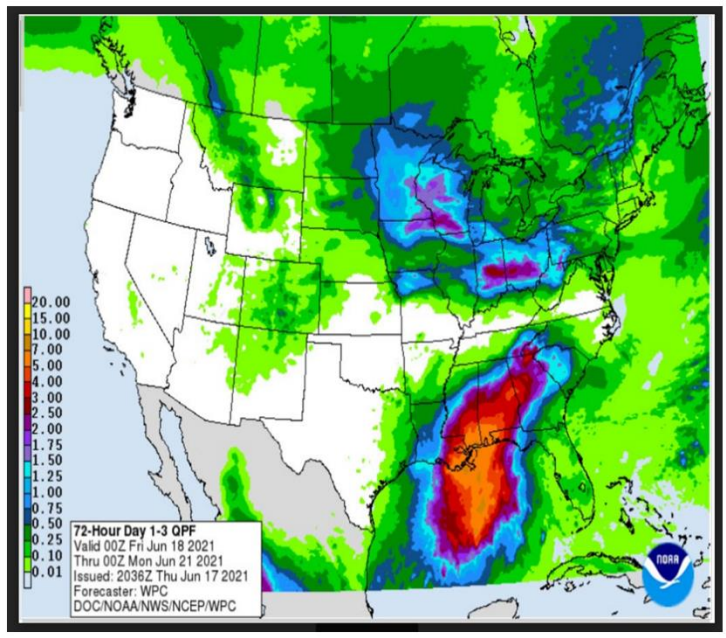


Figure 2. *Projected rainfall associated with the remnants of T.S. Claudette from June 18-21, 2021.*

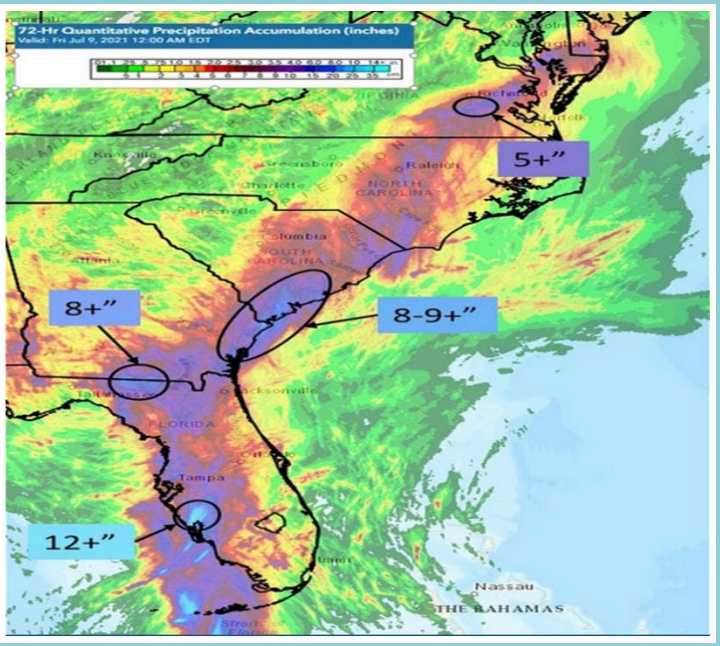


Figure 3. *Observed rainfall associated with Hurricane Elsa from July 1-9, 2021.*

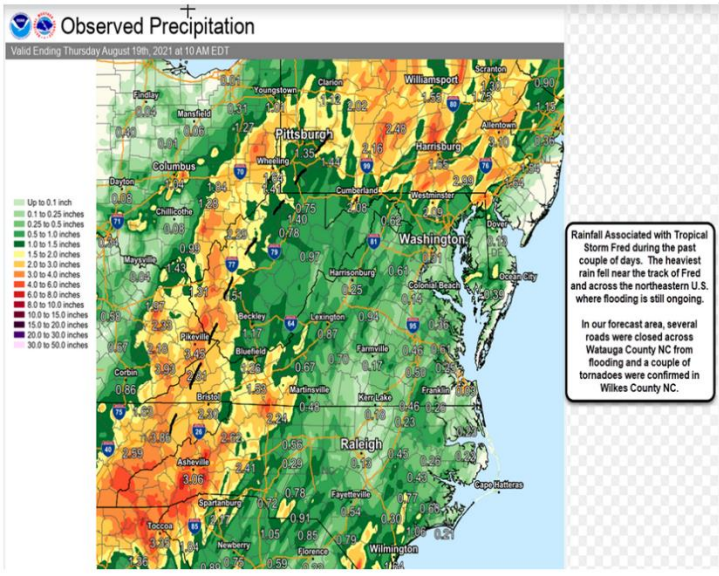


Figure 4. *Observed rainfall associated with the remnants of T.S. Fred from August 11-18, 2021.*

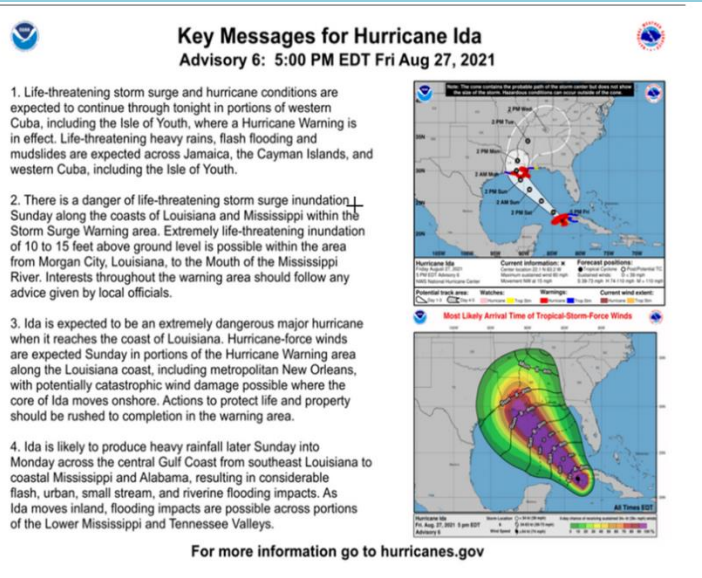


Figure 5. *Key messages published by the National Hurricane Center in Miami, FL, as major Hurricane Ida headed for the Louisiana coast – the remnants of which then tracked into the Blacksburg NWS forecast area, spawning two tornadoes and flooding rainfall.*

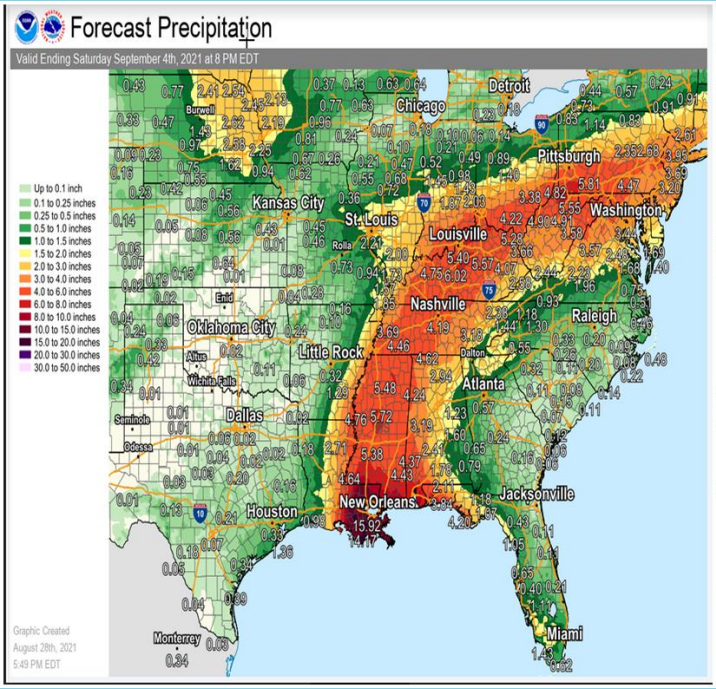


Figure 6. *Projected rainfall associated with the remnants of major Hurricane Ida from August 26-September 2, 2021.*

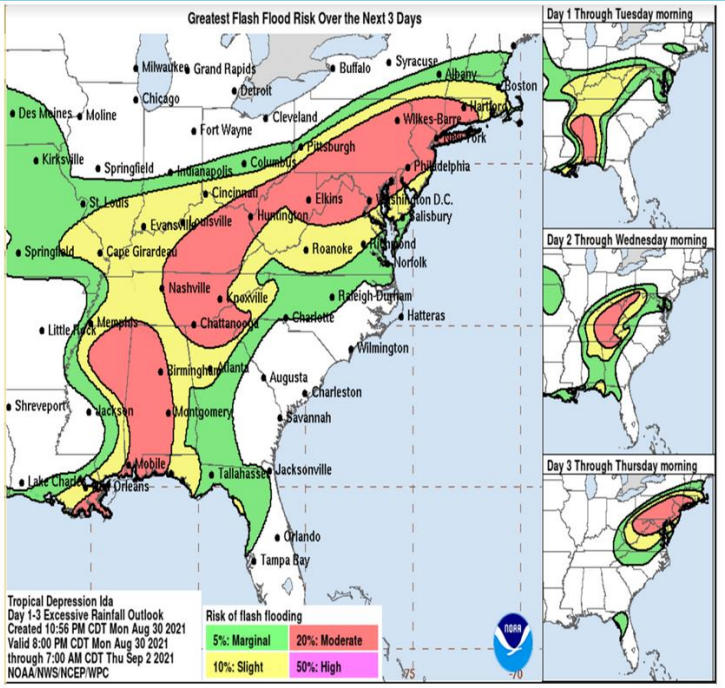


Figure 7. *Excessive rainfall outlook from the Weather Prediction Center associated with the remnants of major Hurricane Ida.*

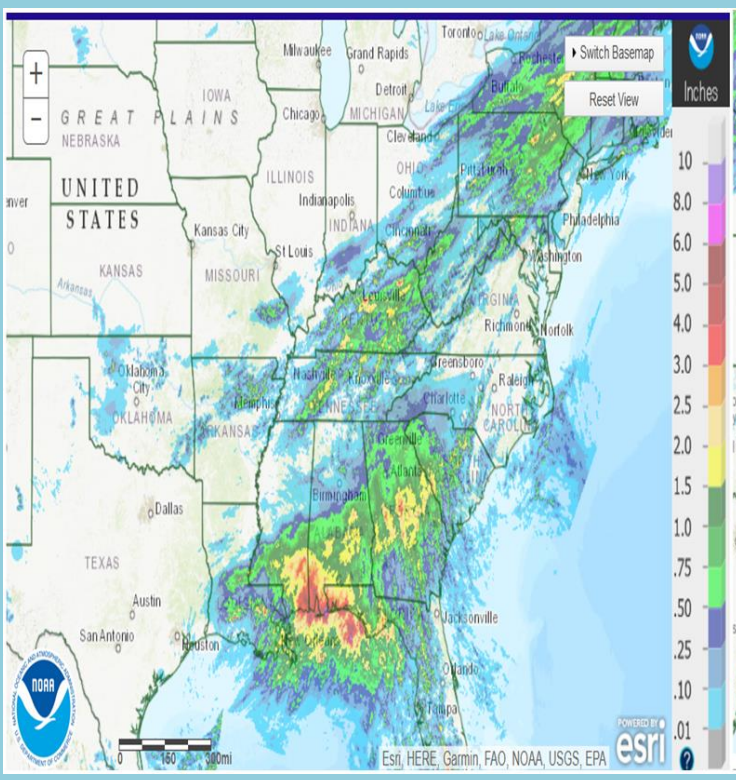


Figure 8a. *Rainfall associated with the remnants of Hurricane Nicholas - September 15-17, 2021.*

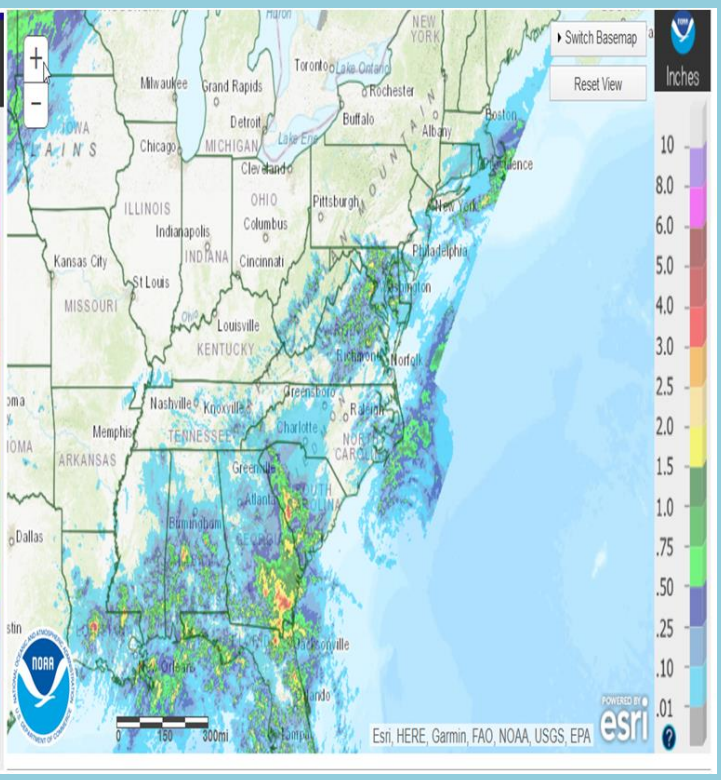


Figure 8b. *Rainfall associated with the remnants of Hurricane Nicholas combined with a fall cold front - September 16-18, 2021.*

"What roar is that? 'tis the rain that breaks
In torrents away from the airy lakes,
Heavily poured on the shuddering ground,
And shedding a nameless horror round.
Ah! well known woods, and mountains, and skies,
With the very clouds! ye are lost to my eyes.
I seek ye vainly, and see in your place
The shadowy tempest that sweeps through space. A whirling ocean that fills the wall
Of the crystal heaven, and buries all.
And I, cut off from the world, remain
Alone with the terrible hurricane."

From "The Hurricane," by William Cullen Bryant

Tropical Remnants of Ida Spawn Two Tornadoes

Will Perry, Lead Forecaster

Hurricane Ida made landfall into the Gulf Coast of Louisiana on August 29, 2021, weakened to a tropical depression on the 30th, and then became a post-tropical low on the 31st. The strong shear associated with this system, combined with just enough instability, allowed for two tornadoes to touch down in Montgomery County, Virginia, early in the evening on August 31, 2021. This was the fourth time that confirmed tornadoes have impacted Montgomery County. The two tornadoes on August 31 were EF-1 on the Enhanced Fujita scale, with estimated winds of 90-95 mph. Fortunately, and what is usually the case with tropical-induced tornadoes, they are usually short-lived, lasting only a few minutes or less. In this case, damage was mainly to trees, though a barn was damaged near Radford. The first tornado (Figure 1) touched down at 6:34 PM near the intersection of Stanley Road and Dove Drive southeast of Radford, damaging a barn (Figure 2) and uprooting several trees. This tornado traveled north-northeast and snapped several hardwood trees just south of Interstate 81, before lifting near Tyler Road at 6:38 PM.

Figure 1. *Track of EF-1 tornado southeast of Radford.*

Figure 2. *Barn damage from EF-1 tornado near Dove Drive.*

The second tornado (Figure 3) touched down just west of Price Mountain near Merrimac Road at 6:59 PM. This tornado uprooted and snapped several trees, and destroyed a swing. The tornado quickly lifted just to the northeast of its touchdown point. This storm was captured by our camera here at the NWS Office in Blacksburg, VA. The video is looking west from our office. In addition to the tornadoes caused by Hurricane Ida, Figure 4 shows the other two confirmed tornadoes that have impacted Montgomery County. The most recent was in Oct 2017 when an EF-1 tornado moved from Pulaski County into the McCoy area of Montgomery County. The second was near the Radford Ammunition Plant in June 1998.

Fun Fact: *The Fujita Scale was developed by Dr. Ted Fujita in 1971, and meterologists and civil engineers came up with an enhanced version in 2007. The enhanced scale assigns a category number (0-5) to the tornado, based on estimated wind speeds and related damage. To learn more about the Fujita scale and the five EF categories, click here.*

Figure 3. *EF-1 tornado near Merrimac.*

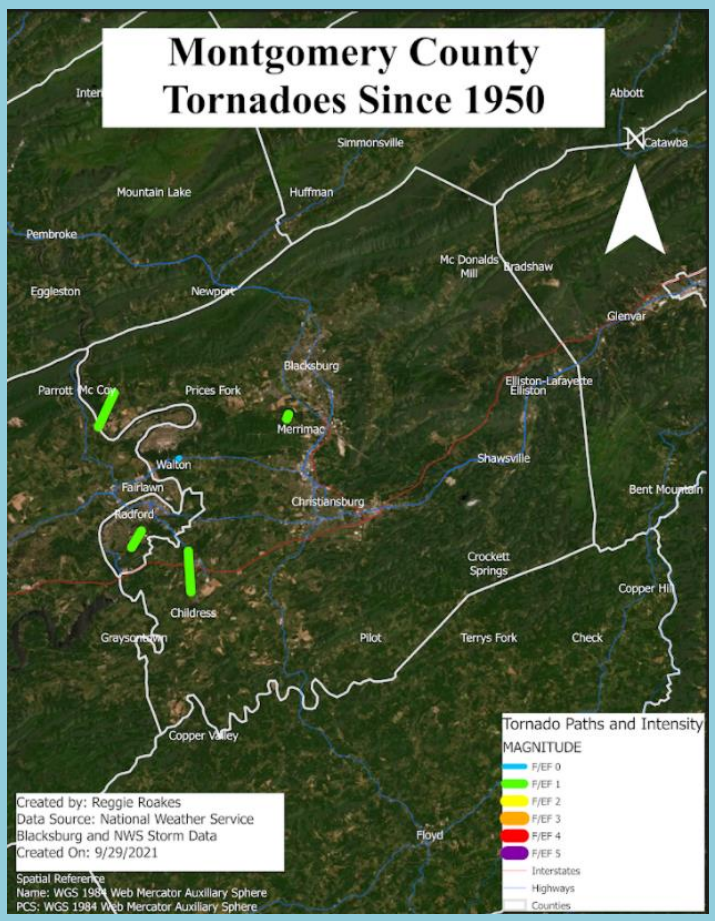


Figure 4. *Confirmed tornadoes that have occurred in Montgomery County, VA, and the City of Radford since 1950.*

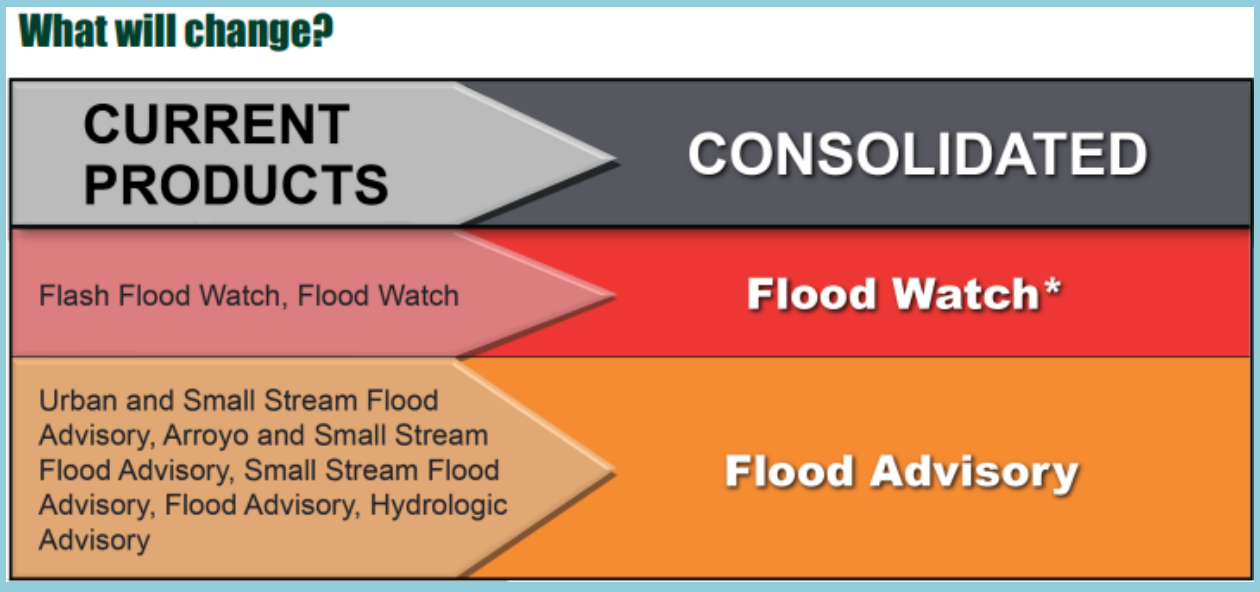
Consolidation of Flood Watches, Warnings, and Advisories New this Fall!

Phil Hysell, Warning Coordination Meteorologist

Social science research indicates users of National Weather Service (NWS) products can become confused by the number of hazard messages NWS issues before and during active weather. Especially while dangerous weather is unfolding, it is critical that NWS hazard messages are simple, short, and direct. With this in mind, the NWS will consolidate Flood Watches, Warnings and Advisories on November 4, 2021.

First, Flash Flood Watches and Flood Watches will be consolidated into one Flood Watch product when the immediate cause is excessive rainfall. Flash Flood Watches will be maintained only for the threat of flash flooding due to non-precipitation causes like dam failures or ice jams, or if flash flooding is caused by excessive rainfall on burn scars or landslide-prone areas.

Second, the five types of Flood Advisory products, including Urban and Small Stream Flood Advisories, Arroyo and Small Stream Flood Advisories, Small Stream Flood Advisories, Flood Advisories and Hydrologic Advisories will be consolidated into, simply, Flood Advisories.



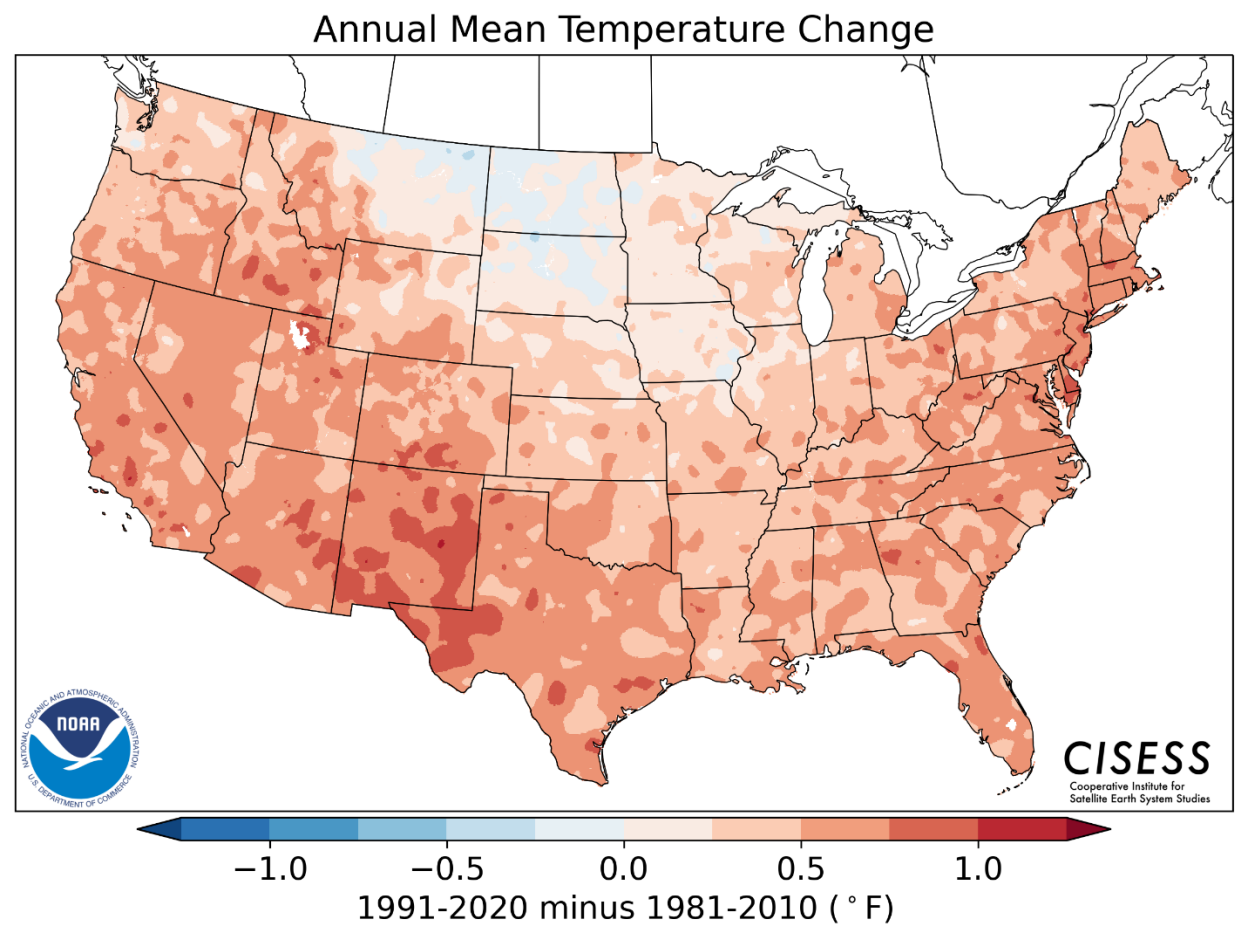
The consolidation of these hydrologic products will allow the NWS to more clearly communicate the potential or imminent threat for flooding. For more information about this consolidation of hydrologic products, visit https://nws.weather.gov/products/PDD/PDD_Opl_ConsolidationandReformatting_FloodProducts_2021.pdf

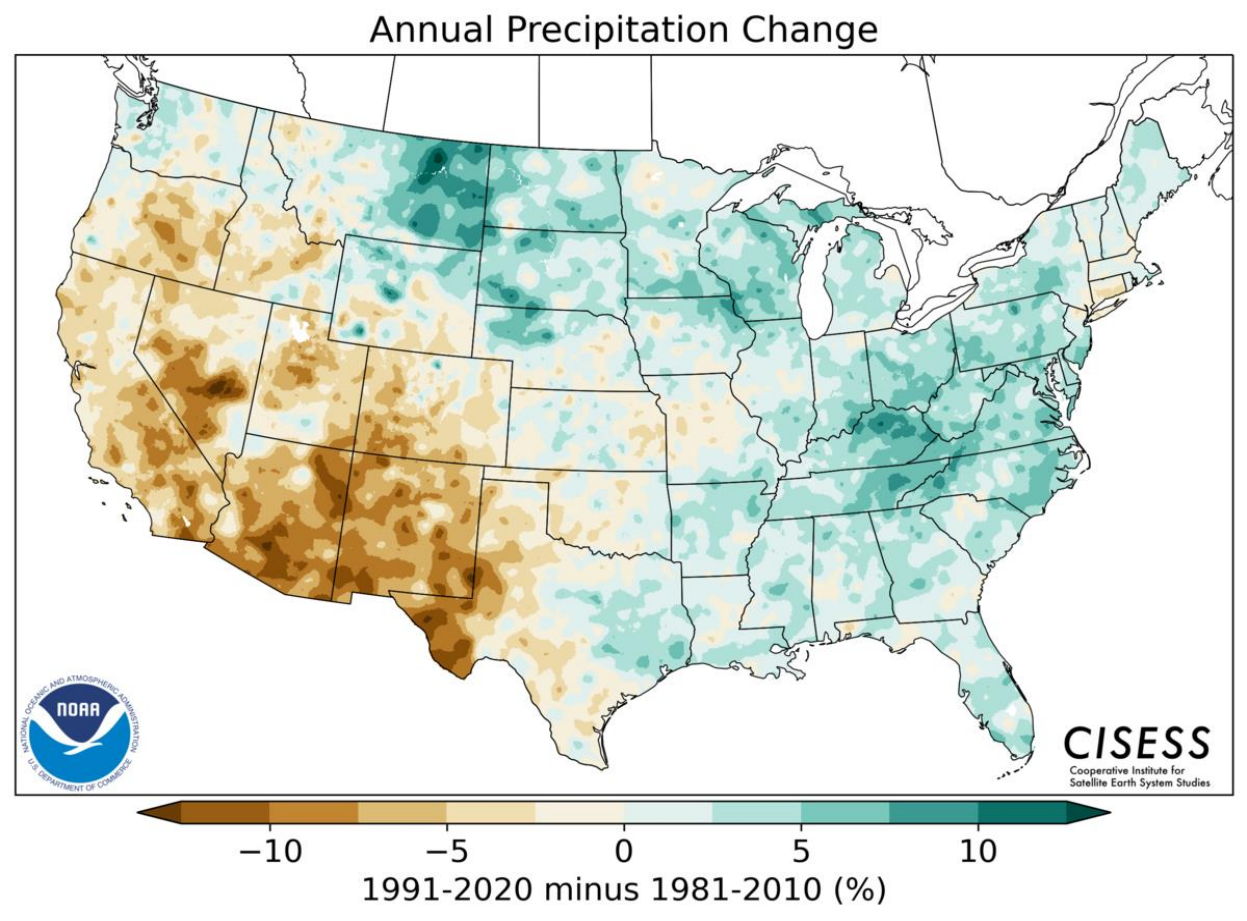
New Climate Normals – (1991-2020 vs. 1981-2010)

Robert Stonefield, Meteorologist

The 1991-2020 Normals were released earlier this year. According to the World Meteorological Organization (WMO), of which the United States is a member, each member nation is to compute thirty-year meteorological quantity averages at least every thirty years (1931-1960, 1961-1990, 1991-2020, etc.), and recommend an update each decade. Climate normals for the United States are calculated by the National Center for Environmental Information (NCEI) from approximately 8700 National Weather Service (NWS) weather stations operated by NOAA. The NCEI calculates several parameters, but the normals we will focus on in this article will be monthly average temperatures and annual precipitation.

Comparing the new Normals (1991-2020) to the last set (1981-2010), we can see a warmer and wetter trend across the majority of the United States.





The same trend exists in the NWS Blacksburg County Warning Area. Of our climate stations, Roanoke, Lynchburg, Danville, and Blacksburg, were all warmer while Bluefield was cooler. All sites were wetter, with the exception of Danville.

Warming temperatures occurred in every month for all Virginia stations, with Roanoke having the biggest average monthly temperature increase of 1.2°F. Generally, most had warmer than normal temperatures for both daytime highs and overnight lows. However, Danville had warmer average maximum temperatures, but cooler average minimums, almost canceling each other on daily average temperatures. Bluefield, living up to its nickname, "Nature's Air-Conditioned City," had average monthly temperatures 2°F to 3°F cooler than previous normals.

The charts on the next several pages display the changes over time in both temperature and precipitation at our five climate stations.

Roanoke Monthly Temperatures – Average ↑ 1.2°F

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	37.9	40.8	48.3	58.0	66.1	73.8	77.8	76.2	69.6	58.9	48.4	40.9
1981-2010	36.6	39.6	47.3	56.7	64.6	72.9	76.7	75.4	68.1	57.7	48.1	39.0
Difference	1.3	1.2	1.0	1.3	1.5	0.9	1.1	0.8	1.5	1.2	0.3	1.9

Lynchburg Monthly Temperatures – Average ↑ 0.7°F

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	35.9	38.8	46.4	56.1	64.2	72.0	76.0	74.5	68.0	57.0	46.5	38.9
1981-2010	35.1	38.2	45.9	55.4	63.1	71.6	75.3	74.1	67.0	56.2	46.8	37.6
Difference	0.8	0.6	0.5	0.7	1.1	0.4	0.7	0.4	1.0	0.8	-0.3	1.3

Danville Monthly Temperatures – Average ↓ 0.1°F

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	38.5	41.5	49.0	58.1	66.0	73.9	77.9	76.5	70.0	58.8	48.1	41.0
1981-2010	37.7	40.9	48.7	58.3	66.4	74.8	78.3	77.0	69.9	59.5	49.2	40.1
Difference	0.8	0.6	0.3	-0.2	-0.4	-0.9	-0.4	-0.5	0.1	-0.7	-1.1	0.9

Blacksburg Monthly Temperatures – Average ↑ 0.5°F

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	31.9	34.7	41.7	51.4	60.2	67.9	71.7	70.4	64.3	53.2	42.7	35.1
1981-2010	31.5	34.2	41.6	50.7	59.3	67.7	71.2	70.0	63.1	52.3	43.3	33.8
Difference	0.4	0.5	0.1	0.7	0.9	0.2	0.5	0.4	1.2	0.9	-0.6	1.3

Bluefield Monthly Temperatures – Average ↓ 2.6°F

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	31.9	34.9	42.2	52.7	60.3	67.1	70.3	69.3	63.5	53.7	43.5	35.5
1981-2010	34.2	37.4	45.3	55.1	62.6	69.8	73.0	72.3	65.8	56.4	47.1	37.2
Difference	-2.3	-2.5	-3.1	-2.4	-2.3	-2.7	-2.7	-3.0	-2.3	-2.7	-3.6	-1.7

Since the NCEI calculated the last set of Normals, annual precipitation increased by 1.00 to 1.75 inches for all stations except Danville, which had a decrease of 0.71 inches.

Roanoke Annual Precipitation – ↑ 1.58 inches

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	3.17	2.89	3.51	3.49	4.31	4.66	4.28	3.37	4.06	2.96	3.04	3.08
1981-2010	2.92	2.89	3.46	3.37	4.06	3.83	4.04	3.56	3.89	2.89	3.40	2.94
Difference	0.25	0.00	0.05	0.12	0.25	0.83	0.24	-0.19	0.17	0.07	-0.36	0.14

Lynchburg Annual Precipitation – ↑ 1.20 inches

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	3.46	2.91	3.76	3.45	3.98	3.82	4.19	3.22	3.96	3.12	3.39	3.50
1981-2010	3.14	2.93	3.58	3.31	3.73	3.62	4.36	3.26	3.88	3.11	3.41	3.24
Difference	0.32	-0.02	0.18	0.14	0.25	0.20	-0.17	-0.04	0.08	0.01	-0.02	0.26

Danville Annual Precipitation – ↓ 0.71 inches

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	3.41	2.73	3.53	3.53	4.13	3.98	4.88	3.47	4.25	3.30	3.46	3.06
1981-2010	3.42	3.01	4.11	3.46	3.88	3.84	4.67	3.91	3.99	3.54	3.35	3.26
Difference	-0.01	-0.28	-0.58	0.07	0.25	0.14	0.21	-0.44	0.26	-0.24	0.11	-0.20

Blacksburg Annual Precipitation – ↑ 1.75 inches

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	3.23	2.83	3.78	3.77	4.47	4.27	4.21	3.57	3.45	2.91	2.85	3.30
1981-2010	3.08	2.81	3.64	3.48	4.33	4.00	4.26	3.59	3.10	2.78	2.87	2.95
Difference	0.15	0.02	0.14	0.29	0.14	0.27	-0.05	-0.02	0.35	0.13	-0.02	0.35

Bluefield Annual Precipitation – ↑ 1.61 inches

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1991-2020	3.03	2.90	3.84	3.64	4.61	4.14	4.36	3.14	3.24	2.78	2.55	3.01
1981-2010	2.90	2.76	3.51	3.34	4.31	4.14	4.17	3.26	3.14	2.50	2.69	2.91
Difference	0.13	0.14	0.33	0.30	0.30	0.00	0.19	-0.12	0.10	0.28	-0.14	0.10

For more information about United States Climate Normals, please visit https://www.ncei.noaa.gov/news/noaa-delivers-new-us-climate-normals.

Weather Witticism

Q: What do corals get stressed about during hurricanes?
A: Current events.

Husband (yelling into the phone): "How in the world would I know? I'm not a weatherman."
Wife: "What's that all about?"
Husband: "Some guy keeps calling and asking if the coast is clear."

A TV meteorologist broke both her legs and arms in an accident. She had to call in from the hospital to explain her four casts.

Jokes about the weather can be funny. To a certain degree.

Snowflake Types

Stacie Hanes, Lead Meteorologist

There is no question that snow is pretty to look at, but it can either be welcomed or despised, depending on a person's point of view. As meteorologists, understanding a snowflake's life cycle can help us forecast the type and character of a snowfall (dry and fluffy, or wet and heavy).

High up in the atmosphere, a snowflake begins as a tiny droplet of supercooled water which freezes to form an ice crystal. Then, if the atmospheric conditions are right, a snowflake will form when the ice crystal attracts other water molecules as it falls through the air. Eventually, enough molecules clump together to form a flake. All snowflakes are hexagonal (or six-pointed), since this is the most efficient way for the hydrogen and oxygen molecules to organize.

There are an endless number of possibilities of changes in temperature and humidity as the flake falls to the ground - so many that, for practical purposes, we say that no snowflake is alike. Although snowflakes come in many shapes and sizes, we can put them in broad categories, based on the temperature and humidity values of the air mass(es) they fall through.

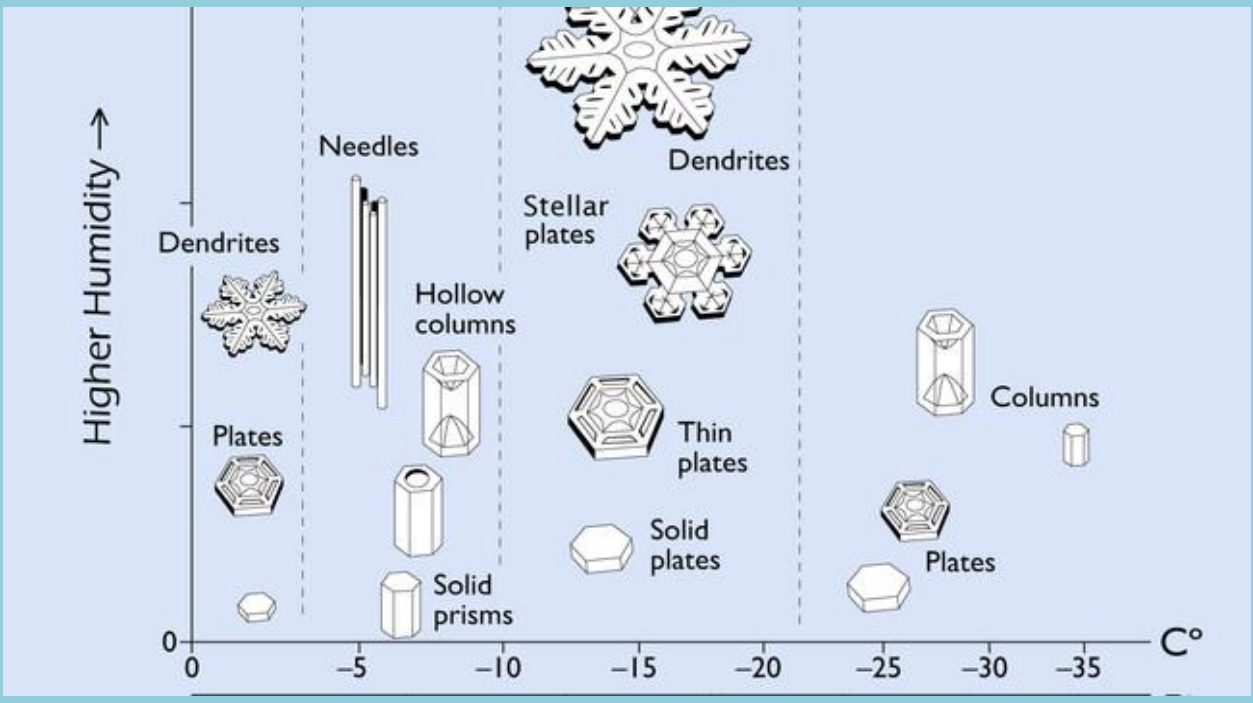


Figure 1. *Snowflake types based on temperature and humidity*

Stellar Dendrites have a multi-branch appearance, with six symmetrical main branches and numerous seemingly random side branches. They can be small or large. ***Spatial Dendrites*** have a more erratic appearance, with branches oriented at different angles. All dendrites need high moisture and very cold temperatures to form.

Plates form in air masses with less moisture and warmer temperatures. Plates are essentially partially formed dendrites. ***Thin plates*** do not have enough moisture to even begin the branching process. ***Sectored plates*** form in slightly more ideal conditions, but they form flat sectors instead of true branches like dendrites.

Columns are less well-known than dendrites, but account for the majority of snowflakes. ***Hollow columns*** are hexagonal like a wooden pencil. ***Capped columns*** begin as hollow columns, but then form plates. This can happen when a snowflake is blown from one air mass into another.

Needles are columnar crystals that grow very thin and long, like an ice pick. They form in warmer temperatures than dendrites, but similar humidities.

The more complex the snowflake, generally the lighter the density of the snowfall, as large spacing between the branches of a flake means they pack together poorly. This results in fluffy snow. Heavy snow is a result of denser snowflakes, which can become more tightly packed, leaving very little space for air pockets. So, dendrites are generally associated with fluffy snow, while columns, plates, and needles can be associated with heavier snow.

Figure 2. *Snow on the ground at Virginia Tech.*

Methods of Measuring Snow

Stacie Hanes, Lead Meteorologist

Snow measurements done by our partners and citizen scientists take a little more time than rainfall, but they are well worth it. Scientists are just as interested in variations of snowfall as they are rain and hail, and the water supply we get from melting snow is extremely valuable. Observers also get to track the snowfall at their location and compare it to other values.

To measure ***snowfall depth***, a snowboard (Figure 1) is helpful to have. This can be as simple as a 1/2" to 3/4" thick piece of plywood, about 16" by 16" in size, and painted white. You can also use your deck, as long as the board is placed at least two times the height of your house away from obstacles such as trees and roofs. The only other piece of equipment you need is a yardstick.

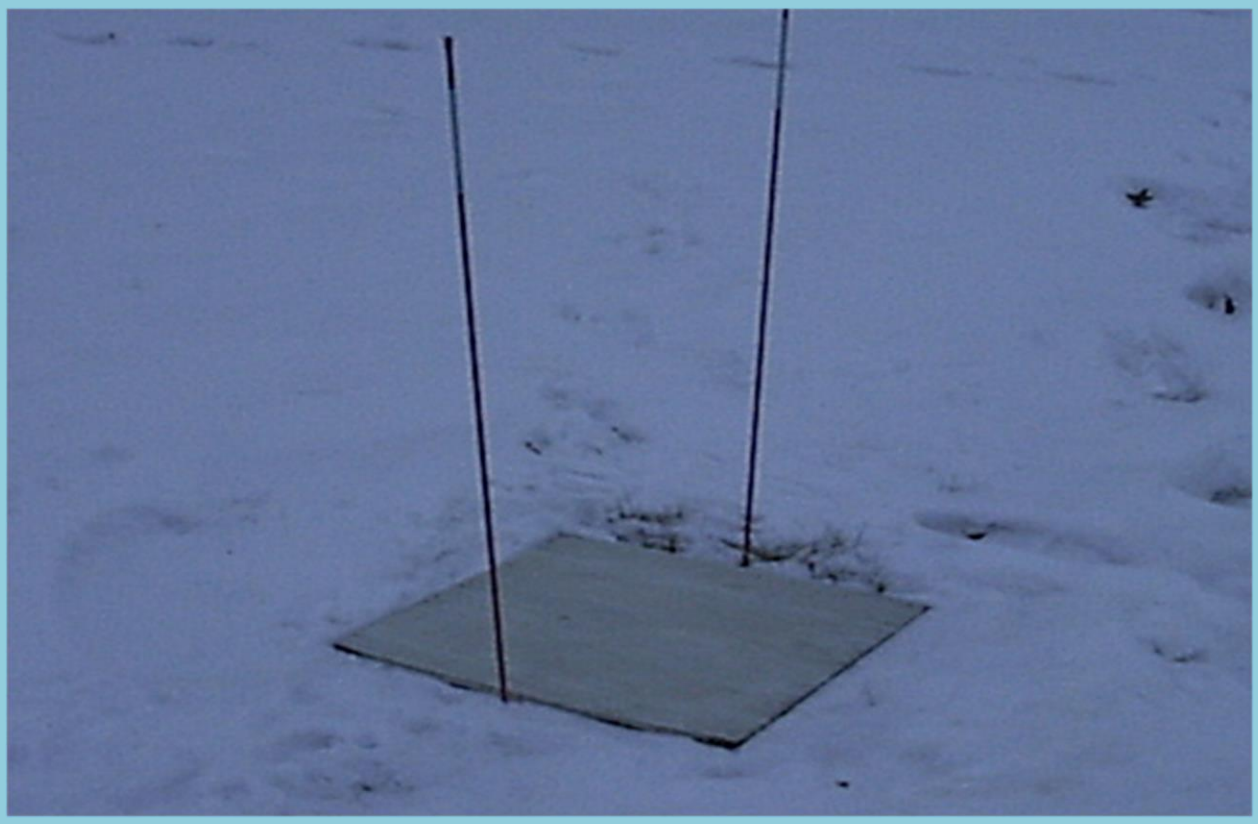


Figure 1. *A snowboard ready to accumulate snow.*

The problems with this type of measuring include the possibility of melting, settling, blowing, drifting, or evaporating of the snow before you are able to measure it. To avoid these issues, measure the snow as soon as the storm ends, and away from areas of drifted snow. You can also take several measurements and average them.

To measure the water content of snow, you can use a 4" diameter precipitation gauge (Figure 2). Remove the inner tube and funnel, and bring them inside when temperatures go below freezing. The gauge works well for moderate snowfall amounts up to six to eight inches, especially if winds are light. One method for measuring the ***liquid equivalent of snowfall*** from your gauge is to measure and pour warm water into the outer cylinder that contains the snow. Mix the water and snow until the snow is all melted, and then re-measure the liquid. You can use your inner cylinder to measure the liquid. The total precipitation is the amount in the inner cylinder minus the amount of hot water you poured in. Of course, the other way to measure the liquid equivalent of snowfall is to bring the gauge in and allow the snow to melt, then pour the melted snow into the inner tube and measure the amount.

We love receiving snowfall reports from you! To share your snowfall amounts, please complete our storm report form. You can learn more about measuring snow by reading this handy guide on our web site.

Figure 2. *Snow in a rain gauge, ready to be melted down.*

What's New In Our Office: Personnel Changes

Doug Butts, MIC

This summer, our office said goodbye to our invaluable Science Operations Officer and welcomed a new Electronics Technician.

Steve Keighton

After more than 37 years in the NWS and 23 years, 10 months, and 3 days (give-or-take) at the weather forecast office (WFO) in Blacksburg, Steve Keighton retired at the end of July. After graduating with a B.S. in Meteorology from Penn State and an M.S. from the University of Oklahoma, Steve started his NWS career in the Scientific Services Division at Western Region Headquarters in Salt Lake City, UT. There, he was instrumental in developing and providing training material for the field. In 1992, he moved back to Norman to serve as an instructor (then lead instructor) at the Operational Support Facility Training Branch when the national WSR-88D (doppler radar) course was getting started.

In 1995, he accepted the inaugural Science Operations Officer (SOO) position at the brand new WFO in Flagstaff, AZ. Soon after, in 1997, he moved closer to family in North Carolina and began his tenure as WFO Blacksburg's SOO.

Steve accomplished a lot during his nearly 24 years in Blacksburg. He worked closely with Virginia Tech (VT) in the development of a meteorology program. Then, through a successful student volunteer program, he facilitated the career development of dozens of students. Many of these (former) volunteers currently work for the NWS. He collaborated with VT on several additional projects, worked on initiatives with NC State and UNC-Charlotte, and investigated operational forecast challenges with Appalachian State University, UNC-Asheville, and WFOs across the region. He helped organize and lead an NWS Appalachian Heavy Precipitation Workshop, as well as a multi-agency Landslide Workshop for the region. Steve also participated in a number of NWS leadership courses, serving as a facilitator and mentor. He most recently served as the acting meteorologist-in-charge (AMIC) for WFO Blacksburg for sixteen months in 2020 and 2021.

Steve will be greatly missed by everyone in our office. In retirement, he looks forward to spending time with his family, traveling, attending live music performances, and enjoying time outdoors hiking, camping, disc golfing, biking, or paddling something on area rivers. He also intends to monitor and record the weather as a hobby.

John Strickler

On August 26, WFO Blacksburg welcomed John Strickler as a new Electronics Technician. Originally from Staunton, VA, John graduated from Mary Baldwin University in 1994 and joined the US Air Force in 1997. He was trained in electronic radio maintenance, but over the years had learned to maintain airfield navigation systems and weather forecasting equipment. He has worked as a technician, technical instructor, supervisor, and strategic planner. Most recently, he served as the Section Chief for Radar, Airfield, and Weather Systems at Joint Base Pearl Harbor-Hickam. Over the course of his career, John has lived in Biloxi, MS, Cheyenne, WY, Las Vegas, NV, San Antonio, TX, Osan, South Korea, Ramstein, Germany, and Honolulu, HI. He is married and has two children.

After seeing much of the United States and the world, John is pleased to call Blacksburg his home. He already had an affinity for the area, as his great-grandfather was the minister of the Main Street Baptist Church in Christiansburg. We look forward to working with him in the years to come.

Kidz Korner

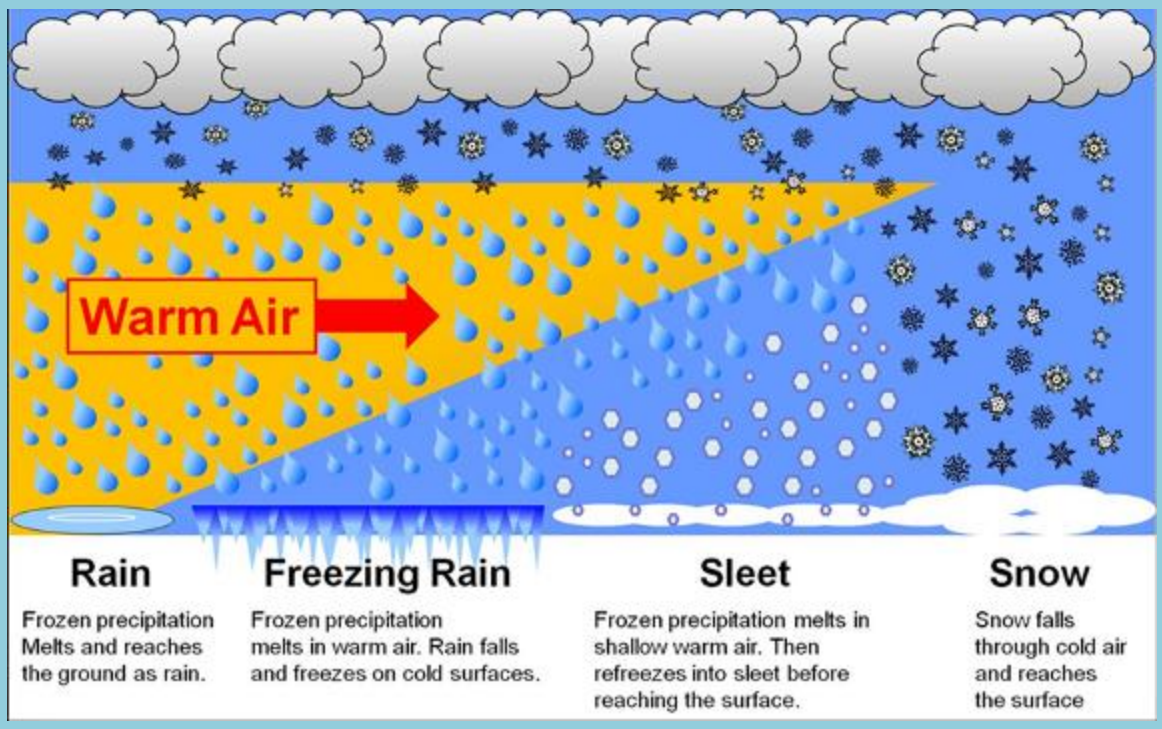
Welcome to the fall edition of Kidz Korner! Our topic today is:

Sleet and Freezing Rain!

Along with snow, which we talked about in the Fall 2020 edition of this newsletter, sleet and freezing rain are the two other types of precipitation unique to this time of the year. We will explore how sleet and freezing rain form, and what they can mean for you and your family.

To consider how sleet and freezing rain form, first think about a sandwich, and all the layers that it has (the bread, the meat, the cheese, and the other toppings and sauces). Well, the atmosphere is kind of like a sandwich. It too has different layers – layers of air! Each of these layers is at a different temperature. Some places in the atmosphere, the layers may be above freezing, with other layers below or at freezing. When snow falls, all the layers are below freezing, so the snowflakes remain in their white, un-melted crystal shape. However, when a layer of above-freezing air is near the ground, snow crystals melt into raindrops on their way down to earth.

Here is where the process can get tricky. If these raindrops then fall into another layer of air that is below freezing, and that layer is fairly thick and cold, those raindrops will refreeze into little balls of ice that we call sleet. They are quite noticeable when they reach the ground, as they tend to not just land, but bounce around with a distinct light tapping sound. Now, if the raindrops that fall into the below-freezing air reach the ground before they can form sleet, they land as raindrops. If the ground, the trees, cars, or the power lines those raindrops fall upon have temperatures that are at or below freezing, the rain will freeze on these surfaces, resulting in freezing rain. You can tell that freezing rain is occurring because layers of slippery ice will start to form on the road and sidewalks, tree limbs and branches will begin to gather icicles and start to bend, and power lines will gather ice and sag.



So, what do sleet and freezing rain mean for you and your family? Both sleet and freezing rain, like snow, can make travel and walking hazardous. You should always allow extra time to reach your destination during winter weather, or if conditions are very bad, and you don't have to travel, stay home. However, sleet is similar to snow in that a snow shovel or snowplow can push it off of sidewalks and roads. Sleet likely won't become too deep, but it will be heavier than the same amount of snowfall. So, be careful not to strain yourself if you help your family clear your sidewalks or driveway. Freezing rain may require special salts or chemicals to help it melt the ice off the sidewalks and roads, with a shovel or snowplow helping after the melting process begins. Freezing rain may cause trees or tree limbs to fall, which then may block roads or cause injuries

to people. Power lines may fail due to heavy amounts of ice, or when a limb or tree falls on them. This could result in an extended power outage to your home until utility crews in their bucket trucks can fix the problem. It's a good idea to keep a emergency supply kit at home or in the family car with essential items such as snacks, drinks, medical supplies, flashlights, batteries, and a NOAA Weather Radio.

Who Has Seen the Wind?

by Christina Rossetti

Who has seen the wind?
Neither I nor you.
But when the leaves hang trembling,
The wind is passing through.
Who has seen the wind?
Neither you nor I.
But when the trees bow down their heads,
The wind is passing by.

Feeling creative? Would you like to see your art or writings included in the next edition of Blue Ridge Barometer? If you are between the ages of 3 and 17, we would love to see your hand-drawn artwork, short poems, or short stories about the weather. For the next edition, we are looking for art and writings that involve the spring or summer. Our meteorologists will review the submissions and select a few to include in the newsletter. Maybe yours will be one of them!

To submit your original drawing, poem, or story, scan your artwork or writing into a .jpg computer image file (with the help of an adult, if needed). You can also write your poem or story using Word and save it as a .doc or .docx file. Please keep any written material to 500 words or less. Artwork may also be completed using drawing or painting software, submitted as a .jpg file.

When submitting your drawing, poem, or story, please include your first name and first initial of your last name, age, and the city/town where you live. All entries should be submitted no later than April 1, 2022. Please email your entries here.

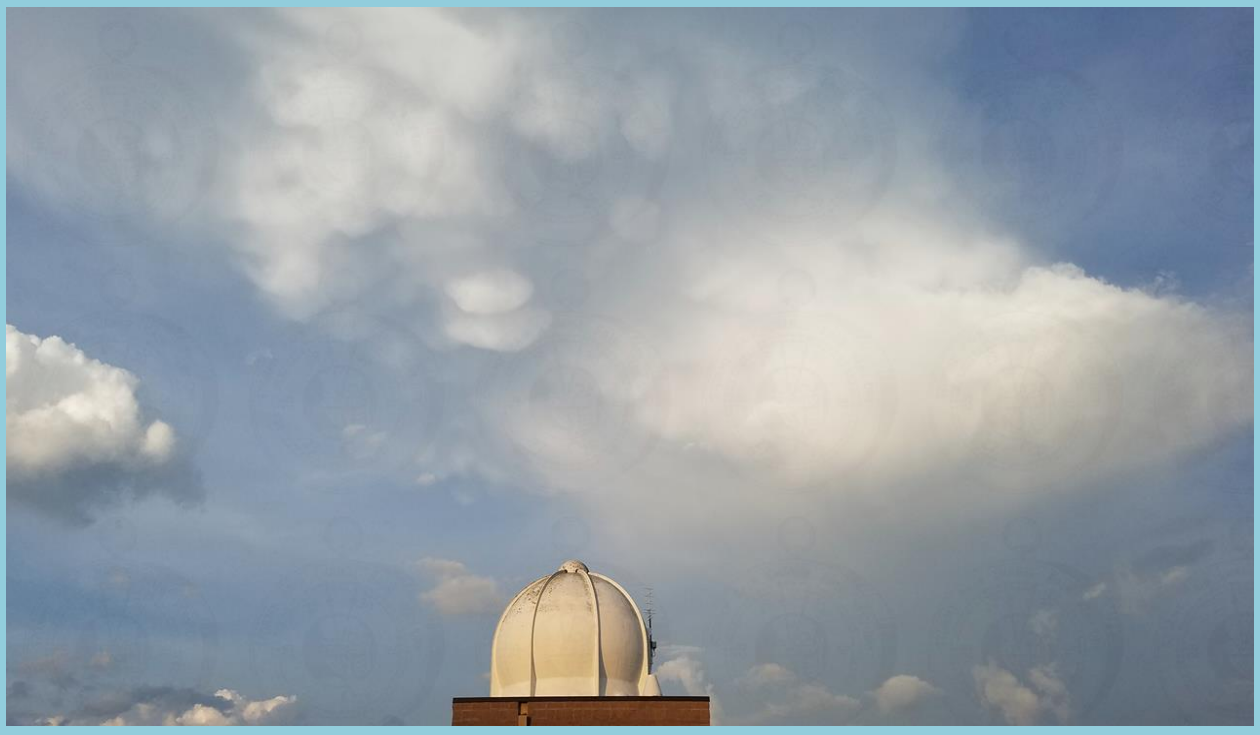
We look forward to hearing from you!

From Piedmont to Mountaintop

In this edition, we have two pictures submitted by one of our meteorologists. These pictures were taken about twenty minutes apart as a thunderstorm departed the Virginia Tech Montgomery Executive Airport.

In the first picture, the storm has moved east of the airport, and the sun is positioned behind the photographer. The sun is shining directly on the rain falling from the storm. The raindrops scatter the white sunlight into its primary visible color components, displaying for the lens a partial rainbow in the background, centered above the weather balloon inflation building in the foreground.

The second picture is a bit more obscure, as the phenomena captured is not as common, especially in this part of the country. In this picture, a few mammatus clouds (the pouchy-looking clouds just slightly left-of-center) developed on the remnant clouds of the thunderstorm. These clouds are interesting in that they develop as cold air sinks into warmer air, rather than the typical method of warm air rising into colder air.



As you can see, our meteorologists enjoy taking pictures of the weather in our neighborhood. However, we would really enjoy seeing pictures from yours! From now through April 1, 2022, we invite you to take some weather-related photos and share them with us. Please include with your photos your first name, the first initial of your last name, and where and when you took the picture. We will include your photos in upcoming newsletters and credit them appropriately. Also, by submitting a picture, you agree that we can use it on one of our social media platforms (Facebook and Twitter) or in our local community outreach presentations (for example, a SKYWARN class). Photos used in these forums will also be credited appropriately.

Stay Safe & Stay Involved!

The fall and winter seasons not only bring cold temperatures, but a wide range of potential weather hazards, including flooding, lightning, snow, and ice. Check out the NWS Weather Safety page for information on all types of weather hazards. If you are interested in helping the NWS with storm spotting and verification, please consider participating in the SKYWARN program. Additionally, the NWS can always use new rain/snow observers for the CoCoRaHS network, especially in West Virginia!

To keep up to date on what's happening in our office in between newsletters, please visit our website: https://www.weather.gov/rnk or follow us on Twitter and Facebook.

For questions or comments about this newsletter, please contact the editor or via snail mail at:

Blue Ridge Barometer

National Weather Service

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