



Blue Ridge Thunder



Newsletter of the NWS Blacksburg, VA

Welcome to the Fall 2017 edition of 'Blue Ridge Thunder' the biannual newsletter of the National Weather Service (NWS) office in Blacksburg, VA. In this issue you will find articles of interest on the weather and climate of our region and the people and technologies needed to bring accurate forecasts to the public.

Weather Highlight Tropical Depression Nate: Tornadoes and Flooding

Will Perry, Senior Forecaster and Steve Keighton, Science and Operations Officer

Hurricane Nate plowed into the Gulf Coast of Louisiana and Mississippi on Sunday morning October 8th, 2017 weakening to a tropical depression by the same afternoon over Tennessee. A strong surge of tropical moisture and low level winds allowed for a band of heavy showers and a few thunderstorms to track north over the western Carolinas producing tornadoes, wind damage and some flooding.

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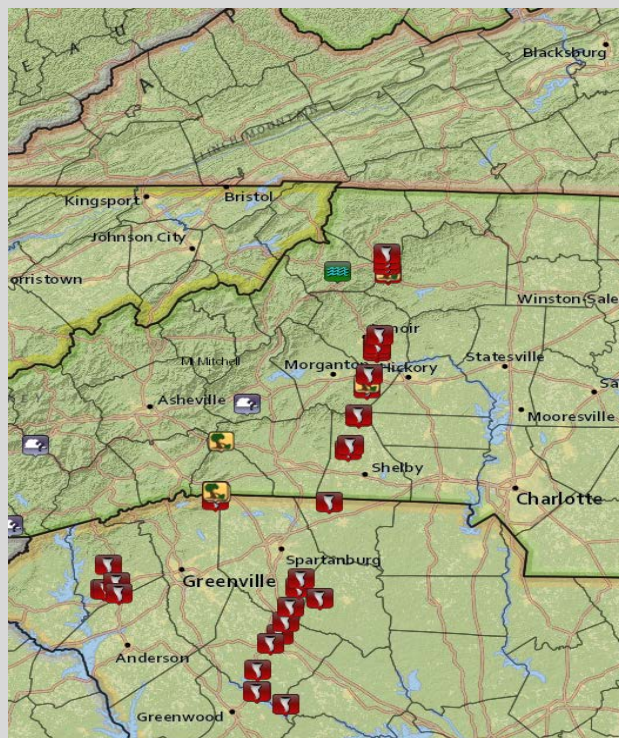
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Regional track of tornadoes and damage on October 8th, 2017



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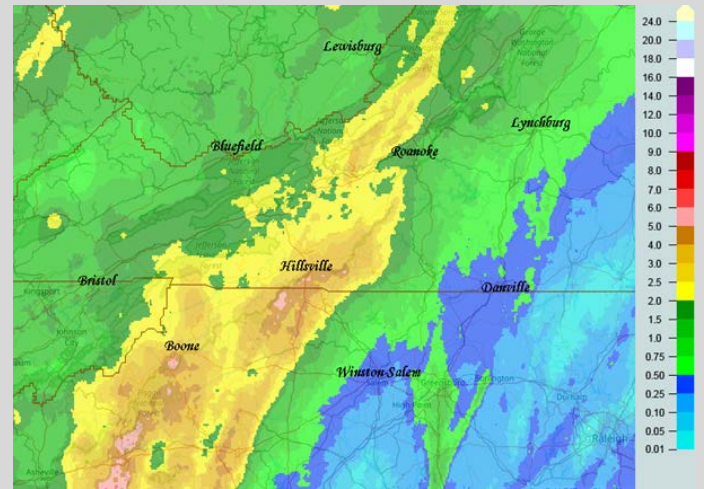
One storm cell moved from south to north across western North Carolina producing multiple tornadoes. The last tornado from this cell left a path of damage in Wilkes and Ashe counties, resulting mostly in snapped trees but several homes and structures had minor damage as well. The figure below shows the path of this nearly continuous tornado damage, as surveyed by our office, from near U.S. 421 east of Deep Gap in Wilkes County, north-northeastward up the Blue Ridge into the Idlewild area of Ashe County. This was the first documented tornado in Ashe County since records began in 1950.



EF-1 Tornado track across Wilkes and Ashe counties, NC

In addition to the severe weather, the heavy rainfall associated with Nate brought significant flooding to the Boone, NC area during the evening of the 8th, especially around the town and on the campus of Appalachian State University, where 4-7" of rain was measured in a 6 to 8 hour period. The map below shows the 24-hour rainfall from

Nate which also brought very welcome moisture of 2 to 3 inches to much of southwest VA.



24-hour radar-rainfall estimates from TD 'Nate' ending at 8 AM, Oct. 9, 2017

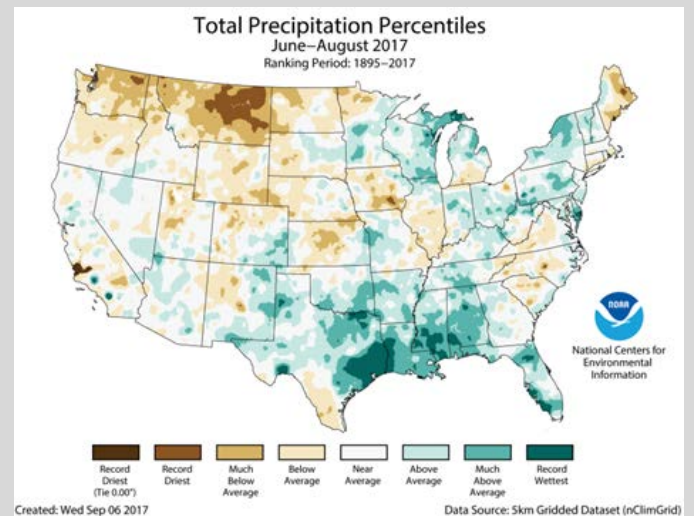
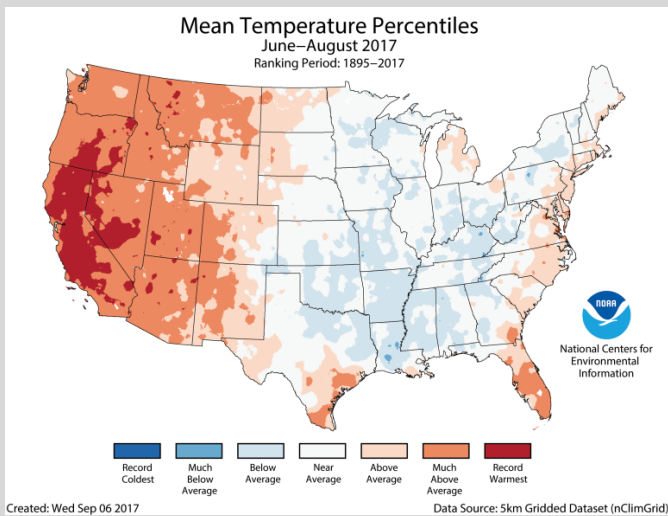
Furthermore, the stronger non-thunderstorms winds associated with Nate downed trees over portions of southwest Virginia during the early morning of the 9th, roughly from Tazewell County northeast into Franklin, Roanoke and Rockbridge counties.

Fall (September-November) tornadoes are certainly not unprecedented in our County Warning Area (CWA) and are usually associated with tropical systems or their remnants. These were the first fall tornadoes in the CWA since October 7th, 2014, when an EF-1 tracked across Mercer County, WV. The last time a fall tornado occurred due to a tropical system was September 5th, 2011 when the remnants of Tropical Storm Lee brought two weak tornadoes to Cana, VA and near Stone Mountain State Park, NC.

Summer 2017 Climate Summary

Peter Corrigan, Sr. Service Hydrologist

After two warmer than normal summers (2015 and 2016) the summer of 2017 saw temperatures (June through August) that were generally near to slightly below average across the Blacksburg CWA (figure below, left). Nationwide, cooler than normal temperatures prevailed across much of the Ohio Valley and Midwest while most of the eastern seaboard and especially the western U.S. were warmer than average. Precipitation was slightly below normal across much of the CWA (figure below, right), while much of the Deep South and Ohio Valley were much wetter than normal. Along the southeast Texas coast it was the wettest summer on record due to the extraordinary rainfall from Hurricane Harvey. Parts of Montana by contrast were extremely dry, helping to aggravate fires in the region.



The table below shows temperature and precipitation rankings and anomalies (departures from normal) for the five official climate sites in the CWA. No climate site reached 100°F during the summer of 2017 and the number of 90°F days was fairly close to normal. Rainfall was general less than normal with the exception of Danville due mainly to local thunderstorms.

Local climatological statistics for summer 2017 (Jun-Aug)

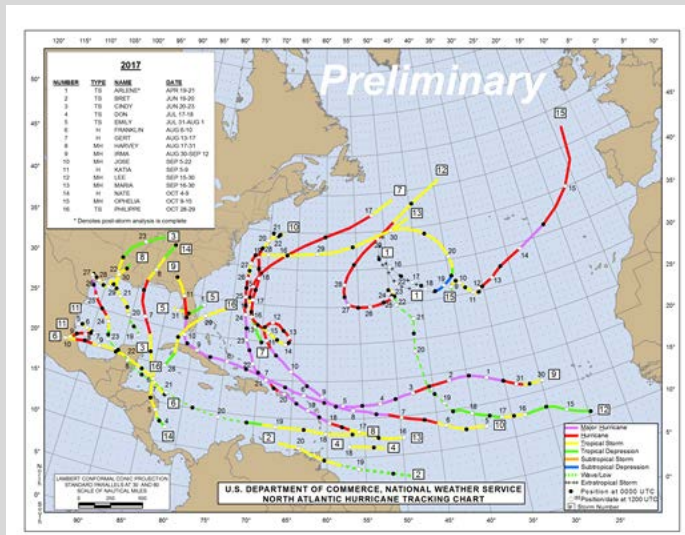
Climate Site	Average Temperature (Anomaly)	Rank (coolest =1)	Summer Maximum Temp. (°F)	No. of days $T \geq 90^\circ\text{F}$	Total Precipitation (Anomaly)	Station Period of Record
Blacksburg, VA	69.5 (-0.2)	t-30 th	92	1	8.72 (-3.13)	1952-2017
Roanoke, VA	75.4 (+0.4)	t-73 rd	97	28	8.88 (-2.55)	1912-2017
Lynchburg, VA	74.1 (+0.4)	t-41 st	95	22	7.63 (-3.61)	1893-2017
Danville, VA	75.3 (-1.4)	t-12 th	95	23	13.10 (+0.69)	1948-2017
Bluefield, WV	68.0 (-3.7)	t-12 th	87	0	11.26 (-0.31)	1959-2017

Very Active 2017 Atlantic Hurricane Season Results in Wind and Rain Across the Local Area

Jim Hudgins, Senior Forecaster

The ongoing 2017 Atlantic hurricane season has been the most destructive since 2005 and at this point rates as the 5th most active in history. It has had the highest number (6) of major hurricanes (Category 3 or higher) as well as the greatest number of consecutive hurricanes (10) in the satellite era (1966-current). The first named system (Tropical Storm Arlene) formed very early, in mid-April, and the last was Tropical Storm Rina, which formed on November 6th. This is only the 5th time since 1950 to reach the letter 'R' for storm names. As of early November, there have been 17 named storms. In addition to being above the normal of 12 named storms, this may be the costliest of all time and deadliest since 2005.

warm water across much of the basin, featured the development of several long-lived Cape Verde type hurricanes. In fact, nine of the next ten named storms reached hurricane status, including six majors ending with Ophelia in mid-October. This included Harvey, Irma and Maria, with Irma being the strongest hurricane to form in the Atlantic outside of the Gulf and Caribbean. Irma's 185 mph winds established a new world record for maintaining that strength for 37 hours. Irma became the first ever Category 5 hurricane to impact the northern Leeward Islands (Barbuda), as well as equaling the strongest hurricane ever to make landfall in the Atlantic basin. This season is also one of only six years on record to feature multiple Category 5 hurricanes as Maria hit Dominica. Hurricane Harvey, the first major system to make landfall in the U.S. since Wilma in 2005, led to record flooding in Texas where over 60 inches of rain fell near Houston, setting a tropical rainfall record. In addition, this season was the first to see three hurricanes make landfall in the U.S. at Category 4 status or stronger. This includes Maria that struck Puerto Rico on September 20th causing massive devastation. Ophelia in mid-October was the easternmost major hurricane on record in the Atlantic reaching Category 3 before impacting Ireland and Scotland as a post tropical storm.



Tracks of 2017 Tropical Cyclones

Tropical activity through early August was spread out with several weak systems forming close to the U.S., but Franklin (Aug. 6-10) was the first hurricane to develop in the 2017 Atlantic season. The heart of the season, with low wind shear and

This season also marked the most impact seen to the local area since multiple systems affected the region back in 2004, The remnants of Irma and Nate brought heavy rainfall and at least some elevation driven wind damage. The heaviest rainfall occurred with tropical depression Nate (see Nate article above for details). With billions of dollars of damage and many fatalities due to multiple landfalls of major hurricanes from the Leeward Islands to Florida, Texas and Puerto Rico,

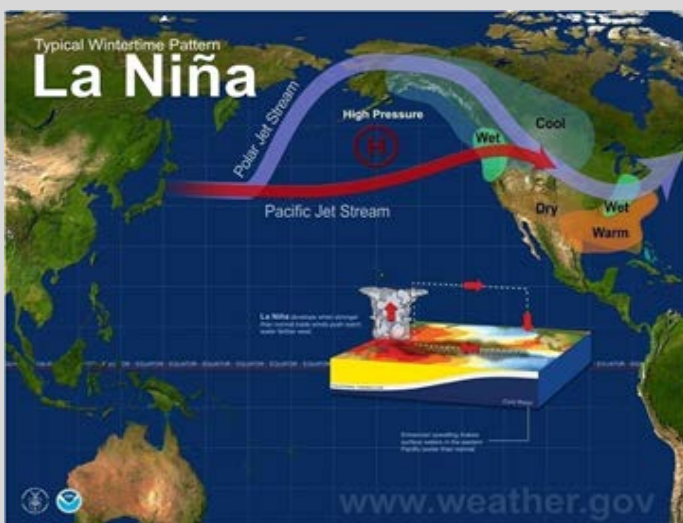
the 2017 tropical season will likely rank as one of the worst on record. The tropical season officially ends on November 30th.

Winter 2017-2018 Outlook: La Niña Returns

Robert Beasley, Senior Forecaster

The 2016/2017 winter turned out to be one of the mildest and least snowy winters on record for our region, as well as large portions of the U.S. Can we expect to make up for that this winter as some of the folklore and the Farmer’s Almanac suggest, or will we experience another mild winter? As of this writing, the latter appears to be the more likely.

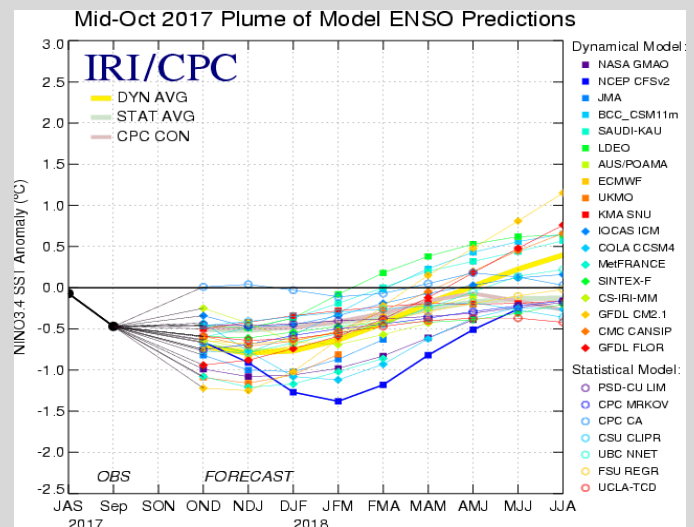
The winter of 2016/2017 featured a weak La Niña event. La Niña is a component of the El Niño-Southern Oscillation (ENSO) phenomenon that evolves across the equatorial Pacific and can have a significant impact on downstream weather patterns, including the U.S. As seen in the image below, a La Niña pattern typically features the jet stream being displaced northward across the North Pacific and further north across the U.S.



Atmospheric response during La Niña

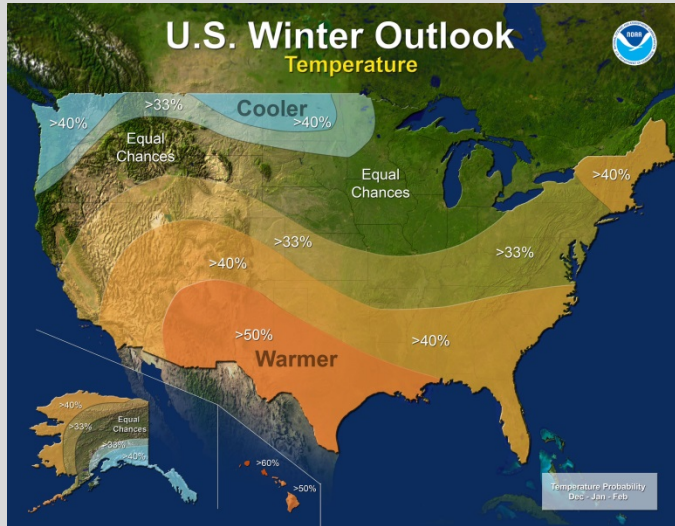
This usually leads to a warmer than normal winter for the country, as was the case for the 2016/2017 winter.

During the spring of 2017, experts saw hints of a returning El Niño pattern as the waters in the eastern Pacific basin showed signs of significant warming. By mid-summer however, the pattern reversed and temperatures began cooling in the eastern Pacific. A La Niña Watch was issued by the [Climate Prediction Center](#) in September and a La Niña Advisory on November 9th, meaning the event has ‘officially’ begun (it actually began in October). There are some indications that this event could be stronger than last winter’s La Niña. The chart below shows an ensemble of ENSO predictions showing some possible outcomes with most of models in negative (La Niña) territory for the upcoming winter.

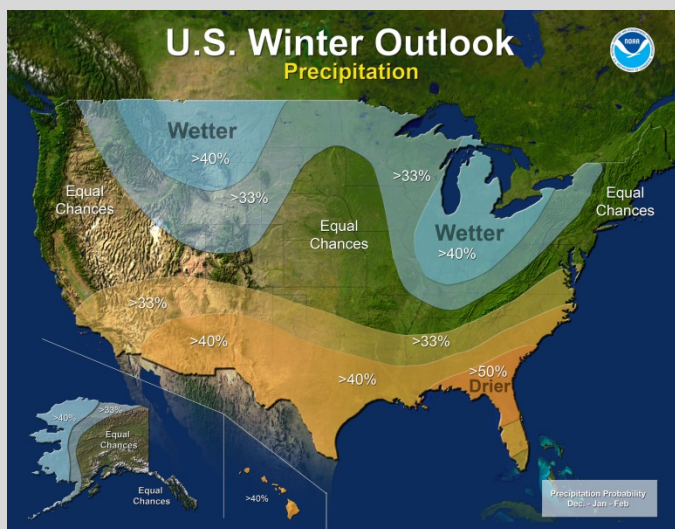


Thus, it appears that we likely to have a warmer and drier winter than normal despite the various non-scientific predictions floating around out there. It is important to understand that there numerous atmospheric circulation patterns that can affect our seasonal weather. La Niña, while a major phenomenon, is just one of those, albeit a

large piece of the weather and climate puzzle. Below is a graphic with the official CPC winter (Dec-Jan-Feb) temperature forecast for the U.S. The map shows a slightly higher chance for above normal temperatures this winter across our region, especially in North Carolina.



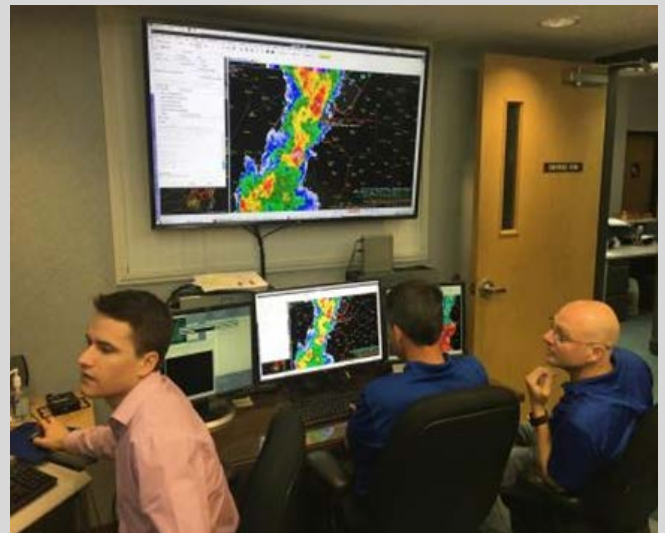
The winter precipitation forecast (see graphic below) shows a slightly increased probability for drier than normal conditions, especially in the southern sections of our area. The rest of the CWA falls into an area of 'equal chances' for any one category (above, normal or below) to predominate.



Local Media Partners Participate in Warning Simulations at NWS Blacksburg

Jamie Morrow, Meteorologist Intern

This fall, our office invited meteorologists from local media outlets to participate in a [Weather Event Simulation](#) (WES) exercise in an effort to strengthen partnerships in disseminating life-saving weather information. We were fortunate enough to have several local media personnel run through the WES, which focused on the [February 24th, 2016 severe weather event](#) that produced several tornadoes across the CWA, including an EF3 in Appomattox, VA. During the simulation, forecasters analyzed the complexities of the environment in a near real-time basis, made informed decisions, answered decision support related questions, and ultimately issued appropriate warnings. Media partners were able to see the importance of communication in a warning environment, and gained a better understanding of the steps and considerations that a warning forecaster goes through in a high impact weather event.



Meteorologist Ian Cassette (left) answers a simulated decision support services question during the WES as Meteorologist Brent Watts (center) and Christian Johansen (right) of WDBJ make warning decisions.

We would like to personally thank the media outlets that cover parts of our area, and the participating meteorologists for dedicating their knowledge and time to completing the simulation, providing feedback, valuable insight, and questions throughout the process.

Want to give it a shot from home? Try out the revamped HotSeat simulator developed and maintained by the [National Severe Storms Laboratory \(NSSL\)](#). The simulator can be accessed from [here!](#)

Virginia Tech Student Volunteer/Capstone/Forecasting Practicum

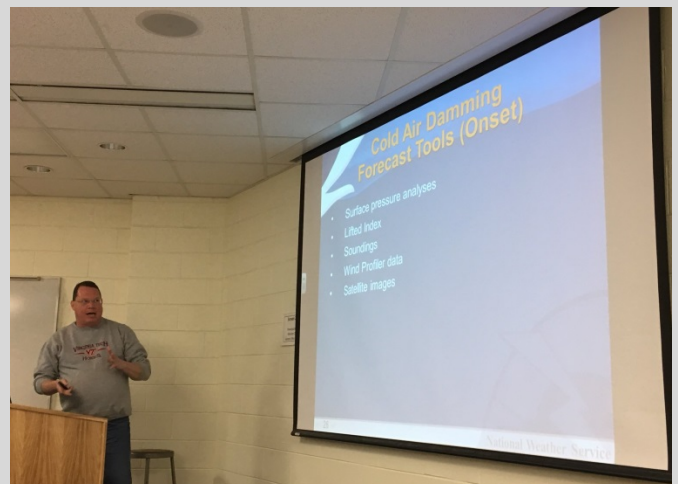
Jamie Morrow, Meteorologist Intern

The NWS Blacksburg office and the growing Virginia Tech Meteorology Program both continue to benefit from increased cooperation and collaboration. Our office is fortunate to host several Virginia Tech student volunteers each semester, allowing each to build personal, professional, and scientific skills which positively shape our office and the agency. This past summer, our student volunteer program graduated three volunteers; Robert Johnson (not pictured), Thomas Smith (right), and Zach Guion (left).



Each of these students dedicated at least six hours per week over the summer to office operations, and impressed us with their dedication, timeliness, and overall forecasting skills. Three new student volunteers (Heather Dulaney, Brandon Pierson, and Megan McCarthy) filled their shoes and began their experience with our office this fall. Two former volunteers (Jennifer Berryman and Robert Johnson) were also competitively selected to undergo the Capstone Course experience this semester, an accredited course in conjunction with Virginia Tech where students are partnered with a Meteorologist mentor, who introduces them to numerous forecasting techniques.

Members of our office staff, including forecaster Robert Stonefield (pictured below), also offer a one credit forecasting practicum class during the Fall Semester at Virginia Tech. In this class, junior/senior meteorology majors are able to learn forecasting methods and techniques from operational meteorologists first hand, and apply said techniques in a classroom type environment. Each participant in the course has the opportunity to conduct forecast briefings, write weather event blogs/reviews, and participate in a 12 week forecasting challenge, with guidance provided by the forecasters and lecturers.



Reformatting and Consolidation of Winter Weather Products

Phil Hysell, Warning Coordination Meteorologist

The National Weather Service (NWS) has been working to simplify products to better meet the needs of partners and the public. Proposals for simplification were developed based on multiple engagements that included focus groups, surveys and an interdisciplinary Workshop held in 2015. Participants included NWS employees, the public, broadcasters, emergency managers, social scientists, and other members of the Weather, Water and Climate Enterprise.

Based on this feedback, the NWS made the following changes to our winter weather products on October 1, 2017:

1. Freezing Rain Advisories are now consolidated into Winter Weather Advisories.
2. Blizzard Watches are now consolidated into Winter Storm Watches.
3. All winter weather products (including wind chill products) are reformatted into a consistent message format as: “What”, “Where”, “When”, “Additional Details” and “Precautionary/ Preparedness Actions”.

Here is a comparison of the old and new winter weather product formats:

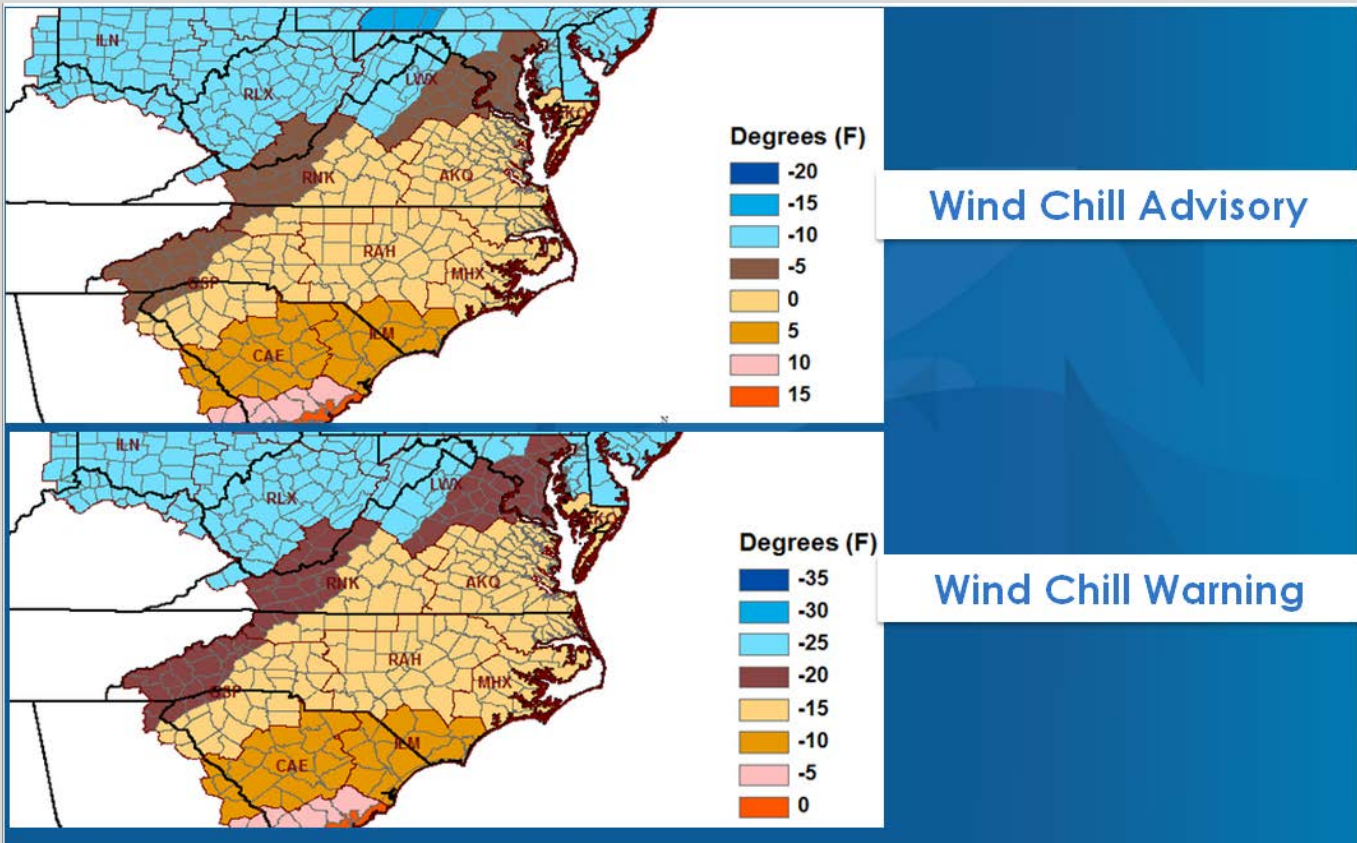
<pre>/O.UFS.KRNK.WS.A.0001.160122T0500Z-160124T1100Z/ /O.NEW.KRNK.WS.W.0001.160122T0500Z-160124T1100Z/ GILES-MONTGOMERY-FLOYD-CRAIG-ALLEGHANY VA-BATH-ROANOKE-BOTETOURT- ROCKBRIDGE-PATRICK-FRANKLIN-BEDFORD-AMHERST-CAMPBELL-APPOMATTOX- BUCKINGHAM-SUMMERS-MONROE-EASTERN GREENBRIER-WESTERN GREENBRIER- INCLUDING THE CITIES OF...PEARISBURG...BLACKSBURG...FLOYD... NEW CASTLE...CLIFTON FORGE...COVINGTON...HOT SPRINGS...ROANOKE... SALEM...FINCASTLE...LEXINGTON...BUENA VISTA...STUART... ROCKY MOUNT...BEDFORD...AMHERST...LYNCHBURG...APPOMATTOX... HINTON...HIX...UNION 330 AM EST THU JAN 21 2016 ...WINTER STORM WARNING IN EFFECT FROM MIDNIGHT TONIGHT TO 6 AM EST SUNDAY... THE NATIONAL WEATHER SERVICE IN BLACKSBURG HAS ISSUED A WINTER STORM WARNING FOR HEAVY SNOW...WHICH IS IN EFFECT FROM MIDNIGHT TONIGHT TO 6 AM EST SUNDAY. THE WINTER STORM WATCH IS NO LONGER IN EFFECT. * LOCATIONS...ALONG THE BLUE RIDGE INCLUDING PARTS OF SOUTHEAST WEST VIRGINIA AND THE SOUTHERN SHENANDOAH VALLEY EAST INTO THE FOOTHILLS OF VIRGINIA. * HAZARD TYPES...HEAVY SNOW. * ACCUMULATIONS...14 TO 20 INCHES OF SNOW. * TIMING...SNOW BEGINNING LATE BY FRIDAY MORNING...CONTINUING THROUGH SATURDAY NIGHT. * IMPACTS...SIGNIFICANT TRAVEL IMPACTS DUE TO SNOW COVERED ROADS. TRAVEL WILL LIKELY BECOME IMPOSSIBLE IN MANY AREAS. * WINDS...NORTHEAST 10 TO 15 MPH...INCREASING TO 15 TO 25 MPH WITH GUSTS TO 35 MPH FRIDAY NIGHT INTO SATURDAY. * VISIBILITIES...MAY LOWER TO BELOW ONE QUARTER OF A MILE IN PERIODS OF HEAVIER SNOW. * TEMPERATURES...MOSTLY IN THE 20S. PRECAUTIONARY/PREPAREDNESS ACTIONS... A WINTER STORM WARNING FOR HEAVY SNOW MEANS SEVERE WINTER WEATHER CONDITIONS ARE EXPECTED OR OCCURRING. SIGNIFICANT AMOUNTS OF SNOW ARE FORECAST THAT WILL MAKE TRAVEL DANGEROUS. ONLY TRAVEL IN AN EMERGENCY. IF YOU MUST TRAVEL...KEEP AN EXTRA FLASHLIGHT...FOOD... AND WATER IN YOUR VEHICLE IN CASE OF AN EMERGENCY.</pre>	<pre>WWUS43 KARX 011813 WSWARX URGENT - WINTER WEATHER MESSAGE National Weather Service La Crosse WI 113 PM CDT Mon May 1 2017 .. *Overview headline (must edit)* *Overview (must edit)* . IAZ008-009-MNZ086-087-094-095-020215- /O.NEW.KARX.WS.W.0001.170501T1813Z-170502T1800Z/ Mitchell-Howard-Dodge-Olmsted-Mower-Fillmore- Including the cities of Osage, Cresco, Dodge Center, Rochester, Austin, and Preston 113 PM CDT Mon May 1 2017 ...WINTER STORM WARNING IN EFFECT UNTIL 1 PM CDT TUESDAY... * WHAT...A wintry mix. Look for significant reductions in visibility at times. Additional snow accumulations of 4 to 7 inches and ice accumulations of a light icing are expected. * WHERE...Portions of north central Iowa, northeast Iowa and southeast Minnesota. * WHEN...Until 1 PM Tuesday. The heaviest snowfall rates will occur until 7 PM this evening. * ADDITIONAL DETAILS...Plan on difficult travel conditions, including during the evening commute. PRECAUTIONARY/PREPAREDNESS ACTIONS... A winter storm warning means significant amounts of snow, sleet and ice are occurring. Strong winds are also possible. This will make travel very hazardous or impossible. The latest road conditions for the state you are calling from can be obtained by calling 5 1 1.</pre>
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Winter Weather Advisory: Potentially dangerous winter weather is expected within the next 12-36 hours. *Travel difficulties* are expected.

Winter Storm Warning: Dangerous winter weather is expected within the next 12-36 hours. *Considerable travel problems* are expected.

Also on October 1st, 2017 changes were made to the thresholds for wind chill watches, warnings, and advisories for the Piedmont regions of North Carolina and Virginia within the NWS Blacksburg forecast area.

This change was made based on feedback from constituents and to better align with wind chill headline thresholds with NWS offices to our east and south. The definition of a wind chill advisory for the Piedmont regions of North Carolina and Virginia is now zero to -14°F (five degrees warmer compared to the previous trigger). Wind chill warnings for this region will be issued when wind chill values are forecast to be -15°F or colder. Per NWS policy, there must a minimum wind speed of five miles per hour before a wind chill headline can be issued. The criteria for wind chill advisories, watches and warnings across the mountains remains at -5 to -20°F for advisories and colder than -20°F for wind chill watches and warnings.



Recent WFO Staff Changes

Drew Bouvette (Electronics Technician)

Drew Bouvette arrived in Blacksburg in the summer of 2013 coming from the 'Last Frontier' state of Alaska. His complete biography was featured in the [Fall 2013 office newsletter](#). Drew will now return closer to his South Dakota roots as he transfers as an Electronics Technician to [WFO Glasgow](#), Montana. His friendly demeanor and 'can-do' attitude will be greatly missed. Good luck in the Northland Drew!

Here are Drew's own parting words:

Wow, it's hard to believe that I have been here just over four years now and will be going back to where I started my career with the NWS 23 years ago! It has been a wonderful experience working at the Blacksburg WFO. I have made many new lifetime friends and memories. The Appalachian and Blue Ridge Mountains are beautiful especially during the Fall. I have thoroughly enjoyed working with the students of the Virginia Tech Meteorology Department! My worst experience here has been with allergies and humidity. Please visit me if you come out "West"!

James (Jamie) Morrow (Meteorologist Intern)

Meteorologist Intern James Morrow will be soon exchanging the mountains of southwest Virginia for the warmer piedmont counties of North Carolina. Jamie has accepted a General Forecaster position at [WFO Raleigh](#), and is set to depart later this month to begin serving in our primary backup office. Jamie first began his career at our office in September of 2011 as a Student Volunteer and Capstone student. He then was officially hired on in March of 2015 to the Meteorologist (Intern) role. While in Blacksburg, Jamie worked closely with the Student Volunteer programs, social media

platforms, NWS Cooperative Observing Program (COOP), while also working closely with local media outlets to strengthen our partnerships and overall ability to disseminate life-saving information throughout the forecast area.

Jamie's superb work ethic and easy-going personality too will be greatly missed. Best of luck Jamie!



Drew and Jamie on September 27th, 2017 at the Wytheville, VA NOAA Weather Radio on Sand Mountain

Blue Ridge Thunder

National Weather Service

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