THE WEDGE FRONT

NATIONAL WEATHER SERVICE GREENVILLE-SPARTANBURG SC

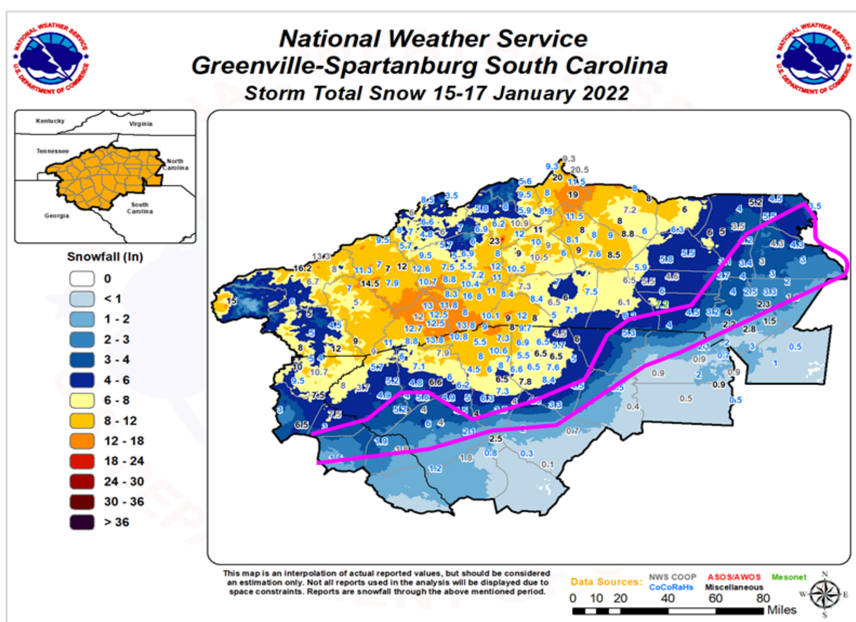
Volume 4, Issue 2 — Winter 2022-2023

INSIDE THIS ISSUE

The Winter Storm of January 16th, 2022

A major winter storm impacted the western Carolinas and northeast Georgia on 16 January 2022. The storm produced heavy snowfall across much of the area, with storm total snowfall ranging from 4 to 7 inches across much of the foothills, to 8 to 12 inches across most mountainous locations. Locally higher amounts of 1.5 to 2 feet were reported closer to the Blue Ridge escarpment and in some high elevation locations near the Tennessee border. Portions of upstate South Carolina saw their most significant snowfall from a single storm in more than 10 years. Periods of heavy snow combined with frequent wind gusts of 30 to 40 mph from the northeast resulted in near-blizzard conditions at times, especially over the foothills. Meanwhile, mixed precipitation was reported in a narrow band near the I-85 corridor, including much of the Charlotte area, where 1 to 4 inches of sleet and snow were reported. Finally, a "nose" of warmer air aloft resulted in locations from the lower South Carolina Piedmont to the far southern North Carolina Piedmont (i.e., Union County) seeing primarily freezing rain, with around 1/4 inch of ice accretion to go along with light sleet accumulations.

Figure 8. Analysis of observed snowfall in the western Carolinas and northeast Georgia from 12Z on 15 January 2022 through 12Z on 17 January 2022. Locations outlined in pink saw roughly equal amounts of snow and sleet along with some freezing rain. Locations south of that area saw mostly freezing rain, rain, and sleet.



Upper air analysis at 00Z on 16 January 2022 (7 pm EST on 15 January 2022; Fig. 1) revealed a “split flow” regime over the eastern United States, with low pressure areas centered in the southern stream over the Arklatex, and another in the northern stream over New Brunswick, with an attendant trough trailing southwest into New England. This was a classic pattern for winter weather in the western Carolinas and northeast Georgia. The northern stream provided a source of cold air. The storm in the southern stream provided lift in the atmosphere and moisture from the Gulf of Mexico: all the ingredients necessary for winter precipitation.

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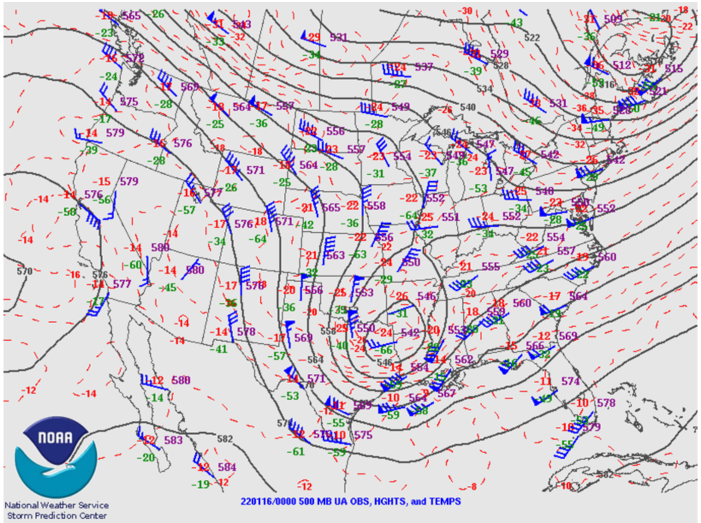


Figure 1. Analysis of heights (dm), temperature (oC), and observed winds at the 500 mb pressure surface at 00Z on 16 January 2022.

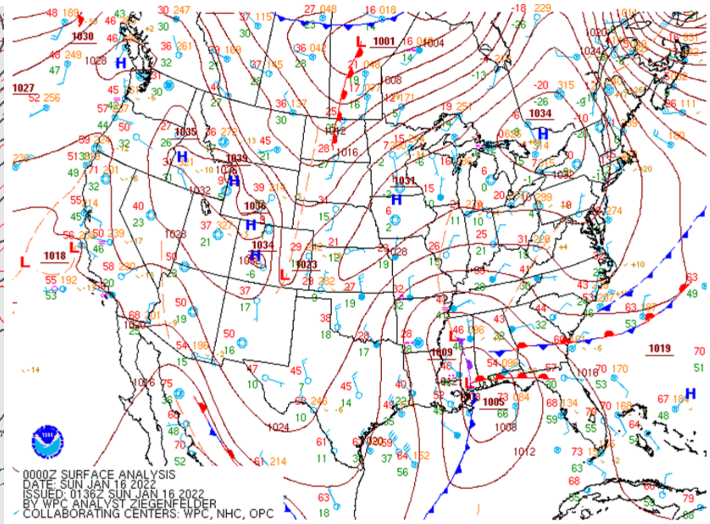


Figure 2. Analysis of air pressure adjusted for sea level (mb), fronts, pressure centers, and some plotted surface observations at 00Z on 16 January 2022.

Surface analysis at 00Z on 16 January (Fig. 2) revealed strong, cold high pressure centered west of the upper trough over southeast Ontario. The dense, cold and dry air circulating around this high was filtering down the Eastern Seaboard, "dammed" by the Appalachians to the west, and resulting in an inverted surface ridge and E/NE surface winds as far south as the Carolinas and north Georgia. Regional analysis of surface air pressure and wet bulb temperature indicated the NE winds had pushed the wet bulb freezing line south of the border between Virginia and North Carolina. Locations near and north of this line would have seen temperatures cool to near freezing in response to falling precipitation saturating the air mass.

Precipitation overspread northeast Georgia and upstate South Carolina from the southwest late in the evening (Fig. 3). For the most part, temperatures were in the upper 30s °F in these areas, allowing much of the initial precipitation to fall as rain. However, the wet bulb zero freezing line had moved to the South Carolina/North Carolina border by 06Z (1:00 AM EST) on 16 January 2022 (Fig. 4). Thus, as air temperatures cooled in response to rain saturating the air mass, precipitation transitioned to snow in many areas after an hour or two.

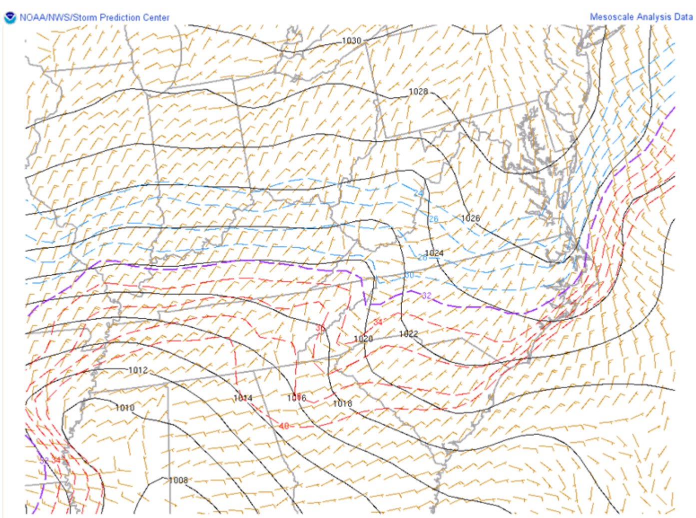


Figure 3. Mesoanalysis of surface pressure adjusted to sea level (mb; solid lines), surface wet bulb temperatures (°F; dashed lines), and surface winds at 00Z on 16 January 2022.

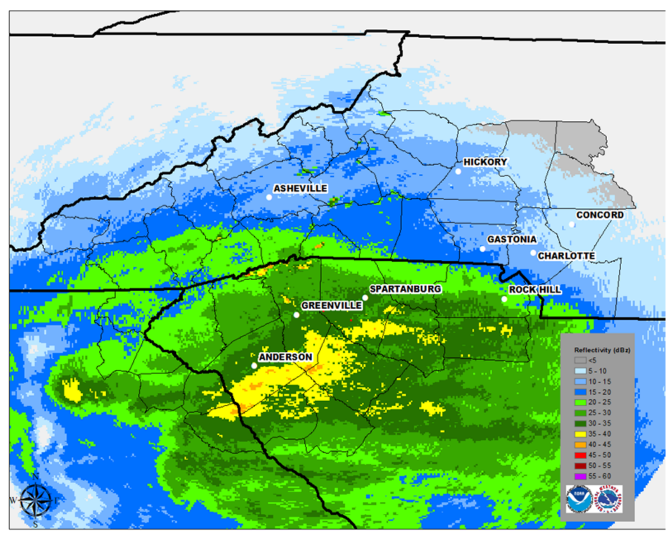


Figure 4. Composite reflectivity from the Greer, SC (KGSP) WSR-88D at 0857Z on 16 January.

As the deep and strengthening low pressure moved closer to the region, snowfall rates intensified through the early morning hours as precipitation overspread the remainder of the western Carolinas. In addition, movement of the center of surface high pressure into New England, and the continued saturation/cooling of the air mass strengthened the inverted surface ridge across the Carolinas and north Georgia. The pressure gradient between this ridge and the intensifying surface low moving east across the Deep South resulted in strong winds across the Piedmont and foothills of the western Carolinas and northeast Georgia. Winds frequently gusted from 30 to 40 mph in these areas during mid-to-late morning on 16 January, resulting in brief periods of blizzard-like conditions around sunrise (Table 1). As the morning progressed, the layer of warm air aloft gradually lifted north, allowing much of the Piedmont and portions of the South Carolina and southern North Carolina foothills to transition to sleet and light freezing rain (Fig. 5).

Continued on Page 3

	Date Time (UTC)	Air Temp (°F)	Wind Chill	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Visibility (mi)	Weather
GMU	1/16/2022 8:53	33.1	22.21	NE	17.25	31.05	0.75	Light Snow
GMU	1/16/2022 9:53	32	20.78	NE	17.25	26.45	0.5	Snow
GMU	1/16/2022 10:53	30.9	17.68	NE	23	31.05	0.5	Snow
GMU	1/16/2022 11:53	28.9	15.02	NE	23	31.05	0.5	Snow
GMU	1/16/2022 12:18	28	12.66	NE	27.6	36.8	0.25	Heavy Snow
GMU	1/16/2022 12:23	28	12.94	NE	26.45	36.8	0.5	Snow
GMU	1/16/2022 12:36	28	12.4	NE	28.75	47.15	1	Mixed Precip
GMU	1/16/2022 12:53	28	13.22	NE	25.3	40.25	1.75	Mixed Precip
GMU	1/16/2022 13:26	28	12.66	NE	27.6	36.8	0.75	Mixed Precip
GMU	1/16/2022 13:31	27	10.28	NE	32.2	41.4	0.75	Mixed Precip
GMU	1/16/2022 13:42	27	10.53	NE	31.05	43.7	0.5	Mixed Precip
GMU	1/16/2022 13:53	27	9.82	NE	34.5	44.85	0.5	Mixed Precip

Table 1. Observations from the Automated Surface Observing System (ASOS) at Greenville (SC) Municipal Airport from 0953Z until 1353Z on 16 January 2022. The observation highlighted in purple meets the National Weather Service definition of blizzard conditions. Observations highlighted in blue indicate near-blizzard conditions.

Precipitation tapered off throughout the morning as a slot of dry air in the upper levels of the atmosphere overspread the area in advance of the upper low (Fig. 6). Bands of mainly light snow then redeveloped during the afternoon and evening as the upper low moved across the area.

The heavy snowpack, topped with light sleet and/or ice accumulation in some areas made travel very difficult, if not impossible across much of the area on the 16th into the 17th. Cold/below normal nighttime temperatures allowed for several nights of refreezing of lingering slush, resulting in hazardous driving conditions for several mornings beyond the 17th.

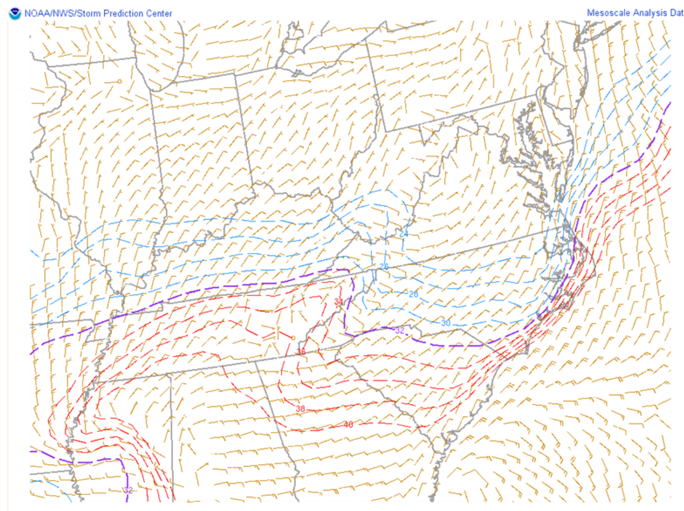


Figure 5. Same as in Fig. 3 except at 06Z on 16 January 2022.

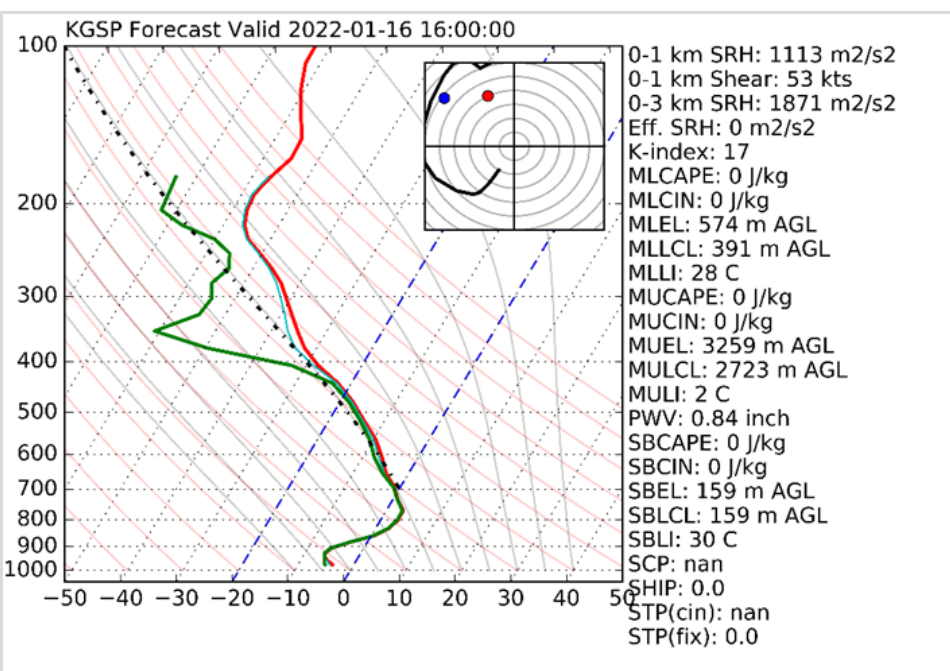


Figure 6. Forecast vertical profile of air temperature and dewpoint temperature (both in °C) from the Rapid Update Cycle (RAP) initialized at 12Z on 16 January 2022 and valid at 16Z on 16 January 2022. Air pressure (in mb) decreases along the vertical axis and temperature is skewed toward the right on the horizontal axis. The freezing line (0 °C) is denoted by blue dashed line. The atmosphere was above freezing between the 900 mb and 700 mb layer. Snow falling into this layer from above would have melted before refreezing (as freezing rain or perhaps sleet) as it encountered the colder air near the surface.

Continued on Page 4

This event occurred during a La Nina phase of the El Nino-Southern Oscillation (ENSO). La Nina patterns are typically associated with warm and dry winters across the Southeast (the official Winter Outlook issued by the National Weather Service during autumn 2021 indeed called for warmer-than-normal temperatures and below normal precipitation for the western Carolinas and northeast Georgia). However, processes that influence development of individual storm systems are far more complicated than the status of ENSO. This event reminded us that, due to the rarity of snowfall across the lower elevations of the Carolinas and Georgia, it only takes one major winter weather event to yield above-normal amounts of seasonal snowfall.

This episode resulted in one of the top 15 daily snowfall events in the official recorded history in the Asheville area (AVL; Table 2), and a top 20 event in the Greenville-Spartanburg Area (GSP; Table 3). Although GSP did not receive any other snowfall during the 2021-22 season, this single event pushed the area above the 1991-2020 seasonal average of 3.9.”

Table 2. The top 15 highest single day official snowfall observations from Asheville, NC from 1869 through March 2022.

Rank	Snowfall	Date
1	16.3	12/3/1971
2	15	1/26/1906
-	15	3/2/1872
4	14	3/13/1993
-	14	1/7/1988
6	13.4	1/22/2016
7	12.2	3/2/1942
8	12	12/24/1876
9	11.9	1/27/1998
10	11.5	4/3/1987
11	11	1/29/2010
-	11	3/9/1960
13	10.4	1/16/2022
14	10.1	12/18/2009
15	10	3/11/1926

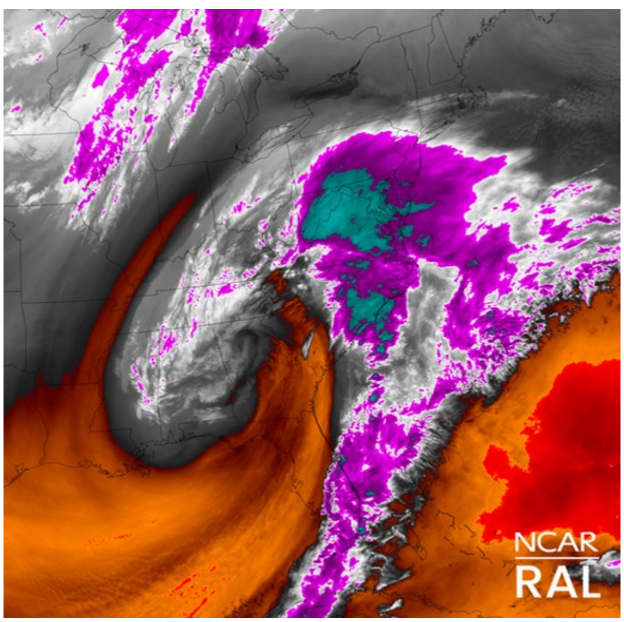
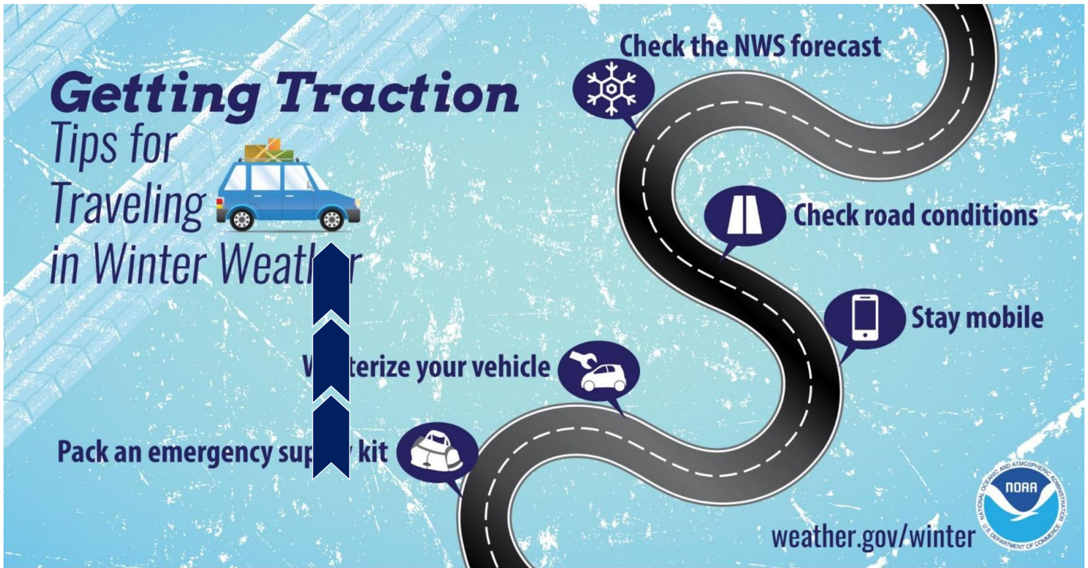


Figure 7. Imagery from the water vapor (6.93 mm) band of GOES-16 at 1807Z on 16 January 2022. White and "cold" colors represent high levels of moisture in the upper levels of the atmosphere. Gray and "warm" colors represent drier areas.

Table 3. Same as in Table 2 except for Greer, SC (Greenville-Spartanburg) from 1884 through March 2022.

Rank	Snowfall	Date
1	15	2/15/1902
2	14.4	12/17/1930
3	12	1/7/1988
4	11.4	12/3/1971
5	10.5	12/02/1896
6	10.2	1/22/1987
7	9.5	12/29/1935
8	9.4	3/13/1993
9	9.3	3/24/1983
10	8.5	1/20/1893
11	8.2	2/18/1979
12	8	2/26/2004
13	7.5	3/2/1942
14	7	2/16/1895
-	7	2/26/1894
16	6.6	3/25/1971
17	6.5	1/16/2022
-	6.5	1/10/2011
-	6.5	1/27/1906
20	6.4	2/15/1958

Justin Lane, Lead Meteorologist



Winter Hazards: Are You Prepared?

Building a Weather-Ready Nation

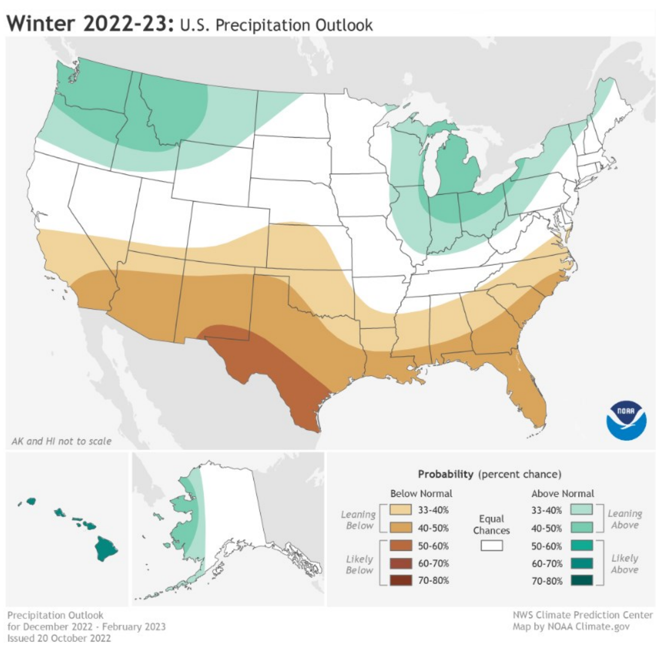
To learn more about winter safety, visit https://www.weather.gov/wrn/

Know your Risk, Take Action, Be a Force of Nature!

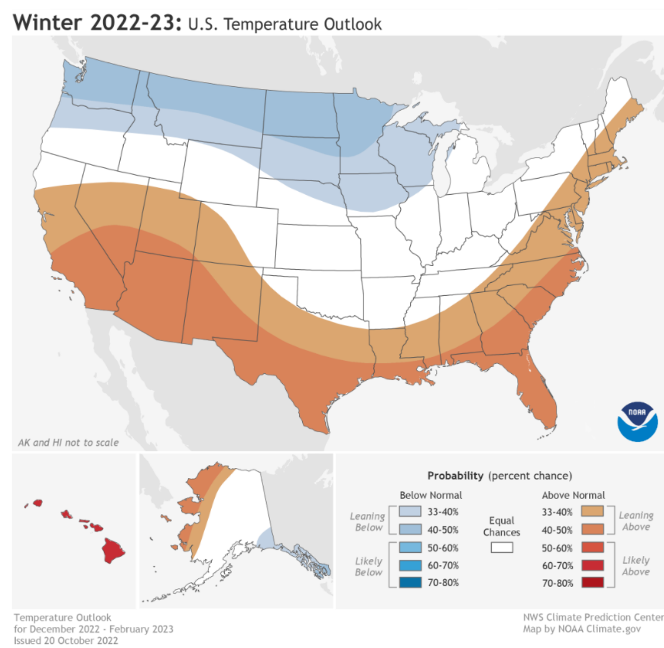
While dangerous road conditions are one of the most deadly hazards during winter, it's not the only threat you may encounter. Other winter hazards include brutal cold, heavy snow and ice, dangerous flooding, extreme wind, and treacherous fog.

2022-2023 NOAA Winter Outlook for the Western Carolinas and Northeast Georgia

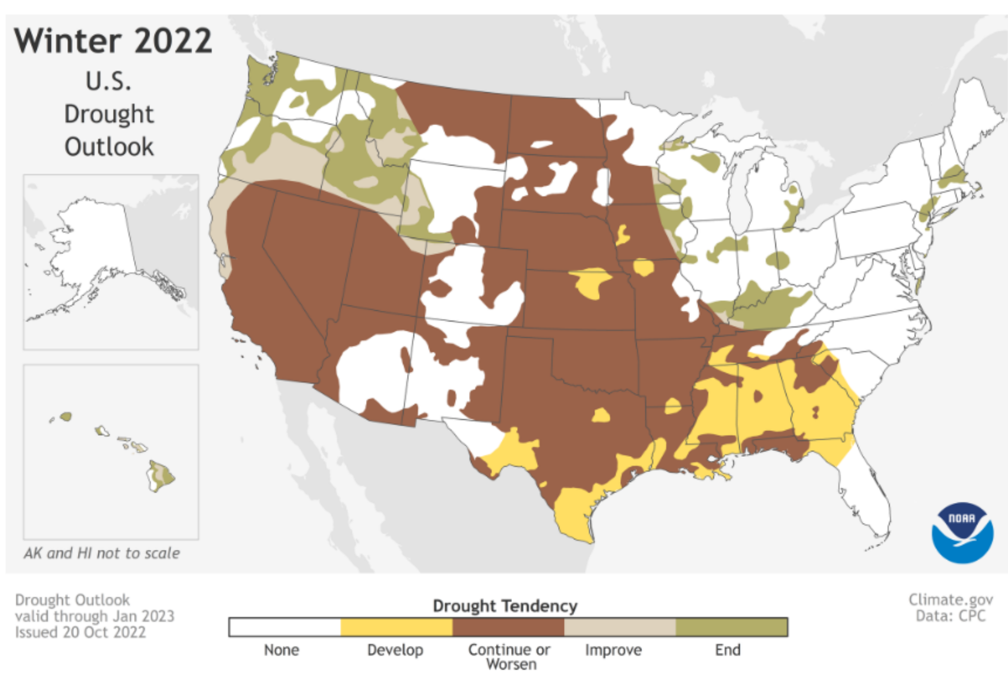
The 2022-2023 Winter Outlook was released by NOAA on October 20th, 2022. With La Niña expected to return for the third winter in a row, the western Carolinas and northeast Georgia are likely to see warmer-than-average temperatures and drier-than-average conditions across the from December 2022 through February 2023. With La Niña in place, this may allow drought conditions to develop and/or worsen across northeast Georgia, the southwest North Carolina mountains and the western Upstate of South Carolina from November 2022 through January 2023. It's important to note that although we are expected to see warmer-than average temperatures and drier-than average conditions, this does not rule out the potential for impactful winter storms. A recent example of this is from earlier this year, January 16th, when we had a major winter storm during a La Niña pattern. So, yes, we can still have an impactful winter with La Niña in place.



The 2022-2023 U.S. Winter Outlook map for precipitation shows wetter-than-average conditions are most likely in western Alaska, the Pacific Northwest, northern Rockies, Great Lakes and Ohio Valley. Drier-than-average conditions are forecast in portions of California, the Southwest, the southern Rockies, southern Plains, Gulf Coast and much of the Southeast. (NOAA)



The U.S. Winter Outlook 2022-2023 map for temperature shows the greatest chances for warmer-than-average conditions in western Alaska, and the Central Great Basin and Southwest extending through the Southern Plains. Below normal temperatures are favored from the Pacific Northwest eastward to the western Great Lakes and the Alaska Panhandle. (NOAA)



This seasonal U.S. Drought Outlook map for November 2022 through January 2023 predicts persistent widespread drought across much of the West, the Great Basin, and the central-to-southern Great Plains. (NOAA)

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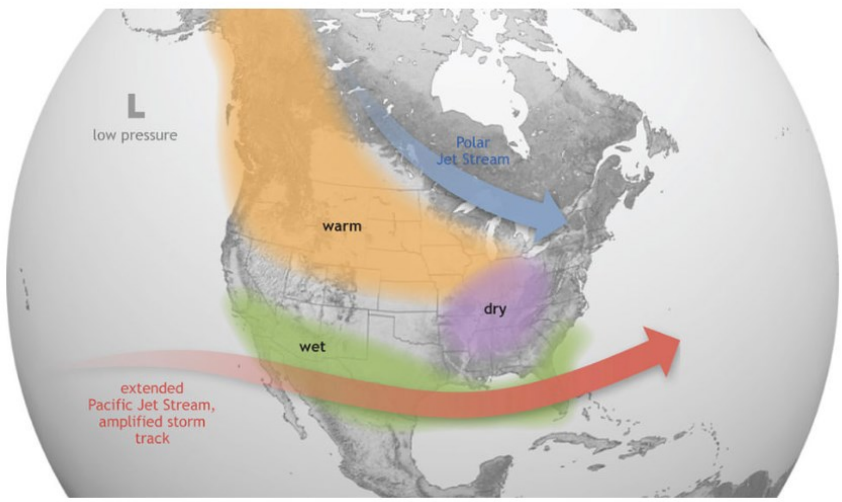
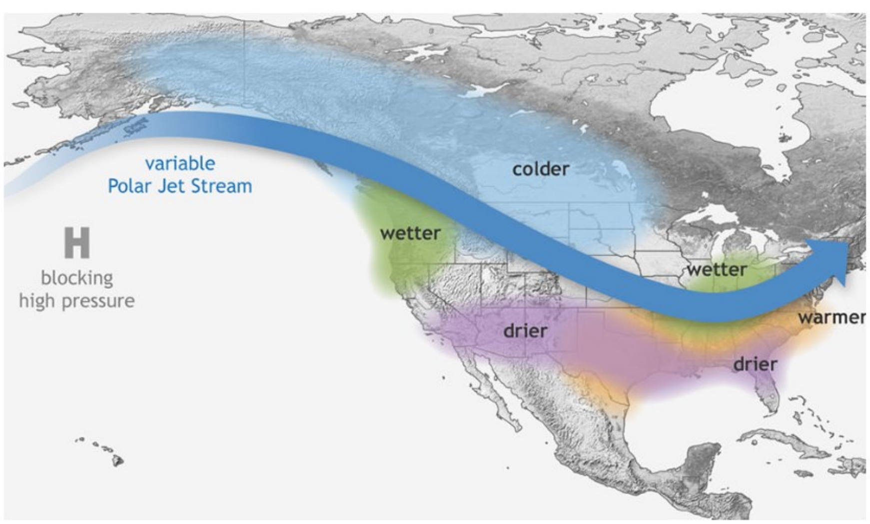
What is La Niña you ask? To answer this question we first need to discuss ENSO which is an acronym for the El Niño-Southern Oscillation cycle. ENSO is made up of two climate patterns in the Pacific Ocean that impact the weather across the globe and they are called El Niño and La Niña. During normal conditions in the Pacific ocean, trade winds blow west along the equator, taking warm water from South America towards Asia. To replace that warm water, cold water rises from the depths (upwelling). El Niño and La Niña are two opposing climate patterns that break these normal conditions. Episodes of El Niño and La Niña typically last 9 to 12 months, but can sometimes last for years. El Niño and La Niña events occur every two to seven years, on average, but they don't occur on a regular schedule.

During El Niño, trade winds weaken. Warm water is pushed back east, toward the west coast of the Americas. El Niño means Little Boy, or Christ Child in Spanish. South American fishermen first noticed periods of unusually warm water in the Pacific Ocean in the 1600s. The full name they used was El Niño de Navidad, because El Niño typically peaks around December. El Niño can affect our weather significantly. The warmer waters cause the Pacific jet stream to move south of its neutral position. With this shift, areas in the northern U.S. and Canada are dryer and warmer than usual. But in the U.S. Gulf Coast and Southeast, these periods are wetter than usual and have increased flooding. La Niña means Little Girl in Spanish. La Niña is also sometimes called El Viejo, anti-El Niño, or simply "a cold event." La Niña has the opposite effect of El Niño. During La Niña events, trade winds are even stronger than usual, pushing more warm water toward Asia. Off the west coast of the Americas, upwelling increases, bringing cold, nutrient-rich water to the surface. These cold waters in the Pacific push the jet stream northward. This tends to lead to drought in the southern U.S. and heavy rains and flooding in the Pacific Northwest and Canada. During a La Niña year, winter temperatures are warmer than normal in the South and cooler than normal in the North. La Niña can also lead to a more severe hurricane season.

El Niño Pattern



El Niño causes the Pacific jet stream to move south and spread further east. During winter, this leads to wetter conditions than usual in the Southern U.S. and warmer and drier conditions in the North.



La Niña Pattern

La Niña causes the jet stream to move northward and to weaken over the eastern Pacific. During La Niña winters, the South sees warmer and drier conditions than usual. The North and Canada tend to be wetter and colder.

NOAA & Ashley Rehnberg, Meteorologist

Did You Know?

Carbon monoxide can accumulate from:

Furnaces

Water heaters

Boilers

Wood stoves

Fireplaces

Charcoal grills

Gas cooking stoves

Clothes dryers

Gas or kerosene space heaters

Automobile exhaust

Carbon Monoxide: The Invisible Killer

Carbon monoxide (CO) is a deadly odorless, colorless, and poisonous gas that is the cause of fatalities each year, especially during the winter weather season. It is a result of the incomplete burning of various fuels (ie coal, wood, kerosene, propane) from equipment such as generators and cars.

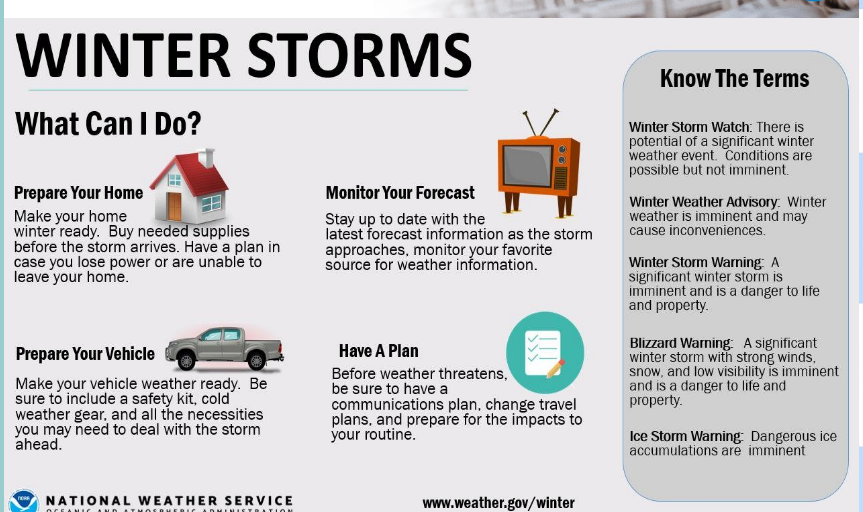
Ways to Prevent CO Poisoning

- Never operate equipment in enclosed spaces (garage or locations in a home)
- Never leave car running in an attached garage (even with garage door open)
- Never burn charcoal inside home, vehicle, garage
- Never use gas appliances to heat your home (ovens, clothes dryers, etc.)
- Never operate equipment where people are sleeping
- Install carbon monoxide alarms in central locations on every level of your home
- If carbon monoxide alarm sounds, move quickly to fresh air

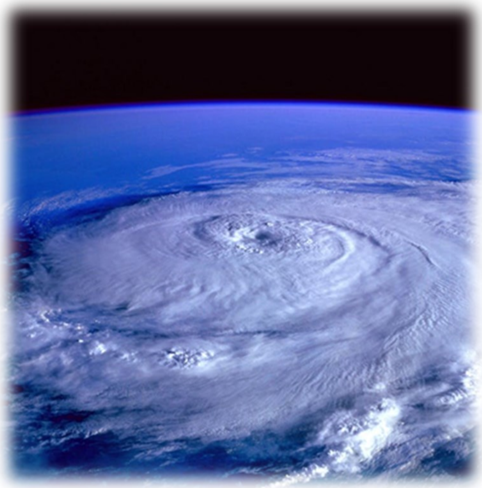
SYMPTOMS OF CO POISONING

- Dizziness
- Nausea
- Fatigue
- Headache
- Shortness of breath
- Vomiting*
- Mental confusion*
- Loss of consciousness*

**High level of CO Poisoning*



Meteorological Uncertainty and Ensemble Forecasting



Ever heard someone say "Meteorologists get paid to be wrong half the time" and then belt out a hearty chuckle? I have. I never really knew whether to take it lightly and laugh along, or be miffed. On the surface, it's a funny quip and doesn't hurt anyone. I'm always tempted, though, to respond with counter-arguments: psychological proof that most people only remember our bad forecasts, and conveniently forget our good ones; statistical proof of how often meteorologists are actually wrong versus right; philosophical ponderings on where to even draw the line between a "correct" forecast and an "incorrect" one. However I look at it, the implication that meteorologists are "just guessing" is frustrating to me, and I know I'm not the only meteorologist who feels this way.

Then again, that is what we're doing. The atmosphere is a monumentally complex place. It's one that we understand fairly well in theory, but understanding is only part of the great puzzle of forecasting. The other parts are what we refer to as data resolution and computer error. Computer error is readily understandable as imperfection in either the way that computers round off numbers or the math used to make predictions. And a lot of the math used in meteorology is an approximation. Many of the equations that describe the atmosphere are impossible (with current methods) to solve, or solving them requires so much computing power that it would take longer to create a forecast for next Tuesday than it would take to just wait until next Tuesday and see what happens! So, whether guided by complex and elegant scientific principles or not, forecasting often boils down to educated guesses based on imperfect information, tempered by years of experience.

The data resolution side of forecast confidence is actually a bigger problem than the computing error. With perfect math and perfect computer precision, we still couldn't produce perfect forecasts. That's because forecasting relies heavily on knowing what the atmosphere is like now, so we can extrapolate what it will be like later. But, as it turns out, we have a really hard time understanding what the atmosphere is like right now. Using satellites, radar data, and observations, we can get a really good picture of what the atmosphere looks like at a large scale. Think cyclones, high pressure systems, and organized bands of thunderstorms. But at smaller scales, picking up those details can be difficult or virtually impossible. Next time you have the fireplace roaring, step outside and watch the plume of smoke drifting out of your chimney. It won't be constant. It will billow out erratically, meandering first this way, then that. Maybe a stray breeze will spread the plume out for a moment or two. Such fine detail, collectively referred to in meteorology as the "microscale," can't be picked up by any of our current observation networks, and the gaps have to be filled in with "best guess" data that we hope is close to real conditions. These small features make a difference, though, and our inability to "see" them makes that a problem.

All these things join together to determine what we call atmospheric predictability. In his 1963 paper Deterministic nonperiodic flow - fantastic reading, by the way, if you're ever really having trouble sleeping - Edward Lorenz determined that in systems like the atmosphere, very small initial differences can mean huge differences in what happens down the road, in an hour, a day, a week, and so on. It's only a slight exaggeration to say that the direction of the breeze carrying smoke from your chimney could mean the difference between a rain shower over you this afternoon versus a rain shower the next county over and sun for you.

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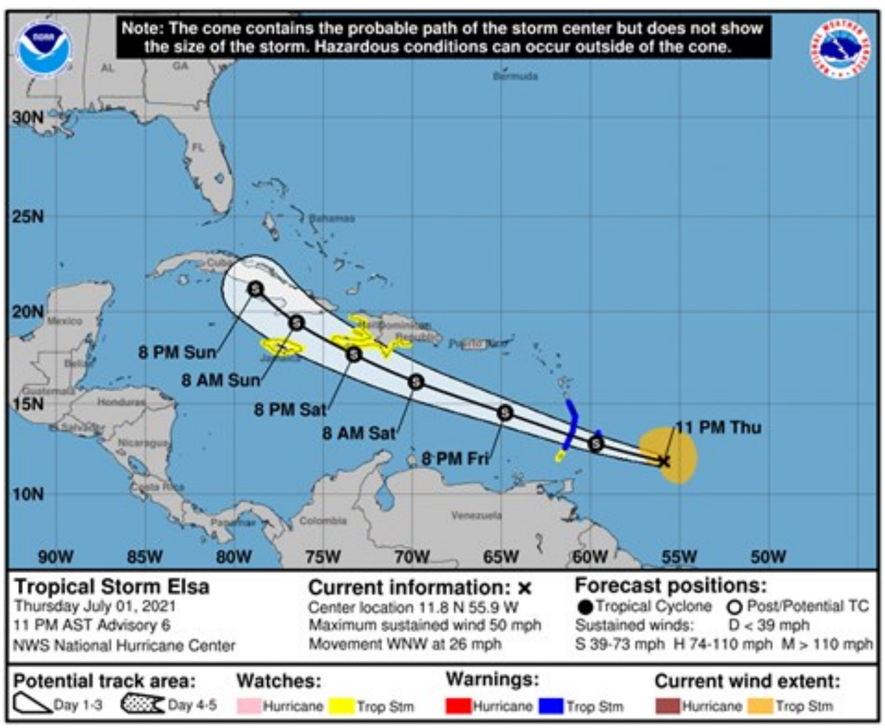
So, while it's not quite true that meteorologists are guessing, it's definitely true that we make certain assumptions about the atmosphere that are sometimes wrong. Is there anything we can do to mitigate this potential for failure? Believe it or not, I haven't written this article just to harp on the hardships we face as forecasters. There are indeed ways to minimize the uncertainty that comes from not knowing about the small-scale details of the atmosphere, and one of those is called ensemble forecasting.

A simple weather model - perhaps you've heard about the "GFS" or the "Euro" on the news - makes a single guess at the initial state of the atmosphere. As described above, it fills in the gaps in between our weather observations with reasonable guesses, and then runs its forecast from there. But what if we guessed something slightly different to fill in the gaps? Would it change the outcome of the forecast? Edward Lorenz's research says maybe. What if we tried a third guess? Or a fourth? Well, we'd get four different predictions for the forecast, and we could look at all of them as possible correct answers. In fact, we could try as many first guesses as we wanted, and get that many possible solutions to the forecast. This is the basic process for creating a forecast ensemble, which essentially amounts to a set of multiple model solutions to a single forecast setup.

What does this accomplish? Well, we may still be unsure of which first guess is actually correct, but by looking at the solutions in tandem we can gain some insight into the atmosphere. If, for example, we try 30 different first guesses and 29 of them all end with the same result, then we can express high confidence on actually getting that result. We've essentially determined that it doesn't really matter what the initial conditions are, because in all likelihood they're going to result in the same forecast no matter what we do. If, however, all 30 of our forecasts end up completely different, then we have low confidence in our forecast. No matter what forecast we wind up choosing, we know that there are a lot of other possibilities. This is the fundamental thinking behind forecast confidence, and it opens the door for us to communicate how "good" we feel about our forecast. Instead of saying "It's going to rain heavily this afternoon and cause flash flooding," forecasters can now say "We are almost certain it's going to rain this afternoon. We are about 50% sure it will rain enough to cause localized flash flooding. We have very low confidence on where the most-affected location will be."

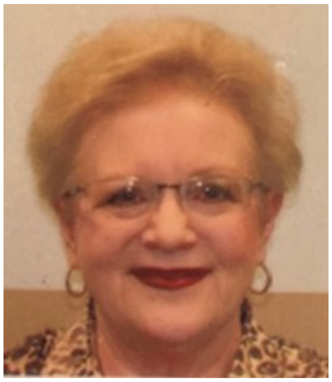
There are all kinds of statistics we can calculate once we have a group of possible solutions. We can calculate the average to grab a middle-ground picture of what all the different solutions are picturing. We can compare how different the solutions are to tell us how likely the forecast is to fail. We can create probabilities for certain thresholds (say, what's the probability that more than an inch of rain will fall? How likely is it that we'll see enough instability for severe thunderstorms?). We can also compare many of these statistics to historical data to put them in context, which helps us understand how similar setups evolved in the past.

Ensemble forecasting becomes a bigger part of the forecasting process every day. Many outlets for weather information use the information that ensembles provide. The confidence information available from these new techniques allow for more precise communication to scientists and non-scientists alike, and is slowly but surely transforming the way meteorologists message weather hazards and impacts. From the cone of uncertainty graphics used to predict hurricane location (like the one on the right!) to the best- and worst-case scenarios generated for winter storms, ensembles are paving the way for new and better forecasting while laying the groundwork for new and better forecasting techniques in the coming decade!



Mike Rehnberg, Meteorologist

New GSP Employees



Betty Swanson is our new Administrative Support Assistant (ASA) and she started in March of 2021.

Betty is a native of the Mississippi Gulf Coast, where she was introduced to weather by her earliest memories of Hurricane Betsy, which started the long list of hurricanes that she weathered, Fredric, Elena, Georges, Katrina, and Camille, just to name a few. Many hours were spent in front of the TV watching the late great Nash Roberts out of New Orleans, Louisiana, using his legendary whiteboard to show the coordinates of the latest storm. Nash was a legend and is profiled on Wikipedia.

In between hurricanes and tropical storms, Betty earned a BS/BA in Accounting from the University of Southern Mississippi (USM), and was working on her Master's Degree from William Carey University when Hurricane Katrina leveled the Gulfport campus, which overlooked the Gulf of Mexico.

Upon graduation from USM, Betty went to work for Mine Warfare with the Naval Oceanographic Office at Stennis Space Center, Mississippi, where late one afternoon, Betty found herself surrounded by Admirals and Captains who were dictating to her information for a classified Naval Message for some unnamed urgent correspondence to one of the naval ships at sea. It was not until a few days later that the nature of the message was disclosed. The urgent message contained the tides and currents needed for the invasion of Grenada where Navy SEALs and the Naval aircraft carrier, USS Independence, launched Operation Urgent Fury.

Betty continued her Federal career as a Budget Analyst with the Department of Agriculture (USDA), a Program Analyst with the Naval Meteorology and Oceanography Command (Meteorology is included in the current name), the Veterans Administration, and finally the National Weather Service, with a few positions within the civilian workforce along the way. While at USDA, Betty, who developed the budget for Area III (Mississippi, Alabama, Tennessee, Kentucky, and the Port of Mobile (Alabama)), was the Budget Analyst of the only office in the entire Southeastern United States, including Miami and Puerto Rico, which was financially running in the black. Those funds were quickly redirected to the states of South Carolina for Boll Weevil and Florida for the Medfly and Citrus Canker outbreaks.

At the Naval Oceanographic Office, Betty met her late husband Rick, who started as a Co-op Student and worked his way up to Director of Ocean Analysis Division where he was presented both the Navy Superior Civilian Service Award and the Navy Meritorious Civilian Service Award before the age of 45. Betty is the mother to Trey (Richard III) and Camille Grace and a grandmother to Richard IV. Camille Grace was born during the 25-year remembrances on the Coast for Hurricane Camille, for which she is named.

Jason Morris is our new Electronics Technician (ET) and he started in April of 2022.

"I grew up in rural WV when coal mines were the booming business at the time. When I graduated high school, I didn't really want to work underground in the mines... so I decided to join the USAF as a radio maintainer. I spent 6 years maintaining radios and was offered a chance at a new job as an incentive to reenlist. I became an X-ray/CT/MRI technologist, went to college, and earned national credentials in X-ray, MRI, and MRI Safety. I retired from the USAF in 2019 with just over 21 years of service and went to work for the VA.

After a couple years managing radiology clinics for the VA and being a first-line supervisor, I decided it was time to change things up a little and tossed my name into the sorting hat for an Electronics Tech position.

My wife and I have three (11, 8, & 2) ornery, rotten little boys that are meaner than rattlesnakes, and two dogs that are just as spoiled as the kids. I'm an avid deer and turkey hunter, an amateur radio operator (KD2RKN) and a below average guitarist."

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Christiaan Patterson is our new General Forecaster and she started in June of 2022.

From a young age, Christiaan Patterson knew she wanted to be a meteorologist. However, her road to GSP took many detours and roundabouts, which included chasing her passion for severe weather through Oklahoma. Christiaan set off on her journey serving in the U.S. Navy as a Sonar Technician. Once she transferred back into civilian life, Christiaan returned to school and completed a B.A. in Journalism from California State University Northridge. With her new degree and dream of still pursuing meteorology, she ventured to Oklahoma, where she worked as a news reporter, serving the cities of SW Oklahoma City and Moore. During this time, Christiaan experienced a major career event: covering the EF5 tornado that destroyed the City of Moore and SW Oklahoma City on May 20, 2013. This experience refueled her ambition to study the weather and led her to the University of Oklahoma to pursue a second bachelor's degree, this time in meteorology. While attending OU, Christiaan used her communication skills and worked as a Science Translator for the South Central Climate Adaptation Science Center. Christiaan also pursued many academic opportunities including the Research Experience for Undergraduates (REU) in Fort Collins, CO, where she worked with a team studying the effects of topography on MCSs in Argentina, South America. Furthering her passion for weather, she joined the TORUS (Targeted Observation by Radars and UAS of Supercells) field campaign for the 2019 season. Here she worked with a team during the spring months collecting critical data of the environment surrounding tornado producing supercells. Now at GSP, Christiaan continues to expand her experience as she pursues a Masters of Science in Emergency Management.

Thomas Winesett is our new General Forecaster and he started in December of 2022.

"My name is Thomas Winesett and I'm from Hickory, NC. I've been enthralled by weather ever since a young age and always enjoyed watching summer thunderstorms and winter weather. I got my Bachelor's degree in Atmospheric Science from UNC Asheville in May of 2013 and went on to get my Master's in Meteorology at UNC Charlotte in May of 2015. I started my career in the National Weather Service at the forecast office in Jackson, Mississippi where I worked for the last 6.5 years. I'm very excited to be returning back home to the Carolinas and the Greenville-Spartanburg forecast office! In my spare time you can find me outdoors, especially hiking and backpacking in the Appalachian Mountains."

New NWS Director – Ken Graham

Kenneth Graham is NOAA's assistant administrator of weather services and the 17th director of NOAA's National Weather Service.

Kenneth Graham was selected as the NOAA assistant administrator for weather services and the 17th director of the National Weather Service, effective June 7, 2022. Since April 2018, Graham has served as the director of the National Hurricane Center, leading the nation through numerous hurricanes, including 30 named storms during the record-breaking 2020 hurricane season. His tireless energy to build effective partnerships at all levels of government and his close work with emergency managers underpin the nation's preparedness ahead of hazardous weather. Graham has a vast amount of operational field experience. He worked his way up through the ranks at NWS, mostly in field offices, starting out as an intern meteorologist in 1994 at the New Orleans/Baton Rouge weather forecast office. Before joining the National Hurricane Center, Graham served as the meteorologist-in-charge of the NWS' New Orleans/Baton Rouge office for 10 years. He notably established two command centers in the wake of the Deepwater Horizon oil spill in 2010 that provided forecasts to help authorities make critical decisions in the five months following the spill. Graham also led the effort to support decision makers in Louisiana and Mississippi with services focused on expected impacts for hurricanes Gustav, Ike, Isaac, and during the historic 2017 season. Prior to leading the New Orleans/Baton Rouge forecast office, Graham served as the systems operations division chief at NWS' Southern Region headquarters in Fort Worth, Texas, where he led Hurricane Katrina recovery efforts. He also served as the meteorological service chief at NWS headquarters in Silver Spring, Maryland, and was the meteorologist-in-charge at the local forecast offices in Birmingham, Alabama, and Corpus Christi, Texas. Graham earned a bachelor's degree in atmospheric science from the University of Arizona and a master's degree in geoscience from Mississippi State University. He was recently named the 2022 Weatherperson of the Year by the Federal Alliance for Safe Homes and was a 2021 finalist for the Partnership for Public Service's Samuel J. Heyman Service to America Medal. Graham is a member of the American Meteorological Society, the National Weather Association and the International Association of Emergency Managers.

Susan Buchanan , Supervisory Public Affairs Specialist

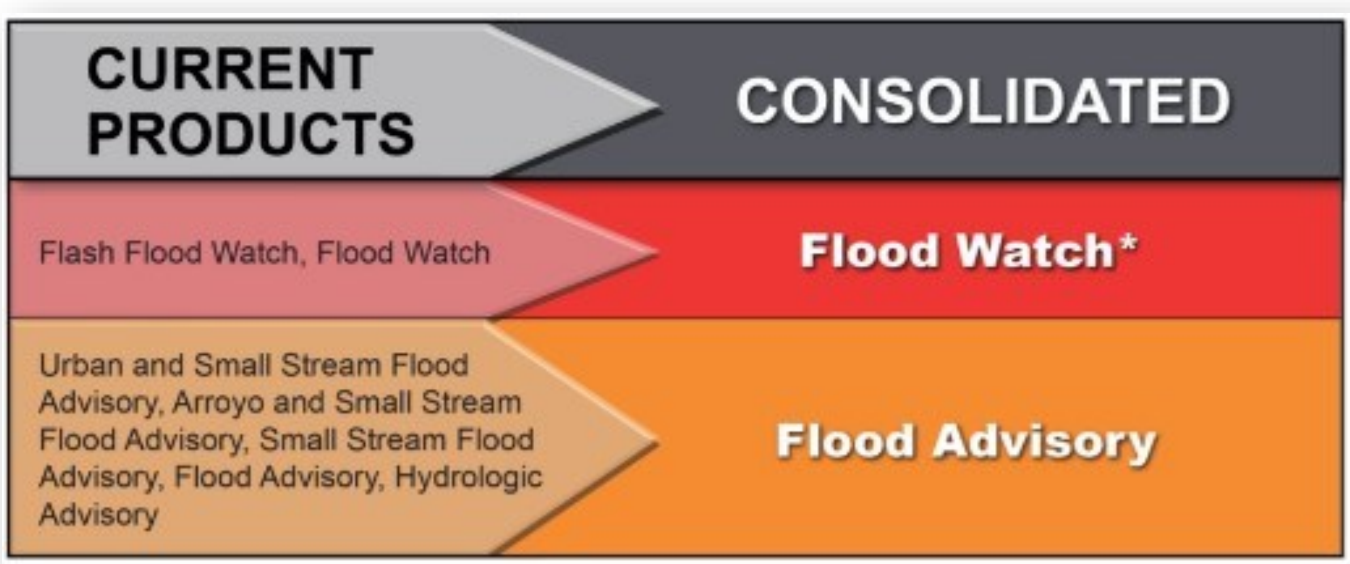
Hazard Simplification - Flood Watches and Advisories

In the fall of 2021, the NWS made changes to our Hydrology suite of products as part of the national Hazard Simplification process. First, we'd like to review the idea of "Hazard Simplification" in general - bottom line, we recognize that we issue a lot of different products. Hazard Simplification consists of two phases: "repair" and "revamp". The "repair" phase is what we've been going through - to consolidate products by reducing the number of products that we issue and reformat them into more readable (bulleted) products. The "revamp" phase will be the next phase, in that we will explore an entirely new system for some of our headlines.

Now for the Hydrology products. Did you know that before we "simplified" our Flood Advisories, NWS offices had five different types of flood advisories we could issue? Now, instead of issuing one of the five different **types**, we just issue one Flood Advisory, and within the product, we describe the details of the event. Urban and Small Stream Flood Advisory, Small Stream Flood Advisory, Flood Advisory, Hydrologic Advisory will be consolidated to **Flood Advisory**.

For the Watches, we used to issue both Flood Watches and Flash Flood Watches. We have now consolidated those into just **Flood Watches**, and again within the product, we will describe the conditions expected (that is, do we expect flooding or flash flooding). The exception where we can still issue a **Flash Flood Watch** is in the case of a dam break/levee failure or heavy rainfall over a known burn scar in a debris-flow or landslide-prone area, both of which would be exceedingly rare.

More information about the hazard simplification process can be found at https://www.weather.gov/hazardsimplification/. Stay tuned for future Wedge Front editions to learn more about the "revamp" phase!



Trisha Palmer, WCM

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