

THE COASTAL BREEZE



Brownsville/Río Grande Valley

WINTER 2021

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WELCOME BACK!

We hope you all had a very happy holiday season! We have a lot in store for in this issue. We say goodbye to two long time Meteorologists of the Brownsville/Río Grande Valley office, find out a little more about us and what types of weather we like, reflect on Skywarn Recognition Day with Meteorologist Brian Miller, learn about sea turtle stunning with Meteorologist Rick Hallman, Warning Coordination Meteorologist Barry Goldsmith will educate us on road brining, solve the mystery of why the sky is blue with Meteorologist Amber McGinnis and check in with our Meteorologist-In-Charge Mike Buchanan. Enjoy!

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MIC MINUTE

By Mike Buchanan



While it is generally warm throughout most of the year across across the Rio Grande Valley and Deep South Texas, we can occasionally experience sub-freezing temperatures mainly between the months of December and February. Sub-freezing temperatures, especially for a prolonged period, can significantly impact sensitive plants, exposed water pipes, and agriculture such as citrus and sugar cane. Some of the most significant Arctic outbreaks have occurred in February 1899, February 1951, January 1962, December 1983, and December 1989. Several of these Arctic outbreaks still stand to this day as some of the coldest temperatures (in the teens) ever experienced in Deep South Texas.

Rarer still is wintry precipitation (snow, sleet, freezing rain, freezing drizzle) that can affect the region. Wintry precipitation is often accompanied by Arctic outbreaks. Often, it can be several years or longer between such events. Most of the time, these events produce only trace amounts of snow or a very thin coating of ice. However, significant snow and ice accumulations have occurred in the Rio Grande Valley and Deep South Texas with several winter storms. The last significant snowfall occurred on December 7-8, 2017 where up to one-half foot of snow fell across Brooks and Jim Hogg counties. This was the earliest known date that measurable snow was observed across South Texas. The region's only known White Christmas occurred in 2004 and a significant ice storm with up to 1" of ice occurred on Feb 3-4, 2011.

So, while these events are rare, they can happen again. If you live here long enough, don't be surprised if you experience a taste of a "northern" winter, albeit for a very brief time.



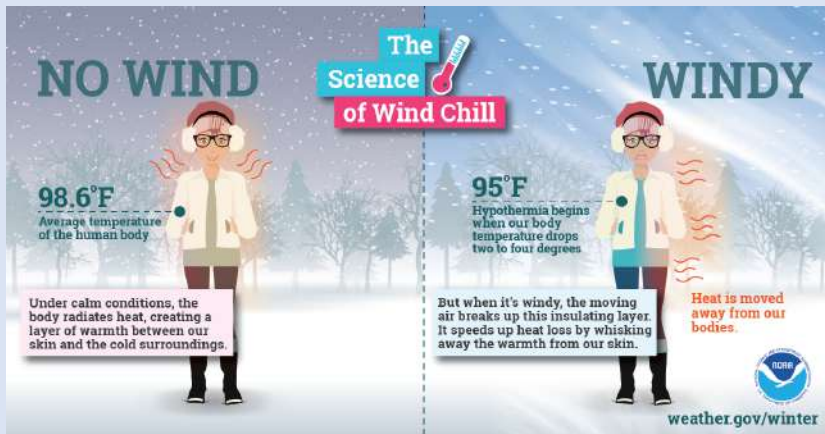
Photo from after the historic snow of December 8, 2017.

COLD WEATHER SAFETY

MAKE SURE YOU ARE PREPARED FOR COLD TEMPERATURES BY DRESSING IN LAYERS



WIND CAN MAKE IT SEEM COLDER THAN IT IS



DON'T FORGET YOUR FURRY FRIENDS, COLD CAN AFFECT THEM TOO!



SEA TURTLE STUNNING

By Rick Hallman

As we head further into the winter season, and water temperatures along the lower Texas coast cool, we'd like to remind everyone to watch for our local sea turtles in the days following any strong cold fronts. When the water temperature drops to below 50-55°F, especially when it drops quickly within 24-36 hours, sea turtles can become "cold-stunned" and float to the surface as they are unable to dive or swim. This makes them unable to avoid watercraft, or wash up onshore and become stranded, mainly along the shores of the Laguna Madre as many turtles feed in these shallow waters making them susceptible to cold stunning.



This is a cold-stunned turtle that you may find in the shoreline around the Laguna Madre.
Photo credit: Padre Island National Seashore.



Cold-stunned sea turtles being transported to Sea Turtle, Inc for rehabilitation. Photo credit: Sea Turtle, Inc.

Sea Turtles are cold-blooded and become lethargic or nearly paralyzed from the hypothermic shock of the cold water during these events. Luckily, Sea Turtle Inc. on South Padre Island can rescue and rehabilitate these turtles, if found in time, and release them when waters are warmer. In early January 2017, nearly 200 cold-stunned sea turtles were rescued after a strong cold front quickly dropped water temperatures across the Laguna Madre from 69°F on Friday, January 6th to 53°F by Sunday, January 8th. Sea Turtle Inc. has a dedicated line for stranded turtles and emergencies at 956-243-4361. During office hours, you can also reach them at 956-761-4511.



Cold-stunned sea turtles being rehabilitated at Sea Turtle, Inc. Photo credit: James B. Lowenstein



Cold-stunned sea turtles being released after rehabilitation. Photo credit: Sea Turtle, Inc.

THE DELICATE DILEMMA OF DE-ICING

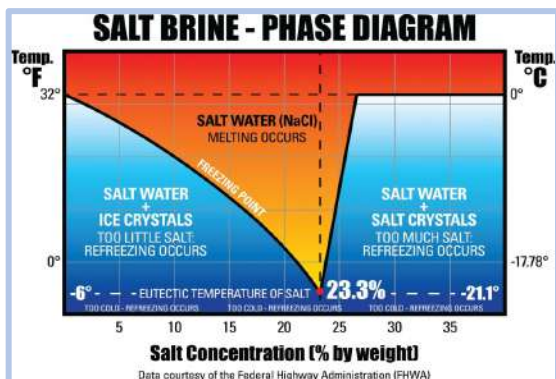
By Barry Goldsmith

In May 2013, the Federal Highway Administration approved the designation as Interstate Highways for several main arteries crossing the populated Lower Rio Grande Valley. Newly anointed Interstate Highway (IH) 2 covered 47 miles from Mission to Harlingen; IH 69C ran 18 miles from Pharr to north of Edinburg, and IH 69E extended for 53 miles from Brownsville to Raymondville. Formerly US 83 (IH-2), US 281 (IH-69C), US 77/83 (IH-69E from Brownsville to Harlingen) and US 77 (IH-69E from Harlingen to Raymondville), these new Interstate Highways were required to be cleared of accumulated wintry precipitation when such a situation occurred. This was not the case prior to the IH designation; during the [Early February 2011 Rio Grande Valley Ice Storm](#), dozens of miles of elevated highway were closed to traffic.

How does the Texas Department of Transportation (TXDoT) work to keep these Interstate Highways open today? Since the Rio Grande Valley region rarely observes accumulating wintry precipitation, there are no area-wide removal systems, or particle treatment systems (such as coal ash or halite rock salt) to do the job. Instead, a system of liquid brining is used to pre-treat Interstate Highways, most frequently for elevated portions and bridges.

How It Works: [Brining](#) is a simply a solution of salt (sodium chloride) in water. TXDoT uses brine as an *anti-icing* agent most frequently, to prevent ice, sleet, or snow from bonding to pavement. Brine may also be used as a *de-icing* agent (i.e., during an event). When NWS Brownsville/Rio Grande Valley forecasts temperatures at or below freezing, brining operations may begin. When precipitation is forecast at the same time, brining operations go into full effect. A layer of brine is applied to the road surface hours before the first precipitation falls, which effectively warms the surface above freezing and causes frozen precipitation to melt soon after impact and keeps rain from freezing on impact.

Balance is the Key: Successful brining is not as simple as adding sodium chloride to water to automatically raise the effective freezing temperature. The lowest temperature on the salt-brine phase diagram (below) occurs at the eutectic point, known as the [eutectic temperature](#).



Hydrometer / Salometer Chart for Salt Brine (59°F)			
%Salt	Salometer Using 0 - 100%	Hydrometer Specific Gravity	Eutectic Temperature
0	0	1	32
1	4	1.007	31
2	7	1.014	30
3	11	1.021	29
4	15	1.028	27
5	19	1.036	26
6	22	1.043	25
7	26	1.051	24
8	30	1.059	23
9	33	1.067	21
10	37	1.074	20
11	41	1.082	19
12	44	1.089	17
13	48	1.097	16
14	52	1.104	13
15	56	1.112	12
16	59	1.119	9
17	63	1.127	7
18	67	1.135	4
19	70	1.143	2
20	74	1.152	0
21	78	1.159	-2
22	81	1.168	-4
23	85	1.176	-6
24	89	1.184	-8
25	93	1.193	-10
26	96	1.201	-10
27	100	1.201	-32

THE DELICATE DILEMMA OF DE-ICING CON'T

The key to a successful melting brine is based on knowing the value of the eutectic temperature and the percentage of salt (by weight) necessary to maintain melting. For a sodium chloride brine, the eutectic temperature is -6°F (-21.1°C) at a 23.3 percent concentration. For lower sodium chloride concentrations, the brine will refreeze at exponentially warming eutectic temperatures until the value reaches the freezing point ($32^{\circ}\text{F}/0^{\circ}\text{C}$). For higher sodium chloride concentrations, however, the brine will *also* refreeze at *sharply linear* warming eutectic temperatures until the value reaches the freezing point. The table beside the phase diagram shows how just a slight increase in sodium chloride concentration above 23.3 percent can lead to refreezing (4 percent increase), while refreezing occurs much more gradually at lower concentrations.

A Case Study in Balance: January 2018:

A strong cold front swept across the Rio Grande Valley January 16, 2018. The strongest, and coldest, surface high pressure of the winter sent temperatures tumbling from the 60s into the 30s after noon across the Valley. Drainage of modified arctic air combined with weak overrunning and a touch of atmospheric lift produced mixed light snow and sleet from Rio Grande City to McAllen, while temperatures were still above freezing. As the afternoon faded to twilight, subfreezing temperatures arrived from Weslaco to north Brownsville, bottoming out between 28 and 30°F during the evening commute. Despite pre-event brining of elevated sections of IH-2 and IH-69E, the drizzle froze on these road surfaces—contributing to more than two dozen accidents and eventually closure of several sections of the highway, including the busy junction of IH-2 and IH-69E in Harlingen. A review of the event can be found [here](#).

So...what happened? On transport between the brining facility and the pre-event application of the brine solution, the sodium chloride solution percentage increased to or above 27 percent, and the eutectic temperature rose above the ambient temperature of the elevated road surfaces, whose temperatures were estimated to be around 30°F at the time of impact.


Brining has proved to be a cost-effective method for treating Texas highways, especially those in the Rio Grande Valley where wintry precipitation events are rare but of high impact. In most cases, the sodium chloride concentration is calibrated for successful anti-icing of elevated highways. January 16th, 2018, showed just how critical that balance is to success...and how just a slight increase in concentration can dramatically change the intended outcome from a relatively safe drive on wet roads to a potentially life-threatening trip on icy roads.

OUR FAVORITE WEATHER PHENOMENON

Thunderstorms, because that's what got me into meteorology. I used to run outside and stand on the back porch watching them and my parents would always fuss at me to go back inside.

~TIM SPEECE, LEAD METEOROLOGIST



 Tornadoes are my favorite weather phenomenon. Growing up in the Great Plains they were common, and I was always fascinated with their power, yet I have never seen one! Hurricanes may give them a run for their money though, especially after this past season!

~AMBER MCGINNIS, METEOROLOGIST.

Thunderstorms. When I was growing up in Houston, I was always fascinated in the development of thunderstorms. I would keep a journal of thunderstorms noting when different aspects of the thunderstorm would occur. It was one of the reasons I was fascinated with weather besides tracking hurricanes during the summer.

~MIKE CASTILLO, LEAD METEOROLOGIST



My favorite has always been snow. Like many children growing up in the DC metro region, I often stayed awake for much of the night awaiting accumulations to begin during Winter Storm Warnings, with the hope that the following morning would dawn with no school and all day to go sledding! As I grew up, I became interested in the *why* of snow.

~BARRY GOLDSMITH, WARNING COORDINATION METEOROLOGIST



OUR FAVORITE WEATHER PHENOMENON

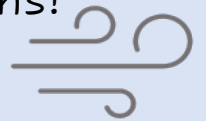
My favorite weather phenomenon by far, is severe weather. Tornadoes in particular are amazing to me because they form under such particular circumstances, are so violent, and so important to understand because they are so devastating. One struck near my hometown in Pennsylvania when I was little, and that spurred my career in Meteorology.

~BRIAN ADAMS,
METEOROLOGIST



My favorite weather phenomenon is and will always be severe thunderstorms-lightning, wind, rain, hail, and tornadoes! When I was growing up, against all safety guidelines, I was always glued to the windows or sitting in my open garage to watch storms roll through. Once, a few friends and I were watching a storm when lightning struck the maple tree 20 feet from where we were all sitting, blowing out most electrical sockets in the garage (as well as the washer, dryer, furnace, and tv!) in a series of sparks, pops, and booms!

~RICK HALLMAN,
METEOROLOGIST



Growing up in northern Illinois, I definitely experienced all four seasons, but I've always been a winter-weather geek. Maybe it was all those winter mornings spent listening to the radio to see if school would be cancelled by a snowstorm! I went on to study lake-effect snow in graduate school.

~JOSHUA SCHROEDER, SCIENCE AND OPERATIONS OFFICER



OUR FAVORITE WEATHER PHENOMENON



When I was a kid, it was most definitely New England nor'easters, especially blizzards. It was a chance to get off from school for a day (or more), go sledding, make snowballs, build snowmen/igloos, and shovel snow for my neighbors to earn a little bit of money. During the Blizzard of 1978, I had off from school for 2 weeks! For the past 2 decades, I would say my favorite weather phenomenon is sunny and hot weather. This allows me to do a variety of things which I enjoy such as fishing, camping, swimming, and walking on the beach.

~MIKE BUCHANAN, METEOROLOGIST IN CHARGE



I like Crepuscular rays.

~ GREGORY SAUNDERS,
ELECTRONICS TECHNICIAN

Cumulonimbus clouds are my favorite weather phenomenon. I like breathing the ozone (O₃) that lightning creates.

~PABLO GONZALEZ,
INFORMATION TECHNOLOGY
OFFICER



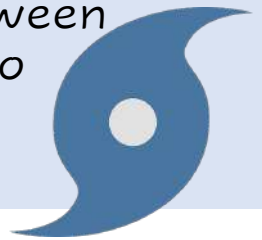
The first thing that came to mind was cumulus congestus clouds, that turn into towering cumulus. I love just watching them form...they literally look like an explosion in super slow motion. I have good memories heading out the field behind my neighborhood growing up to just watch them form on a summer afternoon, and at the park near my house in college. I even had a fleeting desire to become a cloud physicist at one point because I love all clouds, but I figured they pretty much did research all the time and I'm not a fan...forecasting and doing what I can to protect lives and property is much more up my alley.

~LAURA FARRIS, METEOROLOGIST

FAVORITE WEATHER PHENOMENON

My favorite weather phenomenon is hurricanes. I got interested in weather when I was a kid living in south Louisiana but tracking hurricanes were my favorite. The storm that stood out to me growing up was Hurricane Juan in October 1985 "The Halloween Hurricane". The hurricane quickly developed over the central Gulf of Mexico and headed north. What was so amazing was the erratic path and as a child it was difficult to track. Juan made two loops and caused plenty of flooding. I remember that most of my friends were disappointed that Halloween was cancelled but was I excited that I was able to experience this unique storm.

~KIRK CACERES, METEOROLOGIST



My favorite weather phenomenon is severe weather (surprise, surprise). I fell in love with it while in college. Never really experienced severe weather quite like that before moving to and living in Oklahoma.

~BRIAN MEJIA, METEOROLOGIST



My favorite weather phenomena is the Low-Level Jet (LLJ). It might not be as exciting as severe thunderstorms, tornadoes or hurricanes but it is one of the main atmospheric drivers that initiate several weather elements and phenomena. South Texas and the Rio Grande Valley are one of the prime locations for North America's LLJ with most of our windy days, especially in the Spring and Winter, deriving from this feature. Other main weather features forming from the LLJ are Severe Thunderstorms, which can lead to Tornado outbreaks, Flash Flooding, and strong damaging winds events.

~GEOFF BOGORAD, LEAD METEOROLOGIST



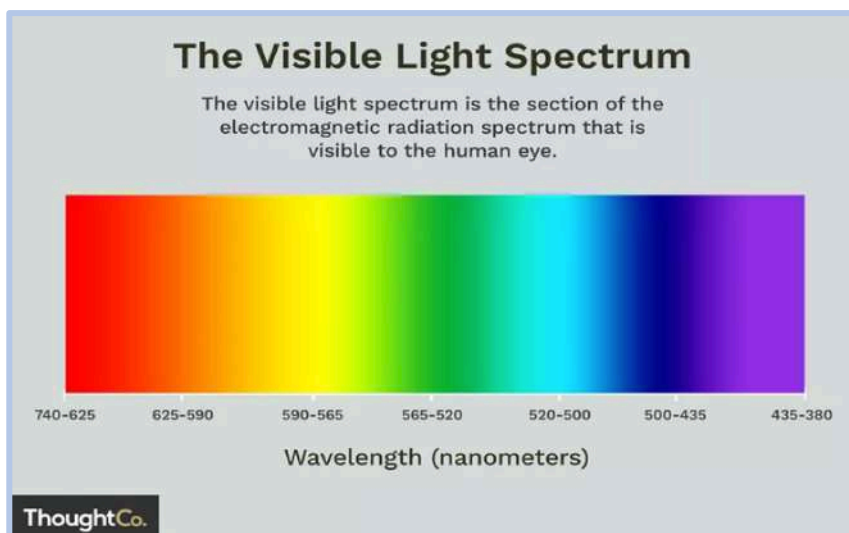
WHY IS THE SKY BLUE

By Amber McGinnis

Have you ever looked up on a clear day and wondered, why is the sky blue? Why not yellow, green or red? The simple answer is: Light scatters in wavelengths and shorter wavelengths scatter more easily. Shorter wavelengths have a blue hue; therefore, we see blue skies. Let's go into this a little more in depth.

We get our light from the Sun, which appears white and comes to us in the form of waves. These waves are vibrations of electric and magnetic fields and the colors that we see are distinguished by these wavelengths. While the light from the sun may appear white, it is a mixture of all colors. The colors on this electromagnetic spectrum humans can see are called The Visible Spectrum and ranges from about 740 nanometers (red) to 380 nanometers (violet). The human eye responds most strongly to red, green, and blue wavelengths. The smaller the wavelength, the easier the scattering and thus blues and violets are more easily scattered than red. Our atmosphere is made up of Nitrogen (78%), Oxygen (21%), other gasses and particles (1%). As light moves through the atmosphere the longer wavelength light passes straight through without getting scattered while shorter wavelength light is absorbed by these gas molecules and particles in our atmosphere. This light is then radiated in all different directions and scatters throughout the sky.

If violet scatters more easily than blue, why is the sky not violet? There are a few reasons for this. First, light emission from the sun is not constant at all wavelengths and it is also absorbed in the high atmosphere, so there is less violet in the light to start with. By the time it reaches farther into the atmosphere where we are more likely to see it, most of it has already been absorbed. Secondly, as mentioned above, the human eye is more sensitive red, green and blue wavelengths and since we are more sensitive to blue wavelengths than violet, we see blue.



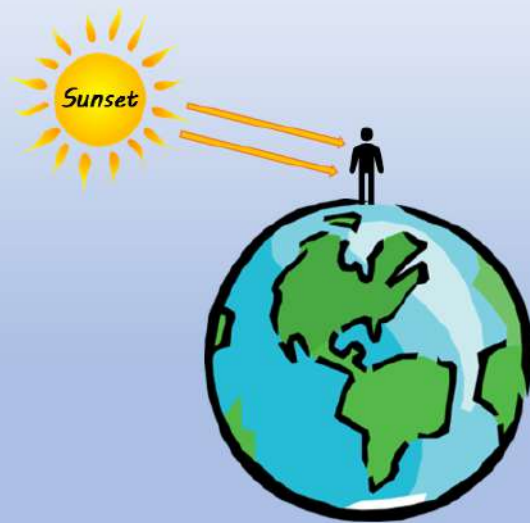
WHY IS THE SKY BLUE

Ok, so the sky is blue, but how does that explain red sunsets? When the sun is setting it is farther away from us and the wavelengths must travel farther. The blue wavelength light has been scattered away because it has passed through more gasses and particles that absorb it. This leaves yellow, red, and orange wavelength light to continue through the atmosphere. The more particles (including dust and pollutants) that are in the atmosphere the more wavelength light gets absorbed. If there are not many particles in the atmosphere, then the sunset appears more yellow to orange. If there are a larger number of particles the sunset appears more orange to red.

Now the next time you see a brilliant blue sky or a gorgeous red/orange sunset, you'll enjoy it more, knowing how it's made.



Light travels a short distance



Light travels a longer distance

Why the sky is blue and the sunset is red

SKYWARN(TM) Recognition Day 2020

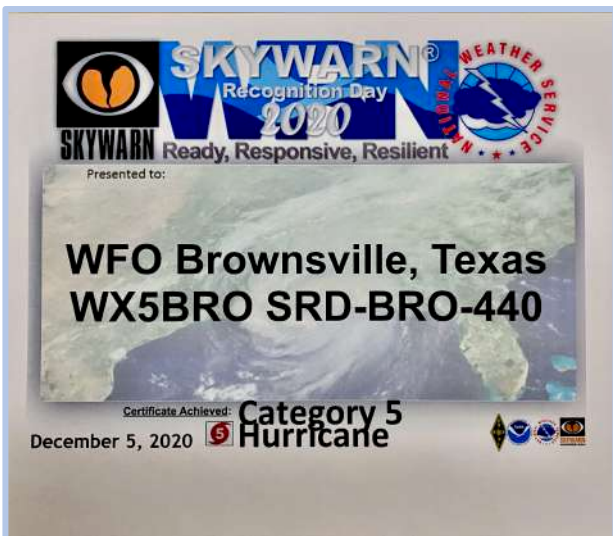
By Brian Miller



Lead Meteorologist Brian Miller shows off his Amateur Radio skills. Photo credit: Amber McGinnis

SKYWARN(TM) Recognition Day (SRD) 2020 was co-sponsored by the National Weather Service (NWS) and the Amateur Radio Relay League on December 4 and 5. SRD is a fun annual event that recognizes certified severe weather spotters' contributions to the NWS mission of saving lives and protecting property. Many spotters are also licensed amateur radio operators (Hams). During SRD, Hams work out of local NWS offices for 24 hours, making and recording as many contacts as possible. Besides just having fun on the air, NWS offices can earn recognition for the number of connections they make with other offices and other Hams.

Due to COVID-19, the Weather Forecast Office (WFO) Brownsville/Rio Grande Valley SRD 2020, call sign WX5BRO, ran a little differently. Hams operated as WX5BRO from their own radio shacks instead of from the Brownsville weather office. Despite the change in procedure, SRD 2020 was a huge success. WX5BRO Hams made at least 185 contacts covering 33 states, including Hawaii. Dr. David Woolweaver, K5RAV, one of the participants, said, "The enthusiastic participation by local amateur radio operators illustrates the level of support for SKYWARN(TM) Recognition Day and the Brownsville NWS." A couple of other Ham participants for 2020 included David Bridgewater (WB6TJB) and Rick Bono (NO5V). WFO Brownsville earned the highest certificate awarded, the CAT 5 Hurricane award.



Category 5 Hurricane Award

SAYING GOODBYE

Please join us in saying farewell to Meteorologists Matt Brady and Chris Birchfield, who left the Brownsville WFO this past fall, as we wish them all the best in their new roles!



Throughout my 4 years of service at the NWS Brownsville/Rio Grande Valley office, from late 2016 through late 2020, many memorable events had occurred across the Rio Grande Valley. My favorite public events were being part of the 2018 Hurricane Awareness Tour and the 2019 Weather Festival. For the 2018 Hurricane Awareness tour, the Hurricane Hunters, who fly into hurricanes, came to McAllen. During the 2019 Weather Festival, we had invited the public to learn about weather and public safety, we brought out local public safety vehicles and launched mock weather balloons. These events were very rewarding as it showed how important we are to the community.

There were several memorable weather events that occurred during my time in Deep South Texas and the Rio Grande Valley. One of the most memorable, was the rare snowfall event that occurred on December 8th, 2017, which was the first widespread snowfall event across Deep South Texas since the infamous 2004 Christmas snowfall, and marked only the 3rd time since 1899 that Brownsville had measurable snow accumulation. The 2020 Atlantic Hurricane Season, which included the Valley's first direct hit in twelve years (Hanna) and the devastation of Hurricane Laura, was very memorable. This season resulted in a very busy time in the office but was inspirational as it showcased why we are there to provide service to the residents of Deep South Texas with the mission to protect life and property.



Deep South Texas will always be a place I will remember forever for its beautiful and unique landscape and the hospitality of its residents. I have enjoyed going to South Padre Island for the beautiful sandy beaches and sunsets while also enjoying some wonderful meals at the local establishments. I enjoyed visiting the small peaceful towns across the northern

ranchlands, especially when talking to the residents who help volunteer in the NWS Cooperative Observer Program (COOP). Deep South Texas and the Rio Grande Valley will always remain in my heart and I would like to thank all who helped to shape it as a wonderful place to live during my 4 years of service to the community. ~ Matt Brady



SAYING GOODBYE

A memory that immediately comes to mind when I think back on my time at NWS Brownsville/Rio Grande Valley was my first week of training back in 2014. The former Data Acquisition Program Manager, who was in charge of training new meteorologists, was an avid nature enthusiast. As a form of initiation, he placed a live Texas tarantula on my desk in front of me and subsequently made me hold it right there in operations. Though I'm not a big fan of spiders, I appreciated him welcoming me to the Valley and even getting me into nature photography throughout my time there.

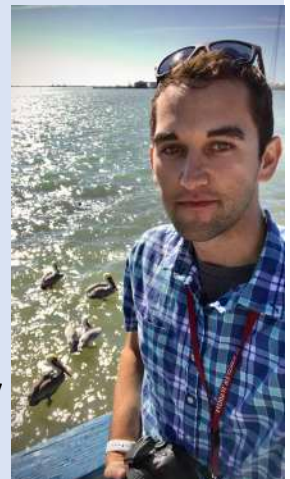


One of my proudest moments was leading our office's weather festival. This allowed us to directly engage with the community and teach the importance of flood preparedness in the wake of recent devastating flood events. The experience was very humbling, being able to entertain young children with science, and even wowing them with several live weather balloon releases. Seeing the joy on their faces brought back memories of when I learned I wanted to be a meteorologist. Just knowing that this outreach event may have sparked some interest in these children is one of the many reasons we all signed up for the job.



After over 6 years as a meteorologist in Brownsville, there is a lot that I will miss from the office. Most importantly, this includes the strong teamwork displayed during high-impact weather events. Our responsibility of issuing life-saving warnings to Deep South Texas has never gone unabated, as we continue to make critical decisions to protect life and property across our area of responsibility day after day.

Finally, 2020 was such a tough year in and out of the office. Despite a devastating global pandemic, NWS Brownsville/Rio Grande Valley triumphed through an unprecedented tropical season with a record number of named storms, many of which made landfall along the Gulf coast. We had the challenging task of not only working our own landfalling hurricane early in the season but backing up another forecast office during the catastrophic Category 4 Hurricane Laura. Though these events caused considerable stress and suffering to many communities, I'm proud of the work that we and many other forecast offices did to keep our citizens informed. ~ Chris Birchfield



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NWS Mission

Provide **weather**, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the **national** economy.



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