THE COASTAL BREEZE

Brownsville/Rio Grande Valley

WINTER 2021

IN THIS ISSUE

HAPPY HOLIDAYS!

We hope this past year was a great one for you. Here at the NWS Brownsville we have sure been busy. We started off the year with the infamous freeze and we will take a look back at that event in this issue. We will also have plenty of other articles to keep you entertained. We will introduce you to our new Upper Air System, take you with us to a training event, get an inside look at an amatuer radio drill, find out what our favorite holiday traditions are and bid farewell to our Pathways intern Michael Lavallee as well as meteorologist Brian Adams, plus much more!

WISHING YOU AND YOURS A VERY HAPPY HOLIDAY SEASON!

Find us on Social Media and the Web

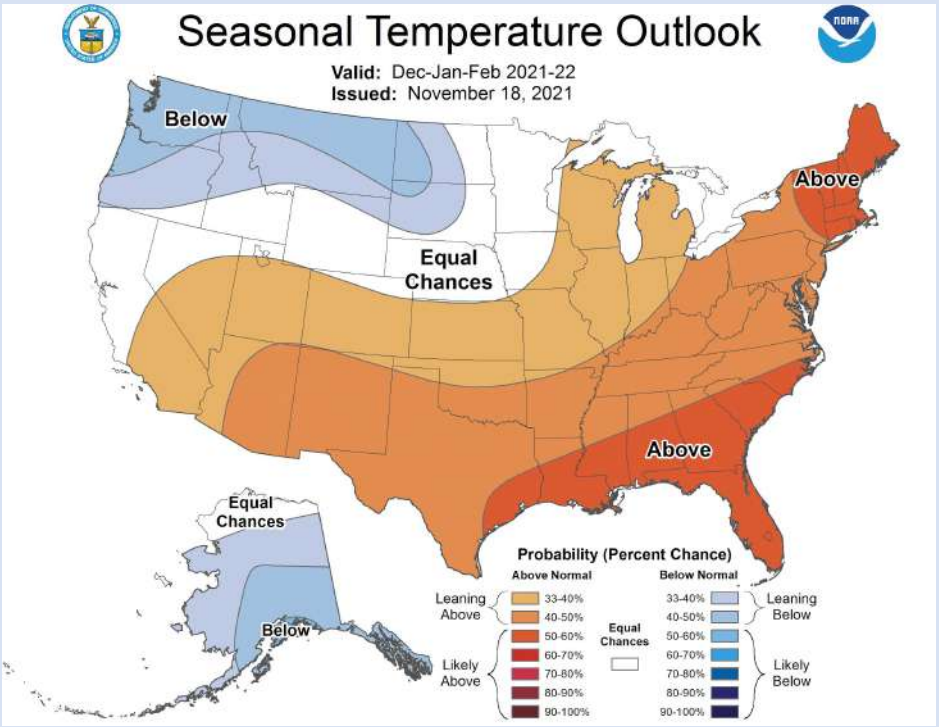
@NWSBrownsville

@NWSBrownsville

@NWSBrownsville

weather.gov/rgv

The one-year anniversary of the record-breaking Arctic Outbreak that occurred in February 2021 is fast approaching. As you may recall, widespread freezing temperatures were frequently observed between the evening of February 14, 2021 through the morning of February 20. This event caused prolonged power outages, millions of dollars in agricultural losses and infrastructure damage, thousands of fish and other wildlife killed, an almost total loss of most tropical vegetation, and many other significant impacts. The coldest temperatures (middle teens to lower 20s) occurred on the mornings of the 15th and 16th. The coldest observed temperature across Deep South Texas was 16 degrees at Falfurrias on the morning of the 15th. The February 2021 event is considered a hard freeze event which means observed temperatures of 27 degrees or lower occurred for 2 or more hours.



You may be wondering if Deep South Texas will experience another hard freeze event this winter. The simple answer is we do not know. The latest winter outlook (pictured) issued by the Climate Prediction Center is calling for warmer than normal temperatures but this does NOT mean that a freeze (32 degrees or less for 2 or more hours) or even a hard freeze will NOT occur this winter.

So, have there ever been back-to-back winters in which Deep South Texas has experienced a hard freeze? To answer that question, let's look at the Brownsville location which has temperature records dating back to 1878. Before we go further, we must make an assumption when looking at the historical temperature record. Since observations every hour weren't always taken in the past, we will assume that if a temperature of 27 degrees or lower was observed, then a hard freeze event did occur.

Since 1878, Brownsville has recorded a hard freeze event in consecutive winters 8 separate stretches of time. The longest such stretch was a 5-year period between 1883 and 1888 in which a hard freeze occurred during each consecutive winter. Other consecutive winters in which a hard freeze was observed in Brownsville were: 1879-1881, 1893-1895, 1899-1901, 1911-1912, 1917-1919, 1924-1925, and 1962-1963. Of note is that some of the coldest temperatures ever observed in our region occurred in 1899, 1911, and 1962. The all-time record low temperature of 12 degrees occurred in Brownsville on 2/13/1899. 1/4/1911 remains one of the coldest days in our history. On 1/4/1911, an all-time record low of 13 degrees in Zapata and the second coldest temperature of all time of 10 degrees in Falfurrias were observed. One of the coldest days ever occurred on 1/12/1962. 9 degrees, the coldest temperature ever observed in Deep South Texas since record keeping began, occurred on that day in Falfurrias. McAllen recorded their all-time record low of 13 degrees on 1/12/1962.

So, given the historical record and the uncertainty with long-term forecasting, another hard freeze event for the 2021/2022 Winter CANNOT be totally ruled out for our region. As always, for the latest forecast and warning information, please go to our homepage at weather.gov/bro.

SITE	RECORD LOW	DATE
Brownsville	*12*	*2/13/1899*
Harlingen	*14*	*1/12/1962*
McAllen	*13*	*1/12/1962*
Zapata	*13*	*1/4/1911*

THE SAD PLIGHT OF THE VALLEY'S MAJESTIC ROYAL PALMS

By Barry Goldsmith

The Rio Grande Valley's Killing Freeze of Mid February, 2021, was an unfortunate event for the region's $1 billion agricultural industry. At least $380 million in the Valley's citrus and other cold-sensitive crops was lost, though it was expected that these values would double as insurance claims continued to arrive through the rest of the year. Not included in the calculation was the near-complete loss of tropical ornamental plants. One such plant, the towering and majestic Cuban royal palm (*roystonea regia*), sustained such a loss over the months that followed the freeze. Thousands of Royal palms had been planted in the Valley, mostly in Cameron County but also in parts of Hidalgo County over the prior 31 years, as the population of both counties doubled in that time (US Census, 2020). During that time, hundreds of subdivisions sprouted up across the two-county area, and new residents may not have been aware of the impact the December 1989 Killing Freeze had on the Valley's tropical plant life. Royal palms are not only beautiful, their towering size can be both expensive as a plant and require more labor costs to remove when they die. Larger, established Royal palms have been valued in the thousands of dollars, and removal costs can run close to $1,000. It is likely that the damage and removal costs of the Valley's Royal palms following the freeze was over $10 million.

Above: Before…and after. Left: Royal palms just as the killing freeze was underway (February 15, 2021), with no discernable change. RIght: "Singed" Royal palm fronds on February 19, 2021, four days after the coldest temperatures occurred. Photo courtesy of Barry Goldsmith.

The Risk of Royal Palms in the Rio Grande Valley

Royal palms are a favorite of many due to their towering trunks, smooth green "crownshaft" above the trunk, and especially the expanse of the broad green fronds. Unfortunately, that beauty comes with a risk: cold weather. Historically, killing freezes sufficient to damage or destroy the Royal palm occurred roughly every fifteen years in the Valley, dating back to 1850. However, that value is highly variable; killing freezes between 1880 and 1900 occurred about every five years, while there were two 30+ year gaps in the 20th into the 21st century: 1911 to 1949, and 1990 to 2021. Prior to the mid-20th century, the availability of Royal palms was limited - and many residents may have been familiar with more frequent killing freezes that precluded taking the chance of planting, then losing, the trees.

At the close of the 20th Century through the first two decades of the 21st, new residents may have falsely assumed that the era of killing freezes was over, and that royal palms were worth the investment. While global warming may well increase the separation between Valley killing freezes, it will not remove the threat as a reasonable worst-case scenario - as February 2021 proved.

The lower Valley is the same latitude of Ft. Lauderdale. They have Royals Palms. Why can't we?

A Royal palm's cold hardiness is rated down to 28℉, while the Sabal Palm (*Sabal Palmetto)* which is native to wetlands along the Rio Grande, is rated down to 15℉. "Hardiness" implies a lack of protection for several hours at those temperatures or lower. In other words, a short-duration frost, even with temperatures in the mid 20s, will help insulate the plant from being killed - though fronds may be "singed" and would have to regrow. A prolonged breezy event that combines low temperatures with lower dew point temperatures, as was observed in mid February 2021, will kill the plant.

The biggest difference between South Florida and the Rio Grande Valley? **Geography.** South Florida is a true peninsula, with year-round warm waters from the Florida Straits to the Atlantic coast between the state and the Bahamas. The strength of the Gulf Stream along the south Florida coast, extending from the west coast near Naples around the straits and exiting the east coast just north of Palm Beach moderates cold air that moves into the state farther north.

The Rio Grande Valley, on the other hand, is ***not*** a peninsula, and the much weaker Gulf stream flow is situated about 60 to 100 miles east of the coast. Geographically, the lack of a water source west of the Valley, combined with our proximity to arctic air surges that originate in northwest Canada and occasionally slam south like a freight train along the east slopes of the Rockies, through Texas, and deep into northeast Mexico east of the Sierra Madre Oriental, opens the door for occasional killing freezes.

The following segments, from the USDA's Plant Hardiness Zone Map, show the critical difference.

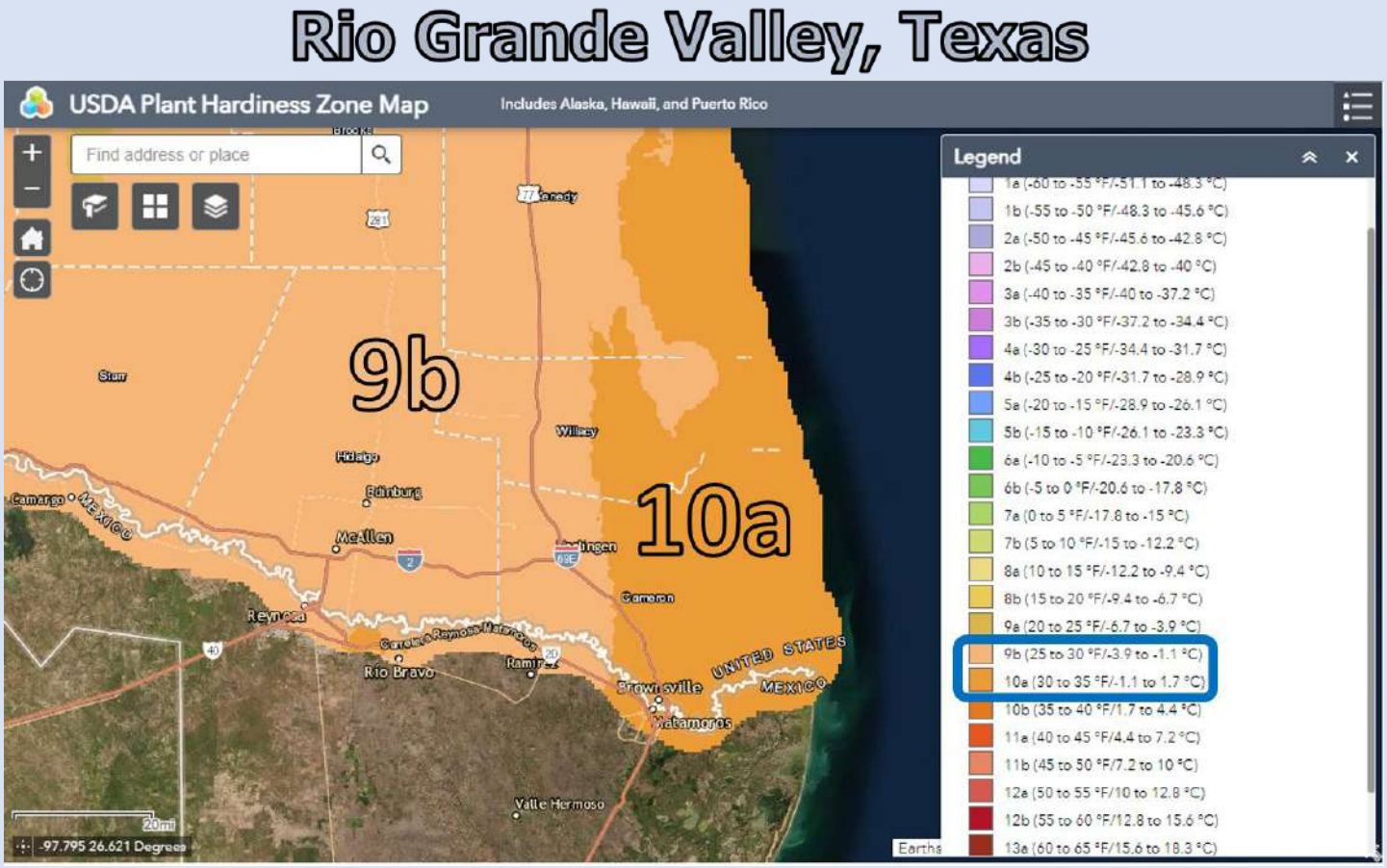


Figure 1. Plant hardiness zones for the Rio Grande Valley.

Zones 9b and 10a, where most of the Valley's Royal palms were lost from the February 2021 Freeze, have a combined hardiness temperature of 25 to 35℉, just on the edge of survivability for the Royal Palm. The probability of a prolonged 28℉ event is low, but ***not near zero.*** This has borne out by the killing freezes of the 19th and 20th century, as well as February 2021.

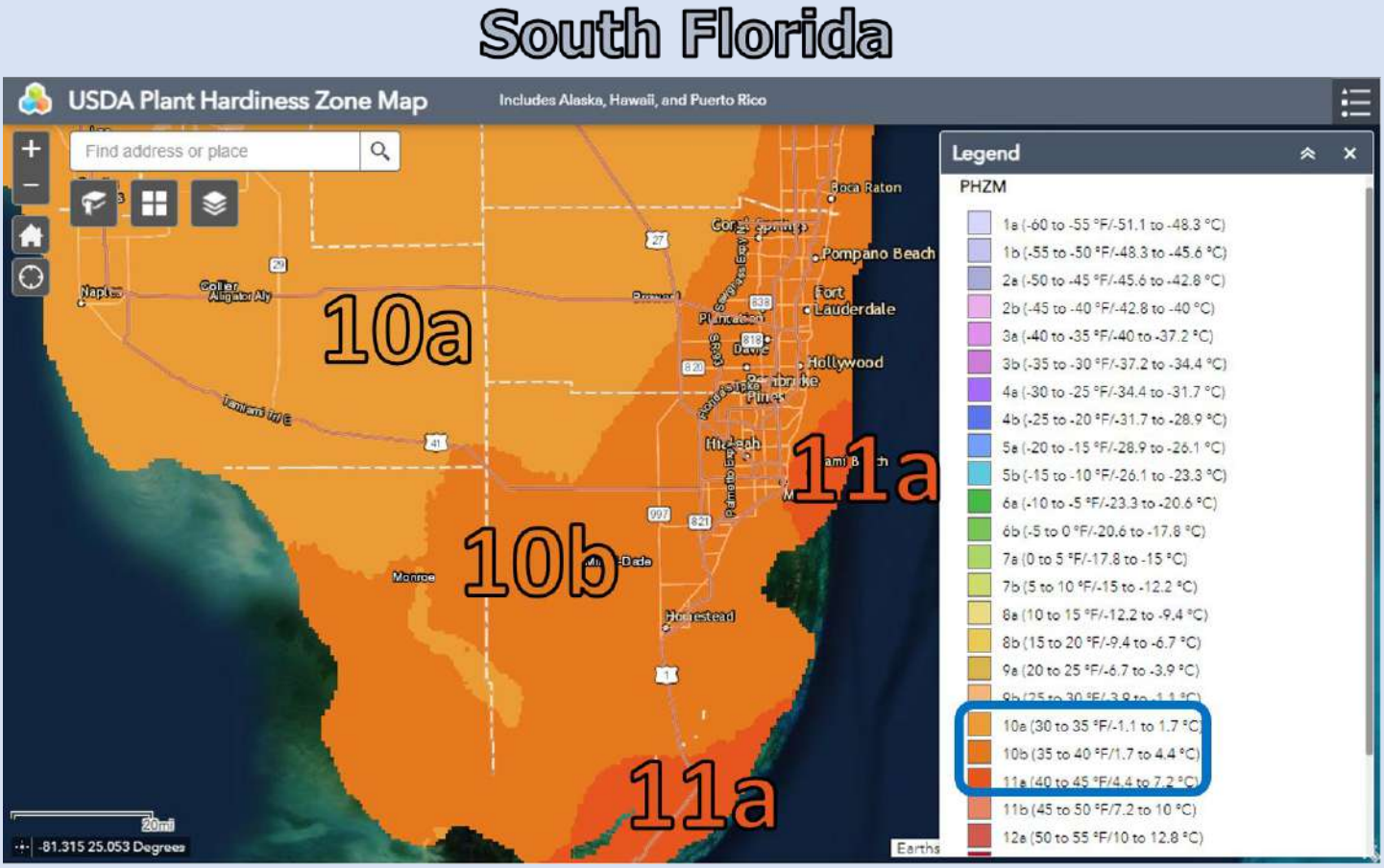


Figure 2. Plant hardiness zones for south Florida, along and just a touch south of the latitude of the Rio Grande Valley.

The higher average minimum temperatures for zones 10b (35 to 40℉), which includes Ft. Lauderdale and West Palm Beach, and 11a (40 to 45℉), which includes Miami and the Keys, affords Royal Palms a better chance for long-term survival, since the probability of a prolonged period of 28℉ is nearly zero.

In each area, Sabal palms will survive freezes that would otherwise kill Royal palms. This explains why the Sabal is native to wetland regions along the Lower Rio Grande, as well as across most of the Florida Peninsula.

Bottom Line

Royal palms, as well as their Coconut palm cousins, can be considered the "Palm of the Tropics", and what so many people think of when they consider the landscape of a tropical paradise. The lower Valley, unfortunately, is a **sub**-tropical climate susceptible to the occasional killing freeze of cold-sensitive tropical vegetation like the Royal Palm. While there may not be another similar freeze to February 2021 for decades, even established majestic and tall Royals cannot survive prolonged temperatures, combined with wind and moderate to low humidity, below 28℉. Better options include the Sabal Palm, and even the Mexican Fan Palm (*Washingtonia Robusta)*, which are cold-hardy to 20℉.

Happy planting!

THE MROS ERA LAUNCHES FROM NWS BROWNSVILLE

By Rick Hallman

During the week of October 18, 2021, a deployment team with members from Sterling, Boulder, and Fort Worth replaced the Radiosonde Replacement System (RRS) at WFO Brownsville with the Manual Radiosonde Observing System (MROS) as the new upper air system for the office.

The hardware was installed on Monday, October 18 and tested on Tuesday, October 19. Beginning with the first synoptic flight at 12 UTC on Wednesday, October 20, WFO Brownsville became the first operational MROS upper air station in the National Weather Service. Virtual training on the system began on October 1, 2021, with all 16 certified observers completing prerequisite training in time for the first official flight. Physical training on the system was conducted in three phases: an observed flight, an assisted flight, and a solo flight. Through 10 flights with the deployment team, NWS Brownsville was able to get 11 out of 16 forecasters through Phase One, five forecasters through Phase Two, and four forecasters fully trained by Friday evening (October 22). With additional training flights through the following week, nearly all meteorologists at NWS Brownsville were ready for solo flights on the new system.

Deployment teams from Sterling, Boulder, and Fort Worth installed the Manual Radiosonde Observing System at NWS Brownsville on Monday, October 18, 2021. Photo by Rick Hallman.

With the aging RRS over the past few years, Brownsville's upper air observations had been increasingly at the mercy of the Telemetry Receiving System and intermittent GPS signals. The upgrade to MROS means there are now no moving parts to maintain and a vastly improved GPS tracking system, including the RB31 antenna, installed on a tower behind the office. This antenna consists of 6 horizontal segments and 1 vertical to detect and track the RS41 radiosonde in any direction.

RS41 radiosondes are much lighter than the previously used RS92 radiosondes, with long-lasting lithium batteries already included within the sonde. The lighter radiosonde requires less hydrogen in the weather balloon to obtain a realistic ascension rate, effectively cutting hydrogen gas costs and decreasing the hydrogen tank supply needed on station. Guy wires attached to anchors nearly four feet long were installed by the end of the week, making the MROS antenna tower capable of withstanding category 5 hurricane wind speeds.

Through two weeks of observations, the GPS signal has remained strong and uninterrupted, and NWS Brownsville observers are both excited and optimistic about this upgrade. They would like to thank everyone involved in bringing MROS to Deep South Texas, especially those who deployed here for the week: **Lindsey Rosenthal, Tim Bruno, Brandon Fugate, Paul Oosterhout, Mike Shanahan, Jorge Negrete, Robert Sandifer**, and **Tyler Douglas.**

Pictured Above: New RS41 Radiosonde (left) vs old RS92 Radiosonde (Right). Pictured Below: New Antenna. Photos by Amber McGinnis

Mike Shanahan with the anchors and wrench used with the new antenna. Photo by Rick Hallman

The Cameron County Local Emergency Planning Committee (LEPC) recently hosted the 2021 Union Pacific Railroad – Transportation Community Awareness and Emergency Response (TRANSCAER) Railcar Emergency Response training event. TRANSCAER is a national outreach effort to help communities prepare for and respond to hazardous material transportation incidents. This training event, held from September 28 to October 1, 2021, provided unique insights into best management practices in railroad emergencies and provided U.S. Customs and Border Protection officers and other first responders with the experience needed to safely respond to and work in today's complex world of hazmat rail emergencies.

Warning Coordination Meteorologist (WCM) Barry Goldsmith, Senior Meteorologist Brian Miller, and General Meteorologist Rick Hallman participated in the training event this year. Brian attended day one at the Port of Brownsville. Then, Barry and Rick provided meteorological Impact-Based Decision Support Services (IDSS) for the exercise portion of the training on day three.

Senior Meteorologist Brian Miller in front of a railroad building. Photo courtesy of Brian Miller

On the first day of training, participants learned how to identify railcars, railcar anatomy, and mitigate railcar incidents including chlorine gas. More than a lecture-based class, Brian got hands-on training from some of the best in the profession. Brian learned about chlorine and other hazardous chemicals transported by railcar and their mitigation. In addition, Brian learned about initial duties when arriving on scene, train lists, and emergency contacts. Finally, Brian learned about railroad safety, recovery procedures after an incident, locomotive and railcar anatomy, capping kits, and hands-on leak mitigation and response on protective housings.

During a chemical leak or explosion, the weather plays a crucial role in the response and mitigation of the incident, including where to safely stage first responders and potential evacuations of residents. A change in wind speed or direction could greatly impact response and recovery operations. Showers or thunderstorms could bring multiple new impacts to a chemical leak or explosion as well, with some chemicals reacting violently to water, increased runoff of toxic chemicals, or the dangers of lightning to both the crews and as a potential ignition source for volatile fumes.

Through planning meetings in the weeks leading into the TRANSCAER training event, WCM Barry Goldsmith consulted with participating emergency management and chemical response partners to create multiple realistic weather scenarios for their final training exercise. It was determined that light to moderate southeasterly winds were a realistic surface observation for the beginning of the exercise. To enhance the scope of the incident, the proposed forecast was that a cold front and increasing chance of showers and thunderstorms was expected just beyond the initial time frame of the exercise, including a strong northerly wind shift and heavy rainfall rates.

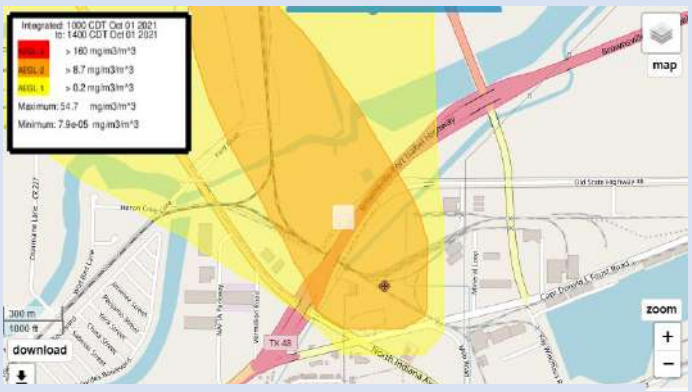
Tank Car designed to carry compressed or liquid commodities, like chemicals, molasses, edible tallow, water, and diesel fuel. Multiple types of fittings can be seen on the top which are used for demonstration purposes. Photo by Brian Miller

Boxcars are designed to transport many types of commodities. This one was converted into a classroom. Photo by Brian Miller

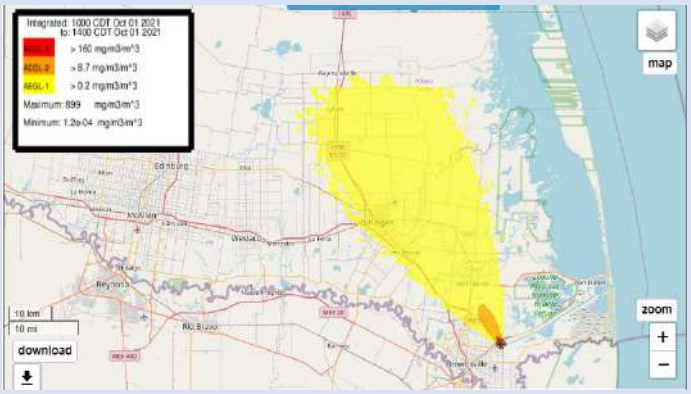
For this final training exercise, responding teams would be faced with a leaking railcar of an unknown chemical. In responding to the incident, the team would contact Meteorologist Rick Hallman, stationed at NWS Brownsville, for current weather, such as wind speed and direction, the short term forecast, and a HYSPLIT model output of the smoke plume over the next few hours. As the first responders learned more information, such as the size of the railcar, the type and amount of chemical onboard, and the size of the leak, another call would be placed to Hallman for a more accurate depiction of where this chemical leak plume would go, or what could potentially happen if there was an explosion.

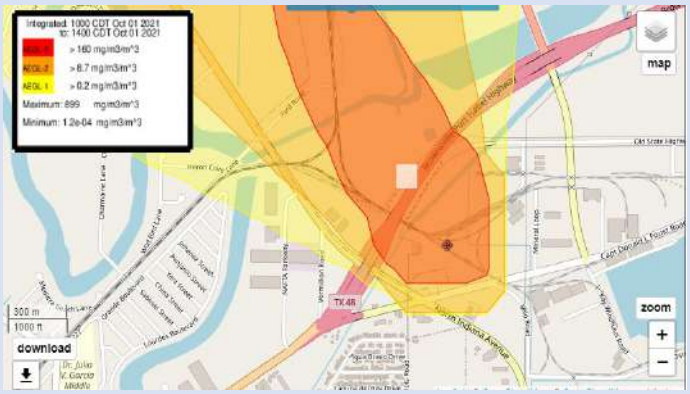
The chemical during the exercise was determined to be 20,000 gallons of Oleum, a fuming sulfuric acid. Using software called ALOHA and CAMEO, as well as referencing OSHA fact sheets, Rick noted that Oleum reacts very violently to water and that the main air-dispersed chemical would be sulfur trioxide.

New HYSPLIT model outputs were created for both the current leak (images A and B) and potential explosion (images C and D) using sulfur trioxide as the known chemical. As the cold front approached, additional model outputs could have been created to show the remaining chemical plume shifting further west and south with the wind shift over more populated areas.



Above: Image A (left) - HSPLIT model output showing a six hour leak of sulfur trioxide with light to moderate southeasterly winds. Image B (right) - Image A, at incident site.





Above: Image C (left) - HSPLIT model output showing a six hour dispersion of sulfur trioxide after an explosion with light to moderate southeasterly winds. Image D (right) -at incident site.

These types of exercises are great tools in the preparation for real incidents. By involving all potential agencies and first responders, including the National Weather Service, these training events maintain professional communication among local and regional entities and guide all involved into a more efficient and complete response plan. Something as simple as a wind shift or streamer shower off of the Gulf of Mexico could completely change the situation on site. As it turns out, the day of the training exercise, multiple thunderstorms with heavy rain and intense lightning forced first responders to train indoors and safely out of the elements.

A drone video of this event is available here: 2021 Trancar Training Event

My favorite tradition is having hot soup on Christmas Eve. Obviously, it works better if the weather is cold! Growing up in Illinois, it was always my mom's vegetable beef "soup" (though really more of a stew) with egg dumplings. And after living near the southern border in New Mexico for 13 years, it transitioned more to posole, which we've kept going here in the RGV.

-Joshua Schroeder, Science and Operations Officer

One of our holiday traditions is to celebrate Christmas Eve with my wife's family including dinner and gifts. The next day we celebrate Christmas with our family. Every year one of the boys gets to play Santa and hand out gifts just like they do in The Christmas Story movie. Of course we always watch that movie on Christmas Day. -Mike Castillo, Lead Meteorologist

We always try to watch as many classic cartoons as we can on Christmas Eve (A Charlie Brown Christmas, How the Grinch Stole Christmas, Rudolph, Frosty, Santa Claus is Coming to Town), usually with eggnog. On Christmas, we watch A Christmas Story and National Lampoon's Christmas Vacation. -Rick Hallman, Meteorologist

Swapping shifts with my colleagues that may have to work on Christmas Eve or Christmas Day, giving them the time with their families. -Geoff Bogorad, Lead Meteorologist

My favorite holiday tradition when I was little was after Christmas Eve mass going to my grandmas to open presents. And she had a nativity scene and I'd always be the one to put baby Jesus in the manger! Felt like the most important job of the whole holiday! -Angelica Soria, Meteorologist

Although we don't go every year, I would say spending Christmas with my wife at the Riverwalk in San Antonio. For New Year's Eve, usually me and my wife have dinner at P.F. Chang's. Many years ago, me and my family would celebrate New Year's Eve with Chinese food takeout from either the Golden Bowl Restaurant (in MA and not open anymore) or the Cathay Pacific Restaurant (in MA and still open). -Mike Buchanan, Meteorologist In Charge

One of my favorite traditions is from when I was little. After the Christmas Eve Church service, my sister and I would get to open our christmas present from each other. It is a tradition we try to keep up today, as long as our packages arrive on time, even though we live over 1000 miles away from each other. -Amber McGinnis, Meteorologist

My favorite Christmas tradition is making spritz cookies with my mom. -Laura Farris, Meteorologist

Family gatherings as far as I can remember is our holiday tradition. Several times for different family members the weather was a critical factor in their safe arrival. One example was about ten years ago when my sister traveled to College Station to pick up her daughter. I called to stop at the nearest town/city and get a room for the night because the weather stations were reporting the possibility of snow, and sure enough about an hour after they had checked into a hotel that DPS started closing roads and snow started falling.-Pablo Gonzalez, Information Technology Officer

My favorite holiday tradition is watching A Christmas Story while gorging on Christmas Cookies! -Brian Adams, Meteorologist

RACES HURRICANE "READY" DRILL

By Brian Miller, Amber McGinnis, Pablo Gonzalez, & Barry Goldsmith

On October 30, 2021, Information Technology Officer (ITO) Pablo Gonzalez (callsign KI5AKK) and General Forecaster Amber McGinnis delivered simulated yet realistic weather updates during the Radio Amateur Civil Emergency Service (RACES) Hurricane "Ready" drill. RACES is a volunteer organization of licensed amateur radio operators who provide a communications function to government agencies during emergencies. In Texas, the Department of Emergency Management administers RACES.

Pablo provides the first weather update for the RACES drill. Photo by Amber McGinnis

During the drill, Pablo and Amber operated an Icom IC-7100 multi-band radio from station WX5BRO (NWS Brownsville). Pablo has held a technician license for many years. Amber is currently working toward earning her technician license. The technician license is a basic, entry-level license that gets people quickly on the air. Pablo and Amber are part of a cadre of meteorologists at NWS Brownsville who enjoy the hobby of amateur radio and how it can synergize with local weather operations.

Amber providing updates throughout the event. Photo by Pablo Gonzalez

The NWS Brownsville office has supported amateur radio events for many years. Licensed amateur radio operators are often activated when severe weather conditions develop. These "Hams" are certified by the NWS as part of the SKYWARN program. Once certified, Hams may relay important weather information via a net control station to the NWS. Ham reports provide valuable real-time ground truth information to NWS meteorologists, who may use the information to save lives and protect property.

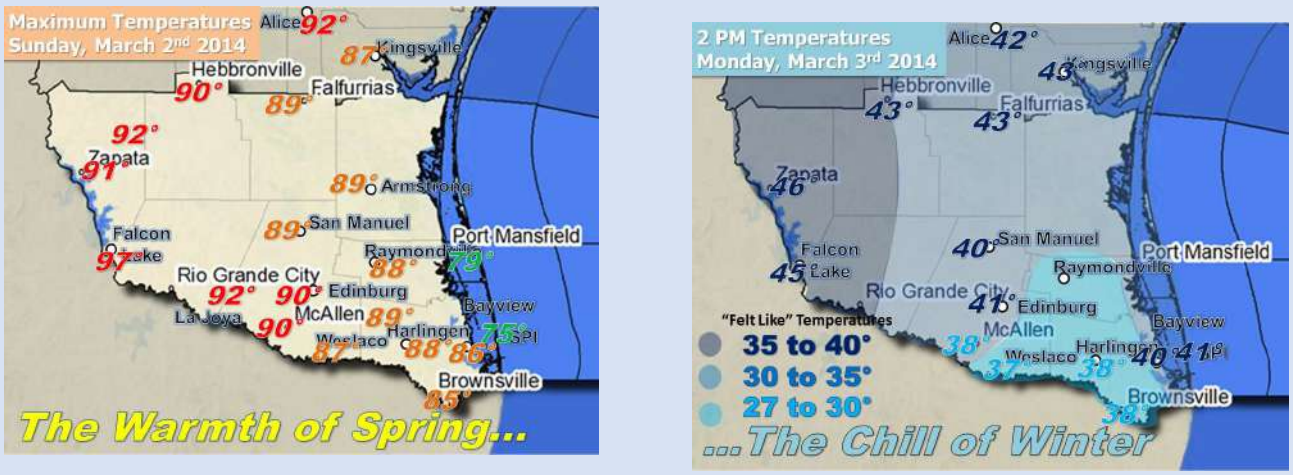
A drill is a coordinated, supervised activity usually employed to test a specific operation or function. For example, the RACES Hurricane Ready drill conducted on October 30 tested communication resilience if a natural disaster like a hurricane temporarily knocked out communication infrastructure across the region. Local RACES officials asked Brownsville's National Weather Service (NWS) office to participate in the drill by injecting realistic weather information as the drill evolved. The weather injects enhanced situational awareness of the participants.

FROM SUMMER TO WINTER, IN LESS THAN A DAY

By Barry Goldsmith

From *aguas frescas* to *chocolate caliente Mexicano*, in less than a day!

Longtime residents of the Rio Grande Valley are familiar with the occasional deep plunge of temperatures as early as November and as late as March each "cool" season. In many cases, the change in apparent temperature is 30℉, falling from the 70s-80s into the 40s-50s. In fewer cases, typically once or twice each winter, the drop is more severe, literally changing balmy, summer-like weather to uncomfortably cold, gray, and windy weather accompanied by a biting drizzle or light rain. Those severe drops can change apparent, or "feels-like", temperatures from near 90 to around 30 in less than 24 hours - a 60℉ or more crash! Such was the case in March, 2014, when apparent temperatures dropped from around 90℉ in McAllen on the 2nd to around 32℉ on the 3rd. A similar situation occurred more than five years later, and was the subject of a New York Times article on November 12, 2019, when apparent temperatures crashed from 92℉ on the 11th to 31℉ on the 12th.



Above: Ambient (values) temperature difference from 2 PM March 2, 2014 (left) to 2 PM March 3, 2014 (right). For the lower and mid Valley, this was a 50℉+ drop. When considering wind chill, the apparent temperature drop was **more than 60℉** in the lower/mid Valley.

Reasons for the "Plunge"

The geography of the Rio Grande Valley explains…everything.

Southern Latitude. Situated just 150 miles from the Tropic of Cancer, the Rio Grande Valley is always in range of warm and humid air. Persistent southerly air flow circulating between general high pressure over the Gulf of Mexico and lower pressure in the lee of the Sierra

Madre Oriental (Rio Grande Plains) provides a modestly warm and humid climate regime along the Lower Rio Grande, even during winter. Upper level disturbances crossing the western/southwestern U.S. increase the dome of atmospheric high pressure farther east, including much of the Gulf. Between the disturbances and the atmospheric "dome", enhanced southerly flow punches up temperatures from the surface to tens of thousands of feet in the atmosphere and leads to warm to hot surface temperatures across the Valley.

(Cold) Pipeline to the Prairie…and sometimes the (North) Pole

The southern Florida peninsula has water on three sides and a robust Gulf Stream of deep tropical water surrounding the southern third of the state to moderate shallow cold air masses that dive southward. Such is *not* the case for the Rio Grande Valley. During the cool season, cold to bitterly cold air gradually develops and pools across the arctic, often held in check by the circumpolar vortex. However, at varying points between November and March, the circumpolar vortex "breaks down", allowing the bitterly cold air to drain into southern Canada. A slight southward shift of the "polar" jet stream (Figure 1) nudges the arctic air south of the U.S./Canadian border. The heaviness of the air increases surface pressure, mainly in the lee of the Rocky Mountains. The slightest of additional atmospheric "nudges" brings the cold air mass farther south, into the central Great Plains. At this point, the momentum of the shallow but near-bitter air drives it rapidly southward, into the southern Plains (Figure 2) and ultimately deep into Mexico east of the Sierra Madre (Figure 3).

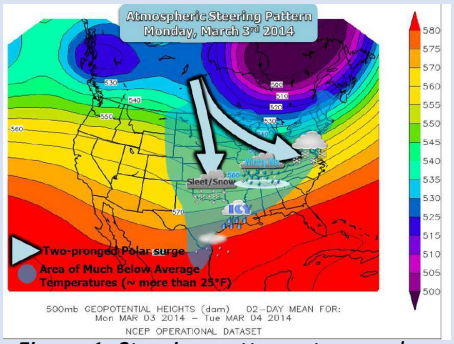


Figure 1: Steering pattern at around 18,000 feet on March 3, 2014, showing a slight "dip" in the flow across the central Great Plains, and a stronger drop in southeastern Canada. Farther south, a separate "dip" was noted over north central Mexico; southwest flow east of this dip helps lift moisture into light rain or drizzle. When cold enough, precipitation may freeze on contact to exposed surfaces.

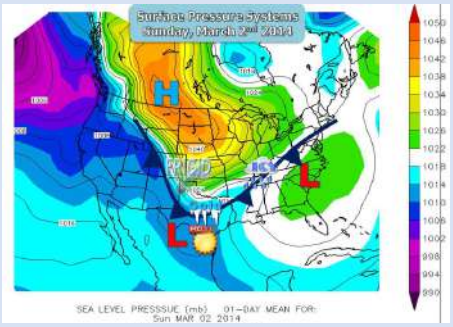


Figure 2: Surface fronts and pressure systems on March 2, 2014. While temperatures were at or above 90°F across much of the Rio Grande Valley, severe winter weather was occurring in parts of north Texas and the panhandle with temperatures ranging from the single digits to the lower 20s (°F), along with light sleet and snow.

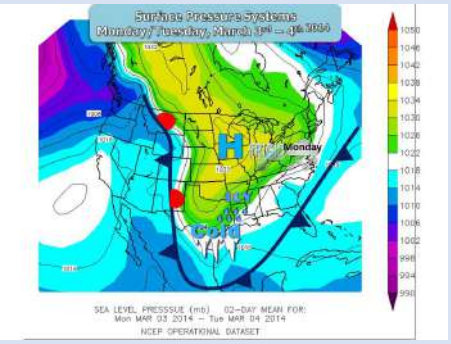


Figure 3: The front, like a freight train of cold/very cold air, surged deep into northern Mexico on March 3rd. Rio Grande Valley temperatures crashed into the upper 30s to lower 40s in less than 24 hours.

Though the air modified on its journey south, there is no Gulf Stream or other warm and deep water to warm the air sufficiently west of the Texas and northeastern Mexico coast. Therefore, when it undercuts the warm-hot, often humid surface air ahead of it, the changes are rapid and often difficult for residents and visitors to adapt to in short order. Temperatures will crash up to 25 or 30 degrees in two hours in the sharpest events before a more steady drop to the 40-50℉+ actual/apparent temperature difference in less than 24 hours.

Low clouds and light rain/drizzle often join the party, courtesy of weak upper level disturbances in the subtropical jet (also in Figure 1) which provide southerly flow of relatively warm, humid air overtop of the heavy, dense cold air at the surface. The slate-gray sky and light precipitation block out all sunshine/brightening skies, ensuring temperatures change little during the day.

Prepare for the Plunge

If the forecast calls for a sharp cold front, be ready.

- Check space heaters for proper operation, and be sure the heater is three feet from any combustible material.
- Check forced-air heat (central heat) to ensure safe operation. A burning smell the first time you transition from air conditioning to heat is normal, but if the smell persists, call a heating/ventilation/air conditioning expert.
- Have a change of clothes handy, especially if the sharp front arrives during the day. Multiple layers will keep you warmer than a single jacket. Consider gloves and a hat if the forecast apparent temperature is 40℉ or lower and planning to be outdoors for any length of time.
- Have blankets in your vehicle, in case of a stall and there is no nearby warmer location.

A BITTERSWEET FAREWELL

By Brian Adams

June of 2020 was a life-changing. I left my job in Wichita, KS where my now-fiancee' and I had worked together for 5 years, as well as lived together for about 2.5 years, all during a global pandemic was one of the most daunting tasks I ever had to take on.

On June 2nd, 2020 I packed up my life and made the drive down to Brownsville with my parents and dog. There's nothing like a long move down to Deep South Texas to remind you just how massive of a state Texas is. Fourteen hours later we were greeted by palm trees, tropical warmth, and a new adventure ahead.

Soon after getting acclimated to the National Weather Service and its culture, Hurricane Hanna made its approach in July of 2020 giving me quite the "Baptism by Fire" approach to my new job. It was amazing not only seeing everyone work together to keep the public safe and informed, but also getting to directly help with social media work so early in my career. I knew the NWS was where I needed to be.

The hurricane season kept us busy, especially in late August and early September when we were tasked with backing up Lake Charles during, and after Hurricane Laura. This presented another daunting task of learning a whole new area to monitor in southwest Louisiana and southeast Texas, all while trying to learn more about the "home" area here in the RGV.

With the hurricane season finally behind us, I was able to focus my efforts into learning the shift duties and other responsibilities here at Brownsville. I was called on to accelerate my training and was able to join our forecasting rotation fairly quickly. A busy hurricane season, seemingly endless amounts of training, and acclimating to a new place while making time to talk with my fiancée each night certainly kept me busy.

By Spring of 2021 I began to feel comfortable with my duties in the office and how the weather behaves in Deep South Texas. Life, on the other hand, had other plans. I then learned of an opportunity to possibly reunite my fiancée and I, or at least move to an office neighboring hers. My application was sent off in July. Three months and a few interviews later, the opportunity of my life came in my email: an opportunity to move to San Diego and get back together with my fiancée.

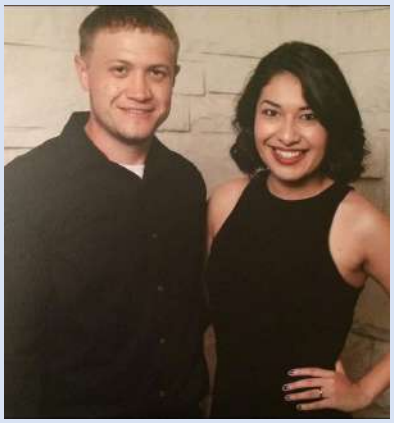
It feels incredibly bittersweet leaving only after a year and a half with my first NWS office. I've made some incredible memories and some lifelong friendships here. I'll be forever grateful to NWS Brownsville for everything they've taught me and all the opportunities I've been given. None of this could have happened without their help, and for that, I say Thank You.

INTERNSHIP COMES TO A CLOSE

By Michael Lavalle

Even though my time at the Brownsville NWS office was short through the Pathways internship program, I believe that it was an invaluable experience. Due to the ongoing pandemic it remained virtual throughout but I still was able to get some things accomplished and learned along the way. I was able to learn from the different project leads from tropical to aviation and see that there is a lot of work that goes on behind the scenes at a weather service office. I also got to see how much of the weather service's duties entails outreach to their partners and the community they serve; that it's more than just forecasting the weather. A large portion of my time during the internship was working on a research project where I looked into how common it was for southwest hurricanes to rapidly intensify in the Gulf of Mexico. I was able to not only expand on my computing and software skills but also with communication skills from having to present my research several times to a couple different groups. While we didn't know what we would find by completing this study, results were a little different then what we had initially expected. Southwest moving storms are more common, intensify and rapidly intensify more compared to other motions in the Gulf. However, southwest moving storms occur more frequently in the Gulf compared to other areas and they are more likely to rapidly intensify at the beginning of the motion turn compared to northwest moving storms.

In addition to my research project I also got some experience writing forecasts, Area Forecast Discussions (AFD) and received some valuable feedback on improving my skills as a forecaster as well as learning from a great deal of training modules and attending as many presentations and webinars that I could. Towards the end of my time in the program I assisted Brian Miller with some of his responsibilities. This included reaching out and updating contact information for the HAM radio EC list, also I helped start the setup for the Unit Radar Committee meeting, but unfortunately I won't be around to see it actually take place. As for my future plans, because of my interest in research I am currently looking at Ph.D programs after my December graduation from Texas A&M. At this time I am applying to Texas A&M, The University of Miami, and Texas Tech. I am hoping to eventually work for the National Hurricane Center or one of NOAA's national labs. While I might not be joining the weather service in Brownsville at this time as I continue my studies, it has been an invaluable experience where I learned a lot and worked with a great team in my short time here.



THE NATIONAL WEATHER SERVICE BROWNSVILLE/RIO GRANDE VALLEY
20 S Vermillion Ave, Brownsville, TX 78521
(956) 504-1432

EDITOR-IN-CHIEF: AMBER MCGINNIS **ASSISTANT EDITOR:** KIRK CACERES

CONTRIBUTORS

MIKE BUCHANAN, BARRY GOLDSMITH, JOSHUA SCHROEDER, BRIAN MILLER, MIKE CASTILLO, GEOFFREY BOGORAD, RICK HALLMAN, LAURA FARRIS, AMBER MCGINNIS, BRIAN ADAMS, ANGELICA SORIA, MICHAEL LAVALLEE, PABLO GONZALEZ