South Texas Weather Journal

NWS Corpus Christi, TX Fall 2015 Edition

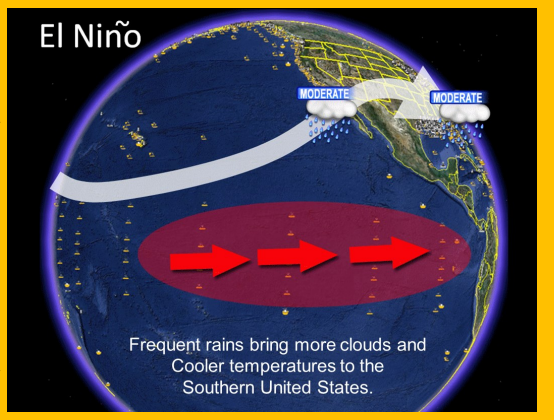
Special points of interest:

- Did you know that this year marks the 45th Anniversary of Hurricane Celia?
- Learn all about the new improvements to severe weather warnings!
- Are you ready for more rain? Above normal rainfall is possible this winter.
- Check out our new hurricane track maps online!

Inside this issue:

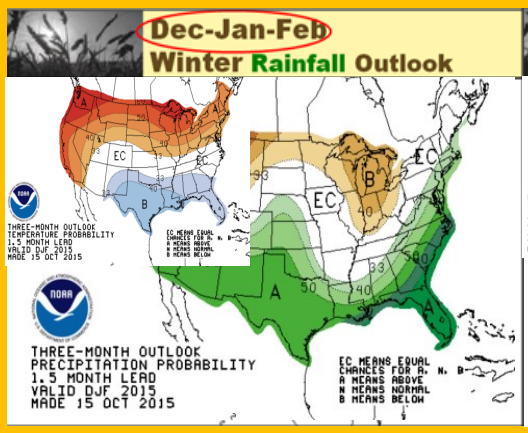
What can we expect from El Niño this winter?

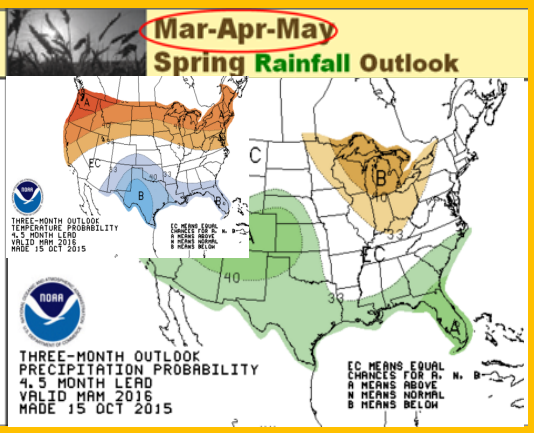
John Metz – Warning Coordination Meteorologist

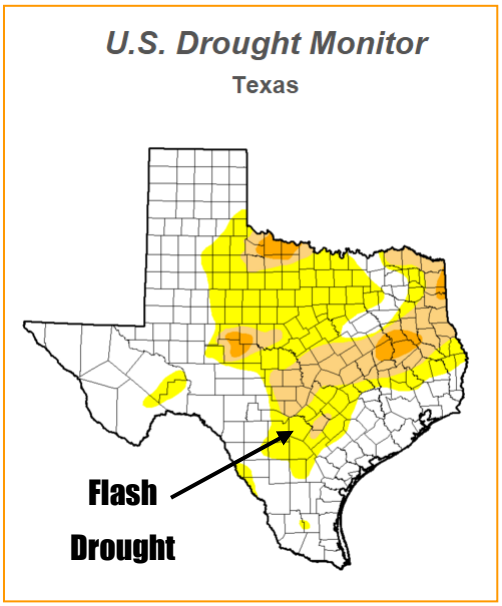


News headlines for much of the summer have highlighted that El Niño could reach record territory this winter, but what does that mean for South Texas? The climatological reference for the term "El Niño" describes a cyclic warming of the Pacific Ocean near the equator, which causes impacts to weather and climate across the globe. In particular, these warm waters influence the atmosphere by warming the air above it and creating an increase in clouds and thunderstorms in that region. This increased moisture is then picked up by the **jet stream** and channeled across the southern United States during the winter and early spring time period.

These combined effects typically result in periods of above normal rainfall and below normal temperatures across South Texas during the November through February time period. This is supported by the latest Climate Prediction Center outlooks, which call for a 50% probability of above normal rainfall and below normal temperatures across region during the December through February time period and 33% probability during the March through May time period.







The winter is normally the driest part of the year for South Texas, in which rainfall amounts average around 7.27" in Corpus Christi (10.15" Victoria, 6.49" Laredo). However, during El Niño years, rainfall amounts during the winter average about 2 inches above normal, and during strong El Niño years, rainfall amounts average near 3 inches above normal. In reviewing the five strong El Niño events (1997/98, 1982/83, 1972/73, 1965/66, and 1957/58) in the historical record, that dates back to 1950, only once did Corpus Christi have a very wet winter in which over 20 inches of rainfall occurred (1957/58).

In addition to the above normal rainfall, we also have an increased probability for severe weather due to the close proximity of the Jetstream, warm gulf waters, and an increased possibility for winter precipitation. Local residents should review their severe/ winter weather safety plans to ensure the safety of you and your family.

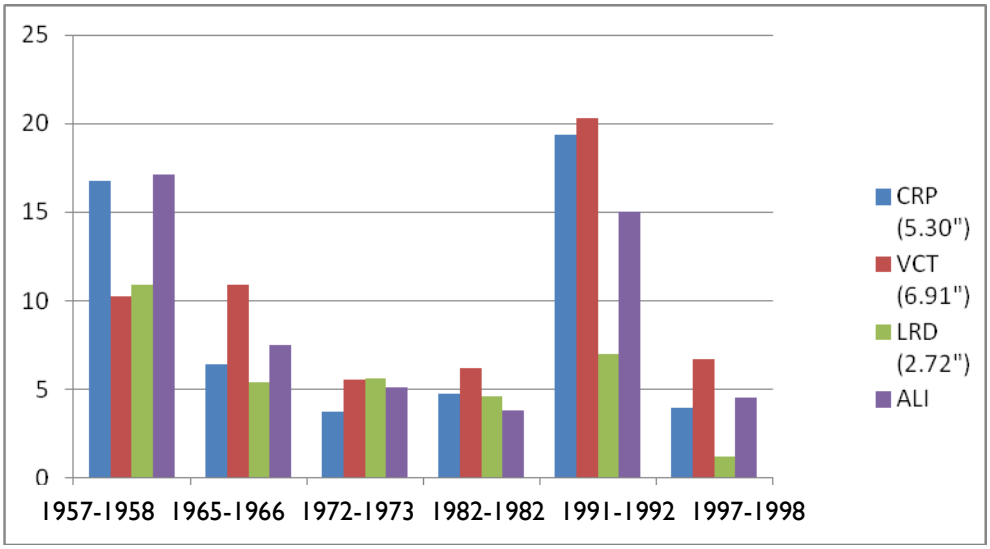
To summarize, El Niño is a term that is very welcome here in South Texas because it brings beneficial rainfall for agriculture and our reservoirs. Hopefully this winter will stamp out the moderate drought which is taking hold of our state once again.

El Niño Precipitation History in South Texas

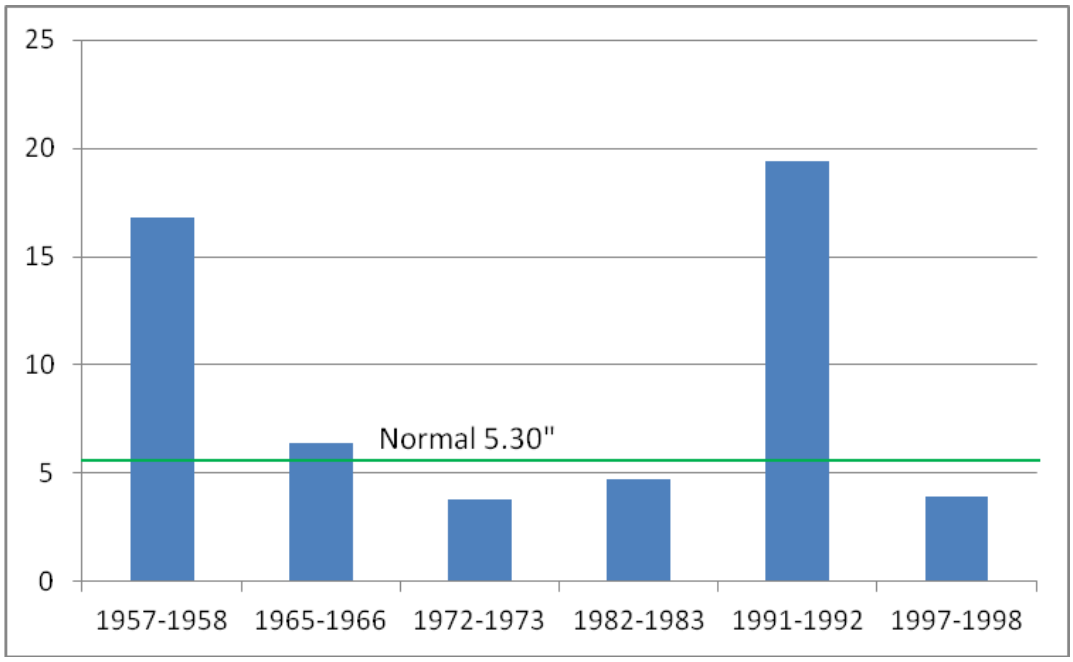
Juan Alanis—Student Volunteer

It has been well advertised that the fall of 2015 through the spring of 2016 will be influenced by one of the strongest El Niño events ever. El Niño is the warming of the tropical Pacific Ocean waters. The current El Niño event is considered one of the strongest ever based on current sea surface temperatures in the tropical Pacific Ocean, running 2˚ to 4˚ C above normal similar to the El Niño of 1997-1998. A look back at previous strong El Niño events reveals that above normal rainfall is not always the case for South Texas.

The two strongest El Niño events on record are the winter to spring period of



Winter rainfall (December-January-February) during strong El Niño events
Normal precipitation is in parenthesis at the right.



Winter rainfall (December-January-February) during strong El Niño events at Corpus Christi

1982-1983 and the winter to spring period of 1997-1998, each of which had average SST anomalies of 2.1˚C during the months of December-January-February. Despite these El Niño events ranking as the two strongest, rainfall across South Texas was actually below normal during each of these events.

In1982-1983, Corpus Christi and Victoria were slightly below normal for rainfall, while Laredo was above normal. Most of Corpus Christi and Victoria's rain fell in February. January 1983 ranks as one of the driest on record in Victoria receiving only 0.75 inches.

For the 1997-1998 El Niño event, all three climate sites experienced one of their wettest Octobers ever. By the winter, the rainfall was below normal for all three climate sites. Laredo received only 1.22", Victoria 6.67" and Corpus Christi 3.92" for the December through February period. Normal rainfall is 2.72", 6.91" and 5.30" respectively for Laredo, Victoria, and Corpus Christi.

The wettest El Niño events in South Texas occurred during the winters of 1957-1958 and 1991-1992. January 1958 ranks as Corpus Christi's wettest January ever, recording 10.78", including three days which recorded at least 2.50" inches or more. February 1958 was also very wet, ranking 5th wettest all-time with 5.24". January 1958 was also Laredo's wettest January ever, with 5.25".

The winter of 1991-1992 brought soaking rains, with the months of December, January and February ranking as the wettest ever. For Corpus Christi, December 1991 was the wettest December ever, followed by the 5th wettest January ever and the 9th wettest February. In total for the three month period, 19.39" fell, well above the average of 5.30". For Victoria, December 1991 ranks as the 5th wettest December, followed by the 2nd wettest January. Victoria had 14 days that January with measurable precipitation including a stretch of 6 consecutive days from the 7th to the 12th. In total, Victoria received 20.34" for the three months. In Laredo, the winter of 1991-1992 brought 6.99" of rain with almost all of it falling during December and January. December 1991 ranks as Laredo's 9th wettest ever which includes a streak of 10 consecutive days of measurable rainfall from the 13th through the 22nd. January 1992 ranks as Laredo's third wettest ever.

Overall, looking back at all 21 El Niño events since 1950, rainfall in South Texas was above normal only about half of the time. For Corpus Christi, 10 of the 21 El Niño events brought above average precipitation while in Victoria, 12 of 21 were wetter and Laredo 13 of 21 were wetter.

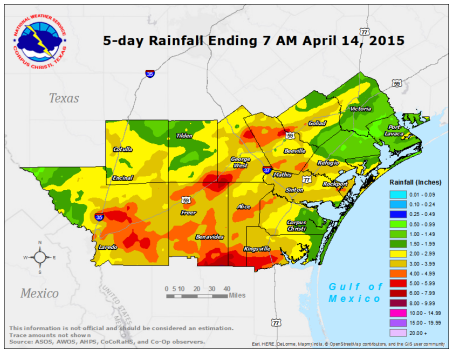
A LOOK BACK

Major Weather Events: Spring 2015

Severe Weather Event: April 12–14th, 2015

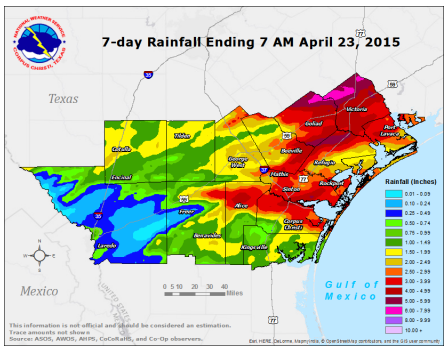
A strong subtropical jet stream along with embedded upper level disturbances persisted across South Texas and Mexico between April 12 through April 14, 2015. Meanwhile, abundant moisture and a very unstable airmass interacted with the strong jet stream and several upper level disturbances to produce 3 separate rounds of severe weather across South Texas during this time period.

The first event began in the late evening on April 12th and continued through the early morning hours on April 13th. Storms developed along the Sierra Madre in Mexico and organized into a squall line as they entered South Texas. Wind gusts of 30 to 50 mph with isolated 60 mph wind gusts occurred along and behind this squall line. Isolated wind damage and localized flooding occurred with this squall line. By the evening of April 13th, another round of severe storms developed. Extremely unstable conditions, and several boundaries across South Texas led to the development of large hail across Bee and Refugio counties. Hail up to tennis ball size associated with a supercell thunderstorm was reported 7 miles southwest of Woodsboro. A second squall line developed in the early morning hours of April 14th. The squall line intensified as it moved into the Coastal Bend between 6 and 8 AM. Wind gusts along and behind the squall line were generally between 40 and 60 mph. Several locations in Corpus Christi had peak wind gusts of 62 mph.



Severe Weather Event: April 16th, 17th, and 22nd, 2015

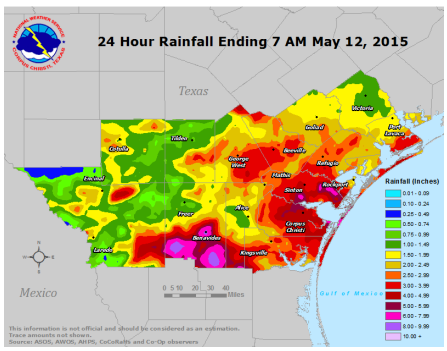
A very strong subtropical jet stream of 100+ knots along with several upper level disturbances, several frontal boundaries, and a very moist and extremely unstable airmass impacted South Texas and the adjacent coastal waters on April 16th, 17th, and the 22nd, 2015. The strong subtropical jet stream aided in producing strong wind shear across South Texas and the adjacent coastal waters. As a result of the strong wind shear and extreme instability, many thunderstorms quickly became severe during this 3-day period.



Flood Event: May 11th and 12th, 2015

At around 2 PM on May 11, 2015, showers and thunderstorms began developing across the South Texas Brush Country. This was due to a very moist and extremely unstable airmass residing across South Texas. A slow-moving cold front and outflow boundary along with an upper level disturbance set the stage for a widespread heavy rain and flooding event that peaked from the evening on the 11th into the morning hours of the 12th. Widespread 2 to 4 inches of rain fell across South Texas. Many areas across San Patricio, Nueces, Kleberg, and southern Jim Wells counties generally received 4 to 6 inches. Southern Duval and southeastern Webb counties received as much as 8 to 10 inches!

Due to the very heavy rainfall, many streets and low-lying areas became flooded due to high water. Hardest hit areas were Benavides, near Ramirez and west of Realitos in Duval county where several county roads were closed due to high water. Also, several rivers rose sharply due to runoff from the heavy rain. In particular, Oso Creek rose from nearly 6 feet to more than 20 feet in less than two hours!

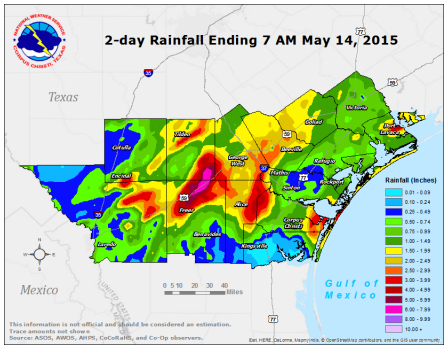


Flood Event: May 13th, 2015

A slow moving front along with abundant moisture and an upper level disturbance produced widespread heavy rain across many areas of South Texas on May 13, 2015. On average, 3 to 4 inches of rain fell during the morning of the 13th on the south side of Corpus Christi including Flour Bluff, North Padre Island, and Mustang Island. The Agua Dulce to Orange Grove area received 4 to 5 inches of rain. However, the heaviest rainfall fell in an area just north of Freer to just west of Clegg. Within this area, as much as 6 to 8 inches of rainfall fell during the morning and afternoon hours. This rainfall came on the heels of another heavy rain event that occurred in the previous 24 to 48 hours. 3-day rainfall totals exceeded 10 inches in portions of Flour Bluff and 8 to 10 inches across many areas of Duval county.

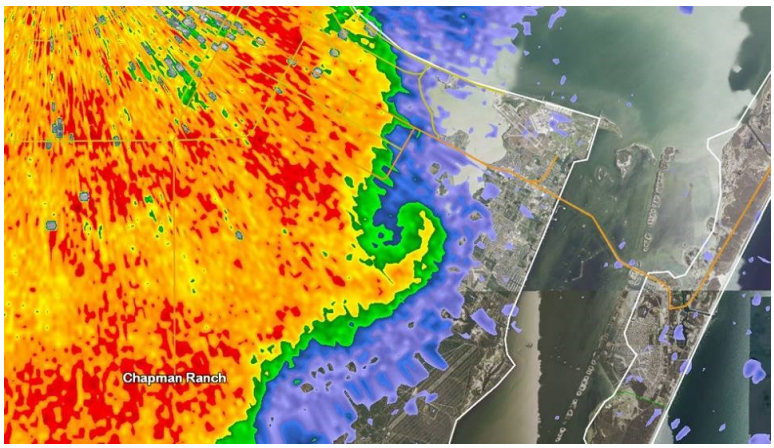
Oso Creek Flood, Corpus Christi, TX

This additional heavy rain, on top of the prior heavy rain that occurred, produced flooding in many communities of South Texas. Saturated soils, swollen ditches and nearly full creeks left nowhere for the water to go. Many streets and subdivisions in Corpus Christi were flooded. Some roads were even closed for a portion of the day. Many Corpus Christi schools delayed classes due to the widespread flooding. Similar conditions occurred in Orange Grove, Agua Dulce, and Freer. In fact, flooding in Agua Dulce lingered through the morning of the 14th.



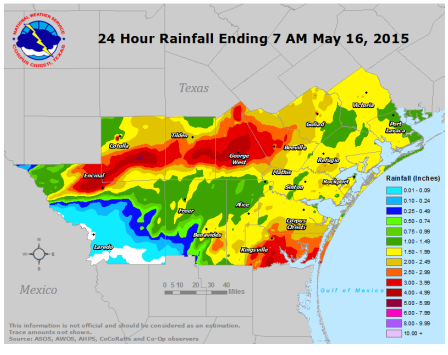
Severe Weather & Flood Event: May 15th, 2015

Persistent abundant moisture over the region along with a potent upper level disturbance created another severe weather and heavy rain event across South Texas on May 15. Around day-break, storms moved into La Salle and McMullen counties where wind damage was reported near Woodward. The storms continued to the east and drifted southward with widespread 2 to 3 inches of rain across La Salle, McMullen, Live Oak and Bee counties. The strengthening line of storms also produced an occasional rotation signal on radar. As the storms approached the coast they were tapping into even more moisture from the Gulf of Mexico and expanded into a strong squall line. Several weak rotation signatures occurred along the leading edge of the squall line and may have produced brief spin-ups. Three injuries occur during this event when a construction trailer flipped at a construction site near Gregory in San Patricio county.



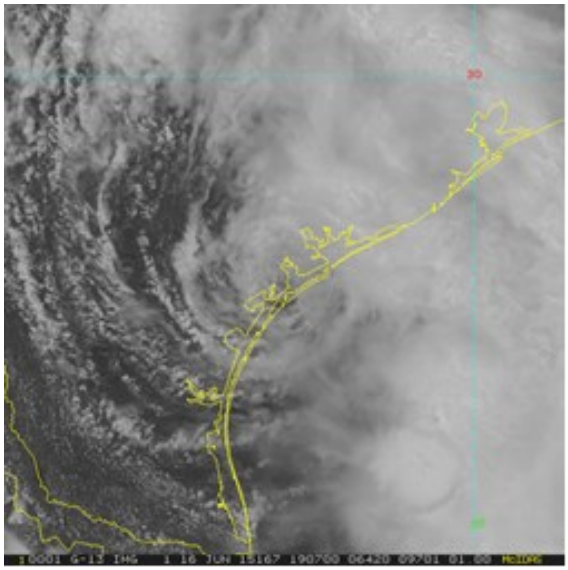
Radar Image of tornado that affected Corpus Christi's South side

A storm survey confirmed a tornado on the South Side of Corpus Christi near the intersection of Yorktown and Rodd Field Rd. The damage was primarily confined to a business on Doberman St. A large tree was blown onto a car, an outbuilding was heavily damaged and the main building of the business had some flashing peeled back below the roof line.



A Tropical Storm Named Bill

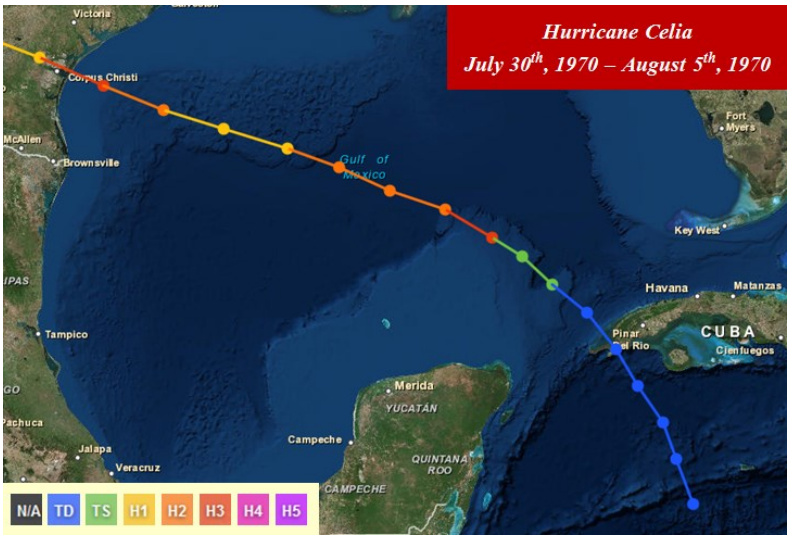
John Metz—Warning Coordination Meteorologist



The month of June marks the beginning of hurricane season in the Atlantic basin, and early in the season the western Gulf of Mexico is a region of favored development. Tropical Storm Bill was the first gulf storm this season, having formed from the interaction of an upper level trough and broad area of low pressure near the Yucatan Peninsula. Within 14 hours of development Bill made landfall on the southern tip of Matagorda Island, approximately 25 miles southwest of Port O'Connor, Texas. Hurricane hunter dropsonde data estimated maximum sustained winds of 60 mph with a minimum central pressure of 997 mb. Although the storm spent little time over the water before moving inland, the winds were strong enough to generate a 3.5 foot **storm surge** across Lavaca Bay. This is only one foot lower than the surge produced when Hurricane Claudette moved through the same area in July 2003. Ladonna Thigpen, Calhoun County Emergency Management Coordinator, and storm spotter Mike Harabis provided the NWS office in Corpus Christi with real-time reports, photos, and videos from the impacted areas during the storm's landfall. In total, the storm produced approximately 1.5 million dollars in damage, primarily to docks and bulkheads in the Port Lavaca and Alamo Beach areas. Although Bill's wrath was primarily focused along a narrow path near the storm's center, the rainfall that followed the day after became the bigger weather story. Abundant tropical moisture on the back side of the storm surged into the South Texas Coastal Bend on June 17, 2015. This resulted in widespread showers and thunderstorm with very heavy rainfall. Rainfall amounts averaged between six and twelve inches, which caused significant flooding in many Coastal Bend communities. Hardest hit were the communities of Rockport, Orange Grove, and Alice, where hundreds of homes were flooded and numerous vehicles were stranded. Flooding caused by Bill was exacerbated by record rainfall and widespread flooding that occurred in May. Corpus Christi recorded 31.63 inches of rain during the period from January 1 through June 17, 2015. This was approximately 20 inches above normal, coming in as the wettest period for Corpus Christi on historical records dating back to 1887.

45th Anniversary of Hurricane Celia

John Metz—Warning Coordination Meteorologist



This year marks the 45th anniversary of the last major hurricane to make landfall along the Middle Texas Coast. Hurricane Celia came ashore on August 3rd, 1970 as a strong category 3 hurricane with sustained winds of 125 mph near Port Aransas, Texas. Celia was the third named storm and the second hurricane of the 1970 Atlantic hurricane season.

Damaging winds were the primary hazard as Hurricane Celia made landfall. In addition to the damaging winds in the eastern quadrant, very explosive damaging wind gusts were also noted in the western semi-circle of the eye wall. Winds between 110 and 130 mph occurred in Nueces County and the city of Corpus Christi with gusts 30 to 40 mph higher than the sustained winds. The highest estimated wind gusts with Hurricane Celia were 180 mph at Aransas Pass and Robstown.

Damage from Hurricane Celia was similar to widespread EF2 tornado damage, with a few areas of EF4 tornado damage across the Coastal Bend. The hardest hit areas included the city of Corpus Christi, Port Aransas, Aransas Pass, Robstown, and Portland. Across the Coastal Bend, 8,000 homes were destroyed, nearly 14,000 homes sustained major damage, and about 42,000 homes had minor damage. Hurricane Celia destroyed or damaged 252 businesses, 331 boats, and 310 farm buildings.

Hurricane Celia produced 8 tornadoes. All tornadoes occurred in the state of Texas. One of the tornadoes killed a man and caused 2 injuries near Lake Corpus Christi.

Hurricane Celia was responsible for 15 fatalities and 466 injuries in South Texas. Total property and crop damage was estimated around $454 million ($2.5 billion in 2010). Hurricane Celia, at the time, was the costliest storm to hit Texas, surpassing Hurricane Carla in 1961.

Hurricane Celia serves as a reminder that impacts from hurricanes are not only limited to storm surge. The primary cause of damage with this hurricane was tremendous wind damage.

Wind damage from Hurricane Celia

ADVANCEMENTS & ON THE WEB

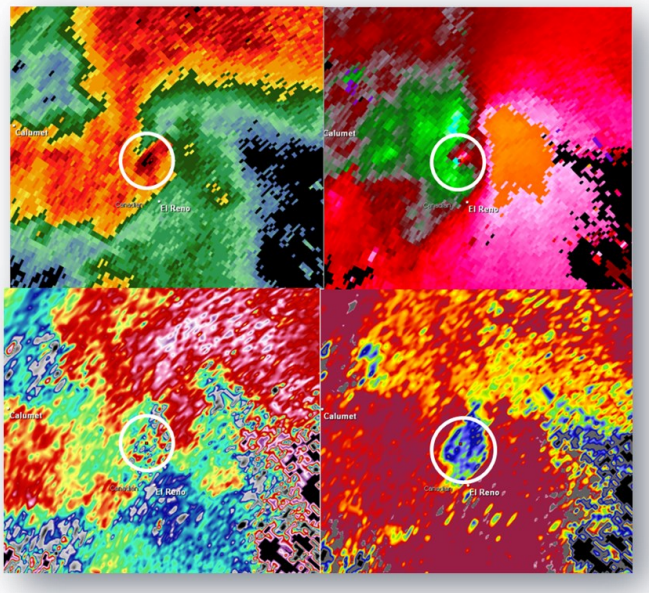
Saving Lives through Improved Severe Weather Warnings

John Metz—Warning Coordination Meteorologist

A recent service assessment after the Joplin Tornado determined that people are more likely to take action when risk is communicated to them. Knowing when a tornado or severe thunderstorm poses such a risk allows you to make a more informed decision to shelter, and ultimately save your life.

The fact is that more than 95% of tornado fatalities are a result of strong to violent (EF2 or greater) tornadoes. Due to recent advancements in technology (i.e. Dual-Pol Doppler Radar and implementation of the latest scientific research into National Weather Service operations), tornado intensity is now detectable. Utilizing these new tools, NWS Meteorologists will be able to identify the difference between weak, strong, or violent tornadoes as they are tracking through our communities. To better communicate the risk posed by these storms and their anticipated impacts, our warning messages have been modified to more clearly communicate this risk and potential impacts.

More specifically, warnings will include bullets identifying the anticipated hazard, source of the report, and a clear description of anticipated impacts based on the observed intensity of the tornado. In addition, when strong or violent tornadoes are expected, we will identify the damage threat posed by this storm as "Considerable" or "Catastrophic".



How do we identify such tornadoes? We look for strong **tornadic debris signatures** which extend through a very deep layer of the storm, combined with confirmed reports of a tornado from a trusted source, and a very highly sheared and unstable atmosphere.

Although tornadoes of this magnitude are extremely rare here in South Texas, a few have been documented in the historical record. In fact, the 2nd deadliest tornado in Texas history occurred in Goliad in May 1902, in which 115 people were killed. The

tornado that tore through Corpus Christi in October of 2002 was an EF2, producing $85 million in damage and claiming the life of a Del Mar College Professor. The Squall Line which plowed through the Coastal Bend in June 2010 produced an EF2 Tornado in Rockport with considerable damage as well.

Given that these new tools are already in place, we hope we never have to use them. But rest assured, if one is observed, an impact based warning will be issued. Then it is up to you to take immediate action to save your life!

Help Us Build a Weather Ready Nation, Become an Ambassador Today

Weather Ready Nation (WRN) Ambassadors serve as change agents and leaders in their community. They inspire others to be better informed and prepared, thus helping to minimize, mitigate, or avoid the impacts of natural disasters. WRN Ambassadors can encourage these changes in their community in a number of ways, including:

- Setting an example by **becoming** "**weather-ready**" yourself (e.g., making employee preparedness a priority and having a disaster plan);
- **Promoting** Weather-Ready Nation key messages in your outreach activities; (NWS will provide messages for you to share)
- **Sharing** success stories with NOAA.

AMBASSADOR™

WRN

WEATHER-READY NATION

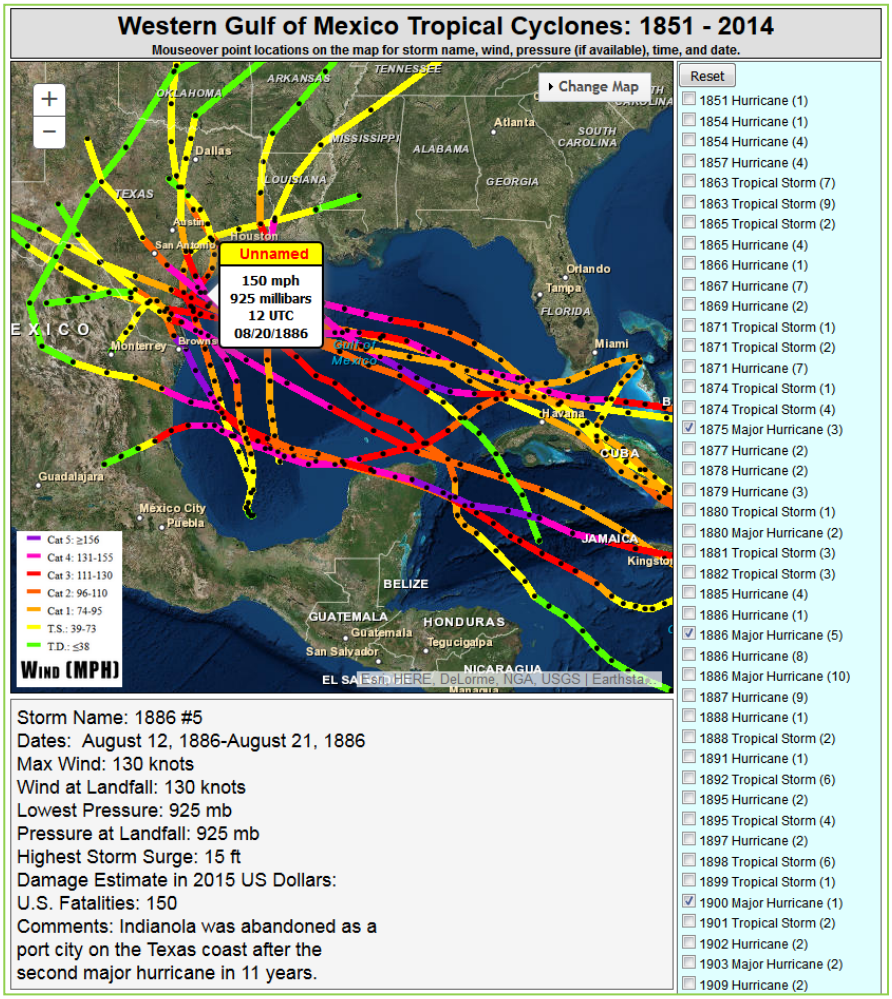
How to Become a Weather-Ready Nation Ambassador

Any organization across all levels of government, businesses large and small, non-profit and non-governmental organizations, and academia can become a WRN Ambassador. The WRN Ambassador initiative is intended for organizations and designed to help serve the public by strengthening our national resilience against extreme weather events. To sign up click the following link: http://www.nws.noaa.gov/com/weatherreadynation/amb_tou.html

Western Gulf of Mexico Tropical Cyclone Tracks Web Page

Michael Buchanan —Science and Operations Officer

On September 4, 2015, the National Weather Service in Corpus Christi launched a brand new web page (http://www.srh.noaa.gov/crp/?n=tropical_cyclone_tracks) called Western Gulf of Mexico Tropical Cyclones (1851-2014). This web page allows the user to display tracks from tropical cyclones that have affected an area within 100 miles of the coastline between Tampico, Mexico and Beaumont, Texas from the years 1851 to 2014. A user can display one or more tropical cyclones at a time on a dynamic ESRI map interface. The user can hover over a specific 6-hourly track point location for the storm name (if available), 6-hourly winds, 6-hourly pressure (if available), time, and date. Below the map interface will be an extensive tropical cyclone dataset that includes the following: maximum wind speed, wind speed at landfall, minimum lowest pressure, pressure at landfall, maximum storm surge, damage estimates in 2015 U.S. dollars, U.S. fatalities, total fatalities, storm name or number, times, and dates. Other socio-economic and historical information are included, when available. Tropical cyclone sources of information came from the International Best Track Archive for Climate Stewardship, the National Hurricane Center, the Atlantic Oceanographic & Meteorological Laboratory, National Weather Service forecast offices, and David Roth's "Texas Hurricane History" .

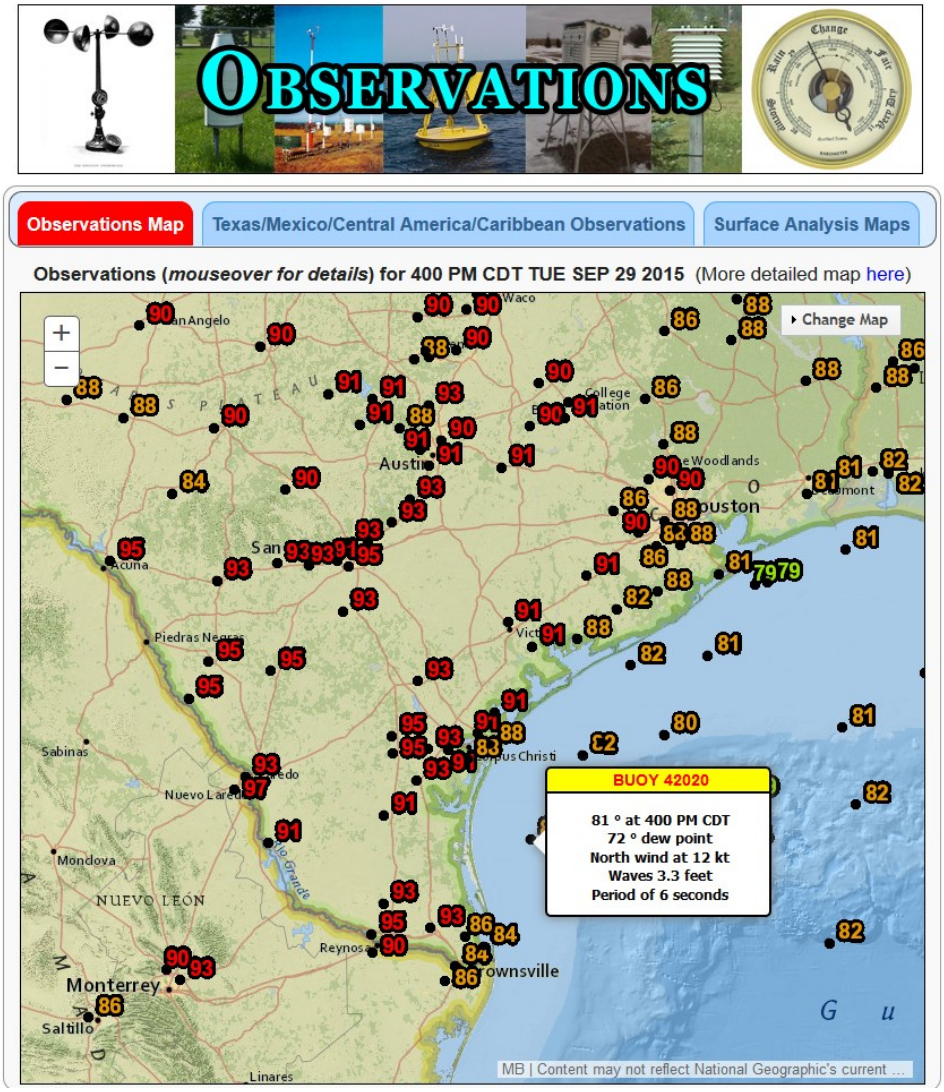


These tropical cyclone tracks are in the form of GIS mapping services. The creation of these mapping services and the extensive research of the above information were completed by the GIS Team (Michael Buchanan, Penny Zabel, Lara Keys, Todd Beal, and Tim Tinsley) at the National Weather Service in Corpus Christi. Further technical assistance in hosting these mapping services was provided by Jack Settelmaier from the National Weather Service Southern Region's Science and Technology Services Division.

Revamped Observations Web Page

Michael Buchanan —Science and Operations Officer

A year ago, the National Weather Service in Corpus Christi first launched a totally revamped Observations web page (http://www.srh.noaa.gov/crp/?n=observations). Since then, several significant updates to this page have occurred. The web page has three sections. The main section contains the latest hourly surface temperatures plotted on a dynamic ESRI map interface. The map is initially centered on South Texas but does contain observations from most of North America, most of the Caribbean, and portions of South America, Europe, Africa, and the Pacific. In order to be more legible, the temperatures are color-coded differently for each ten degree temperature range (e.g., 70-79, 80-89). For example, a 72° temperature will have the same color as a 78° temperature but will be a different color than an 82° temperature. A user can hover over the observation location and additional information such as station name, cloud cover, weather type (if occurring), surface dew point, wind speed, and wind direction will pop up in a separate display. Marine observation locations will also include wave heights and period. The basemap can be easily changed by selecting the "Change Map" dropdown menu located in the upper right hand corner of the main map. This dynamic observation plot is in the form of a GIS mapping service. The other sections of the web page include 3-hourly surface analysis maps from the Weather Prediction Center and decoded text observations from many Texas, Mexican, Central American, and Caribbean locations. A hyperlink to a more detailed observation map containing more meteorological elements and additional options can be found on the main title line just above the dynamic temperature plot.



STAFF SPOTLIGHT

Meteorologist Intern Ian Blaylock Departs NWS WFO Corpus Christi

Ian Blaylock left our office earlier this year after being selected as a new hydrologic analysis and support (HAS) forecaster at the Southeast River Forecast Center in Peachtree City, GA. Ian first joined the NWS in 2010 at Juneau, AK while a SCEP student. Ian then came to WFO Corpus Christi in 2012 as an intern, where he served as AWIPS II focal point. While here Ian excelled in computer programming, developing tools to benefit office operations. Ian is missed at our office, and we wish him and his family the best in their new location.

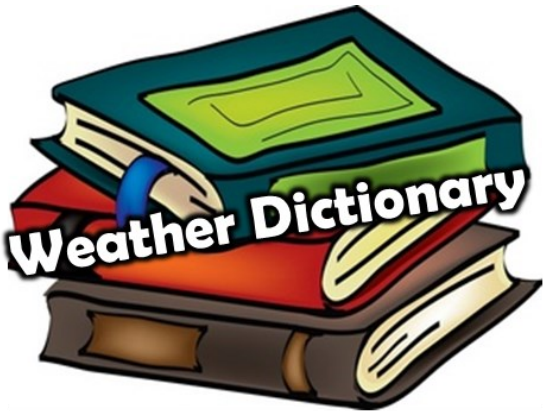
New Senior Forecaster Greg Heavener

Greg Heavener is the new senior forecaster at the National Weather Service (NWS) Weather Forecast Office (WFO) of Corpus Christi, TX. Greg was born and raised in Owings Mills, MD, a suburb of Charm City, Baltimore, MD. Greg's interest in weather began around the age of 6 after witnessing the severe damage created by a tornado touchdown near his hometown, sparking his interest in the science. Greg graduated with his Bachelor of Science in meteorology from Millersville University. Prior to arriving in Corpus Christi, he was an intern and journeyman forecaster at the NWS office in Philadelphia/Mount Holly, NJ. Greg and his family are excited about the move to South Texas and looking forward to a warmer climate.

Greg is an avid Baltimore Orioles and Ravens fan. He also enjoys playing golf, weight lifting, and spending time with his two sons and wife.

DID YOU KNOW?

From January 1, 2015 to June 30, 2015 Corpus Christi has received 31.89" of rainfall. This is more rainfall in the first six months of this year than the average yearly rainfall of 31.76"! The month of May alone had a record breaking rainfall amount of 14.32"!



- **JET STREAM –** Relatively strong winds concentrated in a narrow stream in the atmosphere, normally referring to horizontal, high-altitude winds. The position and orientation of jet streams vary from day to day. General weather patterns (hot/cold, wet/dry) are related closely to the position, strength and orientation of the jet stream (or jet streams). A jet stream at low levels is known as a low-level jet.

- **FLASH DROUGHT –** characterized by a sudden onset of high temperatures and decreases of soil moisture

- **STORM SURGE –** An abnormal rise in sea levels generated by a tropical cyclone, over and above the predicted astronomical tides. Storm surge is usually estimated by subtracting the normal or astronomic tide from the observed storm tide.

- **TORNADIC DEBRIS SIGNATURE (TDS) -** an area of high reflectivity seen on radar, coinciding with a tight rotational signature and particles of greatly varying size and shape caused by debris being lifted into the air. A TDS is indicative of a tornado on the ground already doing damage.

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References:
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National Weather Service
WFO Corpus Christi, TX

426 Pinson Drive

Corpus Christi, TX 78406

Phone: 361-289-0959

Fax: 361-289-7823

www.weather.gov/corpuschristi