South Texas Weather Journal

NWS Corpus Christi, TX Spring 2013 Edition

Special points of interest:

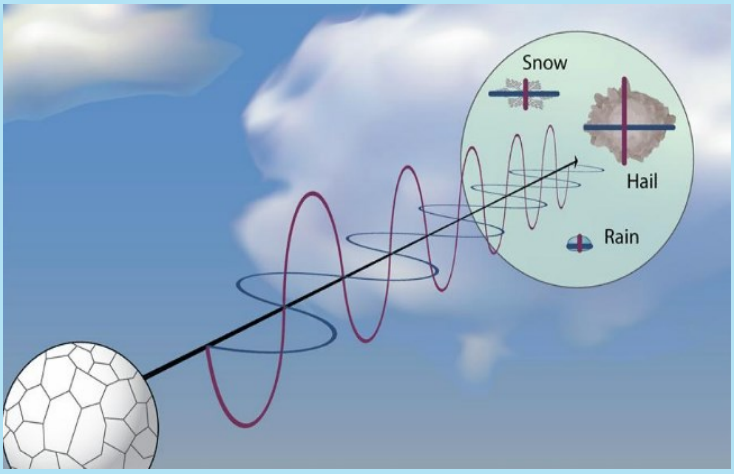
- Did you know that with the new Dual-Pol upgrades we can improve the accuracy of precipitation estimates, leading to better flash flood detection ?
- All about the 10th Anniversary of Hurricane Claudette.
- Is the Drought Improving?
- Learn more about the Storm-Ready Program!

Inside this issue:

The most significant upgrade to the NWS network of Doppler radars [WSR-88D] was completed in April for the contiguous United States. This upgrade incorporated a new technology called dual-polarization, or dual-pol. The upgrade for the Corpus Christi Doppler radar was completed the first week of April 2013 at the Corpus Christi International Airport. This new technology will result in 14 new radar products to the suite of radar data already available to NWS forecasters. These tools will assist forecasters in the warning and forecast process. This new technology and data primarily will help forecasters improve rainfall estimates along with identifying the type of precipitation that is falling.

What is Dual-Pol?

The current Doppler radars transmit and receive pulses of radio waves in a *horizontal* orientation. As a result, the radar only measures the horizontal dimensions of targets such as cloud and precipitation droplets. Dual-polarimetric radar transmits and receives pulses in both a *horizontal and vertical* orientation. Therefore, the radar measures both the horizontal and vertical dimensions of targets. Since the radar receives energy from horizontal and vertical pulses, we can obtain better estimates of the size, shape, and variety of targets. It is expected that this will result in significant improvements in the estimation of precipitation rates, the ability to discriminate between precipitation types (hail vs. rain), and the identification of non-meteorological returns.

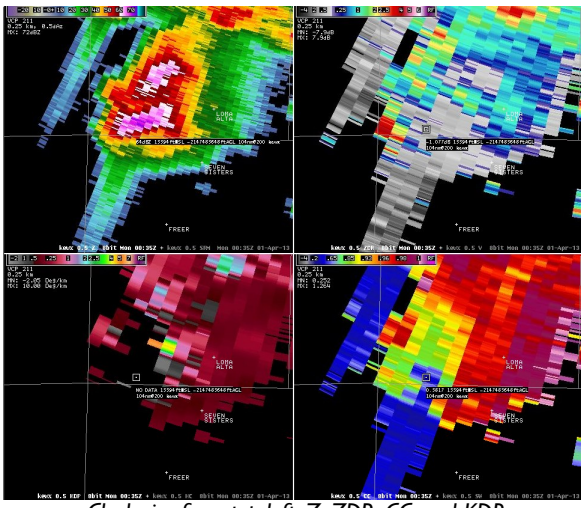


Some of the fundamental variables measured by polarimetric radars, and a short description of each, are listed below:

•**Differential Reflectivity (ZDR)** - The differential reflectivity is a ratio of the reflected horizontal and vertical power returns. Amongst other things, it is a good indicator of drop shape. In turn, the shape is a good estimate of average drop size.

•**Correlation Coefficient (CC)** - The correlation coefficient is a correlation between the reflected horizontal and vertical power returns. It is a good indicator of regions where there is a mixture of precipitation types, such as rain and snow.

•**Specific Differential Phase (KDP)** - The specific differential phase is a comparison of the returned phase difference between the horizontal and vertical pulses. This phase difference is caused by the difference in the number of wave cycles (or wavelengths) along the propagation path for horizontal and vertically polarized waves. It should not to be confused with the Doppler frequency shift, which is caused by the motion of the cloud and precipitation particles. Unlike the differential reflectivity and correlation coefficient, which are all dependent on reflected power, the specific differential phase is a "propagation effect". It is a very good estimator of rain rate.



Clockwise from top left: Z, ZDR, CC, and KDP

Dual-Pol Technology Benefits

- Improve the accuracy of precipitation estimates, leading to better flash flood detection and improved stream flow forecasts during river flooding.
- Ability to discern between heavy rain, hail, snow, and sleet, especially helpful discerning locations of precipitation type during winter weather events.
- Improve the detection of non-meteorological echoes (such as ground clutter, anomalous propagation, birds, and tornado debris) and reduce their effects on radar data displays.
- Detection of aircraft icing conditions by identification of the melting layer.

Dual-Pol will not improve tornado warning lead times but will have the ability to identify debris from a damaging tornado, providing confirmation on the location and danger of an ongoing tornado, even when storm spotter reports are not possible due to night time or low visibility near the tornado.

Dual-Pol Products & Applications

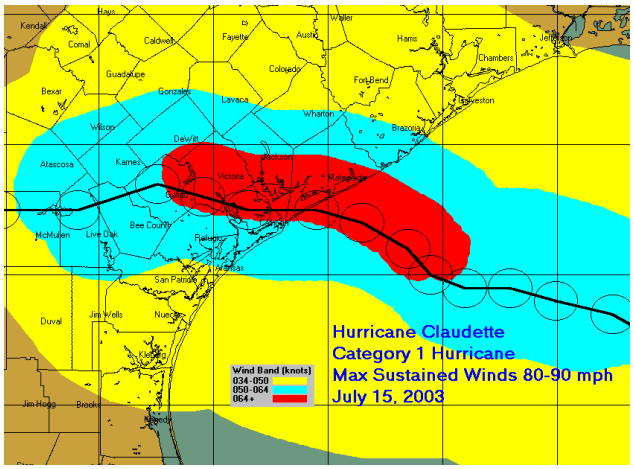
The base radar products that have been available to users are base reflectivity, base velocity, and spectrum width. Three new base products will be available after the dual-pol upgrade, including differential reflectivity (ZDR), correlation coefficient (CC), and specific differential phase (KDP). In addition to these three new base products, there will be several derived products. These include a melting layer (ML) product, a hydrometeor classification algorithm (HCA) product, and eight new precipitation products. The following is an example of using dual-pol products during the recent severe thunderstorm event that produced softball sized hail over the Brush Country on March 31, 2013. These radar products are from the Doppler radar at New Braunfels, Texas. The four-panel shows the recognized reflectivity product in the upper left pane. This image shows very high reflectivity associated with the hail core in this storm. The image also shows a three body scatter spike extending down radial that is a strong indication of hail within the storm. The upper right pane shows the Differential Reflectivity (ZDR) with values below zero and the lower right pane shows the Correlation Coefficient (CC) product with values below 0.80, which are both indicative of very large hail. The values of CC are very low within the three body scatter spike. The lower left pane shows the specific differential phase (KDP) product. There is an absence of data near the hail core due to values of Correlation Coefficient being too low. But values were higher north of the hail core where very heavy rain was indicated.

A LOOK BACK

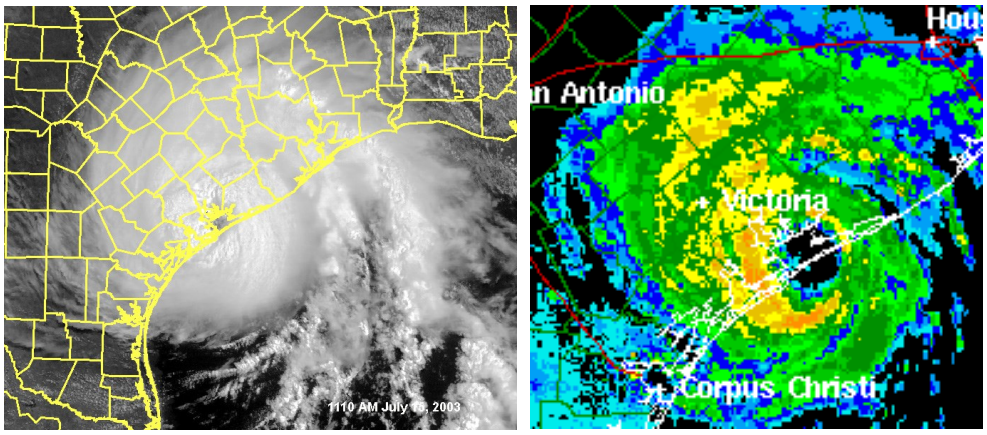
10th Anniversary of Hurricane Claudette

Tim Tinsley — Lead Forecaster

This upcoming July will mark the 10th anniversary of Hurricane Claudette, the last hurricane to make landfall on the Middle Texas Coast. Claudette began as a tropical wave that moved off the coast of Africa into the far eastern Atlantic during the first week of July 2003. Shear weakened as the wave passed through the central Caribbean Sea on July 8th, allowing the wave to form into a tropical storm. Tropical Storm Claudette passed over the tip of the Yucatan Peninsula on July 11th and emerged into the Gulf of Mexico. Steering currents weakened over the central Gulf of Mexico and Claudette's northwesterly movement slowed, becoming almost stationary on July 13th. But Claudette struggled to organize as shear increased over the western Gulf of Mexico. The shear weakened on July 14th and steering currents resumed as high pressure built from the western Gulf coast into the western United States. This would turn Claudette towards the northwest and eventually west. Claudette reached hurricane strength around midnight on July 15th, and steadily strengthened until landfall late on the morning of July 15th. The timing of landfall was quite fortunate for the Mid-Coast as Claudette was in an intensifying cycle. Claudette continued inland across South Texas during the afternoon and evening of July 15th and weakened back to Tropical Storm status. Claudette was slow to lose organization, with radar and satellite presentation remaining distinct for more than 24 hours after landfall. Claudette eventually dissipated west of the Texas Big Bend in northern Mexico on July 17th.



Hurricane Claudette made landfall, as a strong Category 1 hurricane on the Saffir/Simpson Scale, near Port O'Connor, Texas in Calhoun County on July 15th around 10:30 AM. Maximum sustained winds were estimated at 90 mph during landfall. The Formosa Plant in Point Comfort recorded maximum sustained winds of 80 mph with a gust to 100 mph. The minimum central pressure of Claudette at the time of landfall was 979 millibars (28.91 inches). Just prior to landfall, storm surge reached 5 feet at Port O'Connor in combination with high astronomical tides. The storm surge, along with the higher astronomical tide, was higher up the coast to Galveston Bay. The storm tide reached 6 to 9 feet from Matagorda to Galveston with the highest tide of slightly over 9 feet occurring at Freeport.



Left: *Visible satellite image of Hurricane Claudette* ***Right:*** *Base reflectivity of Hurricane Claudette*

Claudette produced brief tornadoes in Port Lavaca and Palacios while making landfall along the middle Texas Coast. One direct fatality occurred as a 13 year old boy was crushed by a falling tree in Jourdanton. An indirect fatality occurred in Victoria when a woman was hit by a falling tree limb. Over 21,000 homes in Texas received damage, most of which occurred around Victoria. There were 191 homes completely destroyed, mostly in coastal areas. Property damage was estimated at $180 million dollars. Major beach erosion occurred from High Island to Freeport and further south in the Sargent area and along Matagorda Beach. Minor beach erosion was observed in Calhoun County, closer to where Claudette made landfall. The heaviest rainfall with Claudette fell around Refugio and Beeville and stretched northwest to just south of San Antonio ranging from 5 to 8 inches across these areas.

Damage near Long Mott

House destroyed in Alamo Beach

Damage to church in Port Lavaca

Aerial view of the damage

LOOKING AHEAD

No End in Sight To The Drought. Will The 2013 Hurricane Season Bring Some Relief?

Greg Wilk — Lead Forecaster

Despite having ENSO (El Niño/Southern Oscillation) neutral conditions over the Eastern Pacific Ocean for the last several months, rainfall over South Texas has been well below normal. Since October 1, 2012 (the start of the Water Year), no portion of South Texas has observed above normal rainfall, with deficits ranging from a couple of inches over the northern portions of the Brush Country, to around 12 inches over portions of the Victoria area and Eastern Coastal Bend. As a result of these rainfall deficits (with most areas never experiencing relief from the 2011 drought), extreme to exceptional drought conditions exist over much of South Texas (see http://www.srh.noaa.gov/crp/?n=drought for the latest Drought Monitor product).

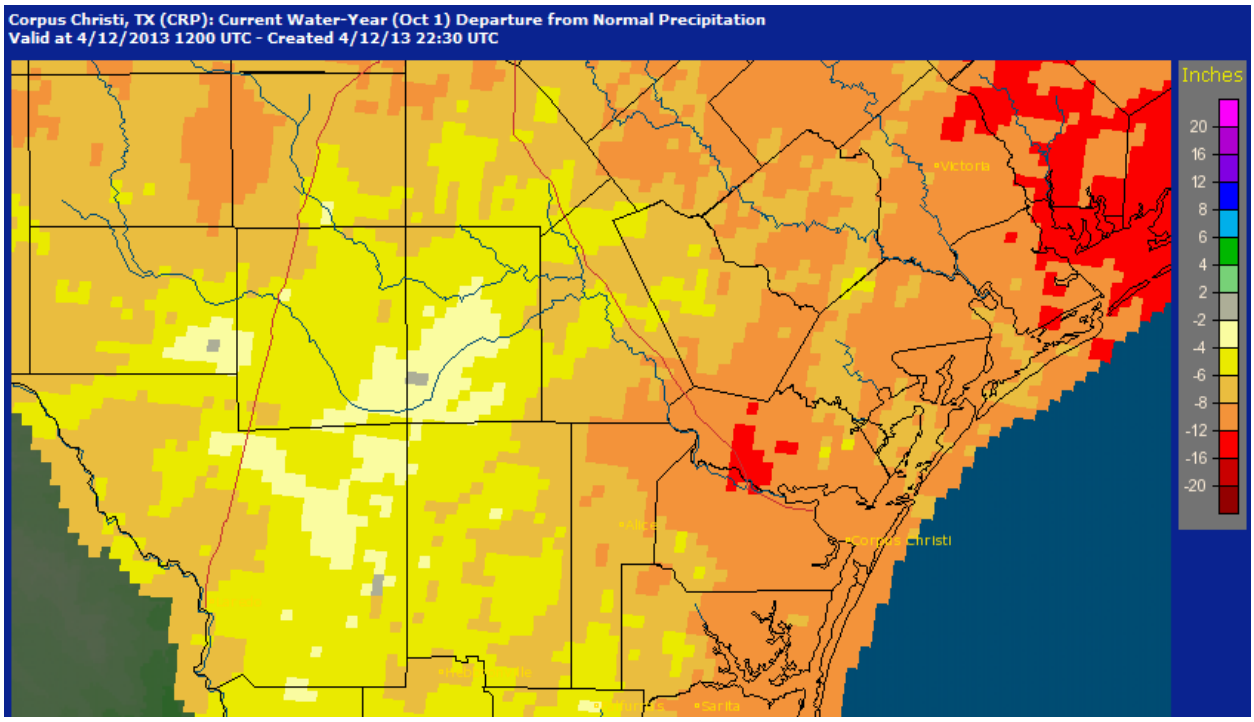


Figure 1: Recent rainfall deficits (in inches) over South Texas for the Current Water Year, which began October 1, 2012. Most of the eastern half of South Texas have deficits of more than 8 inches, with some areas having deficits more than 12 inches.

Unfortunately, the precipitation outlook for the next three months (which includes the beginning of the Atlantic hurricane season) predicts that there is a greater likelihood for below normal rainfall over all of South Texas. If this holds true, then drought conditions (and rainfall deficits) will increase over South Texas. Obviously, this will not be good news for farmers and ranchers, and would mean that water levels in our reservoirs will continue to plummet (which may result in even greater water restrictions for many South Texas residents).

Is there any hope on the horizon concerning this long-term drought? One possible way to alleviate the current drought would be for South Texas to be directly impacted by at least one organized, slow-moving tropical system (not necessarily a hurricane). Dr. Bill Gray, a world-renowned expert at forecasting the number of named tropical systems in the Atlantic Basin each year, predicts an above average season for 2013, with 18 named storms, 9 hurricanes and 4 major hurricanes. Dr. Gray bases this above average season on anomalously warm Atlantic Ocean waters (expected to continue into at least part of the tropical season), along with the lack of El-Niño. Although a slow-moving tropical depression or several slow-moving tropical waves could also help to alleviate the drought, a slow-moving organized system would more likely be a more efficient rain producer. A more organized tropical system however, could also bring unwanted impacts, such as high winds, beach erosion, flooding, and damage to crops. Fortunately, South Texas residents have generally missed the high impact tropical systems in recent years. We may have to endure some unwanted aspects of a well-organized tropical system this year if we want to see some serious drought relief.

If South Texas does not experience a direct impact from an organized tropical system this season, prospects for a wet fall and winter (bringing drought relief) look pessimistic. Long-range forecasts concerning the probability of El-Niño, La-Niña, or ENSO-neutral conditions to develop by the end of 2013 and the beginning of 2014 (Figure 2) indicate that the chances for La Niña conditions to develop are nearly the same as ENSO-neutral conditions to continue. If La Niña develops this fall, then South Texas could be facing serious water shortages, along with other economic and agricultural impacts. Hopefully, residents in South Texas will take water conservation very seriously as summer approaches, as continued rainfall deficits will only further deplete low reservoir levels.

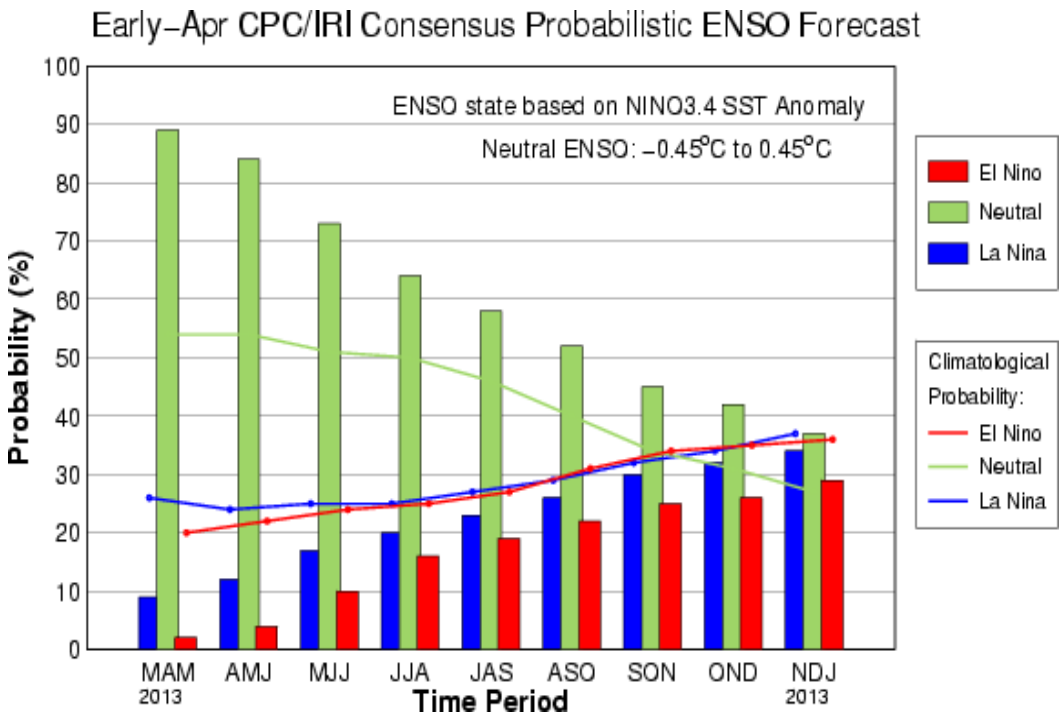


Figure 2: Cumulative probabilities for El Niño, La Niña and ENSO Neutral conditions to develop for each three month period through Nov-Dec-Jan 2013/2014. Note that the probability for La-Niña conditions to develop is nearly the same as ENSO-neutral conditions by the end of 2013/beginning of 2014.

EVENTS, OUTREACH, & MORE

Number of StormReady Communities Growing Across South Texas

John Metz — Warning Coordination Meteorologist

StormReady has an increasing presence in South Texas as emergency managers work to prepare their communities for hazardous weather. In the past 6 months, the City of Laredo and the Naval Air Station in Kingsville and Corpus Christi have become StormReady. They join 139 other communities in Texas with this honorable distinction. Texas A&M University in Corpus Christi will soon join the list, as they are going through the final stages of the application process.

Left to right: Commanding Officer Capt. Mark McLaughlin, Warning Coordination Meteorologist John Metz, and Emergency Manager Monette Walker

StormReady is a nationwide community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather from tornadoes to tsunamis. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations.

To officially be designated as StormReady, a community must:

- Establish a 24-hour warning point for hazardous weather.
- Have multiple ways to receive notification and alert the public of severe weather warnings and forecasts.
- Create a system that monitors weather conditions locally.
- Promote the importance of public readiness through community seminars.
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.
- Pass a site-visit conducted by the National Weather Service.

StormReady doesn't mean storm proof. StormReady communities are better prepared to save lives from the onslaught of severe weather through better planning, education, and awareness. Communities have fewer fatalities and property damage if they plan before dangerous weather arrives. No community is storm proof, but StormReady can help communities save lives.

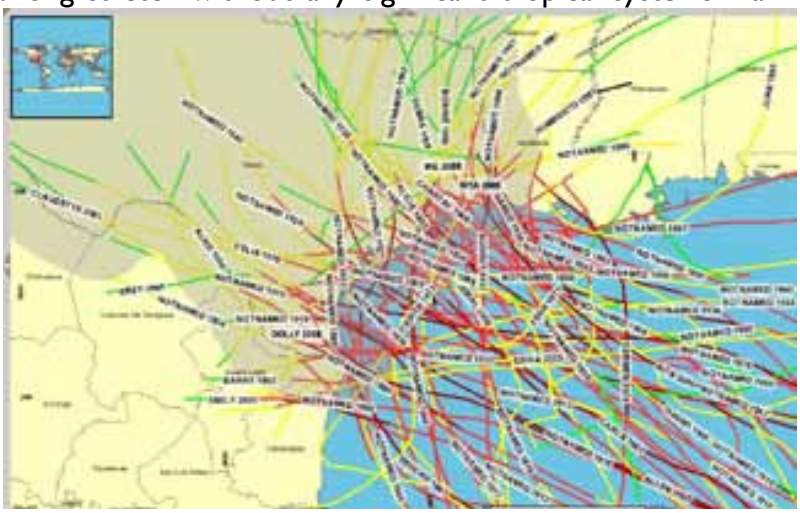
Each of the designated communities in South Texas has exceeded the requirements needed to obtain StormReady Recognition. Congratulations to all the emergency managers for this most outstanding achievement and your dedication to public safety!

StormReady
NATIONAL WEATHER SERVICE

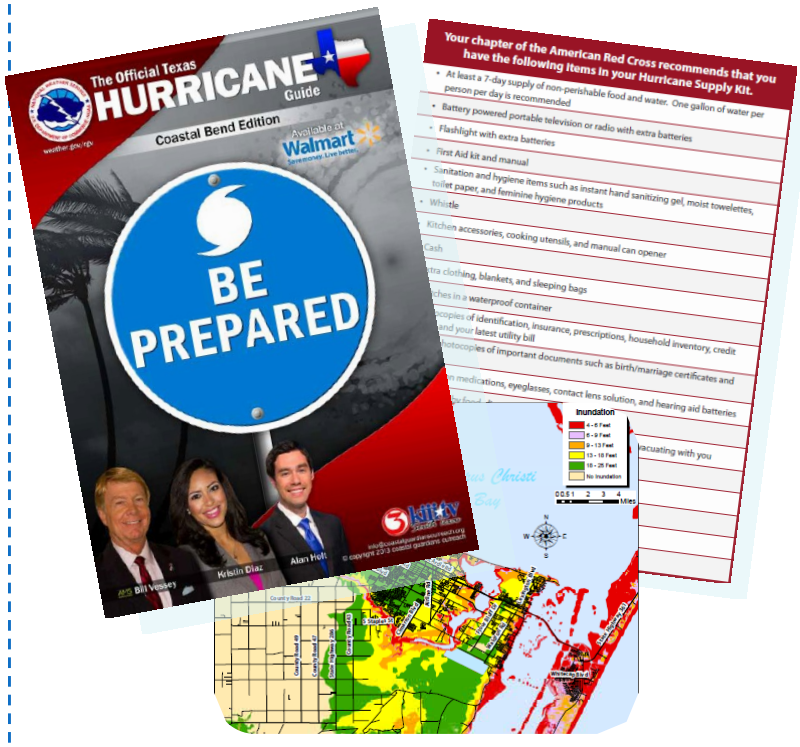
Hurricane Season — Be Prepared

Lara Keys—Meteorologist Intern

Hurricane season will be upon us shortly. Are you prepared? Although it seems like the 2012 Atlantic Hurricane Season just wrapped up, a new season will start in close to one month. Last year brought a lot of attention to the dangers of tropical systems (How could we forget Sandy?). However, it is easy to get complacent when South Texas has had a long stretch without any significant tropical systems making landfall locally. Do not forget though, 63 hurricanes have struck the Texas coast alone since 1851. No place along the Gulf coast is not susceptible to being in danger from hurricanes. Be proactive in your and your family's safety by preparing for this hurricane season. There are many preparedness activities to consider such as building your hurricane supply kit, making sure your insurance is up to date, ensuring your storm shutters are ready to go, and planning your evacuation.



Paths of hurricanes that have struck Texas since 1851.



Once you have made all your preparations for hurricane season, it does not end there. The next key to weather safety is to act on the plans and preparations made when alerted by officials that you are in danger's way.

Want more information on hurricanes, storm surge, flooding, local evacuation routes, safety, and more? Drop by our office or Walmart to pick up your Coastal Bend Edition of The Official Texas Hurricane Guide. You can also visit http://www.ready.gov/hurricanes for extensive information on how to prepare and plan for before, during, and after a hurricane.

Tsunami Preparedness Workshop

Alina Nieves—Meteorologist Intern

On February 7, 2013 the National Weather Service in Corpus Christi, TX conducted their first "Tsunami Preparedness Workshop" at the Public Safety Center in Rockport, TX. The focus of this workshop was to increase tsunami awareness along the mid Texas coast, share outreach and preparedness ideas, and assist the Emergency Managers to establish the first *Tsunami*Ready community on the Gulf Coast. This event coincided with the Great Central U.S. ShakeOut which is a regional safety drill in which millions of people practice the recommended action during earthquake shaking[1]. This workshop provided the means to open up the discussion regarding tsunami awareness and preparedness among the Emergency Mangers along the mid Texas coast. Some of the discussed topics included recent tsunami studies conducted in the Gulf of Mexico, hazards preparedness and mitigation, safety actions to take during tsunami events, and the importance of the *Tsunami*Ready program.

[1]http://www.shakeout.org/centralus/downloads/2012.10.02%20CUS%20ShakeOut%20Announcement.pdf

STAFF SPOTLIGHT

Meteorologist in Charge Scott Cordero, Electronic Technician Rich Martinez, & Journeyman Forecaster Roger Gass Depart from NWS WFO Corpus Christi

NWS WFO Corpus Christi will be losing three valuable members of the staff as **Roger Gass**, **Rich Martinez**, and **Scott Cordero** leave the area to go to other weather forecast offices.

Roger was recently selected to serve as a lead forecaster at WFO Monterey, California. Roger came to WFO Corpus Christi in 2007 as an intern meteorologist. Roger was later promoted on station to journeyman forecaster. While here Roger used his talents in outreach, serving our partners, and improving operations and products in the office. Roger will be making the move with his family to California in May.

Roger Gass

STAFF SPOTLIGHT

Meteorologist in Charge Scott Cordero, Electronic Technician Rich Martinez, & Journeyman Forecaster Roger Gass Depart from NWS WFO Corpus Christi

Rich was recently selected to be the new Electronic Systems Analyst (ESA) at WFO Juneau, Alaska. Rich served as an Electronic Technician (ET) at WFO Corpus Christi, TX, since 2005. Here, Rich kept much of our office, systems, and equipment running smoothly. Prior to his time here, Rich worked at WFO Brownsville, TX. Rich was a member of the US Air Force for 10 years specializing in electronics maintenance of weather, radar, and air traffic control equipment. Rich, with his wife and family, left South Texas at the end of last month to make the long move to Alaska.

Rich Martinez

Scott Cordero

WFO Corpus Christi will also be losing Meteorologist in Charge (MIC) Scott Cordero. Scott was recently selected to be the new MIC at WFO Jacksonville, Florida. Scott arrived at WFO Corpus Christi also back in 2005. Prior to his work here, Scott served at several other offices, including WFOs Chicago, Las Vegas, Brownsville, Memphis, and Pacific Region Headquarters. He has contributed greatly to the office and provided wonderful dedication and leadership. Scott will go with his family to Florida in May.

Roger, Rich, and Scott will be greatly missed here, but we wish them the best of luck and happiness at their new offices. They will continue to make significant contributions wherever they go.

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