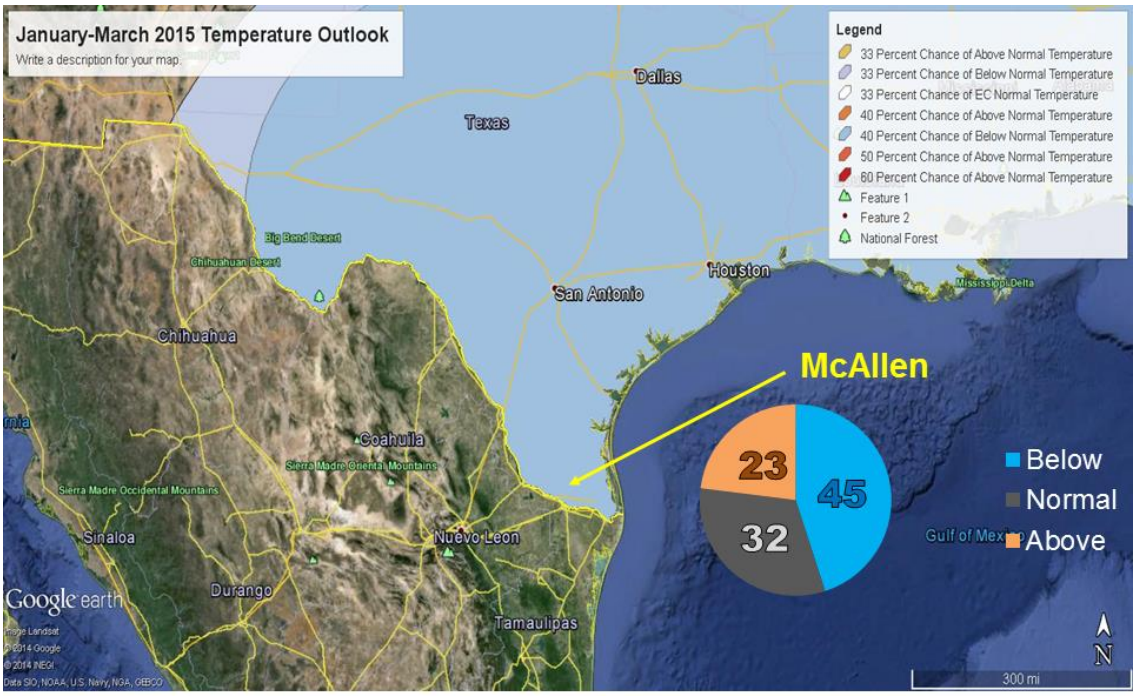
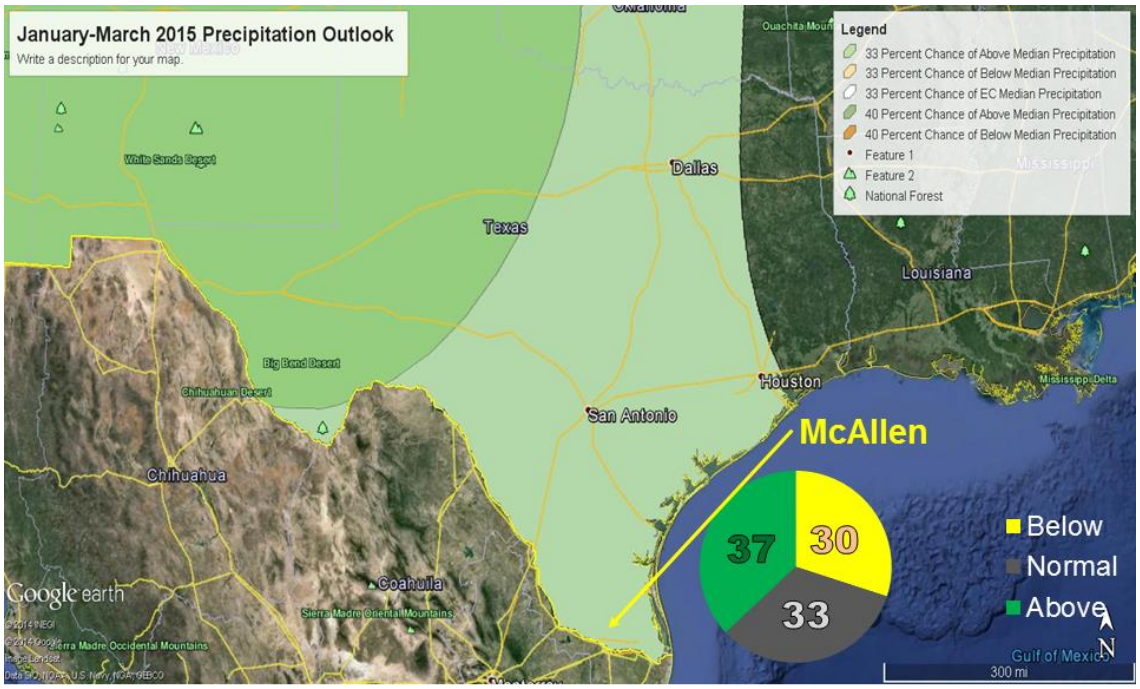
Late Winter/Early Spring 2015 Outlook



Rio Grande Valley Average for January-March (based on 1981-2010)
Wake-Up Temperature: Lower to Mid 50s
Afternoon Temperature: Mid 70s

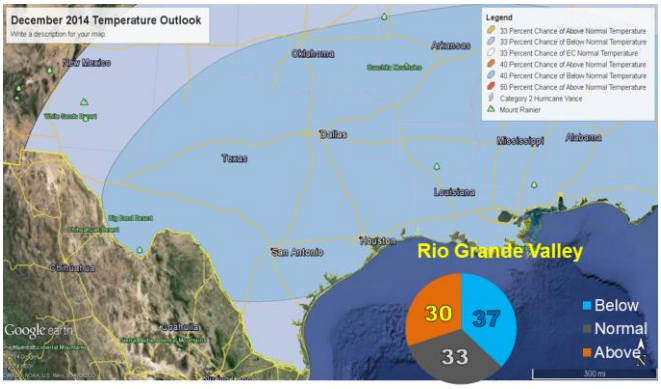


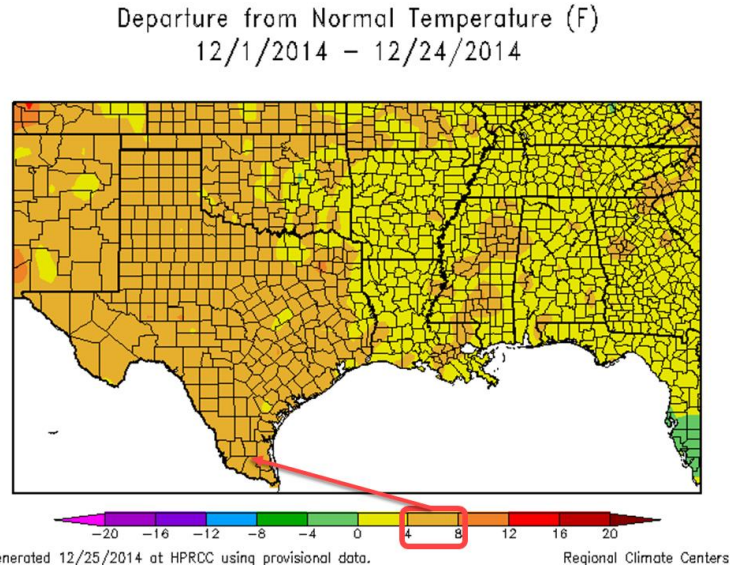
Rio Grande Valley Average for January-March (based on 1981-2010)
Precipitation: Ranges from 2 ½ inches Starr/Zapata to 4 ½ inches Along Coast

2015, For Openers: November 2014-Like?

After Warm December, Do El Niño and Other Factors Return the Chill?

December 2014 "flipped the script" across the Rio Grande Valley after a cool, wet November had seemingly set the stage for continued cool and wet weather to close out the year. While monthly rainfall for most of the populated regions of the Valley was expected to end up above average as forecast, temperatures, which were forecast to be below average (left), were anything but (right). What might this mean for January through March?





Above: Oops!? November's cold trend failed to continue in December. As of Christmas Day, 2014, Rio Grande Valley temperatures remained 3 to 6 degrees above monthly averages. With a few more warm days interspersed with a couple of chilly days to close out 2014, these departures were expected to hold.

El Niño, At (Long) Last

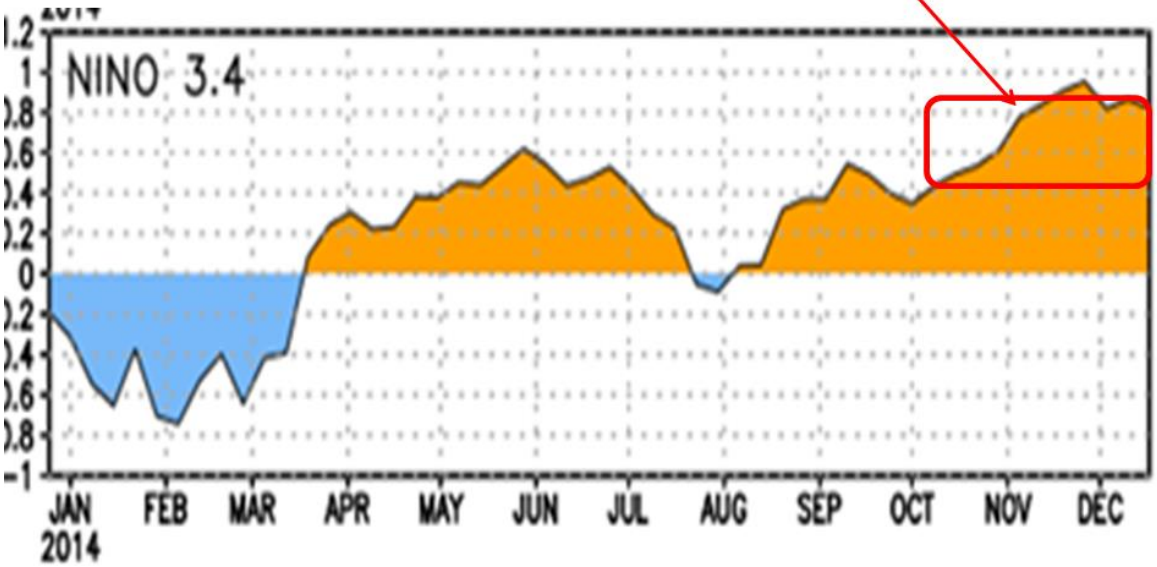
The development of at least a weak El Niño episode looks to be underway to begin 2015. Numerous indicators are in line for the ONI value between +0.8°C and 1.0°C as of this writing (December 25, 2014) to maintain into at least February. All that's left to confirm a weak El Niño is "coupling" of the atmosphere with the eastern/central tropical Pacific warmth, which hadn't yet occurred in December, by the start of 2015. The following are key points for the near certainty for a late winter through (at least) early spring El Niño:

- Sea surface temperature (SST) anomalies in the east-central tropical Pacific, also known as the "Niño 3+4 region", remained steady through December (top image, below)
- Weakness in an upwelling Kelvin Wave (bottom image, below), following two fairly robust downwelling periods, which helped maintain the warmer than average eastern/central tropical Pacific - markedly different from the "meteoric" rise and fall of the late winter/early spring wave earlier in 2014 (note red and orange areas and the width of each).

El Niño was discovered when Peruvian fishermen noted a marked warming of sea water around Christmas (hence, the association of the name with baby Jesus). The increase of anomalously warm water from the east central to the equatorial Pacific late in the year is a more robust indicator for prolonged warm conditions to develop or continue.

Niño 3.4 Region is roughly between 5°N and 5°S Latitude and 170° and 120°W Longitude

El Niño ONI (0.5) exceeded and remaining "stout" since October 2014



El Niño About to Set Sail?

Weekly Heat Content Evolution in the Equatorial Pacific

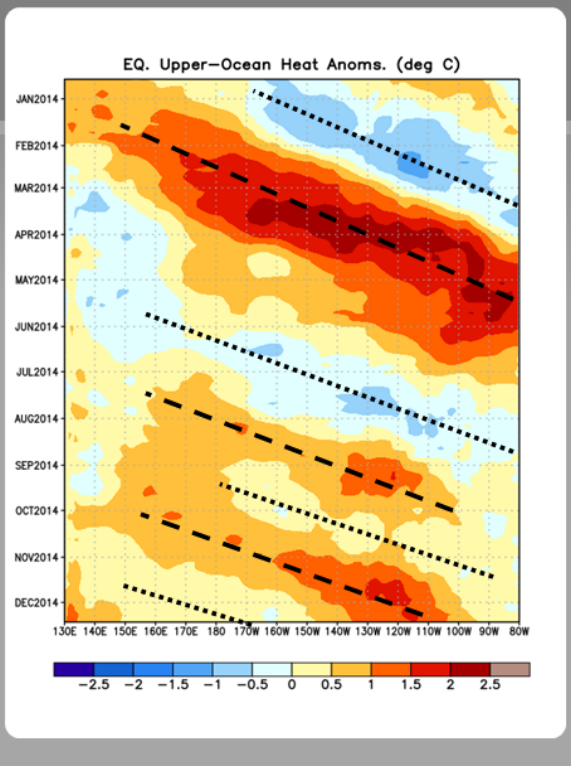
During January - May 2014, the downwelling phase of a strong Kelvin wave crossed the Pacific.

During May-July, positive temperature anomalies progressively disappeared from the equatorial Pacific in response to the upwelling phase of the Kelvin wave.

During October-November, positive subsurface temperature anomalies increased and shifted eastward in association with the downwelling phase of a Kelvin wave.

Since November, a weak upwelling phase of a Kelvin wave has shifted eastward.

Oceanic Kelvin waves have alternating warm and cold phases. The warm phase is indicated by dashed lines. Down-welling and warming occur in the leading portion of a Kelvin wave, and up-welling and cooling occur in the trailing portion.



How Might El Niño Affect the Valley's Weather into Early Spring?

Rainfall

There is increasing confidence for the development of at least a modest subtropical jet stream - sometimes known as the "Hawaiian, or Pineapple, Express" - that will ingest deep tropical moisture from the central and eastern Pacific. Such moisture, when lifted by perturbations (disturbances) riding along the jet, would increase the number of rain producing events from California through Texas, and perhaps extending to parts of Florida and the northern Gulf coast. In December 2014, both California and north Florida saw above average rainfall, with California seeing the most sustained rainfall since 2009, the last time there was a moderate El Niño in play.

However, to relate the California events to the "Pineapple Express" would be incorrect. The California rains were a result of a two week pattern change that brought moisture from the central Pacific, well north of the tropics. Warmer waters along the U.S. Pacific coast, perhaps aided by the persistent positive phase of the Pacific Decadal Oscillation, may have contributed to the amount of available latent heat for heavier rain. El Niño, however, had not yet fully developed and a direct relationship could not be provided in late December.

The lack of persistent December rains across the region south of 35°N latitude gave pause to exactly how the remainder of winter's rains would occur - hence the "lean" toward above average rain rather than a much higher probability heading through March 2015.

Temperature

Typically, the more rain and cloud cover the tip of Texas receives, the cooler the temperature will be compared with long term averages since the combination of fewer hours of sunshine with passages of low latitude cold fronts suppress the ability of the atmosphere to warm sufficiently and transfer that warmth to the surface. For early 2015, confidence in below average temperatures has increased a tad when compared with the December 2014-February 2015 outlook. One reason may be the start of a "buckling" trend in the atmospheric steering pattern, that showed signs of bringing air from the North Pole and/or western Canada down the Great Plains and ultimately into south Texas and northern Mexico, similar to November. The trend could hold for a good part of January, which would return a below normal month to the Rio Grande Valley.

For February, the key will once again be the *exact location* of upper level and surface low pressure areas will track. A slightly farther north track, similar to much of December, would bring strings of warm, relatively humid nights on southerly winds that would more than balance the only slightly above average days ahead of each front. Farther south tracks, as we saw between December 2009 and February 2010, would lock in cooler/colder air for several days in a row and tilt the longer term temperature averages to the negative. The January to March forecast banks on just enough southern track systems in February to lead to cooler than average temperatures for the month, which would likely lock in a below average January-March period, unless March recovered sharply to the warm side, which appeared unlikely in late December.

Freezes

The potential for any freeze in January and February is highly dependent on individual, weekly to bi-weekly weather patterns that can bring just enough cold air to bring temperatures to or below 32°F for several hours. On average in any winter, the number of days when the temperature touches the freezing point ranges from 2 to 4 in the Lower Valley to 4 to 8 in the Upper Valley and Ranchlands. In other words, it's a pretty good bet there will be at least a couple of widespread freezes across Deep South Texas/Rio Grande Valley from December to February – typically favoring rural agricultural and ranching areas. December's warm and humid pattern overall kept freezes to a minimum; a minor freeze occurred on Christmas morning in pockets of the ranchlands that drained well. Sheltered locations beyond the urban corridor of Cameron and Hidalgo County fell to 29 to 32°F that morning.

What About a Hard Freeze or Killing Freeze?

A *hard freeze* is defined as having temperatures drop to ≤27°F for at least two hours across a fairly large area or impact area (i.e. half a county or half a county's population). A hard freeze occurs much more seldom, with less than a day per year across the Lower Valley and 1 to 2 days per year across the Upper Valley. Hard freezes are highly dependent on the arrival of modified air from near the North Pole and whether the push of

this shallow cold air is strong enough to surge through the region. El Niño, even a weak one, would need assistance from teleconnections, such as the negative phase of the Arctic Oscillation, to bring this level of chill. In 2009/2010, this did occur on one occasion (January 9th).

Fortunately, there has not been a *killing freeze* – one which can decimate subtropical crops and plants over a large area – since late December 1989. Such a freeze can last up to 60 hours, but more importantly, comes with very low absolute humidity (measured by dew point) which cools plant temperatures through evaporation. The past two widespread Rio Grande Valley killing freezes (December 1983 and 1989) occurred during weak La Niña (or leaning La Niña) episodes, which are more favorable to situations where air can empty out of the Arctic all the way into eastern Mexico. While one can never rule out a short-term pattern within the seasonal average that could create this circumstance, the probability as of this writing is very slim.

Wind Machine and Dangerous Thunderstorms?

March is typically a transition month out of the damp cold fronts and into warmer and more humid weather which sometimes is punctuated by fronts that move more robustly across the Valley. Such fronts can bring the resurgence of the "Valley Wind Machine" where gusts can reach 50 mph or higher and cause more serious damage than the more typical 20 to 30 mph pre- and post-frontal winds. Rapidly moving systems in the atmospheric steering flow in an El Niño spring can assist both windier days and dangerous thunderstorm potential. In late December 2014, it was a bit too soon to predict the exact type of steering pattern, as well as degree of recovery of tropical moisture as well as near and offshore water temperatures which can add fuel to the atmosphere. Look for more details on the potential for dangerous storms and strong winds in the early spring 2015 outlook, coming at the end of January.

Bottom Line?

Keep the raincoats handy, and make sure your umbrellas are working! In all seriousness, the following tips can help you through the rest of winter:

- For your home: Check window, door, roof, and floor (foundation) for air leaks, and seal them. You can save a lot on your home heating bills with simple repairs.
- For your vehicle: Replace dry-rotted or old windshield wiper blades, check your tires for tread wear and replace, and be sure to check tire air pressure often to ensure a safe ride in the rain.
- For more winter safety tips, check out our "slide guide". Also en Español!
- Review our **Hazardous Weather Guide** for thunderstorm and tornado safety as we move into February and March 2015.