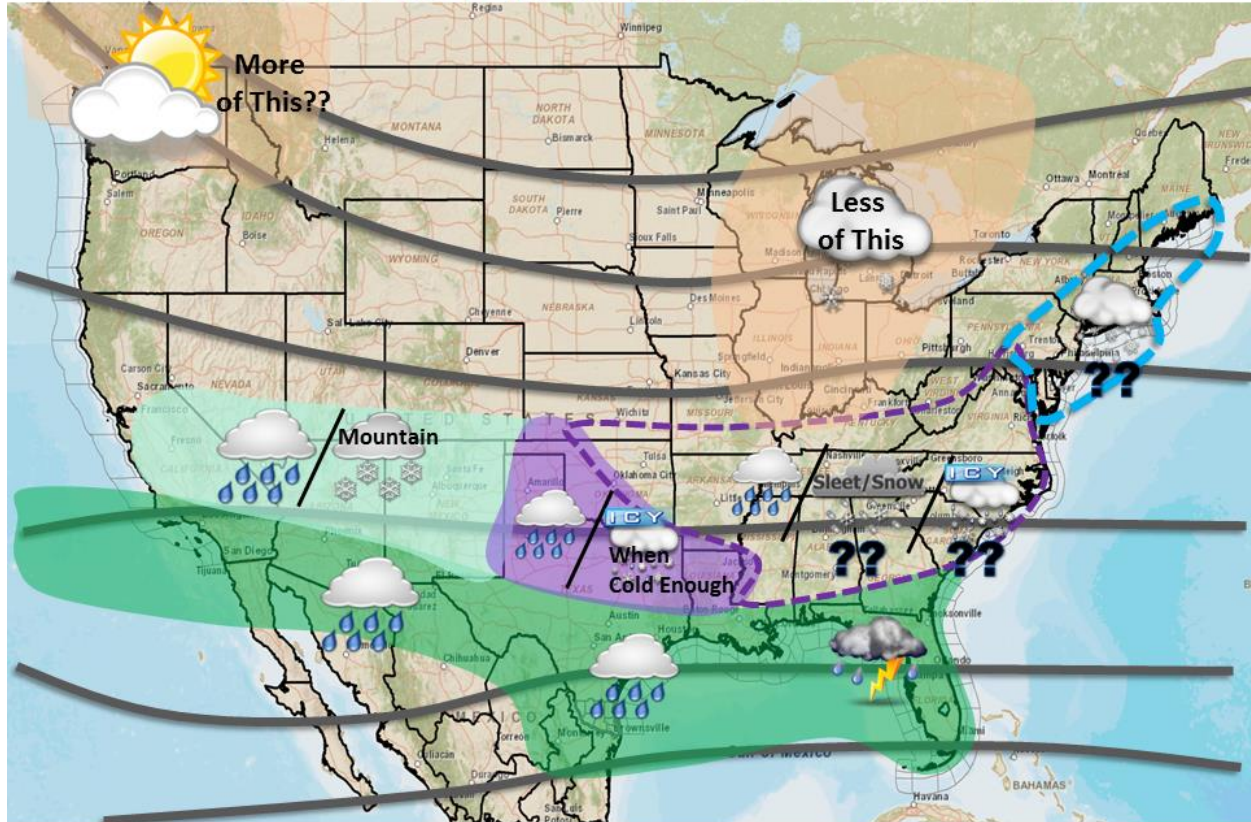


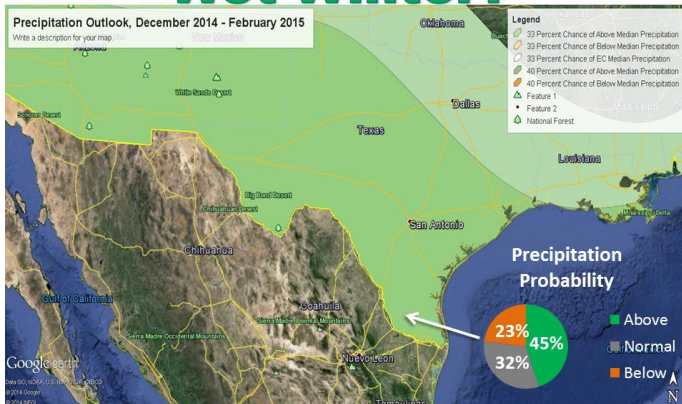
Winter 2014/2015 Possibilities



— Potential Average Flow pattern at 500 mb (~18,000 feet)

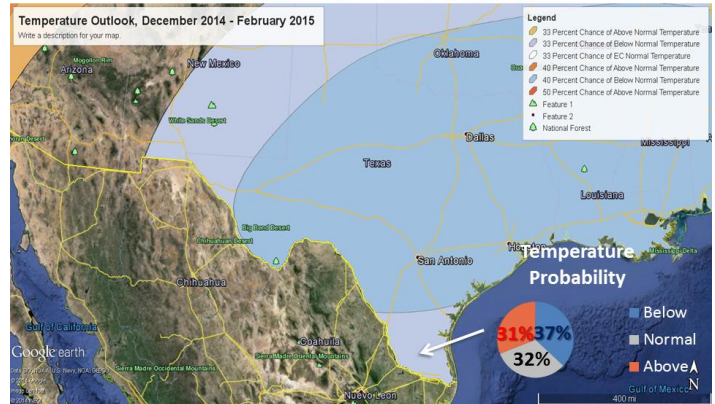
RGV Winter 2014/2015 Forecast: Wet and Cool, Again? Confidence Increasing in Some Similarities with 2009/2010, 2013/2014

Wet Winter?



Note: Average Precipitation for Period (RGV): 3 inches along the Rio Grande (Starr, SW Hidalgo); 3.5 to 4 inches Elsewhere except 4 to 4.5 inches Along the Coast.

Cool Winter?



Note: Average Temperature For Period (RGV): Approximately 63°F
Daytime: ~73°F, Wake-Up: ~53°F.

After a notable November 2014 that featured one [prolonged heavy rainfall event](#), a [cold outbreak](#) that broke a few records mid-month, and a late month [local wind/hail storm event](#) that evolved into pockets of heavy rain, all seemed in line for the expected winter of cool and wet weather. As of November 28th, 2014, month-to-date rainfall was anywhere from 1.5 to 6 inches above average (ranging from 2 to 3 inches across the Rio Grande Plains to 4 to 7 inches in the Lower Valley; average is general 1 to 1.5 inches), and temperatures some 4 to

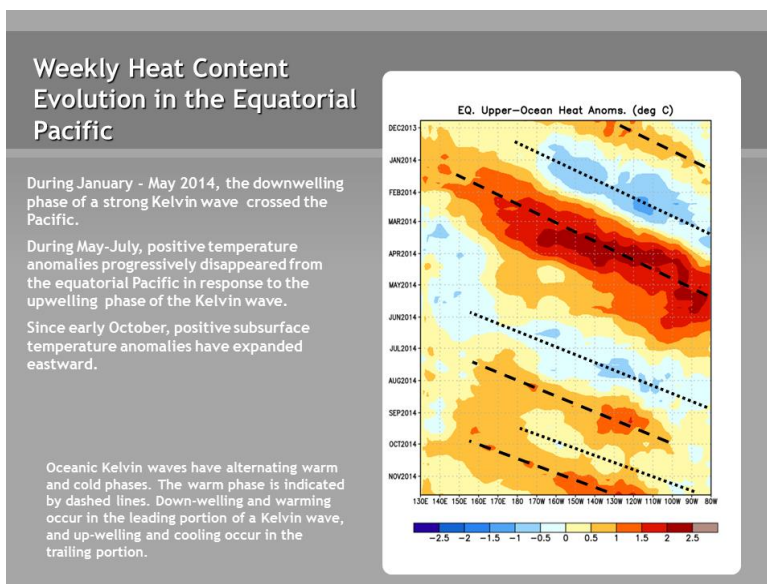
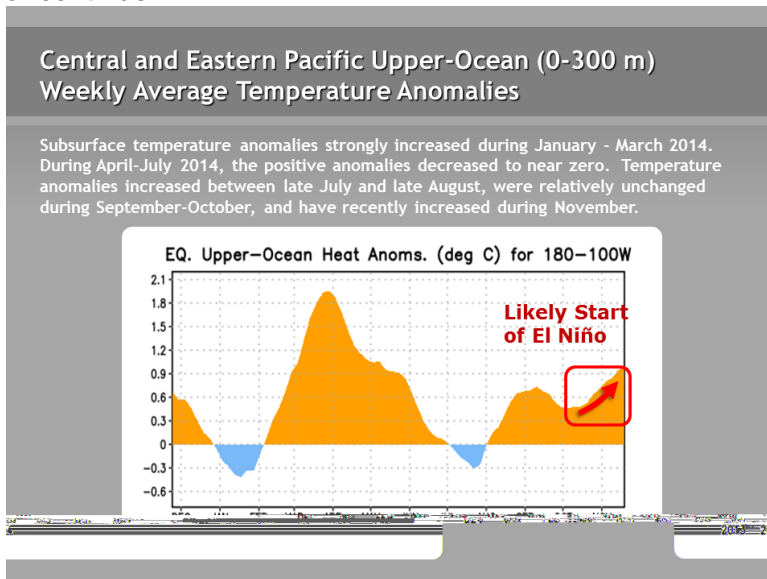
7°F below average (average for the month is in the upper 60s – upper 70s each afternoon and upper 50s for wake-up).

Will winter (December 2014 through February 2015) follow November’s lead? We believe some indicators will (precipitation), while others (temperature, freezes, precipitation type) were very difficult to handicap as November turned to December.

El Niño, At (Long) Last

After months of uncertainty, led by the promise of a rapidly developing El Niño by mid spring, everything has come together for the development of at least a weak El Niño episode by the start of 2015. The following are key points for the increased confidence in 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”, have steadily climbed since September (top image, below)
- The steady climb mirrors the persistence and strength of a down-welling Kelvin Wave (bottom image, below), which is 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.



El Niño index values had risen in October to somewhere near 0.5°C (which is the low end of a weak episode). End of November 2014 values were somewhere near 1.0°C, which suggests the two-month (October-November) period would be between the 0.5 and 1.0°C values. Of course, it requires three consecutive months of the Oceanic Niño Index (ONI) to be at or above 0.5°C to define an episode. Based on the reasoning above, there is high confidence that December's monthly value will remain well above the 0.5°C threshold – and El Niño will be defined as starting in the October-December 2014 window.

How Might El Niño Affect the Valley's Weather?

Rainfall

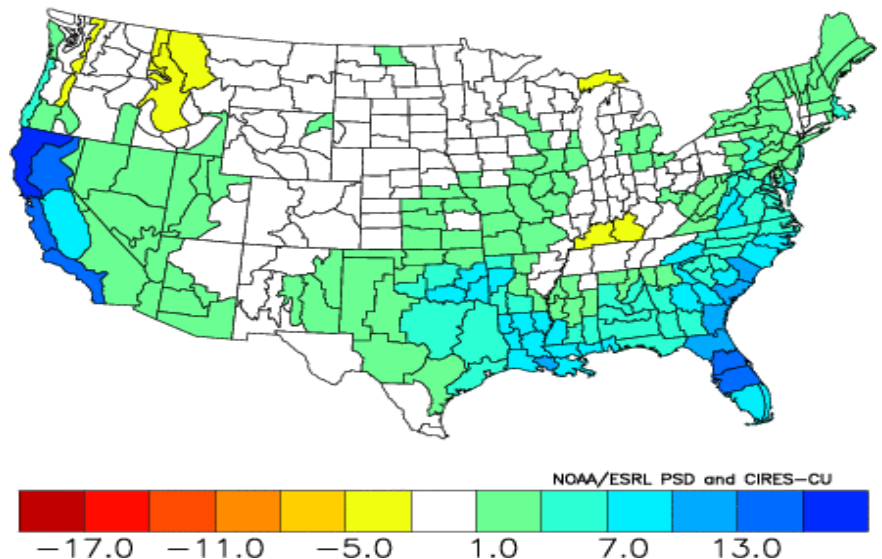
There is increasing confidence for the development of at least a modest subtropical jet stream (sometimes known as the “Hawaiian Express”) that will ingest deep tropical moisture from the central and eastern Pacific. Such moisture, when lifted by perturbations (disturbances) riding along the jet, would increase the number of rain producing events from California through Texas, and perhaps extending to parts of Florida and the northern Gulf coast. Exactly how many perturbations form, when they form, and where they generate the most precipitation remains a mystery. For example, the 2009/2010 moderate winter El Niño episode led to an overall cool and wet winter for the Rio Grande Valley. However, the bulk of the cool (and wet) was “front loaded” in December; January (typically a dry month) was actually *below* average for rainfall in 2010 before the wet and cold weather returned in

February. During the moderate/strong El Niño of 1997/98, big rains fell in October, for mostly unrelated reasons; below average rainfall was the rule during the December-February then. The predominant heavy rain skirted west Texas and the Rio Grande Valley (right). Just a several hundred mile relocation of the upper and lower level storm track can make all the difference for a wet or dry Valley winter – El Niño or not.

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 2014/2015, confidence in below average temperatures is a bit lower than for above average precipitation. One reason may be the unknown of *exactly where* upper level and surface low pressure areas will track. A slightly farther north track 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. We believe there will be just enough southern track systems between December and February to lead to cooler than average temperatures for the period across the Valley.

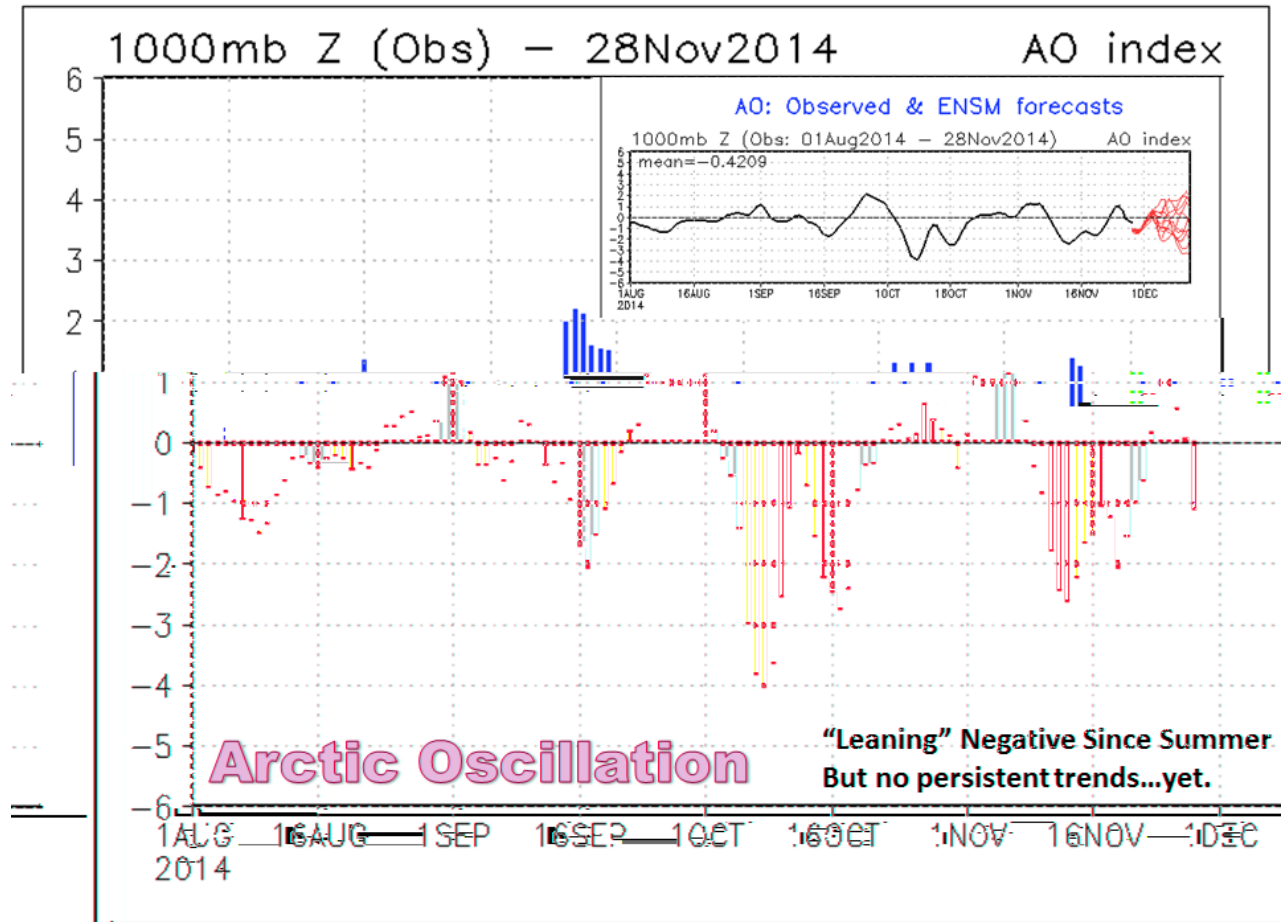
NOAA/NCDC Climate Division Precipitation Anomalies (in)
Dec to Feb 1997–98
Versus 1950–1995 Longterm Average



Another Year of Numerous Sharp (35°F or more) Day-to-Day Temperature Crashes?

2013/14 blew away the previous ten cold seasons for such drops, with seven in total (no year prior since 2004/05 had more than two!). The mid-November 2014 cold snap got this winter off to a rapid start, nearly ten days earlier than in 2013! However, the particular atmospheric “puzzle pieces” that came together were rare; even record-setting (low pressure in the Bering Sea Storm that set the atmospheric chain reaction in motion). The presence of El Niño alone is not enough to dictate the potential for sharp temperature drops; other factors, including teleconnections such as the Arctic Oscillation, North Atlantic Oscillation, Pacific-North American, and Pacific Decadal, will have to line up just right and for a prolonged period to set up a repeat or anything close.

Currently, two of these teleconnections, the Arctic Oscillation (below) and the [Pacific Decadal Oscillation Index](#) (PDO), are more uncertain as to their “assistance” for numerous sharp cold snaps. The PDO in late 2014 had “flipped” positive, and was at its highest positive level this late in the year since the 1997 El Niño. The Arctic Oscillation has “hinted” at turning persistently negative – a connection that tends to favor more frequent cold air outbreaks from the Great Plains to the East Coast – but has failed to solidify.



Freezes

The potential for any freeze during the December-February time frame 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.

What About a Hard Freeze or Killing Freeze?

A *hard freeze* is defined as having temperatures drop to $\leq 27^{\circ}\text{F}$ 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.

Bottom Line?

Keep the raincoats handy, and make sure your umbrellas are working! In all seriousness, the following tips can help you this 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!](#)