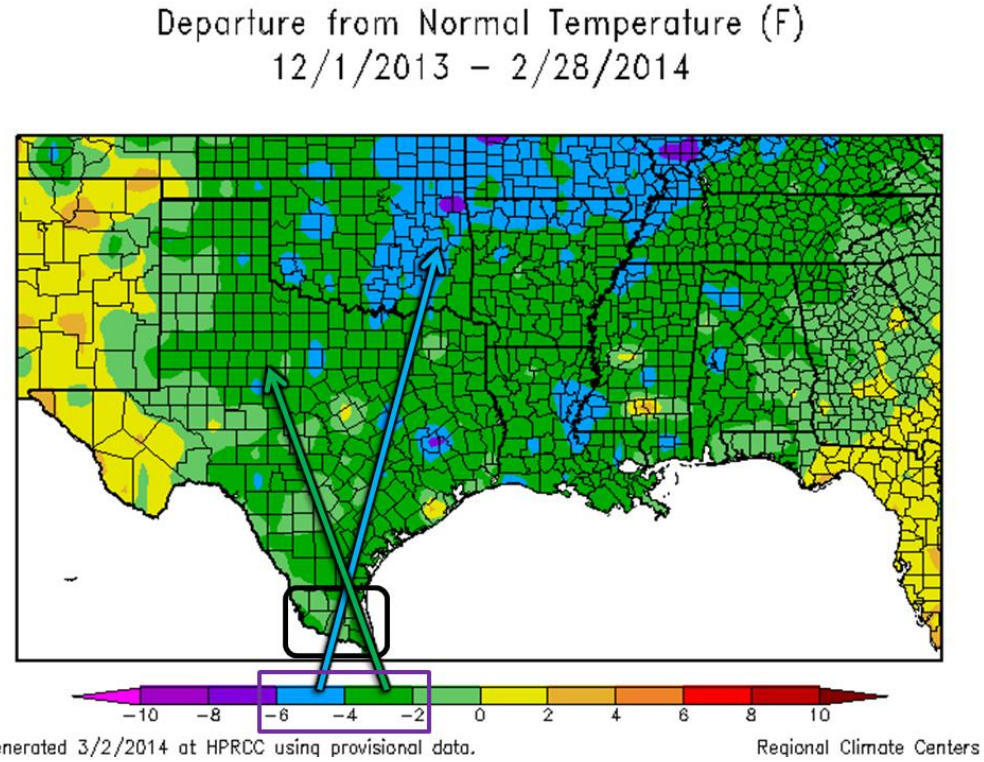
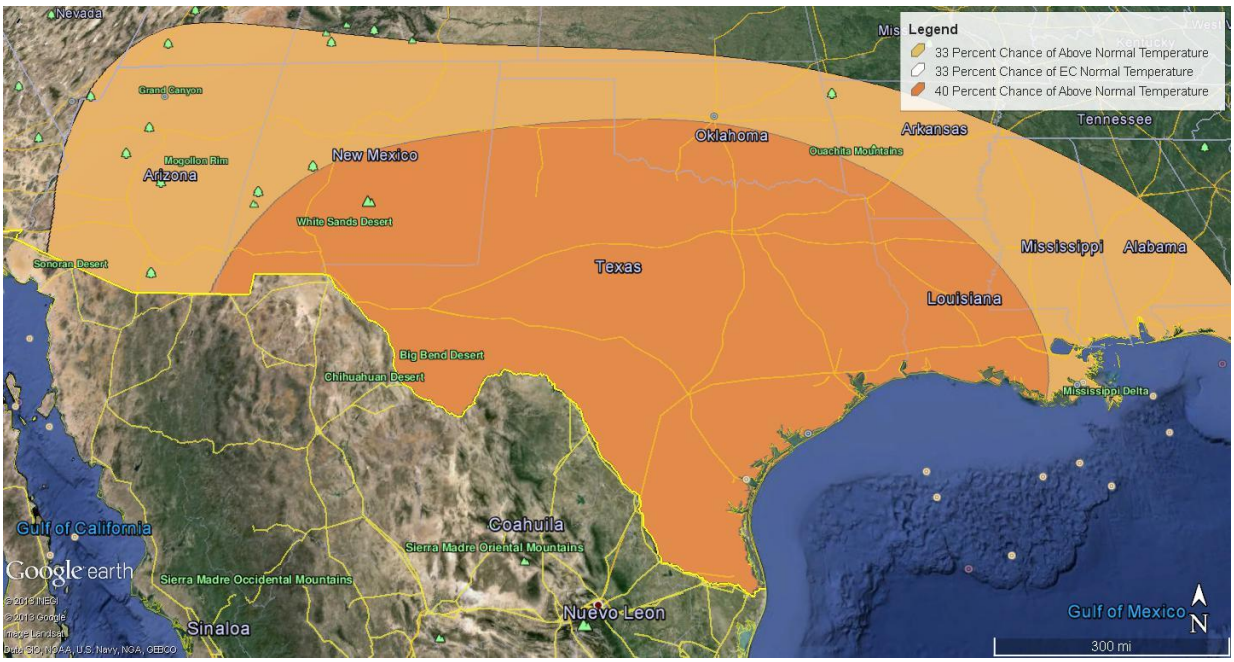
Cold, Damp Memories

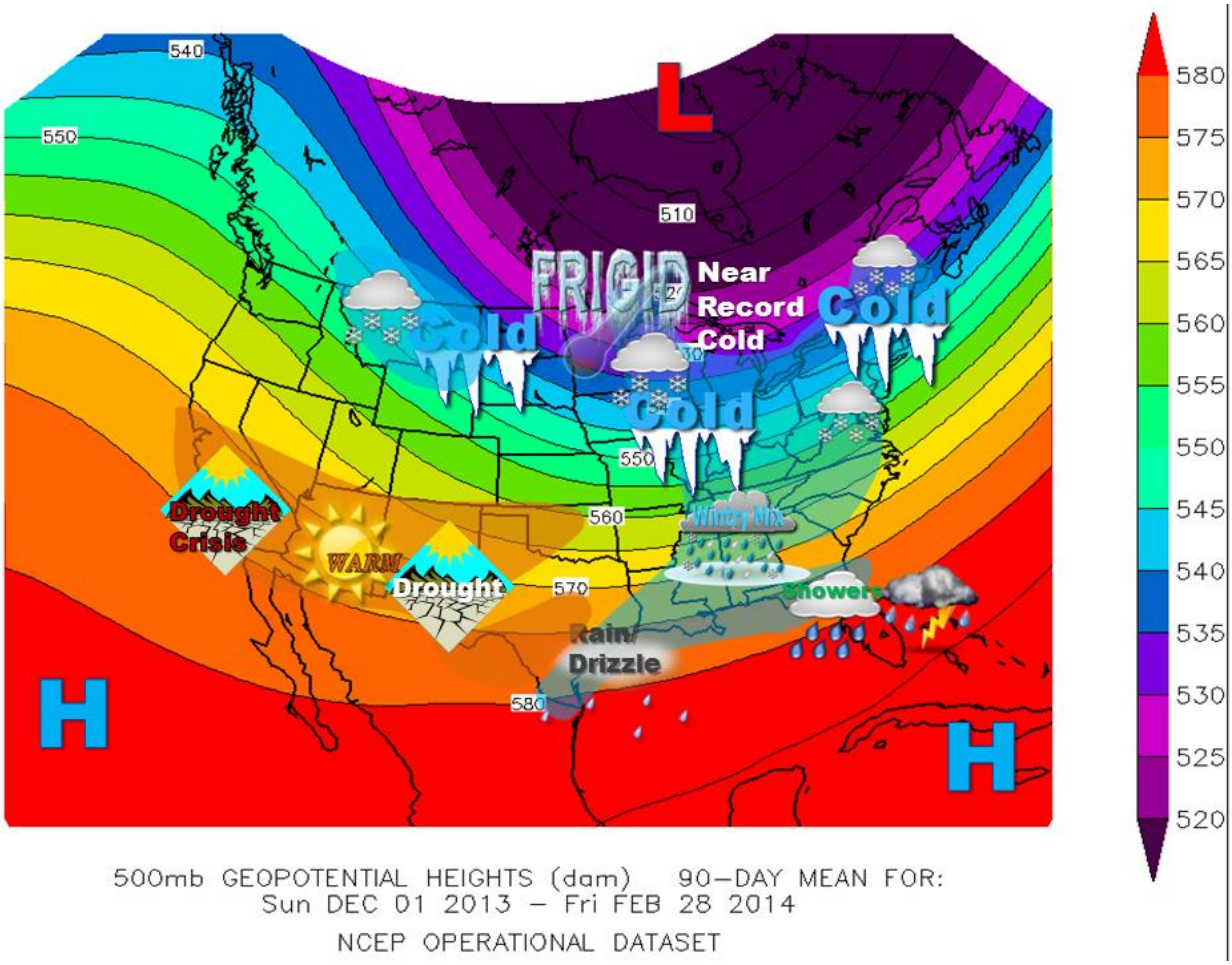
December 2013-February 2014 Rank Among Top 25 Coldest in RGV



The reality: Winter Temperatures across Texas and the Deep South U.S., 2013/2014



The forecast, issued November 21, 2013, for December 2013-February 2014. Data suggested a 45% chance of above average temperatures, a 32% chance of average temperatures, and only a 23 percent chance of below average temperatures. The 23 percent value "won" this "election" by a large margin.



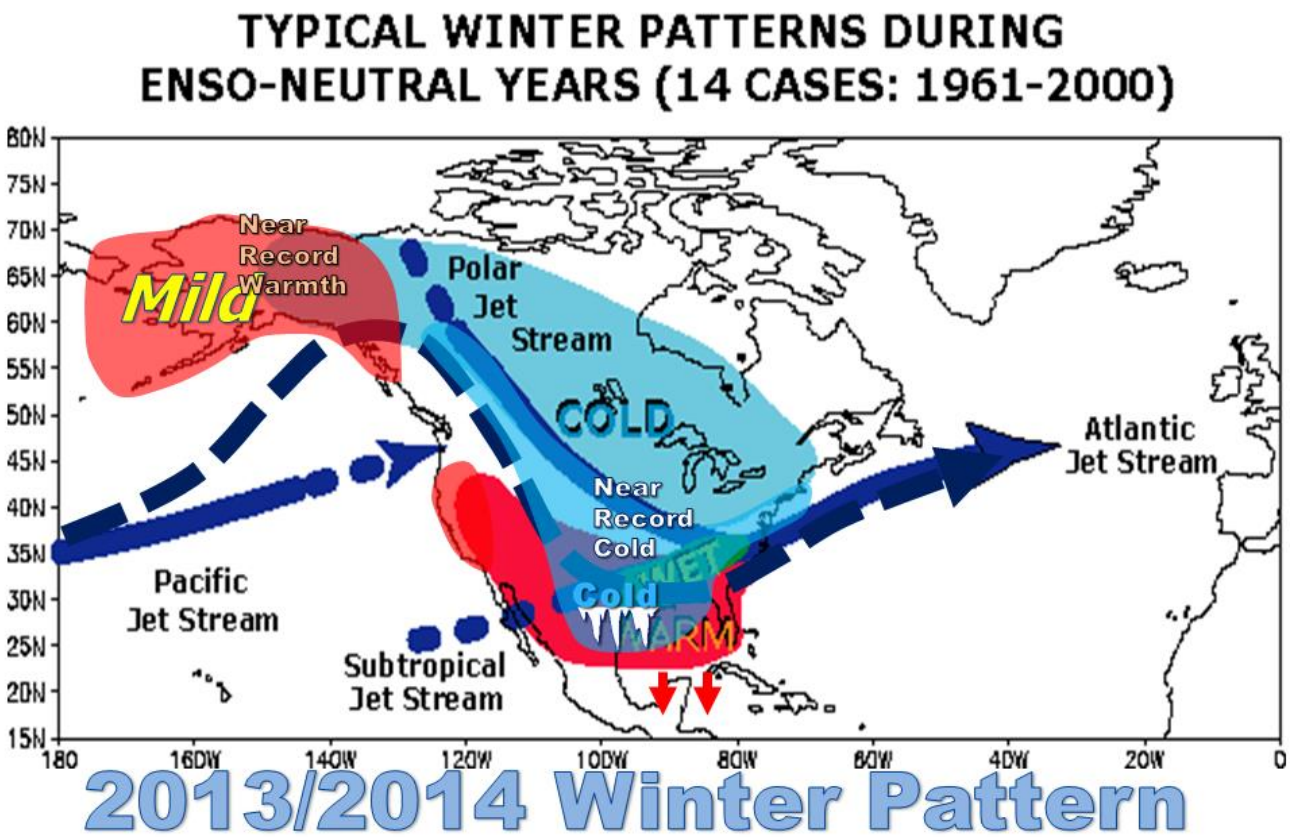
Atmospheric steering pattern (average) and general weather conditions in winter (December 2013 – February 2014).

The forecast was wrong. And we apologize.

Sometimes, even the "big" pieces of the atmospheric jigsaw puzzle don't fit together the way one thought they would. During the winter of 2013/2014, an unusually deep, broad, and persistent upper level low pressure system set up camp over Hudson Bay (red "L", above). The counterclockwise circulation around the low opened the door for frequent excursions of air from the North Pole. These excursions drove through southern Canada and continued through the U.S. Upper Midwest and into the Great Lakes region. Average winter temperatures in these areas neared all-time records and landed in the Top 5 based on records dating to the late 19th century. In fact, for most stations in these regions with more than 100 years of record, 2013/2014 was the first winter of the 21st Century to crack the Top 10 coldest.

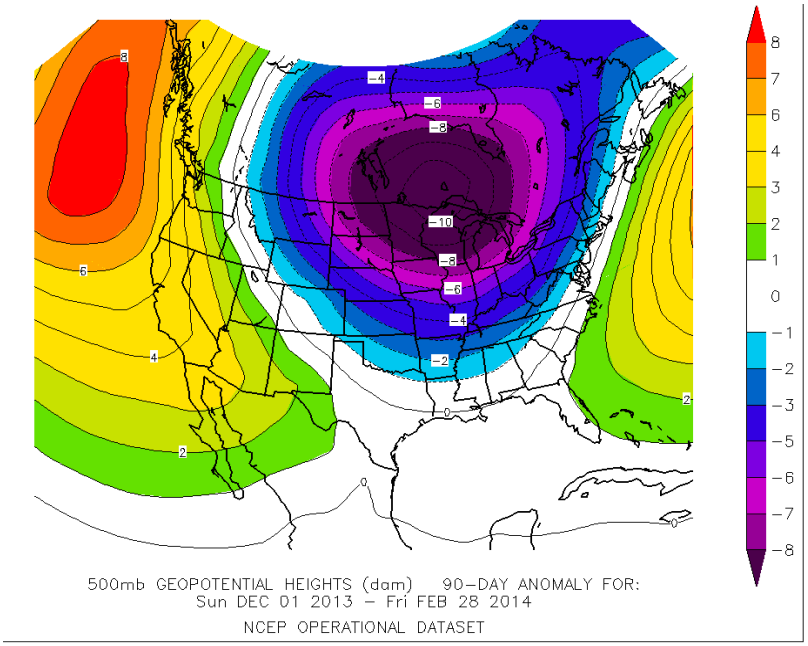
Blame it on ENSO?

A prolonged neutral-phase El Niño/Southern Oscillation (ENSO) *may* be a large reason for the failed forecast across much of the U.S. South. Other signals, including the Arctic Oscillation and the Pacific-Decadal Oscillation, can sometimes help "flavor" the course of a winter season when ENSO is parked in neutral. Unfortunately, that was not the case in 2013/2014; the Arctic Oscillation began December in the solidly positive phase, then turned neutral with a slight negative lean for the rest of winter. The PDO, whose negative phase generally correlates to warmer Gulf and western Atlantic waters (which can influence temperatures east of the Continental Divide) and was generally the case during the winters of 2010/11, 2011/12, and 2012/13, averaged neutral in 2013/2014. For a winter seasonal forecast with a prolonged neutral ENSO phase with no outstanding signals, the slippery slope is the uncertainty. Perhaps the answer to the question, "How warm or cold will the winter of 2013/2014 be?" was "It could be anything: Warm, cold, or 'normal'."



The above chart shows just how a slight “buckle” in the atmospheric steering pattern changed the perception of winter east of the Continental Divide, and why an average (based on only fourteen cases) is just that – an average. The pole-ward shift of the pattern brought warmth to Alaska and a new record warmest winter to Point Barrow, based on more than 90 seasons of data. The pole-ward shift propagated an equator-ward dip of North Pole (Arctic) air across southern Canada, extending to the heartland of the U.S. While the atmospheric steering shifted east well north of the Valley, frequent wedges of cold, dense air easily pushed out warm, humid air that returned temporarily to the subtropics as well as much of the northern Gulf coast. The northward return of the steering pattern along the Carolinas helped keep the Florida peninsula clear of prolonged cold snaps, particularly in December and in February.

The strength of the “buckle” during the winter of 2013/2014 is shown at right. The couplet of red (upper left of image) and pink/purple (center of image) clearly show the strength of the upper level high pressure ridge over the eastern Pacific and pole-ward motion of tropical air into Alaska and a concurrent “Polar Express” east of the Continental Divide and well into the Mississippi Valley and Great Lakes region. The southern Florida peninsula was “protected” by the western Atlantic upper level ridge, which kept the Gulf Stream and Florida Straits warm.



The Lion of Winter 2013/2014

Location	County	Winter 2013/14 (Dec – Feb)	1981-2010 Avg.	Departure	Rank
Brownsville	Cameron	60.1	62.5	-2.4	28th Coldest (since 1879)
Harlingen/Coop	Cameron	58.6	61.2	-2.6	10th Coldest (since 1913)
McAllen/Miller	Hidalgo	59.5	62.5	-3.0	7th Coldest (since 1962)
Edinburg	Hidalgo	58.0	60.5	-2.5	N/A (short period of record to 2001)
Port Isabel	Cameron	59.2	61.5	-2.3	6th Coldest (since 1929)
Falcon Dam	Starr	56.5	60	-3.5	8th Coldest (since 1963)
Port Mansfield	Willacy	56.8	60.3	-3.5	9th Coldest (since 1959)

Temperatures in °F

Closer to Home

Winter's chill often stretched to the Rio Grande Valley in 2013/2014. The frequent combination of shallow but strong cold fronts with warm, humid airmasses overrunning the chilled surface created steel gray skies and periods of precipitation, including conversational sleet on January 6th, one Valley wide ice storm on January 29th and light glaze ice coatings across the Deep South ranchlands of Brooks, Jim Hogg, northern Kenedy, eastern Zapata, and northern Starr Counties on February 6-7. Between November 22nd and March 3rd, there were seven occasions (bottom left) where the temperature crashed more than 35°F between one day and the next (below, left), far more than in any late autumn-early spring in recent memory. Eleven cold fronts were followed by prolonged steel gray skies and/or light precipitation; far fewer fronts came through dry, which had been the expectation.

After a wet end to December, rainfall tailed off in January and February. The combination of heavy rainfall to close December with the frequent cold, damp weather that followed seven times in January and February helped maintain moderate to high soil moisture, especially across the Rio Grande Valley. The well above average rain totals in December across the Valley skewed the seasonal rainfall above average as some areas received well over the average seasonal rainfall in just a week (December 25-31, 2013). Seasonal totals ranged from four to six inches in most of Cameron and four to seven inches in southern Hidalgo and southeastern Starr County, but fell back toward 2 to 3 inches (estimated) across most of the northern ranchlands from Kenedy to Zapata County. The combination of December rain and January/February moisture and frequent cold snaps removed severe and greater drought from the entire region by February (next page).

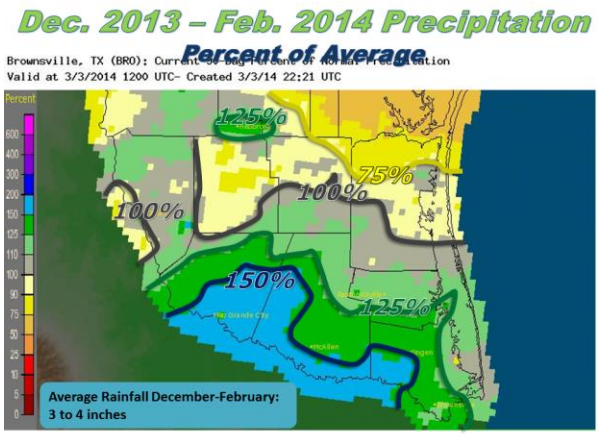
A [Not So] Magnificent Seven

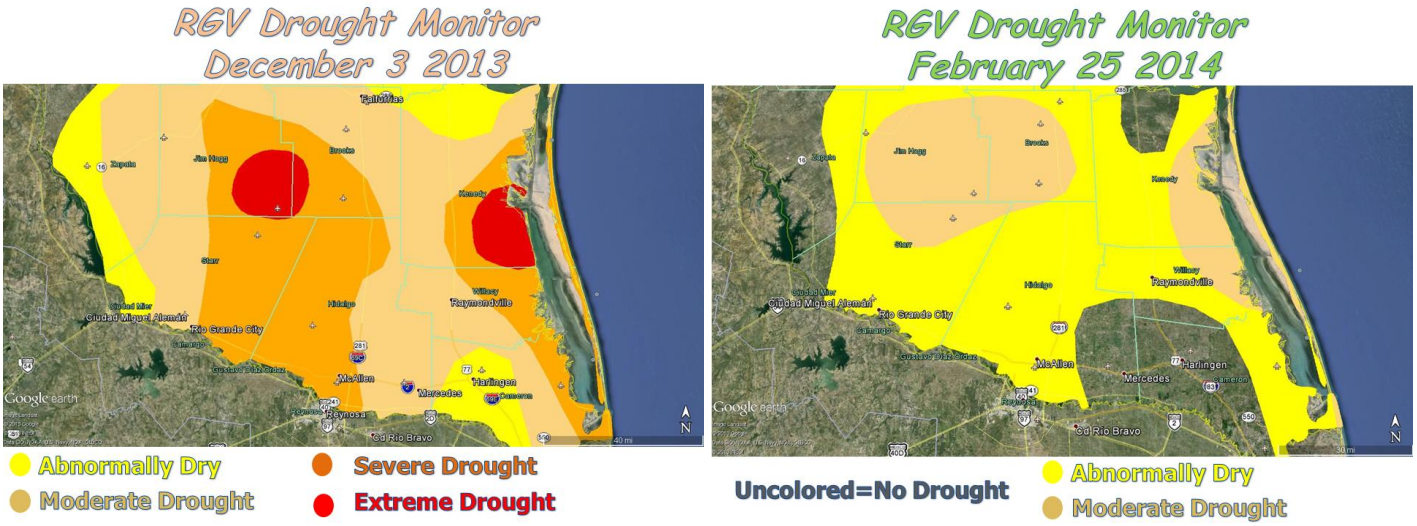
Sharp Temperature Drops (**35 degrees or more**) from one day to the next this winter
(November 2013-March 3, 2014)
Harlingen/Valley International Airport

November 22:	88	November 23 (2 PM):	49	Change: 39 degrees colder
December 5:	83	December 6 (2 PM):	46	Change: 37 degrees colder
January 5:	76	January 6 (2 PM):	40	Change: 36 degrees colder
January 23:	78	January 24 (2 PM):	37	Change: 41 degrees colder
January 27:	80	January 28 (2 PM):	42	Change: 38 degrees colder
February 10:	82	February 11 (2 PM):	41	Change: 41 degrees colder
March 2:	88	March 3 (2 PM):	38	Change: 50 degrees colder

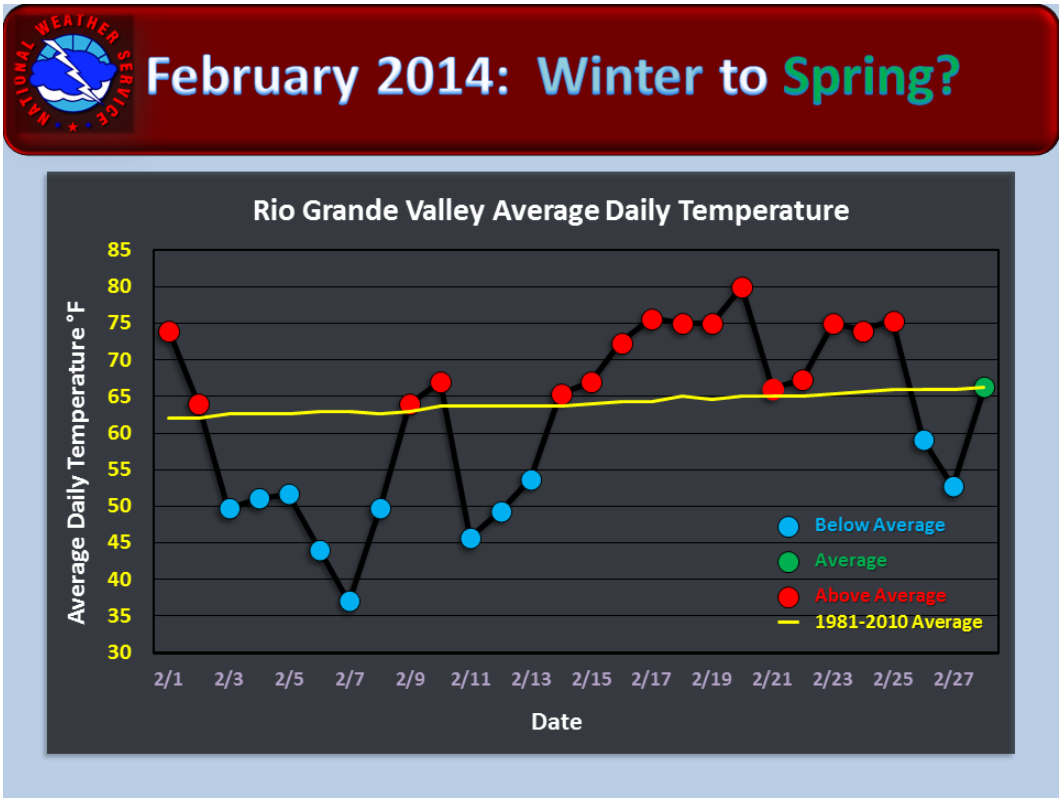
Previous Nine Seasons:

2012/2013: No Cases
2011/2012: No Cases
2010/2011: 1 case (February 1 to 2, 2 PM: 36 degrees colder)
2009/2010: No Cases
2008/2009: No Cases
2007/2008: 1 case (November 21 to 22, 2PM: 35 degrees colder)
2006/2007: 1 case (January 15 to16, 2 PM: 36 degrees colder)
2005/2006: 2 cases (December 7 to 8, 2 PM: 38 degrees colder;
February 17 to 18, 2 PM: 35 degrees colder)
2004/2005: 1 case (December 22 to 23, 2 PM: 35 degrees colder)





Above: Improvement in drought across the Rio Grande Valley and Deep South Texas between early December 2013 and the end of February 2014.

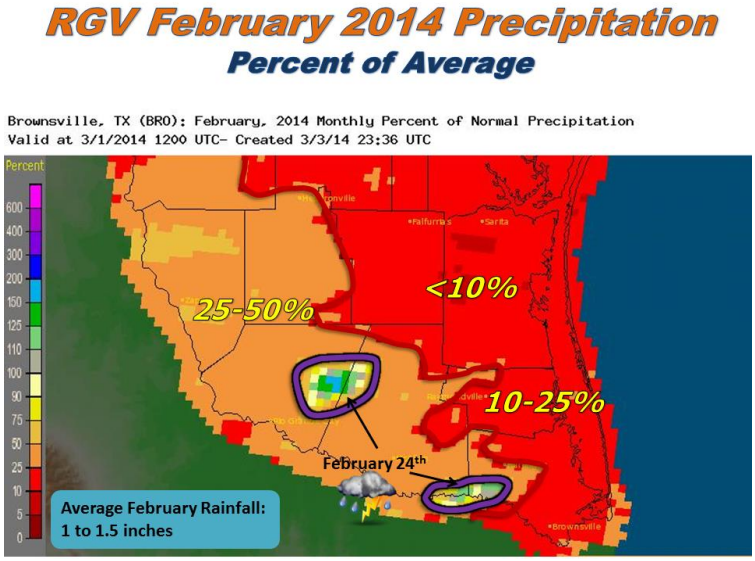


February 2014: Quick Summary

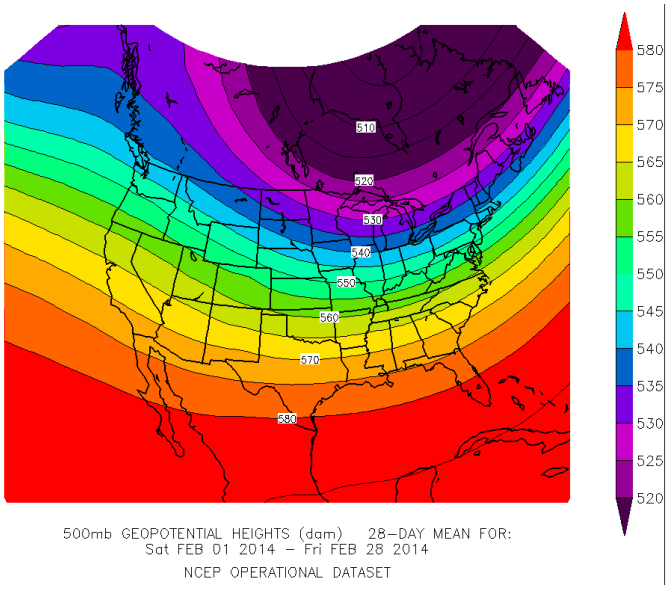
As the chart above describes, February was a tale of two seasons: Winter's chill dominated the first thirteen days, with Rio Grande Valley temperatures nearly 9°F below average through the 13th. From Valentine's Day through the 25th, warm and generally humid conditions prevailed; the increasing sun angle and length of daylight combined with sufficient soil moisture to "spring" grasses, trees, plants, etc. to life toward month's end. In fact, temperatures recovered to nearly 1°F below average and had a shot at reaching the 1981-2010 benchmark before the 10th sharp cold front finished off any possibility. The final monthly tally was 1.8° below average (62.4 vs. 64.2 degrees) at Brownsville; 1.8° below at Harlingen (61.6 vs. 63.4 degrees), and 2.2° below at McAllen/Miller (62.5 vs. 64.7 degrees). February marked the fourth consecutive month with substantial departures below average (~1.5° or more). March 2014 would arrive as a warm lamb before the "lion" ate the lamb; between the 2nd and 3rd, daytime temperatures would crash from near 90 to the upper 30s.

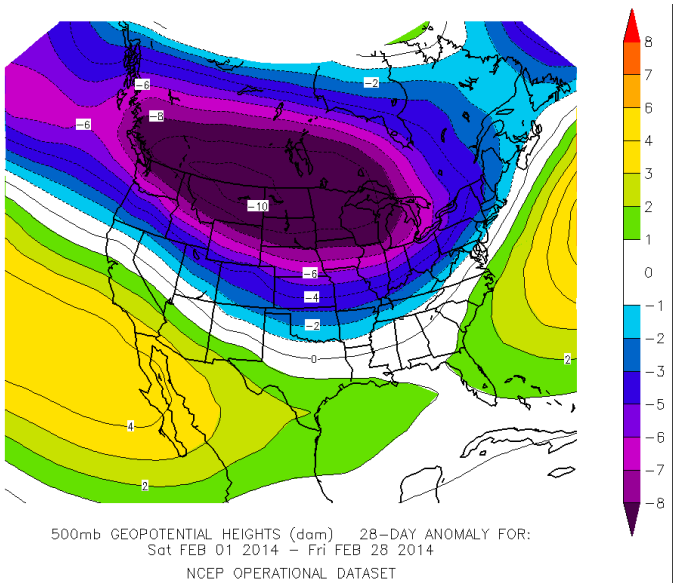
Notable rainfall was scarce in February, as monthly averages settled below one inch. The sole exceptions were a pocket on eastern Starr County and a band along the Rio Grande from southeast of Pharr through

Santa Maria and toward San Benito, where an estimated 1 to 1.5 inches fell from slow moving thunderstorms (circled areas on map at right). Prior to the storms, a prolonged period of dense sea fog plagued the nearshore Gulf waters and South Padre Island between the 22nd and early on the 26th.



For the rest of the nation, winter's beat continued. Persistent frigid weather held under the base of the upper level trough (below) from the central and northern Great Plains through the Great Lakes and Ohio Valley. The "Valentines Storm of 2014" pummeled the Southeast U.S. with ice and sleet, taking out power to more than a quarter million people; the same storm dropped up to two feet of snow in parts of the Mid Atlantic, between the 12th and 13th. The strength of the polar plunge dipped temperatures as low as 15° below average in Iowa, and 9 to 15° below average elsewhere in the northern Plains, Midwest, and Ohio Valley (bottom of page).





Left: Mean steering pattern (500 mb) across most of North America in February. Right: Departure from average values in February. Similar to the winter as a whole, very cold air (purple) was locked across the northern Plains and Upper Midwest. The dominant, poleward ridge over the eastern Pacific flattened a bit, allowing below average temperatures to return to Alaska.