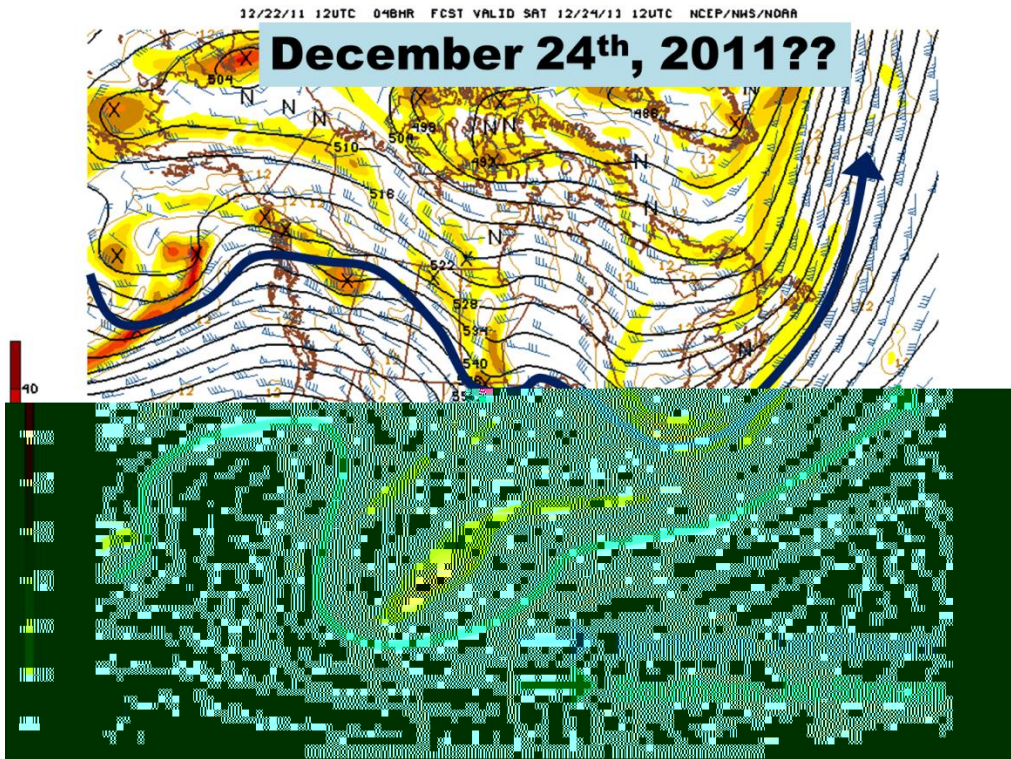


Above: “Split flow” pattern, which was common through the middle part of December. Upper level disturbances in the southern jet stream helped to lift lower level moisture into [welcome rain on the 10th and 11th](#) , and periods of rain and drizzle from the 16th through 18th across the Rio Grande Valley.



Above: The forecast for Christmas Eve, showing another in a series of disturbances expected to lift low level moisture over cooler surface air and produce occasional rain and drizzle for the Rio Grande Valley, for the third consecutive weekend.

Blame It On...?

A Theory on December 2011’s Drought “Time-Out” in Texas

After fourteen months of very low rainfall, interspersed with periods of withering heat and drying winds, every area from the Rio Grande Valley to the Panhandle had some relief in the form of

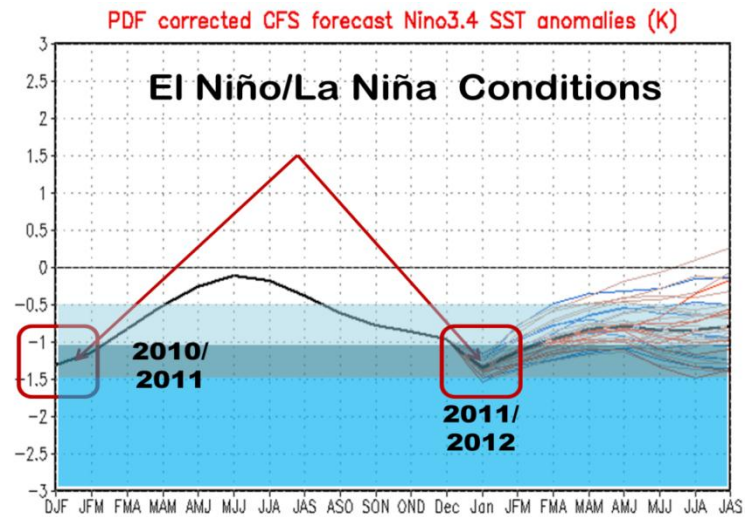
bursts of rain, plenty of clouds, and frequent cooling temperatures in December. The first question for many was, “If we’re in a La Niña similar to this time last year, why is it raining, and why does it ‘feel’ cooler?” This is a good question when only considering the El Niño/Southern Oscillation (ENSO). The image at right shows a striking similarity between the strength of the late 2010 La Niña and the late 2011 La Niña. There is much more to ocean-land-atmosphere interaction than ENSO, which can last from months to years. Intra-seasonal pattern changes driven by regional ocean and continental heating and cooling can either overcome, or assist, the larger scale ENSO. This may explain why much of December, 2011 will be remembered differently than December, 2010.

Arctic Oscillation: What a Difference a Year Makes

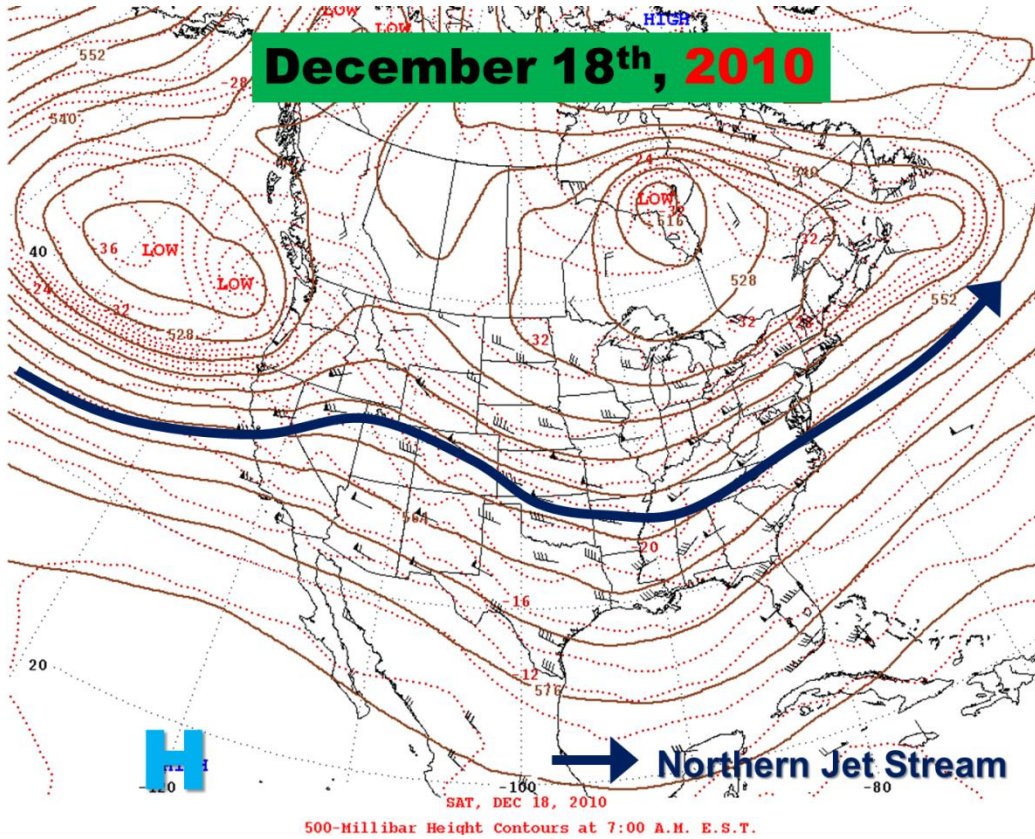
The strongest hypothesis may be the phase of the [Arctic Oscillation](#) (AO). This pattern, defined as opposing atmospheric pressure between the high and middle latitudes in the northern hemisphere. During the winter, a negative phase AO supplies cold air frequently to the eastern half of the U.S. Combined with tropical moisture from an El Niño, heavy snow can result. This was the case from December 2009 through February 2010; all-time records were broken from Texas through the Deep South and Mid-Atlantic states. The Rio Grande Valley saw a [mixed bag from December 2009 through February 2010](#) – overall, the winter was wetter and colder than average.

From December 2010 to February 2011, moderate La Niña had replaced moderate El Niño, and the subtropical moisture vanished. Dry air flowing around a flat high pressure ridge anchored from northwest Mexico into the Pacific west of Baja California reduced rainfall to near zero for the Rio Grande Valley in December, as the jet stream consolidated into one. (next page). The ridge, and equally broad trough of low pressure across the eastern half of the U.S., may have been aided by a second winter with a strongly negative AO. This combination likely contributed to some of [January’s chill](#) and the [early February freeze](#)(s) across the Rio Grande Valley. The AO shifted to positive phase in early February 2011, which correlated with the warming that arrived soon after and continued right into May.

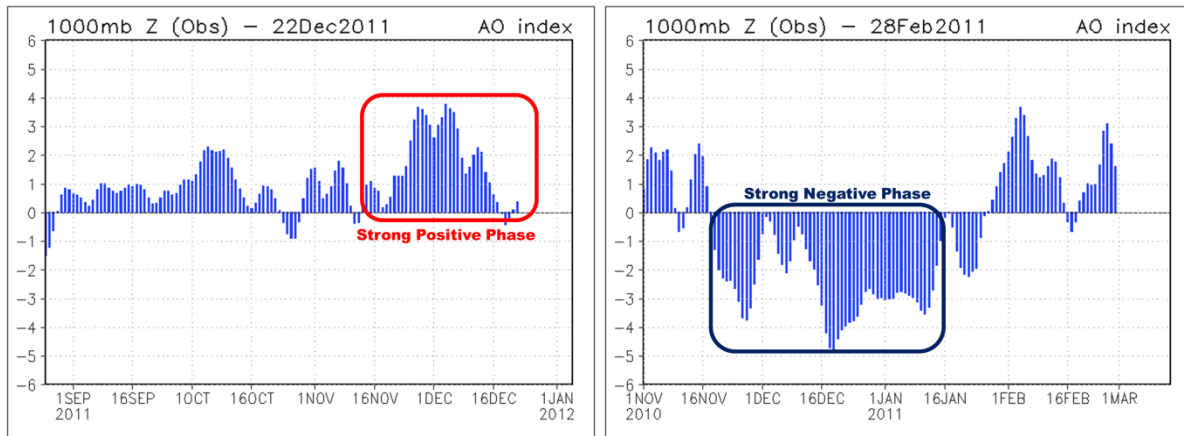
The AO shifted back to negative for most of the summer of 2011, possibly influencing the Atlantic basin hurricane tracks, which, aside from Irene, failed to make much impact along the eastern U.S. seaboard despite 19 named storms. As the Atlantic hurricane season faded, the AO turned neutral, then positive, heading into November and December. The side-by-side images below show the contrast. The positive AO may be a player in a [recent series of windy rainstorms in western Europe](#) .



Climate Forecast System Observed and Forecast ENSO conditions (anomalies) for Nino 3+4 Region (east central Tropical Pacific). Blue shadings indicate strength. Light blue=Weak La Niña; blue-gray=Moderate La Niña; cyan=Strong La Niña.



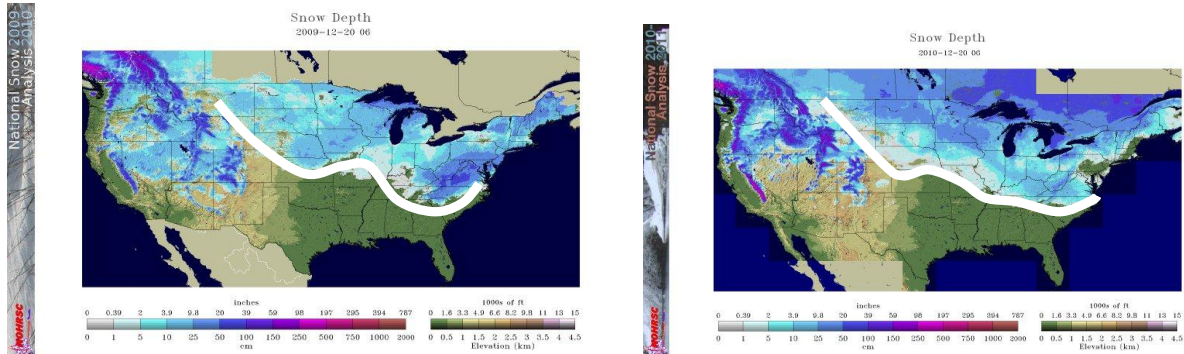
Jet stream pattern for December 18th, 2010. Note the flat high pressure ridge extending from west of Baja California into northern Mexico, and a singular "northern" jet stream. Compare this image to the one at the top of the article for the same time in 2011.



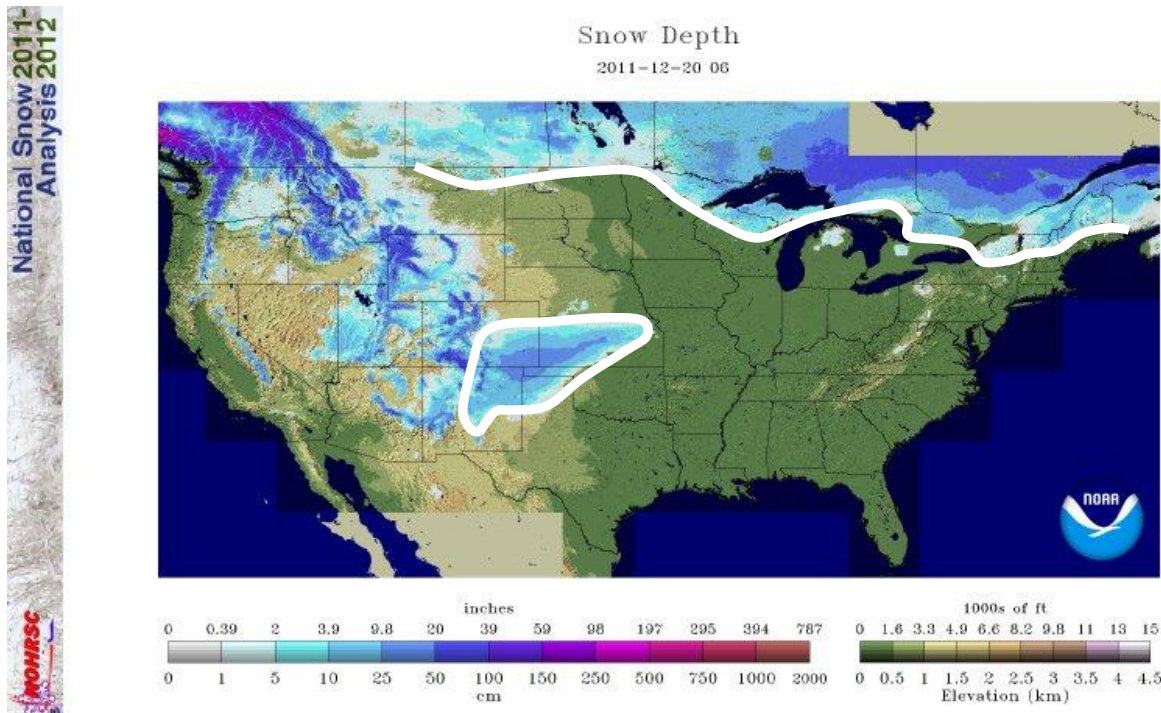
Contrast of Arctic Oscillation in late 2011 (left) and late 2010/early 2011 (right).

White Christmas, Wet Christmas?

Across the U.S., December 2011 has led to Santa preparing another vehicle other than a sleigh. Though White Christmas Eves and Days are relatively rare, the festive weeks leading up to the Holiday often have a modicum of snow, especially across the northern half of the country. In December 2009 and 2010 (below), snow depth was plentiful across a good portion of the country during the ten days prior to Christmas. Coincidentally, strong negative phase AO was present each time. Such is not the case this year; in fact, aside from colder mountain peaks only a fraction of the northern tier of states had some snow on the ground on December 20th.



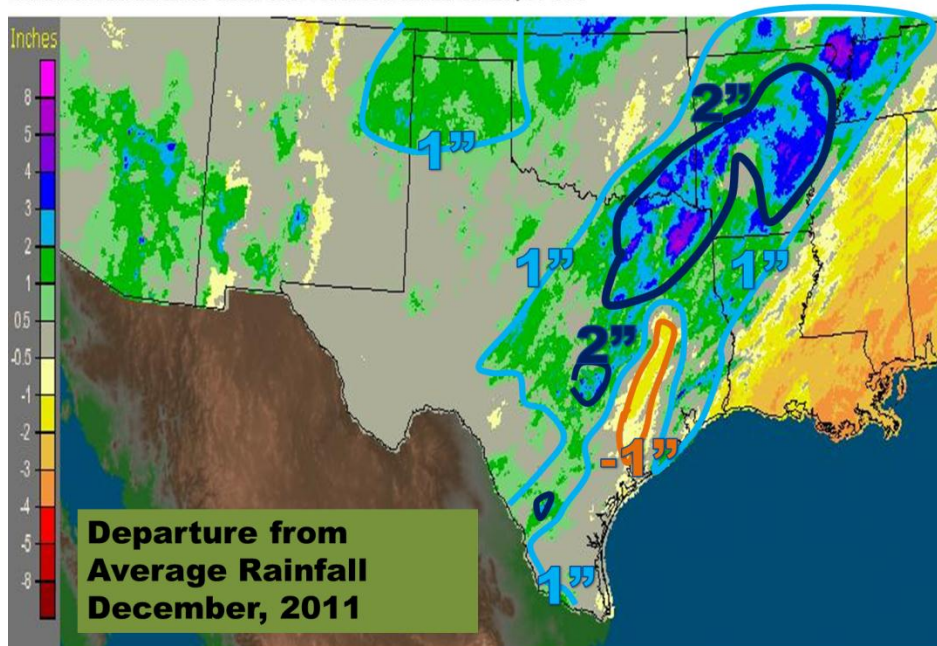
Snow Depth analysis on December 20th, 2009 (left) and 2010 (right). Extent of significant snow depth was nearly one half of the U.S. landmass east of the Rockies (above the white line).



Snow Depth analysis on December 20th, 2011. Aside from small area east of the southern Rockies, where an individual disturbance in the southern jet created a notable storm, only a fraction of the U.S. is under any snow depth.

The area of snow pack in the southern Great Plains (above) is one result of the train of upper level disturbances which have ejected out of Baja California and Sonora, Mexico and weakened into dissipating open waves as they moved into New Mexico and west Texas. As they weaken, they have been able to lift enough Gulf moisture into the welcome rain in much of Texas, and repeated snow in northern New Mexico. One or two more waves are expected to continue the trend into the Christmas weekend, and perhaps longer. The map below shows the December rainfall departure from average in Texas through December 21.

Texas: Current Month to Date Departure from Normal Precipitation
Valid at 12/22/2011 1200 UTC- Created 12/22/11 23:44 UTC



More rainfall will fall across Texas on Christmas Eve, with higher totals once again across East and Southeast Texas. The Rio Grande Valley will add a little to the decent totals thus far, ensuring that all but the immediate coast ends up at or above monthly averages this December, for the first time since January. Santa may need his sleigh after all, as a pocket of snow will move from southern New Mexico into west and central Texas in time for the night ride.

What's Next?

There are signs that the AO will return to neutral, or perhaps slide a bit into negative territory to begin 2012. Long range models show the split jet stream merging as the new year approaches, with a pattern that may become a little more settled, and dry. It remains to be seen how the weather responds in Texas; January is known to switch from warm to cold and back again during winter's nadir. The northern jet stream typically reaches its southern most latitude in January. It's generally safe to expect the occasional cold blast or drizzly front in any pattern during any January in Texas. Stay tuned!