Winter Season 2010-2011 Climate Outlook

Current Status with the Climate System

La Nina conditions developed during this past summer, and have been strengthening this fall. La Nina is associated with a periodic cooling of the waters in the equatorial part of the Pacific Ocean.

La Nina and its Importance

La Nina (and El Nino) conditions are the most well understood, in terms of their long-term impacts on weather patterns worldwide. Their developments have far-reaching effects on global circulation patterns which, in turn, affect the position and strength of jet streams. This has an important influence on the strength and track of storm systems.

Over the years, specific weather patterns have been observed, in association with La Nina (and El Nino) conditions, especially for the stronger events. This has led to a better understanding of their effects on a large scale. Their effects can be accounted for in the long-range outlooks.

Climate Outlook for Winter Season 2010-2011

The Climate Prediction Center indicates that La Nina conditions will continue through the upcoming winter season and into the spring of 2011. From recently observed trends and climate model forecasts, a strong La Nina event is expected. This may become one of the strongest La Nina events on record.

The following two links show the NOAA Winter Season Outlook, from the Climate Prediction Center.

NOAA Winter Season Temperature Outlook

NOAA Winter Season Precipitation Outlook

The temperature outlook indicates an enhanced probability for temperatures to average above normal across West Central Texas during the upcoming winter season. The precipitation outlook shows slightly enhanced probability for winter season precipitation to be below normal across roughly the northeastern half of West Central Texas, with a greater probability of below normal precipitation across the southwestern half of West Central Texas, including adjacent parts of west and south Texas.

Local Study and La Nina

With the expectation of a strong La Nina event, a local study was conducted, to investigate whether there may be an association with winter precipitation and the moderate to strong La Nina events. In this study, historical precipitation records were examined back to 1950, for Abilene, Rotan, San Angelo, and Brady. Since the catalogue of La Nina and El Nino events also extends back to 1950, this was used as the initial year for the study. The years in which moderate to strong La Nina conditions were observed, during the fall and subsequent winter seasons, include: 1954, 1955, 1964, 1973, 1975, 1988, 1998, 1999, and 2007.

These were the years selected for the local study. In this study, we compared average winter (December-February) precipitation for the years with moderate to strong La Nina, verses the normal winter precipitation. The normal precipitation is based on the most recent 30-year normal which, in this case, is 1971-2000. The results are shown in Figure 1 below.

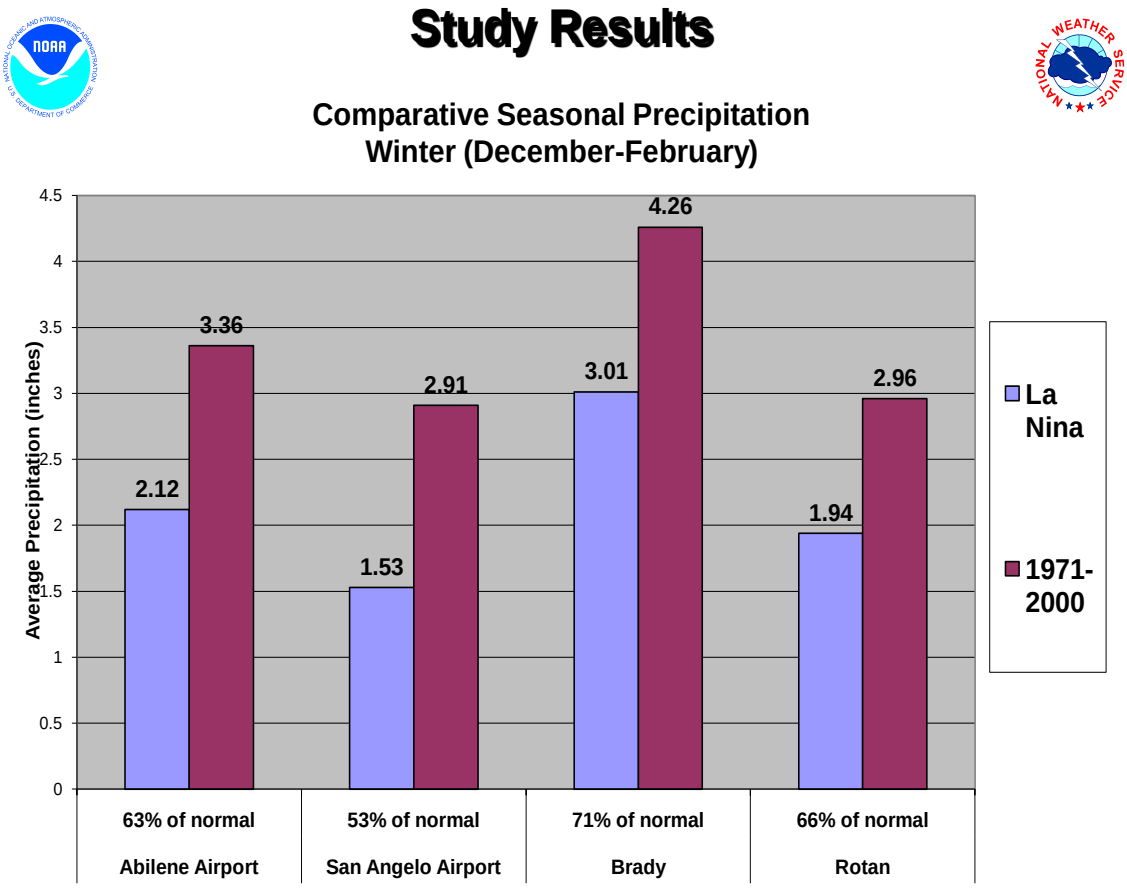

Figure 1: Comparative Precipitation Results, La Nina verses Normal

Figure 1 shows the comparative winter season precipitation at Abilene, San Angelo, Brady, and Rotan. In Figure 1, the purple bars show the average winter season precipitation, for the years in which moderate to strong La Nina conditions occurred. The maroon bars show the normal average winter season precipitation, based on the most recent 30-year normal time period of 1971-2000.

From Figure 1, average winter season precipitation with moderate to strong La Nina is below the 30-year normal winter precipitation, for all four locations. This is consistent with what is indicated in the Winter Outlook from the NOAA Climate Prediction Center.

Comparative Look at La Nina, El Nino, and Normal Winter Precipitation

In light of how La Nina conditions may have an important influence in the upcoming winter season, an item worth noting is the contrasting effects on winter season precipitation with La Nina verses El Nino. A previous local study compared winter season precipitation, for the years in which weak to moderate El Nino conditions occurred, to normal average winter season precipitation, based on the 30-year normal for the period 1971-2000. This previous study was also conducted for the locations of Abilene, San Angelo, Brady, and Rotan. A comparison of La Nina and El Nino to normal winter season precipitation is shown in Figure 2 below.

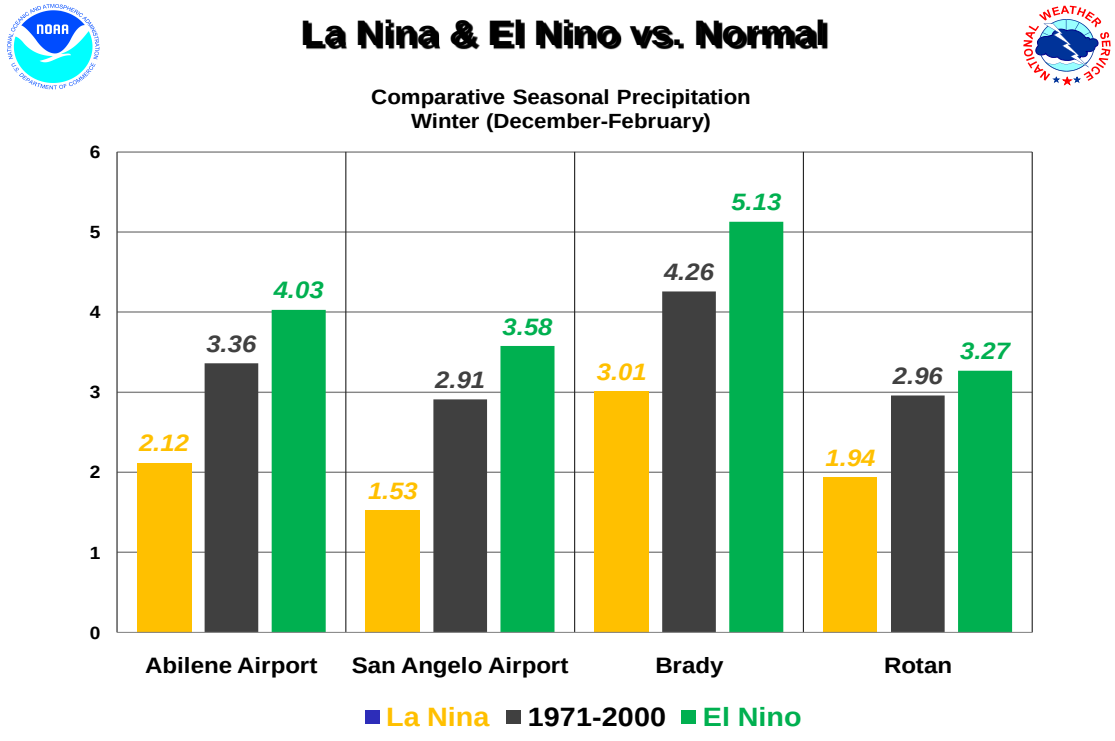

Figure 2: Comparative Precipitation with La Nina, El Nino, and Normal

In Figure 2, the yellow bars show average winter season precipitation, for the years in which moderate to strong La Nina conditions occurred. These values are the same as in Figure 1. The green bars show average winter season precipitation, for the years in which weak to moderate El Nino conditions occurred. The dark gray bars show normal average winter season precipitation (1971-2000), and are the same as in Figure 1.

This graphic illustrates the contrast in the winter season precipitation, from the patterns associated with La Nina and El Nino. These patterns represent relatively the most favorable (El Nino) and least favorable (La Nino) scenarios for winter season precipitation in West Central Texas.

Possible Implications with Patterns Influenced by La Nina

When stronger La Nina events occur, the effects can influence regional weather patterns which can help to bring about the following in West-Central Texas:

- Development of drought, if warmer and drier than normal conditions persist for an extended period of time.
- Persistence or worsening of pre-existing drought conditions.
- Increased fire weather concerns. The track of storm systems can result in repeated weather events where strong, gusty winds are accompanied by intrusions of warm and dry air into our area.

Other Considerations

Even though there are pattern similarities with La Nina, there are unique characteristics with each new season, as no two events are exactly alike. Even when a La Nina pattern prevails overall in a winter season, certain patterns can develop which bring temporary intrusions of very cold air. Wet weather patterns can also develop. Further research is needed to learn more about the variations which can occur with La Nina (and El Nino) events.

Concluding Remarks

The NOAA Climate Prediction Center indicates that the La Nina conditions will continue through the upcoming winter season, and into the spring of 2011. The Outlooks for this upcoming winter show higher probabilities for below normal precipitation, along with enhanced probabilities for temperatures to average above normal. Local study findings indicate where average winter season precipitation is below normal during years when moderate to strong La Nina conditions occur.

We will update our website with additional, pertinent information as we proceed through this upcoming winter season.

Additional Links

The following links provide access to additional information on the winter season outlook and La Nina.

NOAA Winter Season Outlook

NOAA Climate Prediction Center
This link has the latest information on Climate Outlooks, U.S. Hazards Assessment maps, and U.S. Drought Assessment (including the Drought Outlook).

Information on La Nina (and El Nino)
General, background information.

Latest Diagnostic Discussion (somewhat technical)
This link has weekly and monthly updates on La Nina and El Nino conditions, when these phenomena are occurring. These updates are issued by the Climate Prediction Center.