

Report on 90-day Weather Projection for the Northern Half of New Mexico

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Introduction:

This 90-day weather forecast is for the northern half of New Mexico. The forecast area is bounded by the state borders on the north, west, and east, and Interstate 40 on the south.

The report contains a summary weather outlook for February through April (directly below), a review of the current El Nino Southern Oscillation (ENSO) condition, which is an official El Nino, and an overview of current weather trends along with outlook maps for the next 90 days.

Also, I have included a section about how the ENSO condition is formulated. This is not an explanation about the effects of an El Nino or La Nina; most people know that. Rather, it is an explanation of what causes these events to occur in the first place.

Summary, Ninety-day weather outlook for forecast area:

- *The El Nino condition appears to be topping off.* That is, it appears to be getting neither stronger nor weaker. By the time it is over it will have at least been a moderate one.
- The majority of long-range computer models agree that an El Nino condition will persist through the end of Spring of 2010 with the prognostication of higher than average precipitation levels for the forecast area during that period.
- Precipitation throughout the forecast area during the past four weeks has been well above average, as expected.

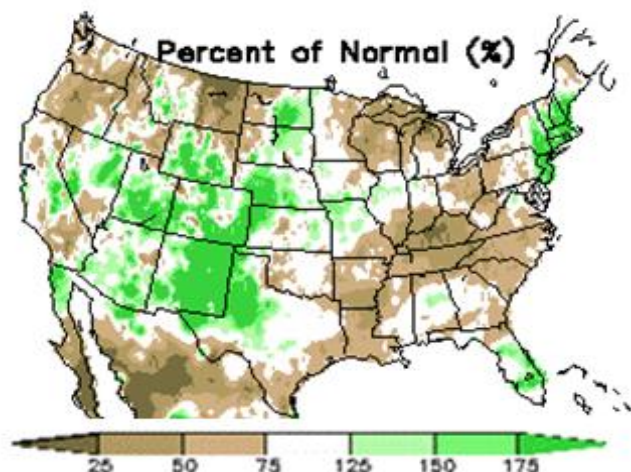
Review of Current El Nino Southern Oscillation Situation and Discussion:

The latest historic Oceanic Nino Index, which is the official metric from which a La Nina or El Nino is declared, is now at 1.7C, about 0.5% less than last month, which may indicate that it has stopped growing and has leveled off—at least for now. However, we have seen El Ninos wane and then reestablish themselves. So we will have to wait for a while before we can know with reasonable certainty how this one will unfold.

The majority of the of the 22 international computer models used to predict El Nino events suggest that it will last through middle of spring.

Last 30 days. Generally precipitation in the forecast area was above normal in almost all areas. See map at right. An El Nino spring weather pattern has developed over the region, with a series of low-pressure cyclonic activity (i.e., storms) being spawned in the eastern Pacific and traversing the area. The position of the jet stream, which tends to track the storms, has been favorably to bring these storms into the state.

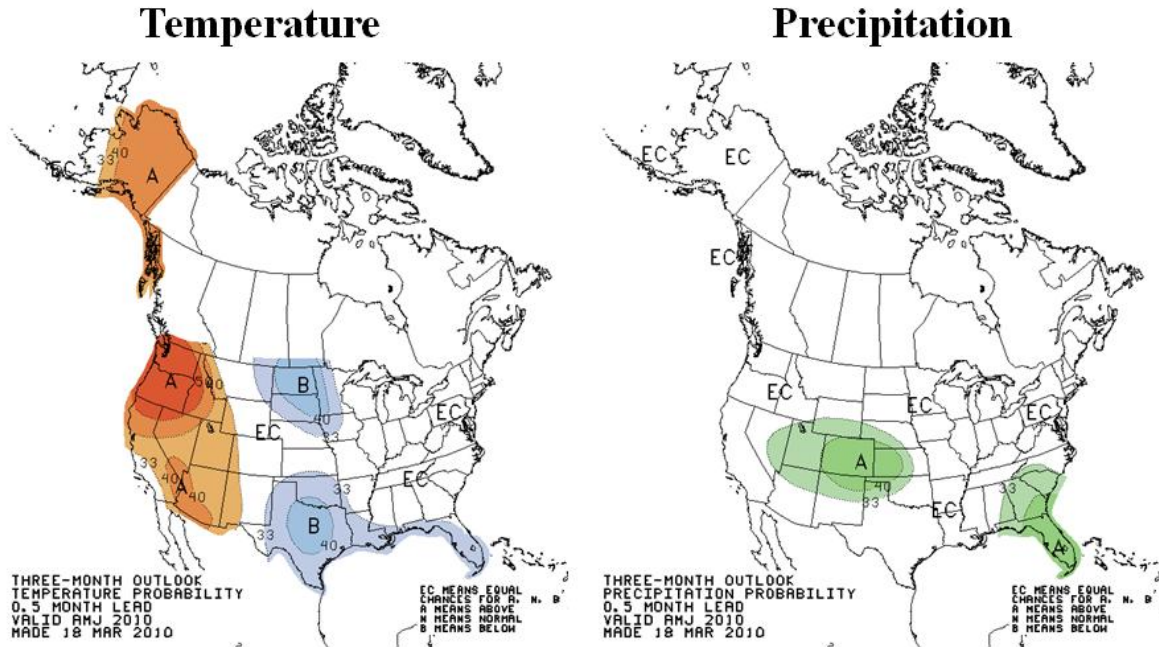
30-day (ending 21 Mar 2010) % of average precipitation



Next 90 days.

The prediction for the next 90 days can be seen below in the graphic from the National Climate Prediction Center.

Outlook for Apr Through Jun 10



Recent Weather Trends

We have seen some significant warming and snow melting at lower levels. The runoff is predicted to be very good, a boon for river runners and farmers. However, we can expect perhaps a half dozen more reasonably significant weather events, including snowfall in higher regions, before the early summer dryness begins in late May.

Simplified Explanation of the El Nino Southern Oscillation

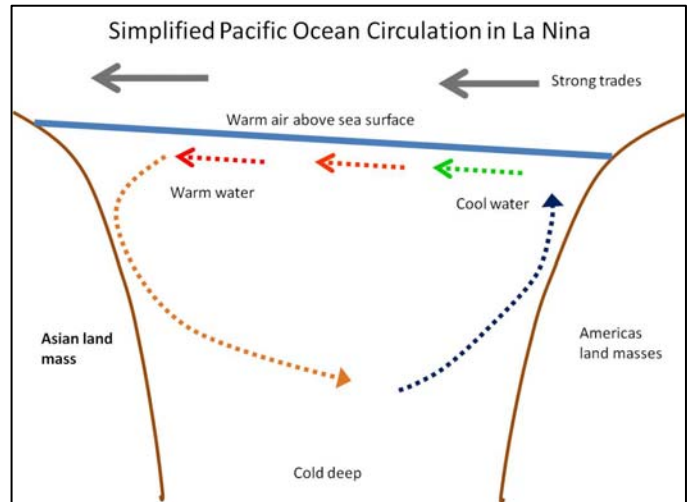
Most people know the effects of the El Nino and La Nina; the El Nino causes wet weather in the forecast area and the La Nina causes dryer weather. So I am not going to discuss it here.

However, most people don't understand the mechanism that creates an El Nino or La Nina. I will explain in very simplified form below the processes in the Pacific that create these conditions. I find it fascinating and intriguing because it is a manifestation of a live earth.

Let me start with a La Nina. During a La Nina, there is cold water along the western equatorial coast of South America. That cold water comes from deep in the Pacific that wells up into that area. The upwelling is caused by the trade winds, which blow from east to west along the equator. The Trades, as they are called, are part of an atmospheric circulation pattern that results from uneven heating of the globe—more heat at the equator than at the poles.

As the winds blow to the west, they drag the top of the water along with them and push the water up against the eastern coasts the Asian and Indonesian land masses. In a La Nina with healthy

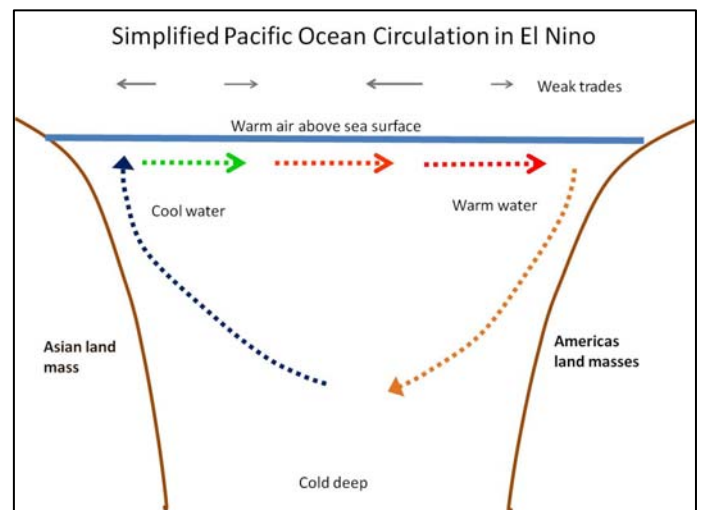
La Nina Condition



Trades the water level along the Asian/Indonesian coasts is actually about 30 inches higher than it is along the South American western coast. The excess water in the western Pacific pushes down and creates a circulation pattern that results in water from deep in the ocean being pushed up along the South American coast to replace the water that has been shoved to the west. See the graphics above.

During an El Nino the trades are either greatly reduced or cease. When that happens, the water that has been shoved up against the Asian/Indonesian land masses then begins to retreat back to the east to try to equalize the sea levels. Since this water is warmer and lighter than the deeper water, it moves to the east on the surface. This retreating warm water moves back in a series of

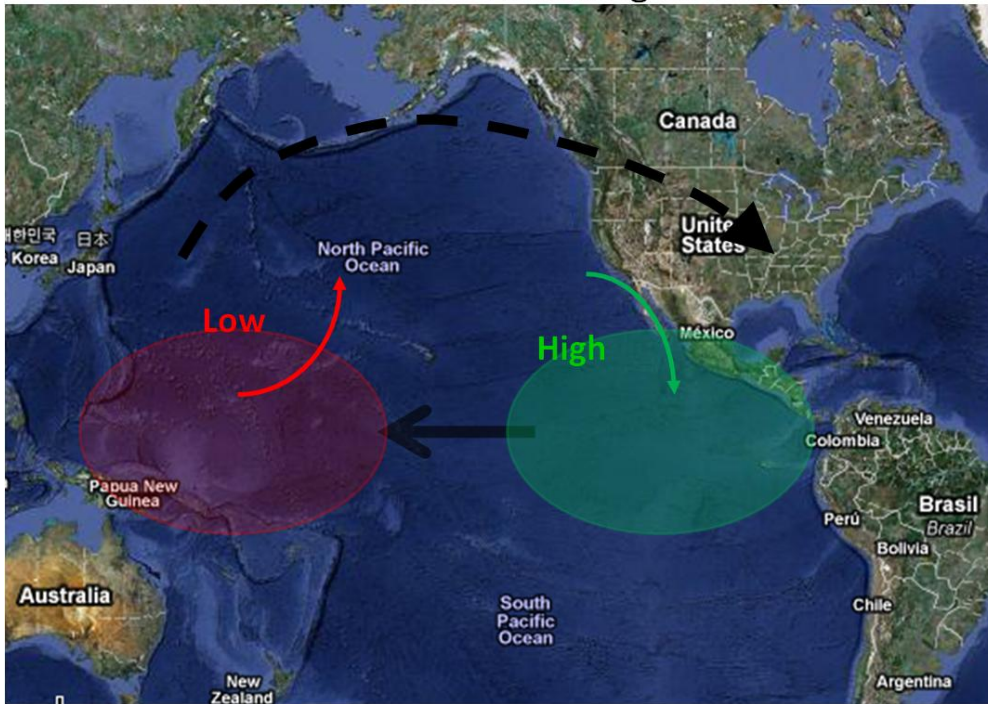
El Nino Condition



small waves, called Kelvin Waves.¹ Thus, this warm water eventually ends up near the equatorial South American west coast. The presence of Kelvin waves in the mid-Pacific equatorial regions is an indicator of an existing or developing El Nino condition.

Climatologists are not sure about what drives the waning and waxing of the trade winds, which are related to changing pressure gradients.

La Nina Condition -- Resulting Storm Track



The result of a La Nina is seen in the map at left. The cold water along the South American coast causes the air above it to cool. Cool air is denser than the warm air above it, so it sinks.

Sinking air creates higher pressure on the surface and it also inhibits precipitation, which depends on rising air that cools with increasing lift and thus squeezes out water. During a strong La Nina, this high pressure area

gets very large, and impacts the SW US.

Meanwhile, the warmer water in the western Pacific creates rising air, spawning storms and moisture masses. The general circulation of the atmosphere in the latitudes north of the equator is from west to east, so these storms/masses are pushed to the east. But with the high pressure blocking it, it is forced farther north, up and around the high pressure area. These storms/masses meld with the ones being spawned by the Aleutian Low. This causes a storm track as shown in the map and dry weather happens in the SW US.

During a strong El Nino, the opposite situation occurs, as shown in the map below. A low pressure area develops in the eastern Pacific. A high pressure area forms in the western Pacific. The high, with its clockwise wind pattern, inhibits precipitation in the western Pacific. The low pressure area, with its counter-clockwise flow, entrains moisture into the storms that are breaking off from the Aleutian low as they enter the SW US.

Thus, the storm track is moved significantly farther to the south and it brings storms directly into the desert SW US, leaving the more northern North American coastal areas dryer than usual.

¹ A Kelvin Wave was discovered and explained by Lord Kelvin (William Thomson) in the late 19th century. A Kelvin Wave is seen as the V-shaped wake behind a boat as it traverses through the water. The water that has been pushed forward by the boat moves around to the rear of the boat to equalize the water level and it does so in a series of small waves that forms the familiar V-shaped pattern.

The forecast area has just experienced a near textbook-classic El Nino winter.

El Nino Condition – Resulting Storm Track

Next Report:
May, 2010.

