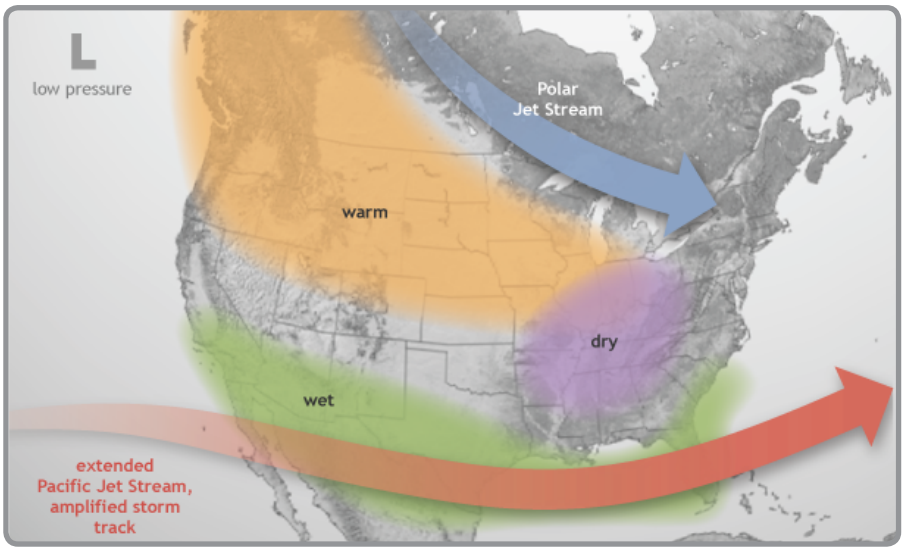
El Niño Impacts and Outlook

Midwest Region

September 2015

Typical El Niño Winter Pattern



The image above shows the typical pattern in the winter during El Niño events. The polar jet stream tends to stay to the north of the Midwest region, while the Pacific jet stream remains across the southern U.S. With the Midwest positioned between the storm tracks, warmer and possibly drier conditions can develop during El Niño events.

Image courtesy of the National Oceanic and Atmospheric Administration.
For more information please visit: https://www.climate.gov/news-features/department/enso-blog

El Niño in Winter

An El Niño develops when sea surface temperatures are warmer than average in the equatorial Pacific for an extended period of time. This is important to North America because El Niño has an impact on our weather patterns, most predominantly in the winter.

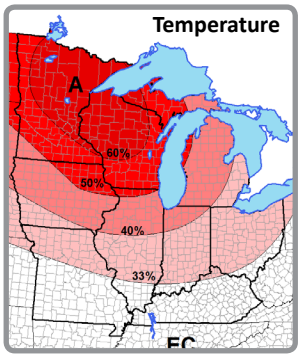
Although each El Niño is different, there are some general patterns that are predictable. For instance, the polar jet stream is typically farther north than usual, while the Pacific jet stream remains across the southern United States (see figure to left).

This pattern brings above-normal temperatures to much of the Midwest region, particularly across the northern states. This does not mean that cold weather will not happen this winter but typical extreme cold weather may be milder and less frequent. In addition, this pattern may bring drier conditions to eastern portions of the Midwest.

Warmer conditions may reduce total snowfall and the frequency of heavy snowfall events in the Midwest. However, a potentially more active storm track across the southern U.S. pose an increased risk of heavy snow events across the lower Midwest.

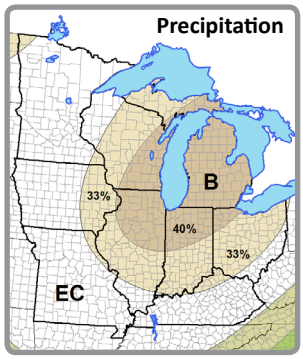
El Niño Outlook

Winter Temperature and Precipitation Outlooks



EC: Equal chances of above, near or below normal
A: Above normal
B: Below normal

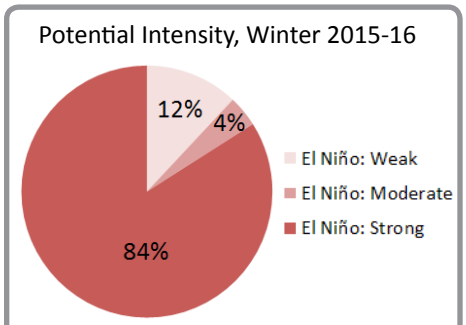
Valid for December 2015 - February 2016



As of August, the winter outlooks for the Midwest show an increased chance of above-normal temperatures across most of the region, except for southern Missouri, far southern Illinois, and Kentucky. Meanwhile, the precipitation outlook indicates that the states along the Great Lakes have an increased chance of below-normal precipitation. The rest of the region has equal chances of above, below, or near-normal precipitation. This forecast could have implications for many sectors, in both positive ways (reduced heating costs, fewer transportation costs and delays, and increased retail sales) and negative ways (reduced winter recreation and increased survival through the winter of agricultural pests).

The seasonal outlooks above combine many factors including dynamical models, the effects of long-term trends, soil moisture, and the El Niño Southern Oscillation cycle (ENSO). Because these outlooks combine many inputs, they do not match the typical El Niño conditions exactly. To learn more about these outlooks, or to retrieve the latest temperature, precipitation, and drought outlooks, please visit the Climate Prediction Center at: http://www.cpc.ncep.noaa.gov.

El Niño Strength



Model data courtesy of the International Research Institute for Climate and Society.

El Niño conditions have continued this summer and forecasts indicate that this El Niño will strengthen, with an 84% chance of it peaking as a strong event in late fall or early winter. In terms of how long the event may last, the Climate Prediction Center (CPC) says there is a 95% chance that these conditions will last through the winter, gradually weakening through spring 2016. Research has shown that strong El Niños are often followed by La Niñas, so conditions should continue to be monitored closely, especially if the El Niño weakens next spring, as predicted.

Based on the September 10th ENSO outlook from CPC.

Contacts: Doug Kluck (doug.kluck@noaa.gov)
Jim Angel (jimangel@illinois.edu)

Potential Winter and Spring Impacts

Agriculture

Grapes in Michigan.
Image: Matthew Kanable (via Flickr CC)

El Niño has worldwide impacts to the agricultural sector. For the Midwest, most of the winter impacts are beneficial. Milder winter weather could benefit winter wheat, forage crops, cover crops, and fruits such as apples and grapes. However, because El Niño winters typically result in reduced snowpack in the upper Midwest, this could expose these crops to the occasional cold air outbreaks and harsh wind. Milder winter temperatures should be beneficial for livestock producers by reducing operating costs, reducing stress to animals, and better production. El Niño could increase commodity prices due to negative impacts internationally.

Economy

Wintertime construction in Michigan.
Image: MSU IPF (via Flickr CC)

Mild and dry winters with less than normal snowfall can have a significant overall positive impact on the Midwest economy. During the strong El Niño of 1997-98, economic benefits outweighed losses by a factor of 10 to 1 according to one study. The largest positive impacts were reductions in home heating costs and increases in retail sales. Construction and home sales also benefited from the mild winter. The economic losses were suffered by those sectors that depend on normal winter weather. These include winter recreation, snow removal businesses, towing companies, road salt sales, and other seasonally-dependent businesses.

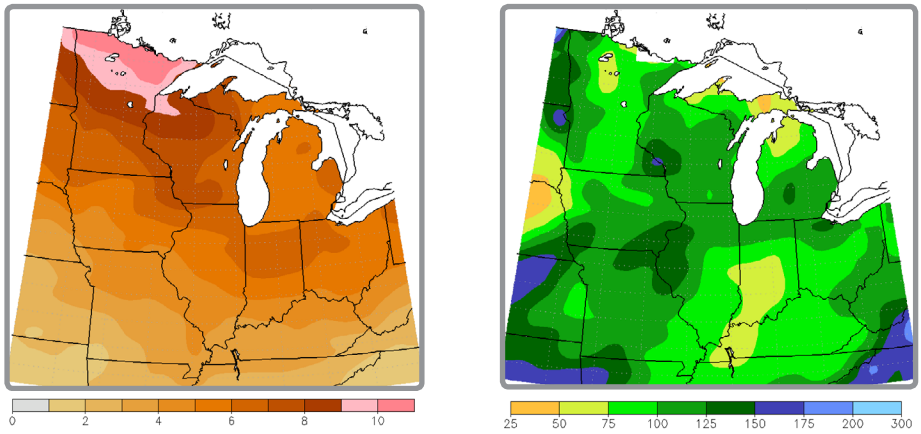
Transportation

Highway I-65 in Kentucky.
Image: Stu Foster

Transportation systems and infrastructure are vulnerable to extreme weather and climate conditions. The anticipation of warmer, drier conditions throughout much of the Midwest may positively affect the transportation sector. Past strong El Niño events since the 1950s suggest a lower risk of extreme precipitation events capable of producing widespread river flooding which disrupt barge, rail, and highway traffic. Fluctuations in an active storm track across the southern U.S. pose a risk of heavy snow events, particularly affecting the lower Midwest. Still, an expected overall decrease in the frequency and amount of snowfall could reduce costs for snow and ice removal.

Comparisons and Limitations

Winter Conditions During Past El Niños



Departure from mean temperature (°F, left) and percent of mean precipitation (%, right) during the El Niño winter of 1997-98 (December-February). The mean period is 1981-2010.

The maps above illustrate the winter conditions of the record breaking El Niño of 1997-98. Much of the Midwest was warmer than average but precipitation conditions varied across the region. While the current El Niño is on track to be one of the strongest on record, it is important to remember that each El Niño episode is different. Other factors can be considered such as antecedent conditions or the Arctic Oscillation, which trumped the El Niño during the winter of 2009-10. Currently there is a large warm pool of water off the Pacific Northwest coast. Scientists are not yet certain how it, in combination with the El Niño, may influence weather conditions in the U.S. this winter.

While past El Niño events can help inform forecasters about certain conditions, there are some limitations. For instance, in the Midwest region, El Niño is *not* known to impact:

- Potential for ice storms or blizzards
- Track or intensity of any single weather system
- First freeze in the fall (early or late)
- Last freeze in the spring (early or late)

Midwest Region Partners

Midwestern Regional Climate Center
http://mrcc.isws.illinois.edu
National Drought Mitigation Center
www.drought.unl.edu
National Integrated Drought Information System
www.drought.gov
National Oceanic and Atmospheric Administration
National Weather Service - Central Region
www.crh.noaa.gov/crh
National Centers for Environmental Information
www.ncdc.noaa.gov
Climate Prediction Center
www.cpc.ncep.noaa.gov
State Climatologists
www.stateclimate.org
U.S. Department of Agriculture
Regional Climate Hubs
www.usda.gov/oce/climate_change/regional_hubs.htm
U.S. Department of Interior
Northeast Climate Science Center
www.doi.gov/csc/northeast/index.cfm
Eastern Tallgrass Prairie and Big Rivers
www.tallgrassprairielcc.org/
International Research Institute for Climate and Society
http://iri.columbia.edu

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