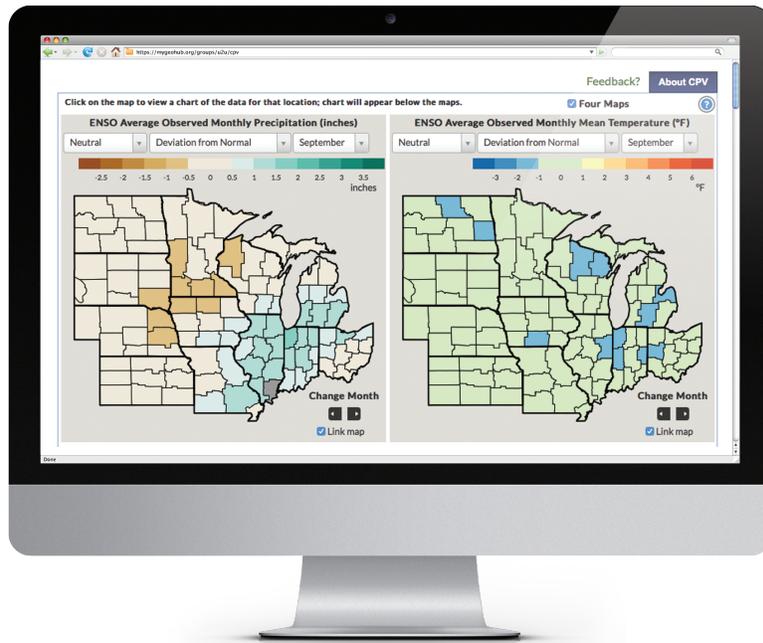


Climate Patterns Viewer^{DST}

Connect global climate conditions to local climate impacts.



CPV.AgClimate4U.org

The Climate Patterns Viewer^{DST} (CPV) shows how the El Niño Southern Oscillation (ENSO) and Arctic Oscillation (AO) weather patterns can affect climate conditions and crop yields in the U.S. Corn Belt. It also provides information about the current phase for the ENSO and AO cycles.

You can use the simple maps and charts within CPV to determine when and where each phase of ENSO or AO has historically influenced:

- Average monthly temperatures and precipitation
- Deviations of temperature and precipitation from the 1981-2010 climate averages
- Deviations of corn yield from the de-trended 1981-2010 average yield

CPV is not intended to provide a climate forecast. Rather, this tool uses historical data (1981-2010) to highlight locations where different phases of ENSO and AO can potentially impact climate conditions over the course of the year, which can help you make more informed farm management decisions.

ENSO and AO

Local weather in the North Central U.S. can be influenced by fluctuations in large-scale atmospheric pressure patterns and sea surface temperatures around the world, such as the Arctic Oscillation (AO) and El Niño Southern Oscillation (ENSO). Different configurations, or “phases” of AO and ENSO differently impact climate and crop yields. Knowledge about the relationship between phase and local impacts can help corn farmers make more informed management decisions.

AO Phases: Negative, Neutral, Positive
ENSO Phases: La Niña, Neutral, El Niño

In the Corn Belt, changes in weather patterns due to ENSO and AO vary greatly by location, time of year and phase. While it's difficult to generalize about impacts across the region, the CPV tool can give you specific information about likely temperature and precipitation conditions in your location during all phases. Detecting patterns of ENSO and AO throughout the year can help producers adjust growing plans and boost yields.

Using CPV in Farming Decisions

CPV can help you evaluate farming decisions by giving you a sense of potential deviations in precipitation and temperature, which can impact production and yields. The CPV tool can help you:

- Assess climate-related risks by identifying likely periods of above or below average temperatures and precipitation.
- Identify locations where a growing season might be shortened or lengthened.
- Plan for crop choices, seed purchases, irrigation needs, fertilizer application, or corrective measures for frost damage.
- Estimate the impacts of climate patterns on potential yield, and use that information to assess market price pressures and explore forward pricing alternatives.

CPV Data Sources

The NOAA Climate Prediction Center (CPC) generated the ENSO and AO phase data for 1981-2010. Temperature and precipitation data for climate divisions across the North Central U.S. are retrieved from the NOAA [Applied Climate Information System \(ACIS\)](#) database.

Observed Crop Reporting District (CRD)-level corn yield data from 1981-2010 were obtained from the USDA National Agricultural Statistics Service (NASS) Quick Stats Database. Maps of Crop Reporting District boundaries are available through NASS.

Corn yields in the Climate Patterns Viewer have been adjusted, or detrended, to remove the effect of improved technology on yield over time. You can think of it like an inflation adjustment. For decades farmers in the Midwestern U.S. have observed a 1-3 bushel/acre yield increase annually due to better seed traits, better equipment, and more efficient farming practices. This annual upward trend makes it difficult to detect the impact of weather and climate on crop yields, and it creates challenges for comparing yields in the 1980s and 1990s with yields today. By adjusting historical yields to current-day levels of technology we can avoid these issues and more clearly identify the impacts of ENSO and AO on Midwestern crop production. The Climate Patterns Viewer uses 2010 yield trend data as the baseline adjustment value.

Each corn yield map in the Climate Patterns Viewer tool will list the calendar years associated with the selected ENSO or AO phase in the lower left corner of the map. As you interpret these maps, please be aware that some phases will include more years than other phases. A calendar year is classified in the appropriate phase based on the growing season (April-October) average of the climate pattern. For example, if the growing season average of the AO index is above 0.5, that calendar year would be classified as AO-Positive for purpose of the CPV yield map.

For more details on the data sources, visit our [About section](#) in the CPV tool.

CPV Scenarios

Here are some examples of how CPV can help you assess risk and plan for your ag-related activities based on climate conditions associated with different AO and ENSO phases.

Marketing in the Face of Uncertain Conditions

At the beginning of the growing season, a producer may be faced with La Nina conditions that developed during the previous winter. Using the CPV tool to examine historical deviations in temperature and precipitation under past La Nina events, the producer can anticipate potential climate impacts on growing conditions and crop yields to develop a responsive marketing strategy.

Late Planting, End of Season Decisions in an El Niño Phase

You are late getting your crops in during the spring because of cool conditions in southern Minnesota. You have forward marketed some of your crop, but you are concerned about crop development throughout the growing season. Looking at the temperature information for El Niño conditions in CPV, you see that if El Niño persists the growing season tends to lean a little cooler than average. In this case you can adapt your marketing or lock in a propane price because of the additional drying expected from a crop that will be slow to mature.

Dry Conditions in an El Niño

You have some soils in Indiana that were essentially tapped out of soil moisture through the season. The fall provided a little recharge, but still left soils quite dry. You are currently in an El Niño. Looking at the precipitation composites for the winter in CPV, you see that precipitation during an El Niño winter and spring is drier than average. You can market and plan, knowing that going into planting you have a better chance of still being dry. This will probably allow earlier field access, but also leave you needing additional precipitation in the spring.

Slow Development, Harvest Decisions in a Negative AO Phase

It's September and your Central Illinois corn crop is behind schedule. Your past experience tells you the crop won't be optimal for harvesting for several more weeks. You hear from your local Extension specialist the AO is in a negative phase, and scientists expect this pattern to continue. Using the CPV tool you see that temperatures tend to be below average in the fall, meaning slow crop development could continue with an increased risk of frost damage before maturity. With this information you can prioritize, developing a back-up harvest plan and lining up the resources you might need for these late season adjustments.



User Guide

Follow these simple instructions to use the CPV tool to create a chart that displays all of the monthly data for the selected region with a map interface. Click on the blue icons  on any page for step-by-step instructions on using the tool. For more background information on the CPV tool, click on the blue About CPV tab in the upper right corner of the tool.

CPV Instructions

1 First drop box on each map
Choose the phase of climate pattern you want to see:

- ENSO: El Niño, Neutral and La Niña
- AO: Positive, Neutral and Negative

The default is set to the current ENSO phase as determined by National Oceanic and Atmospheric Administration (NOAA).

2 Second drop box on each map
Choose the variable you want to see:

- Precipitation
- Temperature
- Corn Yield

Choose the data from within each variable:

- Average, Deviation from Normal, and Deviation from Neutral

The default shows Precipitation Deviation from Normal on the left, and Temperature Deviation from Normal on the right. This lets you quickly see if the current ENSO phase tends to influence the climate in your region.

3 Third drop box on each map
Choose the month (default set to the current month).
 The month can also be changed using the arrows at the bottom right of each map.

If you are viewing Corn Yields, you will not see the third drop box. Corn yields are based on average ENSO or AO conditions for the entire growing season.

4 Click on your region in the map and a chart will appear below the maps, displaying all of the monthly data for the region.

Two additional drop down menus in the chart allow you to view ENSO or AO phases and adjust the variable being displayed.

The default is dependent on the settings from the map you clicked.

U2U Decision Support Tools - Climate Patterns Viewer

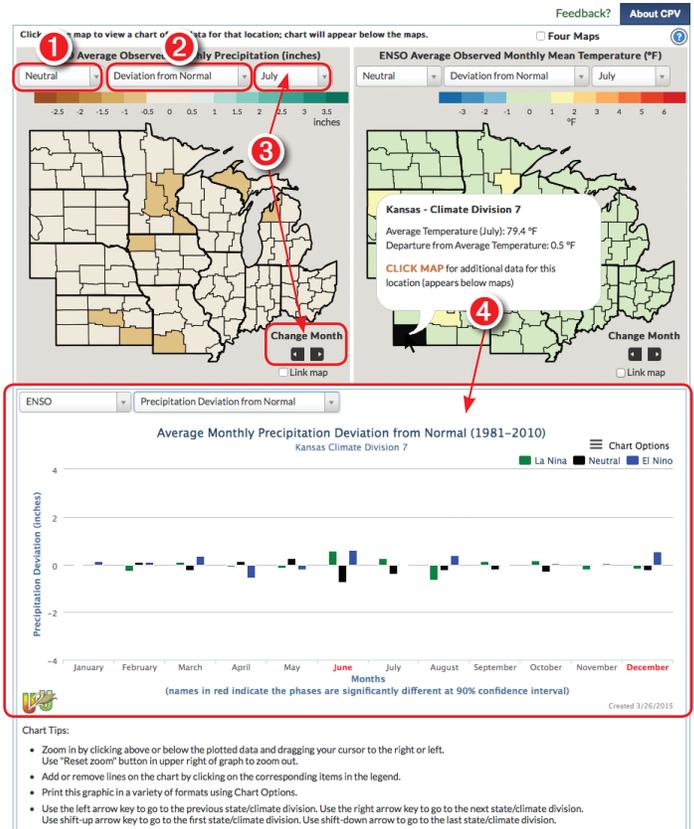
Welcome to Climate Patterns Viewer – connecting global climate conditions to local climate impacts.

This product provides a historical look at how the El Niño Southern Oscillation (ENSO) and Arctic Oscillation (AO) can influence local climate conditions and corn yield across the Corn Belt. You can use these simple maps and charts to show when and where specific phases of ENSO or AO have influenced:

- average monthly temperatures and precipitation,
- deviations of temperature and precipitation from 1981-2010 climate normals, and
- average detrended corn yields (adjusted to 2010 technology) and deviations from average

This tool is not intended to be a forecast. Rather, this tool uses historical data (1981-2010) to highlight locations where ENSO and AO can potentially impact climate conditions over the course of the year, which can help you make more informed farm management decisions.

CURRENT CLIMATE PHASE
 ENSO: El Niño
 AO: Positive
ENSO ALERT STATUS
 El Niño Advisory



CPV Features

- 1 Click on the blue question mark icon for step-by-step instructions for using the CPV tool.
- 2 Select the Four Maps option to create a variety of maps for instant comparisons.
- 3 Link Map lets you change the month in all linked maps at the same time.

Like the charts we have in other decision support tools, you can customize your CPV data:

- 4 Hover the mouse pointer over the map or chart to get a pop-up box displaying a table of the data for that area.
- 5 Click on the legend of the chart to add or remove variables from the chart.
- 6 Print or download the chart by clicking on Chart Options in the upper right corner of the chart.
- 7 To zoom in on a particular feature of the chart, click and hold the mouse button down and drag the cursor across the feature.

U2U Decision Support Tools - Climate Patterns Viewer

Welcome to Climate Patterns Viewer – connecting global climate conditions to local climate impacts.

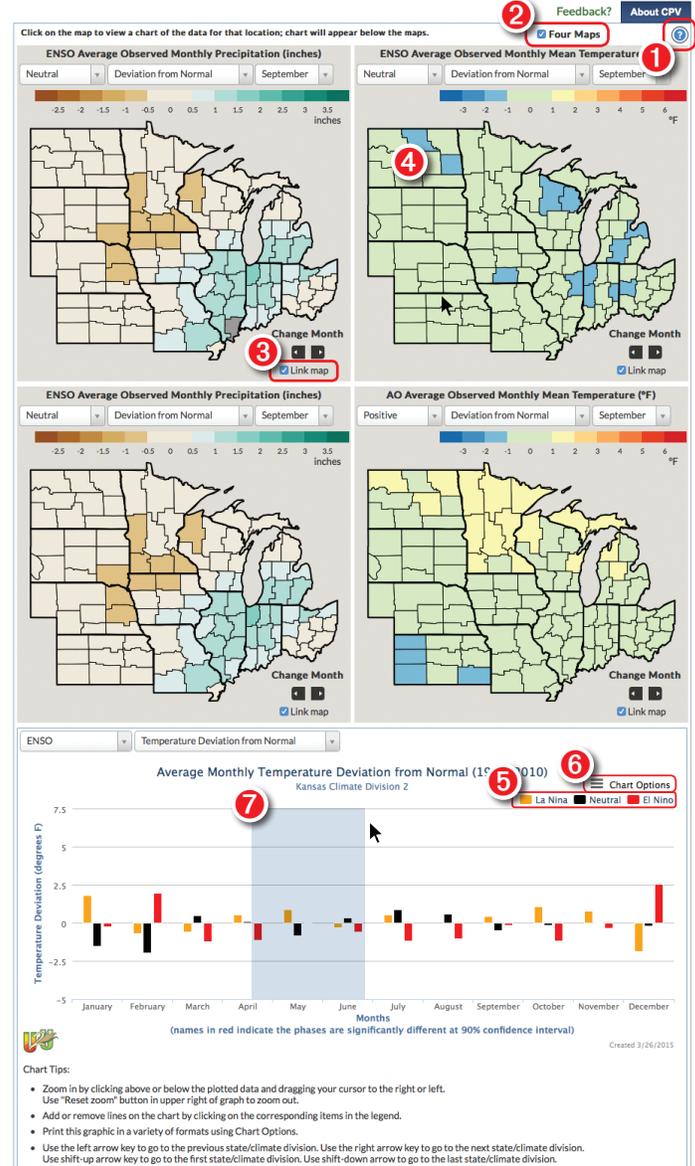
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 AO: Positive

ENSO ALERT STATUS
 El Niño Advisory

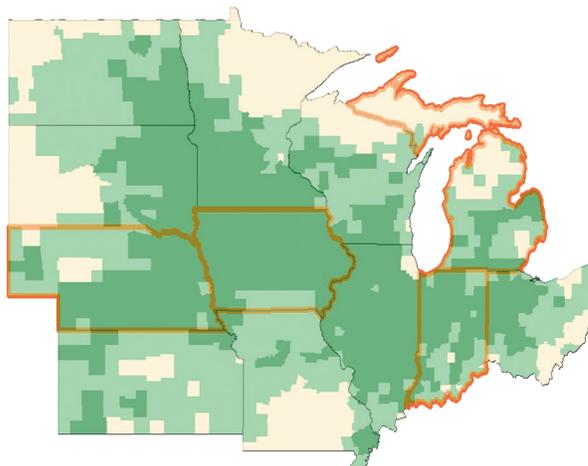


About Useful to Usable (U2U)

U2U is an integrated research and extension project, funded by the USDA, to improve farm resilience and profitability in the North Central U.S. by transforming existing climate data into usable products for the agricultural community. Our goal is to help producers make better long-term plans for what, when and where to plant, and how to manage crops for maximum yields and minimum environmental impact.

The U2U team includes climatologists, agronomists, social scientists and computer specialists who have come together to create tools to aid in farming decisions. Partners include Purdue University, Iowa State University, Michigan State University, South Dakota State University, University of Illinois, University of Michigan, University of Missouri, University of Nebraska, University of Wisconsin, the High Plains Regional Climate Center, the Midwestern Regional Climate Center, and the National Drought Mitigation Center.

U2U Study Region



-  **Pilot States**
-  **Major Corn Growing Area**
-  **Minor Corn Growing Area**

Crop data from National Agricultural Statistics Service (NASS) U.S. 2007 Census of Agriculture

Major corn areas harvested over 60,000 acres of corn

Minor corn areas more than 5,000 acres of corn

Map created by Adam Reimer

PROJECT CONTACTS:

Linda Prokopy

Associate Professor and Project Lead, U2U

Purdue University

765-496-2221

lprokopy@purdue.edu

Melissa Widhalm

Project Manager, U2U

Purdue University

765-494-8191

mwidhalm@purdue.edu



For more information, please visit

AgClimate4U.org

 [@AgClimate4U](https://twitter.com/AgClimate4U)



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