



Developing Collaborative Environment for U2U Project

HUBbub

September 30, 2014

U2U Hub Team

Purdue University Research Computing

Scientific Solutions Group

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U2U Collaboration Portal built on HUBzero Platform



DECISION DASHBOARD

MEDIA CENTER

NEWSLETTER

ABOUT US



AgClimate View^{DST}

Historical climate and yield data for the Corn Belt ▶

Corn GDD^{DST}

30-years of GDD data plus trend projections ▶

Climate Patterns Viewer^{DST}

Connect global climate conditions to local climate impacts ▶

Helping producers make better long-term plans

Weather and climate patterns are a driving force behind the success or failure of Corn Belt cropping systems. Useful to Usable (U2U) is an integrated research and extension project working 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 on what, when and where to plant, and also how to manage crops for maximum yields and minimum environmental damage.

AgriClimate Connection

NWS Outlook – Wet October for Northern Corn Belt (9/19/2014)

Much of the northern Corn Belt has an increased chance of above-average precipitation...[Read More.](#)

Corn belt heat into early September (8/28/2014)



U2U TEAM

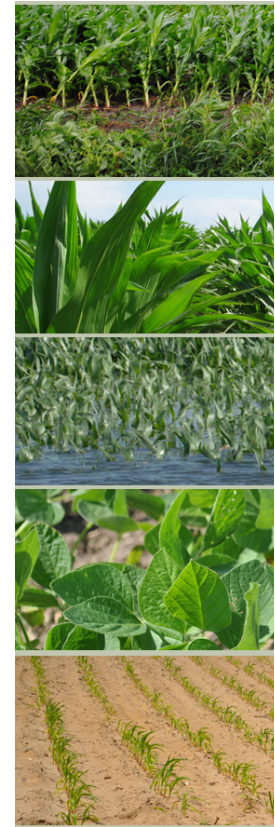
State climatologists, Crop modelers, Agronomists, Economists,
Social scientists, Regional Climate Center staff, IT





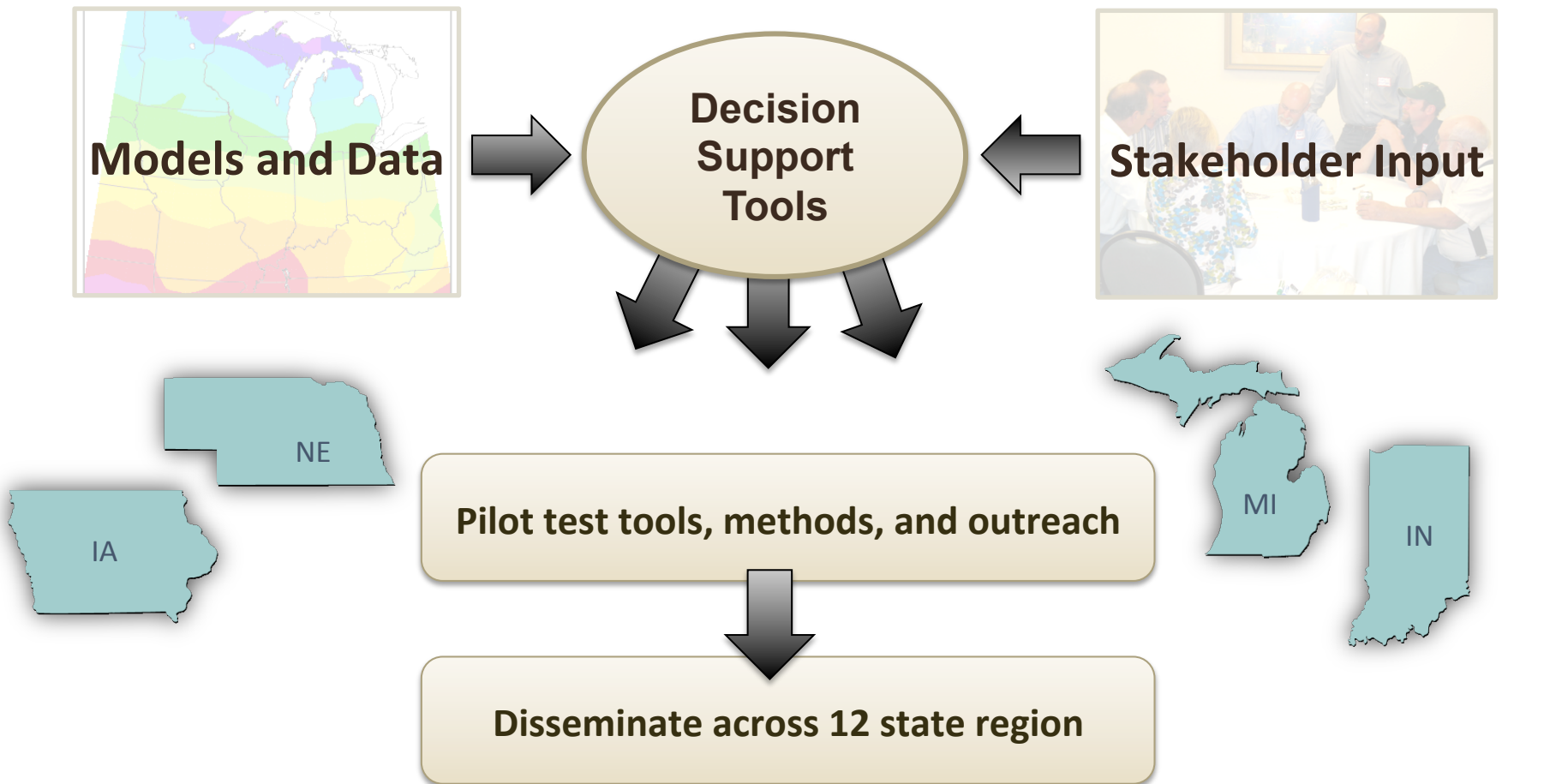
U2U VISION

- Transform existing climate information into usable knowledge for agricultural decision making
- Give farmers resources and training to more effectively manage variable climate conditions
- Increase Extension capacity to address agro-climate issues





Project Objectives



Internal Site for Collaboration Tools



Group Manager ▼

Overview

- Home Page
- Quick Links
- HRLDAS Example Input Images
- HRLDAS Example Output Images
- HRLDAS Gridded Daily Examples
- U2U Gridded GDD Examples

Collections

- Members 48
- Wiki 32
- Resources 77
- Discussion
- Blog 1
- Wish List 3
- Projects
- Usage
- Announcements

ABOUT THE GROUP

Show Public Description (+)

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What's New?

- * NEW!! Our latest [internal evaluation report](#) is now available. Thank you to everyone who participated in sharing their feedback about the U2U project.
- * NEW!! The [2013-14 U2U Annual Report](#) is now available.
- * The [U2U Planned Publications - Master List](#) is always available and up-to date. Everyone is encouraged to contribute to this list. Send details to Melissa.

About the U2U Collaboration Site

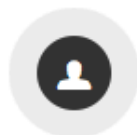
Across this site you will find full group and subgroup collaboration space, data and models under development, meeting notes and documentation, discussions, and other relevant information for the Useful to Usable (U2U) research team. This site is only visible to approved, internal collaborators at this time.

Most static documents that are applicable to the full group (proposal, meeting notes, presentations, etc.) can be found under [Resources](#). Objective 1 and 2 collaboration spaces are located in the [Wiki](#) along with tips for using this site and links to other project information. Feel free to start a [Discussion](#) at any time, announce news and current events in the Blog, and share your ideas by making a [Wish](#).

Please contact Melissa Widhalm (mwidhalm@purdue.edu) if you need any help or have any questions. And keep checking back regularly for updates and new information!

GROUP MEMBERS

View All Members →



Cody Knutson



Jean Marie McGuire



HUBzero Components

- Data Sharing
 - iData
- Decision Support Tools
 - (mygeohub.org/groups/u2u/...)
 - AgClimate View (...acv)
 - Corn Growing Degree Day (GDD) (...gdd)
 - Climate Patterns Viewer (...cpv)
 - Split Nitrogen Application (in evaluation) (...splitn)



U2U Team uses iData to Share Data Files

iDATA Publish, Browse & Discover

Home
 Add
 Remove
 Metadata
 Refresh
 Search
 Setting
 Log

My Collections
Shared Collections

<input type="checkbox"/>	Name	Description	Date created	Share	Delete
<input type="checkbox"/>	drinet_conference_presentations	pdf versions of the presentations made at the driNET conference on June 21 and 22, 2011.	2011/07/14		
<input type="checkbox"/>	Crop Data Layer	NASS Crop Data layers that have been grouped.	2011/05/31		
<input type="checkbox"/>	HRLDAS Gridded Daily Data Sets	Daily gridded HRLDAS data for min temp (degrees C), max temp (degrees C), shortwave r	2012/11/29		
<input type="checkbox"/>	HRLDAS Data Sets	Examples of the HRLDAS output data sets. One can use a tool like MultiSpec (https://engin	2012/02/29		
<input type="checkbox"/>	Sample_NLDAS2_Data	This folder contains sample forcing a, forcing b, mosaic and noah NLDAS2 data in both grit	2012/04/05		
<input type="checkbox"/>	Landuse_for_Lan	Indiana land use file for Lan.	2012/04/09		
<input type="checkbox"/>	County Yield History	NASS County Yield Files	2012/10/26		
<input checked="" type="checkbox"/>	U2U Shape Files	Zipped shape files for U2U Project Area, States, CRDs and Workday CRDs.	2012/12/03		
<input type="checkbox"/>	U2UProjectArea	Shape files for U2U project	2012/12/03		
<input type="checkbox"/>	HRLDAS Gridded Yearly Data Sets	Yearly rainfall data sets for 2001 to 2010. Units are mm.	2012/12/17		
<input type="checkbox"/>	GDD Data	For Growing Degree Day tool. These files contain accumulated gdds starting from January 1	2013/05/21		
<input type="checkbox"/>	SCAN AMERIFLUX Data	Contains data for site validations. Information on SCAN data can be found at: http://www.wc	2013/09/27		



iData Provides Capability for Quick Views of Some Data

iDATA Publish, Browse & Discover

Home Add Remove Metadata Refresh Search Setting Download Log

Current Path : U2UProjectArea\U2U_Climate_Divisions

File View **Map View** Data View

- U2UProjectArea
 - U2U_Active_Coop_Station
 - U2U_Ameriflux_Sites
 - U2U_CRDs
 - U2U_Climate_Divisions**
 - U2U_County
 - U2U_Cropmodel_Sites
 - U2U_Project_Area
 - U2U_Scan_Sites
 - U2U_States
 - U2U_Workday_CRDs

Layers

- U2U_Climate_Divisions

The map displays the continental United States with county boundaries. Michigan is highlighted in white, indicating it is the selected geographic area for the data view.



U2U Decision Support Tools - Corn GDD

Welcome to the Corn Growing Degree Day (GDD) decision support tool.

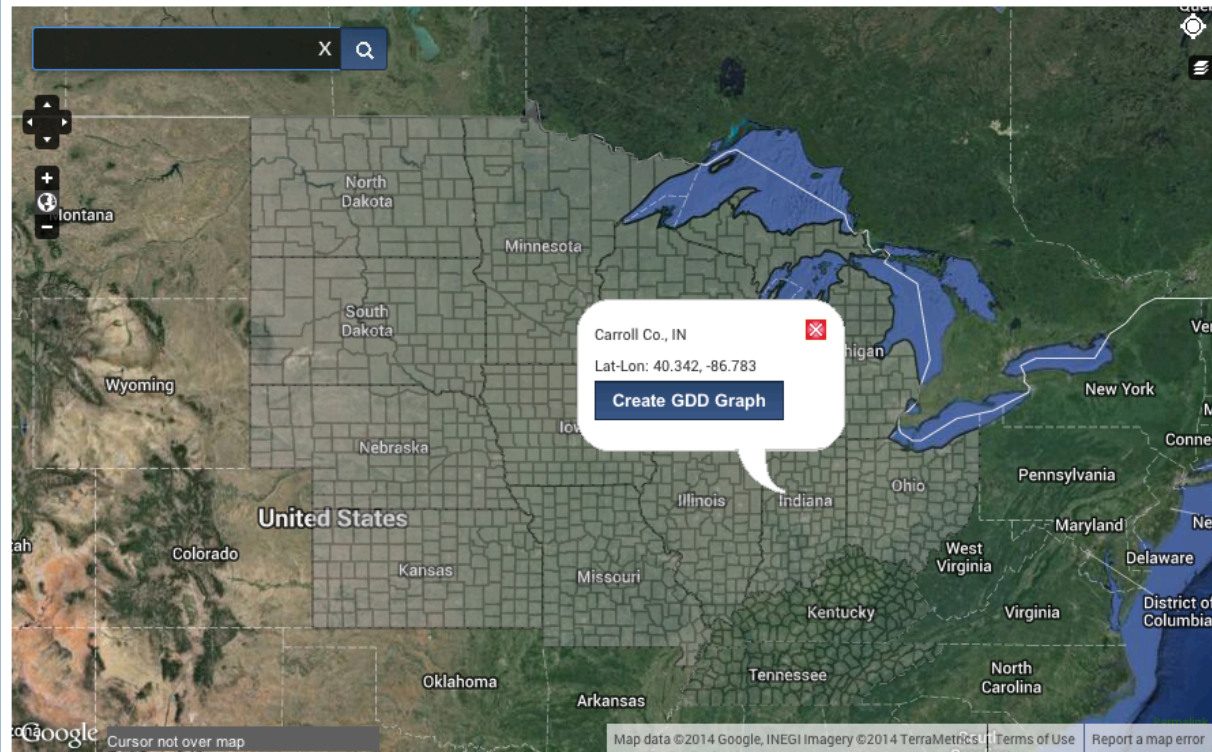
This tool puts current conditions into a 30-year historical perspective and offers trend projections (based on climatology) through the end of the calendar year. GDD projections, combined with analysis of historical analog data, can help you make decisions about:

- Climate Risks – Identify the likelihood of early and late frosts/freezes.
- Activity Planning – Consider corn hybrid estimated physiological maturity requirements, along with GDD projections when making seed purchasing and other growing season decisions.
- Marketing – Look at historical and projected GDD when considering forward pricing and crop insurance purchases.

While this tool is not meant to be a crystal ball, data and information derived from the tool can be used to make helpful inferences about current conditions, especially when combined with personal experience and localized knowledge. Please note that data is currently limited to states within the U2U project area plus Kentucky & Tennessee.

Map Animations

To get started, click on any location within the gray area of the map. Use the zoom function for a more accurate selection.



Tool Tips:

- Use white user location icon (📍) in upper right hand corner of map to zoom to current location of computer being used.
- Use the layer icon (☰) in the upper right hand corner of the map to control your viewing options.
- Tested with browsers: Internet Explorer 11 & later; FireFox 27.0 & later; Chrome 33.0 & later; Safari 5.1.10 & later.

About GDD



This tab allows you to put corn (86/50) GDD progress into a 30-year historical perspective. Customize your data:

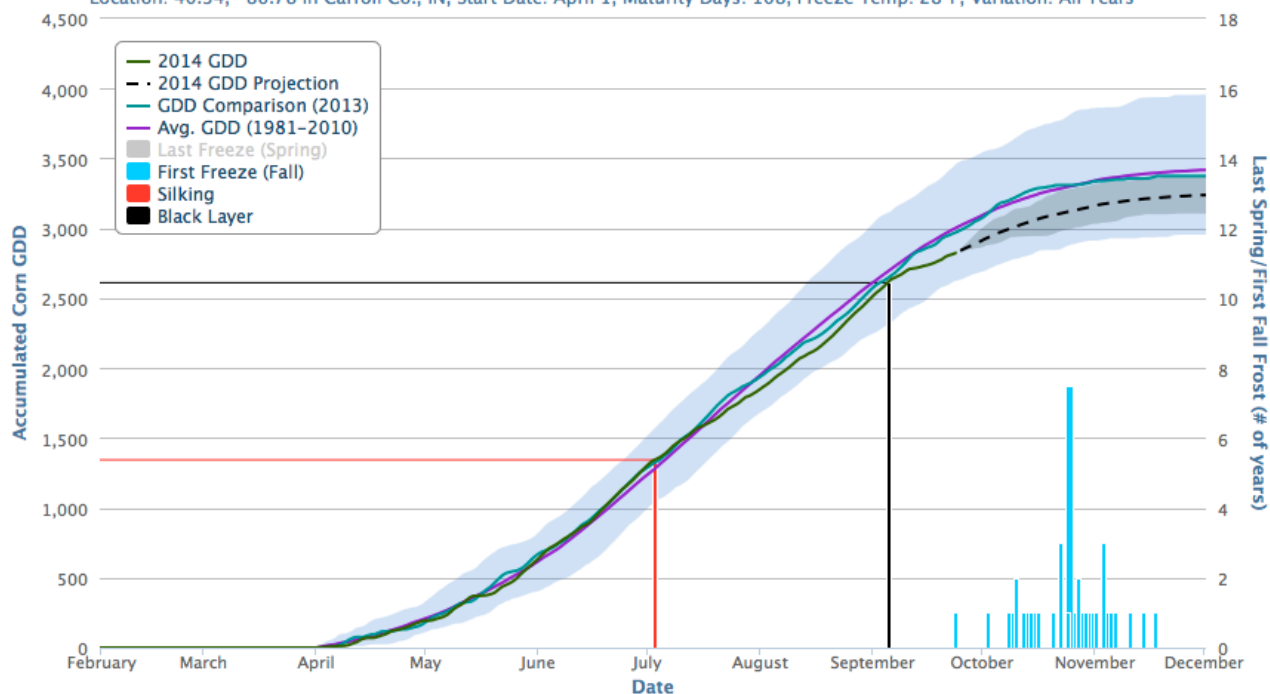
- Choose your GDD start date, freeze temperature threshold and corn maturity rating
- Add any year between 1981-2013 for comparison
- Adjust the spread of historical GDD and temperature data visible on the graph
- Add or remove silking, black layer and freeze dates for a comprehensive growing cycle snapshot

GDD Start: April 1 GDD Comparison Year: 2013 Corn Maturity Days: 108 Silking GDDs: 1,338
Freeze Temperature (°F): 28 Variation: All Years Current Day: Today Black Layer GDDs: 2,594

Corn Growing Degree Day Tool

Chart Options

Location: 40.34, -86.78 in Carroll Co., IN, Start Date: April 1, Maturity Days: 108, Freeze Temp: 28°F, Variation: All Years



GDD Base 50/86 (degrees F); Created: 09/25/2014



Tool Tips:

- Select the blue question mark icon in the top right corner of the tab section for instructions and other information.
- Print this chart or export it in a variety of formats using the Chart Options feature.
- Add or remove visual elements by clicking on their corresponding legend icons.
- Zoom in by clicking above or below the plotted data and dragging your cursor to the right or left. Use "Reset zoom" button in upper right of graph to zoom out.

Download Data

About GDD



U2U Decision Support Tools - AgClimate View

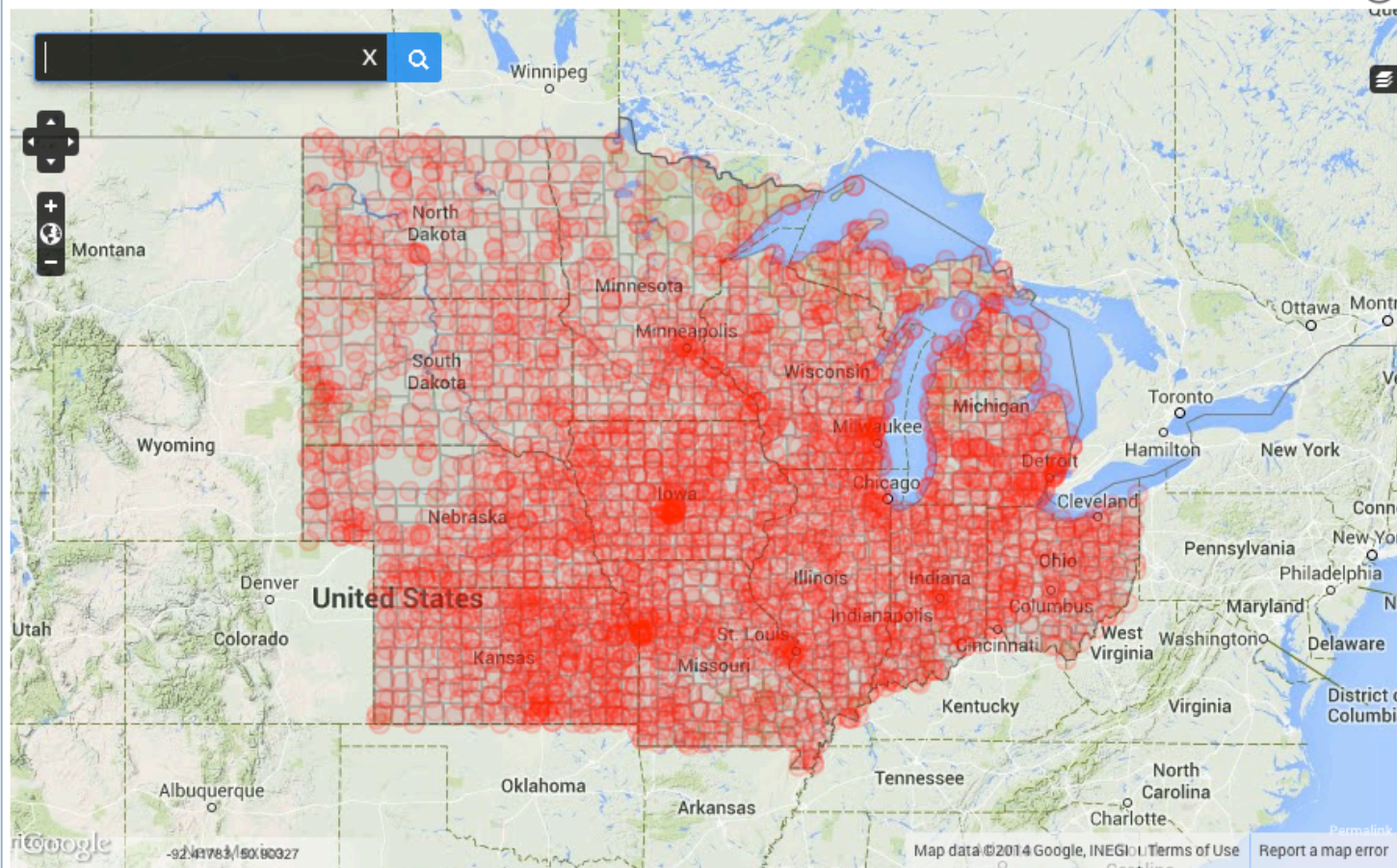
Welcome to AgClimate View – your source for historical climate and crop yield data in the Corn Belt.

- Plot local monthly temperature and precipitation variation back to 1980
- Track county crop yields and trends (where data is available)
- Consider crop yields in the context of monthly temperature, precipitation and growing degree day (GDD50) data

Used in tandem with other decision resources, this product can help you find long-term correlations between climate trends and yields and help put your recent growing cycles into historical context.

Select a Station

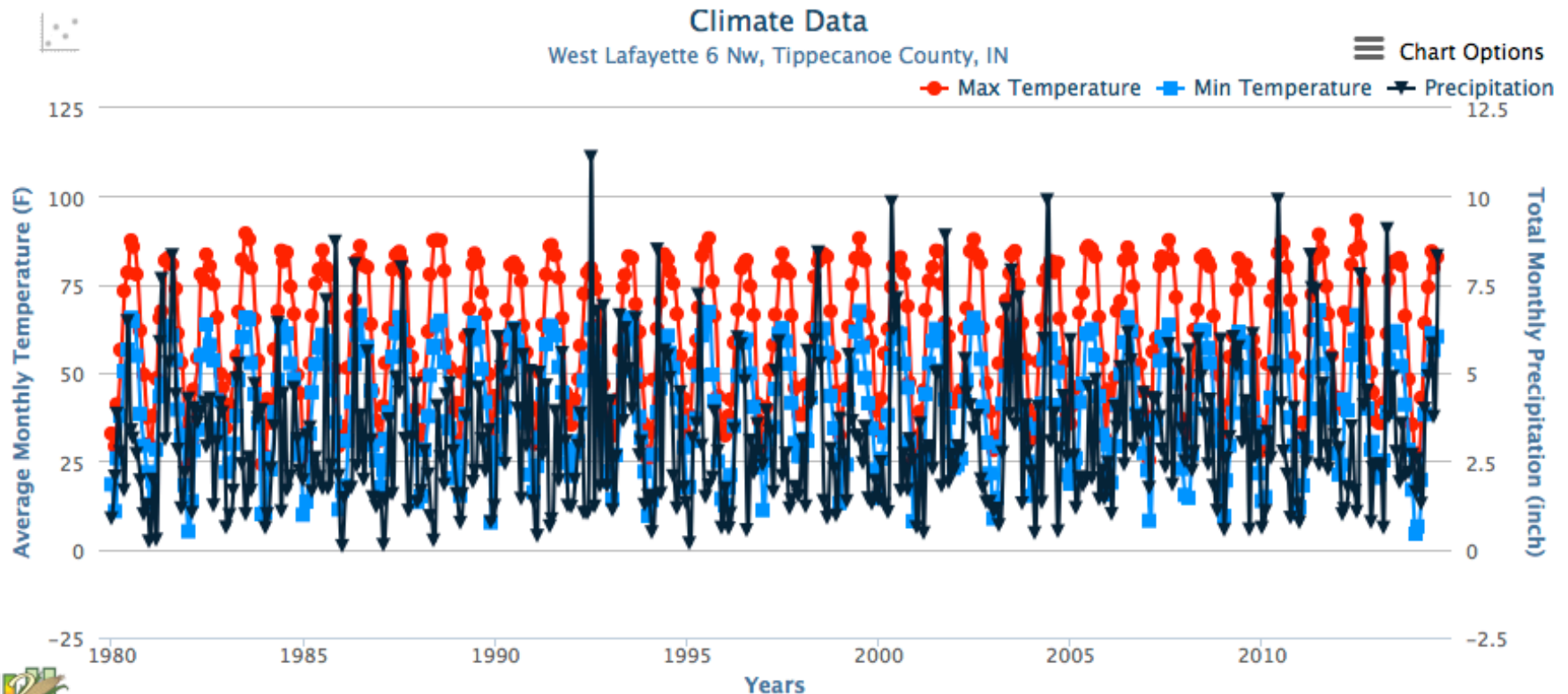
To get started, select a station near you. Do this by clicking on the map or using the search feature.



Climate Data are retrieved from <http://rcc-acis.unl.edu>

About ACV

This tab allows you to plot maximum and minimum temperatures and precipitation data for a specified date range.



Created 9/25/2014



- Add or remove lines on the chart by clicking on the corresponding items in the legend
- Print this graphic in a variety of formats using Chart Options
- Download all climate and crop data for this location using Download Data button below the chart
- Zoom in by clicking above or below the plotted data and dragging your cursor to the right or left. Use "Reset zoom" button in upper right of graph to zoom out.

Climate Data are retrieved from <http://rcc-acis.unl.edu>

Download Data ▾

About ACV



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
- deviations of yield (in percent) from the de-trended 1981-2010 average yields.

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: Neutral
 AO: Neutral

ENSO ALERT STATUS
 El Niño Watch

About CPV

Click on the map to view a chart of the data for that location; chart will appear below the maps. Four Maps ?

ENSO Average Observed Monthly Precipitation (inches)

Neutral Deviation from Normal

ENSO

- El Niño
- Neutral**
- La Niña

AO

- Positive
- Neutral
- Negative

Precipitation

Average Precip

Deviation from Normal

Deviation from Neutral

Temperature

Average Temp

Deviation from Normal

Deviation from Neutral

Corn Yield

Deviation from Normal

Change Month Link map

ENSO Average Observed Monthly Mean Temperature (°F)

Neutral Deviation from Normal

Temperature

Average Temp

Deviation from Normal

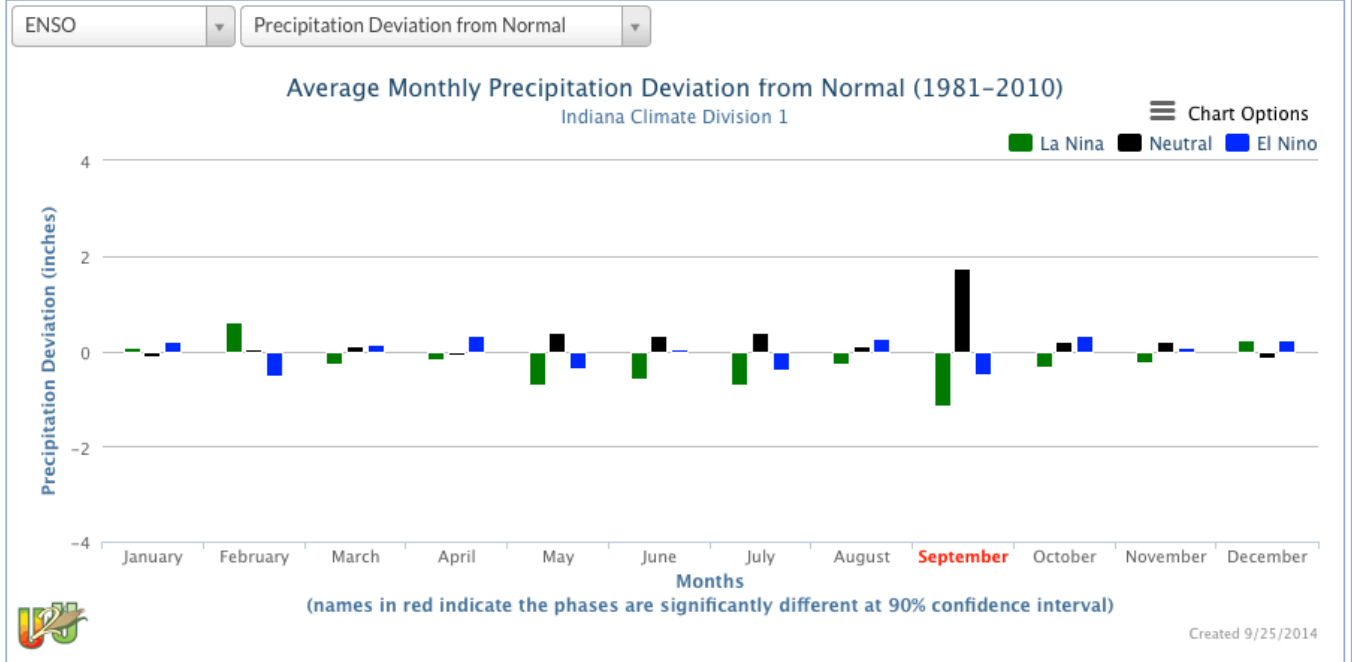
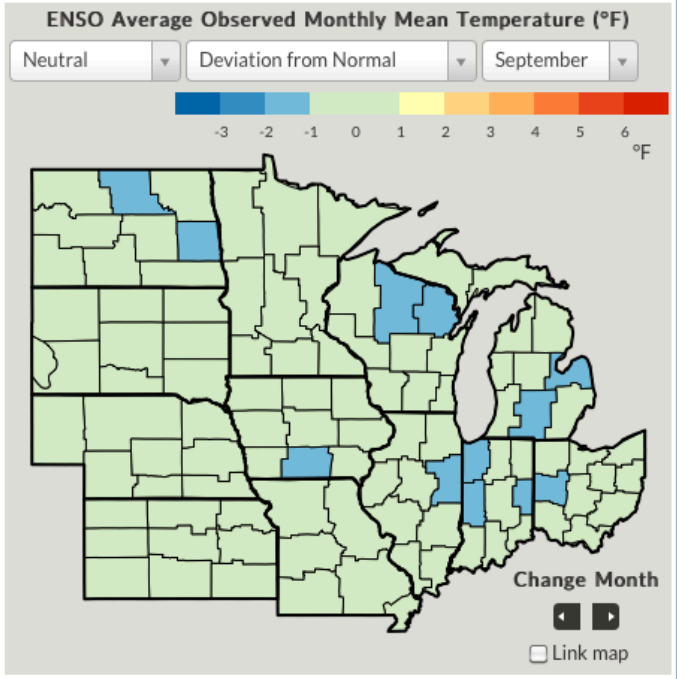
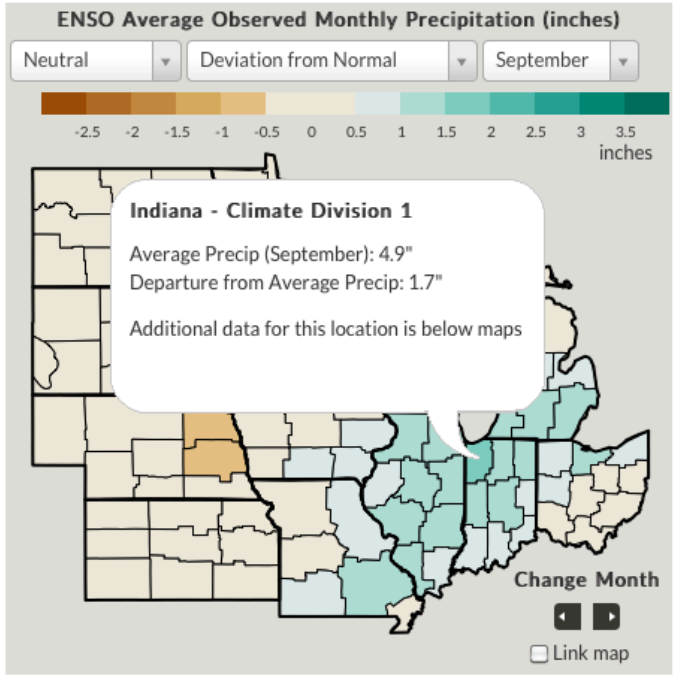
Deviation from Neutral

Change Month Link map



Click on the map to view a chart of the data for that location; chart will appear below the maps.

Four Maps





U2U Decision Support Tools - Split Nitrogen Application

Welcome to the Corn Split N decision support tool.

This product can be used to determine the feasibility and profitability of using post-planting nitrogen applications for corn production. The Split N tool combines historical data on crop growth (estimated using corn growing degree days) and fieldwork conditions (from USDA NASS) with economic considerations to determine best/worst/average scenarios for successfully completing nitrogen applications within a user-specified time period.

Map

About SplitN

To get started, click on any location within the gray area of the map. Use the zoom function for a more accurate selection.



Tool Tips:

- Use white user location icon (📍) in upper right hand corner of map to zoom to current location of computer being used.
- Use the layer icon (☰) in the upper right hand corner of the map to control your viewing options.
- Tested with browsers: Internet Explorer 11 & later; FireFox 27.0 & later; Chrome 33.0 & later; Safari 5.1.10 & later.



This tab allows you to customize inputs for your farm and view summarized results.

Location: Hancock Co, Illinois; Crop Reporting District: West (3)

Planting Date: May 15

Apply N by what stage?: V8

Yield penalty for not getting post-planting N applied: 25 bu/acre

Yield benefit from post-planting N application: 5 bu/acre

Reduced N applied due to post-planting N application: 30 lbs/acre

Nitrogen Price (\$/lb): \$ 0.55 /lb

Corn Price (\$/bu): \$ 4.5 /bu

Sidedress Cost (\$/acre): \$ 15 /acre

Start Date to Apply Nitrogen: June 10

End Date to Apply Nitrogen: June 23

V8 expected by Jun 23

Implement width (ft): 36

Implement speed (mph): 5

Field efficiency: 0.75

Acres worked per hour: 16

Acres: 1,500

Calculated hours needed: 92

Hours in field per day: 15.0

All daylight hours

Custom hours

Days worked in 7: 6

Days in selected period: 14

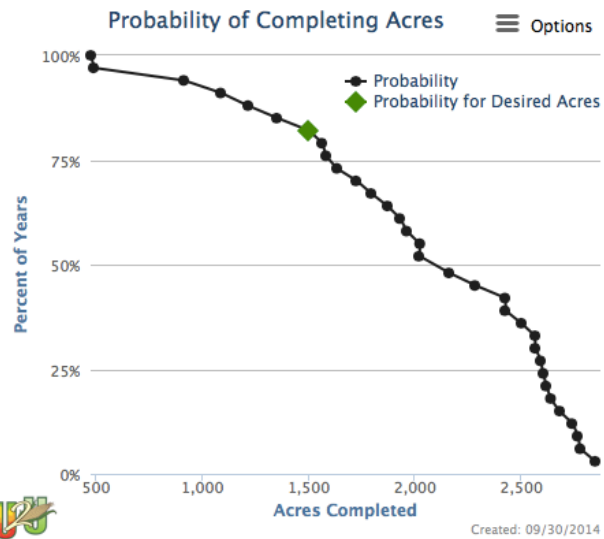
Average days suitable in period: 8.2

Average hours suitable in period: 123

Summary of Acres Completed using 33 years of Field Work Days History

Acres Completed if Start on Jun 10 and End on These Dates

Completion Percentile	Jun 16	Jun 23	Jun 30	Jul 07
50	925	2,091	3,323	4,522
60	811	1,936	3,189	4,341
70	791	1,717	2,965	3,777
80	673	1,539	2,100	3,124
82	665	1,500	2,084	3,093
85	547	1,346	1,967	3,025
90	466	1,126	1,824	2,583
95	390	766	1,442	2,167





Behind the Scene for AgClimate View

- **Accesses:**
 - geoserver for shape files: Coop station list, state & county boundaries
 - csv file for yield information (~4 MB)
 - Over 3000 active coop weather stations available for user to select in 12-state U2U area
 - Data accessed from NOAA's Applied Climate Information System (ACIS) using curl calls



Behind the Scene for Corn GDD

- **Accesses:**
 - geoserver for state & county boundaries
 - Data file with 30+ year history of accumulated gdds
 - 5 GB GeoTIFF bip file
 - ~3.5 km spatial resolution gridded data file
 - NOAA's Applied Climate Information System (ACIS) for gridded daily min & max temps using cron job each night to update accumulated gdd values for current year



Behind the Scene for Climate Patterns Viewer

- **Accesses:**
 - csv data files for climate pattern history & yield residuals
 - geojson files for crop reporting district (crd), climate division and state boundaries



Behind the Scene for Post-Planting Nitrogen Application

- **Accesses:**
 - TIF data files for field workday 36-year history
 - Field workable days per week during growing season (USDA)
 - 300 KB file
 - GeoTIFF file for 30-year average accumulated gdds & current year accumulated gdds
 - 150 MB files
 - geojson files for crop reporting district (crd), county and state boundaries



Libraries U2U DS Tools (components) Use

- Openlayers for mapping
- Highcharts for graphs
- Introjs for inline help
- GDAL for accessing tiff/geotiff files
 - Geospatial Data Abstraction Library

mygeohub.org

U2U is a “supergroup” on mygeohub

The screenshot shows the mygeohub.org website interface. At the top, a dark navigation bar contains the logo 'MY GEO HUB' on the left and a menu with 'RESEARCH PROJECTS', 'COMMUNITY', 'RESOURCES', 'WORKING PROJECTS', 'ABOUT', and 'LOGIN' on the right. Below the navigation bar is a light gray banner with the slogan 'FREE. FAST. POWERFUL.' on the left and a search bar with a magnifying glass icon and a help icon on the right. The main content area is a grid of four project cards, each with a background image and a dark text box. The top-left card features a green field with purple flowers and is titled 'Useful to Usable (U2U)'. The top-right card features a field of corn and is titled 'Geoshare'. The bottom-left card features a cracked, dry earth landscape and is titled 'driNet'. The bottom-right card features a blue ocean wave and is titled 'Water hub'.

MY GEO HUB RESEARCH PROJECTS COMMUNITY RESOURCES WORKING PROJECTS ABOUT LOGIN

FREE. FAST. POWERFUL. Search ?

Useful to Usable (U2U)

Transforming Climate Variability and Change Information for Cereal Crop Producers, is an integrated research and extension project working to improve farm resilience and profitability in the North Central Region by transforming existing climate information into usable knowledge for the agricultural community.

Geoshare

Developing a cyber-infrastructure for open source hosting of agriculture, resource and environmental data, GEOSHARE will deploy a globally consistent, spatially explicit database accompanied by analysis tools and training programs to help government and industry decision makers on issues related to food security and sustainability.

driNet

driNET is a research environment for collecting and disseminating local to regional scale drought information from several sources including the drought monitor, precipitation, soil moisture and more. The site also provides access to models such as the HMM (probabilistic method) Analysis tool and the Drought Impact Viewer.

Water hub

Water HUB is an open platform for connecting hydrologists through sharing of hydrologic information, data, models and simulation tools, connecting researchers and students to high-performance computation and data resources, and connecting science and people through shared knowledge and decision making tools and information.



Questions