

VegScape: A NASS Web Mapping Service Based U.S. Crop Condition Monitoring System

Rick Mueller & Zhengwei Yang
National Agricultural Statistics Service



“ . . . providing timely, accurate, and useful statistics in service to U.S. agriculture.”





Purpose of VegScape

- On-line satellite-based U.S. crop condition vegetation assessment and monitoring
- Improve objectivity, robustness, quantification, and defensibility of nationwide crop condition monitoring program
- Provide tools for data exploration and visualization
- Publically disseminate geospatial vegetation condition at *daily, weekly, and biweekly* time periods
- Supports ethos of data democratization
 - free and open access to digital geospatial data layers
 - open geospatial standards
 - supporting transparent and collaborative government initiatives

VegScape Objective

- Develop an operational National Crop Condition Monitoring System
- Use 250m MODIS daily surface reflectance data (MOD09GQ) to produce crop vegetation condition data products that are complementary to existing NASS crop condition products
- Improve NASS vegetation condition monitoring spatial and temporal resolutions





You are here: Home / Research and Science / Vegetation Condition Maps

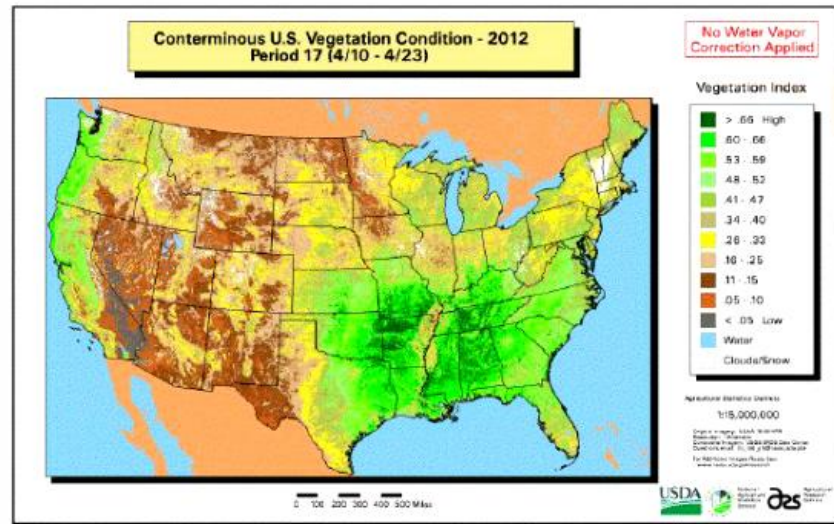
Research and Science

2012 Vegetation Condition Map Animations

Click Year to Play*

- 2012
- 2011
- 2010
- 2009
- 2008
- 2007
- 2006
- 2005
- 2004
- 2003
- 2002
- 2001
- 2000 NA
- 1999
- 1998
- 1997
- 1996
- 1995

*Requires QuickTime (Free)

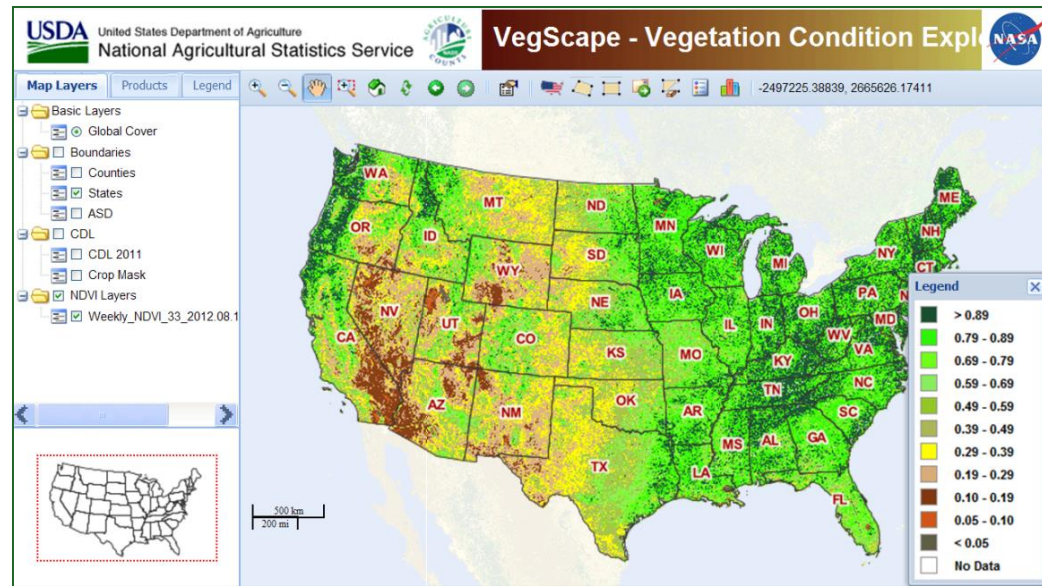


06 13 20 27 | 03 10 17 24 | 01 08 15 22 29 05 12 19 26 | 03 10 17 24 31 | 07 14 21 28 | 04 11 18 25 | 02 09

Click Date to View 1024x663 Image (~300 KB)

- 1995-2012
- NDVI Vegetative Condition
- Static Maps
- Based on AVHRR sensor (1 km spatial resolution)

- 2013
- **VegScape** – web service
- Multiple vegetation indices
- Interactive web mapping: navigate, download, etc.
- MODIS sensor: daily repeat, 250m resolution (~15 acres /6.25 hectares)
- Composites: daily, weekly, bi-weekly

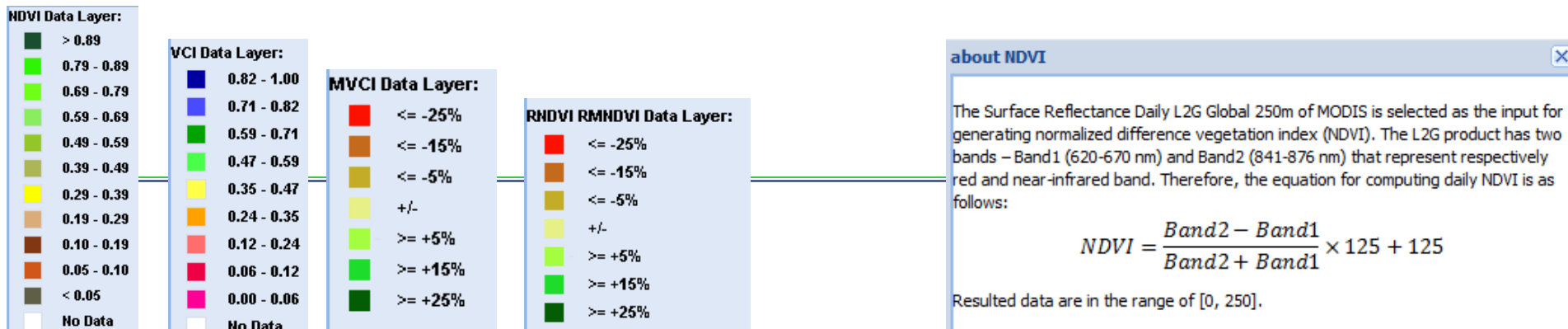


Built on CropScape framework/architecture

- Web-based interactive mapping
- Derive daily/weekly/biweekly composites
- Automated updates
- Online navigation, zooming, panning, downloading
- Hosted/maintained by GMU/Center for Spatial Information Science and Systems

Vegetation Indices

- The Normalized Difference Vegetation Index (NDVI) is used to measure and monitor plant growth, vegetative cover, and biomass production
- NDVI values range from 0 to 1, where higher values indicate stronger plant vigor and high chlorophyll content
 - Lower values indicate low vegetative content/plant heartiness
- Additional derivative vegetation indices can be displayed: Vegetative Condition Index; Ratio VCI; Ratio Median VCI; Mean VCI



Vegetation Indices

- ▶ **NDVI** – Normalized Difference Vegetation Index
 $NDVI = (IR - Red) / (IR + Red)$ = Shows greenness
Healthy vegetation has high NDVI ratio values (1.0 max)
low red light & high near-infrared reflectance values
- ▶ **RVCI** -NDVI change ratio to previous year
- ▶ **RMVCI** - NDVI change ratio to median
- ▶ **VCI** - Relative NDVI change with respect to minimum historical (referenced) NDVI value
- ▶ **MVCI** - Mean referenced VCI (vegetation condition index)

Zoom in

Zoom out

Pan

Drag zoom

Home

Refresh

Previous view

Next view

Identify pixel value

Define state/county AOI

Define rectangle AOI

Import AOI

Clear AOI

Swipe layer

Create PDF map

Download AOI

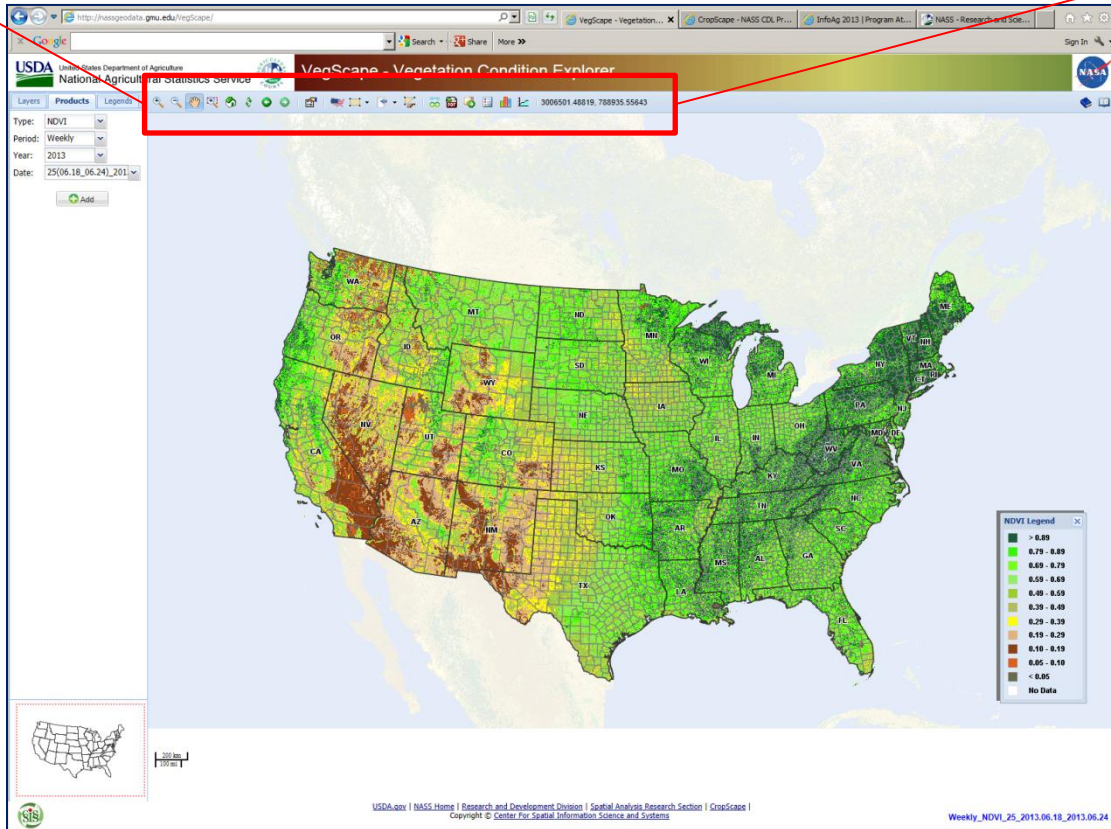
Show/hide legend

Statistics

NDVI Profile



VegScape GUI



Load VegScape Indices

1) Select vegetative index

The 'Products' dropdown menu is open, showing a list of vegetative indices. The options are: MSCI, NDVI, VCI, RSCI, RMSCI, and MSCI. The 'MSCI' option is currently selected and highlighted.

2) Time period

The time period selection interface shows the following settings: Type: NDVI, Period: Weekly, Year: Daily, and Date: Weekly. The 'Weekly' option is selected for the Date field.

3) Year

The year selection interface shows the following settings: Type: NDVI, Period: Weekly, Year: 2013, and Date: 2000. The '2013' option is selected for the Year field.

4) Date

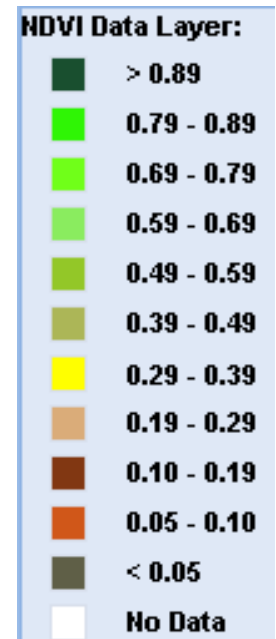
The date selection interface shows the following settings: Type: NDVI, Period: Weekly, Year: 2013, and Date: 05(01.29_02.04)_20. The '05(01.29_02.04)_20' option is selected for the Date field.

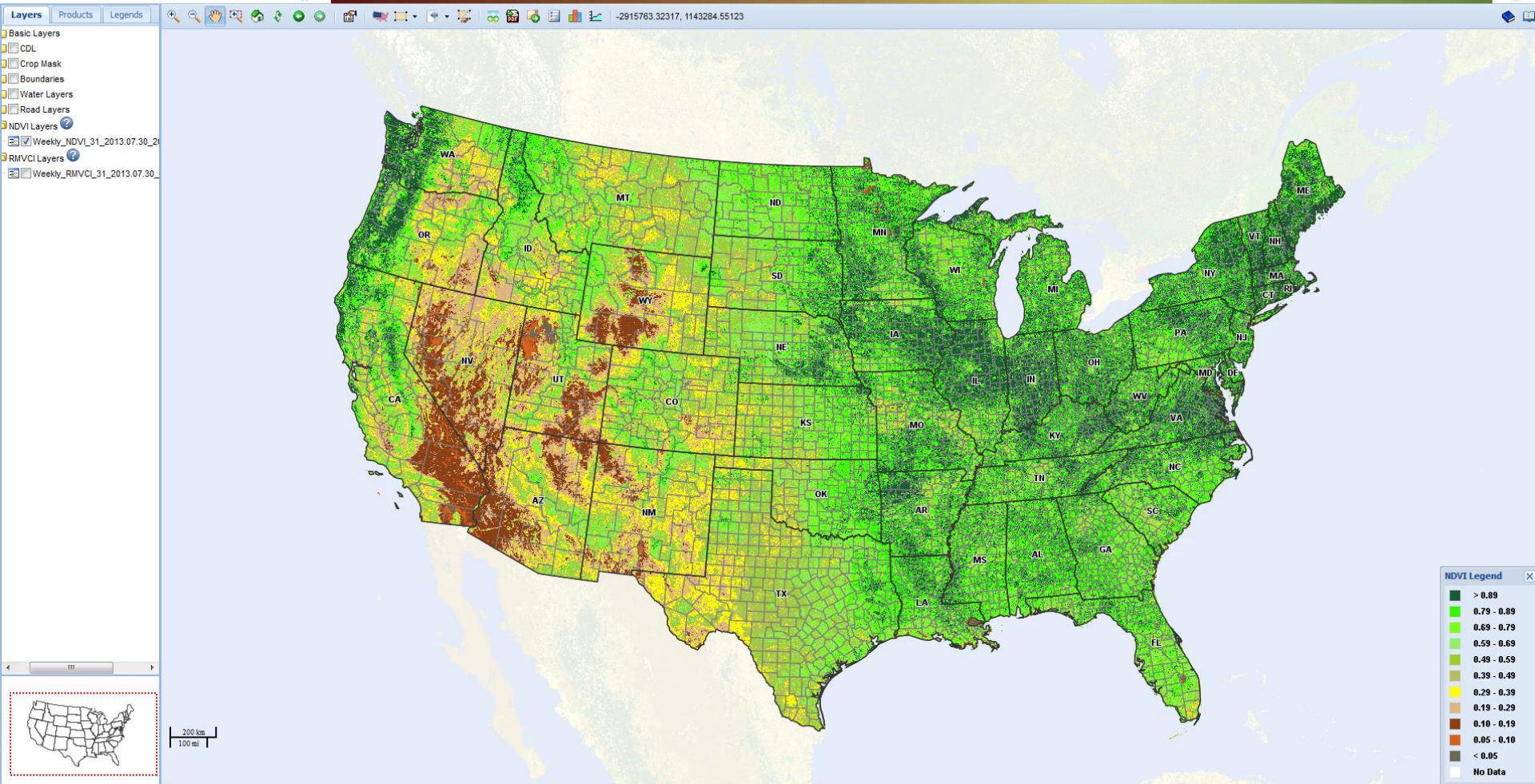
5) Add



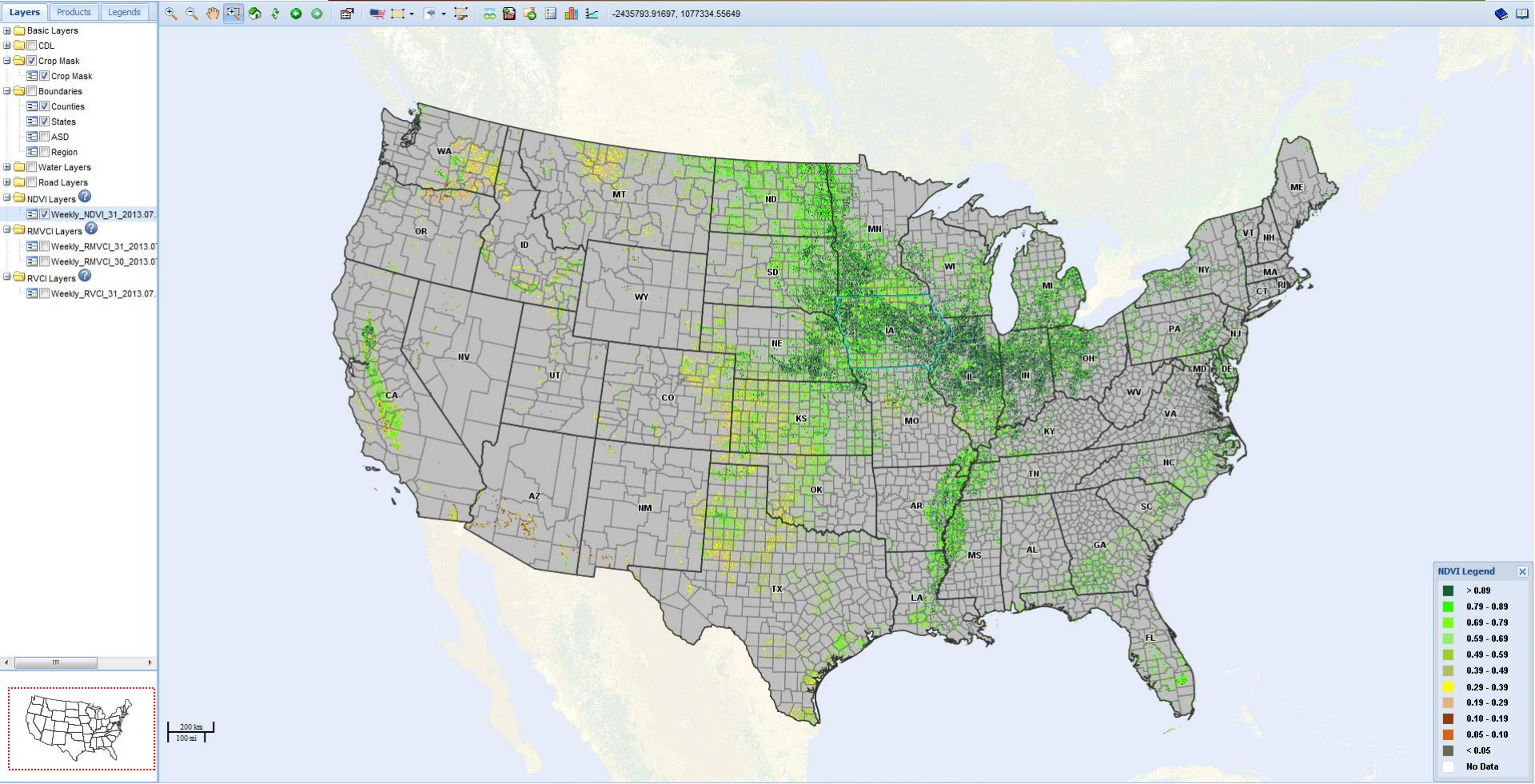
The final 'Products' panel shows the following configuration: Type: NDVI, Period: Weekly, Year: 2013, Date: 05(01.29_02.04)_20. Below the configuration is an 'Add' button with a green plus sign.

Follow these five steps to add products for analysis

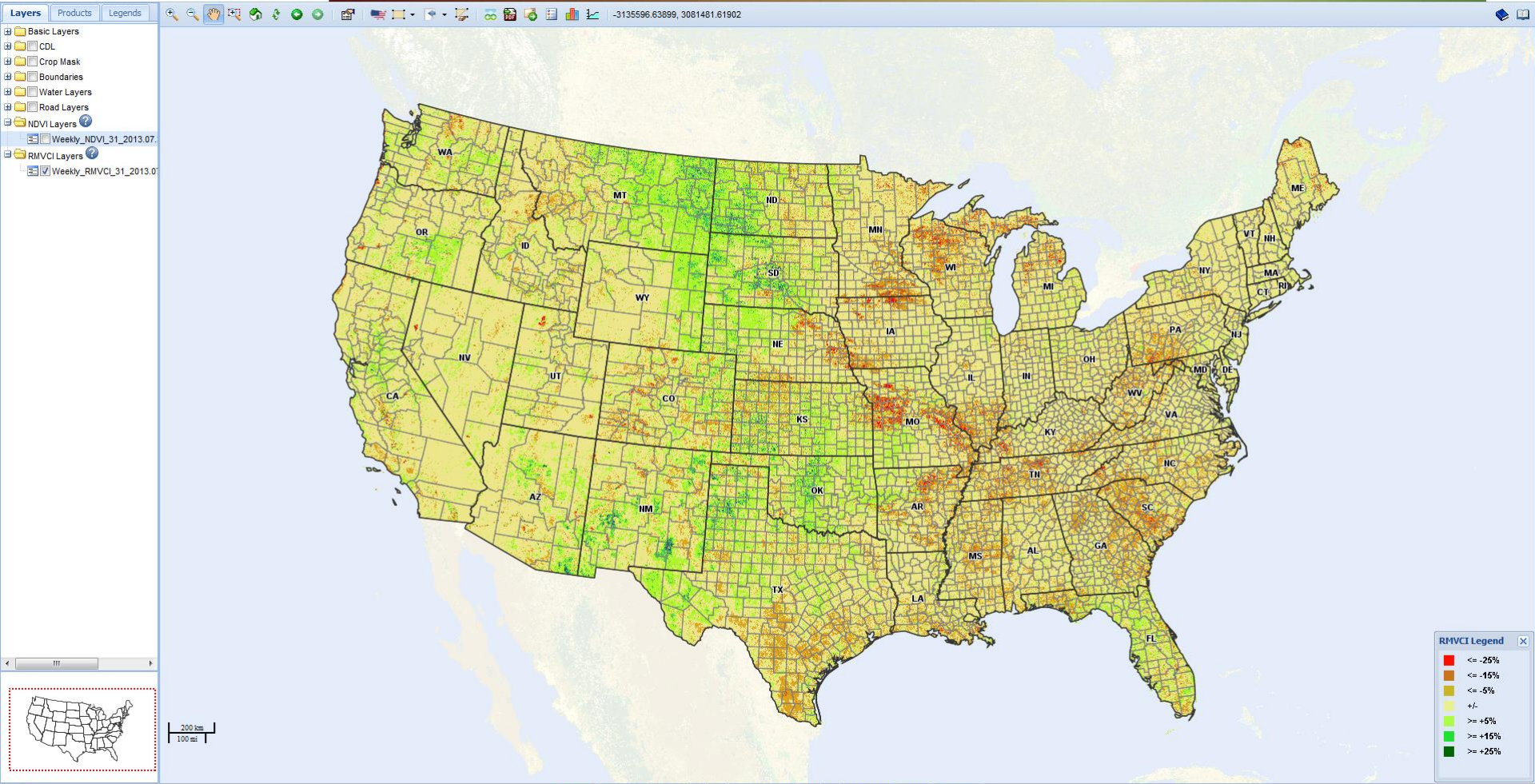




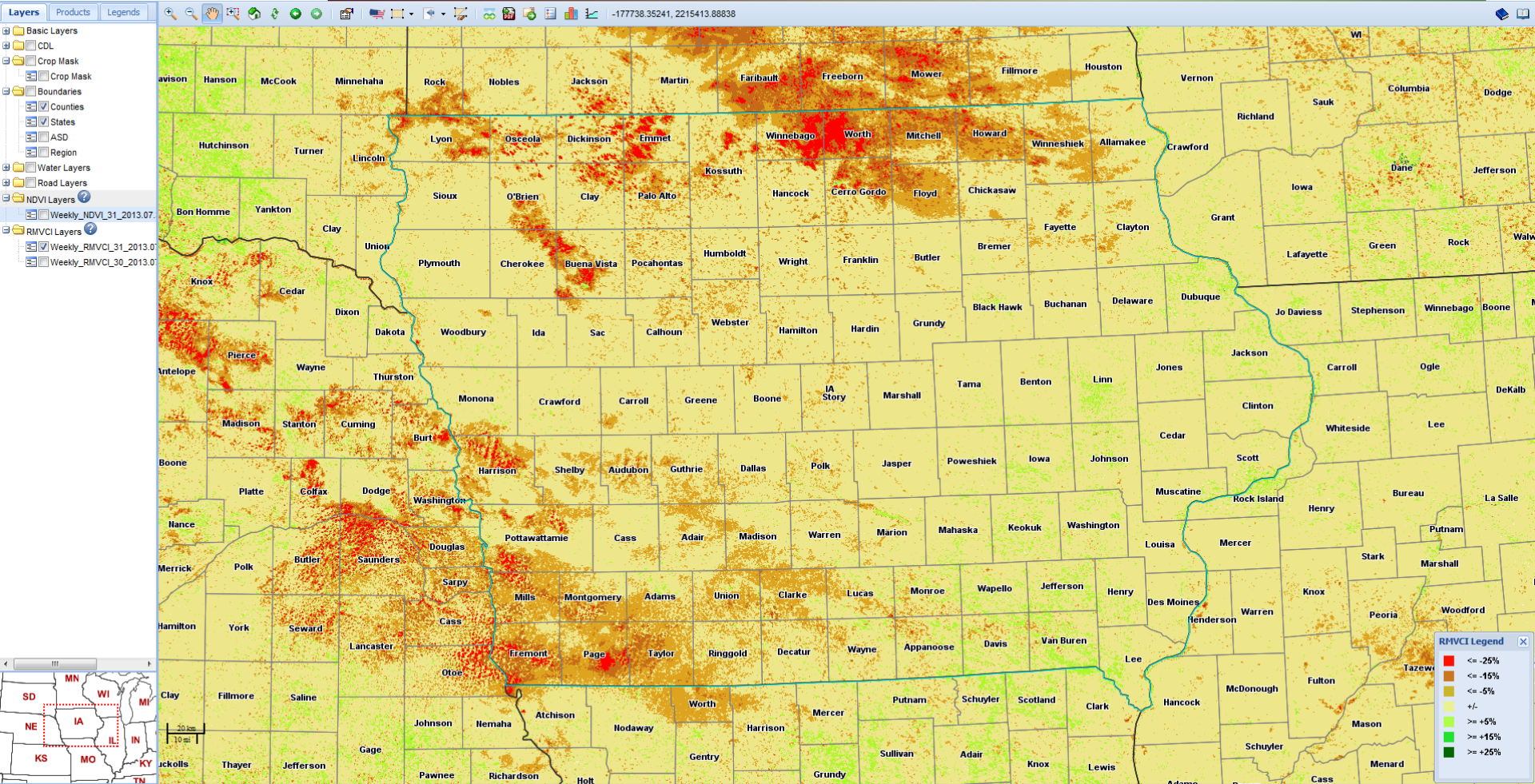
Most recent weekly NDVI image: 07/30/13 – 08/05/13



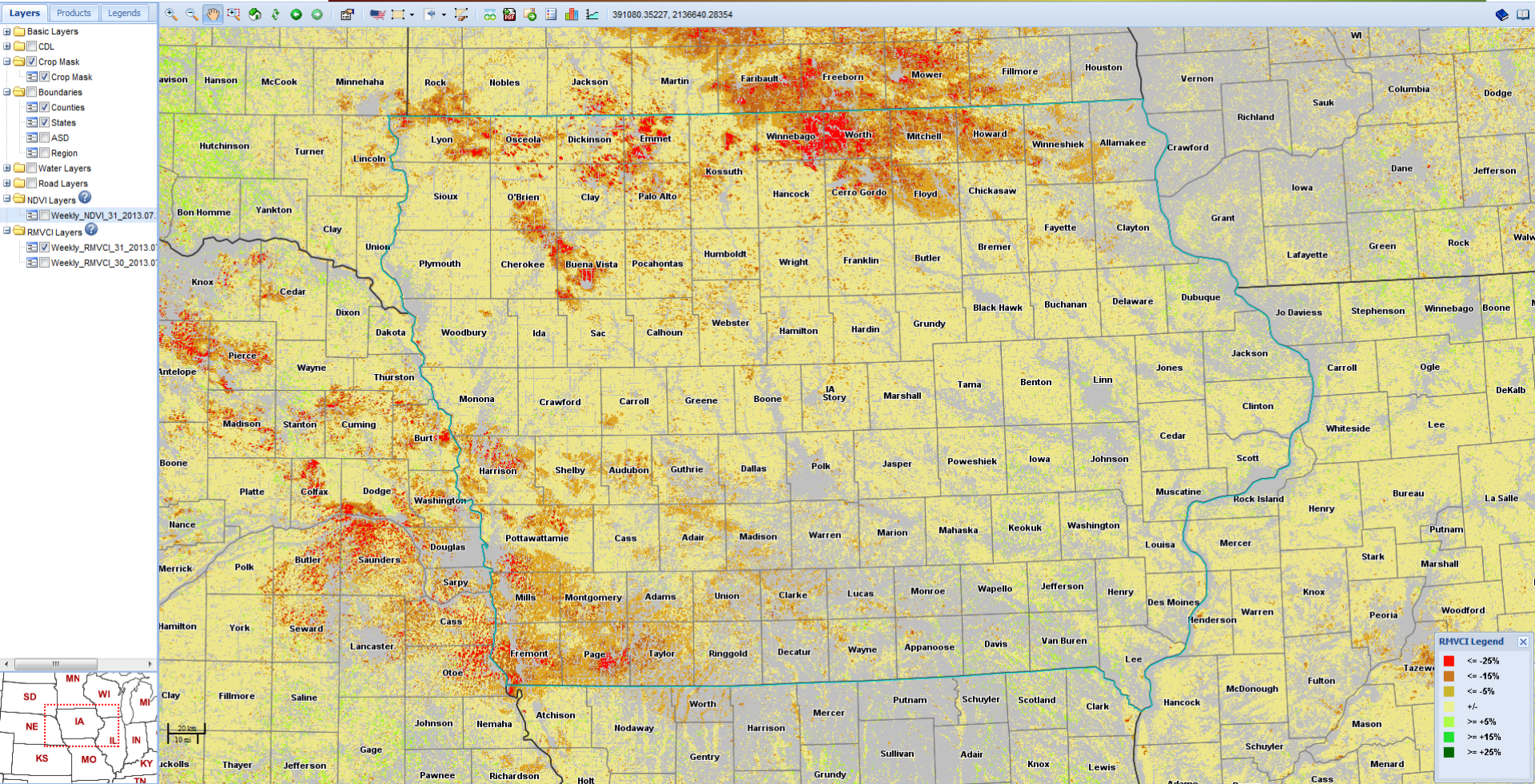
Most recent weekly NDVI image: 07/30/13 – 08/05/13
CDL Crop Mask applied



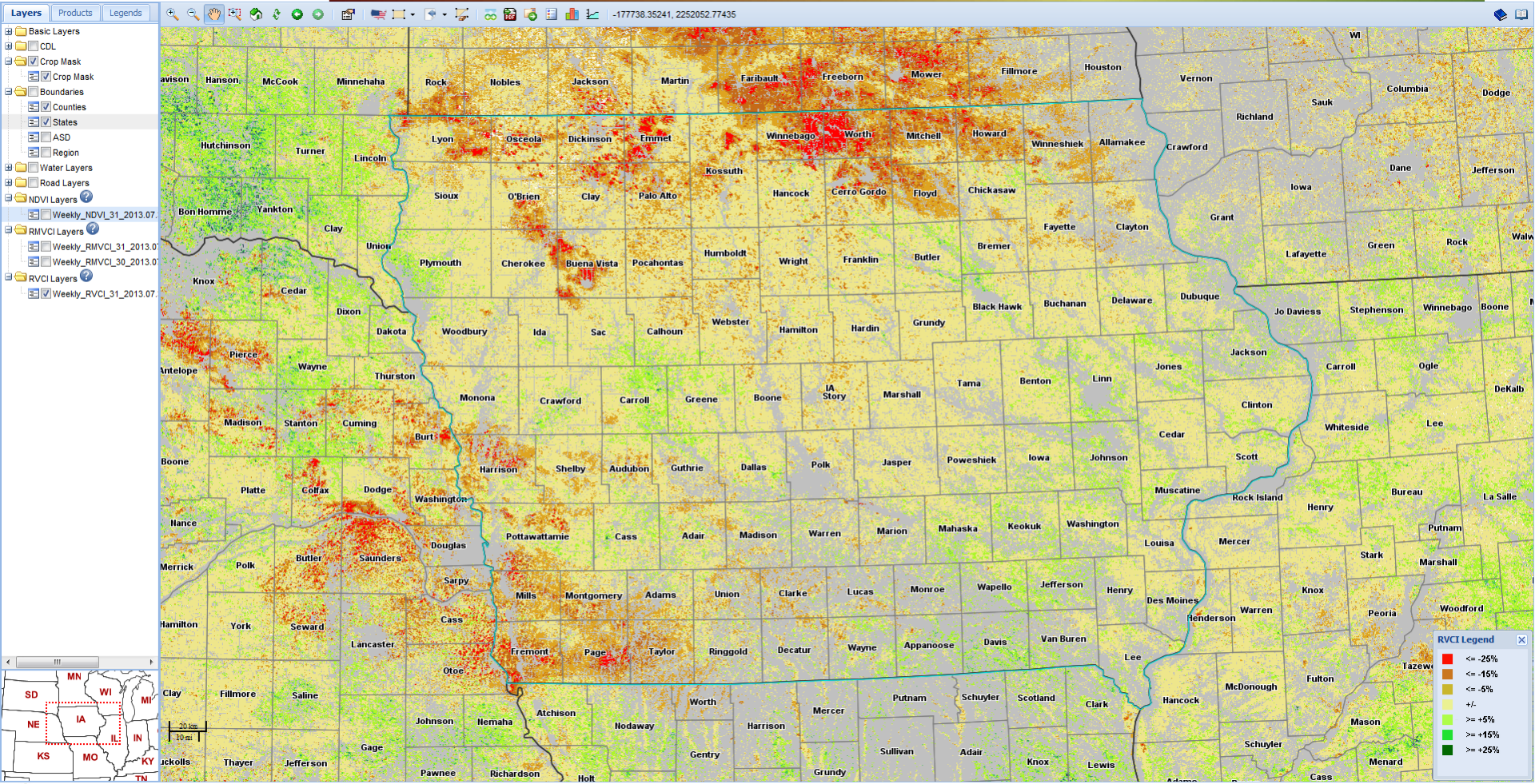
Ratio Median NDVI image: 07/30/13 – 08/05/13



Ratio Median NDVI zoom: 07/30/13 – 08/05/13



Ratio Median NDVI zoom: 07/30/13 – 08/05/13
CDL Crop Mask applied



Ratio to last year NDVI: 07/30/13 – 08/05/13
CDL Crop Mask applied



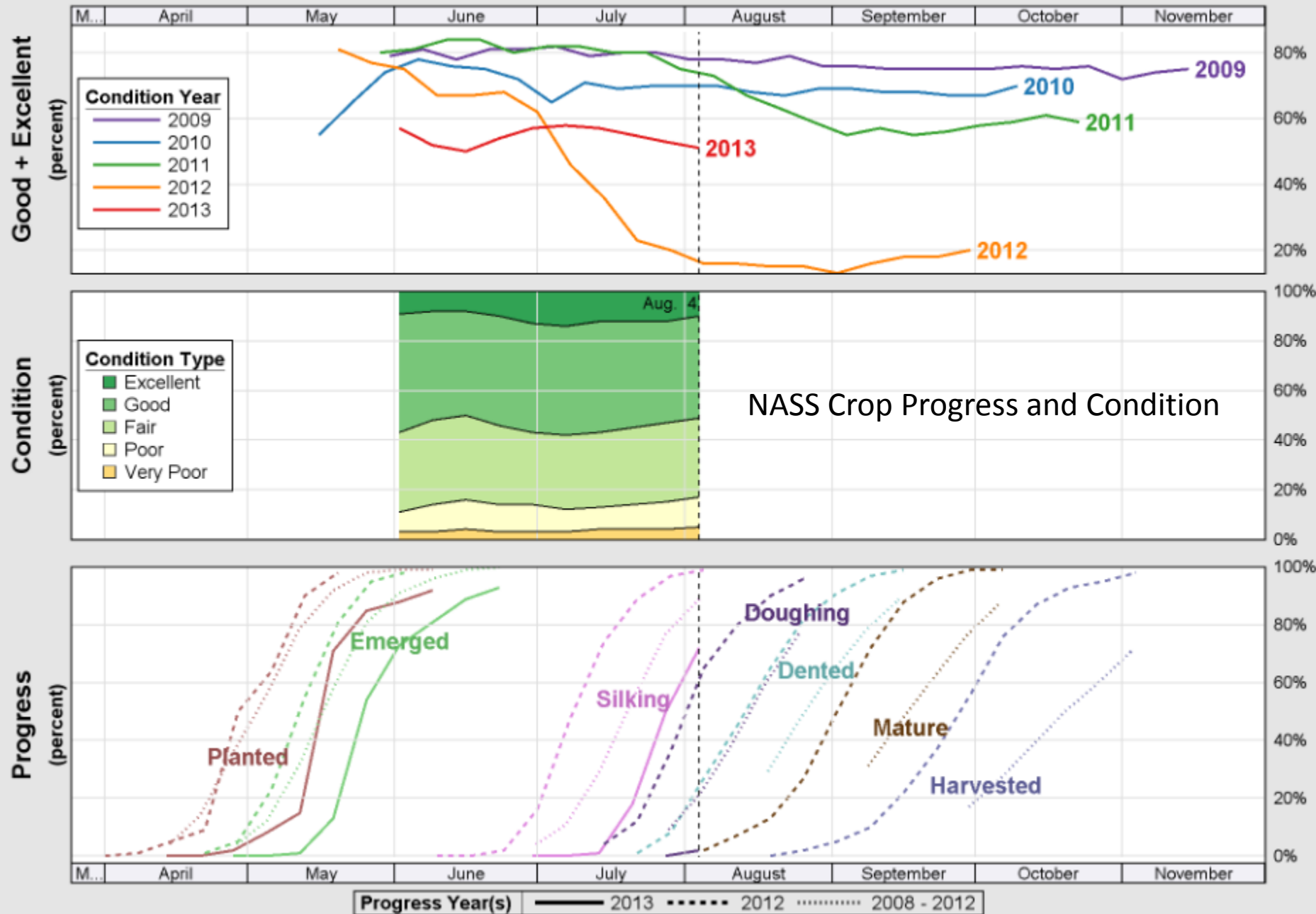
USDA National Agricultural Statistical Service, Iowa Field Office • 210 Walnut, Room 833 • Des Moines, Iowa 50309-2195
Phone 515-284-4340 • 1-800-772-0825 • Fax 515-284-4342 • nass-ia@nass.usda.gov
In Cooperation with the Iowa Department of Agriculture and Land Stewardship

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For the week ending August 4, 2013

Media Contact: Greg Thessen

Eighty-eight percent of the corn crop has tasseled, trailing the five-year average of 96 percent. Seventy-two percent of the corn crop was silking, well behind last year's 99 percent and the normal 89 percent. Nineteen percent of the corn crop has reached the milk stage, and some of the earliest planted corn has reached the dough stage. Corn condition declined slightly from the previous week, and was rated at 5 percent very poor, 12 percent poor, 32 percent fair, 41 percent good and 10 percent excellent. Seventy-nine percent of the soybean crop was blooming, behind last year's 96 percent and the five-year average of 92 percent. Pods were being set on 35 percent of the soybean crop, well behind last year's 74 percent and the normal 65 percent. Soybean condition declined slightly from last week and was rated 4 percent very poor, 10 percent poor, 34 percent fair, 42 percent good and 10 percent excellent. Seventy-seven percent of the oat crop has been harvested, only 1 percentage point behind normal.



NASS Crop Progress and Condition

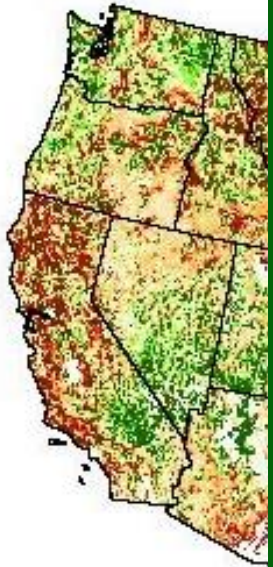
Evaporative Stress Index

1 month composite ending August 7, 2013

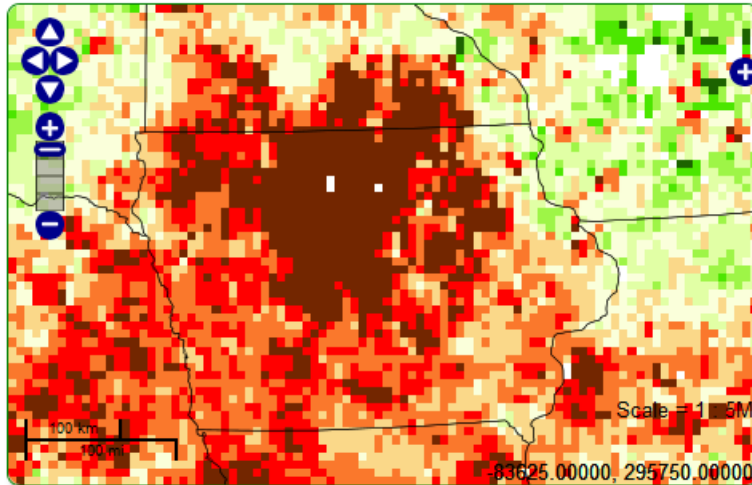
ESI Archive - CONUS



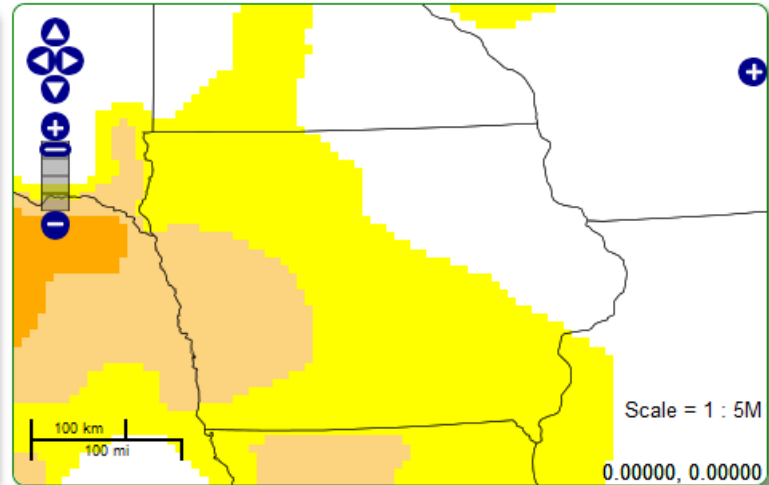
Hydrology & Remote Sensing Lab
Beltsville, Maryland, USA



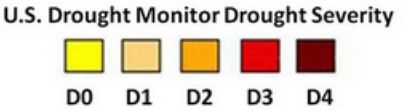
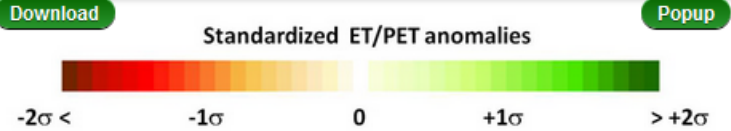
Index: ESI
Timescale: 1 Month
Date: Aug 7, 2013



Index: USDM
Timescale: Weekly
Date: Aug 5, 2013



$-2\sigma <$



[View in Static Mode](#)



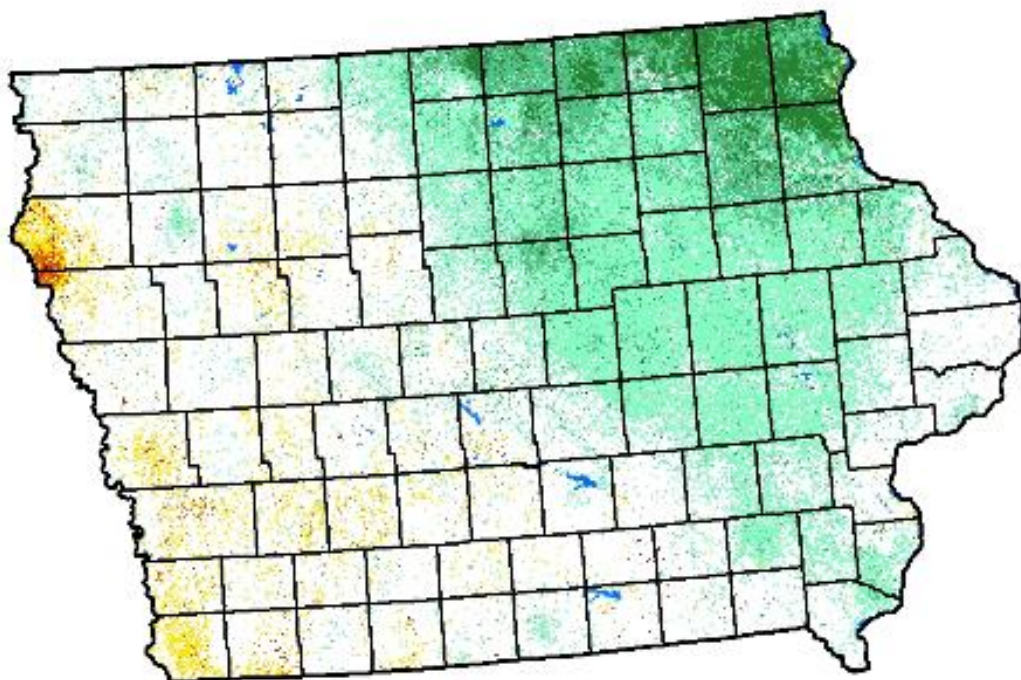
Vegetation Drought Response Index

Complete: Iowa

July 29, 2013

Vegetation Condition

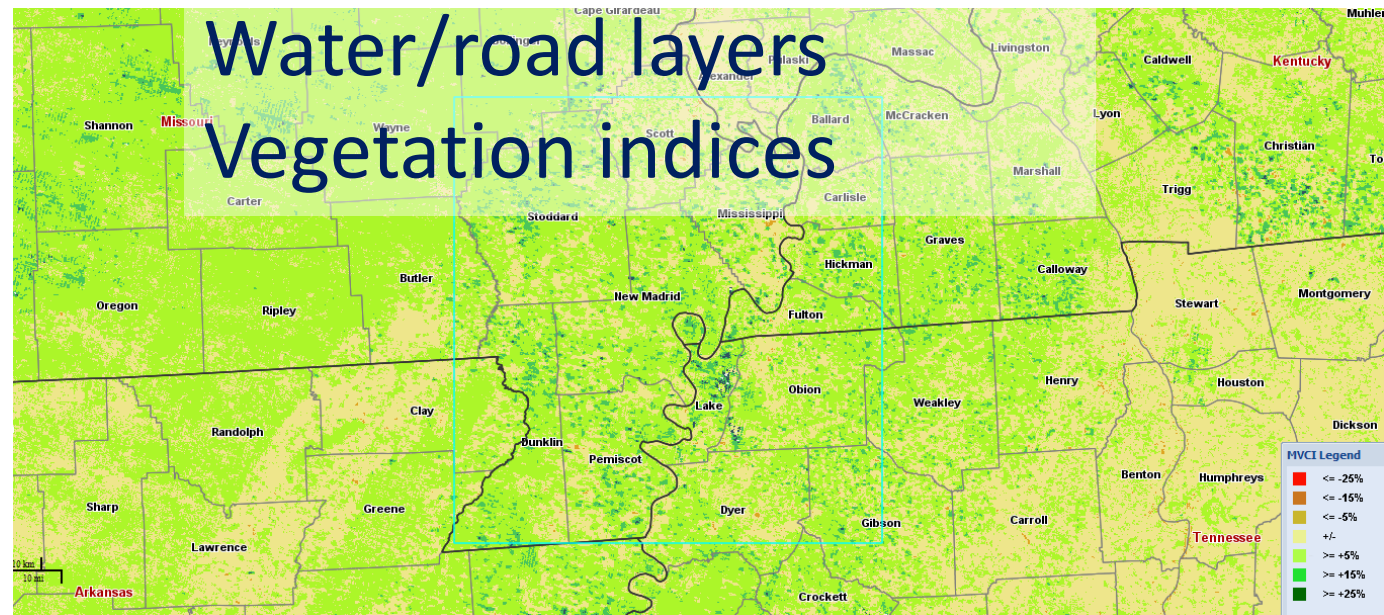
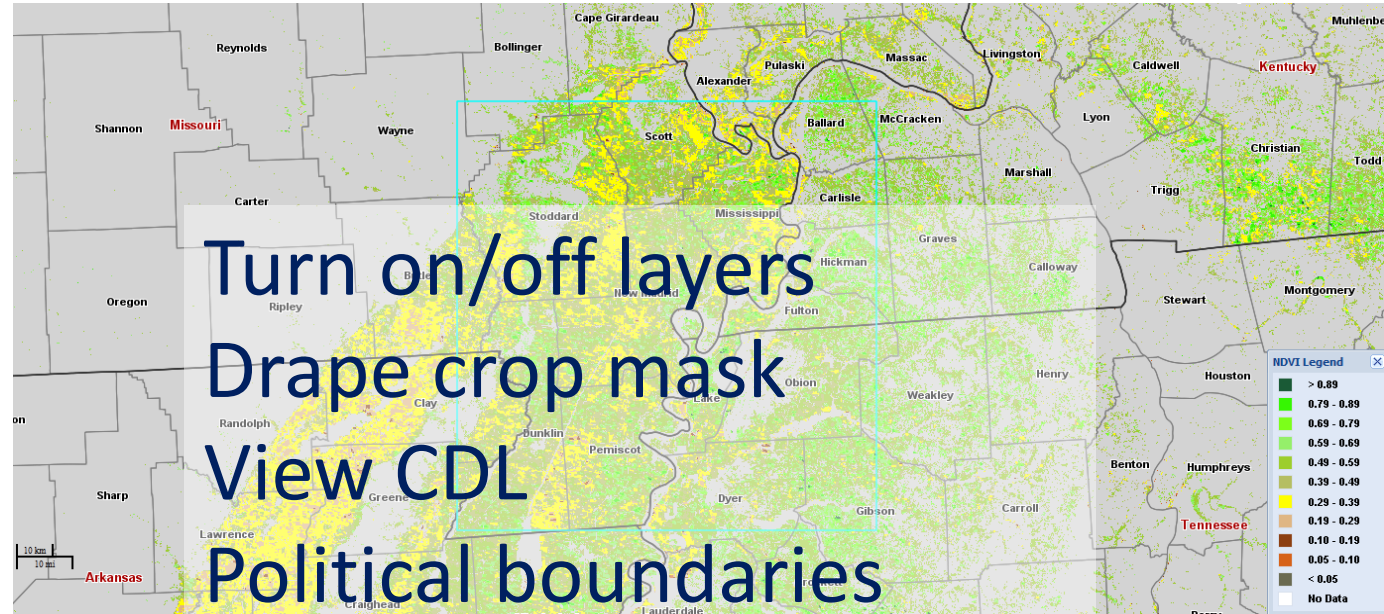
- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-Drought
- Near Normal
- Unusually Moist
- Very Moist
- Extremely Moist
- Out of Season
- Water



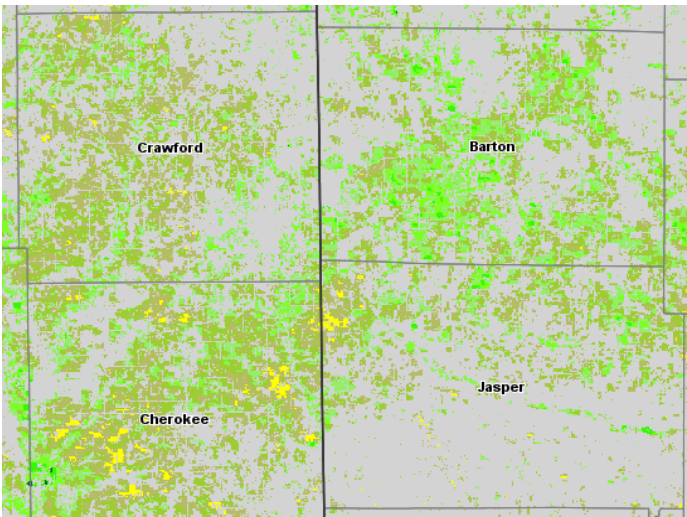
VegDRI: 07/29/13

VegScape Layers/Products/Legends Tab

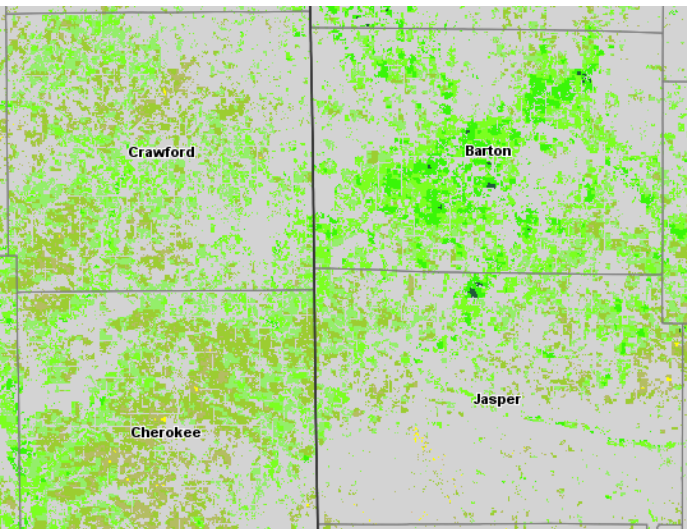
The screenshot shows the 'Layers' panel in the VegScape software. It features three tabs: 'Layers', 'Products', and 'Legends'. The 'Layers' tab is active, displaying a hierarchical list of layers. The 'Basic Layers' folder is expanded, showing 'Global Cover' (checked), 'CDL' (unchecked), 'CDL 2012' (unchecked), and 'Crop Mask' (unchecked). The 'Boundaries' folder is also expanded, showing 'Counties' (checked), 'States' (checked), 'ASD' (unchecked), 'Water Layers' (unchecked), 'Road Layers' (unchecked), 'Freeway System (National)' (unchecked), and 'Major Highways (Regional)' (unchecked). The 'NDVI Layers' folder is expanded, showing 'Weekly_NDVI_07_2013.02.' (unchecked). The 'VCI Layers' folder is expanded, showing 'Weekly_VCI_07_2013.02.1.' (unchecked). The 'RVCI Layers' folder is expanded, showing 'Weekly_RVCI_07_2013.02.' (unchecked). The 'RMVCI Layers' folder is expanded, showing 'Weekly_RMVCI_07_2013.0.' (unchecked). The 'MVCI Layers' folder is expanded, showing 'Weekly_MVCI_07_2013.02.' (checked). A scroll bar is visible at the bottom of the panel.



VegScape Swipe Function



NDVI 07/24/12 – 07/30/12 Crop Mask



NDVI 07/26/11 – 08/01/11 Crop Mask

Swipe Current View

Front Layer: ▾

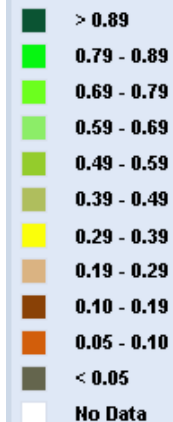
Back Layer: ▾

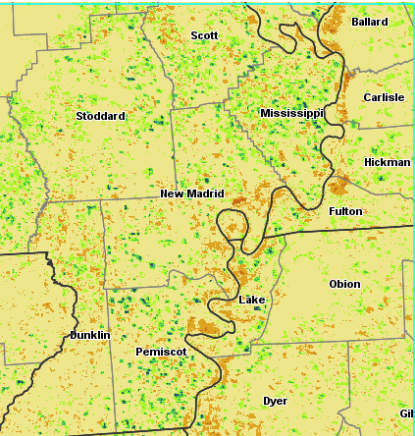
Swipe Position

Direction: ▾

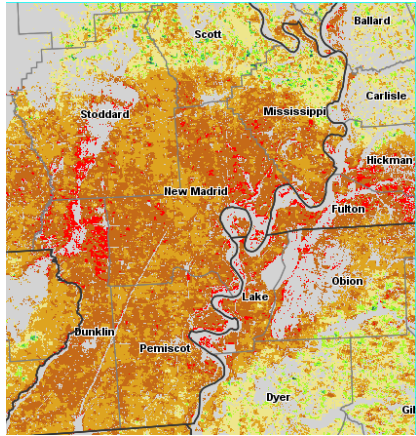
Swipe/fade widget back & forth
Vertical or horizontal motion

NDVI Legend

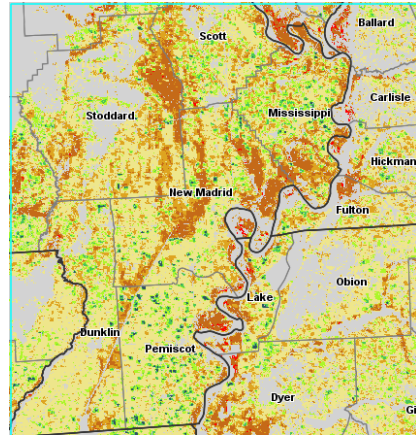




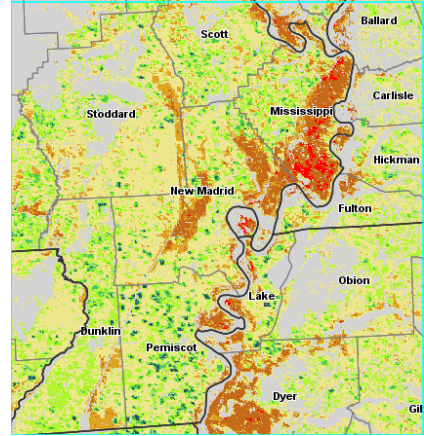
04/12-04/18/11



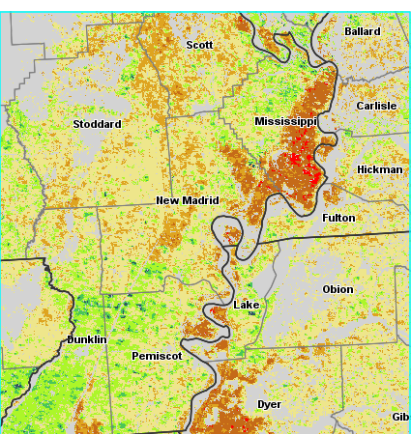
04/19-04/25/11



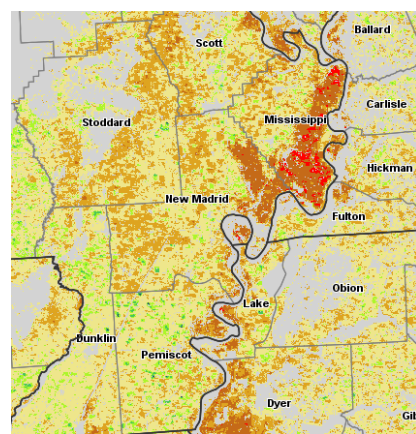
04/26-05/02/11



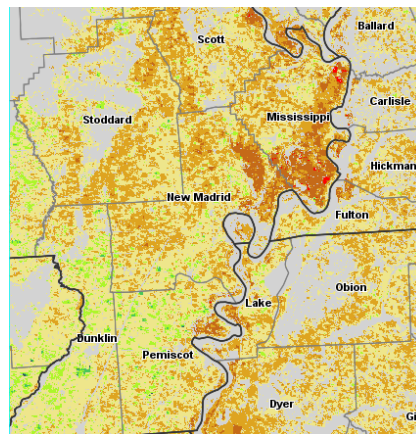
05/03-05/09/11



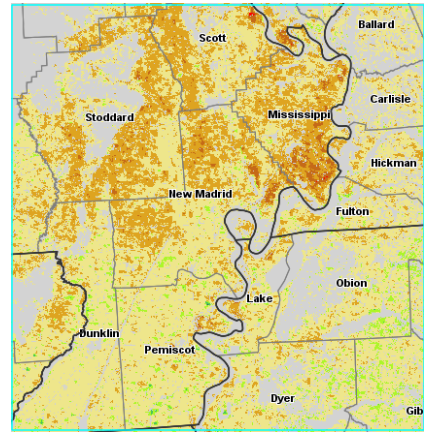
05/10-05/16/11



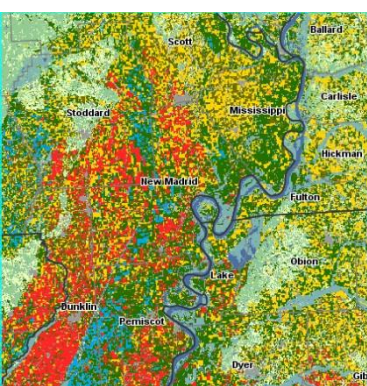
05/17-05/23/11



05/24-05/30/11



05/31-06/06/11



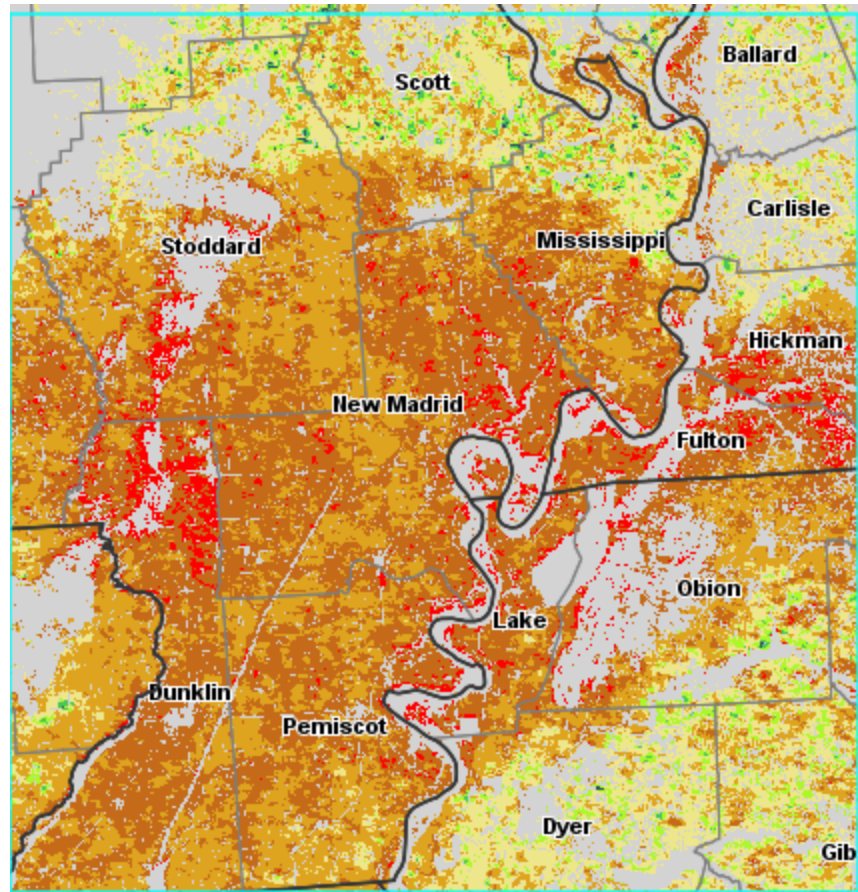
Cropland
Data
Layer

RMVCI Legend

- <= -25%
- <= -15%
- <= -5%
- +/-
- >= +5%
- >= +15%
- >= +25%

Time Series Profile
2011 Flood Missouri Bootheel
Ratio Median NDVI
(Median of 10 years NDVI)

RatioMedian VCI- Area of Interest Statistics



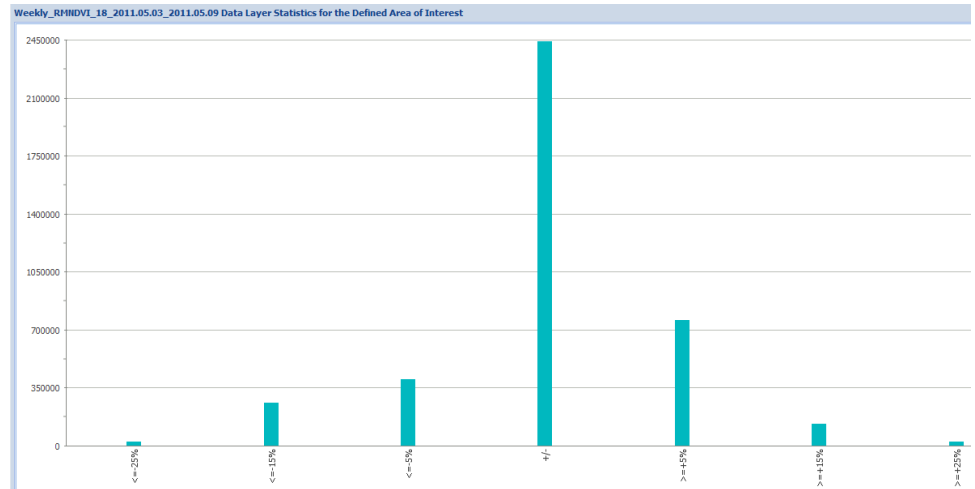
Weekly_RMNDVI_18_2011.05.03_2011.05.09 Data Layer Statistics for the Defined Area of Interest

Note: Pixel and acreage counts are not official estimates.

Value	Category	Pixel Counts	Acreage
0	<=-.25%	1931	25606.6
1	<=-.15%	19647	260535.3
2	<=-.5%	30411	403274.7
3	+/-	184180	2442377.2
4	>=+.5%	57280	759579.6
5	>=+.15%	9910	131414.7
6	>=+.25%	1765	23405.3
Total	7	305124	4046193.4

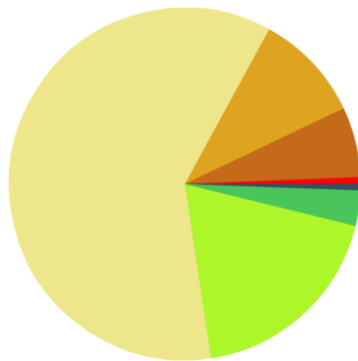
04/19-04/25/11

Quantify vegetative area condition

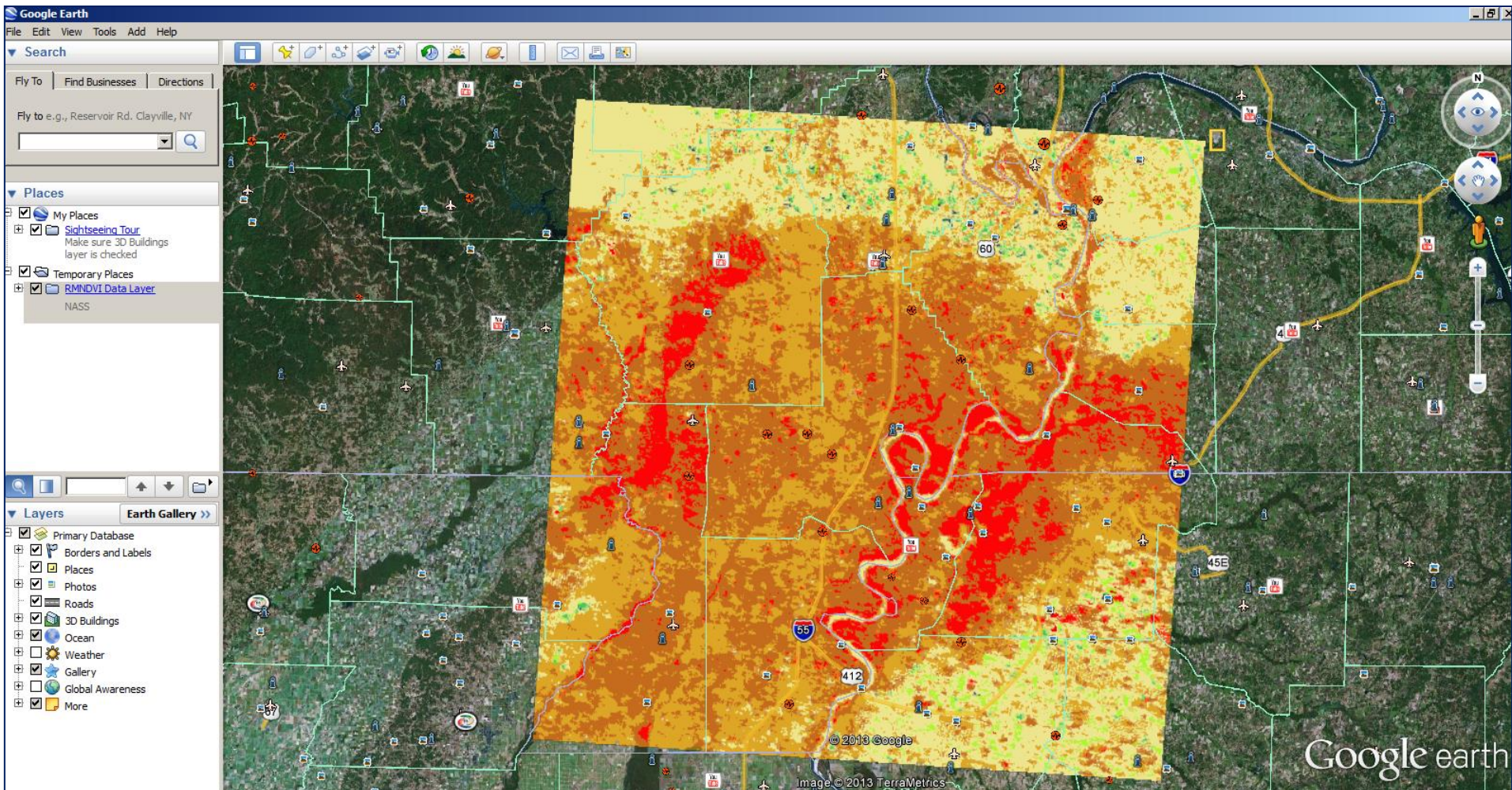


RMVCI Legend

- <= -.25%
- <= -.15%
- <= -.5%
- +/-
- >= +.5%
- >= +.15%
- >= +.25%



Web Mashup



Download any selected index data directly into Google Earth

VegScape Summary

- MODIS offers high spatial/temporal resolution & data continuity
- Web-based dynamic interactive mapping
 - Online navigation, zooming, panning, downloading, on-the-fly processing
 - Leveraging CropScape framework/architecture
 - Automatic data retrieval, processing, publishing, and dissemination
- Irregular, ad-hoc data retrieval and processing for emergency assessment/reporting
- Assessing crop condition and identifying the areal extent of floods, drought, major weather anomalies, and vulnerabilities of early/late season crops
- Consider VegScape operational during the 2013 growing season!



Questions?



2nd International Conference on Agro-Geoinformatics
August 12-16, 2013

