

David M. Johnson
Geographer

United States Department of Agriculture
National Agricultural Statistics Service
Research and Development Division
Spatial Analysis Research Section

An Overview of USA Crop Production Monitoring and the Role of Satellite Remote Sensing

International Meeting on Food Security, Earth Observations and Agricultural Monitoring
November 21, 2013, Secure World Foundation, Brussels, Belgium



National Agricultural Statistics Service (NASS)

Provider of timely, accurate, and useful statistics in service to U.S. agriculture

NASS - Data and Statistics - Microsoft Internet Explorer

Address: http://www.nass.usda.gov/Data_and_Statistics/index.asp

USDA United States Department of Agriculture
National Agricultural Statistics Service

The 2002 Census of Agriculture is the most comprehensive source of statistics portraying our nation's agriculture

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Data and Statistics

Quick Stats (Agricultural Statistics Data Base)

NASS publishes U.S., state, and county level agricultural statistics for many commodities and data series. Quick Stats offers the ability to query by commodity, state(s) and year(s), providing the most up-to-date statistics including all revisions. The query dataset can be downloaded for easy use in your database or spreadsheet.

Query our Quick Stats Data Base

Additional Crops County Resources

Maps of crops county estimates for acreage and yield are available from NASS as both CSV data files and maps.

County data from Quick Stats data is also available in pre-extracted data sets by year and by crop.

Census of Agriculture

To query Census of Agriculture data, choose from the Census years below. To view the Census publications, click here:

Data Queries for 2002, select below:

Select a Census Query

Data Queries for 1997, 1992, 1987

Interactive Data

NASS provides a variety of tools for interacting with our Census datasets.

Interactive Statistical Maps Interactive Census Maps for 2002 Census Highlights

Table Lens Application for 1997 Census Data

Last modified: 12/30/05

NASS Home | USDA.gov | FEDSTATS | Economics Statistics System (ESS) | Site Map
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2001 Wildlife Damage Survey

7.7 Percent of Crop Value Lost to Deer and Geese

Maryland farmers lost \$17.2 million of corn, soybeans and wheat to deer or geese during 2001, translates to Maryland farmers losing 7.7 percent of the crop value to deer and geese. Soybean acres for the greatest economic loss, totaling \$9.1 million, 11 percent. Corn losses were \$6.6 million, 5.8 percent and wheat \$1.5 million, 5.6 percent. Deer damage resulted in losses of \$13.6 million, 6.1 percent, while geese losses were \$3.6 million, 1.6 percent.

Production losses totaled 6.0 million bushels. Corn losses were 3.2 million bushels, soybean losses are 2.2 million bushels and wheat accounted for 0.6 million bushels. Production losses to deer were 4.7 million bushels and geese 1.3 million bushels.

In terms of yield, losses to deer were most severe in Central and Western Maryland, while geese damage greater on the Eastern Shore. Corn yield losses of 9.6 bushels per acre and 7.4 bushels per acre were reported in Central and Western Maryland, respectively. The Lower Eastern Shore reported the highest soybean loss of 6.1 bushels per acre.

Sixty-two percent of farms reported deer or geese damage to one or more crops. Damage was reported on 47 percent of farms raising corn, 58 percent of farms growing soybeans and 27 percent of farms with wheat.

Maryland 2001 Crop Loss from Deer

Region	Crop	Acres Harvested	Harvested Yield (bushels)	Average Yield Loss (bushels)	Production Loss (bu)	Economic Loss (\$)
Western Maryland	Corn	9,500	114,471	7.4	40,100	83
	Soybeans	300	36.7	6.1	1,800	3.6
	Wheat	200	45.9	2.0	460	1
Central Maryland	Corn	114,200	982,944	9.6	1,100,250	2,478
	Soybeans	92,200	34,612	3.8	360,750	1,478
	Wheat	38,300	63.3	3.3	126,350	318

USDA NEWS RELEASE

NATIONAL AGRICULTURAL STATISTICS SERVICE
United States Department of Agriculture - Washington, DC 20250
Ag Statistics Hotline: (800) 727-9540 • www.nass.usda.gov

Contact: Ellen Dougherty, (202) 690-8122
Jeff Geuder, (202) 720-2127

USDA FORECASTS RECORD-SETTING CORN CROP FOR 2007

Washington, Aug. 10, 2007 – U.S. history in 2007, according to the forecast of Agriculture's National Agricultural Statistics Service.

Based on conditions as of August 10, 2007, the Service's forecast for the 2007 corn crop is 13.1 billion bushels, 10.6 percent above the 2006 crop of 11.8 billion bushels per acre, up 3.7 bushels from last year's 10.4 bushels per acre. Behind the 160.4 bushels per acre is the 160.4 bushels per acre of corn for grain in 2006.

WISCONSIN AGRICULTURAL STATISTICS SERVICE
P.O. Box 8934 Madison, WI 53708-8934
In cooperation with WI Department of Agriculture, Trade and Consumer Protection

2002 Dairy Producer Opinion Survey

November 2002

Wisconsin Milk Production to Recover

Milk production is expected to increase in Wisconsin during the next five years according to a survey conducted by the Wisconsin Agricultural Statistics Service. This statewide survey of producers asked for plans with the assumption that milk prices for the next five years will be at the same level as the past five years. The survey was conducted during May and June 2002.

Based on the survey, 60 percent of producers expect to keep the same herd size, 20 percent plan to increase herd size, and 20 percent intend to discontinue milking by 2007. Actual results will depend on future milk prices, input prices, financing availability, crop yields, and other factors.

The number of herds projected for 2007 shows that the diversity of small to large herds will continue. The most prevalent herd size will remain at 50 to 99 cows.

National Agricultural Statistics Service 2002 Census of Agriculture

United States | All data items are from Chapter 2 - Table 1, Area Summary Highlights: 2002
Selected crops harvested - Land in orchards (acres)

State: United States - County Level | Data Item: Selected crops harvested - Land in orchards (acres)

United States Total: 5,330,439
State Total:
County Total:

Download data as CSV | XML | PDF

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Legend

Scale: National

Zero or Data Withheld <= 20,000
20,001 to 40,000
40,001 to 60,000
60,001 to 80,000
80,001 to 100,000
100,001 >=

Color: Green

Source: USDA-NASS 2002 Census of Agriculture © USDA-NASS 2005-2006

Navigate: Mouse-over a specific state/county to view the state/county level data. Right click to zoom (option-click for Mac OS users). Hold the Alt key and click-drag to pan. For additional assistance with this application, click here to view the support page.

All Milk Price, Wisconsin Annual Average, 1989 - 2002 1/

Wisconsin Dairy Herds by Herd Size

Milk cow herd size	May 2002 herds	May 2007 herds (projected) 1/	Change 2007/2002
1-29	2,800	1,440	-45
30-49	4,700	3,440	-27
50-99	7,400	5,600	-24
100-199	1,900	2,080	+9
200-499	700	600	-29
500+	200	440	+120
Total	17,500	15,900	-20

1/ The May 2007 projection is based on farmers' opinions May-June 2002, with the assumption that milk prices for the next five years will be at the same level as the past five years.

Wisconsin Dairy Farmer Plans for May 2007 1/ by Herd Size

Milk cow herd size	Herds	Keep same herd size	Increase herd size	Discontinue milking
1-29	2,800	47	17	58
30-49	4,700	71	9	20
50-99	7,400	63	19	18
100-199	1,900	53	37	10
200-499	700	33	59	8
500+	200	22	78	0
Total	17,500	42	29	20

1/ The May 2007 projection is based on farmers' opinions May-June 2002, with the assumption that milk prices for the next five years will be at the same level as the past five years.

Percent of Herds by Size Group 2007 Projection

Continuous Agricultural Statistics Programs

Crops:

grains	crop progress
hay	acreage
oilseeds	- prospective
cotton	plantings
tobacco	- planted
potatoes	- harvested
sugar	
other field crops	yield & production
	- forecasts
citrus fruit	- final
non-citrus fruit	- by utilization
nuts	stocks
vegetables	disposition
floriculture	processing
	prices received by farmers
	agricultural chemical use

Livestock:

cattle	inventory
hogs	- total
sheep	- by class
goats	- births
equine	- deaths
poultry	- predator losses
milk & dairy products	marketings
aquaculture	slaughter
bees & honey	production/disposition
mink	- meat
	- other products (milk, dairy products, wool, mohair, eggs, honey, etc.)
	prices received by farmers
	inventory/production values

Other:

number of farms
land in farms
land values
cash rents
agricultural labor
- number of workers
- hours worked
- wages paid
cold storage
- holdings
- capacity
cash receipts
production expenditures

weekly ~ monthly ~ quarterly ~ annually

Agricultural Census

total area & land use
irrigation
land in government programs
field & forage crops
fruits, nuts & berries
vegetables & melons
horticultural specialties

livestock & poultry
animal specialties
aquaculture
production contracts
gross value of sales
direct sales to consumers

government loans
government program
payments
farm-related income
grain storage capacity
operator characteristics
farm organization

fertilizer & chemical use
farm production expenses
inventory & value of machinery & equipment
market value of land & buildings
farm labor

~ years ending in “2” & “7” ~

inventories as of December 31 ~ production, sales & other information for calendar year

NASS - National Agriculture x

www.nass.usda.gov

USDA United States Department of Agriculture
National Agricultural Statistics Service

research survey data census

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Today's Reports from NASS More

Sep 11, 2013

Broiler Hatchery Text | PDF | CSV
Released at 3:00 P.M. ET

Headlines

[New Classroom Lesson Uses Food Preference to Teach Statistical and Agricultural Literacy](#)

[NASS to Resume Milk Production Surveys in October](#)

[USDA Forecasts Record-High Corn Production in 2013](#)

[NASS to Release 2013 Farm Computer Usage Results on August 20](#)

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Program: CENSUS SURVEY	Sector: ANIMALS & PRODUCTS CROPS DEMOGRAPHICS ECONOMICS ENVIRONMENTAL	Group: ANIMAL TOTALS AQUACULTURE CROP TOTALS DAIRY ENERGY EXPENSES FARMS & LAND & ASSETS FIELD CROPS FRUIT & TREE NUTS	Commodity: AG LAND AG SERVICES AG SERVICES & RENT AGRI-TOURISM & RECREATIONAL SERVICES ALMONDS ALPACAS AMARANTH ANIMAL SECTOR ANIMAL TOTALS
----------------------------------	---	--	---

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Geographic Level:
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COUNTY
INTERNATIONAL
NATIONAL
REGION : MULTI-STATE
REGION : SUB-STATE
STATE
ZIP CODE

Select Time (one or more) [?](#)

Year:
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2013
2012
2011
2010
2009
2008

USDA CENSUS OF AGRICULTURE

United States Department of Agriculture

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- > Partner to Promote the Census
- > Frequently Asked Questions
- > Find Historical Census Data
- > State and County Profiles
- > 2007 Desktop Data Query Tool

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Watch the video, "Strength in Numbers"

Have fun learning about agriculture today and the benefits of responding to NASS surveys.

1/2 << || >>

Headlines

Latest Tweets

- Final Call for the Agriculture Census
- BLOG: Surveying America's Farmers Online – An Innovation in Collecting Ag Stats
- Grow Your Farm Future with the 2012 Census of Agriculture
- USDA Extends Census Deadline, Reminds Producers It's Not too Late
- Two Weeks Remaining to Respond to 2012 Census of Agriculture
- BLOG: Ag Census Demonstrates Value of Agriculture, Data Critical for Programs and Policies

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- Demographics
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- Farm Numbers
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- Production

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Respond Online to the Census



On-Farm Energy Production Survey



Census of Horticultural Specialties



Farm and Ranch Irrigation Survey



Organic Production Survey



Quick Stats



Ag Atlas Maps





Crop Progress

ISSN: 1948-3007

Released September 9, 2013, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA).

Special Note

NASS's annual September surveys on crops and livestock. In the first two weeks of September, NASS will survey U.S. small grains growers for final production. We will also ask hog producers about their summer pig crop, current inventory, and farrowing intentions for the next six months. The responses will provide the foundation for 2013 production estimates. **Farmers should watch for their survey and be sure to respond. Your information matters!**

Corn Dough – Selected States

[These 18 States planted 92% of the 2012 corn acreage]

State	Week ending			2008-2012 Average
	September 8, 2012	September 1, 2013	September 8, 2013	
	(percent)	(percent)	(percent)	(percent)
Colorado	98	87	96	93
Illinois	100	93	95	96
Indiana	100	91	95	96
Iowa	100	73	86	93
Kansas	100	94	97	99
Kentucky	100	85	92	97
Michigan	93	79	89	89
Minnesota	100	68	85	94
Missouri	100	94	97	97
Nebraska	100	93	98	98
North Carolina	100	100	100	100
North Dakota	100	71	90	88
Ohio	99	91	95	94
Pennsylvania	94	89	93	87
South Dakota	97	90	98	94
Tennessee	100	97	100	100
Texas	97	91	93	97
Wisconsin	94	61	76	86
18 States	99	84	92	94



ISSN: 1949-1522

Released June 28, 2013, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA).

**Corn Planted Acreage Up Slightly from 2012
Soybean Acreage Up 1 Percent
All Wheat Acreage Up 1 Percent
All Cotton Acreage Down 17 Percent**

Corn planted area for all purposes in 2013 is estimated at 97.4 million acres, up 1 percent from 2012, the highest planted acreage in the United States since 1936 when an estimated 102 million acres were planted. Corn planted for harvest is estimated at 89.1 million acres for grain, up 2 percent from last year.

Soybean planted area for 2013 is estimated at a record high 77.7 million acres, up 1 percent from 2012, the highest planted area since 1936 when an estimated 76.9 million acres were planted. Soybean planted area is estimated in New York, Pennsylvania, and South Dakota.

All wheat planted area for 2013 is estimated at 56.5 million acres, up 1 percent from 2012, the highest planted area since 1936 when an estimated 42.7 million acres were planted, is 3 percent above last year and up 2 percent from 2011. About 29.4 million acres are Hard Red Winter, 9.96 million acres are Soft Red Winter, and 17.1 million acres are other spring wheat. Area planted to other spring wheat for 2013 is estimated at 12.3 million acres, up 1 percent from 2012. The estimated Durum wheat planted area is 1.54 million acres, down 28 percent from the previous year.

All cotton planted area for 2013 is estimated at 10.3 million acres, 17 percent below 2012, the lowest planted area since 1936 when an estimated 10.0 million acres were planted, down 17 percent from 2012. American Pima area is estimated at 10.0 million acres, down 17 percent from 2012.

Acreage



ISSN: 1936-3737

Released August 12, 2013, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA).

Crop Production

Special Note

USDA's National Agricultural Statistics Service is suspending a number of statistical surveys and reports for the remainder of the fiscal year resulting from reduced funding. Suspended commodity programs impacting the August Crop Production report are hops, commercial apples, peaches, pears, and grapes. Check the NASS website at www.nass.usda.gov for any future updates to these programs.

Planted Acreage Update

Survey respondents who reported soybean acreage as not yet planted in Arkansas, Illinois, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, North Carolina, North Dakota, South Dakota, Tennessee, and Wisconsin during the survey conducted in preparation for the Acreage report, released June 28, 2013 were re-contacted in July to determine how many of those acres were planted or still intended to be planted. Acreage estimates in this report reflect this updated information.

**Corn Production Up 28 Percent from 2012
Soybean Production Up 8 Percent from 2012
Cotton Production Down 25 Percent from 2012
Winter Wheat Production Down Slightly from July Forecast**

Corn production is forecast at 13.8 billion bushels, up 28 percent from 2012. If realized, this will be a new record production for the United States. Based on conditions as of August 1, yields are expected to average 154.4 bushels per acre, up 31.0 bushels from 2012. If realized, this will be the highest average yield since 2009. Area harvested for grain is forecast at 89.1 million acres, unchanged from the June forecast but up 2 percent from 2012.

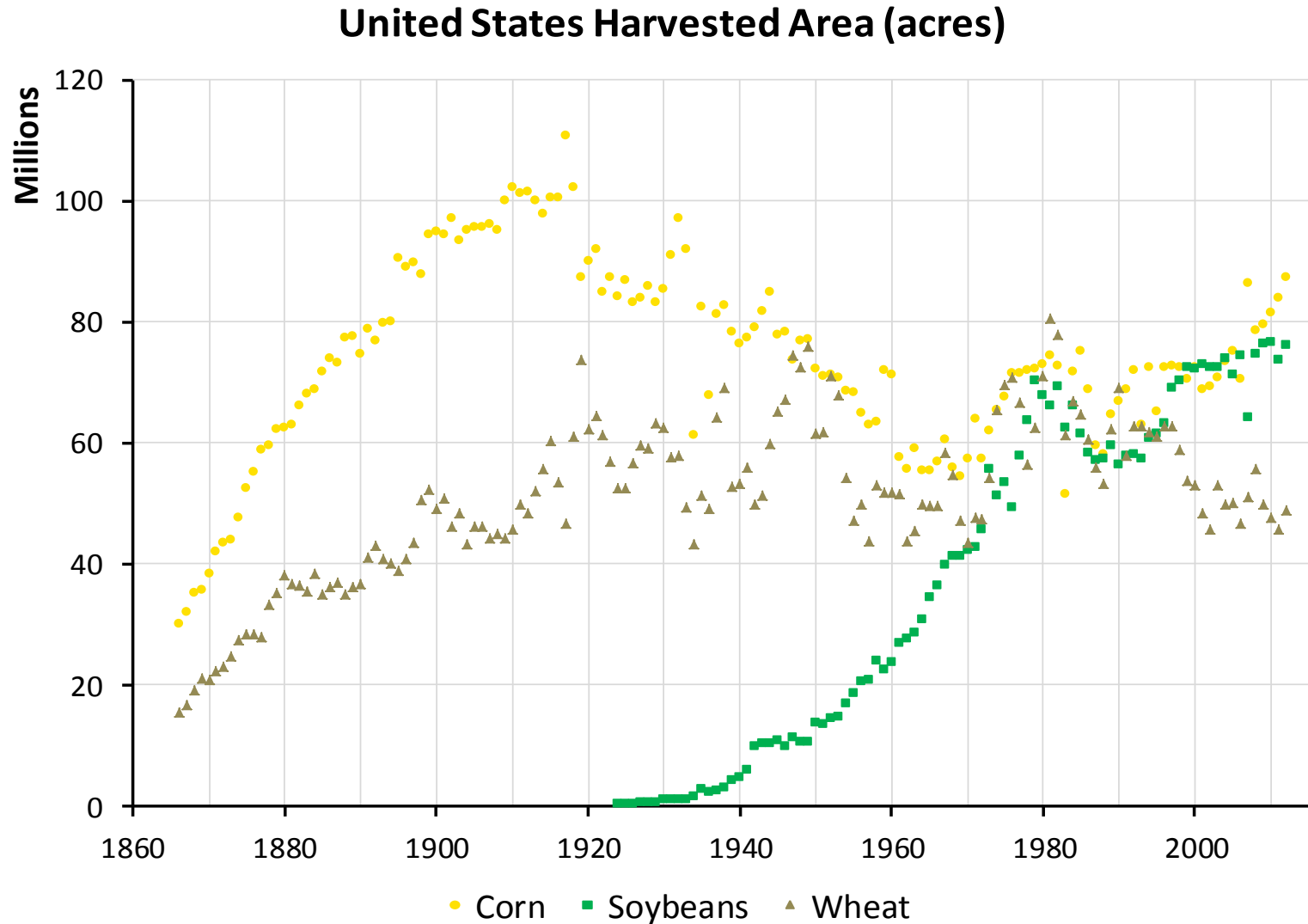
Soybean production is forecast at 3.26 billion bushels, up 8 percent from last year. If realized, production will be the third largest on record. Based on August 1 conditions, yields are expected to average 42.6 bushels per acre, up 3 bushels from last year. If realized, the average yield will be the fifth highest on record. Area for harvest is forecast at 76.4 million acres, down less than 1 percent from June but up slightly from 2012. Planted area for the Nation is estimated at 77.2 million acres, down less than 1 percent from June.

US crop area ranked statistics

<u>Largest crops by area</u>	<u>mil. ha. (2012)</u>
Corn	35.4
Soybeans	30.8
Wheat	19.8
(Winter, spring, durum)	(14.1, 4.9, 0.9)
Hay	22.8
(alfalfa, all other)	(7.0, 15.8)
Cotton	3.8
Sorghum	2.0
Barley	1.3
Rice	1.1

Figures established by a large “area frame” based survey conducted early each June

Area trends of the top US 3 crops



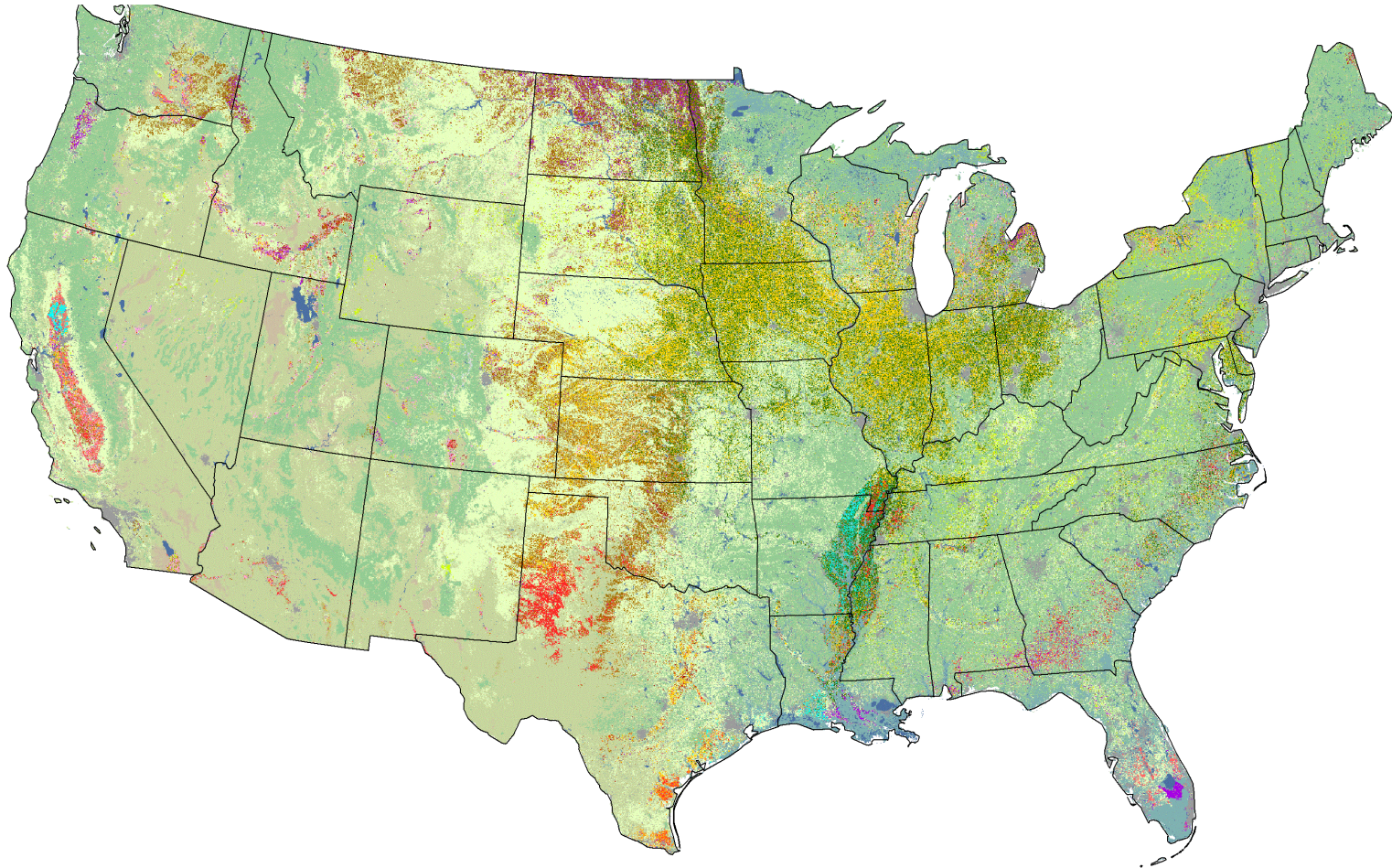
NASS Research and Development Division

Geospatial Information Branch

The collage displays several key components of the NASS Research and Science website's geospatial information branch:

- Website Interface:** A screenshot of the NASS website showing the search bar, navigation menu, and "Research and Science" header.
- Corn for Grain 2007:** A map of the United States showing corn production by county and the location of ethanol plants.
- Stratification of Pennsylvania 2000:** A map showing land use strata in Pennsylvania, including Cultivated, Urban, and Dense Urban areas.
- Crop Progress: Cotton in Arkansas, 2007:** A line graph showing the percentage of cotton in various stages (Planted, Squaring, Setting Bolls, Bolls Opening, Harvested) from April to November, comparing 2007 to the 2002-2006 average.
- Enumerated Areas of South Carolina:** A map showing the distribution of enumerated areas in South Carolina.
- Conterminous U.S. Vegetation Condition - 2007:** A map of the United States showing vegetation indices for the period 7/31 - 8/13, with a legend ranging from High (> .66) to Low (< .05).
- Other Visualizations:** Includes a "Vegetation Condition Images" section, a "2002 Census Map Gallery", and a "Census of Agriculture" section.

Annually derived Cropland Data Layer (CDL)



Major Land Cover Categories

Agriculture

- | | | |
|---------------|------------------------|--------------------|
| Pasture/Grass | Fallow/Idle Cropland | Sorghum |
| Corn | Alfalfa | Other Small Grains |
| Soybeans | Cotton | Rice |
| All Wheat | Other Crops | |
| Other Hay | Vegetables/Fruits/Nuts | |

Non-Agriculture

- | | |
|-----------------|--------------------|
| Woodland | Barren |
| Shrubland | Perennial Ice/Snow |
| Urban/Developed | |
| Wetlands | |
| Water | |

Mapped Crop Categories

1		Corn	41		Sugarbeets	73		Other Tree Fruits	227		Lettuce
2		Cotton	42		Dry Beans	74		Pecans	228		Cucumbers
3		Rice	43		Potatoes	75		Almonds	229		Pumpkins
4		Sorghum	44		Other Crops	76		Walnuts	230		Lettuce/Durum Wht
5		Soybeans	45		Sugarcane	77		Pears	231		Lettuce/Cantaloupe
6		Sunflower	46		Sweet Potatoes	80		Other Non-Tree Fruit	232		Lettuce/Upland Cotton
10		Peanuts	47		Misc. Vegs. & Fruits	92		Aquaculture	233		Lettuce/Barley
11		Tobacco	48		Watermelons	204		Pistachios	234		Durum Wht/Sorghum
12		Sweet Corn	49		Onions	205		Triticale	235		Barley/Sorghum
13		Pop. or Orn. Corn	50		Pickles	206		Carrots	236		WinWht/Sorghum
14		Mint	51		Chick Peas	207		Asparagus	237		Barley/Corn
21		Barley	52		Lentils	208		Garlic	238		WinWht/Cotton
22		Durum Wheat	53		Peas	209		Cantaloupes	239		Soybeans/Cotton
23		Spring Wheat	54		Tomatoes	210		Prunes	240		Soybeans/Oats
24		Winter Wheat	55		Caneberries	211		Olives	241		Corn/Soybeans
25		Other Small Grains	56		Hops	212		Oranges	242		Blueberries
26		DbL. Crop WinWht/Soy	57		Herbs	213		Honeydew Melons	243		Cabbage
27		Rye	58		Clover/Wildflowers	214		Broccoli	244		Cauliflower
28		Oats	59		Sod/Grass Seed	216		Peppers	245		Celery
29		Millet	60		Switchgrass	217		Pomegranates	246		Radishes
30		Speltz	61		Fallow/Idle Cropland	218		Nectarines	247		Turnips
31		Canola	62		Pasture/Grass	219		Greens	248		Eggplants
32		Flaxseed	66		Cherries	220		Plums	249		Gourds
33		Safflower	67		Peaches	221		Strawberries	250		Cranberries
34		Rape Seed	68		Apples	222		Squash	251		Corn - Non-Irrigated
35		Mustard	69		Grapes	223		Apricots	252		Soybean - Non-Irrigated
36		Alfalfa	70		Christmas Trees	224		Vetch	253		WinWheat - Non-Irrigated
37		Other Hay	71		Other Tree Nuts	225		WinWht/Corn			
38		Camelina	72		Citrus	226		Oats/Corn			

2009 Cropland Data Layer New England and Eastern States

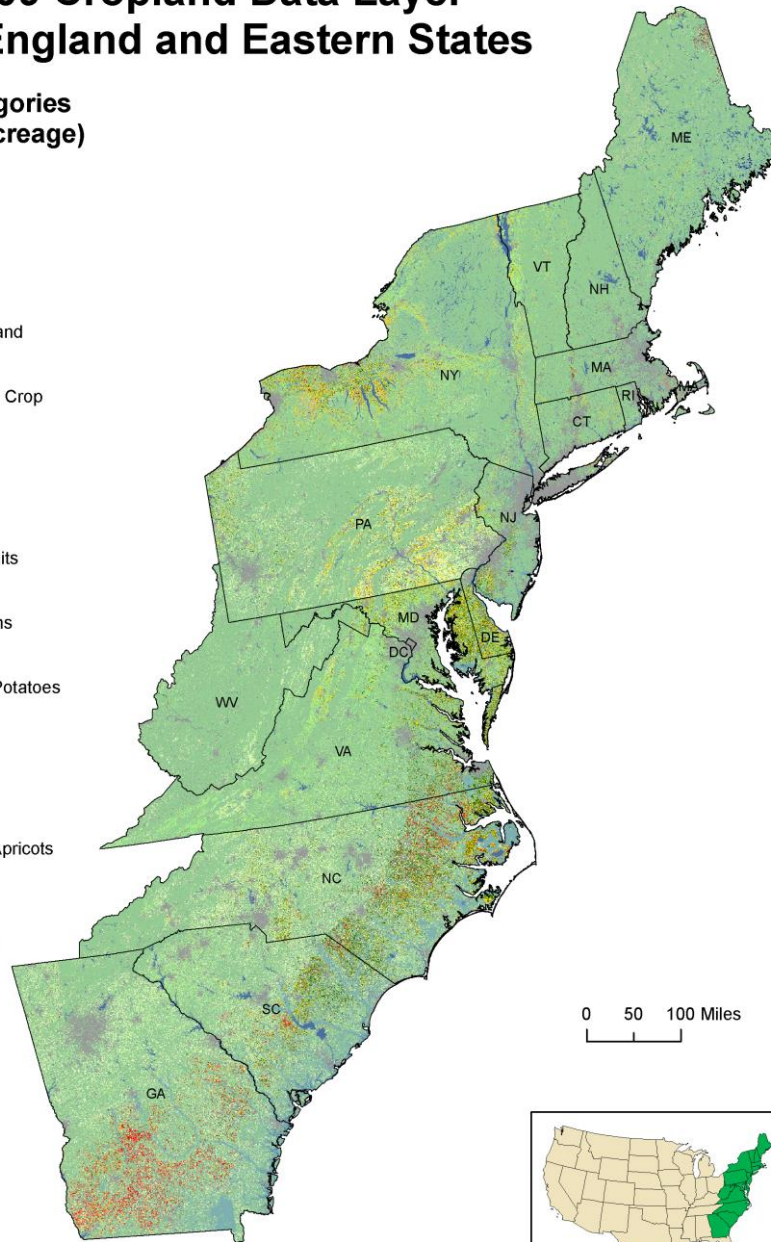
Land Cover Categories (by decreasing acreage)

Agriculture

-  Pasture/Grass
-  Other Hays
-  Corn
-  Soybeans
-  Fallow/Idle Cropland
-  Cotton
-  W. Wht./Soy. Dbl. Crop
-  Peanuts
-  Winter Wheat
-  Alfalfa
-  Other Tree Nuts
-  Misc. Veggies. & Fruits
-  Seed/Sod Grass
-  Other Small Grains
-  Oats
-  Potatoes/Sweet Potatoes
-  Blueberry
-  Other Crops
-  Apples/Cherries
-  Dry Beans
-  Peaches/Plums/Apricots

Non-Agriculture

-  Woodland
-  Urban/Developed
-  Wetlands
-  Water
-  Shrubland
-  Barren





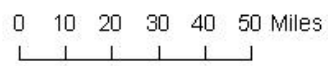
Land Cover Categories (by decreasing acreage)

AGRICULTURE

- Pasture/Grass
- Soybeans
- Corn
- Winter Wheat
- Other Hays
- Alfalfa
- W. Wht./Soy. Dbl. Crop
- Fallow/Idle Cropland
- Misc. Vegs. & Fruits
- Clover/Wildflowers
- Other Crops
- Oats

NON-AGRICULTURE

- Woodland
- Urban/Developed
- Water
- Wetlands
- Barren
- Shrubland





2011 CDL, Pocahontas, Iowa



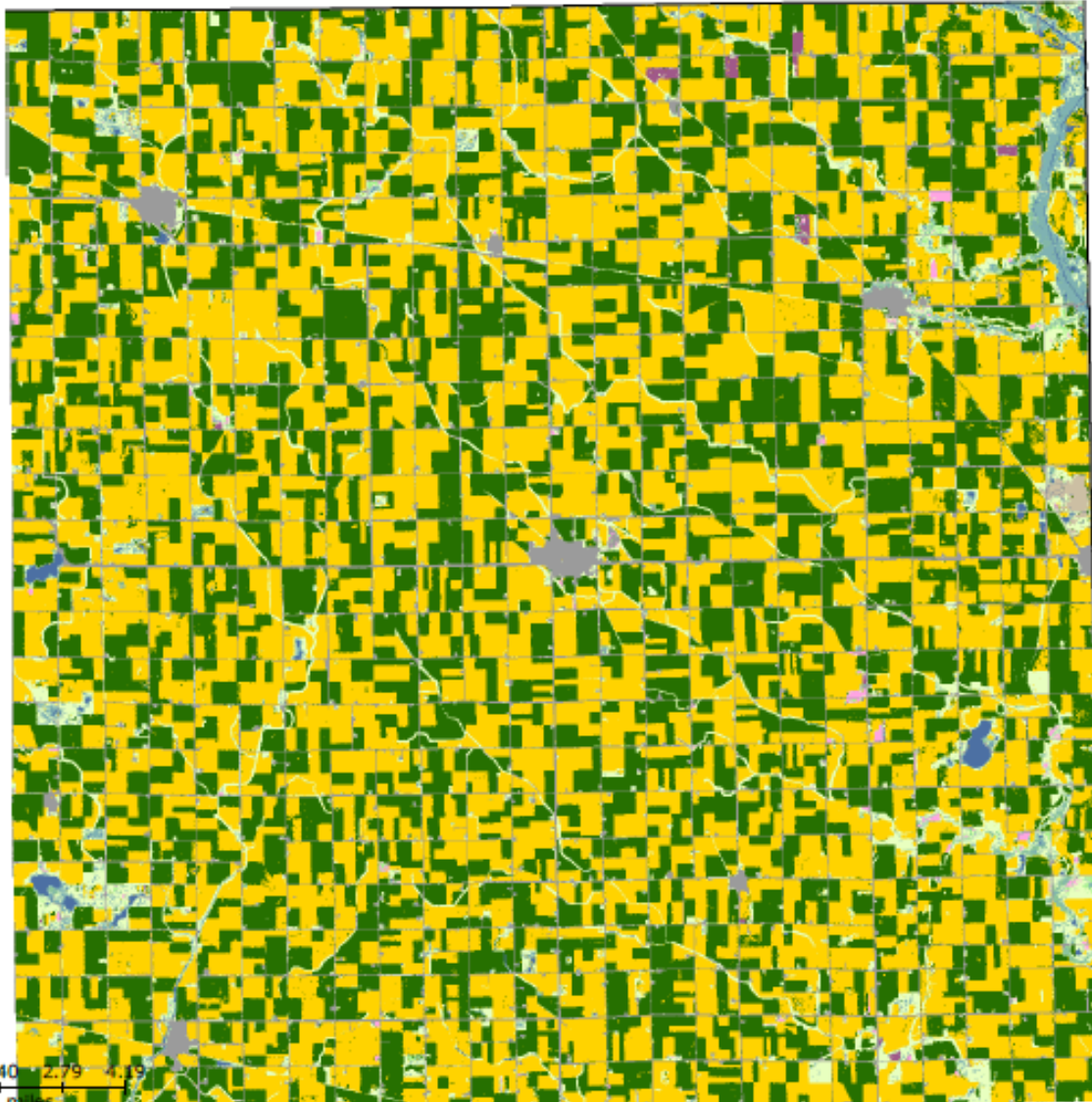
Land Cover Categories
(by decreasing acreage)

AGRICULTURE

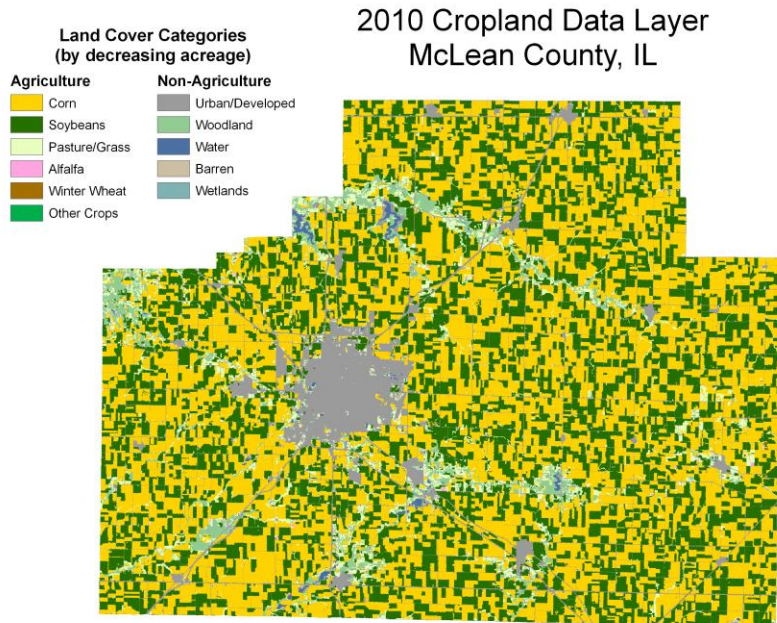
-  Corn
-  Soybeans
-  Grassland Herbaceous
-  Alfalfa
-  Oats
-  Other Hay/Non Alfalfa
-  Pop or Om Corn
-  Winter Wheat
-  Fallow/Idle Cropland

NON-AGRICULTURE*

-  Developed/Open Space
-  Herbaceous Wetlands
-  Developed/Low Intensity
-  Woody Wetlands
-  Open Water
-  Deciduous Forest



CDL generalities



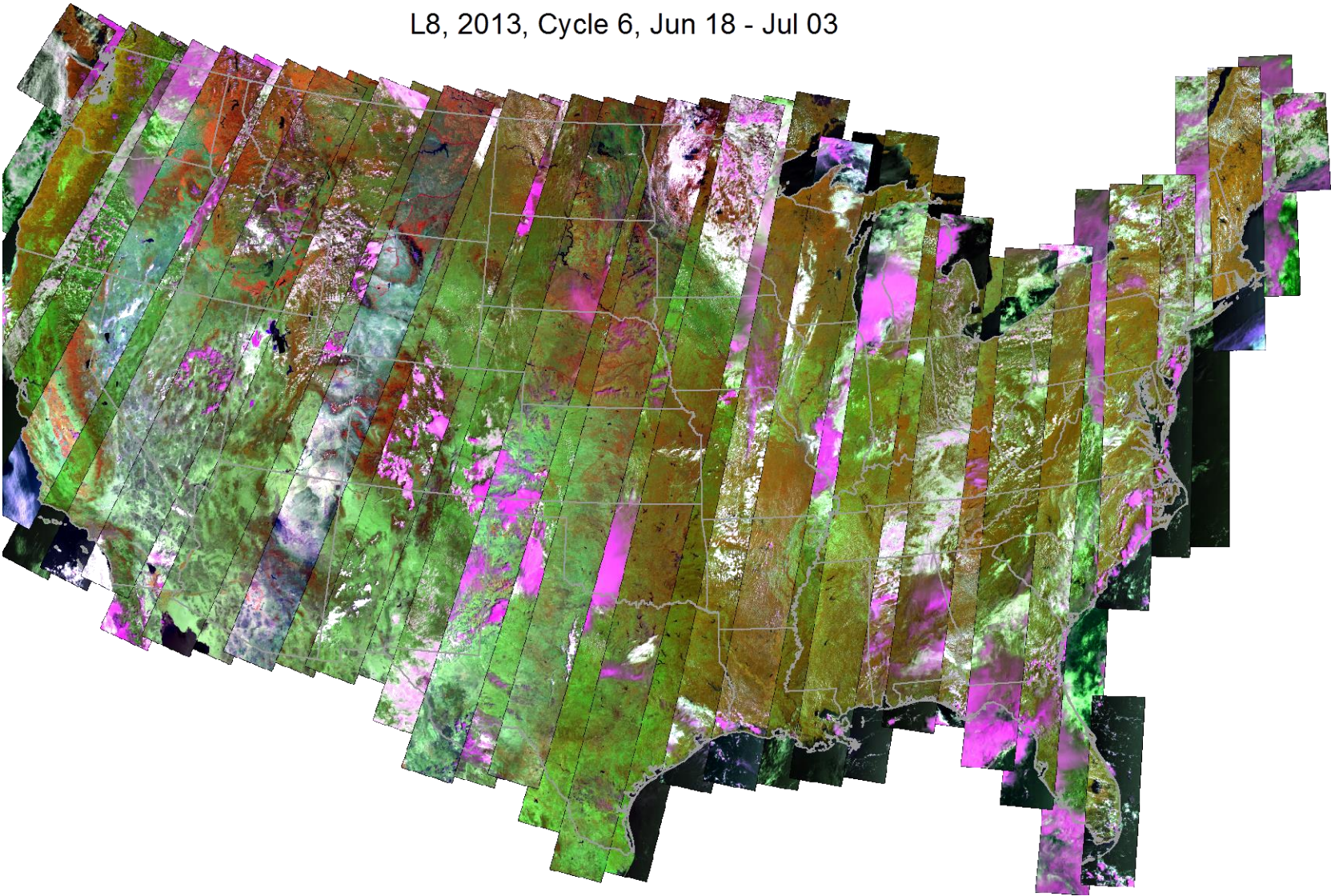
- Annual land cover classification targeted to identifying *circa* summer cultivated crops
- Encompasses all of conterminous USA (since 2008, some states prior)
- 56m or 30m resolution
 - Depending on year but now all 30m
- Built with a supervised boosted classification tree methodology
 - Implemented with See 5.0
- Utilizes ground/training data from USDA Farm Service data and ancillary data from National Land Cover Database
- Highly robust for dominant crop types
 - corn, soybeans, wheat, rice, cotton, etc.
- Used internally by NASS to refine planted acreage estimates
- Derived primarily from
 - Resourcesat-1 AWiFS
 - Landsat-5 TM
 - DMC Deimos-1 and UK-2
 - Landsat-8 OLI and TIRS

DMC Deimos-1/UK2 Collections

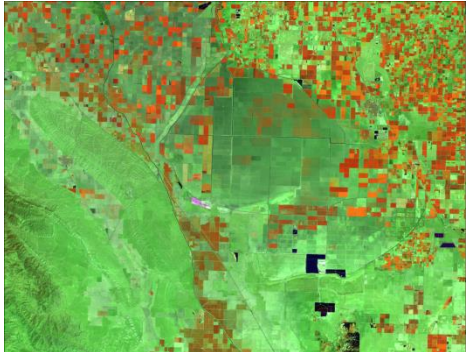


Landsat 8 Collections

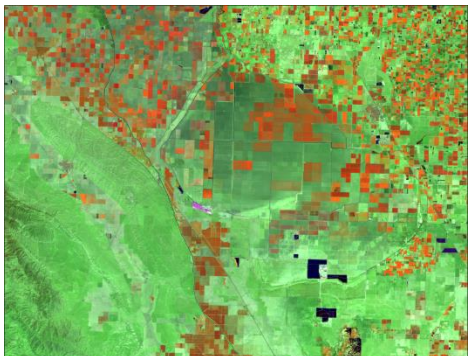
L8, 2013, Cycle 6, Jun 18 - Jul 03



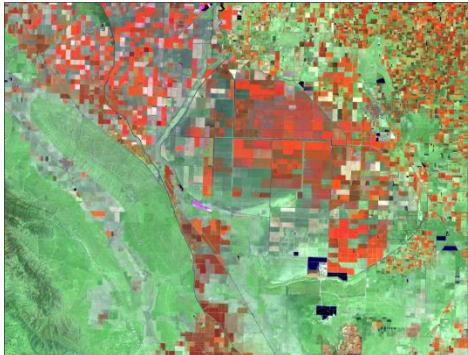
April



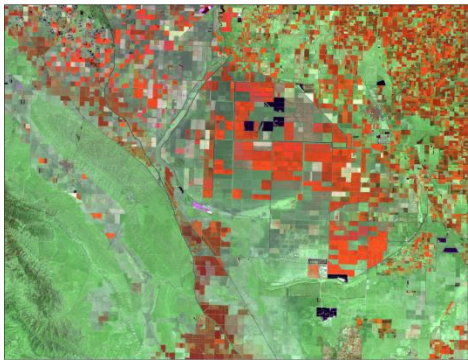
May



June



July

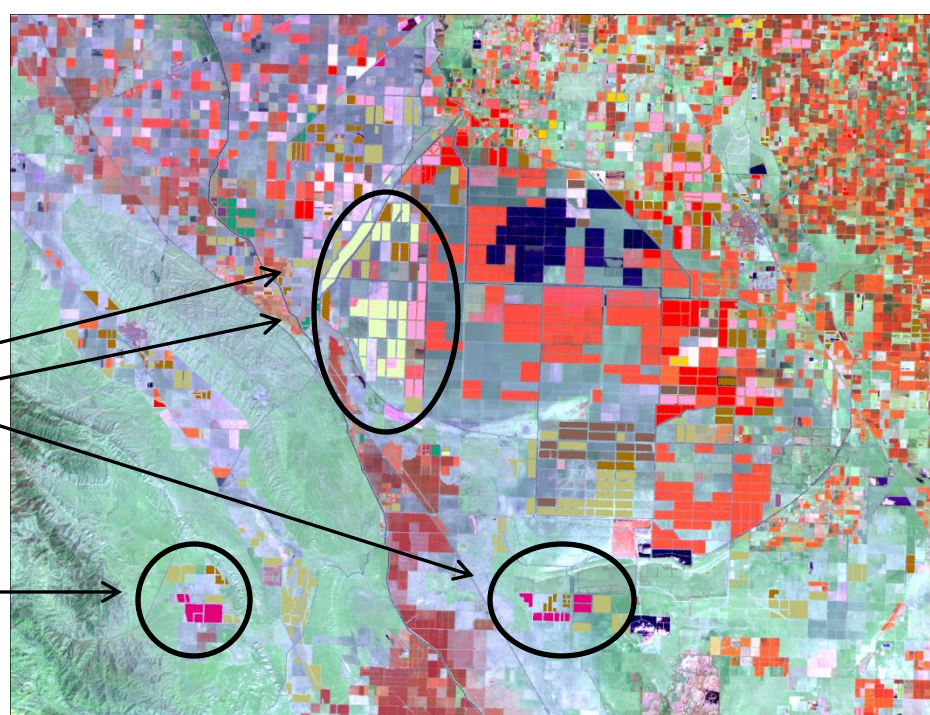


August
with farm
data

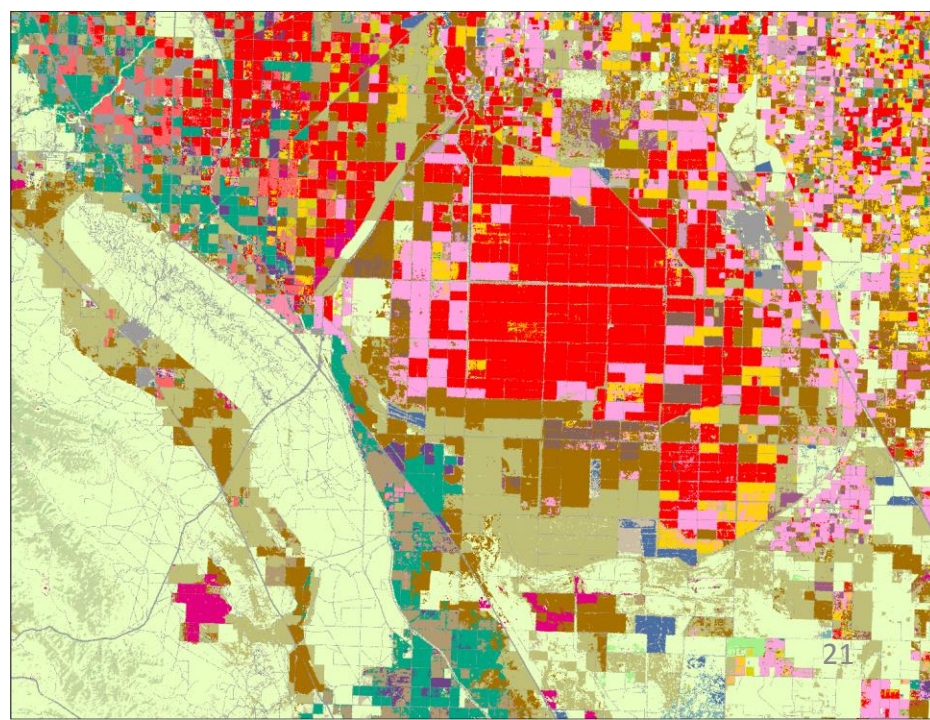
Land Cover Categories

Agriculture

-  Pasture/Grass
-  Alfalfa
-  Fallow/Idle Cropland
-  Winter Wheat
-  Barley
-  Cotton
-  Almonds
-  Corn
-  Durum Wheat



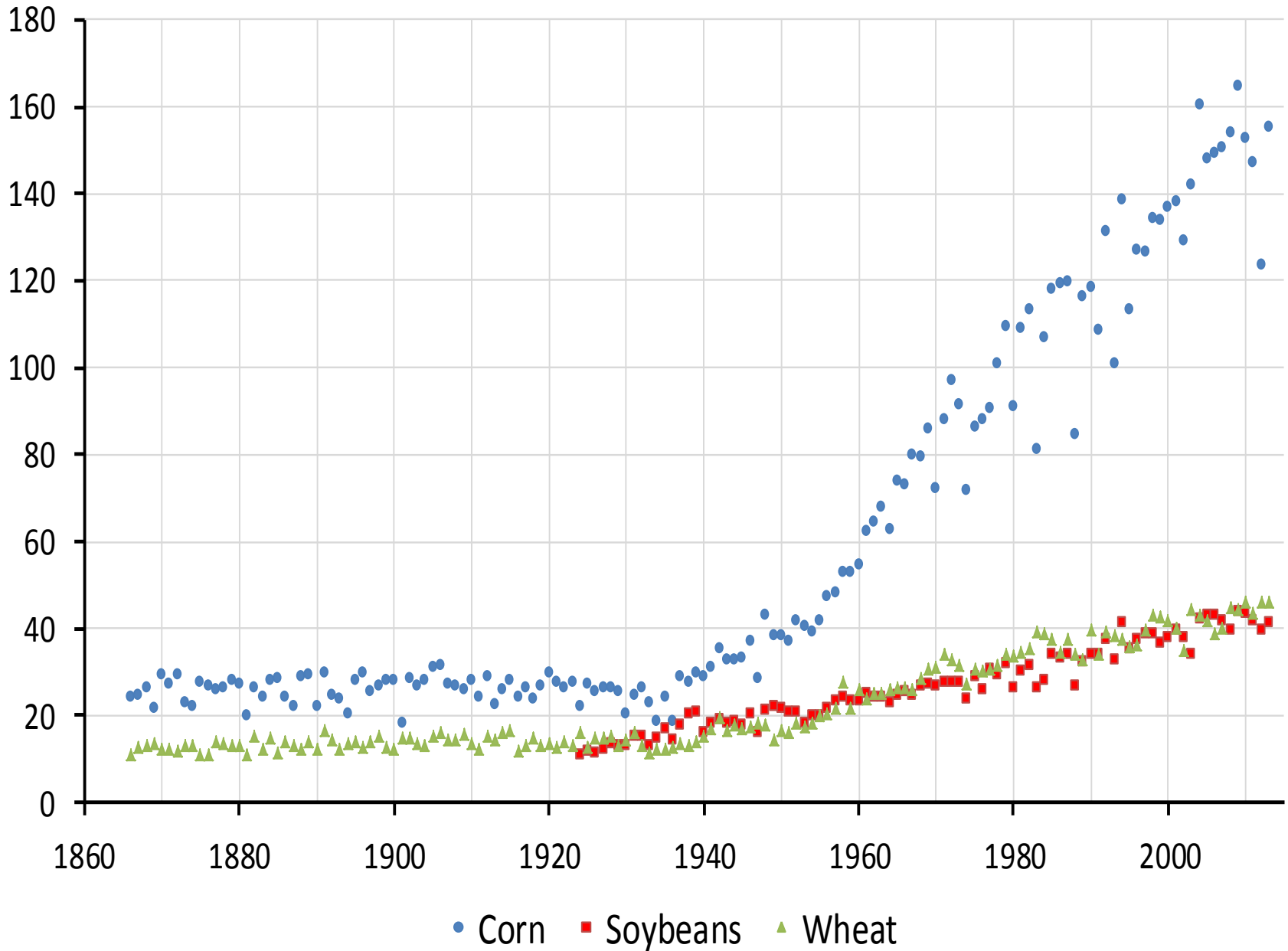
Final
CDL



Crop area mapping lessons learned

- Heavy volumes of time-series imagery important
 - Agriculture is a dynamic land cover
- Fine spatial resolution is somewhat important
 - Particularly if field sizes are relatively large
- Multi-spectral resolution least important
 - The time component reigns supreme
- Crop area estimation by “pixel counting” alone is not sufficient
 - A bias measurement of the classification is needed
 - “regression estimator”
- Some sort of reasonably accurate “ground truth” needed to drive the classifier
 - ~ 1% of land cover might be sufficient

United States Yield (bushel/acre)



Yields results primarily derived from two surveys

Agricultural Yield

- Farmer reported survey data of expected crop yields.
- Data obtained throughout the growing season.
- Conducted in all states except Alaska and Hawaii.
- Sample size in the 1000s per state.
- Farm operator contacts are selected from the March Crops/Stocks survey (small grains) and the June Crops/Stocks survey (late season crops and tobacco).
- Primarily telephone based.



Objective yield

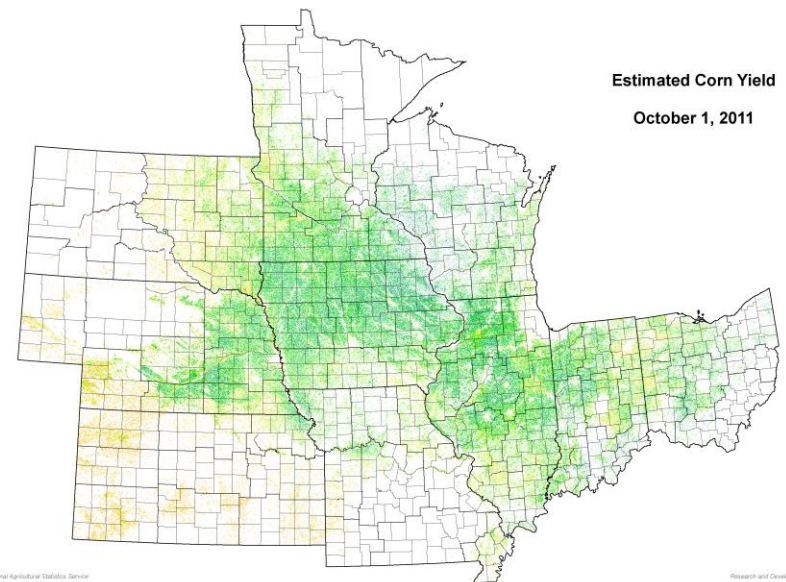
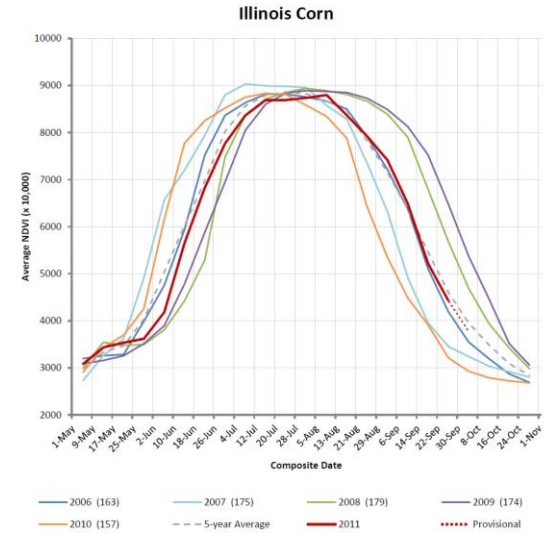
- Corn, Cotton, Soybeans, Wheat, Potatoes.
- Only done in states where the commodities are primarily found.
- Samples selected from areas found in June Area Survey (“Acreage”).
- Performed at 100s of sample sites per state.
- Biophysical plant/seed measurements obtained.
- Each plot revisited a few times per season.



Remote Sensing Yield


Third method for yield estimates

- Premise
 - There is a Relationship between crop
 - Biomass, vigor, “greenness”, NDVI
 - and
 - Land surface temperature
 - And the resulting crop yield
- Utilize MODIS data to obtain biomass and temperature variables
- National, State, ASD, and County
 - Corn and Soybeans only
 - “Speculative” region only
 - i.e. Corn Belt



Moderate Resolution Imaging Spectroradiometer (MODIS)



 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION + NASA Homepage SEARCH GO

MODIS Web

+ ABOUT MODIS + NEWS + DATA + IMAGES + SCIENCE TEAM + RELATED SITES + SEARCH + MODARCH

DATA

The MODIS Data section contains everything from ATBDs to Product Descriptions to tutorials on ordering MODIS data from the various DAACs. Peruse the Data section today.

NEWS

The MODIS news section details all the developing news surrounding the MODIS project.


MODIS/Aqua Collection 6 Level 1, Cloud Mask and Atmospheric Profile Products Released

XML MODIS IOTD RSS Feed





[Visit the News Section >>](#)



IMAGES

Super Typhoon Jelawat (18W) in the Philippine Sea

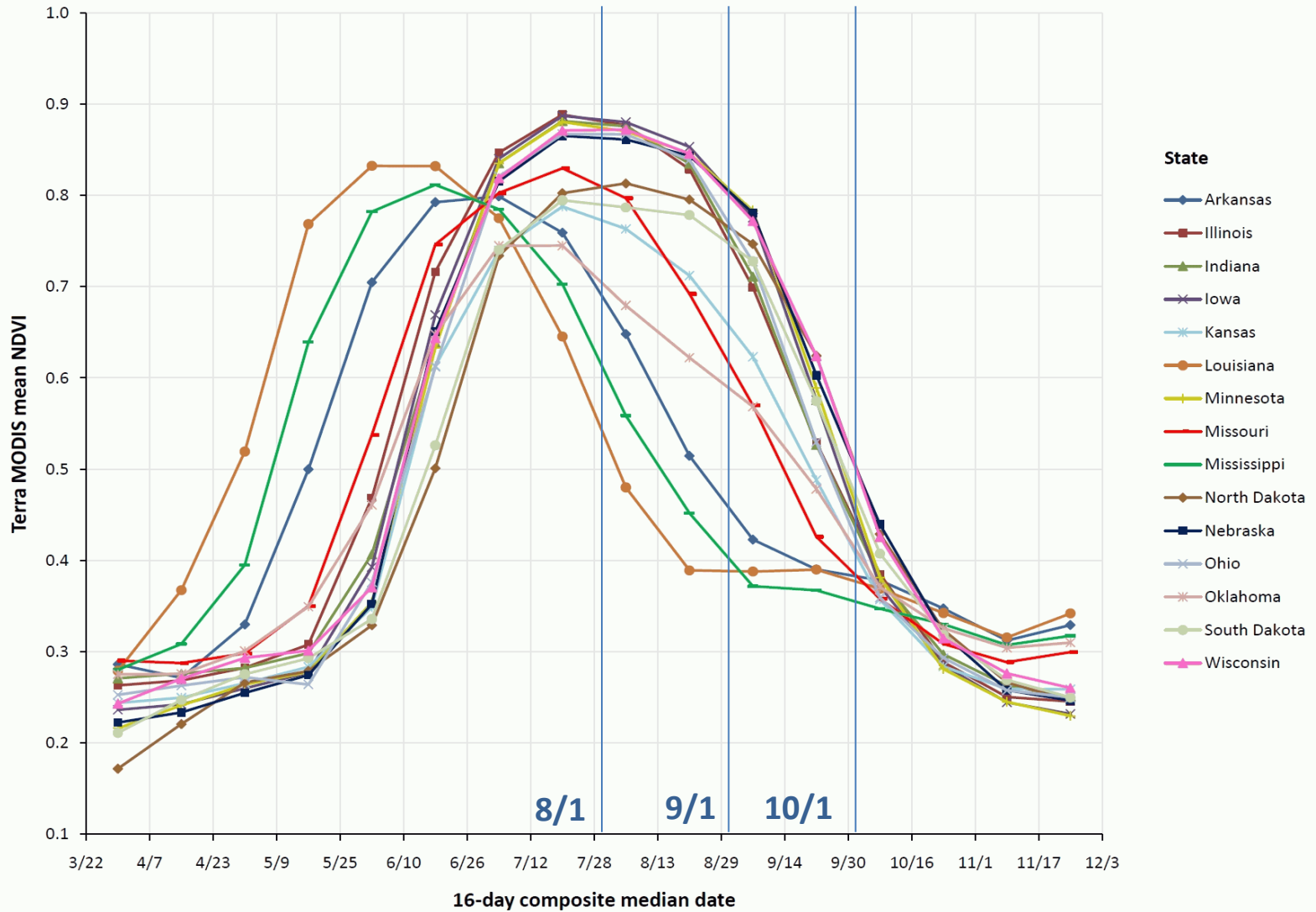


DISCIPLINES

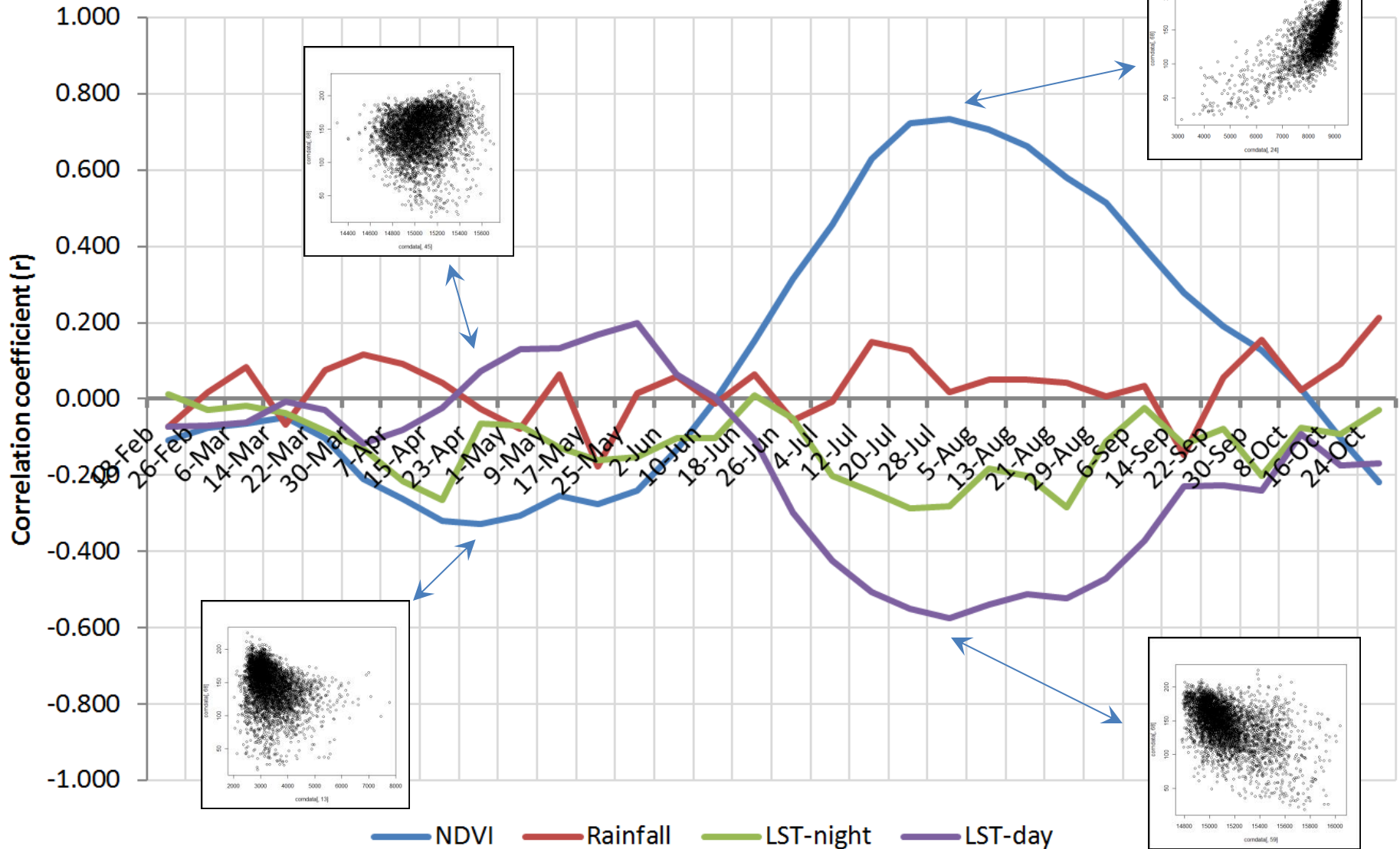
-  Atmosphere
-  Land
-  Ocean
-  Calibration

 [Privacy Policy and Important Notices](#)  Curator: Brandon Maccherone
NASA Official: Shannell Frazier

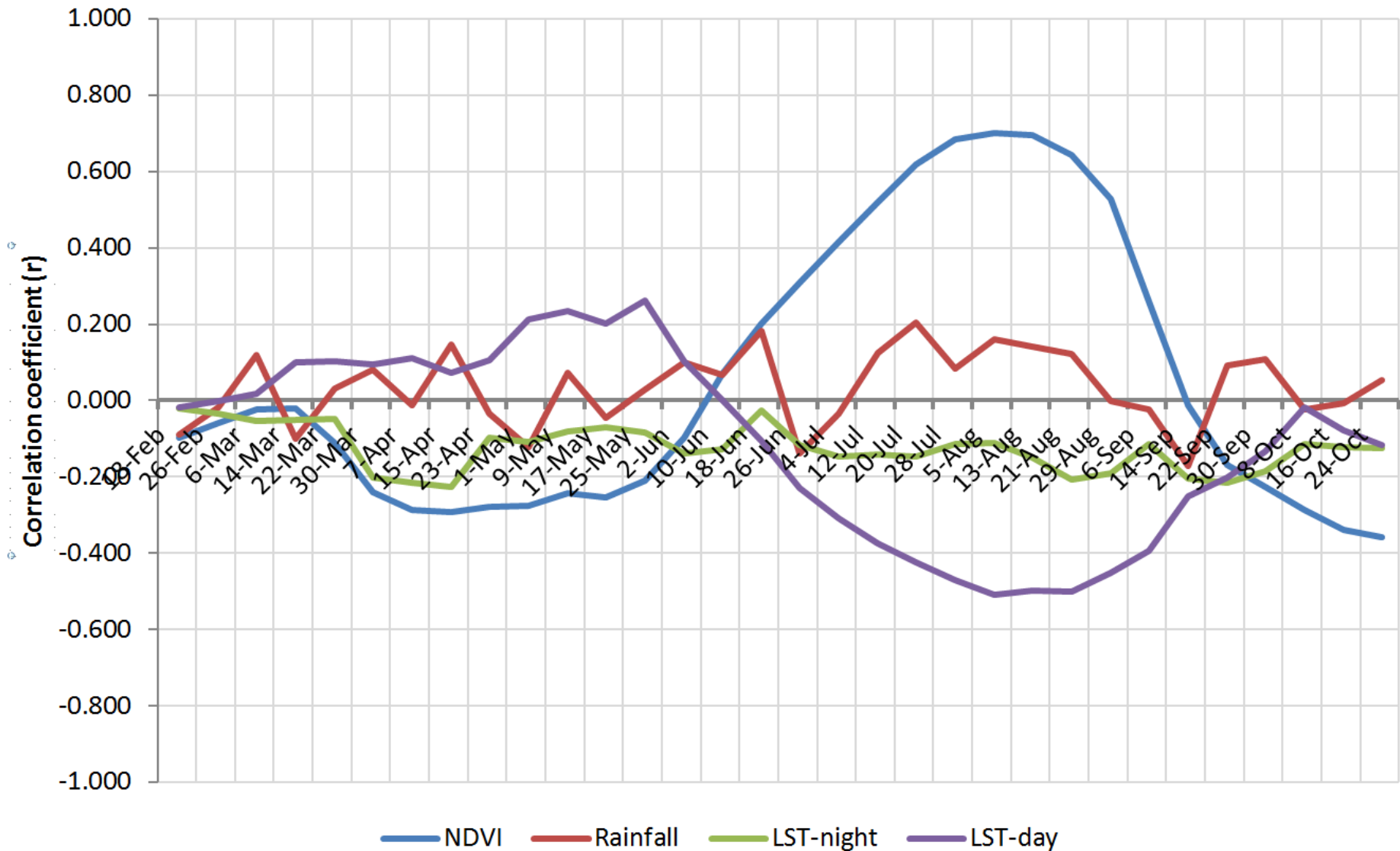
Corn 5-year average 2006-2010



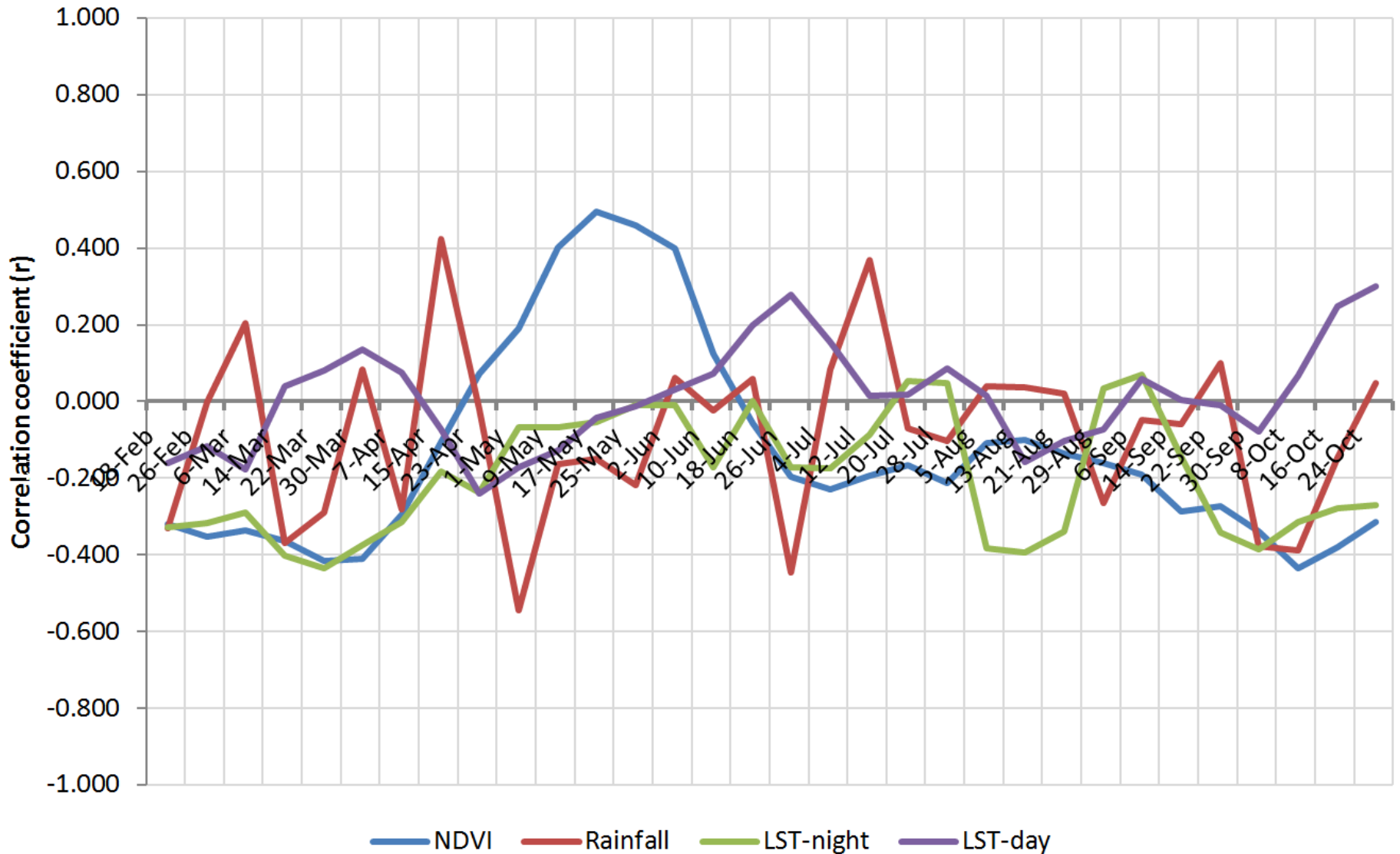
Corn yield dependence at county level speculative region, 2006-2011



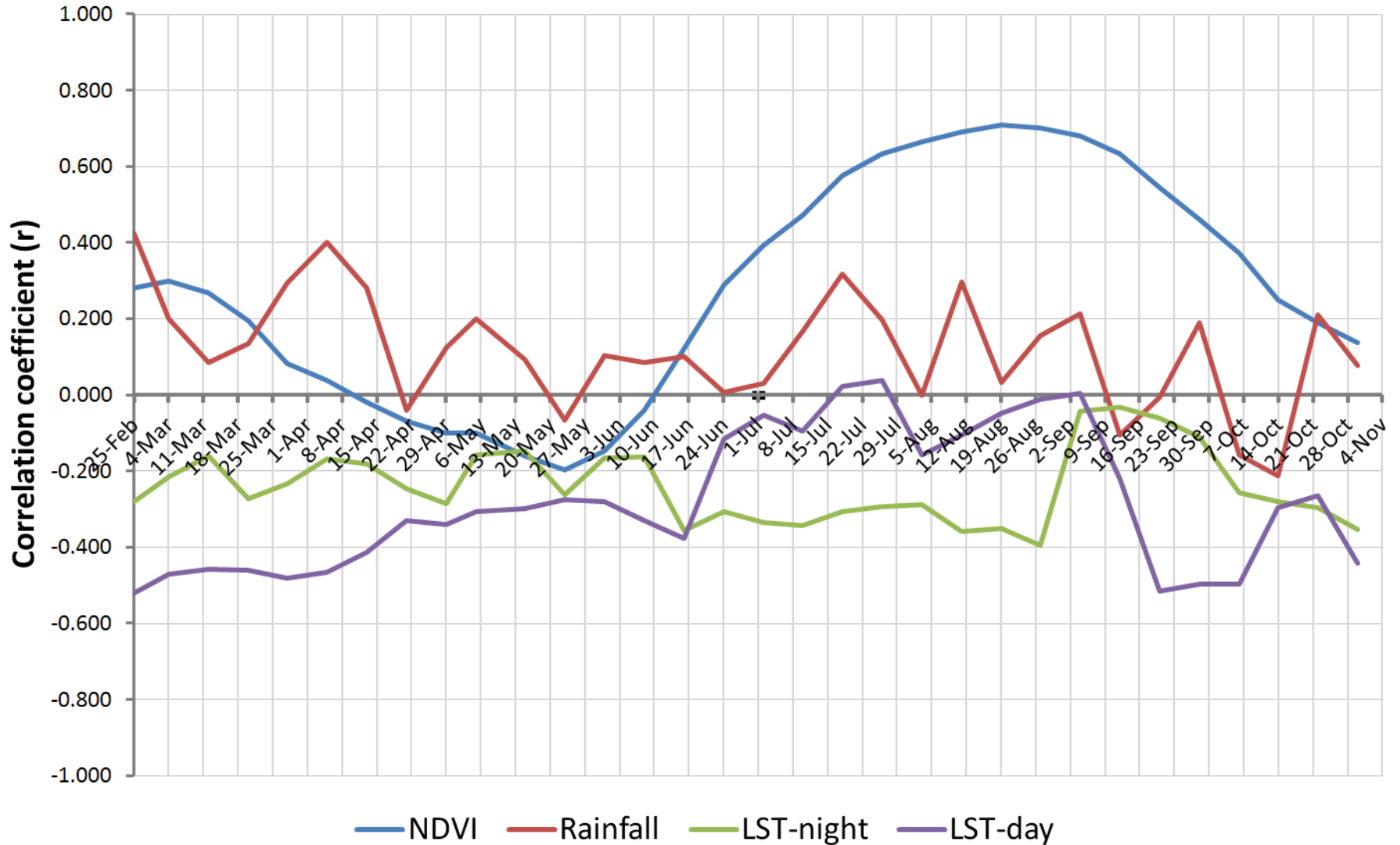
Soybean yield dependence at county level speculative region, 2006-2011



Winter wheat yield dependence at county level Kansas, 2006-2011

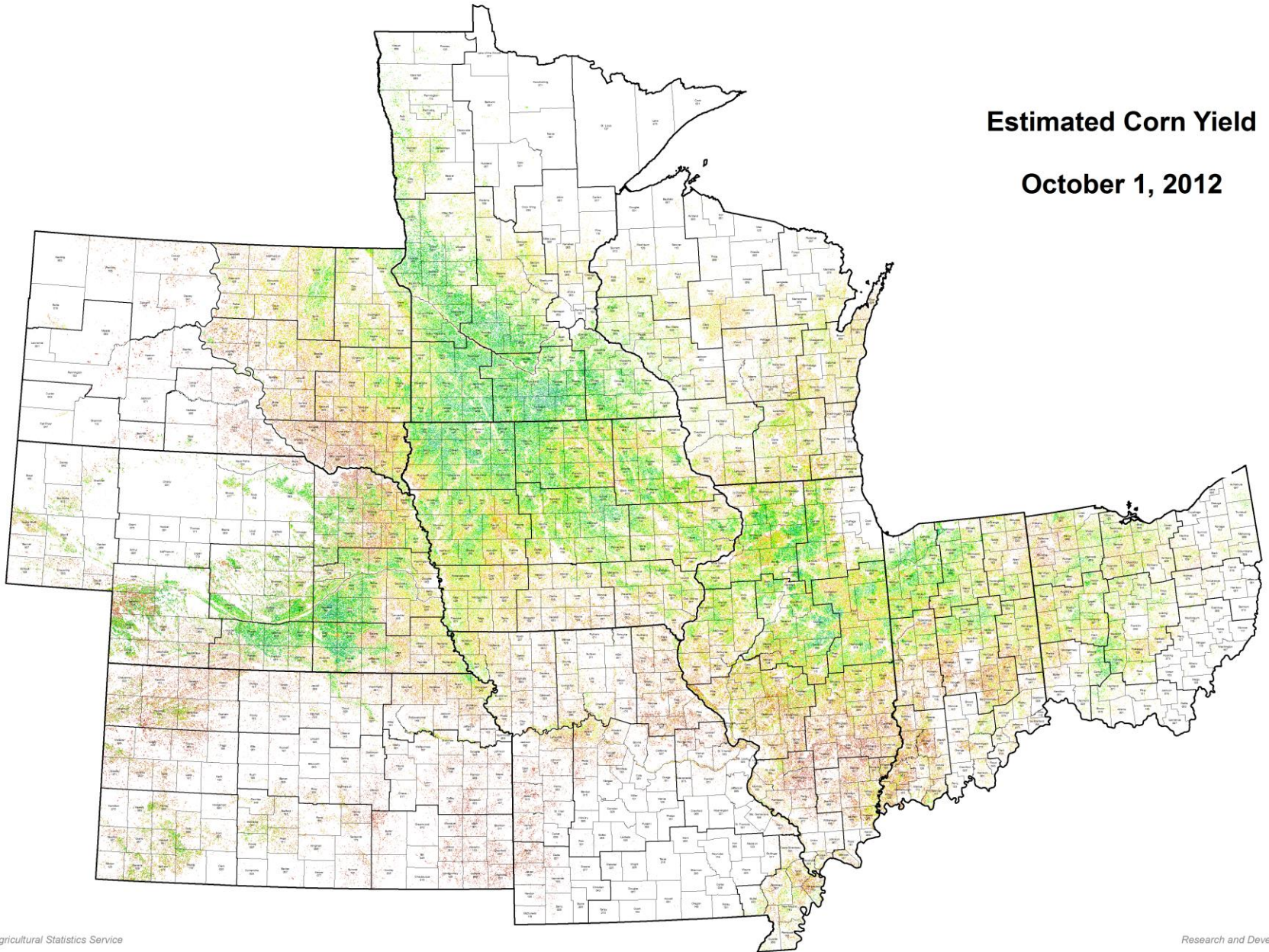


Cotton yield dependence at county level TX & AR, 2005-2011



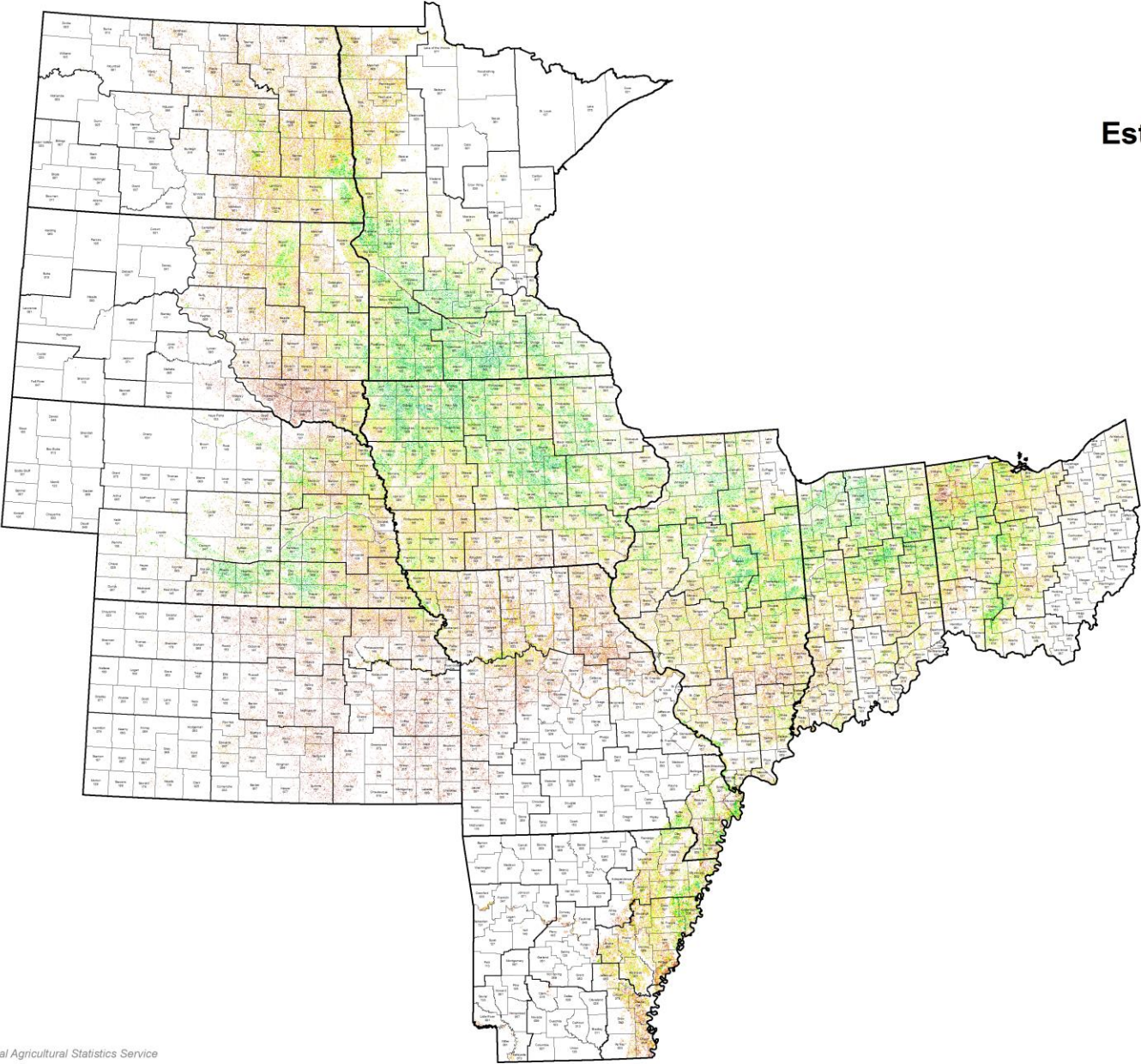
Estimated Corn Yield

October 1, 2012



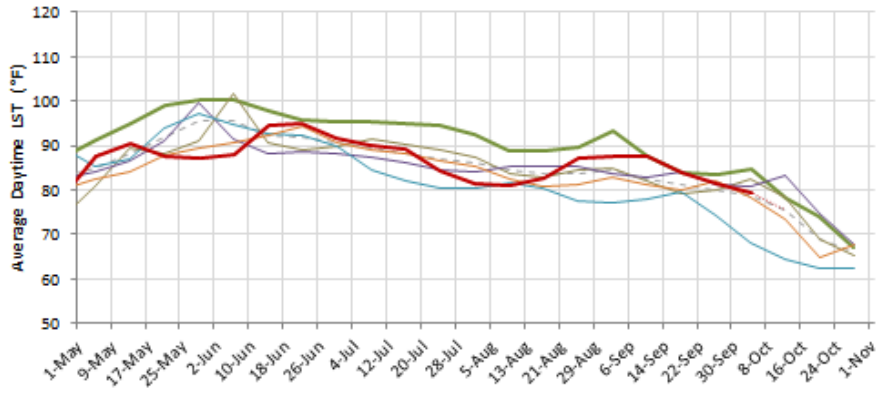
Estimated Soybean Yield

October 1, 2012

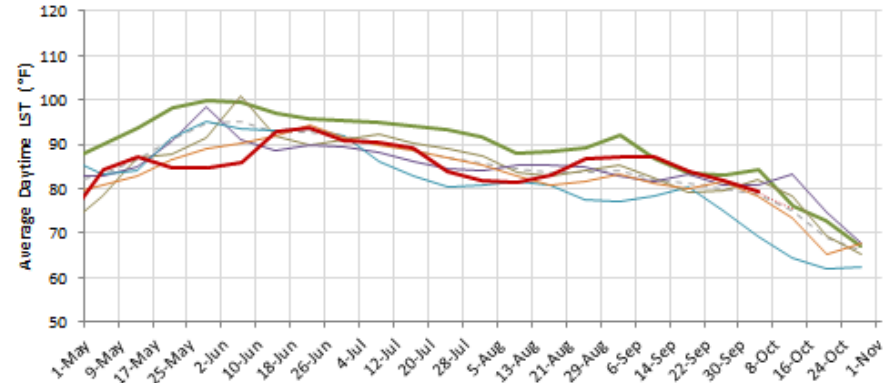


MODIS-derived crop dynamics based on CDL areas

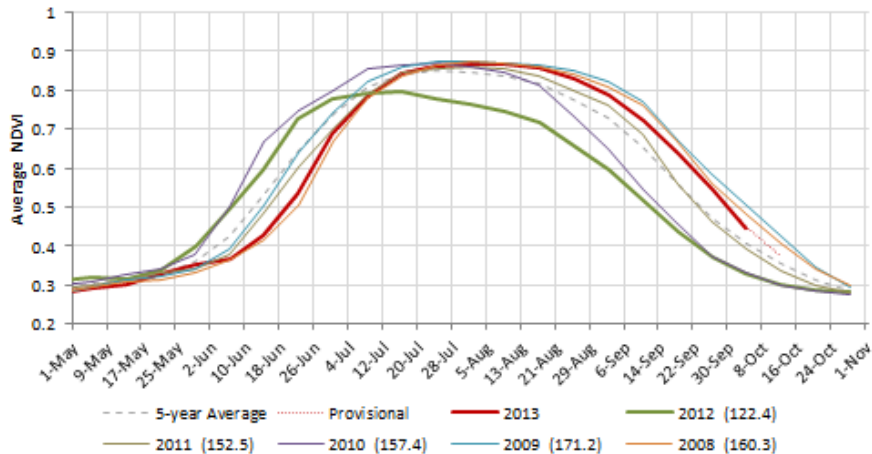
Daytime Land Surface Temperature (LST)



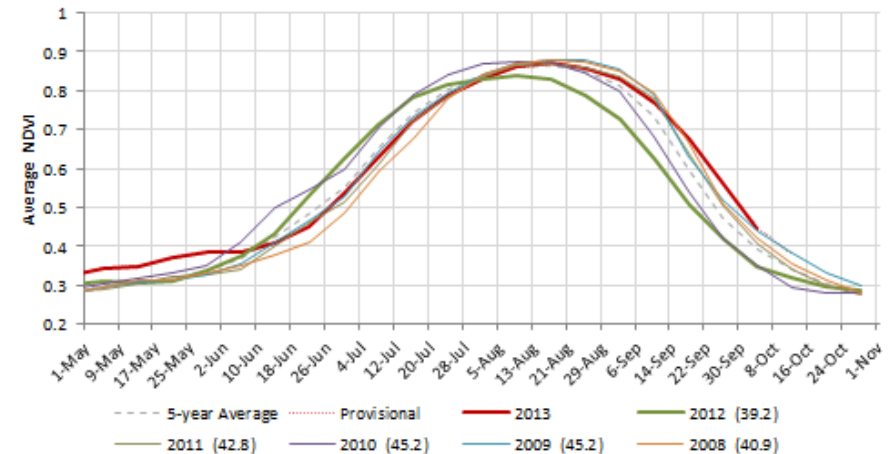
Daytime Land Surface Temperature (LST)



Normalized Difference Vegetation Index (NDVI)



Normalized Difference Vegetation Index (NDVI)



Corn

Soybeans

This winter: Try to understand all common MODIS derived variables and how they relate to various crops' yields

- Explore fully beyond only corn and soybeans
 - Wheat
 - Rice
 - Potatoes
 - Cotton
- Compare the full suite of common MODIS variables
 - NDVI
 - EVI
 - LAI
 - FPAR
 - LST (daytime and nighttime)
- Test Both Terra and Aqua platforms
 - Truly assess the AM vs PM overpass time
- Look at pixel scale issues
 - 250 m vs. 500 m vs. 1000 m (particularly for NDVI)

Final thoughts about crop production monitoring using earth observation satellites

- A wealth of satellite data already exists
 - Free and with significant history
 - Terra and Aqua MODIS
 - Landsat 7 and 8
 - Others are out there too to supplement
 - DMC, Rapideye, Digital Globe, SPOT, IRS, etc...
 - Plus those coming online like VIIRS, Sentinel II,
- Computing infrastructure can handle it
-and the research is there to guide best practices

Thank You

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www.nass.usda.gov
http://www.nass.usda.gov/Research_and_Science/
<http://nassgeodata.gmu.edu/CropScape>

