

A map of Michigan showing cropland data. The land area is filled with a dense pattern of small, multi-colored dots (green, yellow, orange, red) representing different agricultural categories. Water bodies are shown in light blue. The title text is overlaid on the upper portion of the map.

Introduction of the Cropland Data Layer Program

Rick Mueller

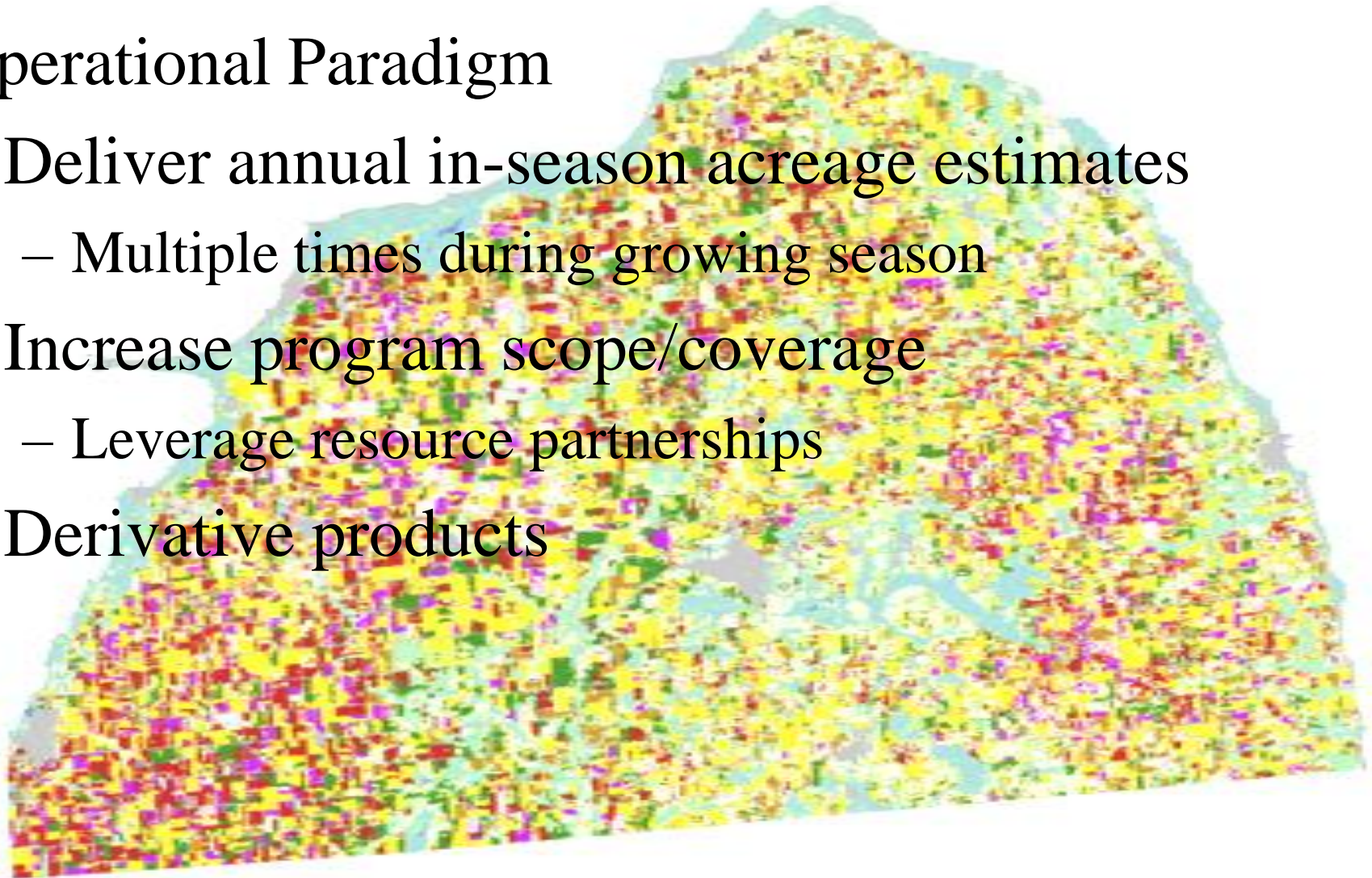
Head, Spatial Analysis Research



Cropland Data Layer (CDL) Discussion

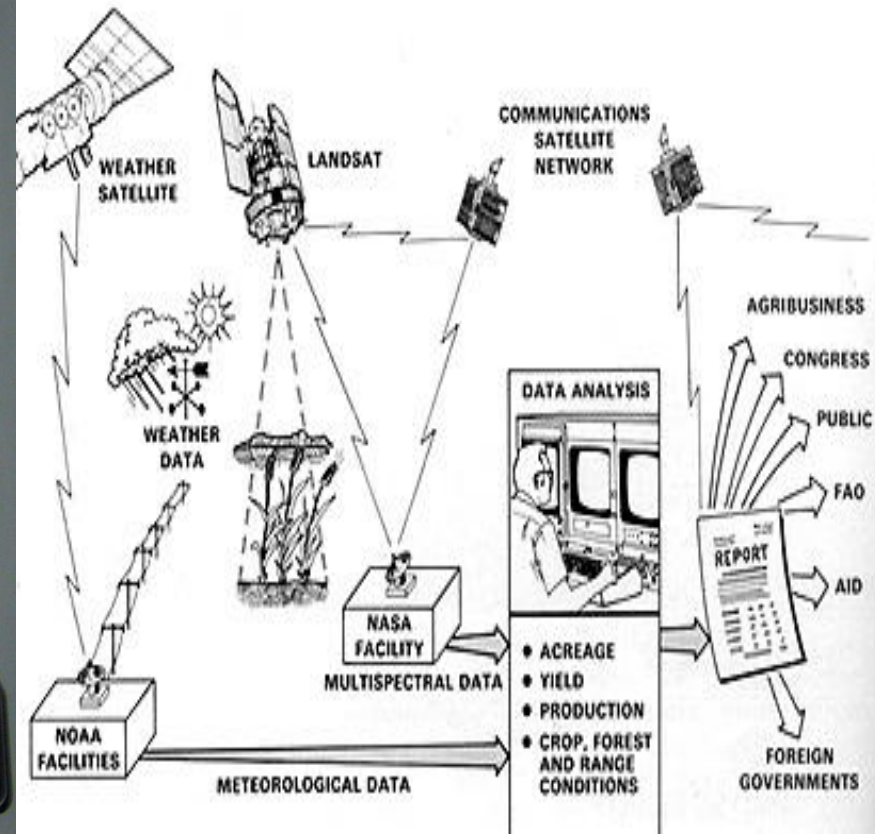
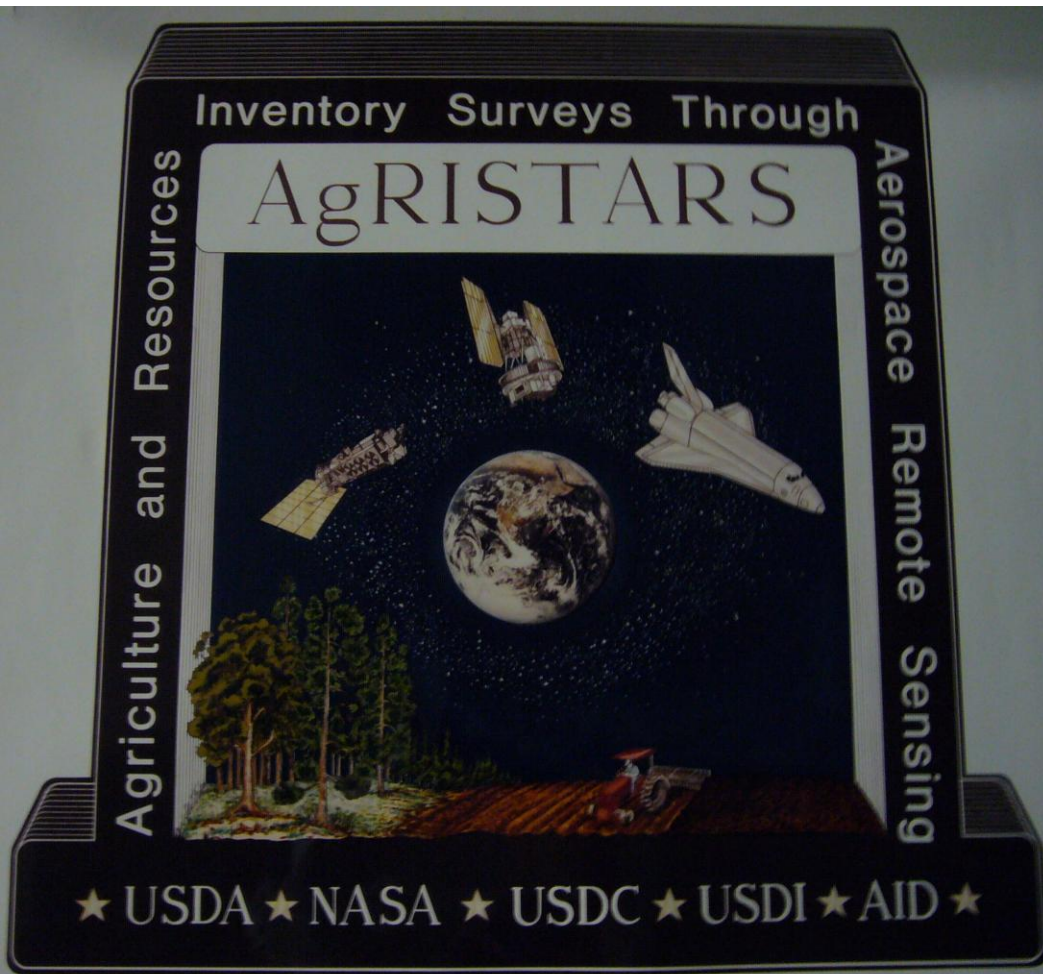
Operational Paradigm

- Deliver annual in-season acreage estimates
 - Multiple times during growing season
- Increase program scope/coverage
 - Leverage resource partnerships
- Derivative products



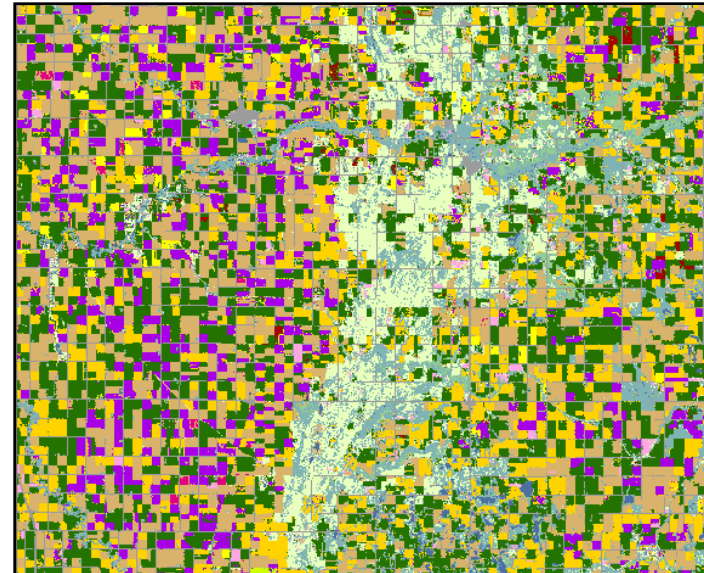
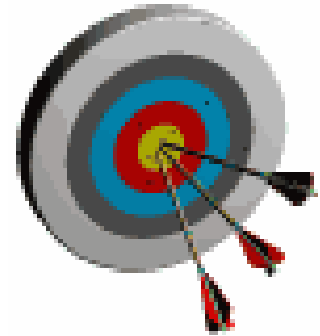
Cropland Data Layer (CDL) Project

- Legacy program
 - Issues: Budget/Satellites/Agency Support/Technology



CDL Program Objectives

- **“Census by Satellite”**
 - Annually cover major producing corn and soybean regions
 - Indications reflect actual location of the crops
 - Not address on record via survey
- **Provide timely, accurate, useful indications**
 - Measurable error
 - Unbiased/independent estimator
 - State, county, ASD
- **Operationalize indications delivery**
 - For June, August, and October
 - Ag Statistics Board
 - Field Offices
 - Update planted area
- **Output crop specific CDL**
 - Distribute to public at the cost of reproduction
 - [NRCS Geospatial Data Gateway](#)



CDL Production Schedule

January

27	28	29	30	31
8:●	15:○	22:○	30:○	

February

23	24	25	26	27	28	29
6:●	13:○	20:○	28:○			

March

23	24	25	26	27	28	29
30	31					
7:●	14:○	21:○	29:○			

April

Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			
5:●	12:○	20:○	28:○			

May

Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
5:●	11:○	19:○	27:○			

June

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24				
29	30					
3:●	10:○					

Crop Acreage Report
CDL winter wheat

July

Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
2:●	10:○	18:○	25:○			

August

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
1:●	8:○	16:○	23:○	30:○		

September

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				
7:○						

Crop Production Report
CDL all crops

Small Grains Annual Summary
CDL small grains

October

Su	Mo	Tu	We	Th	Fr	Sa
7:○	14:○	21:○	28:○			

November

Su	Mo	Tu	We	Th	Fr	Sa
5:○	13:○	19:○	27:○			

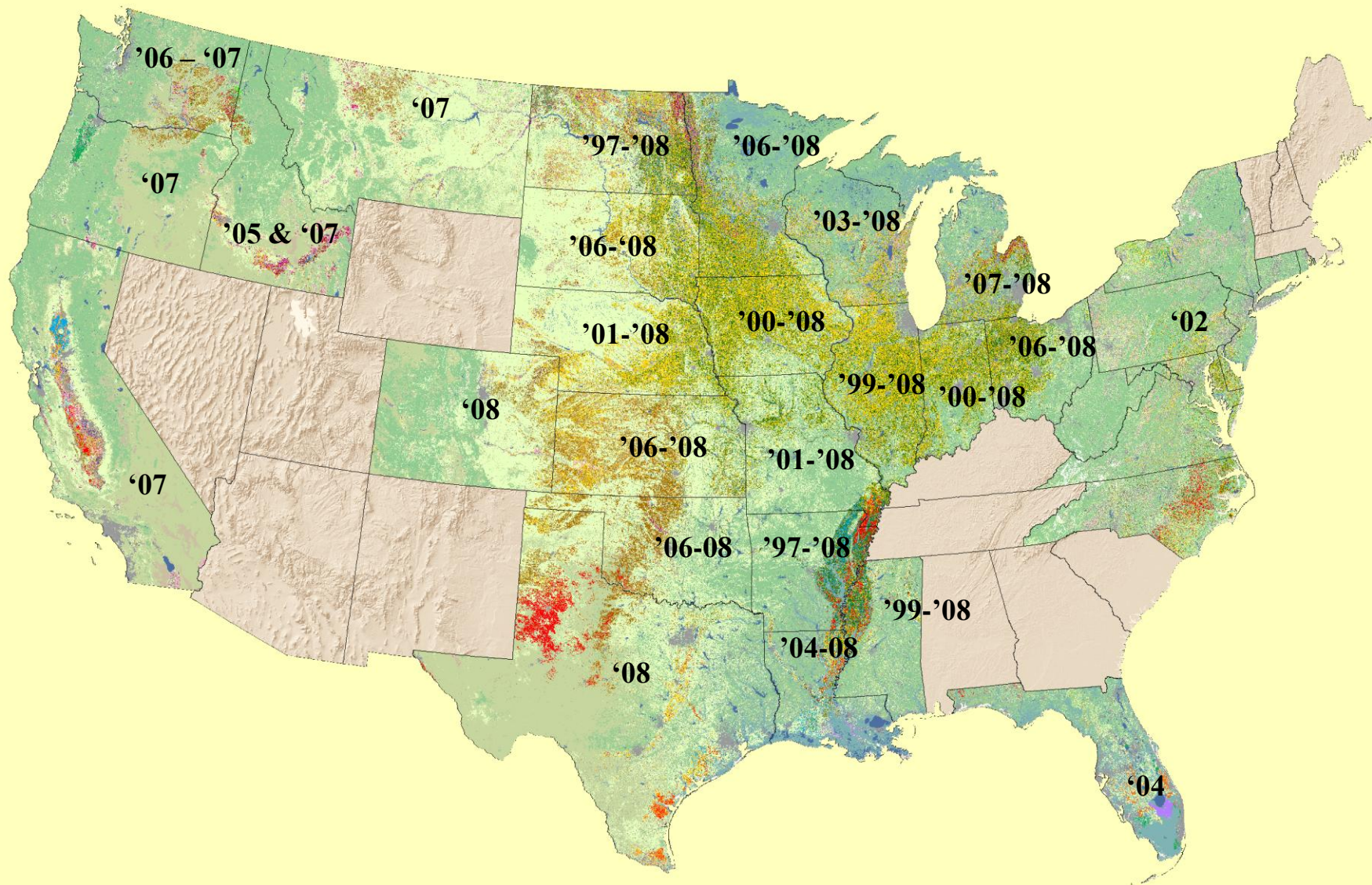
December

Su	Mo	Tu	We	Th	Fr	Sa
5:○	12:○	19:○	27:○			

Crop Production Report
CDL all crops

Historical:
Crop Production Annual Summary
CDL all crops/county estimates

Cropland Data Layers 1997 - 2008



CDL Program



- Inputs
 - Resourcesat-1 AWiFS imagery
 - Farm Service Agency – Common Land Unit
 - Ancillary data
 - Commercial software suite
- Outputs
 - Acreage Estimates
 - Cropland Data Layer

IRS Resourcesat-1 A WiFS Imagery

340 km swath per head
740 km combined

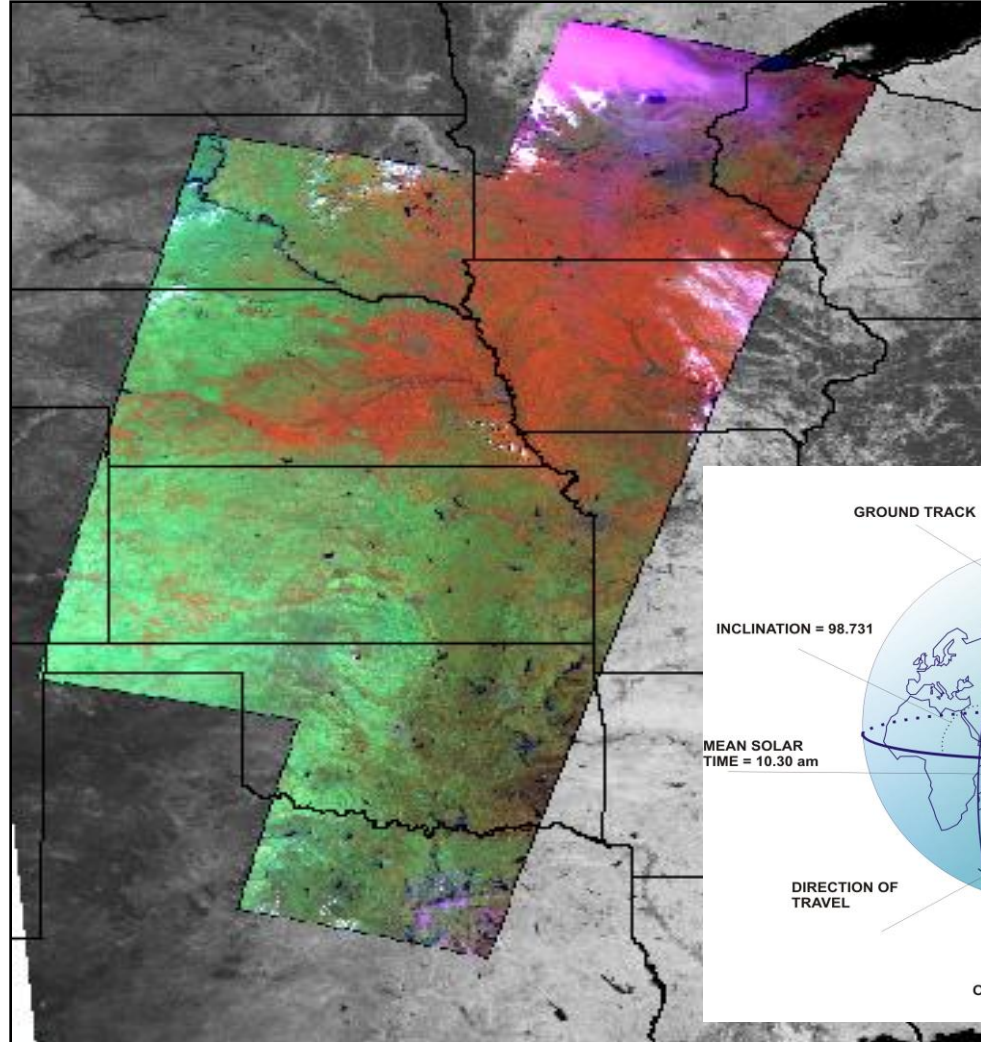
5-day revisit

4 spectral bands

- B2: 0.52 - 0.59
- B3: 0.62 - 0.68
- B4: 0.76 - 0.86
- B5: 1.55 - 1.7

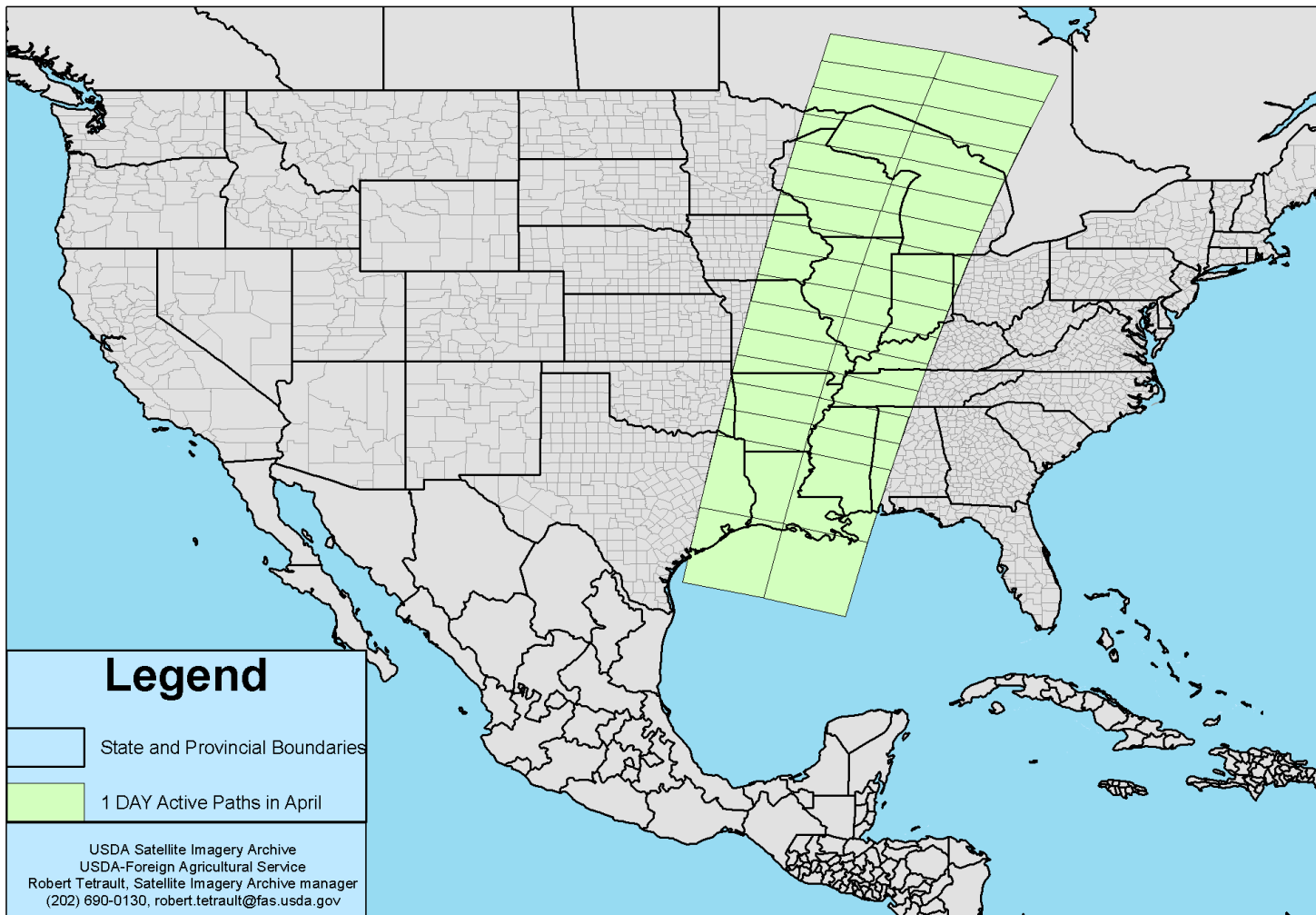
56 m nadir/70 m field edges

Data provided by Arctic Slope
Regional Corporation



Satellite Acquisition Strategy

Active Paths for P6-AWiFS CONUS



The USDA-Satellite Imagery Archive

Operated by the Foreign Agricultural Service:

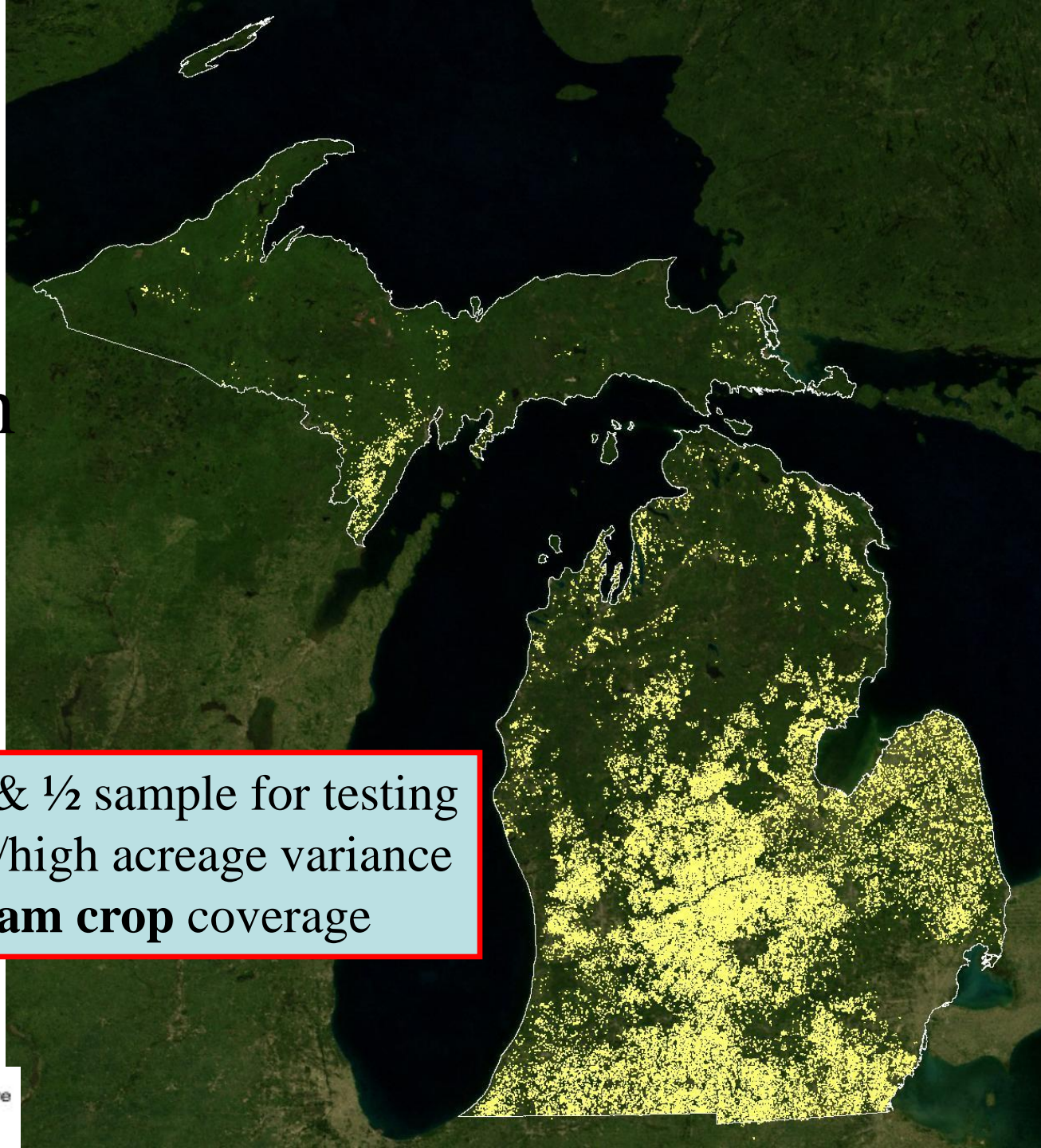
- Provides shared access to satellite imagery purchased by USDA for participating agencies
- Cost-sharing program to maximize the cost effectiveness of Department expenditures on satellite imagery
- Reduces per-image price paid
- Leverages the power of a single USDA purchasing body
- Cooperative partners have open access



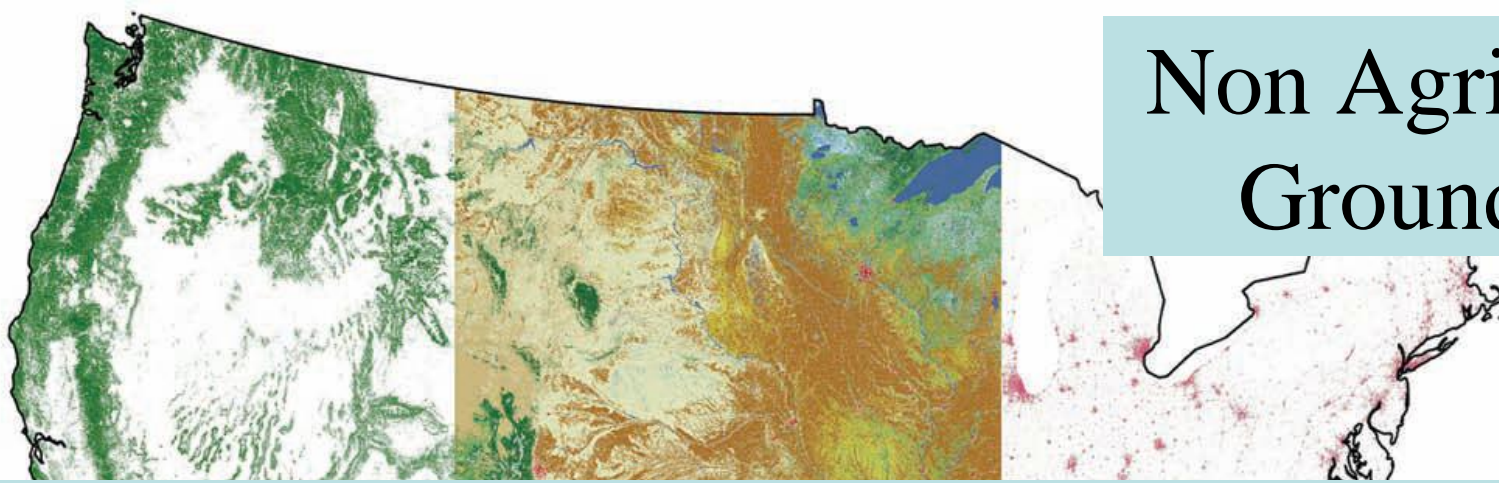
Agricultural Ground Truth

FSA Common Land Unit

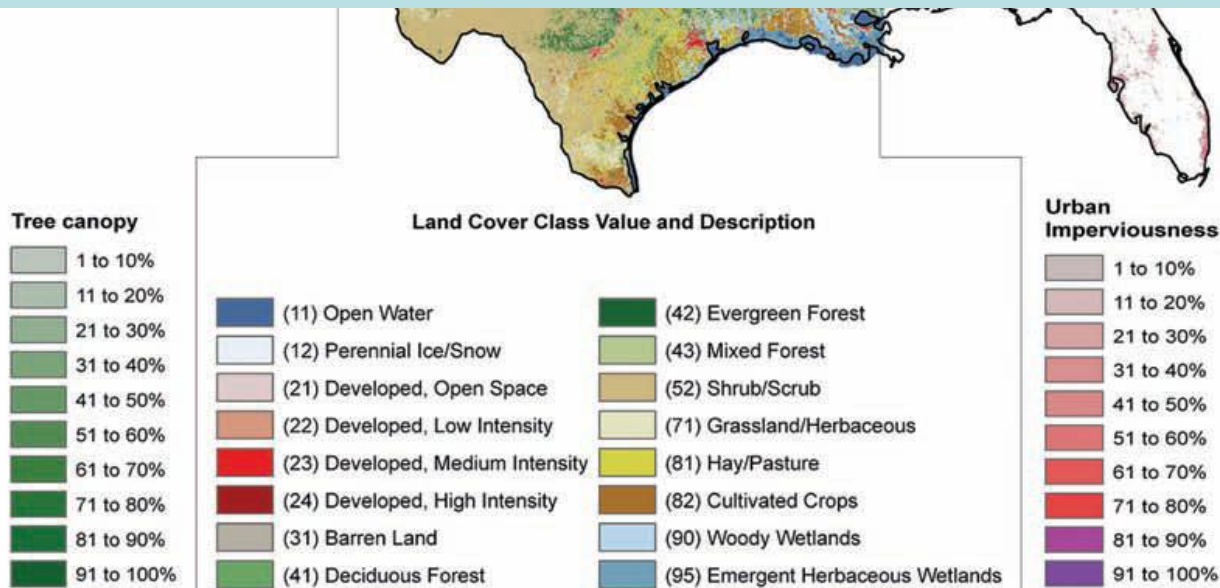
1/2 sample for training & 1/2 sample for testing
Filter multi-field CLU/high acreage variance
Comprehensive **program crop** coverage



Non Agricultural - Ground Truth



- Proportional sampling
- 2001 National Land Cover Dataset from USGS
- Improve CDL coverage of non-ag classes



Commercial Software Suite



- Imagery Preparation
 - ERDAS Imagine



- Image classification
 - Decision tree software
 - See5.0 www.rulequest.com



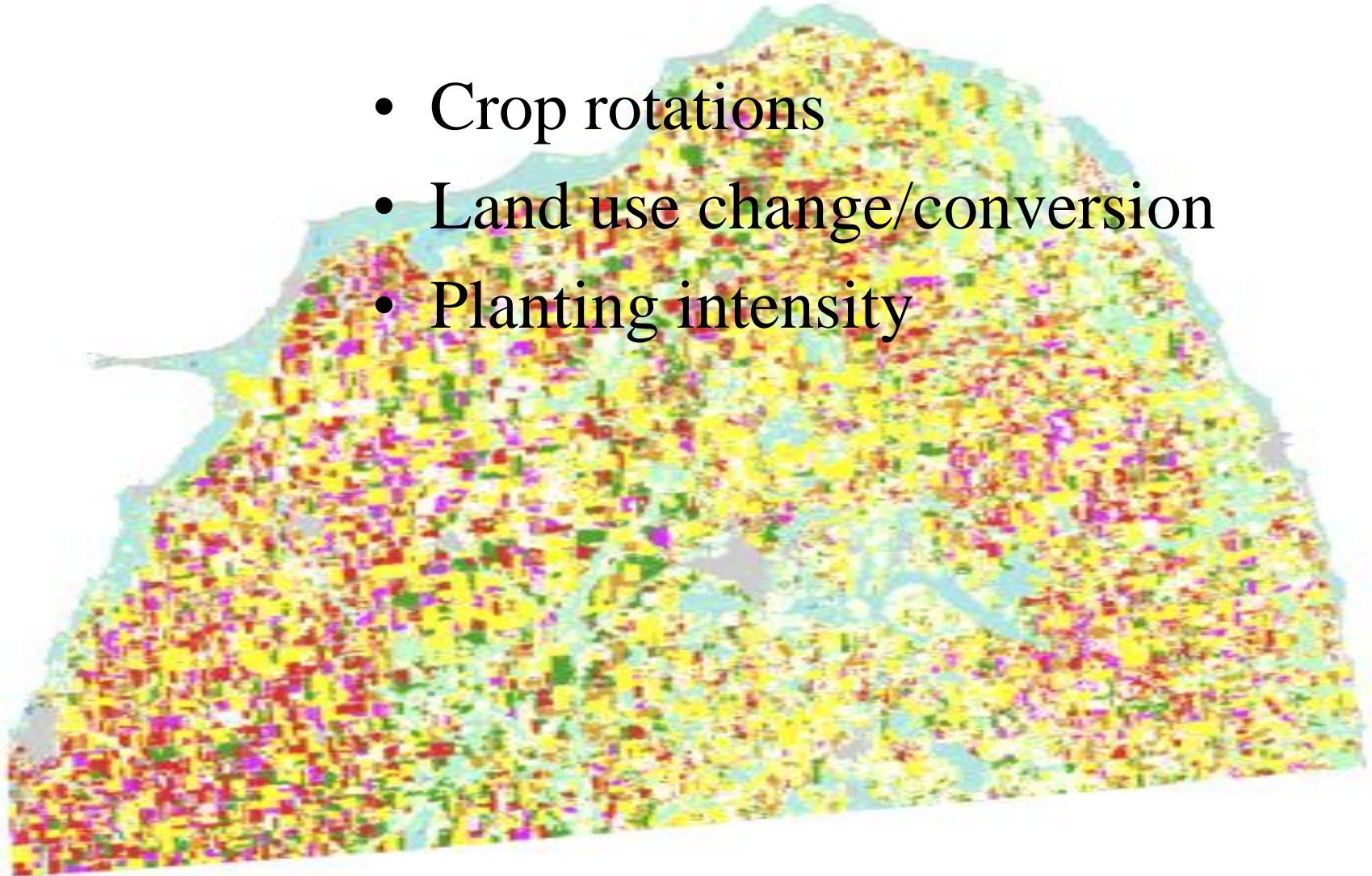
- Ground Truth Preparation
 - ESRI ArcGIS



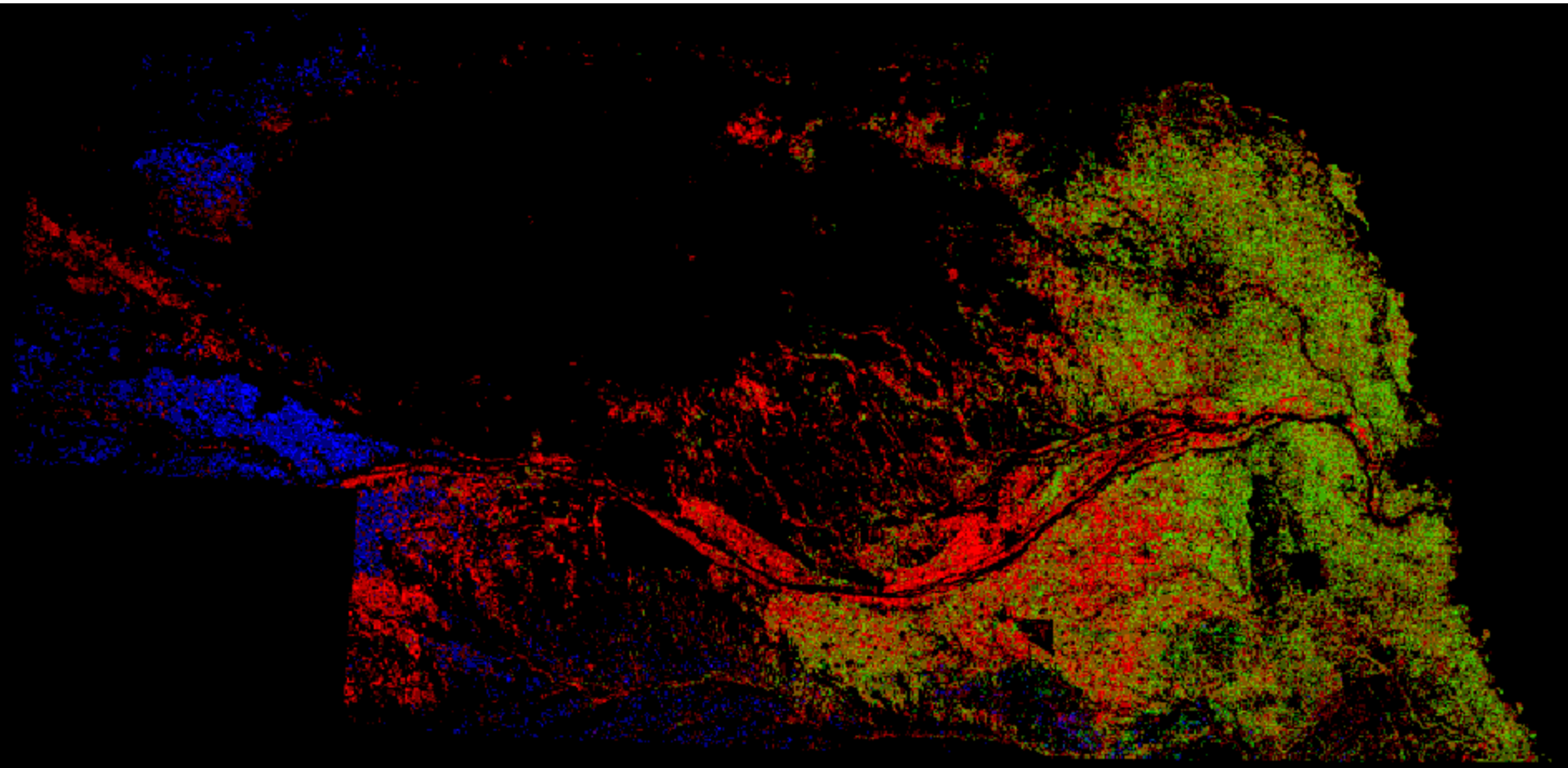
- Acreage Estimation
 - SAS/IML workshop

Derivative Products

- Crop rotations
- Land use change/conversion
- Planting intensity



Crop Rotations



How many times was the same crop planted?

Viewer #1: ne_03_04_05_06_07nass_cdl_probability_corn_soy

Map X: -200971.479695 Y: 1982826.02629

Projection: Albers Conical Equal Area / GRS 1980

Layer	Band	FILE PIXEL	LUT VALUE	HISTOGRAM
1		5.000	255.000	1434915.000
2		0.000	0.000	
3		0.000	0.000	

Corn

Viewer #1: ne_03_04_05_06_07nass_cdl_probability_corn_soy

Map X: -524579.698456 Y: 2038451.393214

Projection: Albers Conical Equal Area / GRS 1980

Layer	Band	FILE PIXEL	LUT VALUE	HISTOGRAM
1		0.000	0.000	0.000
2		0.000	0.000	0.000
3		3.000	255.000	471420.000

Winter Wheat

Viewer #1: ne_03_04_05_06_07nass_cdl_probability_corn_soy

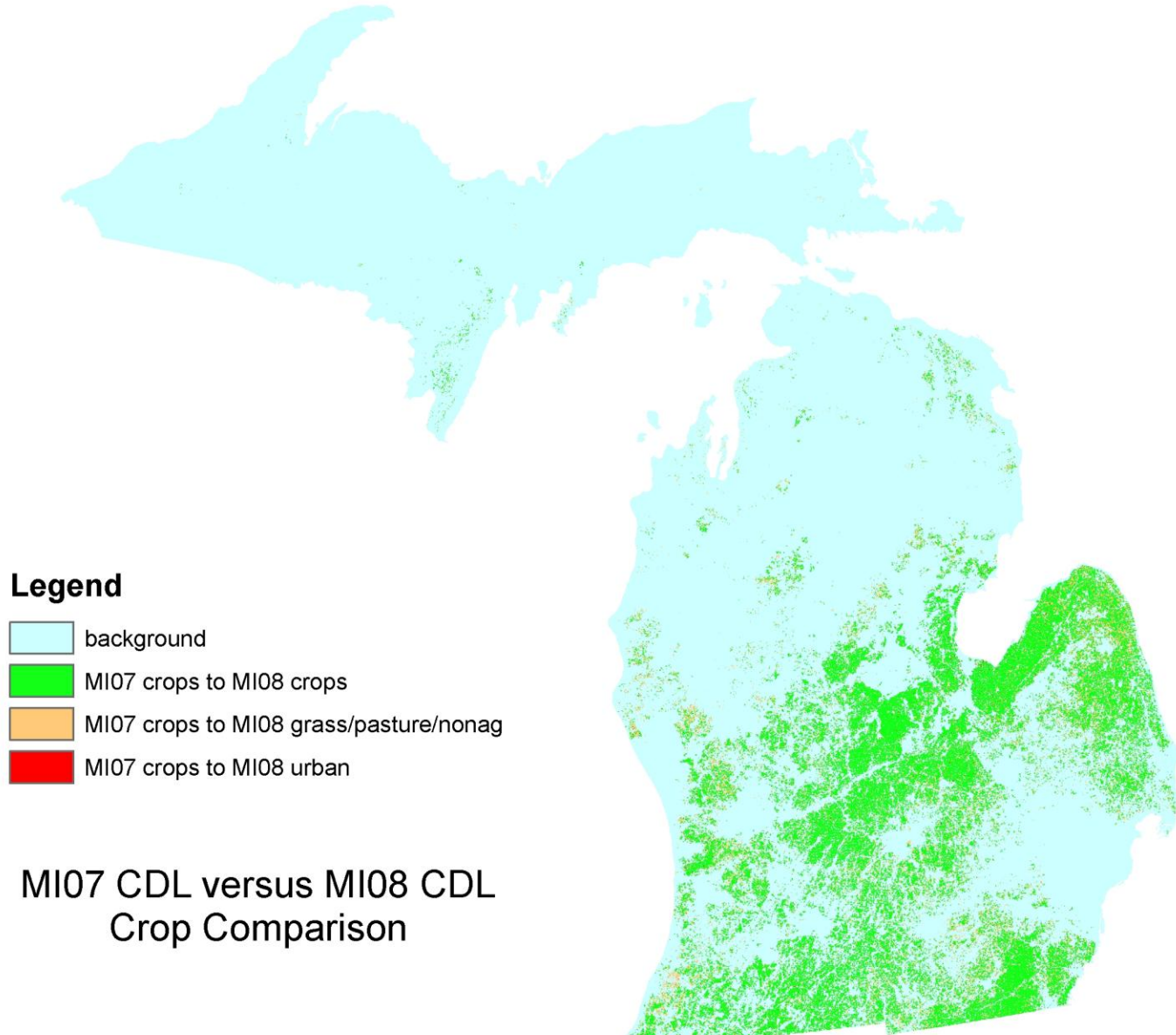
Map X: -191525.070011 Y: 1980840.475211

Projection: Albers Conical Equal Area / GRS 1980

Layer	Band	FILE PIXEL	LUT VALUE	HISTOGRAM
1		2.000	63.000	7051212.000
2		3.000	170.000	3220479.000
3		0.000	0.000	0.000

Soybeans

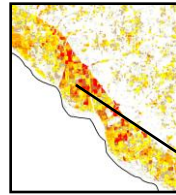
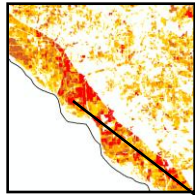
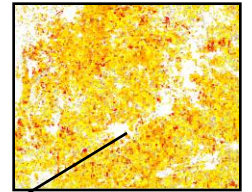
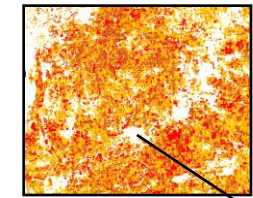
Land Use Change/Conversion



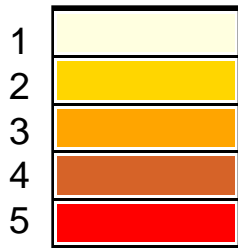
Corn Planting Intensity

5 years vs. 9 years

Illinois

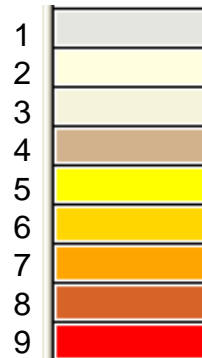


Years
Planted
to Corn



2003-2007

Years
Planted
to Corn



1999-2007

Cropland Data Layer Future



- Expand geographic scope
 - Target speculative NASS crops
 - Cotton, Winter, Durum and Spring Wheat
- Derivatives
 - Change detection
 - Crop rotations
- National program
 - Leverage resource partnerships