Improving Agricultural Landcover Classification in the Cropland Data Layer Using the Disaster Monitoring Constellation

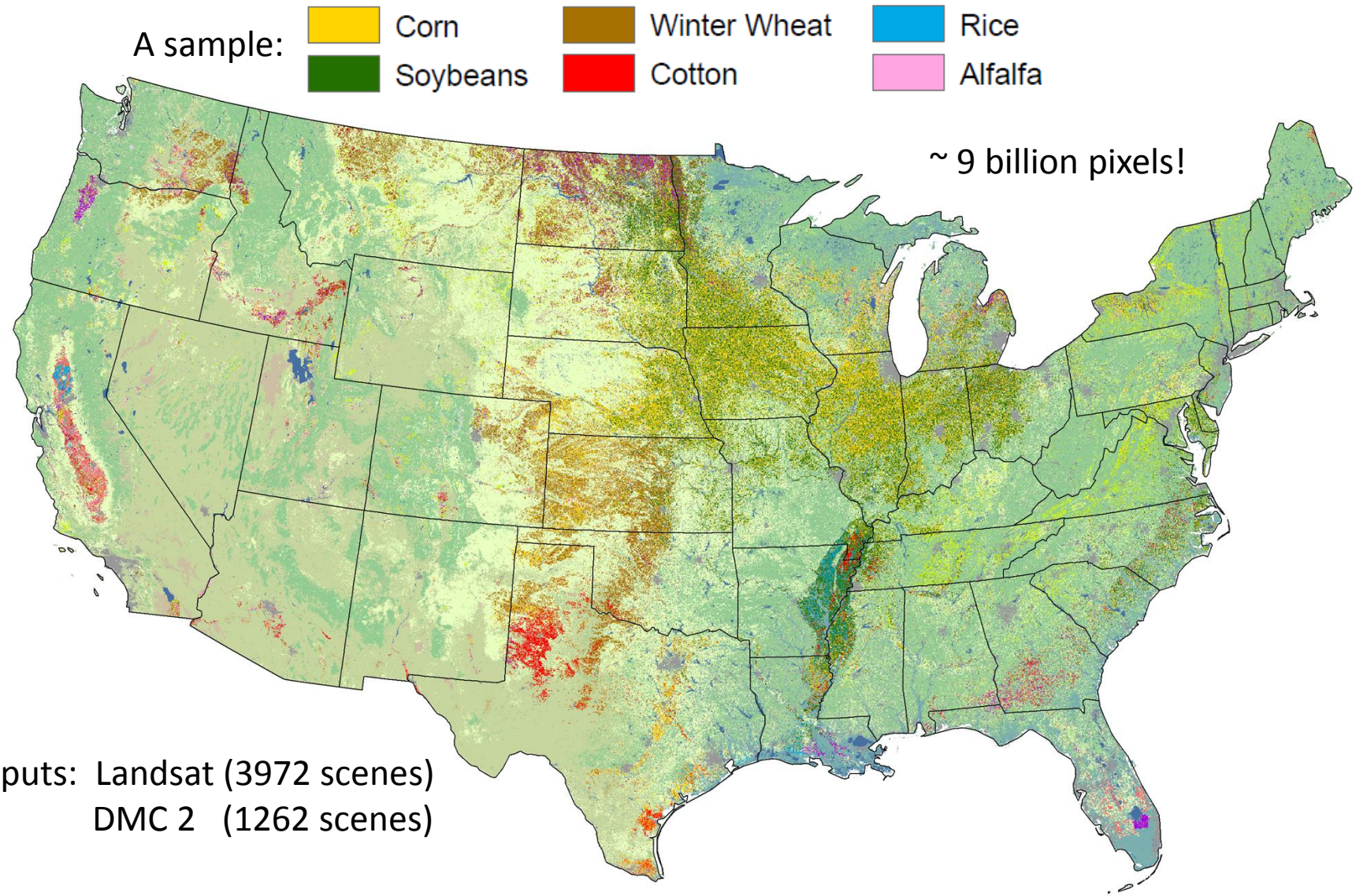
Audra Zakzeski
USDA NASS

2011 Crop Land Data Layer

Agriculture by crop type and location

Each pixel represents a type of crop or land cover

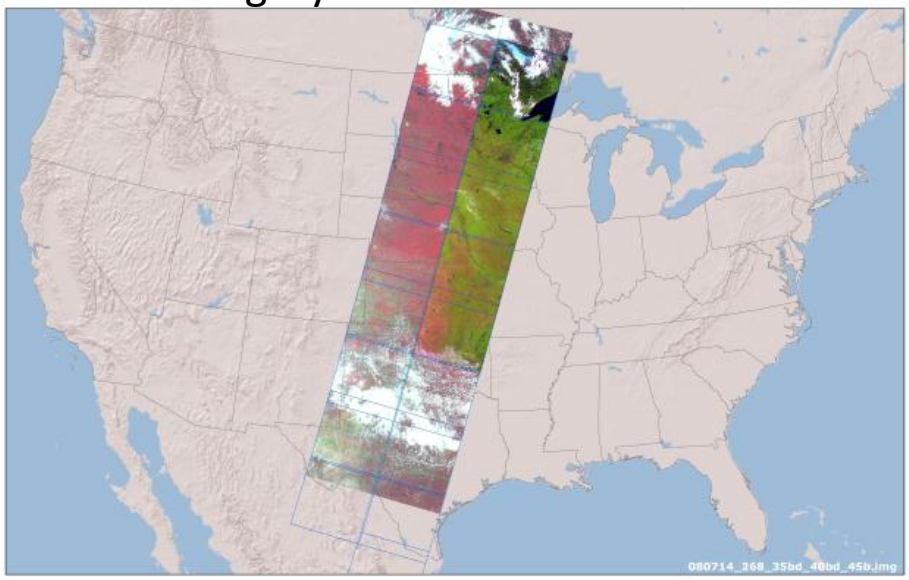
A sample:



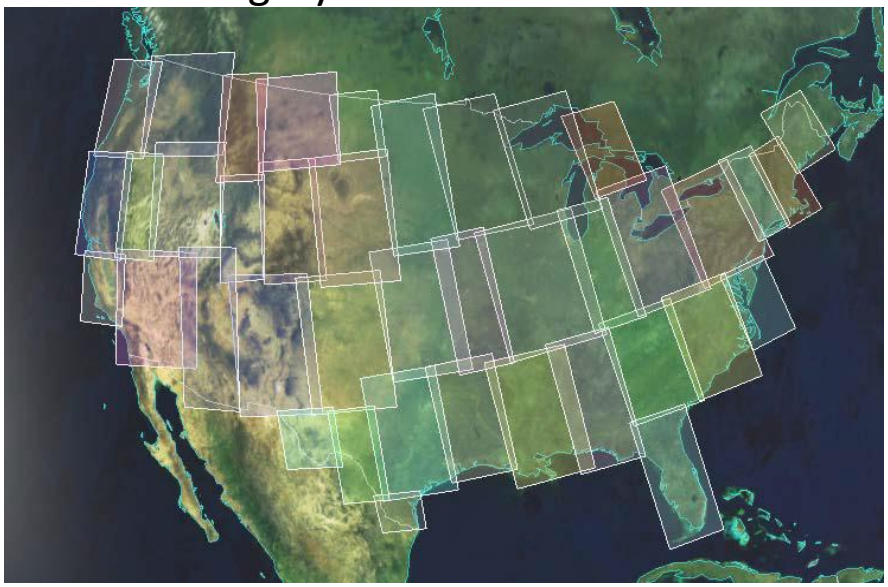
Inputs: Landsat (3972 scenes)
DMC 2 (1262 scenes)

2011 Cropland Data Layer Inputs

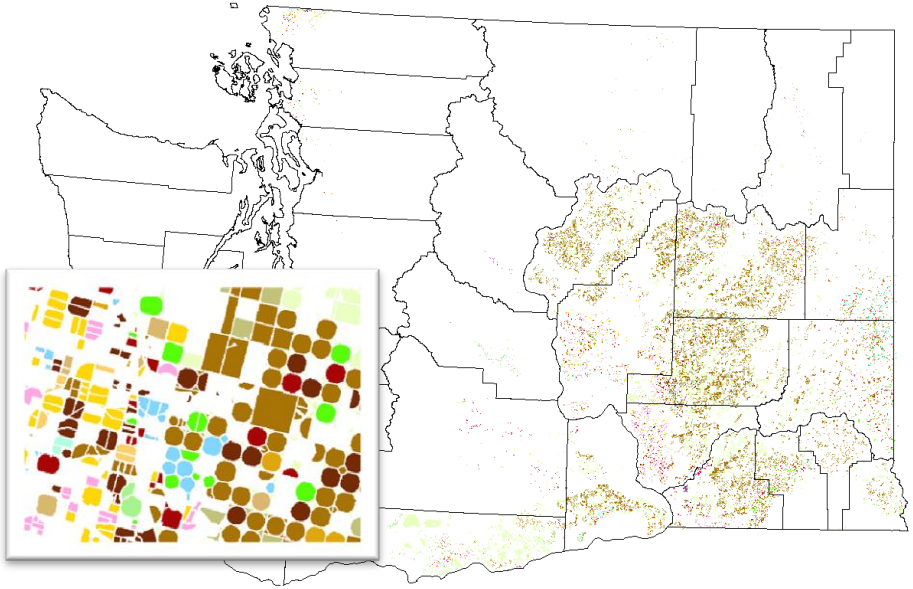
Satellite Imagery – Landsat



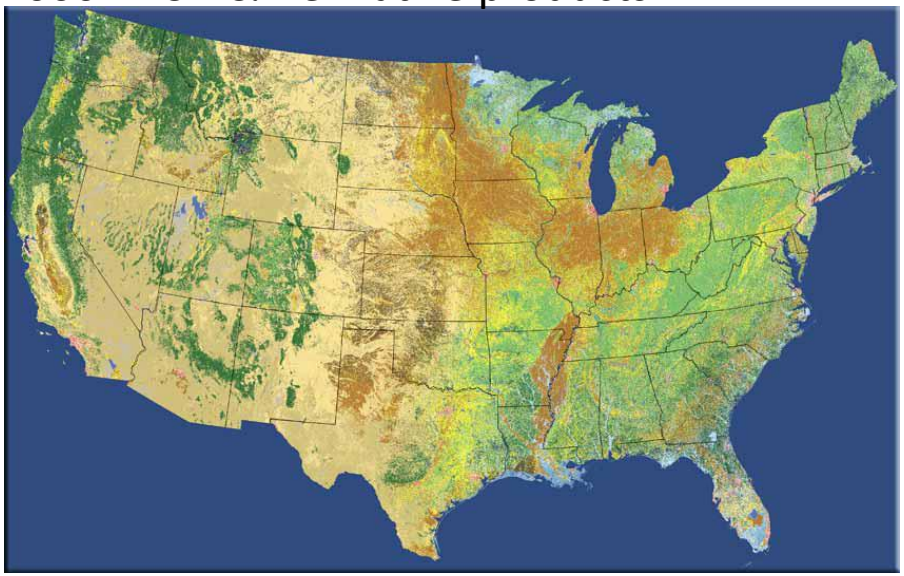
Satellite Imagery – Deimos & UK2



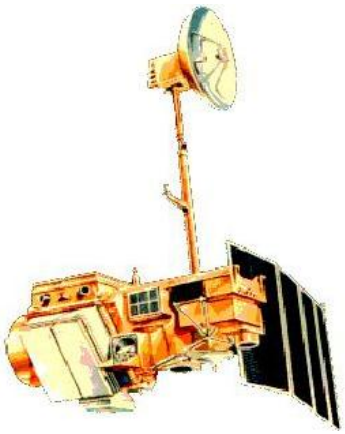
Farm Service Agency: Common Land Unit



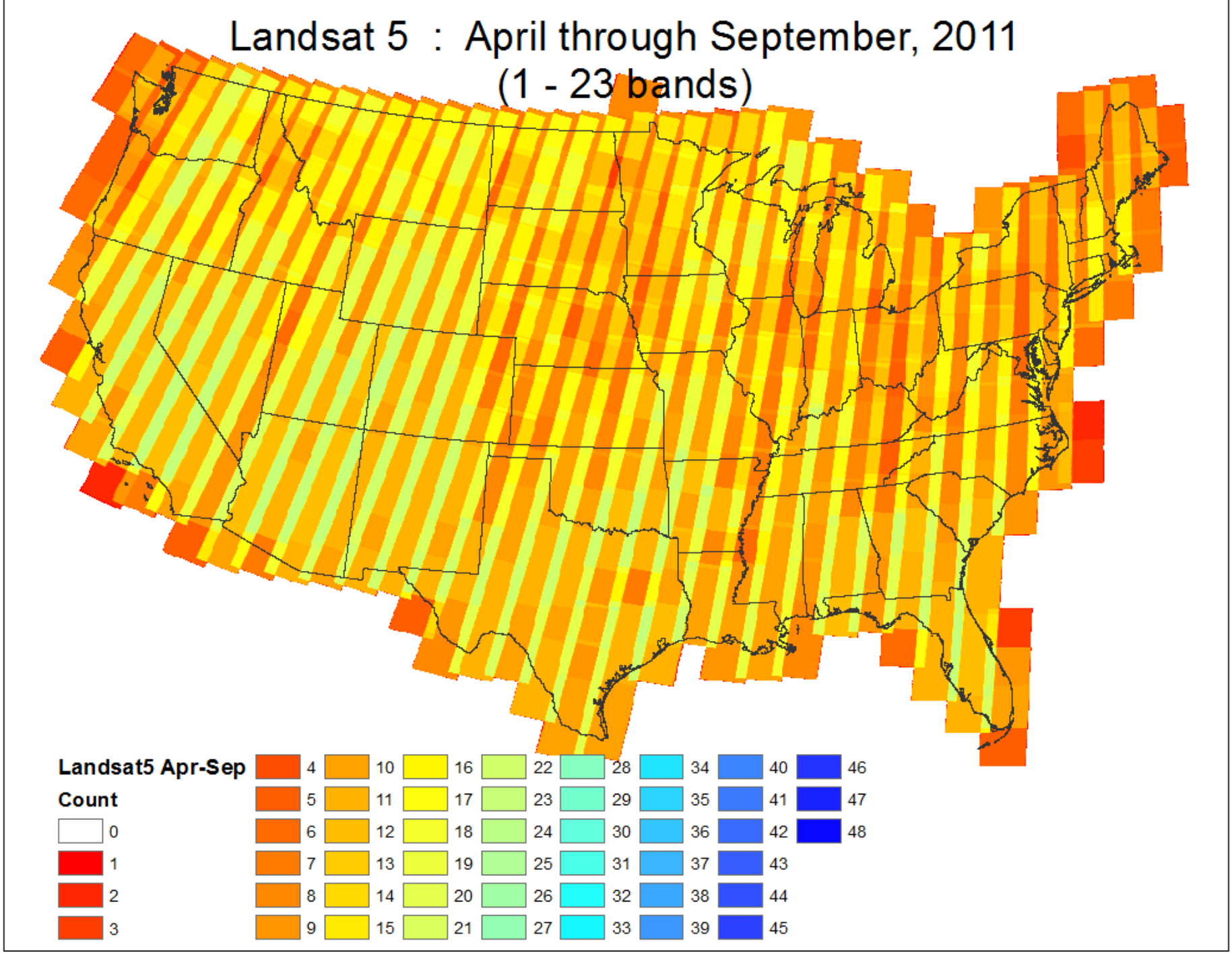
2006 NLCD & Derivative products

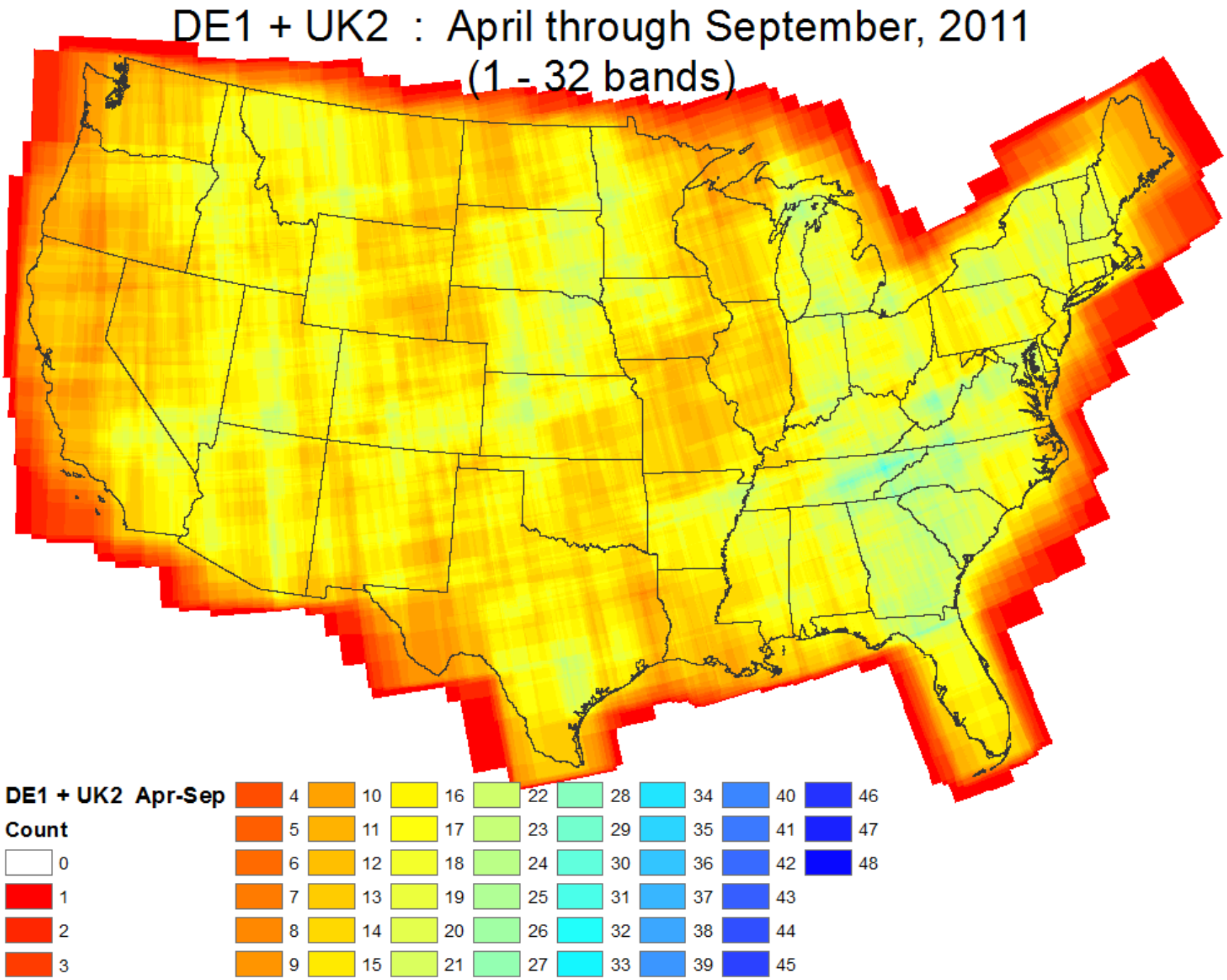


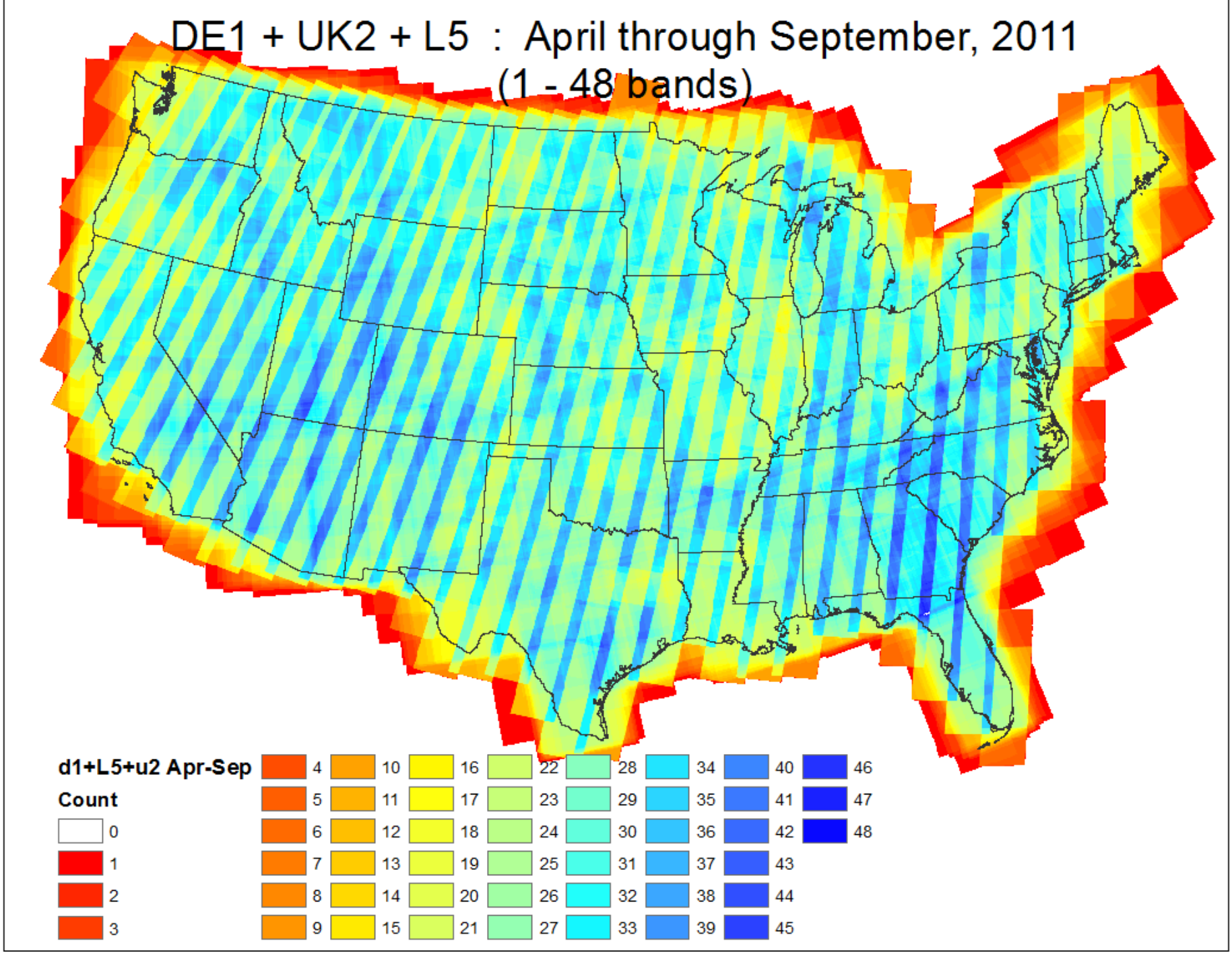
Side by Side Comparison



	Deimos/UK2	Landsat 5
Launch Date	2009	1984
Resolution	22 meters	30 meters
Spectral Bands	B2: 0.52 – 0.60 (Green) B3: 0.63 – 0.69 (Red) B4: 0.77 – 0.90 (NIR)	B2: 0.52 – 0.60 (Green) B3: 0.63 – 0.69 (Red) B4: 0.75 – 0.90 (NIR) B5: 1.55 – 1.75 (SWIR)
	3 bands total	7 bands total
Swath Width	600 kilometers	185 kilometers
Revisit Rate	4 Days	16 Days


Landsat 5 : April through September, 2011
(1 - 23 bands)
Landsat5 Apr-Sep
Count
0
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
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48


DE1 + UK2 : April through September, 2011
(1 - 32 bands)
DE1 + UK2 Apr-Sep
Count
0
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
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48


DE1 + UK2 + L5 : April through September, 2011
(1 - 48 bands)
d1+L5+u2 Apr-Sep
Count
0
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
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48

National Cropland Data Layer Legend

Land Cover Categories (by decreasing acreage)

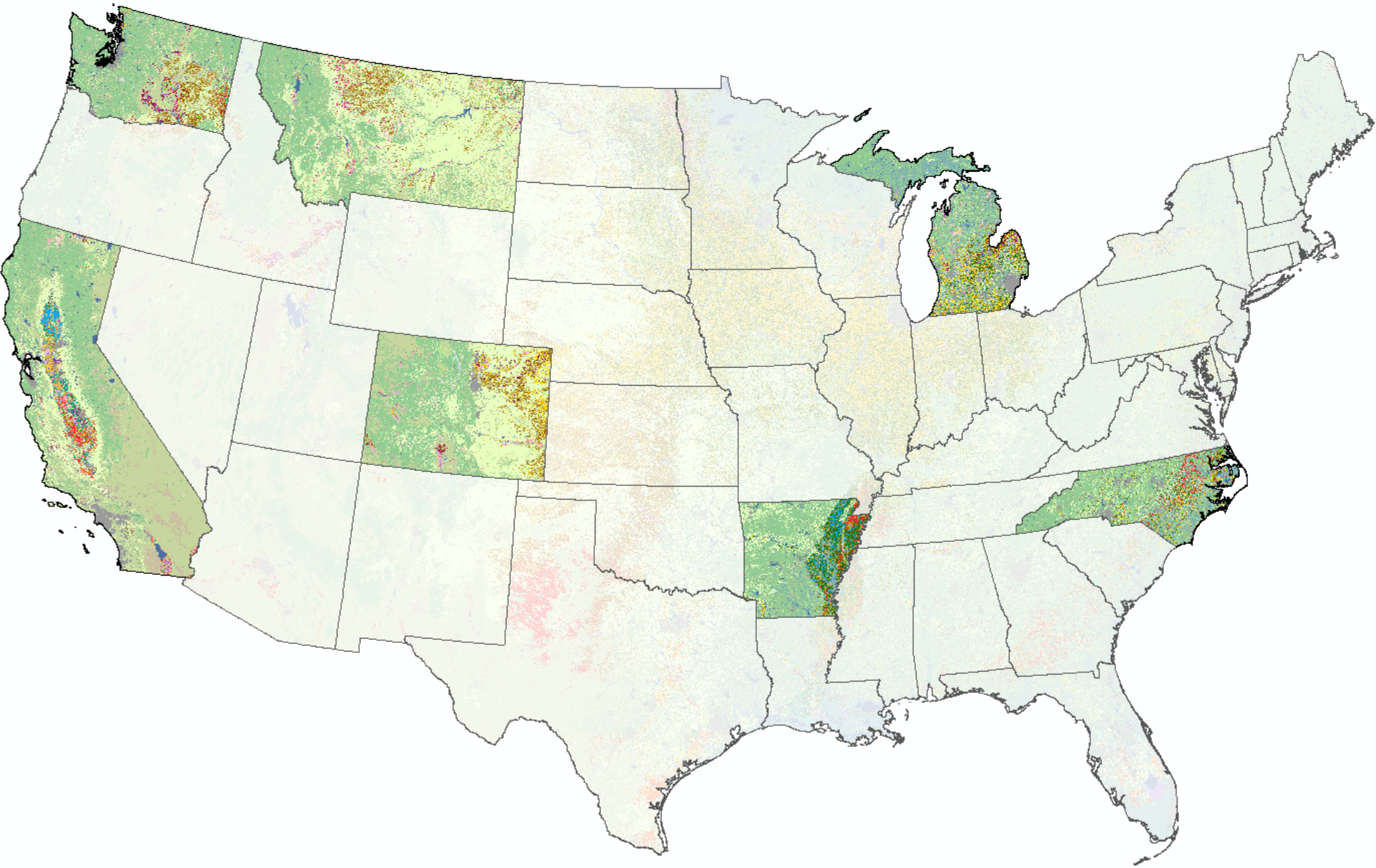
Agriculture

- Pasture/Grass
- Corn
- Soybeans
- Winter Wheat
- Fallow/Idle Cropland
- Other Hay/Non Alfalfa
- Alfalfa
- Cotton
- Spring Wheat
- Sorghum
- Dbl Crop WinWht/Soybeans
- Rice
- Barley
- Oranges
- Oats
- Sunflower
- Dry Beans
- Peanuts
- Durum Wheat
- Sugarbeets
- Potatoes
- Canola
- Sugarcane
- Almonds
- Sod/Grass Seed
- Grapes
- Apples
- Rye
- Peas
- Millet
- Walnuts
- Lentils
- Pecans
- Dbl Crop WinWht/Cotton
- Dbl Crop WinWht/Sorghum
- Sweet Corn
- Aquaculture
- Clover/Wildflowers
- Other Crops
- Dbl Crop WinWht/Corn
- Cherries
- Triticale
- Citrus
- Safflower
- Pistachios
- Blueberries
- Christmas Trees
- Dbl Crop Barley/Soybeans
- Tomatoes
- Onions
- Flaxseed
- Dbl Crop Oats/Corn
- Pop or Orn Corn
- Herbs
- Misc Vegs & Fruits
- Olives
- Other Tree Crops
- Dbl Crop Corn/Soybeans
- Sweet Potatoes
- Peaches
- Cranberries
- Tobacco
- Cantaloupes
- Prunes
- Dbl Crop Barley/Corn
- Dbl Crop Soybeans/Cotton
- Pears
- Lettuce
- Dbl Crop Lettuce/Durum Wht
- Watermelons
- Switchgrass
- Asparagus
- Carrots
- Strawberries
- Pumpkins
- Squash
- Cabbage
- Peppers
- Dbl Crop Soybeans/Oats
- Hops
- Mint
- Pomegranates
- Dbl Crop Lettuce/Cotton
- Mustard
- Plums
- Dbl Crop Barley/Sorghum
- Broccoli
- Radishes
- Garlic
- Speltz
- Vetch
- Apricots
- Caneberries
- Greens
- Nectarines
- Cucumbers
- Other Small Grains
- Turnips
- Dbl Crop Lettuce/Cantaloupe
- Camelina
- Cauliflower
- Rape Seed
- Honeydew Melons
- Celery
- Dbl Crop Durum Wht/Sorghum
- Eggplants
- Gourds
- Dbl Crop Lettuce/Barley

Non-Agriculture

- Forest
- Shrubland
- Developed
- Wetlands
- Water
- Barren
- Perennial Ice/Snow

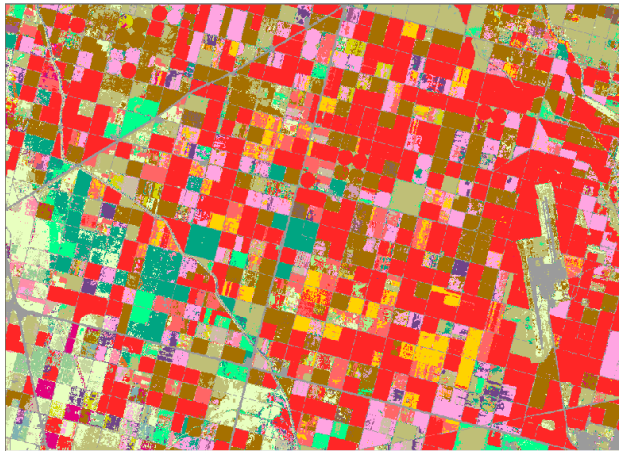
States to Analyze



California

Cotton
Corn
Almonds
Grapes
Alfalfa
Pistachios
Winter Wheat

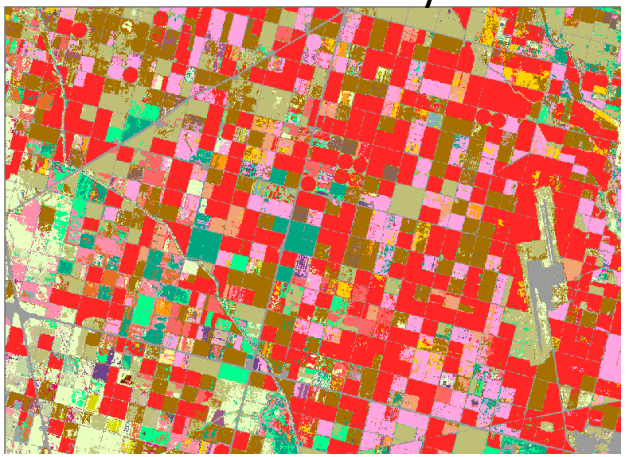
Landsat & DMC



		Producer	User
ALL CROPS	★	85%	
Corn	★	91%	90%
Rice	★	99%	99%
Cotton	★	97%	95%
W. Wheat	★	85%	88%
Alfalfa	★	93%	90%
Fallow/Idle	★	79%	73%

211 bands – North
215 bands – South

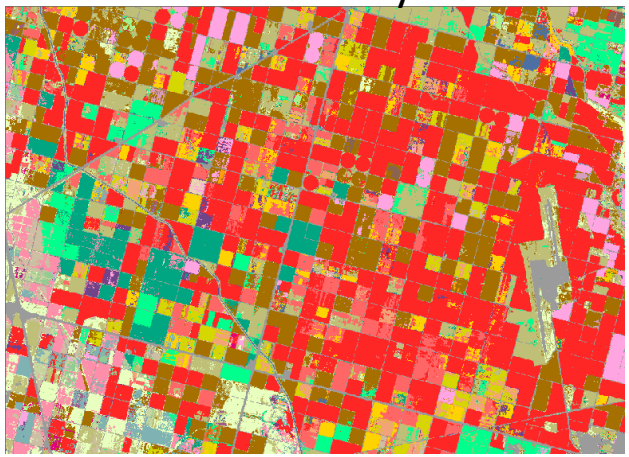
Landsat Only



		Producer	User
ALL CROPS		83%	
Corn		89%	89%
Rice	★	99%	99%
Cotton		96%	91%
W. Wheat		83%	86%
Alfalfa		92%	89%
Fallow/Idle		76%	68%

151 bands – North
135 bands – South

DMC Only

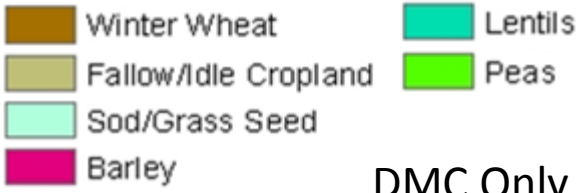


		Producer	User
ALL CROPS		76%	
Corn	★	91%	90%
Rice	★	99%	99%
Cotton	★	97%	95%
W. Wheat		84%	80%
Alfalfa		93%	82%
Fallow/Idle		79%	45%

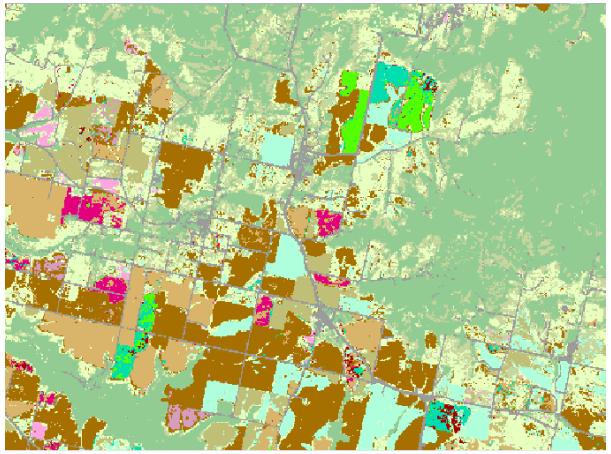
99 bands – North
93 bands – South

★ Highest Accuracy

Washington



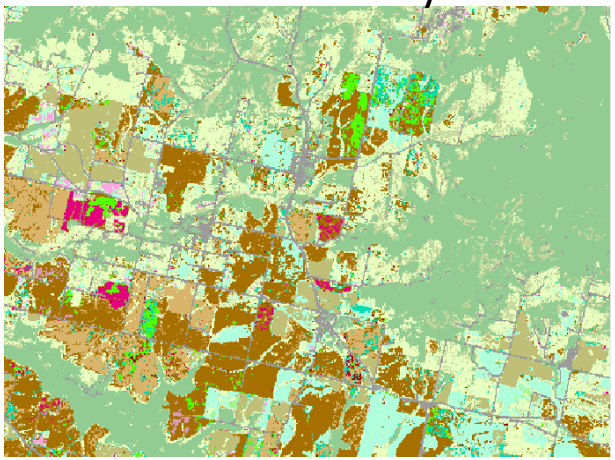
Landsat & DMC



	Producer	User
ALL CROPS ★	92%	
Corn	89%	94%
W. Wheat ★	98%	97%
S. Wheat	92%	93%
Alfalfa	84%	88%
Peas ★	88%	87%
Fallow/Idle ★	97%	97%

179 bands

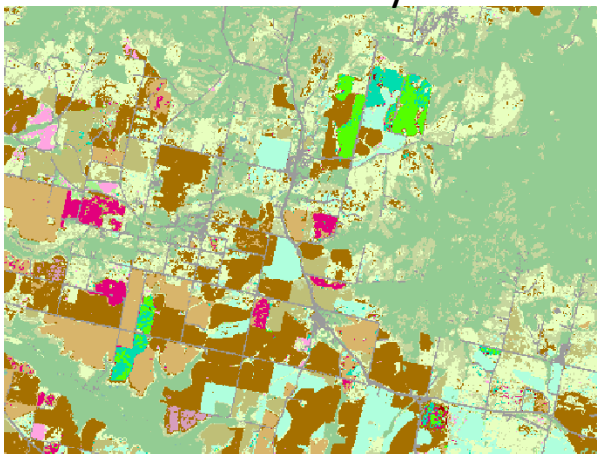
Landsat Only



	Producer	User
ALL CROPS	89%	
Corn	80%	89%
W. Wheat	97%	94%
S. Wheat	84%	88%
Alfalfa	82%	87%
Peas	79%	82%
Fallow/Idle ★	97%	97%

136 bands

DMC Only



	Producer	User
ALL CROPS ★	92%	
Corn ★	92%	93%
W. Wheat ★	98%	97%
S. Wheat ★	93%	93%
Alfalfa ★	85%	89%
Peas	87%	86%
Fallow/Idle ★	97%	97%

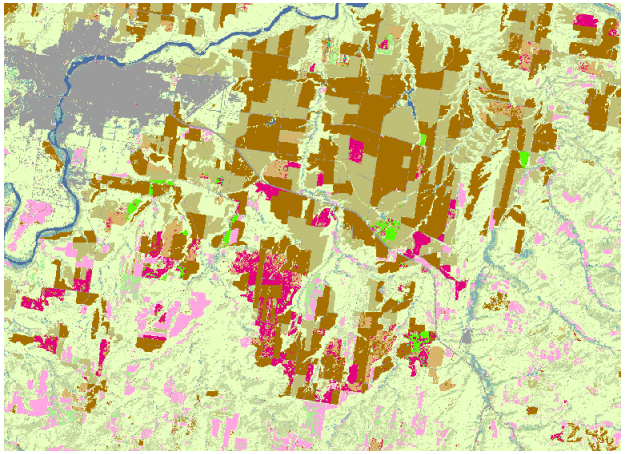
81 bands

★ Highest Accuracy

Montana

- Barley
- Winter Wheat
- Fallow/Idle Cropland
- Alfalfa
- Peas

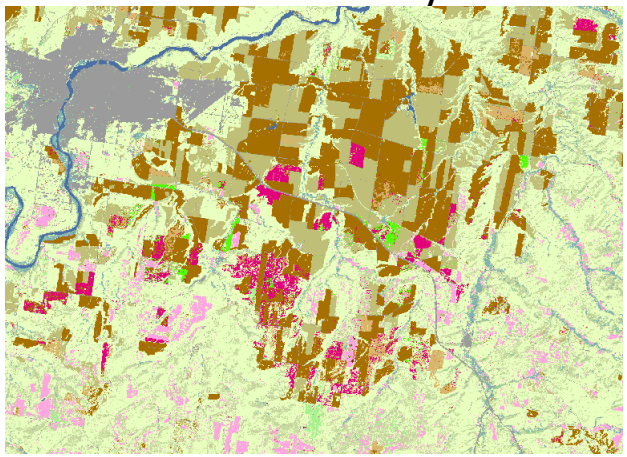
Landsat & DMC



	Producer	User
ALL CROPS ★	72%	
Fallow/Idle ★	90%	90%
W. Wheat ★	90%	92%
S. Wheat ★	86%	83%
Alfalfa ★	60%	63%
Other Hay	21%	38%
Barley ★	66%	77%

181 bands

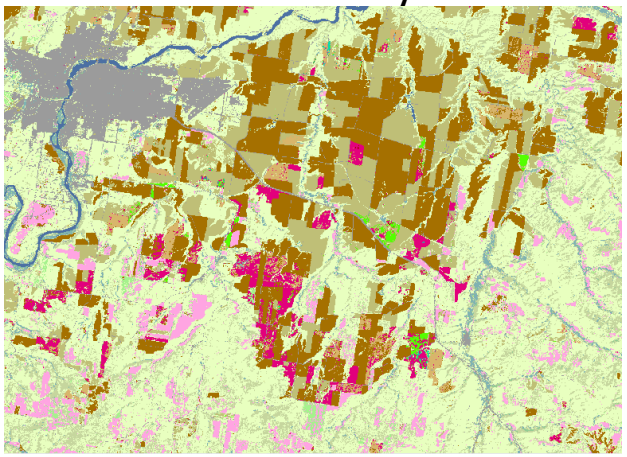
Landsat Only



	Producer	User
ALL CROPS	67%	
Fallow/Idle	89%	88%
W. Wheat	87%	87%
S. Wheat	81%	78%
Alfalfa	56%	58%
Other Hay	19%	35%
Barley	57%	70%

133 bands

DMC Only



	Producer	User
ALL CROPS	69%	
Fallow/Idle	89%	88%
W. Wheat	89%	91%
S. Wheat	84%	81%
Alfalfa	58%	60%
Other Hay	19%	34%
Barley	64%	74%

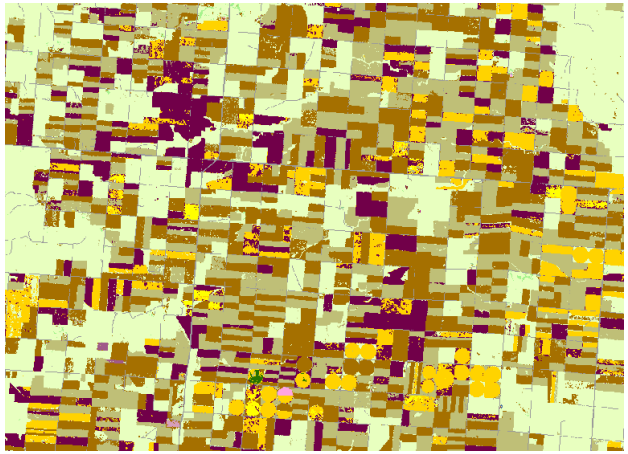
48 bands

★ Highest Accuracy

Colorado

Millet
Winter Wheat
Fallow/Idle Cropland
Corn

Landsat & DMC



	Producer	User
ALL CROPS ★	81%	
Corn	91%	93%
W. Wheat ★	90%	95%
Potatoes ★	87%	93%
Fallow/Idle ★	83%	89%
Barley ★	78%	74%
Millet ★	80%	72%

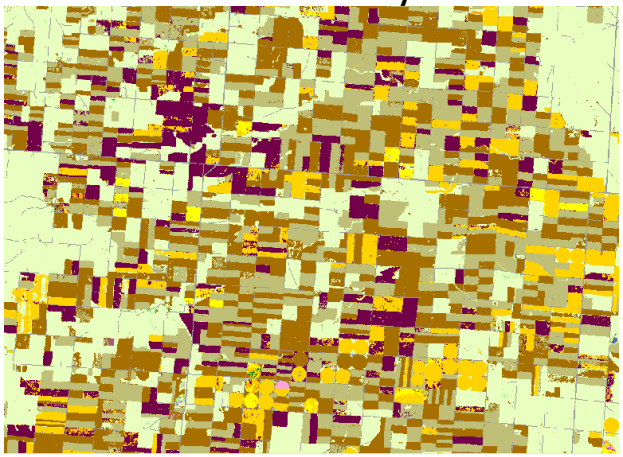
140 bands

Landsat Only

Not enough bands available

	Producer	User
ALL CROPS		
Corn		
W. Wheat		
Potatoes		
Fallow/Idle		
Barley		
Millet		

DMC Only

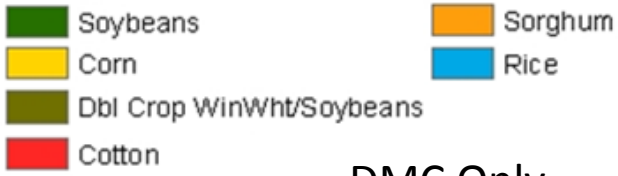


	Producer	User
ALL CROPS ★	81%	
Corn ★	92%	92%
W. Wheat	90%	93%
Potatoes	82%	98%
Fallow/Idle	83%	88%
Barley	73%	78%
Millet	71%	79%

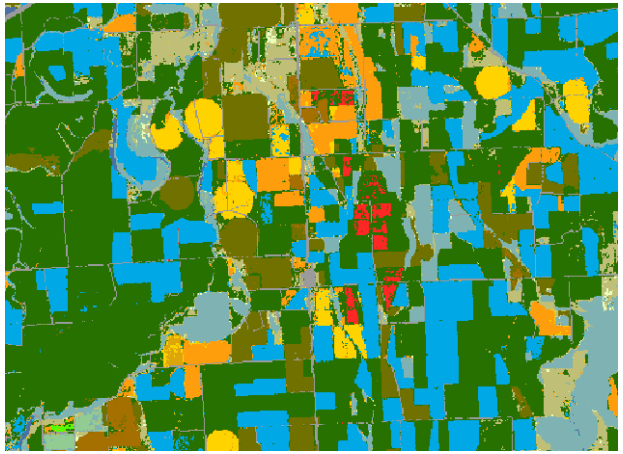
66 bands

★ Highest Accuracy

Arkansas



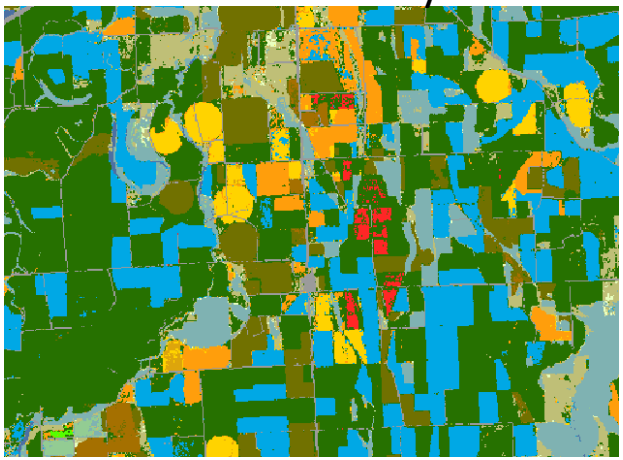
Landsat & DMC



		Producer	User
ALL CROPS	★	92%	
Corn	★	92%	95%
Rice	★	97%	98%
Cotton		94%	94%
Soybeans	★	95%	94%
WW & Soy	★	90%	84%
Sorghum		65%	90%

217 bands

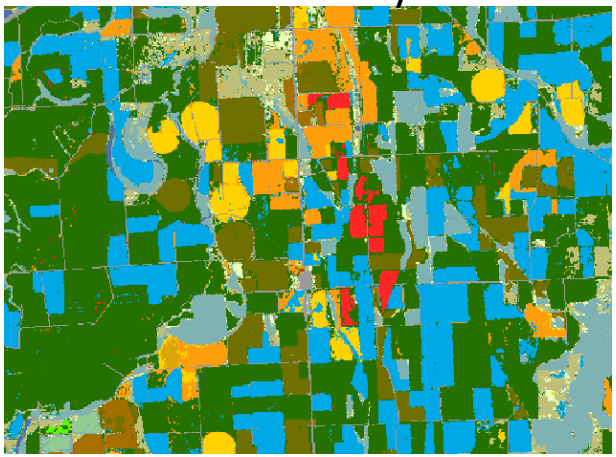
Landsat Only



		Producer	User
ALL CROPS		89%	
Corn		91%	94%
Rice	★	97%	98%
Cotton		94%	93%
Soybeans		94%	93%
WW & Soy		68%	82%
Sorghum		62%	82%

178 bands

DMC Only



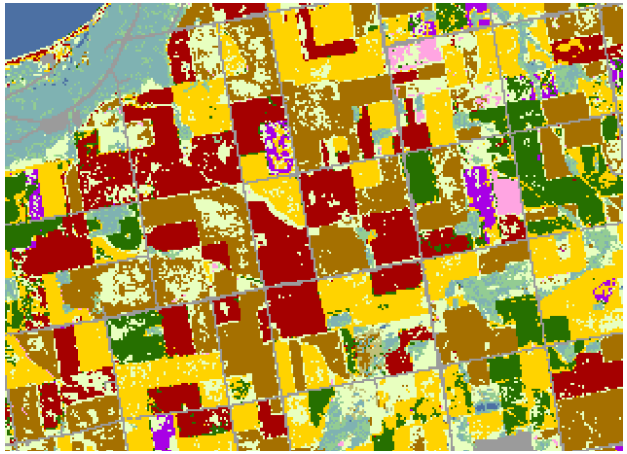
		Producer	User
ALL CROPS		90%	
Corn	★	92%	94%
Rice		96%	97%
Cotton	★	95%	96%
Soybeans		94%	93%
WW & Soy		71%	77%
Sorghum	★	68%	90%

102 bands

★ Highest Accuracy

Michigan

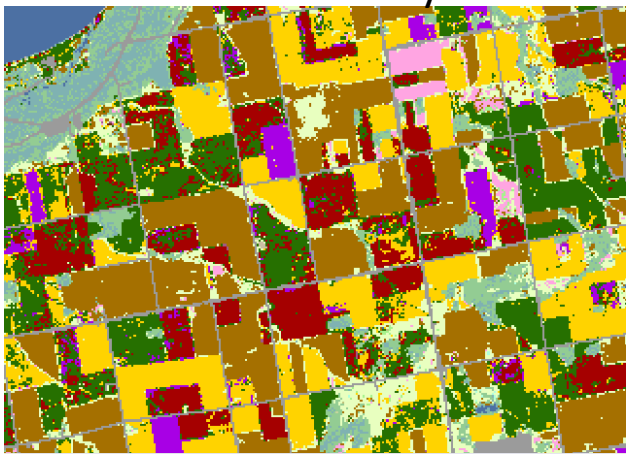
Landsat & DMC



	Producer	User
ALL CROPS ★	91%	
Corn ★	96%	96%
Soybeans	96%	96%
Win. Wheat ★	97%	95%
Dry Beans ★	81%	95%
Sugarbeets ★	94%	93%
Potatoes ★	84%	93%

174 bands

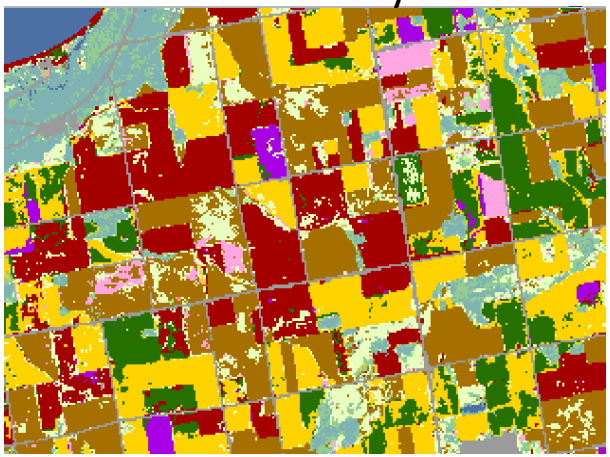
Landsat Only



	Producer	User
ALL CROPS	87%	
Corn	93%	94%
Soybeans	94%	93%
Win. Wheat	96%	92%
Dry Beans	80%	77%
Sugarbeets	86%	88%
Potatoes	76%	85%

115 bands

DMC Only



	Producer	User
ALL CROPS	88%	
Corn	94%	93%
Soybeans ★	97%	93%
Win. Wheat	96%	92%
Dry Beans	79%	79%
Sugarbeets	85%	89%
Potatoes	77%	86%

75 bands

★ Highest Accuracy

North Carolina

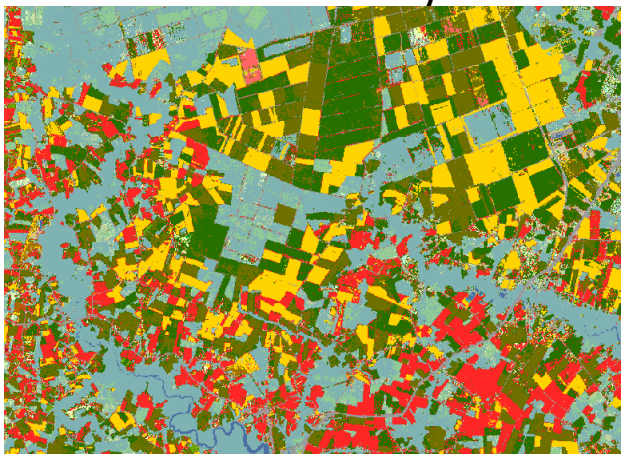
- Corn
- Dbl Crop WinWht/Soybeans
- Cotton
- Soybeans

Landsat & DMC

	Producer	User
ALL CROPS ★	82%	
Corn	94%	92%
Cotton ★	96%	94%
Soybeans ★	85%	84%
WW/Soy ★	94%	88%
Pasture	67%	68%
Peanuts ★	87%	93%

118 bands

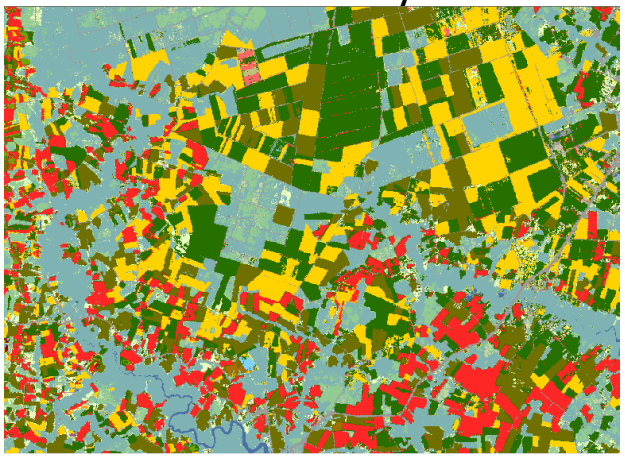
Landsat Only



	Producer	User
ALL CROPS	69%	
Corn	83%	82%
Cotton	91%	85%
Soybeans	63%	71%
WW/Soy	80%	82%
Pasture	59%	44%
Peanuts	71%	90%

73 bands

DMC Only



	Producer	User
ALL CROPS ★	82%	
Corn ★	95%	92%
Cotton ★	96%	94%
Soybeans	84%	83%
WW/Soy ★	94%	88%
Pasture ★	67%	69%
Peanuts	82%	91%

66 bands

★ Highest Accuracy

Thank You!

Audra Zakzeski
USDA - NASS
3251 Old Lee Hwy, Room 305
Fairfax, VA 22030
Audra_Zakzeski@nass.usda.gov