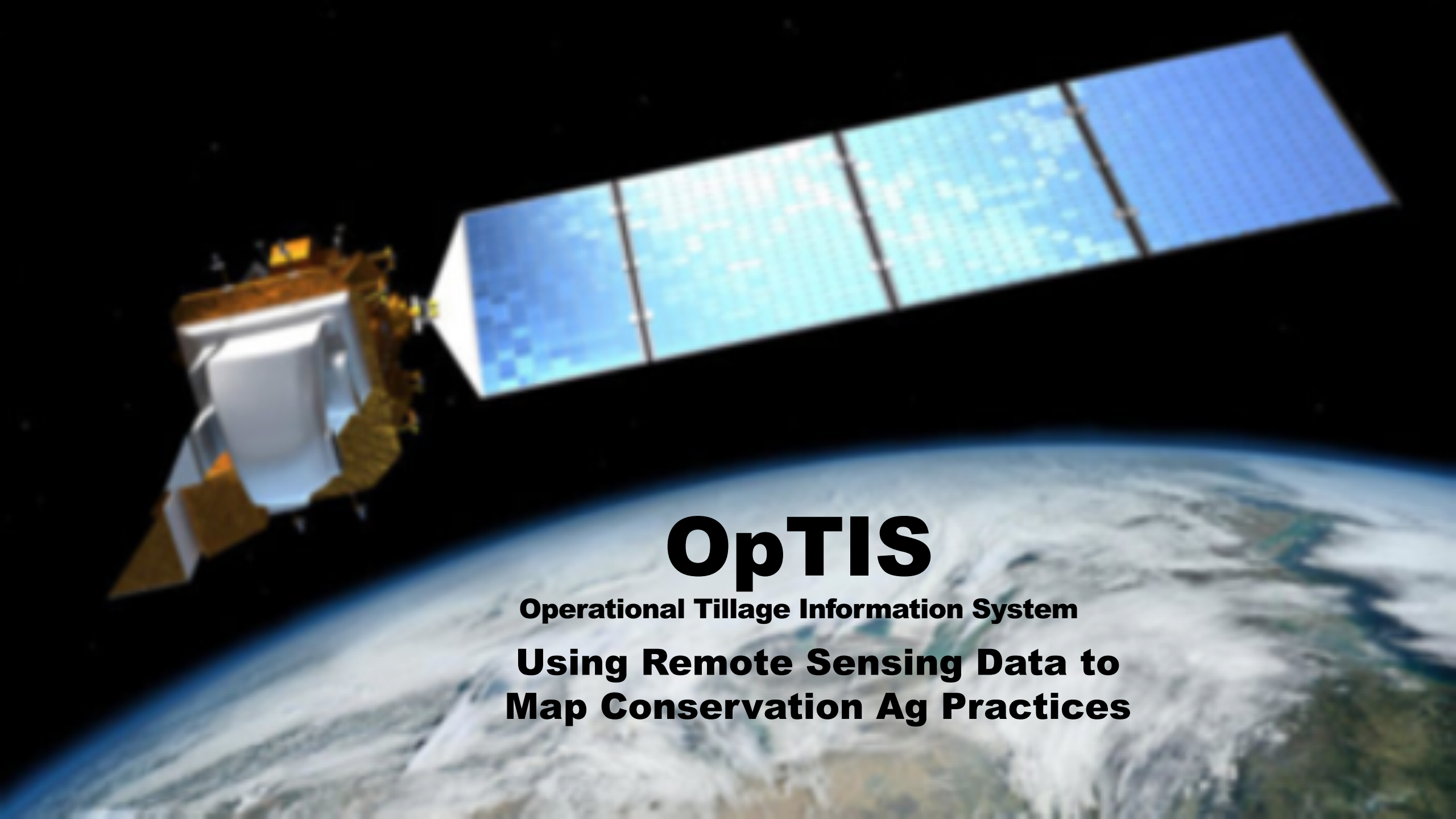


OpTIS

Operational Tillage Information System

Using Remote Sensing Data to Map Conservation Ag Practices

Project Partners

Applied · Geosolutions

Applied GeoSolutions (AGS)

- Steve Hagen & Bill Salas

Conservation Technology Information Center

Conservation Technology Information Center (CTIC)

- Dave Gustafson

The Nature Conservancy

The Nature Conservancy (TNC)

- Pipa Elias

OpTIS: Multiple Past & Current Co-Sponsors

Outline

What is OpTIS?

Possible applications

Phase 1 Data Release

Phase 2 Plans

OpTIS: What is it?

Applied · Geosolutions

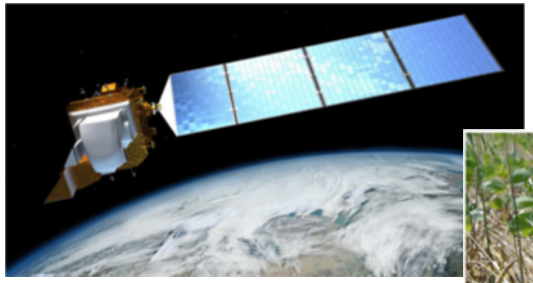
Technology from Applied GeoSolutions

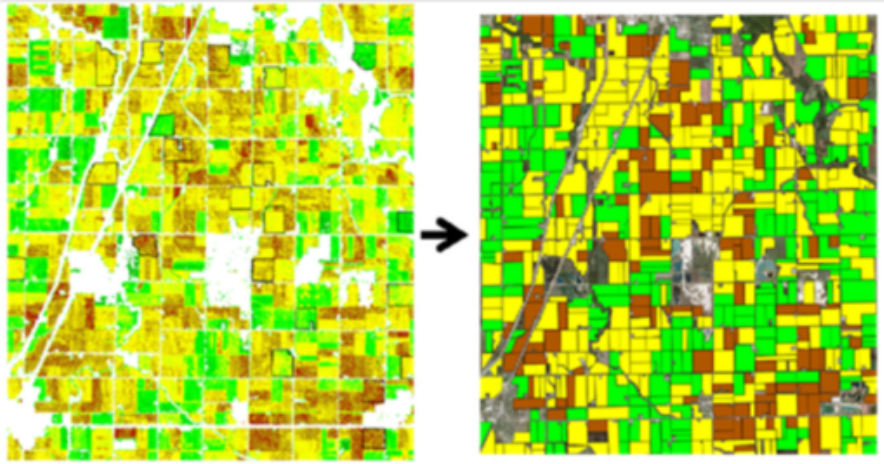
Uses publicly-available remote sensing data to map & monitor adoption of tillage practices and cover crops

Unlike CRM, OpTIS data are “longitudinal,” making multi-year products possible (e.g. include crop rotation overlays, etc.)

Calculations at field-scale (30 m), but released only at HUC8 and CRD geographic scales (grower privacy fully respected)

Data freely available at ctic.org/OpTIS





OpTIS Data: Details

- Tillage categories
- Residue cover levels
- Winter cover types
- Soil Health metrics
- DNDC estimates
- Years: 2005-2018
- Publication plans

CRM Survey Data (Legacy)	No-Till	Ridge-Till	Mulch Till	Reduced Tillage *(low residue)*	Conventional Tillage
Residue Level	>30%			15-30%	<15%
	Conservation Tillage				
NRCS (approximate)	329	345			
OpTIS	No-Till	Reduced Tillage (Corn) No-Till (other crops)		Reduced Tillage *(low residue)*	Conventional Tillage
Residue Level	>50%	30-50%		15-30%	<15%
	Conservation Tillage				
NRCS (approximate)	329	345			

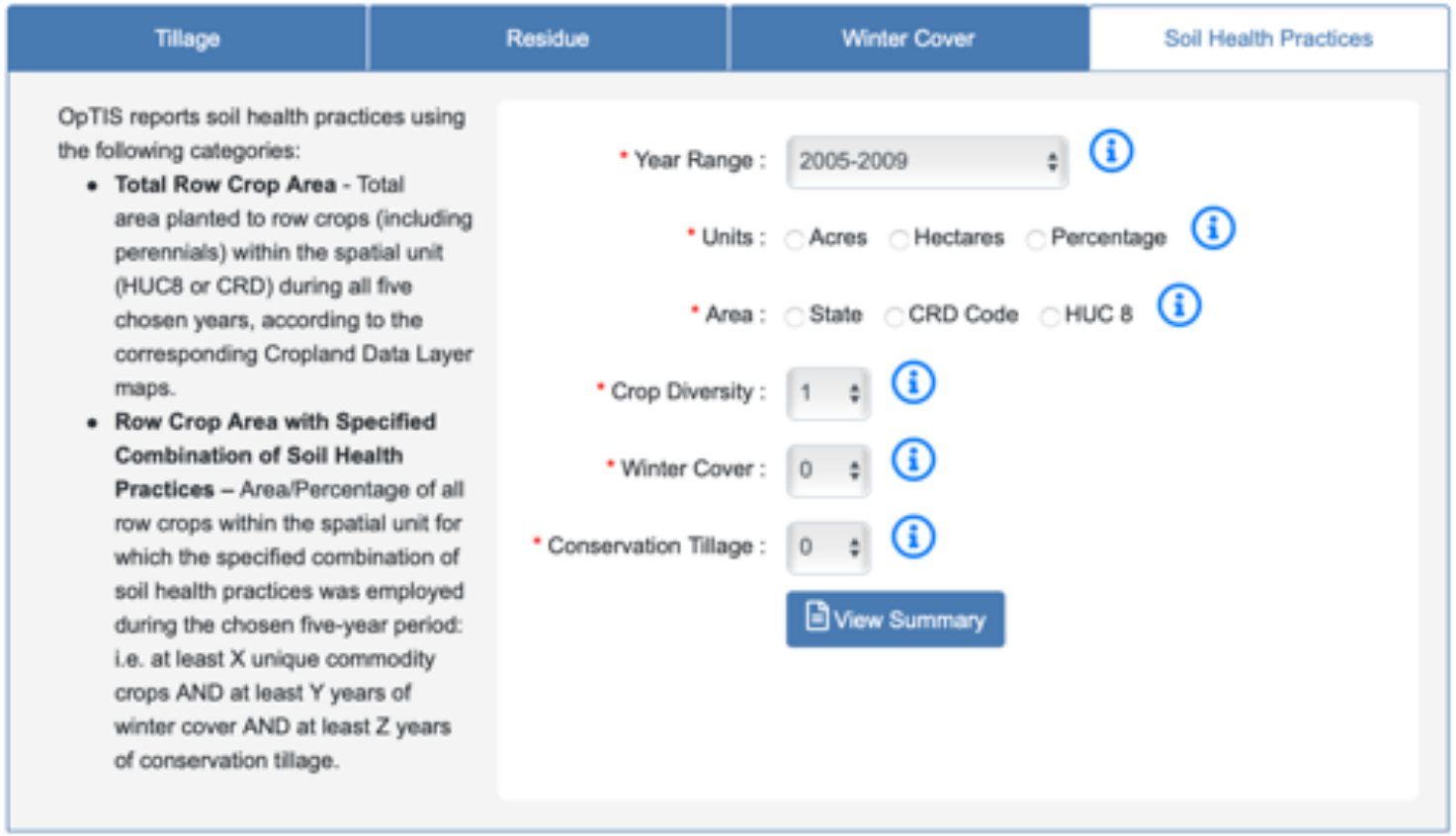
Data reported by previous year's crop (corn, soy, small-grain, other)
Land not planted to row crops (e.g. pasture) is excluded

- Comparison with other estimation methods underway

OpTIS: Soil Health Metrics

Five-year moving window

Select area having at least X unique commodity crops AND at least Y years of winter cover AND at least Z years of conservation tillage – over 5 years



OpTIS: Possible Applications

Phase 1 Release is >1 Billion Acre-Years of Data

Measure Soil Health baselines and trends

Input to Water Quality models (local and basin-scale)

Input to Biogeochemical models (e.g. DayCent, DNDC, etc.) to estimate GHG emissions, Soil Carbon, Nitrate losses …

Target Conservation efforts

Provide verification data for Ecosystem Services Markets

And many others … (e.g. Biodiversity, etc.)

Outline

What is OpTIS?

Possible applications

Phase 1 Data Release

Phase 2 Plans

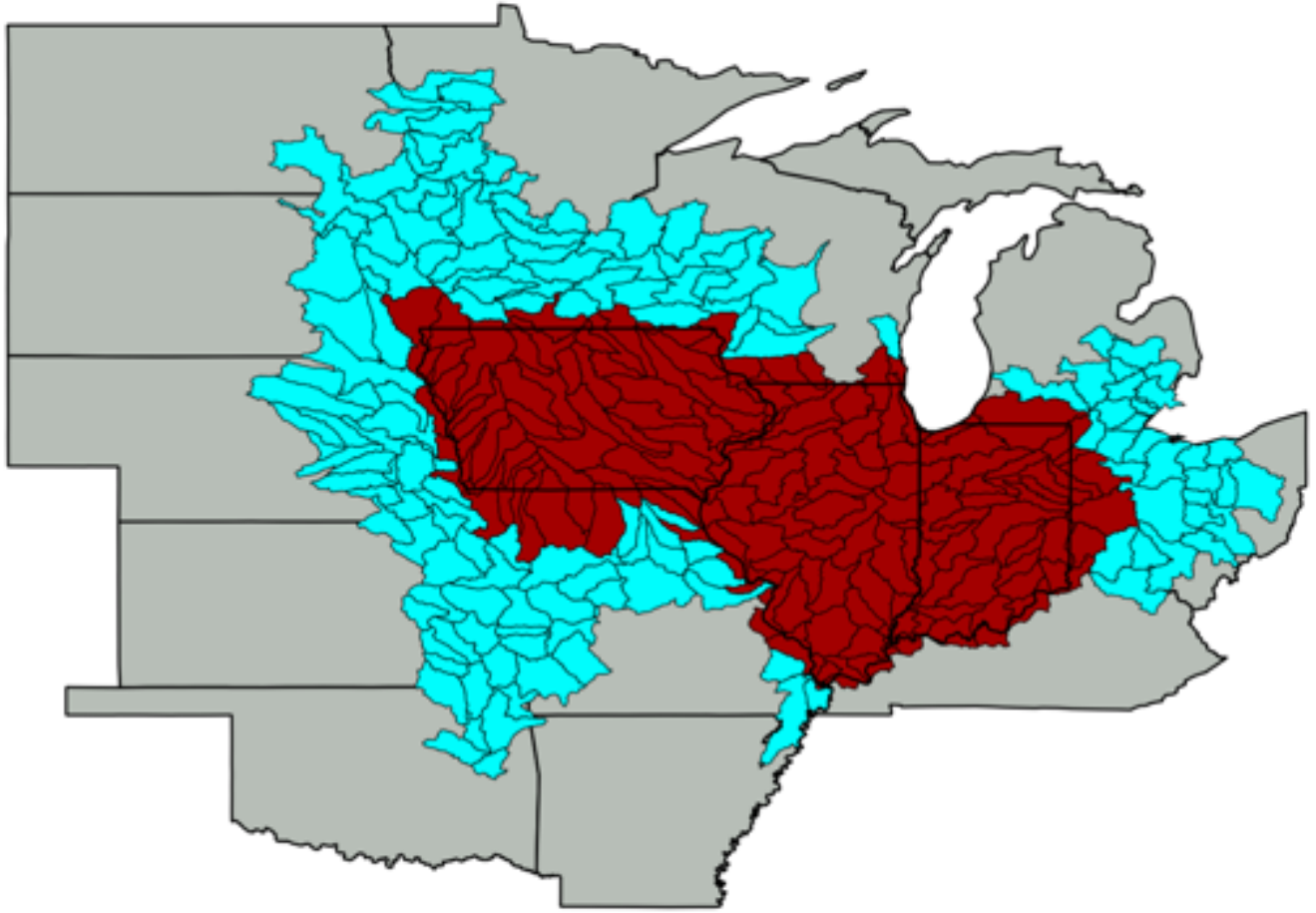
Phase 1 Data Schedule

OpTIS tillage, winter cover, and soil health metrics:

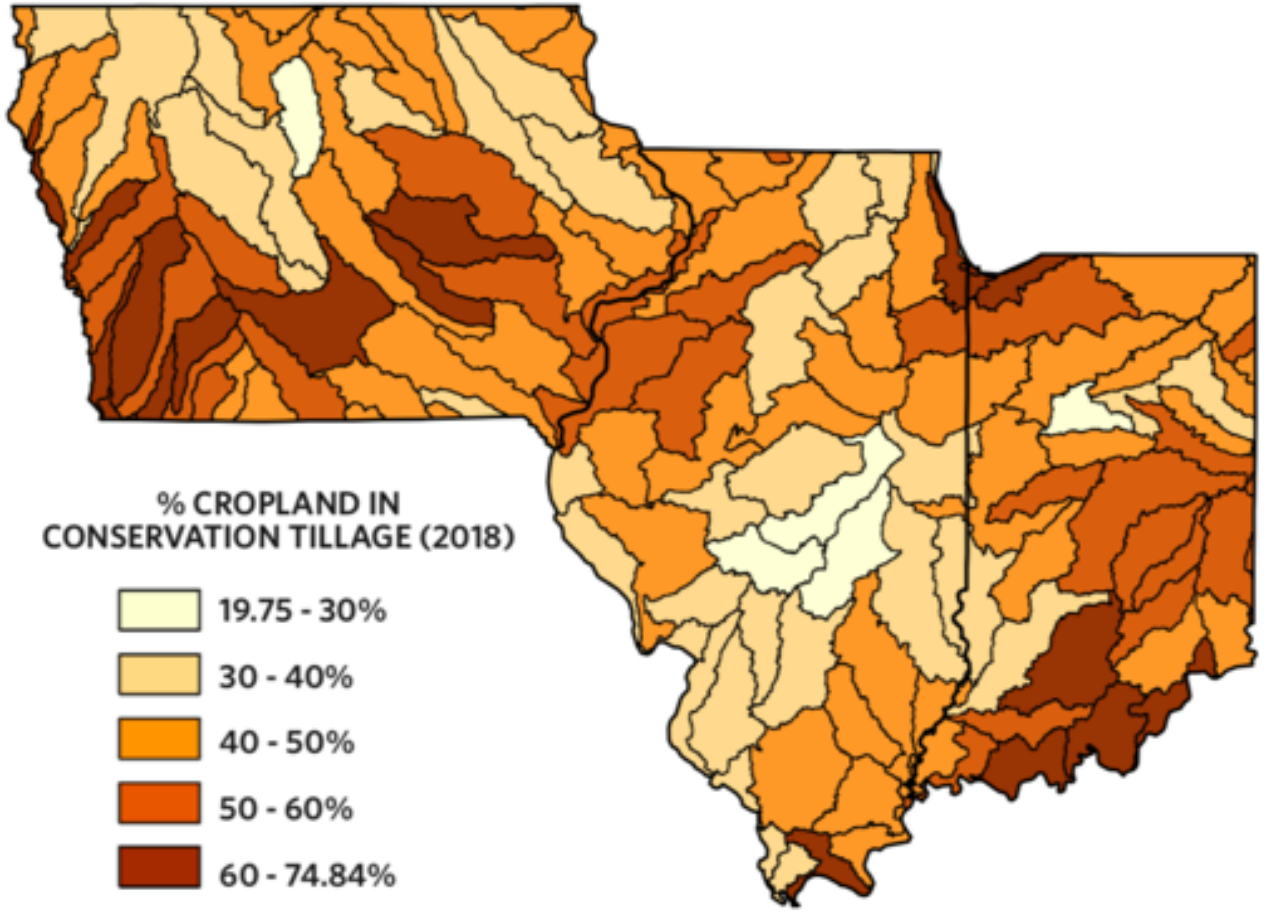
- **Illinois, Indiana, Iowa – Released July 16**
- **Remaining Corn Belt – End July**

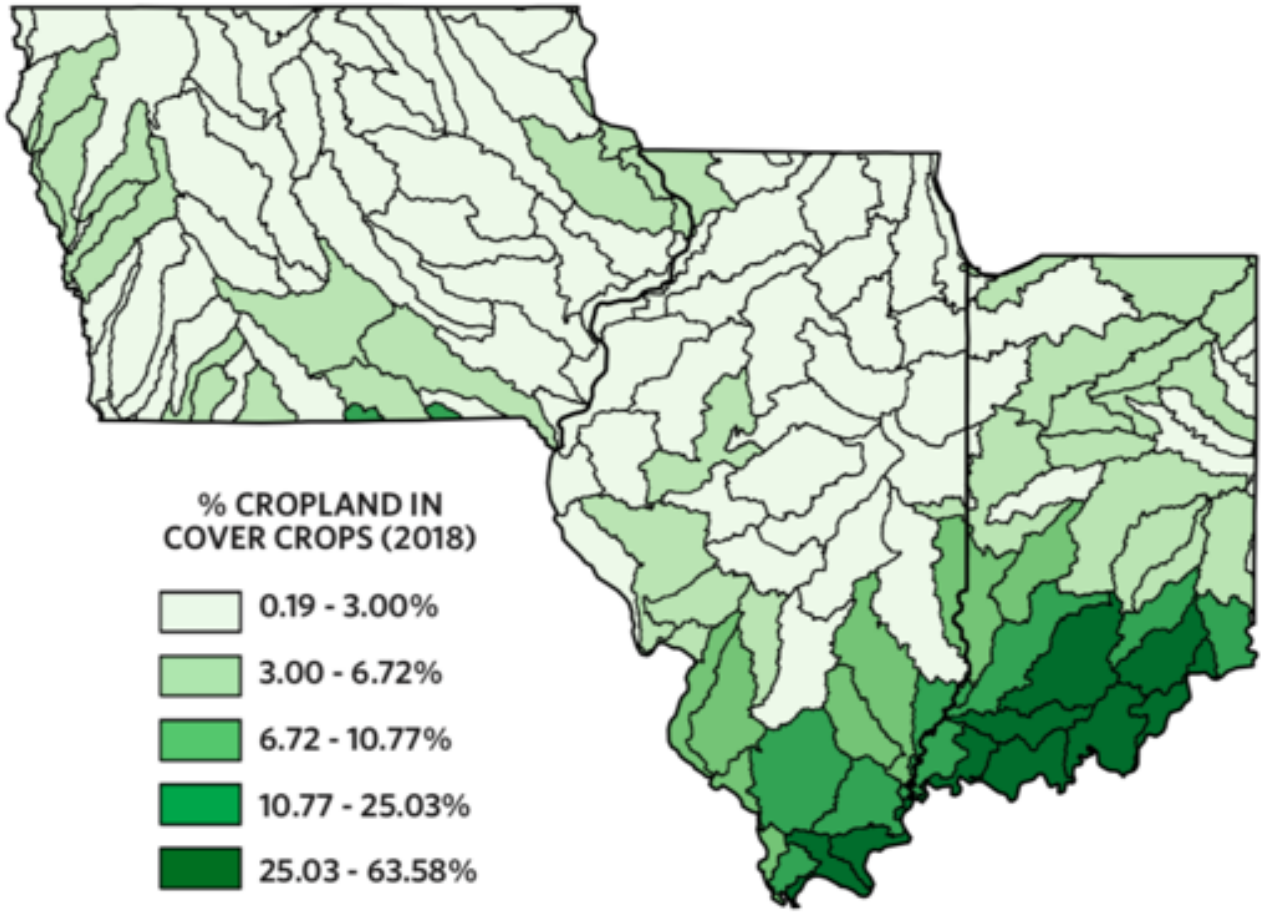
DNDC modeling results – N_2O, SOC, Nitrates, Soil Moisture Holding Capacity:

- **End August**

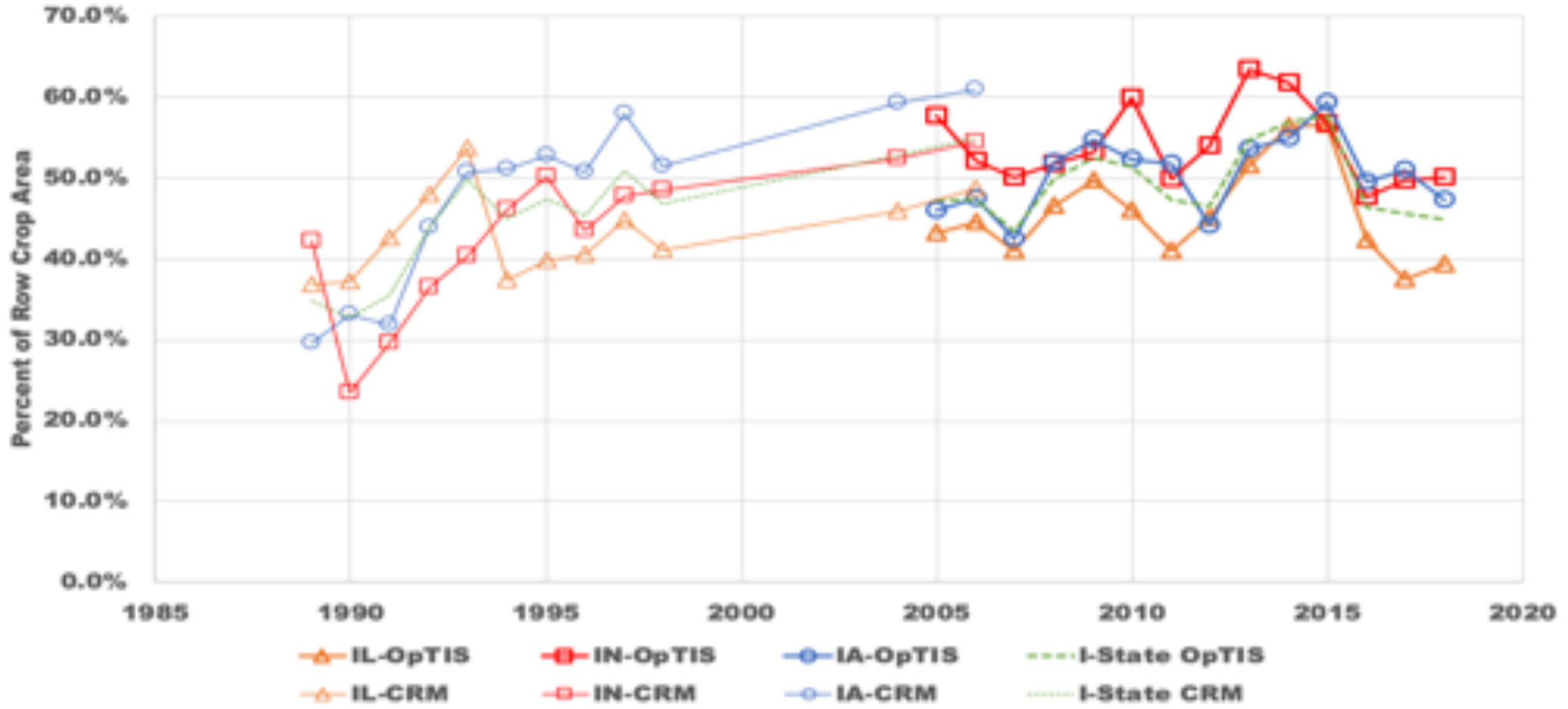


Current OpTIS Data: HUC8 Scale

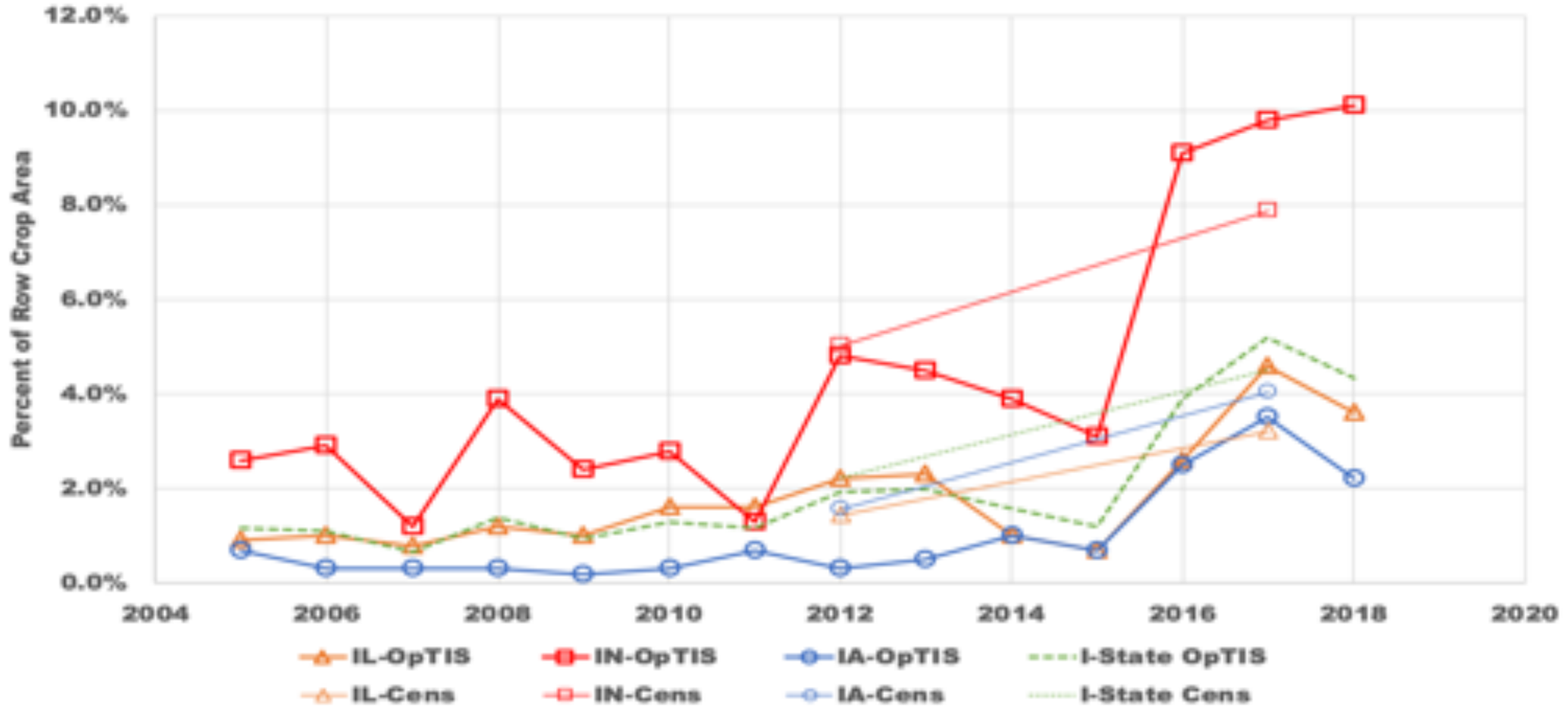




I-State Conservation Tillage Trends (CRM & OpTIS Data)



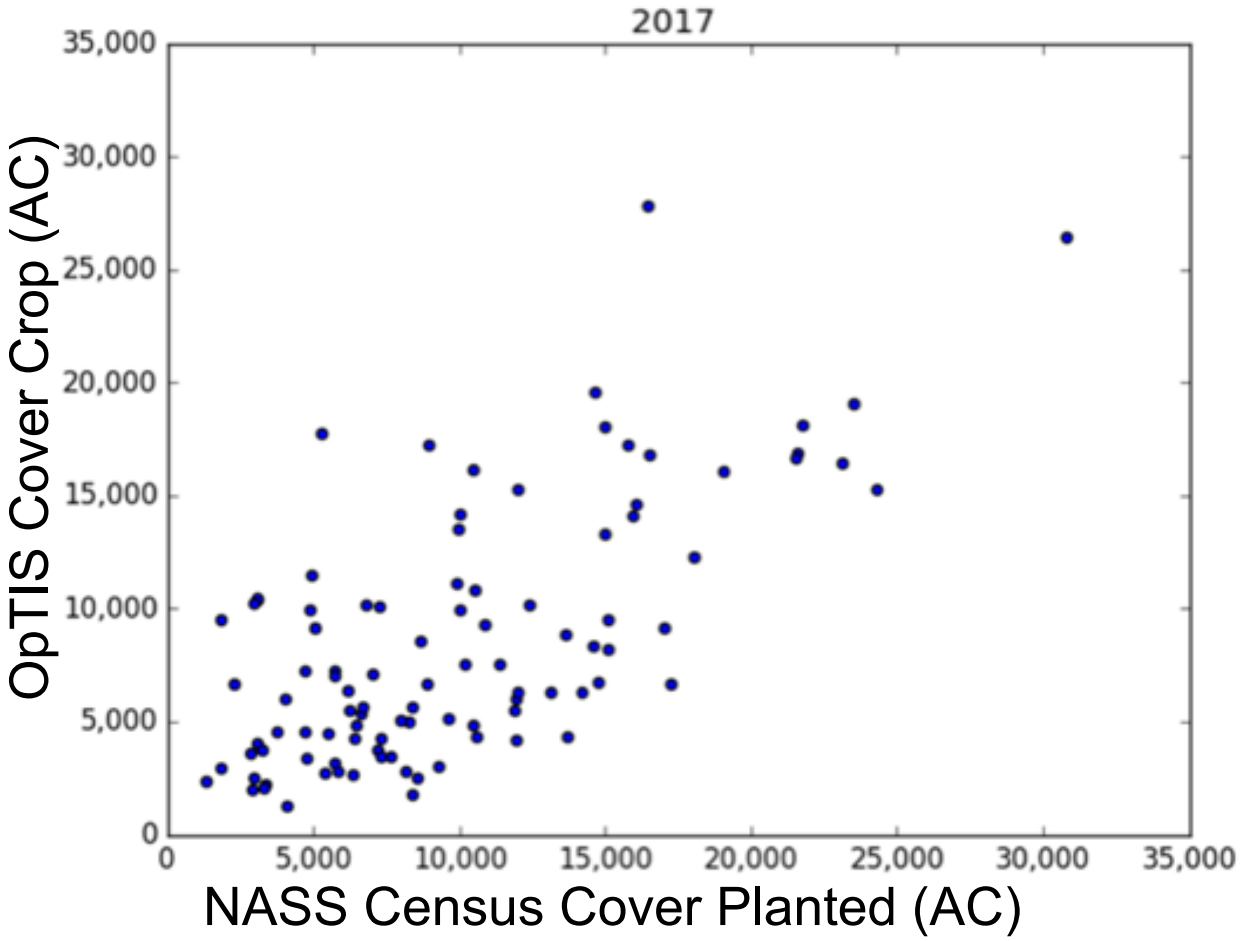
I-State Cover Crop Trends (AgCensus & OpTIS Data)



IA County-level OpTIS Data & USDA NASS AgCensus (2017)

Cover Crops:

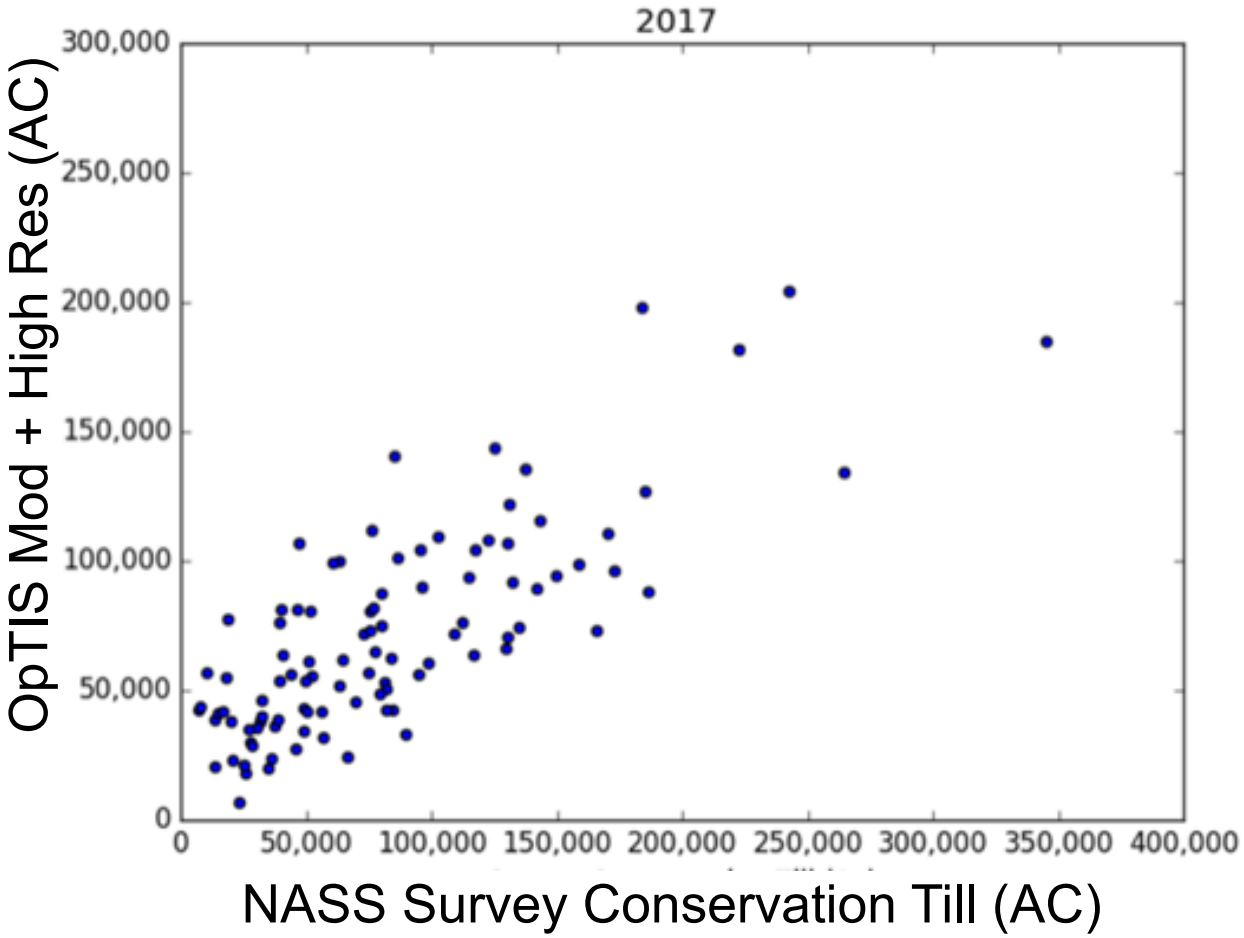
- Moderate correlation between OpTIS and NASS ($R^2 = 0.5$)
- 24.1 million acres analyzed in Iowa
- Acres in cover crops:
  - NASS – 973,000 acres
  - OpTIS – 846,000 acres



IA County-level OpTIS Data & USDA NASS AgCensus (2017)

Conservation Tillage:

- Moderate to high correlation between OpTIS & NASS ($R^2 = 0.6$)
- 24.1 million acres analyzed in Iowa
- Acres in con-till:
  - NASS – 8.2 million
  - OpTIS – 7.1 million



Phase 2 Plans

Add key geographies outside Corn Belt (e.g. Chesapeake, Mississippi Delta, Far West, Great Plains, Southeast, etc.)

Annual updates for 2019 and beyond

Partner more extensively with States

Fund via new Public-Private Partnership, consider direct involvement of USG entities with higher resolution data

Questions?

THANK YOU!

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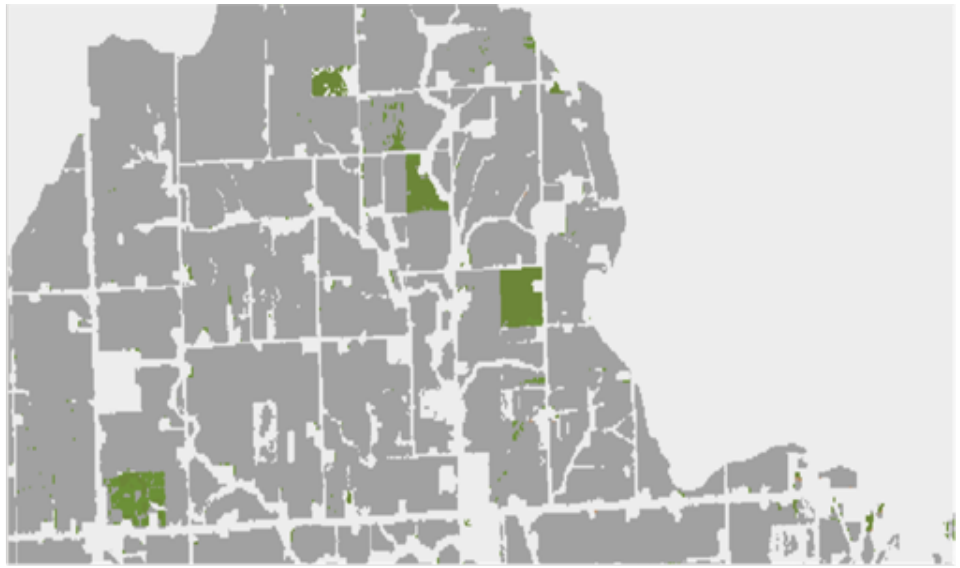
Back-up Slides

Field Data Comparison

- Validation/comparison with Field observations (~500 in Iowa) – Preliminary Results
  - Residue cover – R^2 of 0.42
  - Winter cover - 89% agreement, 0.678 Kappa – preliminary

  - Cereal rye cover crop example from 2018 in Howard County, IA



Green areas are identified as winter cover by OpTIS

DOY 119 2017

DOY 131 2017