OpTIS
Operational Tillage Information System
Using Remote Sensing Data to Map Conservation Ag Practices
Dave Gustafson | April 9, 2019 | Sacramento
Outline

Brief intro to CTIC
CTIC’s historical conservation tillage data: CRM
New ecosystem market initiatives (e.g. EPA, ESMC)
OpTIS
  ◦ What is it?
  ◦ Possible applications
  ◦ Next steps
CTIC: The Mission

CTIC connects, champions and provides information on sustainable agricultural systems and technologies that are productive, profitable and preserve natural resources.
CTIC: What we do

Formed in 1982 as a public-private partnership involving NACD and several major ag companies & organizations

Historically known primarily as the source of US conservation tillage data

Now leading major soil and water conservation projects funded primarily by EPA and NRCS

On Aug 21-22, CTIC will be hosting its 12th annual Conservation in Action tour, this year in the Des Moines area
CTIC: Who We Are

Mike Komp
Executive Director

Crystal Hatfield
Operations Director

Mike Smith
Project Director

Sue Tull
Project Manager

Dave Gustafson
Project Director

Hans Kok
Project Director

Steve Werblow
Communications Director

Full-Time Staff

Contractors
CTIC Board of Directors

Sean Arians, Bayer CropScience
Kellie Bray, CropLife America
Hunter Carpenter, Agricultural Retailers Association
Larry Clemens, The Nature Conservancy
Brooks Coetzee, Corteva Agriscience
Nathan Fields, National Corn Growers Association
Sarah Fox, Nutrien
Peyton Harper, The Fertilizer Institute
Adam Herges, Mosaic
Darian Landolt, Case IH
Tim Palmer, NACD
Heidi Peterson, IPNI
Luther Smith, Certified Crop Advisers

Executive Committee
Terry Tindall, Simplot (Chair)
Mark Schmidt, John Deere (Vice-Chair)
Mark White, Syngenta (Treasurer)

Ex-Officio Members
Mike Komp, CTIC ED
Jeremy Peters, NACD ED

Board Member Emeritus
Dick Foell
CRM Survey Tillage Data

Crop Residue Management (CRM) survey, conducted by USDA-NRCS from 1989 to 2004

Estimated crop residue and tillage at the county scale

Tedious transect method of data collection eventually became unsustainable

Available at www.ctic.org
New EPA WQ Trading Policy

Encourages use of local water quality trading market approaches

Such approaches will require a cost-effective method for validating the adoption of agricultural conservation practices
OpTIS: What is it?

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 available (FREE!) at www.ctic.org
OpTIS: Multiple Past & Current Co-Sponsors
OpTIS Data: Details

<table>
<thead>
<tr>
<th>Tillage categories</th>
<th>Residue cover levels</th>
<th>Winter cover types</th>
<th>Soil Health metrics</th>
<th>DNDC estimates</th>
<th>Future years</th>
<th>Publication plans</th>
<th>Comparison with other estimation methods underway</th>
</tr>
</thead>
</table>

### CRM Survey Data (Legacy)

<table>
<thead>
<tr>
<th>Residue Level</th>
<th>No-Till</th>
<th>Ridge-Till</th>
<th>Mulch Till</th>
<th>Reduced Tillage (low residue)</th>
<th>Conventional Tillage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;30%</td>
<td></td>
<td></td>
<td></td>
<td>15-30%</td>
<td>&lt;15%</td>
</tr>
</tbody>
</table>

#### NRCS (approximate)

<table>
<thead>
<tr>
<th>Residue Level</th>
<th>No-Till</th>
<th>Reduced Tillage (Corn)</th>
<th>Reduced Tillage (low residue)</th>
<th>Conventional Tillage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50%</td>
<td></td>
<td>30-50%</td>
<td>15-30%</td>
<td>&lt;15%</td>
</tr>
</tbody>
</table>

#### OpTIS

<table>
<thead>
<tr>
<th>Residue Level</th>
<th>No-Till</th>
<th>Reduced Tillage (other crops)</th>
<th>Reduced Tillage (low residue)</th>
<th>Conventional Tillage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50%</td>
<td></td>
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</tr>
</tbody>
</table>

Data reported by previous year’s crop (corn, soy, small-grain, other)

Land not planted to row crops (e.g. pasture) is excluded
OpTIS: Indiana Pilot

Verified OpTIS automatic processing method for an important ag state

“Ground-truthed” using 10 years of CRM-style tillage-transect data (2005-2014)

Report available at www.optis.ags.io
OpTIS: Possible Applications

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 and changes in **Soil Carbon**

Targeting **Conservation** efforts

Provide validation data for **Ecosystem Services Markets**

And many others … (e.g. **Biodiversity**, etc.)
OpTIS: Next Steps

Phase 1: Corn Belt 2005-2017 (data release April-June 2019)

Phase 2: Nationwide (timing TBD)

CTIC is now collaborating with others on *N-Gage*, use of OpTIS data to support water quality trading within the MRB
How to learn more

www.ctic.org

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gustafson@ctic.org
Back-up Slides
**N-Gage: Achieving Mississippi River Basin Conservation Goals**

Leverage OpTIS data as a validation tool for supporting local-scale water quality trading programs in the MRB

Unique linkage of OpTIS data to SWAT model representations of watersheds of interest

Nutrient application rates estimated based on publicly-available data on cropping patterns and crop yields

Accuracy will be assessed using relevant WQ data

Six-month effort, planned project launch is April 2019 (to coincide with OpTIS Phase 1 data release)
**N-Gage: Key Outcome**

Once this validation tool is available, it will be a key enabling technology for the development of self-sustaining, local-scale, market-based approaches for improving water quality throughout the MRB – and eventually beyond.
New Ecosystem Services Market Consortium (ESMC)

Includes ADM, Bunge, Cargill, General Mills, Indigo Agriculture, Mars, McDonald’s, Noble Research Institute, Soil Health Institute and The Nature Conservancy

Science-based tools to track ag improvements in soil health, GHG, water quality, and water use
OpTIS: Anticipation is Building

Stakeholder feedback collected at Soil Health Summit side-event (Jan 15 in St. Louis) co-organized with TNC and AGS

Recent calls held with State of Oklahoma (Feb 11) and US Dairy (Feb 15), both expressed interest in collaboration

Additional parties have now also reached out: C-AGG, Iowa 4R Plus, State of Minnesota, USDA/NRCS, etc.

Presentation at next Hypoxia Task Force meeting (May 16)