The 2007 Cropland Data Layer
NASS Overview

Provider of timely, accurate, and useful statistics in service to U.S. agriculture
Cropland Data Layers
The first decade: 1997 - 2006
Example Statewide CDL

Cropland Data Layer
Oklahoma 2006

Spatial Analysis Research Section
Cropland Data Layer Uses

Within NASS
• Refined state-wide acreage estimates
• Improved county-wide acreage estimates
• Tightened confidence intervals on all survey derived acreage estimates

Outside NASS
• Watershed runoff modeling
• Agribusiness planning
• Ground truth
• Change detection
• Water use mapping
• Epidemiological research
• Habitat monitoring
• Carbon sequestration analysis
• …..and more
Goals for 2007 CDL

- Document/map growing season land cover for majority of the US intensive agricultural area

- Derive large area acreage estimates for two dominant commodities

- Complete by early October

Corn

Soybeans
## Classification Categories

<table>
<thead>
<tr>
<th>Cropland</th>
<th>Non-Cropland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>Water</td>
</tr>
<tr>
<td>Soybeans</td>
<td>Developed</td>
</tr>
<tr>
<td>Winter Wheat</td>
<td>Barren</td>
</tr>
<tr>
<td>Cotton</td>
<td>Woodland</td>
</tr>
<tr>
<td>Spring Wheat</td>
<td>Shrubland</td>
</tr>
<tr>
<td>Sorghum</td>
<td>Grassland</td>
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<tr>
<td>Oats</td>
<td>Wetland</td>
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<tr>
<td>Barley</td>
<td></td>
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<tr>
<td>Rice</td>
<td></td>
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<tr>
<td>Sunflowers</td>
<td></td>
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<tr>
<td>Durum Wheat</td>
<td></td>
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<tr>
<td>Dry Beans</td>
<td></td>
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<tr>
<td>… and more</td>
<td></td>
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</tbody>
</table>
2007 CDL Inputs

- IRS Resourcesat-1 AWiFS Imagery (raw reflectance)
  - Minimum of three scenes during growing season
- NASA MODIS Terra (16-day NDVI composite derivative)
  - Time series of current growing season
  - Fall scenes from previous year
- USGS Ancillary datasets
  - National Land Cover Dataset (NLCD)
    - Impervious
    - Canopy
  - National Elevation Dataset (NED)
    - Elevation
    - Slope
    - Aspect
IRS Resourcesat-1 AWiFS Imagery

740 km swath width

5-day revisit

4 spectral bands
  - green
  - red
  - near-infrared
  - short-wave infrared

56 m ground sample resolution

6 July 2007
AWiFS Imagery Time Series

May 20  

July 2  

July 31
MODIS NDVI Imagery
Image Timing

Crop Progress: Corn in Iowa, 2007
--- 2007, ---- 2002-2006 Average

Crop Progress: Soybeans in Iowa, 2007
--- 2007, ---- 2002-2006 Average

www.nass.usda.gov/research/CropProgress/cpindex.htm
AWiFS vs. MODIS

April

Day later

June

August
Ancillary data – USGS products
Ground truth - agriculture

Farm Service Agency (FSA)
- Common Land Unit (CLU)
- 578 reporting data

NASS June Agricultural Survey (JAS) data still used for acreage estimation
Ground truth – non agriculture

2001 National Land Cover Dataset
Methodology

- Analyze areas by state
- “Stack” AWiFS, MODIS, and ancillary data layers within a raster GIS
  - 56 m grid cells, Albers Conic Equal Area projection
- Sample spatially from stack within known ground truth from FSA (for ag. categories) and NLCD (for non ag. categories)
- Data-mine samples using Boosted Classification Tree Analysis to derive best fitting decision rules
  - implemented with Rulequest See5.0
- Apply derived decision rules back to input data stack
- Create land cover map
- Create probability map
- Assess map accuracy
- Derive acreage estimates
  - utilizing customized SAS routines
Example Classification Subset

CDL Classification

Resourcesat-1 AWiFS, 6 July 2007
Regression-based Acreage Estimator

Acreage not just about counting pixels

NASS Inputs
- June Survey summaries
- Area Sampling Frame
- CDLs

United States Department of Agriculture
National Agricultural Statistics Service
Research and Development Division
Spatial Analysis Research Section
Status – October 2007

- AWiFS data was delivered by early September
- MODIS data was ingested as available
- FSA-based ground truth was obtained mid-August

Land cover classifications completed September 19\textsuperscript{th}

Corn/soybean acreage estimates finished October 1\textsuperscript{st}

- Also working on special 2007 CDLs for
  - California, Louisiana, Michigan and Mississippi
CDL 2008?

- **Expand geographic scope?**
  - Wheat states next priority
  - Mid-Atlantic region (often asked about)

- **Improved categories?**
  - Grassland
    - Pasture (chewed grass)
    - Hay (cut grass)
    - Natural (quasi-native)

- **Imagery?**
  - More frugal use of
  - Future sensors
  - Finer resolution

- **Other ancillary data?**
  - Soils
  - Climate

- **Derivatives?**
  - Change detection
  - Crop rotation patterns
Thank You

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