Research to Operational: A Paradigm Shift for the Cropland Data Layer Program

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NASS Overview

Provider of timely, accurate, and useful statistics in service to U.S. agriculture
Agenda

- **Acreage Program Updates**
  - AWiFS & MODIS sensors
  - Ground truth: FSA/CLU + 578 & non-ag
  - Commercial software suite

- **What’s next**
Remote Sensing Program Objectives

- “Census by Satellite”
  - Without area duplication
  - Cover major producing corn and soybean regions
  - Indications reflect actual location of the crops
    - Not address on record

- Provide timely, accurate, useful independent indications
  - Measurable error
  - Unbiased/independent estimator
  - County & state level

- Deliver indications 75 days earlier
  - For October Agricultural Statistics Board
  - Versus end-of-year December estimates
2007 Cropland Data Layer Coverage
Cropland Data Layer Components

- AWiFS sensor
IRS Resourcesat-1 AWiFS Imagery

Eliminate clouds

5-day revisit

Key spectral bands

Large area coverage

Resolution adequate

6 July 2007
Foreign Ag Service Cooperation

The USDA's P6-AWiFS US standing order is displayed; however, only the scenes which are <50% cloudy are purchased.

For more information, please contact
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Cropland Data Layer Components

- **AWiFS sensor**
- **Common Land Unit/578 Admin Data**
  - USDA/Farm Service Agency
    - Training/testing datasets
  - Ancillary training datasets
    - MODIS, NLCD, NED, CDL
Ground Truth - Agriculture

NASS June Agricultural Survey (JAS) data still used for acreage estimation
Definitional Issues

NASS Segment Boundaries

FSA Boundaries
Ground Truth – Non Agricultural

- Proportional sampling
- Use categorized 2001 National Land Cover Dataset from USGS
Ancillary Data – USGS Products

- Elevation
- Impervious
- Slope
- Canopy
- Aspect
MODIS NDVI Imagery

NASA MODIS Terra (16-day NDVI composite derivative)
Time series of current growing season
Fall scenes from previous year
Cropland Data Layer Components

- AWiFS sensor
- Common Land Unit/578 Admin Data
  - USDA/Farm Service Agency
- Commercial software suite
Commercial Software Suite

- Imagery Preparation
  - Leica Geosystems ERDAS Imagine

- Image classification
  - Decision tree software
    - See5.0 [www.rulequest.com](http://www.rulequest.com)

- Ground Truth Preparation
  - ESRI ArcGIS

- Acreage Estimation
  - SAS/IML workshop
Example Classification Subset

CDL Classification  Resourcesat-1 AWiFS, 6 July 2007
Non Ag NLCD Updates (urban sprawl)
Non Ag NLCD Updates (forest clearing)
Input Vector Data
- NASS JAS segments
- FSA CLU

Input Raster Data
- IRS Resourcesat-1 raw AWiFS summer time series
- NASA Terra MODIS 16-day NDVI prior fall and summer time series
- USGS NLCD circa 2001 Impervious & Canopy
- USGS NED Elevation

Tabular Data
- JAS eData
- FSA 578

FSA 578
- Cropland Data Layer and Acreage Estimation Processing Flow
- All Input layers gridded to common cell size, map projection and areal extent

ESRI ArcGIS
- Link and assess data sets
- Ground truth

Rulequest See5.0
- Derives decision tree-based classification rules

ERDAS IMAGINE®
- Manages and visualizes datasets
- Generated rule set

Input Raster Data

Output
- Cropland Data Layer
- datagateway.nrcs.usda.gov
- State and county crop acreage statistics
- Internal to NASS only

Accuracy Assessment

ESRI ArcGIS
- Extract JAS intersecting pixels

Customized for acreage estimation

IRIS
- Pixel count v. reported acreage

Datagateway.nrcs.usda.gov

Internal to NASS only

Confidence Layer

Diagnostics

Accuracy Assessment

NASS JAS segments

FSA CLU

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USGS NLCD circa 2001 Impervious & Canopy

USGS NED Elevation

ESRI ArcGIS

Internal to NASS only

Datagateway.nrcs.usda.gov
CDL 2008?

- Expand geographic scope?
  - Wheat/cotton states next priority
  - Mid-Atlantic region (often asked about)
- Improved categories?
  - Grassland/Non Ag
- Imagery?
  - Future sensors
  - Finer resolution
- Other ancillary data?
  - Soils
  - Climate
- Derivatives?
  - Change detection
  - Crop rotation patterns
- Move up estimates delivery
  - Another 60 days to mid-August
Thank You

Rick Mueller, Claire Boryan, Mike Craig, Dave Johnson, Bob Seffrin, Patrick Willis, Larry Beard, Zhengwei Yang

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