GIS Applications for the Mississippi Cropland Data Layer, 1999-2006

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The Cropland Data Layer in Mississippi

- Multi-temporal processing based on USDA-NASS programs started in the 1970s and the LARSYS software from Purdue University.

- Mississippi project started in 1999 using the Public Domain Peditor and RSP software programs of NASS.

- A cooperative project of NASS, Mississippi State University, and the Mississippi Department of Agriculture and Commerce.

- ESRI ArcGIS® maps are used to communicate project team information and for client displays including multi-year overlays.
June Agricultural Survey (JAS) Segment Selection

This map shows the stratification of the State based on agricultural land use as revealed by satellite imagery. Statistically weighted selection of study segments in each strata allows direct expansion of crop acreages to give the JAS State-wide crop acreage estimates.
A New Stratum

Note that changes have occurred and catfish ponds have been added.
Study Segments

This map locates each of the JAS study segments (356 in 2004) with the location of Landsat scenes (11 scenes minimum). The field data and imagery are processed to obtain the Cropland Data Layer.
Mississippi 2004
JAS Labeled Photo/Map
Field/Operator/Crop information, 1:8000 Scale
Remote Sensing Project (RSP)
Software Acreage Measurement/Mouse Digitizing of Field Outlines Overlayed on an Image from a Previous Year
Field/Segment Boundaries on a High Resolution Photo

The segment boundary is shown in wide lines and the field boundaries in thin lines with acres shown for each field.

2006 Segment 6001, Test County
MSU, USDA-NASS, MDAC Map by Dr. Fred Shore, 4/13/06
Enumerator Caution: photo, acres, and field lines may be inaccurate.
MS Landsat Scenes 2006

Each scene, bounded in yellow, is easy to select using the USGS Viewer.
Indian Remote Sensing (IRS)

AWiFS scenes each cover 350 km² at an average resolution of 56 m (vs. Landsat TM scenes at 185 km² and 30 m resolution).

Shown as false color IR: Band 5 (short wave IR) / Band 3 (red) / and Band 2 (green) as red/green/blue. An additional IR band is also obtained (vs. 7 bands for Landsat TM scenes).
Multi-Temporal Crop Signatures for Image Classification

- Computer processing using Peditor and RSP.
- Use of two satellite scenes of different dates with approximately the same area coverage.
- Use of the ground truth data.
- Clustering the crop signatures and training the classifier.
- Classification of all scenes and making the mosaic.
Image Processing for MS CDL, 2004

Note that Analysis Districts categorized using multi-temporal scenes can be combined with Analysis Districts categorized using scenes of a single date to give the final mosaic.
Image Processing for MS CDL, 2005

Note that three Analysis Districts categorized using multi-temporal scenes and two Analysis Districts prepared using uni-temporal scenes were combined to give the final mosaic.
Mississippi Major Crop Planted Acres Estimates, 1999-2005
Cropland Data Layer Value as Percent of the Official Estimate

Mean = 98.3 Percent, Standard Deviation = 7.1
Mississippi Cropland Data Layer

Mississippi farmers select crops to plant each year depending on the weather and the market. Each year the USDA-NASS uses field personnel and satellite imaging to help provide the best possible estimate of crop production. This statistical information is important in predicting the US economy.

Compilation of the Mississippi Cropland Data Layer is a cooperative effort of the USDA-NASS, the Mississippi Department of Agriculture and Commerce, and the Mississippi State University Cooperative Extension Service.

Landsat imagery was processed and enhanced for this map. The official result is available on disk from USDA-NASS at (800) 727-5540.
Optimizing Location of a Proposed Sweet Potato Processing Plant

2004 Sweet Potatoes Vardaman - Houston Area

Cropland Data Layer Crops
- Corn
- Cotton
- Soybeans
- Sweet Potatoes
- Trees/Pasture/Non-Ag

USDA-NASS Official Estimates
15,300 Harvested Acres in Mississippi
Average Yield of 170 Cwt./acre

USDA-Farm Service Agency
Planted Acre Estimates
Calhoun County 6,770 acres
Chickasaw County 5,290 acres

MDAC/USDA-NASS/MSU
Map by Dr. Fred Shore
The Basic Cropland Data Layer Presentation

The Mississippi Delta showing the Cropland Data Layer classifications obtained using satellite images, and the June Agricultural Survey.
The variation of land use for cotton in the Delta over a 6 year period is shown in this map.

The darker the shade of blue, the more years the same land was used to grow cotton.

In the crescent moon-shaped part of northwestern Mississippi known as The Delta, cotton is usually planted in sandy soil along existing or ancient rivers and creeks. Cotton crop rotations are used but high cotton prices can lead to the same land being used for cotton every year.
Multiyear Overlays
Rice

With the three year rotation schedule, comparing two 3-year periods gives similar land use areas. Note that almost all areas had only one year of rice growth as shown by the red color.
Note that the largest crop acreage is soybeans but the most profitable crop is cotton with rice second most profitable.
Overlaying soybeans with cotton and then overlaying both with rice reveals that potential rice acreage is nearly equivalent to the cotton acreage.
## Mississippi's Rank Among States In Agricultural Commodities, 2004

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Production or Number</th>
<th>Unit</th>
<th>Rank</th>
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<tbody>
<tr>
<td><strong>Crop</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>All Cotton</td>
<td>2,346,000</td>
<td>bales</td>
<td>3</td>
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<tr>
<td>All Rice</td>
<td>16,146,000</td>
<td>cwt</td>
<td>4</td>
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<tr>
<td>Sorghum for Grain</td>
<td>1,422,000</td>
<td>bu</td>
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<tr>
<td>Sorghum for Silage</td>
<td>13,000</td>
<td>tons</td>
<td>20</td>
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<tr>
<td>Sweetpotatoes</td>
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<tr>
<td>Soybeans</td>
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<td>13</td>
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<td>Winter Wheat</td>
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<tr>
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<tr>
<td>Watermelons</td>
<td>378,000</td>
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<tr>
<td>Potted Poinsettias</td>
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<td><strong>Livestock</strong></td>
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<tr>
<td>Catfish-foodsize</td>
<td>388,000,000</td>
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<tr>
<td>Broilers</td>
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<tr>
<td>Eggs</td>
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<td>Milk</td>
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<td>Honey</td>
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1 January 1, 2005.
2 December 1, 2004.
Cotton yields in Mississippi and the United States increased steadily for decades. However, during the 1980s, yield increases remained relatively flat. Since 2000, cotton yields have resumed their historic advances.
After a rapid jump in 1985, Mississippi long grain rice yields have increased at the same rate as National rice yields. Mississippi is the 4th leading state in rice production.
Mississippi catfish production remains first in the U.S. in spite of the recent drop in production.
Results

• Annual Cropland Data Layers are available on disk from USDA-NASS (800) 727-9540 and on-line at www.mdac.state.ms.us and http://www.nass.usda.gov/research/Cropland/SARS1a.htm.

• The Cropland Data Layer is useful for crop acreage estimates and for visual presentations of cropland coverage.

• The Segment Locator Maps and other ArcGIS presentations make data collection easier during the June Agricultural Survey.

• Multi-layer ArcGIS maps allow land use patterns and crop rotations to be observed.

• Adding pictures and graphs to ArcGIS maps allow a more dramatic presentation of agricultural statistics and give a useful way to print large-format posters.