

Using Imagery and GIS to Calculate Agricultural Use Value

Woolpert – Andy Freckmann, PMP

Woolpert at a Glance



1911

Founded in
Dayton, Ohio



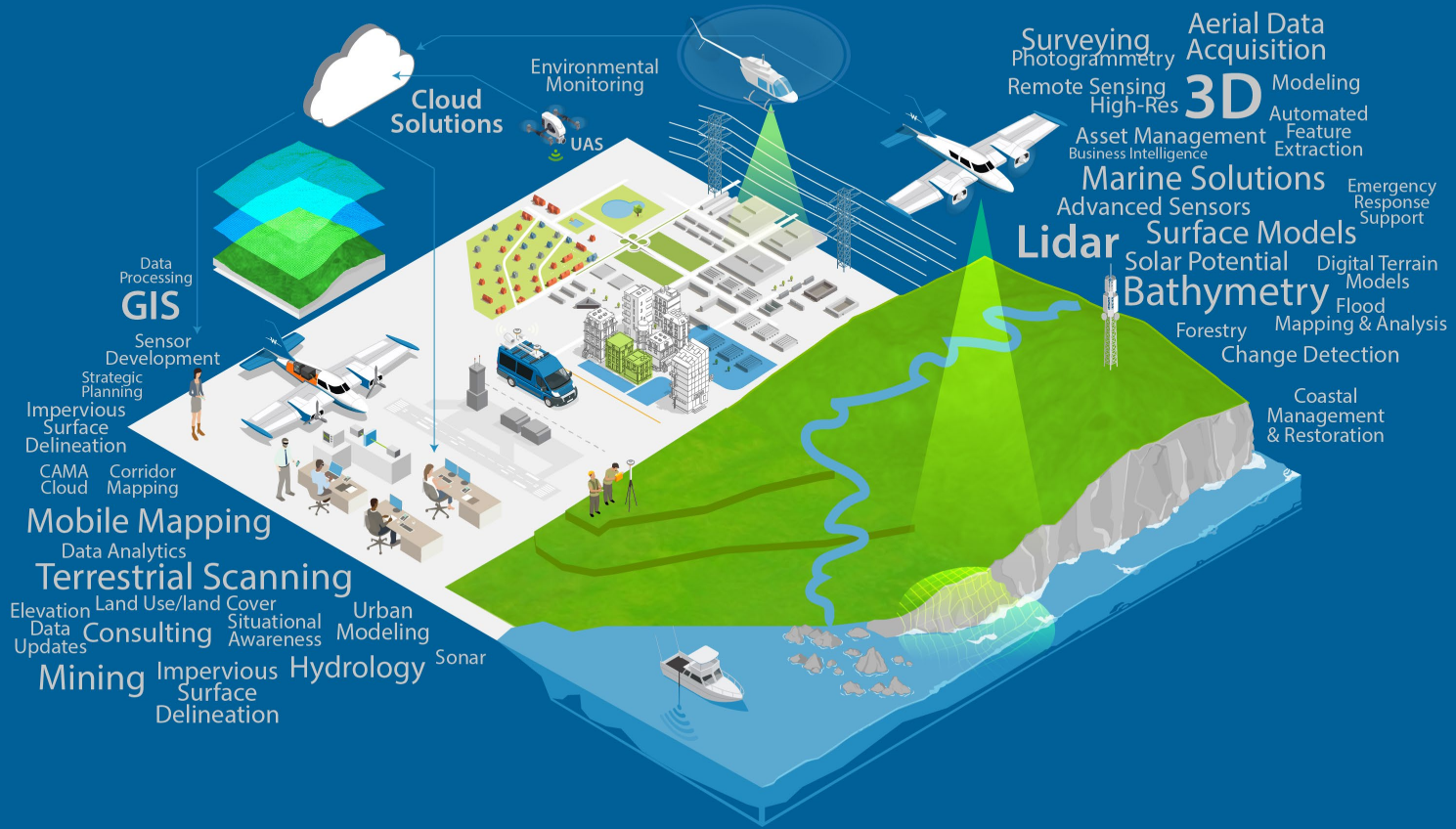
65+
Offices
Worldwide



1900+
Global
Employees



WOOLPERT GEOSPATIAL CAPABILITIES



CAUV

Background

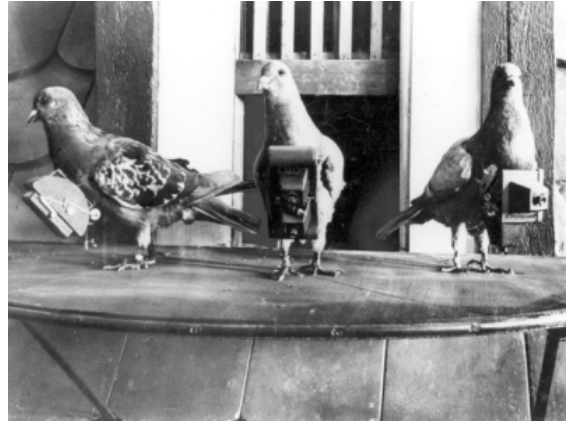
- Provides a means to identify:
 - Parcels on CAUV with no farming activity
 - Parcels being farmed that are not on CAUV
 - Opportunity to provide 100% inspection for agricultural activity
- Identify CAUV land not being farmed due to natural barriers

- More accurate means to categorize areas by their slope
 - Review valuation based upon slope, waterways, etc.

What is Remote Sensing?



ca. 1840

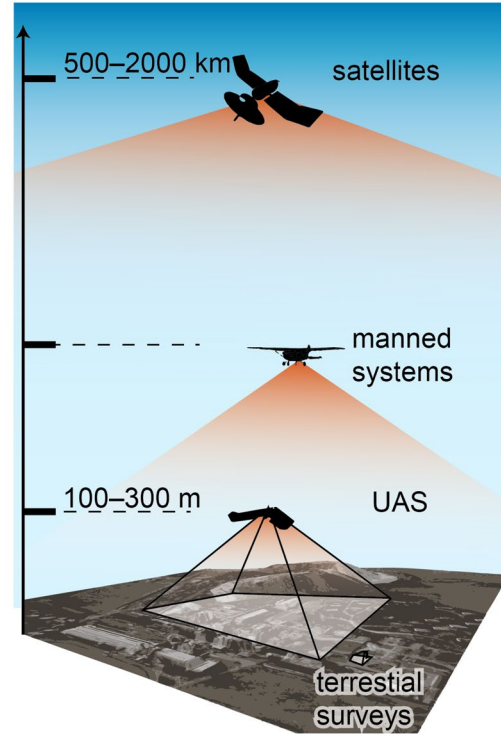
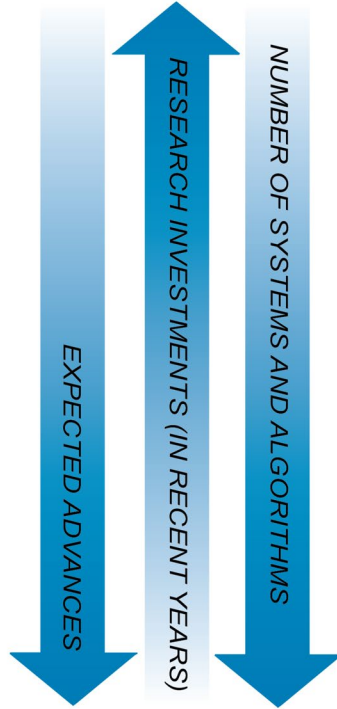
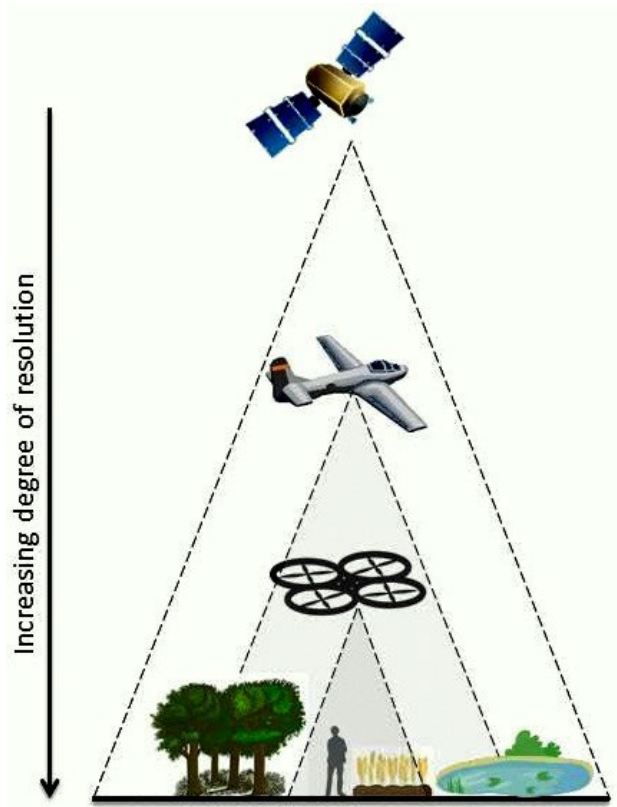


Ca. 1903



Leica CityMapper-2
Courtesy Hexagon
2019

Geospatial Methods of Collection



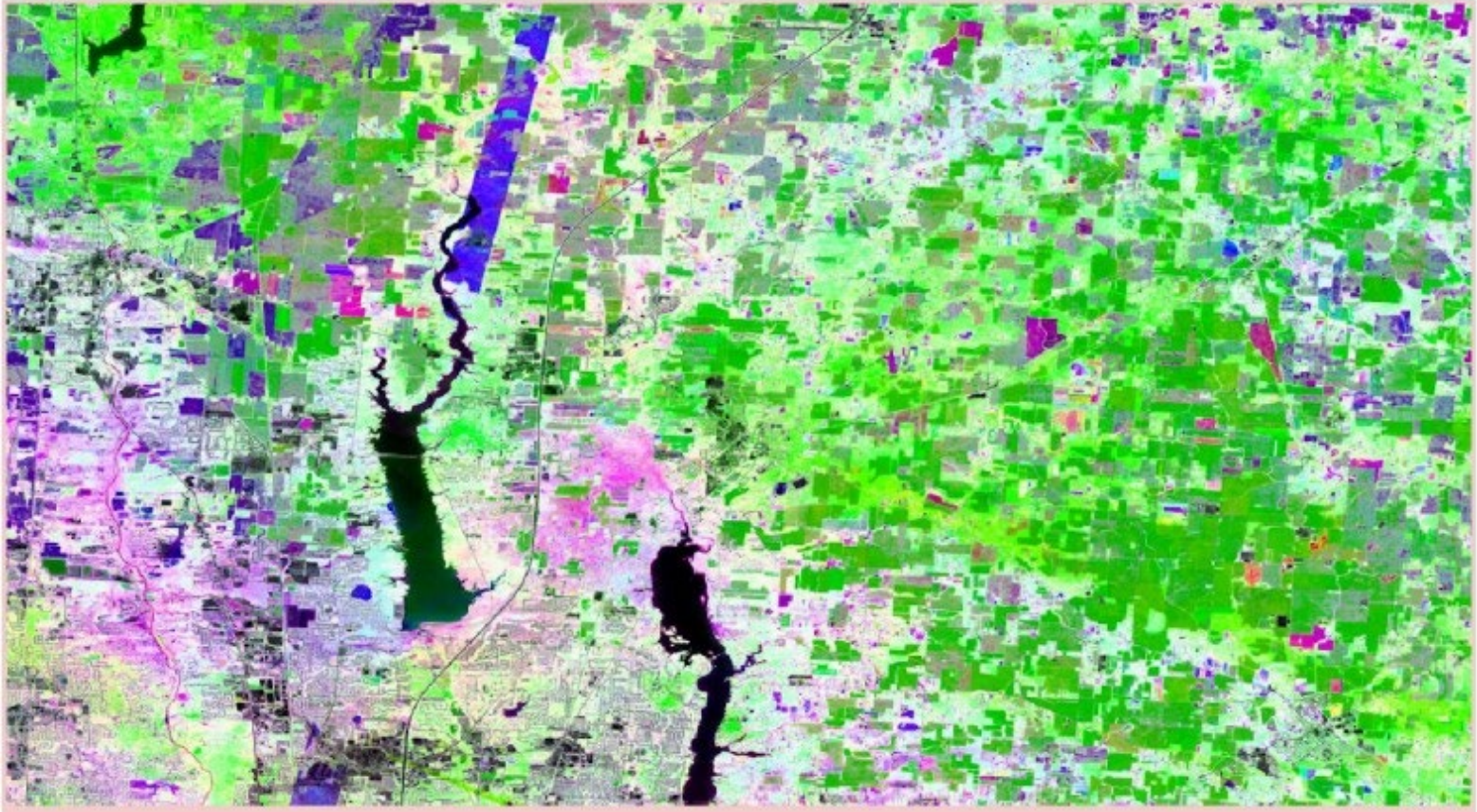
Orthoimagery



Orthoimagery 6-Inch vs. 3-Inch Resolution

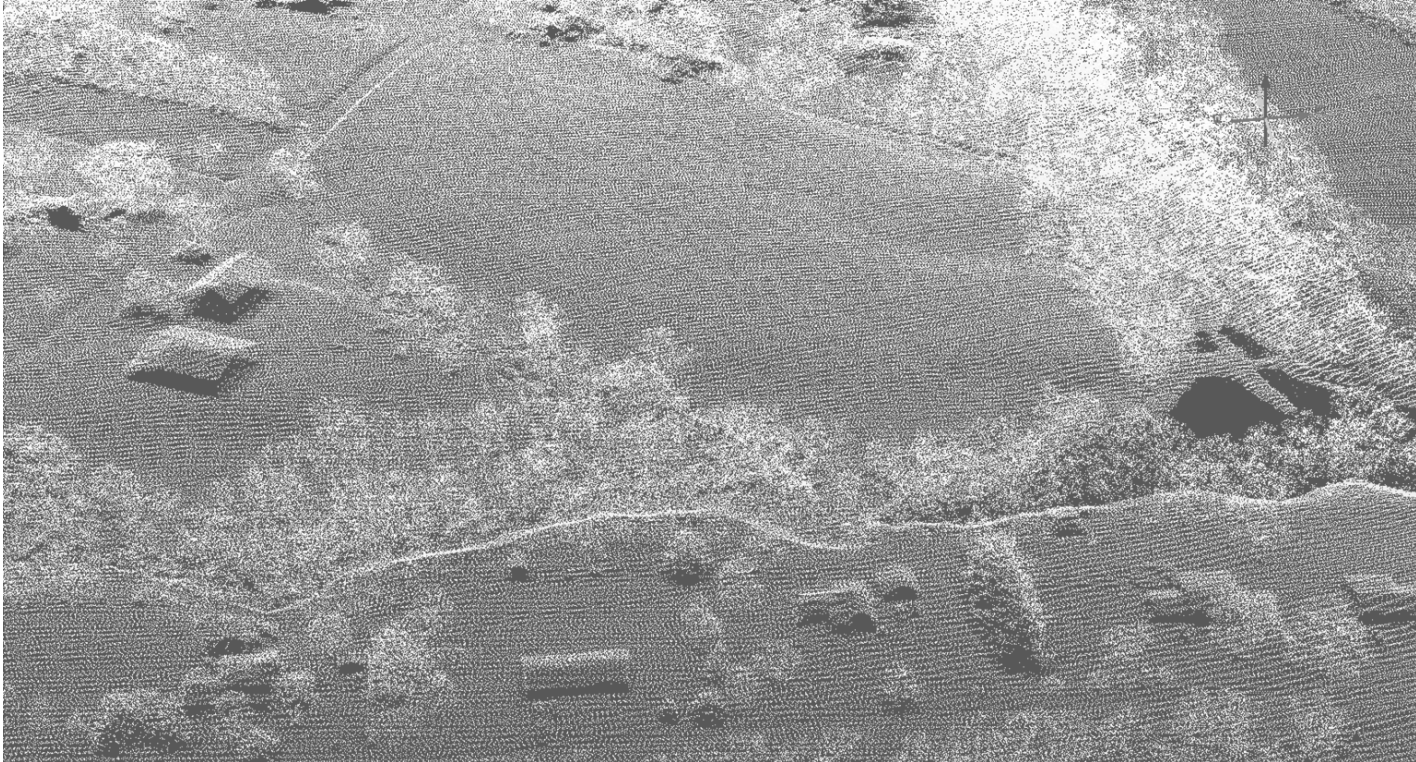


Satellite imagery slide



LiDAR

QL3 vs QL2 Lidar Density

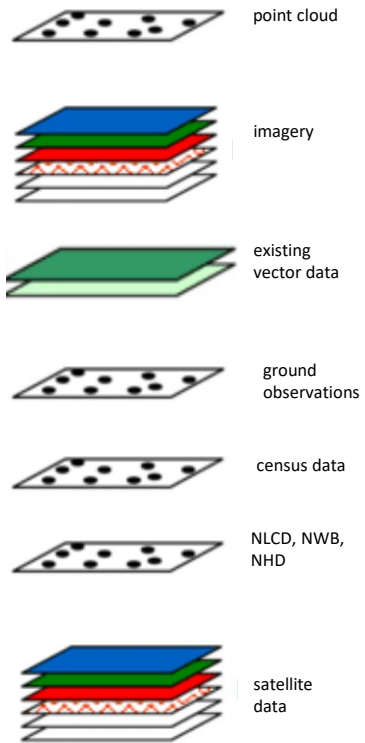


LiDAR

QL3 vs QL2 Lidar Density

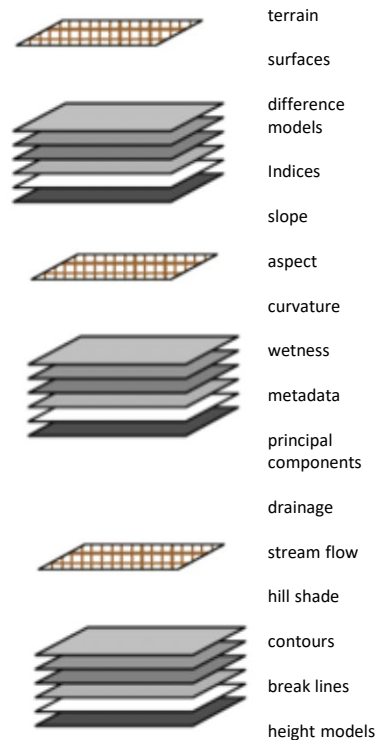


Data Acquisition



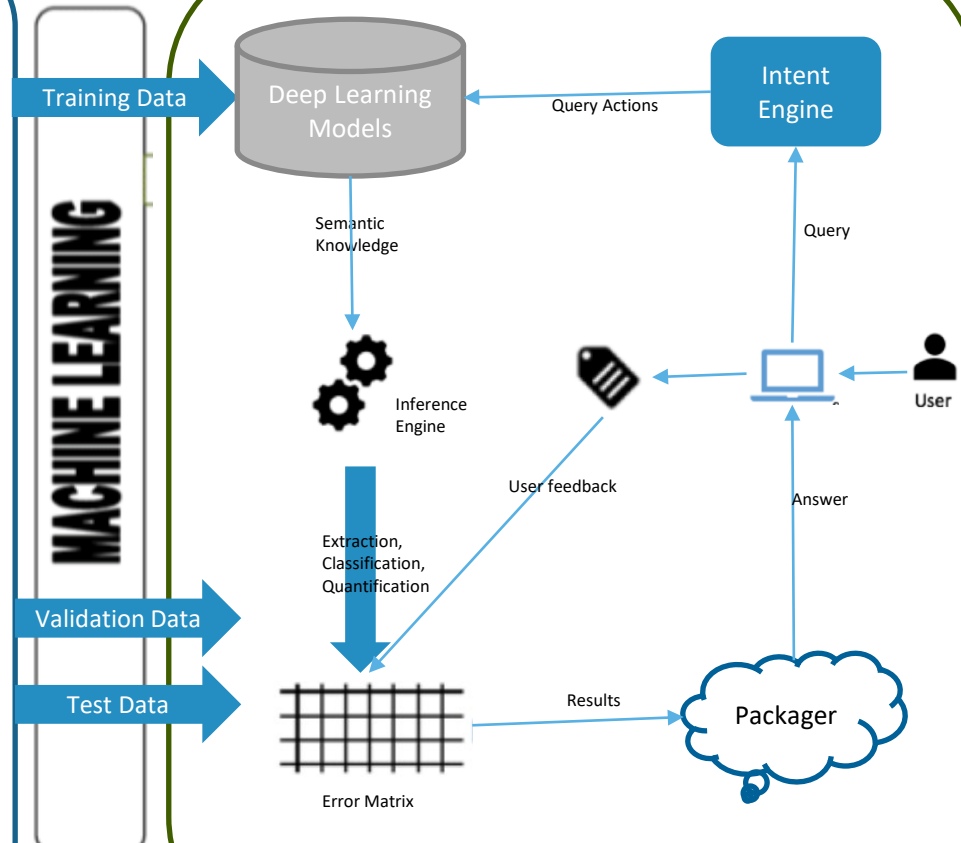
** data gathering, validation and curation to be done by technicians in on premises and through cloud services

Data Analysis



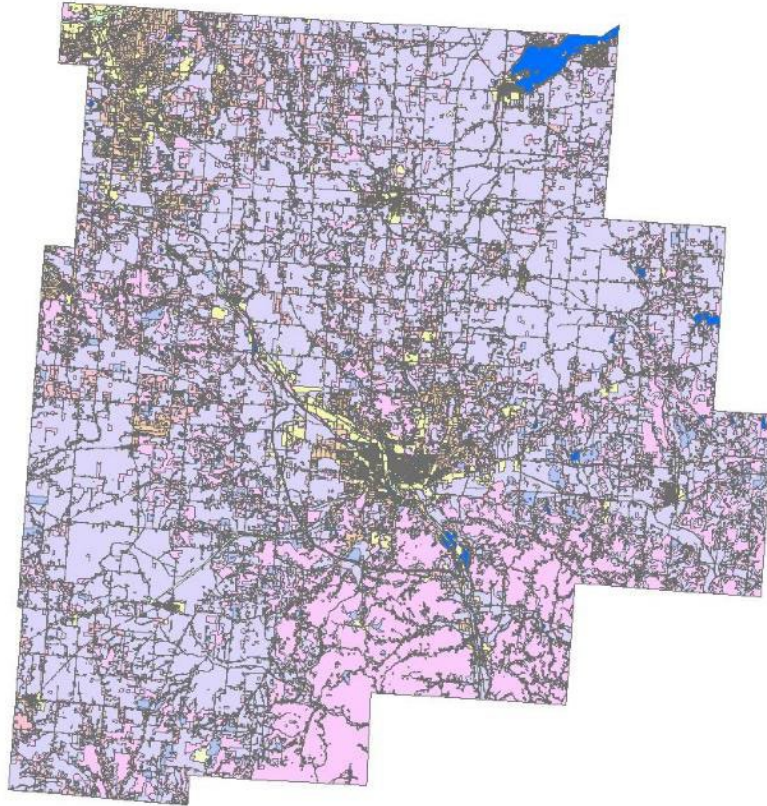
** sleek algorithms and cloud based high throughput computations are used to make the data "analysis ready".

Decision

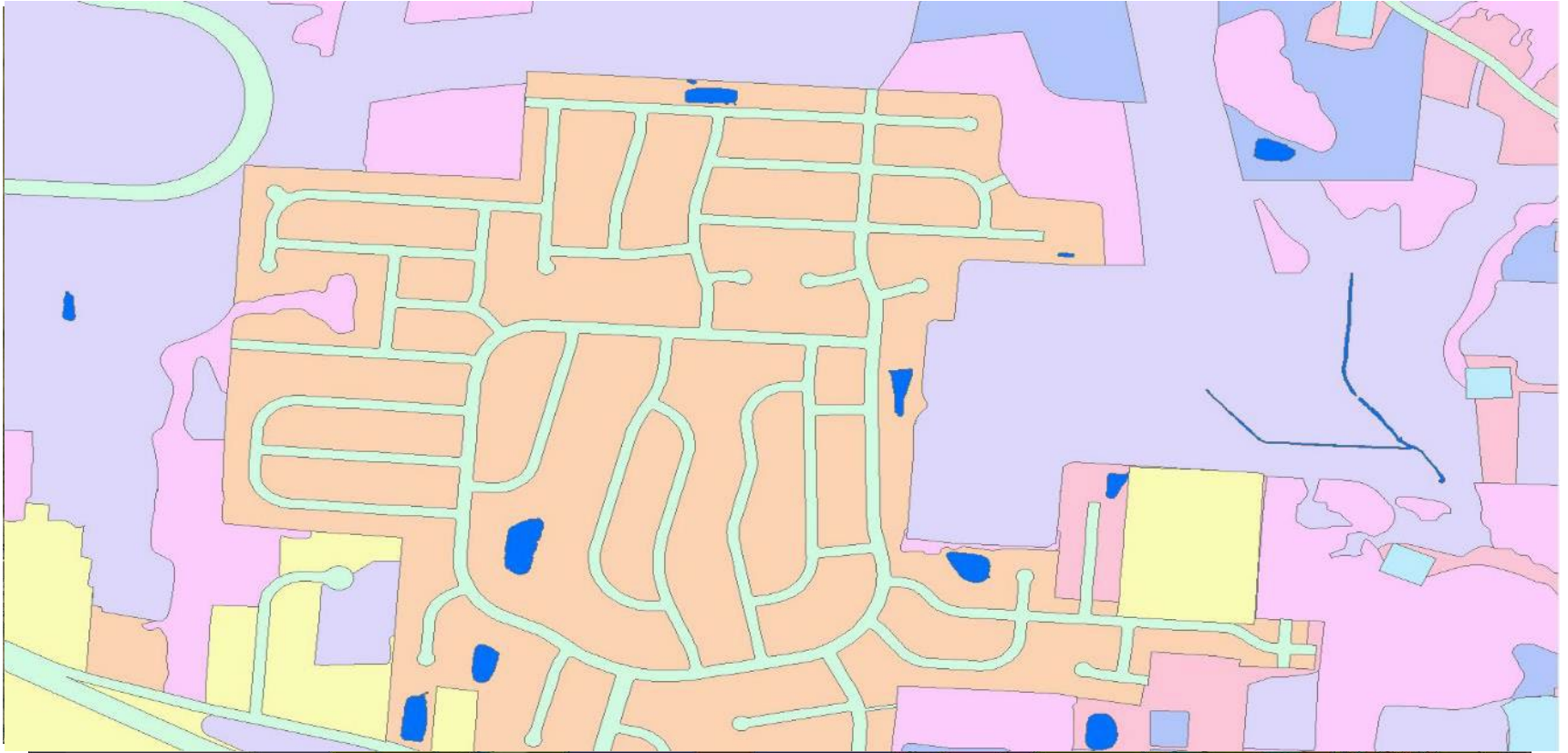


** decision ready analysis that is at the users finger tips, all done in the cloud to offer speed at scale.

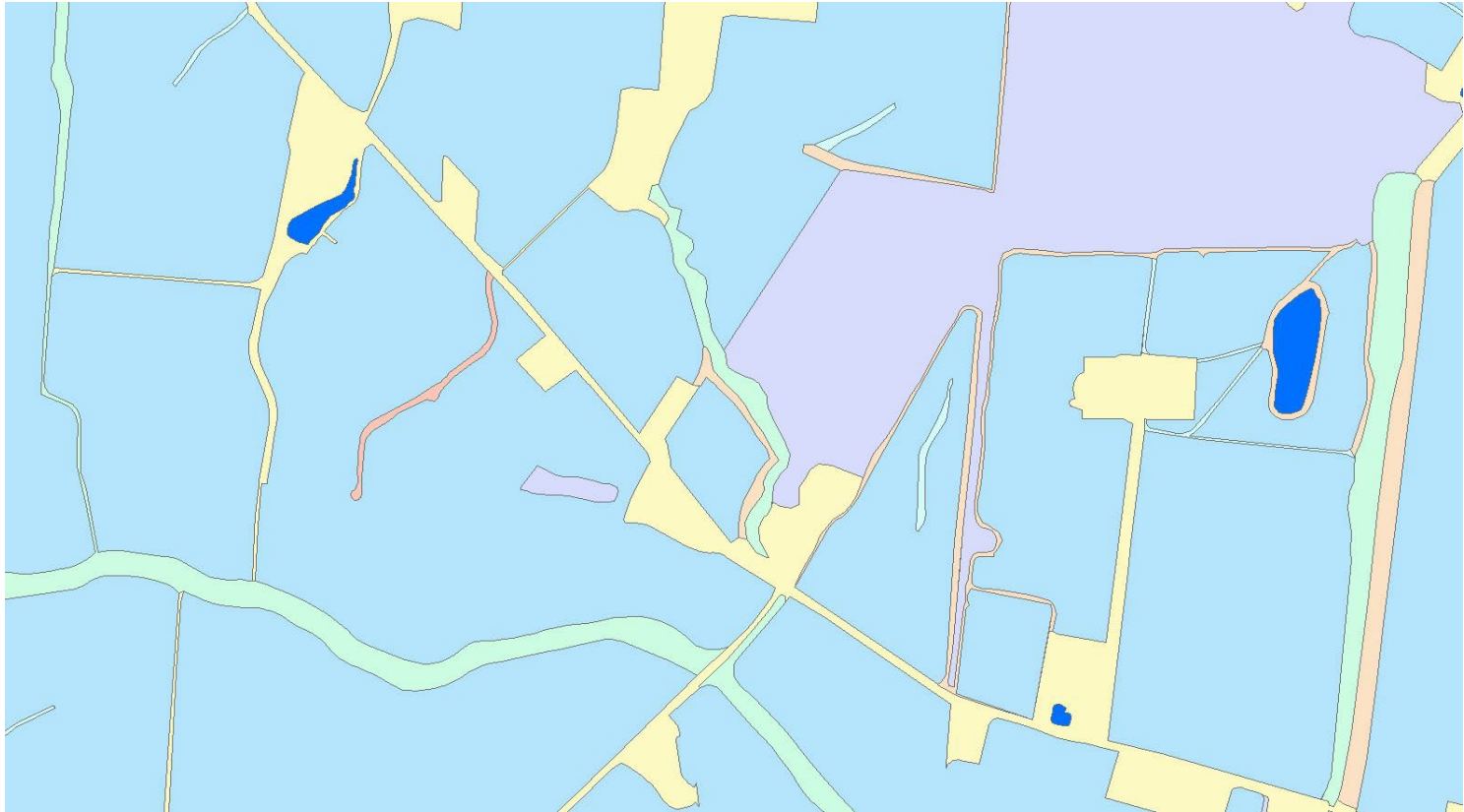
Land-Cover



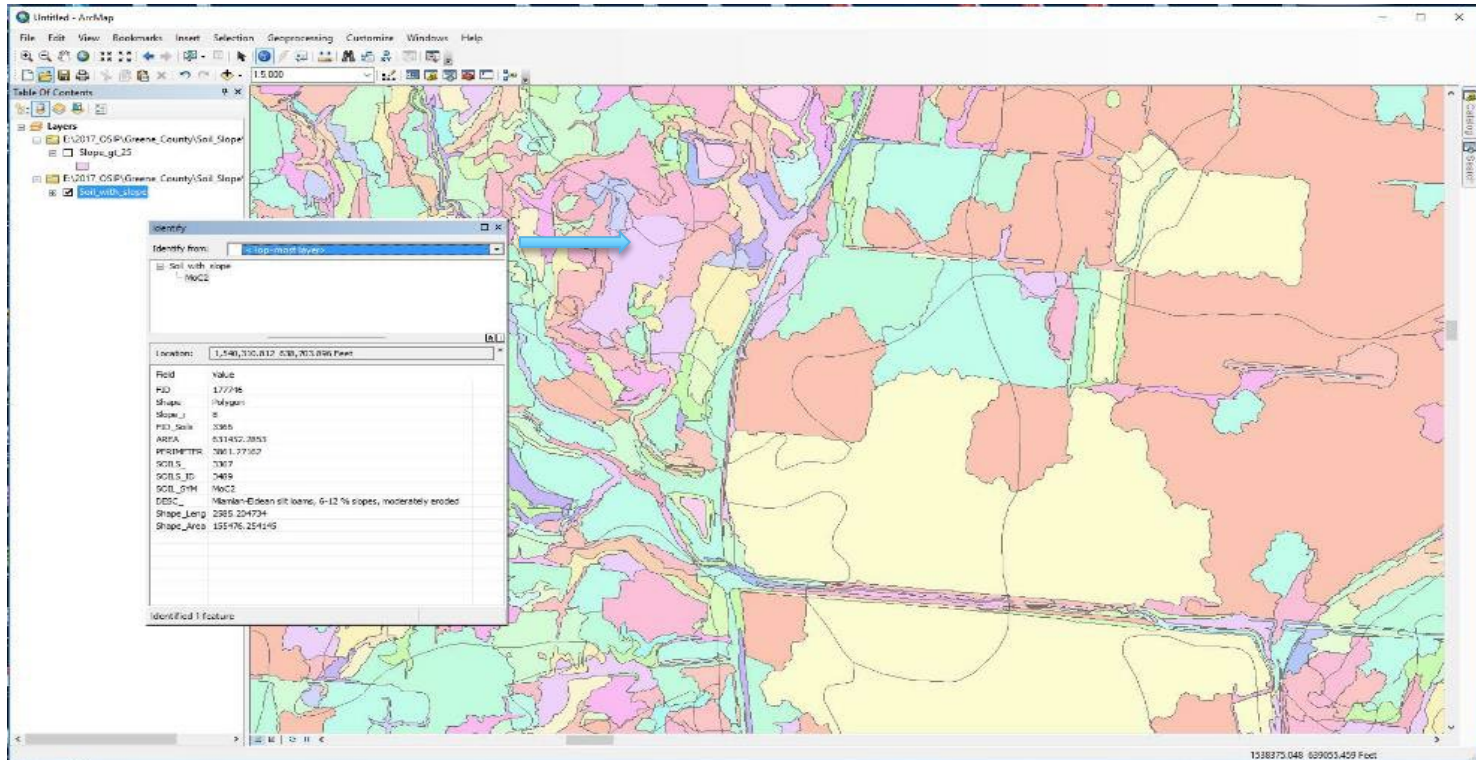
Land-Cover



Conservation Land



Slope Analysis



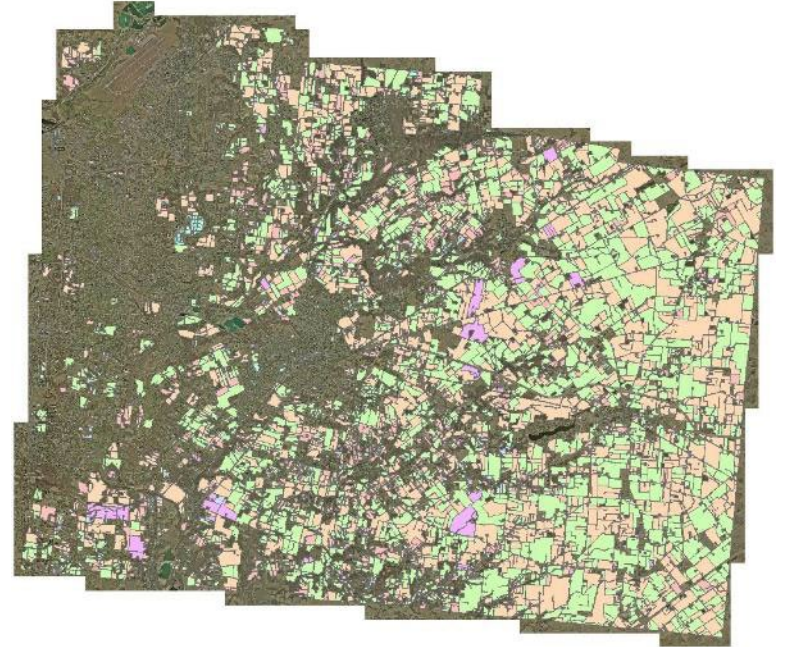
CAUV Cropland Delineation



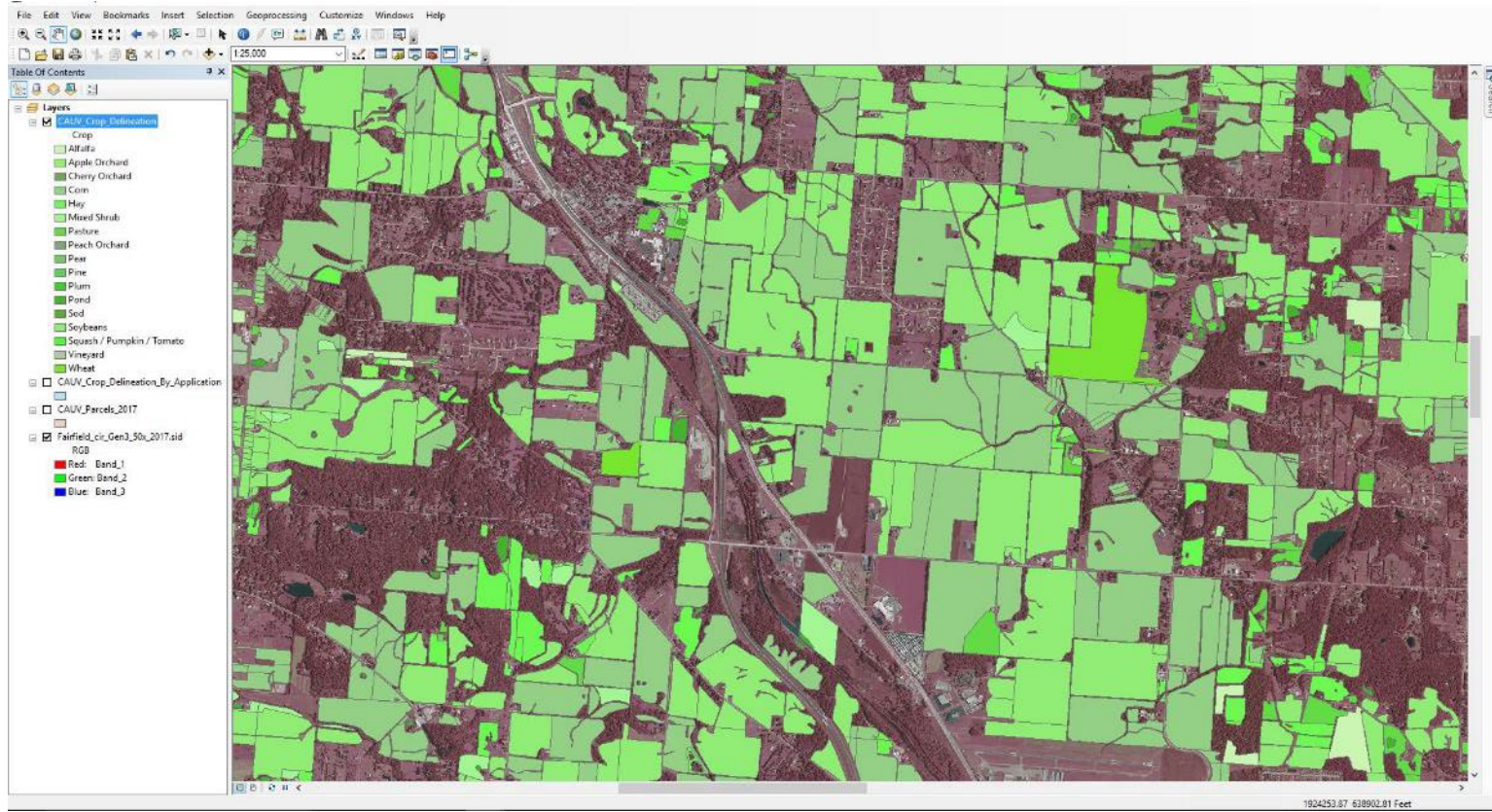
Field Spectrometers



CAUV Cropland Delineation



CAUV Cropland Delineation



1924253.87 628902.81 Feet

CAUV Cropland Delineation

PIN	ACRES	Crop Summary	Total Crop Acreage	Percent Crop Area
10000100	24.2	2.185 acres of mixed shrub; 15.529 acres of soybeans	17.714	72.7
10000200	5.01	4.405 acres of corn	4.405	88.1
10000210	5.01	2.354 acres of corn	2.354	47
10000230	131.61	49.176 acres of corn; 52.943 acres of mixed shrub; 0.112 acres of soybeans	102.231	77.7
10000300	32.47	5.177 acres of mixed shrub; 8.691 acres of soybeans	13.868	42.6
10000400	13.76	9.348 acres of corn; 0.864 acres of pasture	10.212	74.4
10000500	48.1	31.253 acres of corn	31.253	61.2
10000510	5	7.183 acres of soybeans; 2.596 acres of wheat	9.779	59.3
10000520	22.13	28.539 acres of soybeans	28.539	74.5
10000800	26.53	4.081 acres of corn; 3.858 acres of hay; 2.378 acres of mixed shrub; 5.065 acres of pine	15.382	57.6
10000810	21	0.395 acres of pine	0.395	1.9
10000821	5.03	0.86 acres of corn; 2.039 acres of pasture	2.899	57.6
10000900	31.92	21.323 acres of soybeans	21.323	66.8
10000910	23.62	18.735 acres of corn	18.735	79.3
10001100	80.8	60.032 acres of soybeans	60.032	71.5
10001210	6.08	4.101 acres of hay	4.101	67.3
10001300	61.14	28.17 acres of hay	28.17	48.2
10001500	42	0.834 acres of hay; 9.397 acres of soybeans	10.231	24.7
10001600	216.14	98.369 acres of corn; 25.903 acres of hay	124.272	57.4
10001700	61.96	55.97 acres of corn	55.97	90.3
10001710	13.61	4.574 acres of corn; 0.495 acres of pine	5.069	37.3
10001800	75	60.849 acres of soybeans	60.849	81.2
10001900	30.36	7.523 acres of hay; 7.807 acres of pine	15.33	52.7
10001910	10.02	8.189 acres of hay	8.189	82
10002100	104.07	39.212 acres of hay	39.212	37.8
10002200	27.61	25.306 acres of soybeans	25.306	91.5
10002700	55.73	31.349 acres of soybeans	31.349	56.5
10003100	16.27	9.641 acres of corn	9.641	62.4

County Analysis

County Analysis

County Slope Analysis

• Total Acres in CAUV for Tax Year:	157,064.87
• Total CAUV value for Tax Year:	\$381,356,560
• Total Acres Changed for Slope data:	6,221.72
• Value of acreage without slope change:	\$5,862,940
• Value of acreage with slope change:	\$1,646,470
• Value lost due to slope change:	\$4,216,470



County Analysis

County Land Use Analysis

- Total Acres in CAUV for Tax Year: 217,159.75
 - Approximately 67% of total acres for County
- Total Parcels in CAUV for Tax Year: 5,987
 - Approximately 8% of total Parcels for County
- Total Land Value in CAUV for Tax Year: \$466,607,150



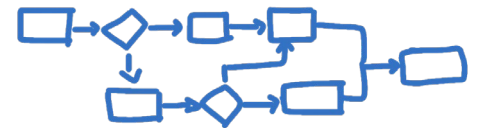
County Analysis

Goals

- Improve Accuracy of Land Breakdowns for all CAUV parcels
- Improve Efficiency in review of Renewal and Initial Application submissions.
- Provide tools to communicate with property owners with County website.
 - Tabular data with existing land breakdowns.
 - Map data showing the existing boundaries of all Land Use breakdowns.

Process

- Developed New County-Wide Land Cover
- Utilized summer flight to capture Crop Delineation
- Combined both elements to create new County-Wide Land Use for CAUV purposes.
- Fine-tuned and added features for Home site, ROW and Water elements.
- Utilized with Farm Calculation application to prepare the new highly accurate land breakdowns by soil type.



County Analysis

Results

- Modified land breakdowns are all 6,000 parcels in CAUV
- Outreach to the local farming community (~1,000 of the 2,600 applications) to discuss the improvements to the land breakdowns
- Identified ~900 parcels requiring a closing inspection for CAUV qualification.
- Improved our review efficiency to ensure completion in the required timeframe



County Analysis

Overall Benefit

- Fair and Equitable Means of Evaluating Property
- Increase Efficiency within the Office (Tools to Identify Potential Problem Areas)
- Reduce Human Error
- More Accurate Means of Analyzing Countywide Condition
- Provides a Streamlined and Cost Effective Solution



Questions???

Troy: In discussing crop classifications, how is this different than the USDA NASS crop Data Layer?

Answer:

- We are acquiring/utilizing 12-inch, 4-band orthoimagery. Due to the accuracy (1"=200' scale mapping spec), the orthoimagery is also utilized for secondary uses (i.e. change detection, update of GIS data layers) for the counties.
- We are utilizing a field spectrometer to calibrate the crop types.
- We provide individual boundaries for each crop type by parcel and then provide a statistical breakdown for each crop type within each CAUV parcel.
- In addition to corn, cotton, soybeans and wheat, we also delineate several other crop types (tobacco, orchards, alfalfa, ponds (i.e. fisheries), sod, pasture, etc.). We customize the crop types to be included.
- The majority of counties contracted with us perform the CAUV mapping annually (consistent frequency).