

LiDAR: Derivatives & Applications

**Alabama Association of Floodplain Managers
7th Annual Fall Conference**

Kimberley Denney – Associate Vice President

Overview

Part I: LiDAR Basics

Part II: LiDAR Derivatives & Applications

Part III: LiDAR Opportunities & Trends



LiDAR Basics

Light Detection And Ranging



LiDAR Basics

A pulse of light energy is emitted and the precise time is recorded.

- ALS70's generate up to 500,000 pulses of energy/second

The reflection of that pulse is detected and the precise time is recorded.

Knowing the speed of light, the range can be determined.

Knowing the position & altitude of the sensor, the XYZ coordinate of the target can be calculated.

LiDAR Derivatives & Applications



Derivatives

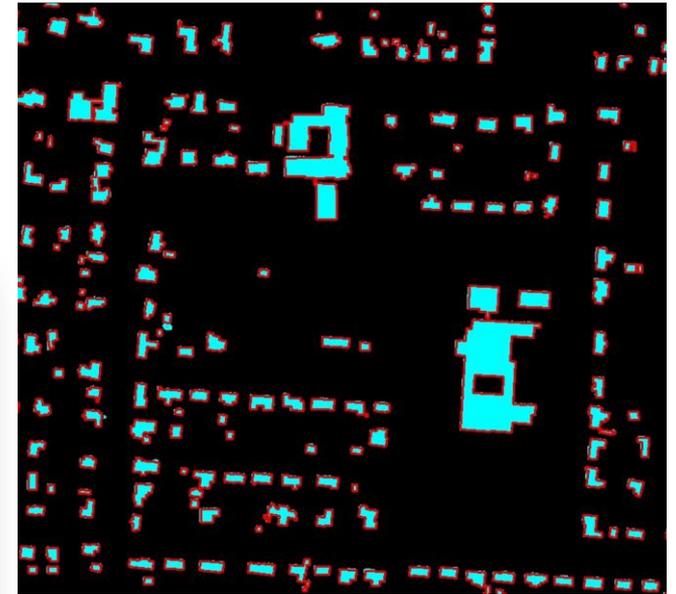
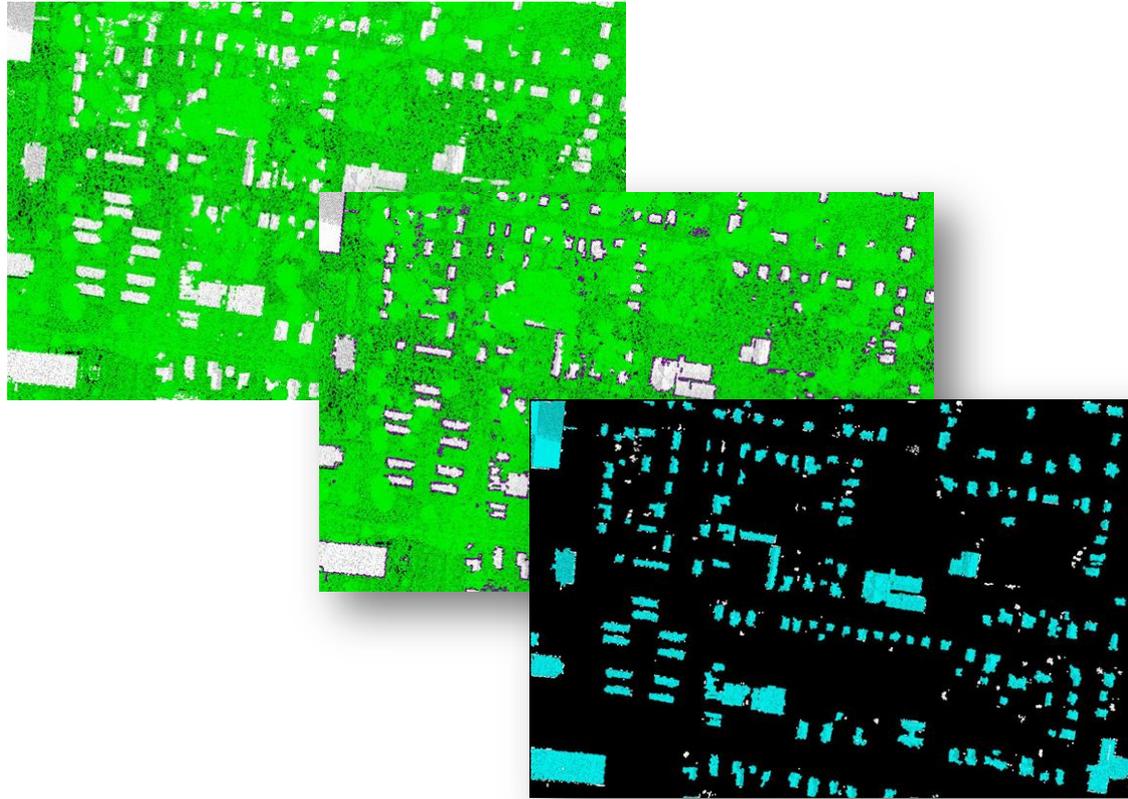
Market shift in LiDAR as the primary data source for creating foundational data layers that are often needed by local, state, federal, tribal and private sector clients OR producing derivatives from newer / higher in accuracy elevation data

- Limited budgets
- Maximize ROI
- Innovation / Research & Development
- 2 Recent Project Examples

Extracting Building Footprints

- “Helping Weakley County, TN’s Tactical GIS Team Maximize their LiDAR ROI”
 - classification and extraction of building footprints from USDA-NRCS LiDAR point data; old imagery
 - created 3-D data for 25,000 buildings over 5,500 square miles covering 8 total counties in NW TN
 - Key component to Intelligence Packages for drug bust
 - 2014 MAPPS Geospatial Excellence Award

Extracting Buildings From The Dataset

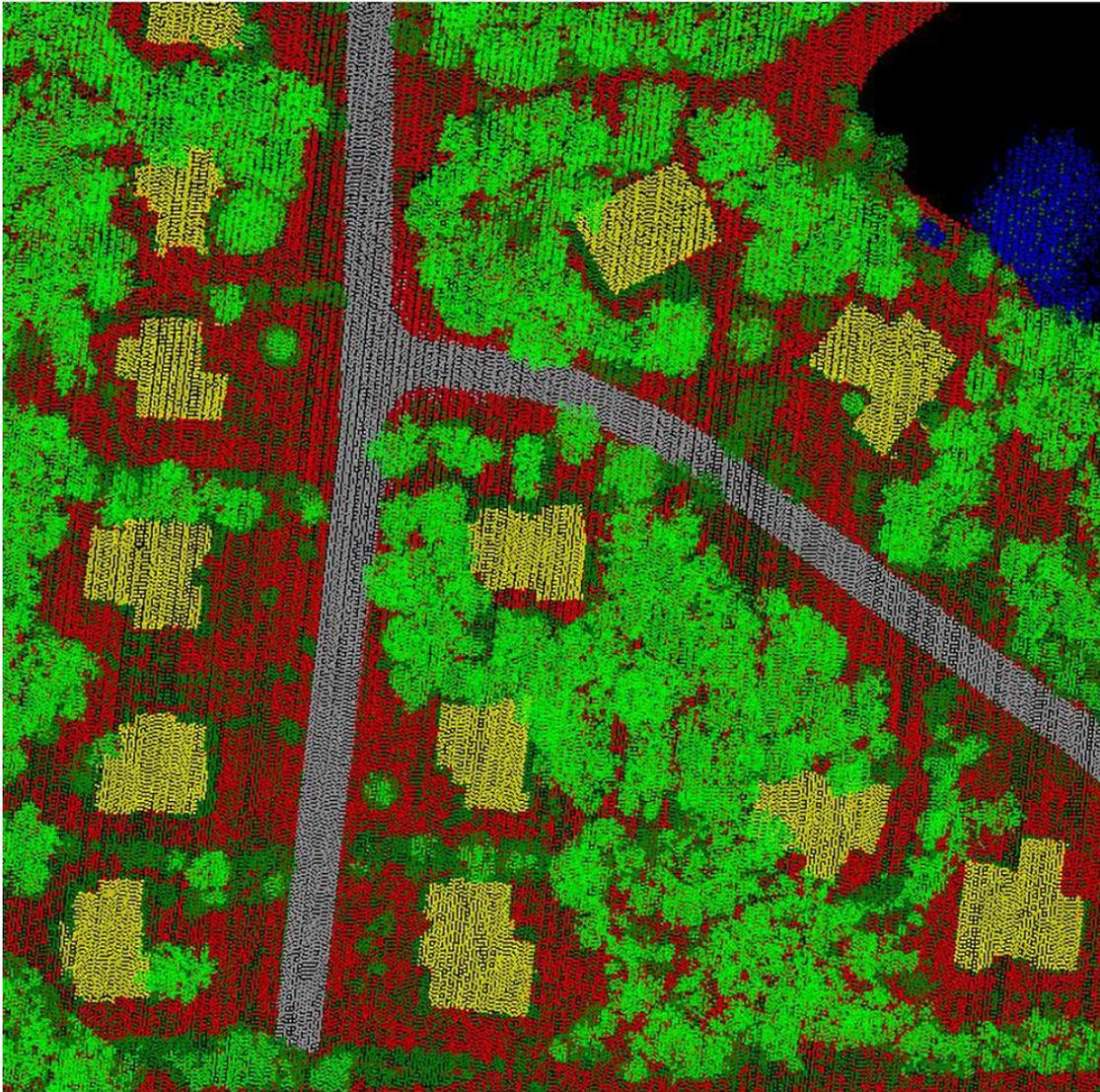


**Steps to Final Deliverable
Weakley County, TN 911**

Impervious Surfaces

- *LiDAR News* “Mapping Impervious Surfaces from LiDAR”
 - Jefferson County, Alabama / RPC of Greater Birmingham
 - algorithmic extraction of other features (R&D) resulted in a capability to extract impervious features directly from the LiDAR point cloud and intensity data
 - Atlantic developed new macros to automate the classification process using GeoCue & Terra Scan software; extra R&D push after Weakley County success

Impervious Surface Extraction



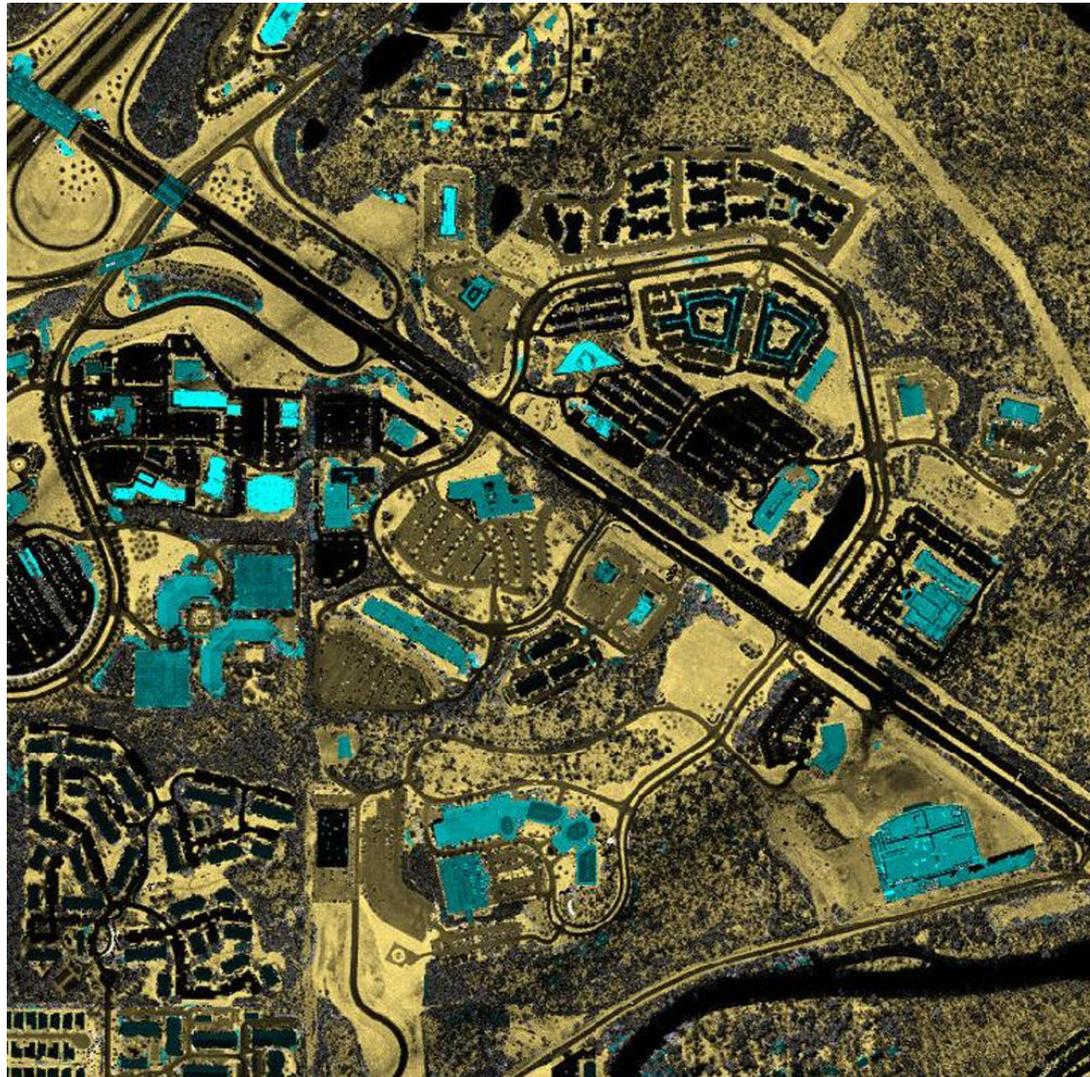
Jefferson County, AL

The classified point cloud results for a small area within Jefferson County.

The image shows colors of different classes in the LAS data structure achieved by algorithmic classification and manual cleanup.

(LP360
ArcGIS - Feature Analyst
Other Atlantic-developed
tools

Impervious Surface Extraction



Illustrates an intensity orthophoto that has been biased towards building extraction.

Jefferson County, AL

Final Deliverable / Derivative



Final polygon impervious feature results of process.

Through automation, application of COTS tools and with a little clean up from a subject matter expert, this dataset was generated at a fraction of the cost of other impervious layers and using only LiDAR.



Jefferson County, AL

Applications

- Floodplain Mapping
- Storm water Management
- Hydraulic Engineering
- Infrastructure Planning / Development
- Natural Resource Management
- Environmental Studies
- Corridor Mapping / Obstruction Analysis
- Transportation Engineering
- Site Design Engineering

LiDAR Opportunities & Trends

Funding Partners / Program Design

Market Trends

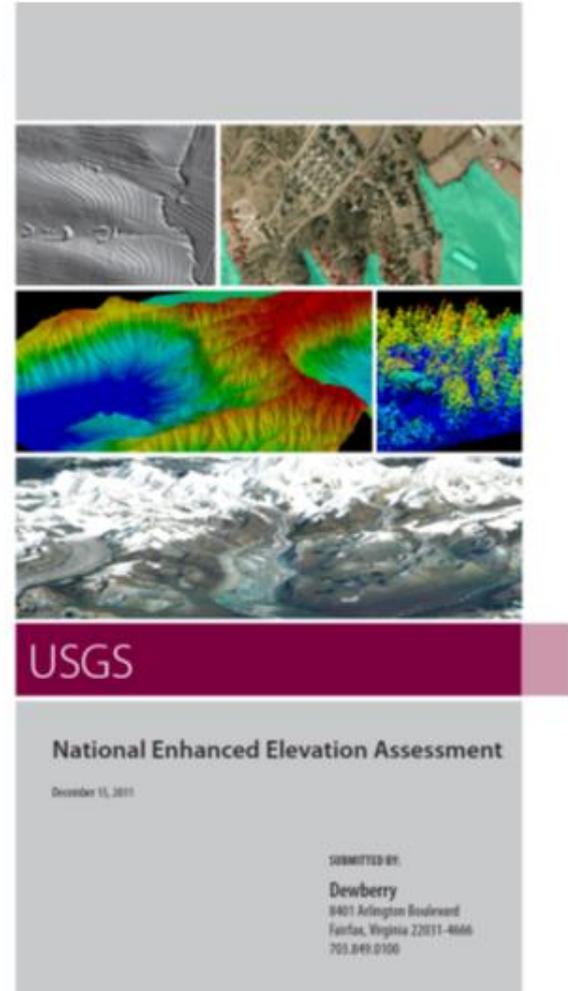


Funding Partners / Initiatives

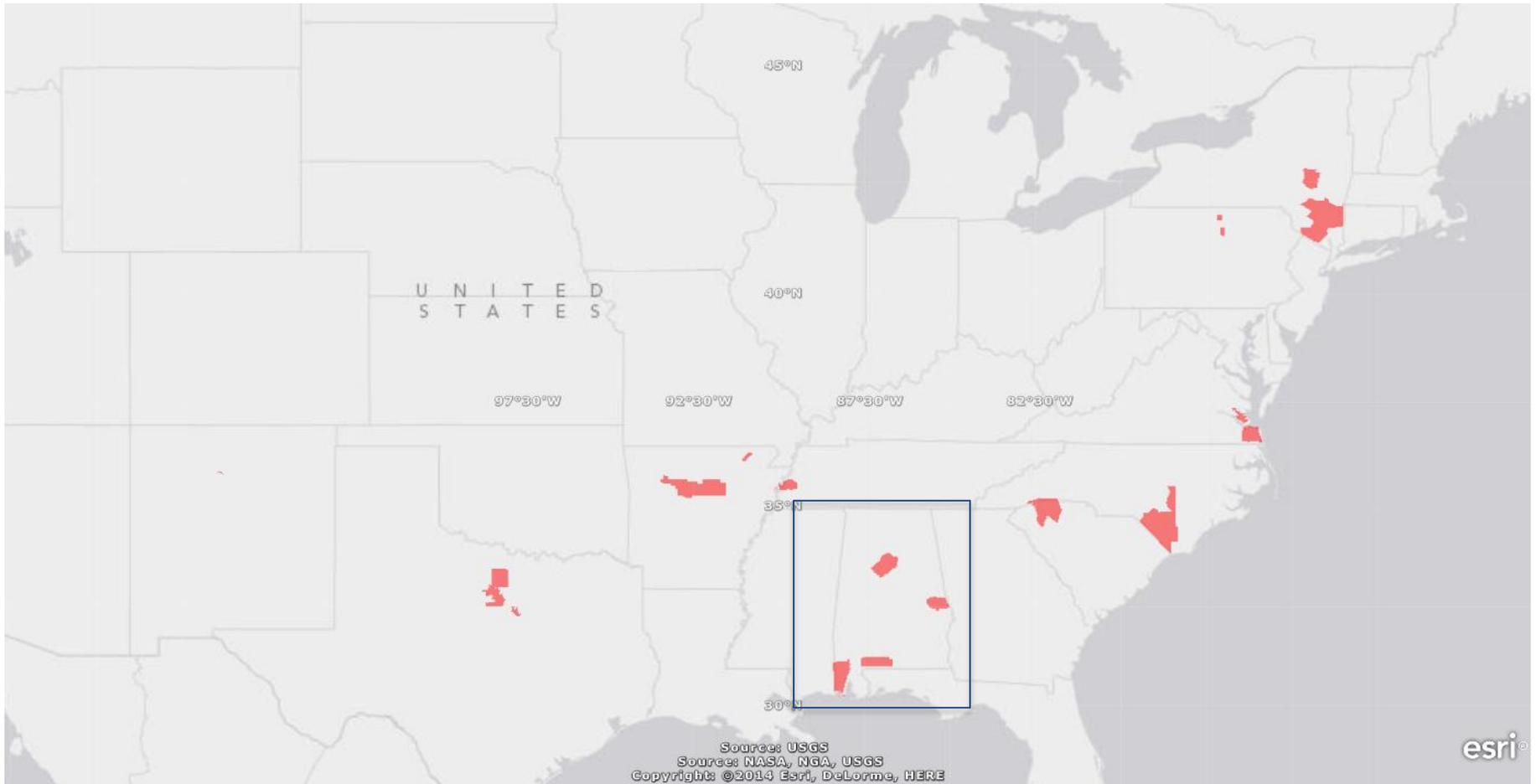
- Local and State
 - Connecting Cities, Counties, etc. to ADECA-OWR
- Federal Liaisons
 - USGS, NRCS, etc.
- Scope of Work / Design Program
 - High quality 3-D elevation data to satisfy every participating agency's needs as far as accuracies without duplicating work
- Market Trends
 - 3DEP (3D Elevation Program); USGS QL2 (minimum); increase density – depending on client's objective

- Led by the USGS
- Phases I and II performed by Dewberry
- Phase III performed by USGS Liaisons with help from State & Local organizations
- Developed ROI's for a nationwide elevation program now called 3DEP
- Accuracy checklist combined to achieve multiple agency goals (FEMA, etc.)

 Dewberry

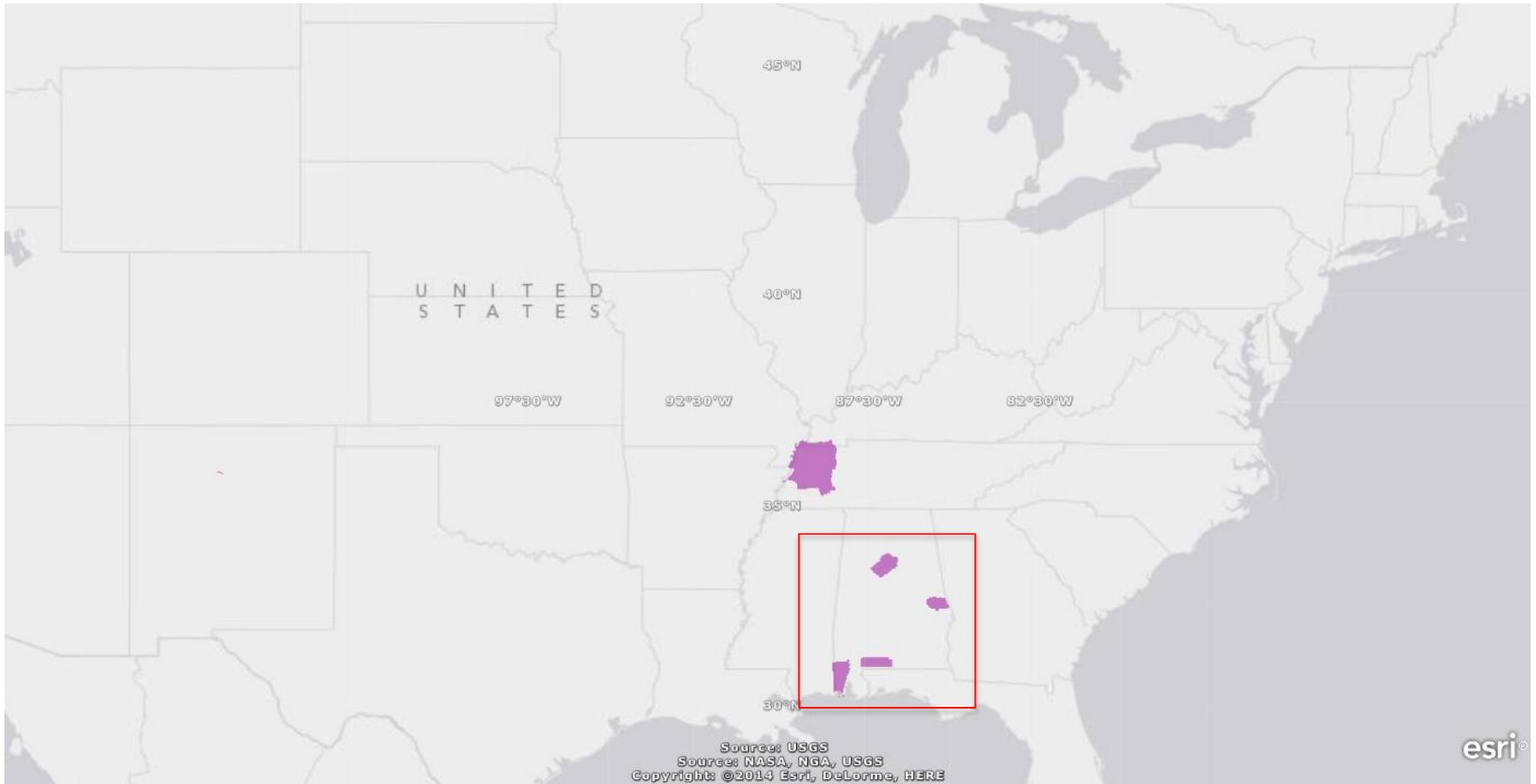


USGS QL2 Data Acquired: 2012-2014



20,028 Square Miles

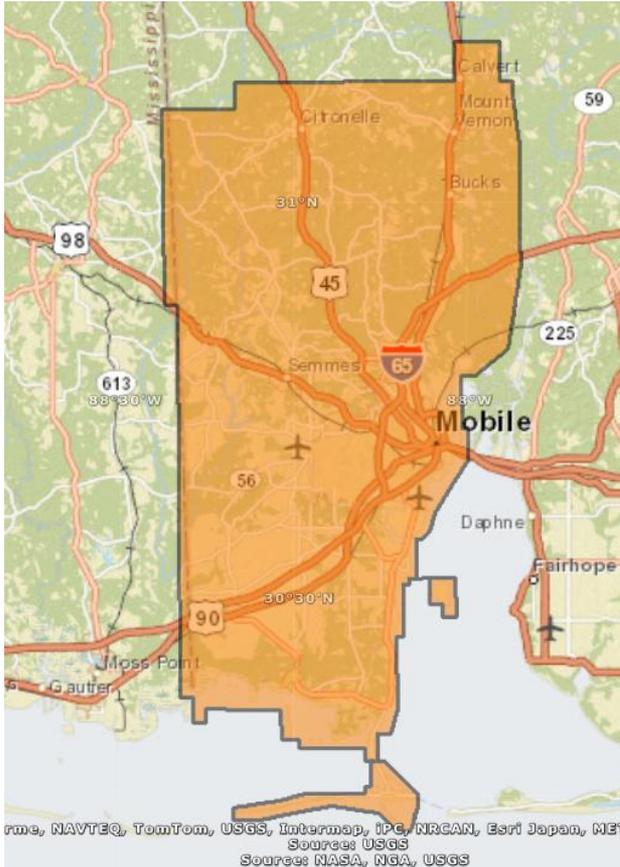
USGS QL2 Data Processed: 2012-2014



9,787 Square Miles

Funding Partnership Success

Mobile County, AL – 2014 Acquisition



- 1,229 Square Miles
- LiDAR ~ 4.5 pts / square meter
- Hydrolines to USGS Specifications
- Hydro-flattened DEM data
- 100 QA/QC survey checkpoint
- ADECA – OWR
- USGS

QUESTIONS

Atlantic
2223 Drake Ave SW, Suite 200
Huntsville, AL 35805
Office: (256) 971-9991

Kimberley Denney
kldenney@theatlgrp.com
Steve Denney, CP
rsdenney@theatlgrp.com



<https://twitter.com/AtlanticGrp>



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