Getting the Most Out of Your Imagery and Lidar

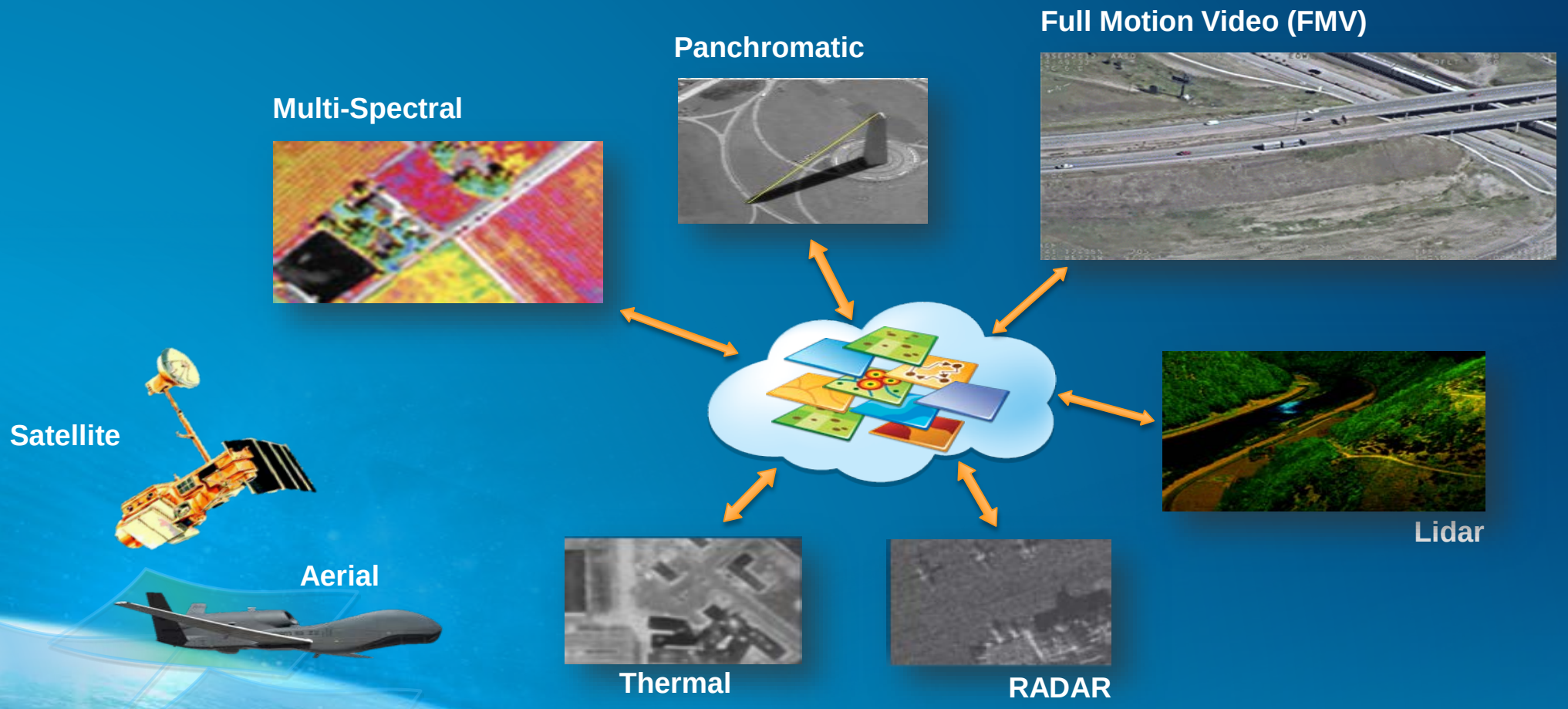
Esri Pacific User Conference

October 13 – 14, 2014 | Sacramento

Agenda

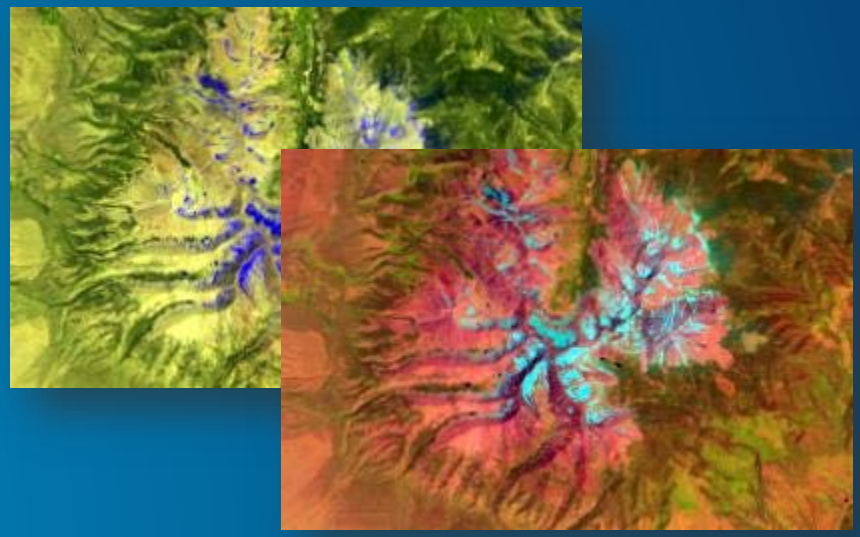
- ArcGIS and imagery
- Common needs and concerns
- Lidar and the LAS format
- LAS Dataset
- Imagery and lidar analysis
- Mosaic Dataset
- Sharing imagery and lidar data
- Q & A

Managing Imagery with ArcGIS



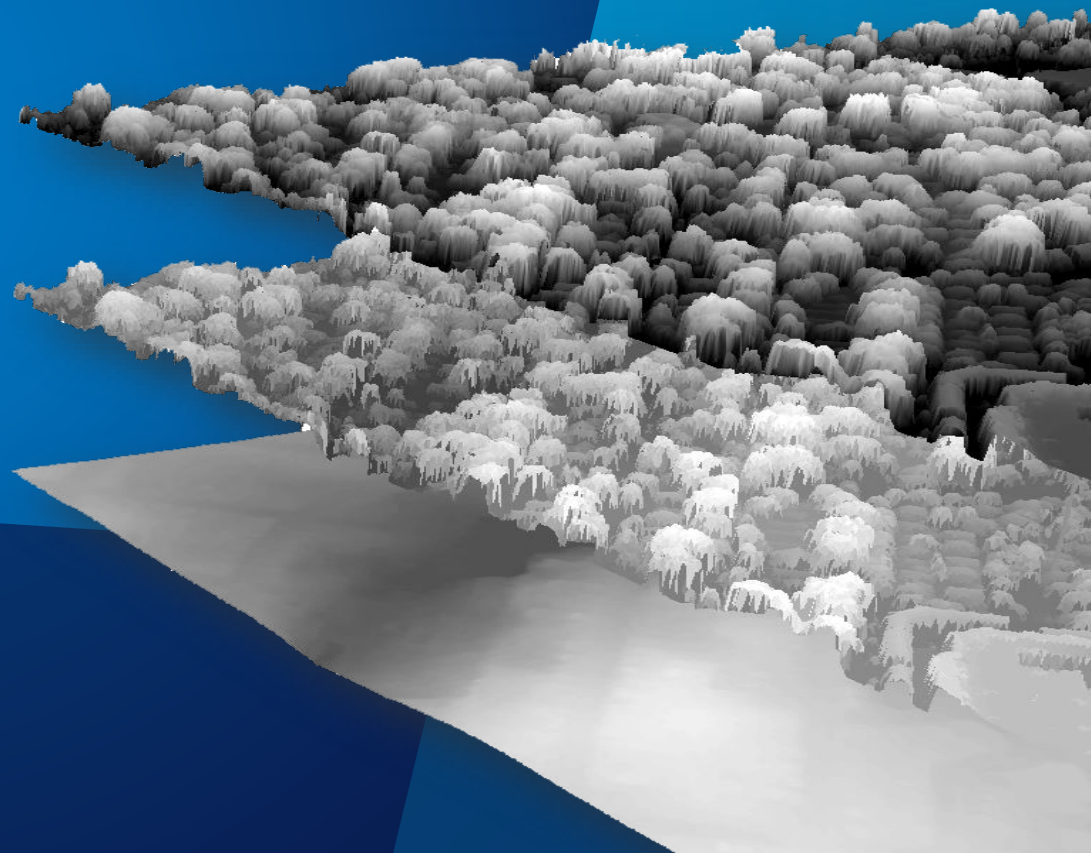
Imagery

- Basemaps Imagery
  - ArcGIS for Desktop
  - ArcGIS Online
- Multi-Spectral Imagery
  - Landsat
  - NAIP
- Temporal Imagery
  - Historical photos
  - Landsat NDVI



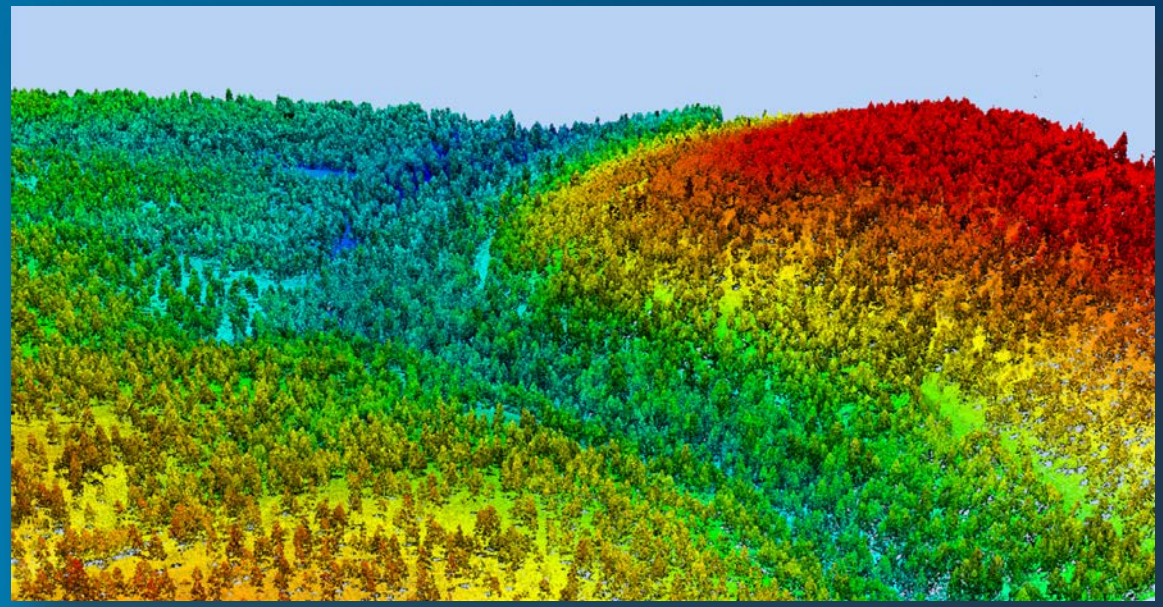
Imagery Tour

Demo



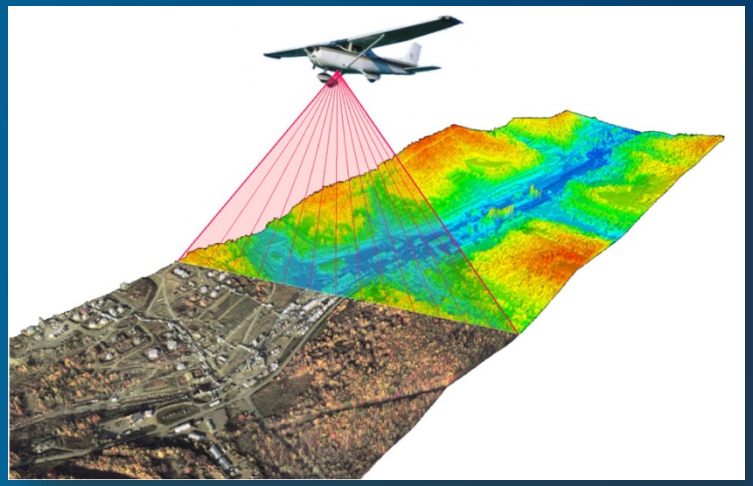
Common Needs

- Store and manage imagery/lidar
- Disseminate as a basemap (web, desktop)
- Imagery/lidar distribution
- Serve to CAD or non-GIS clients
- Feature creation or updates
- Image analysis or processing
- Historical image analysis



Common Concerns

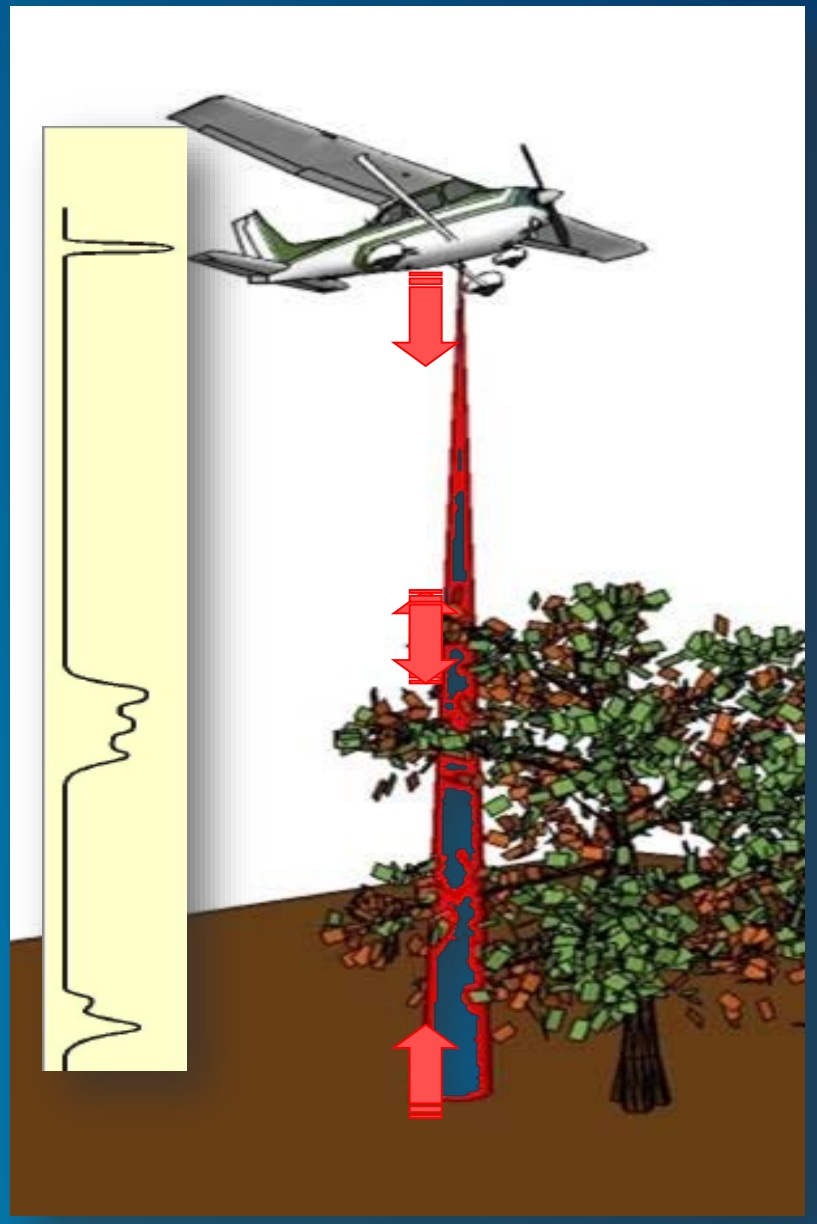
- Cost of image acquisition
- Lack of storage space
- Performance
- Public requests
- Requests from other government entities
- Historical imagery access and management



LiDAR

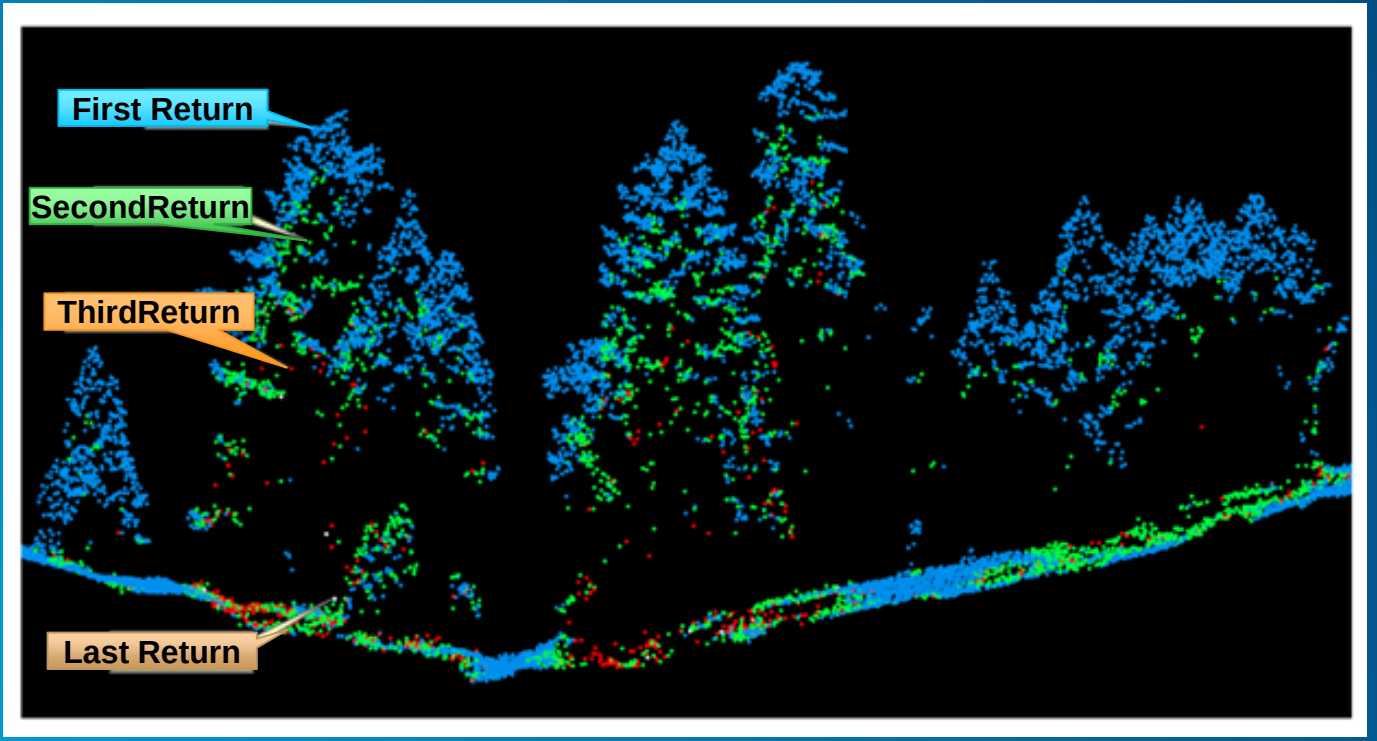
Light Detection And Ranging

Optical remote sensing technology that measures the distance from the sensor to a target



Lidar Data

Very rich, but contains a lot of data not required for many applications



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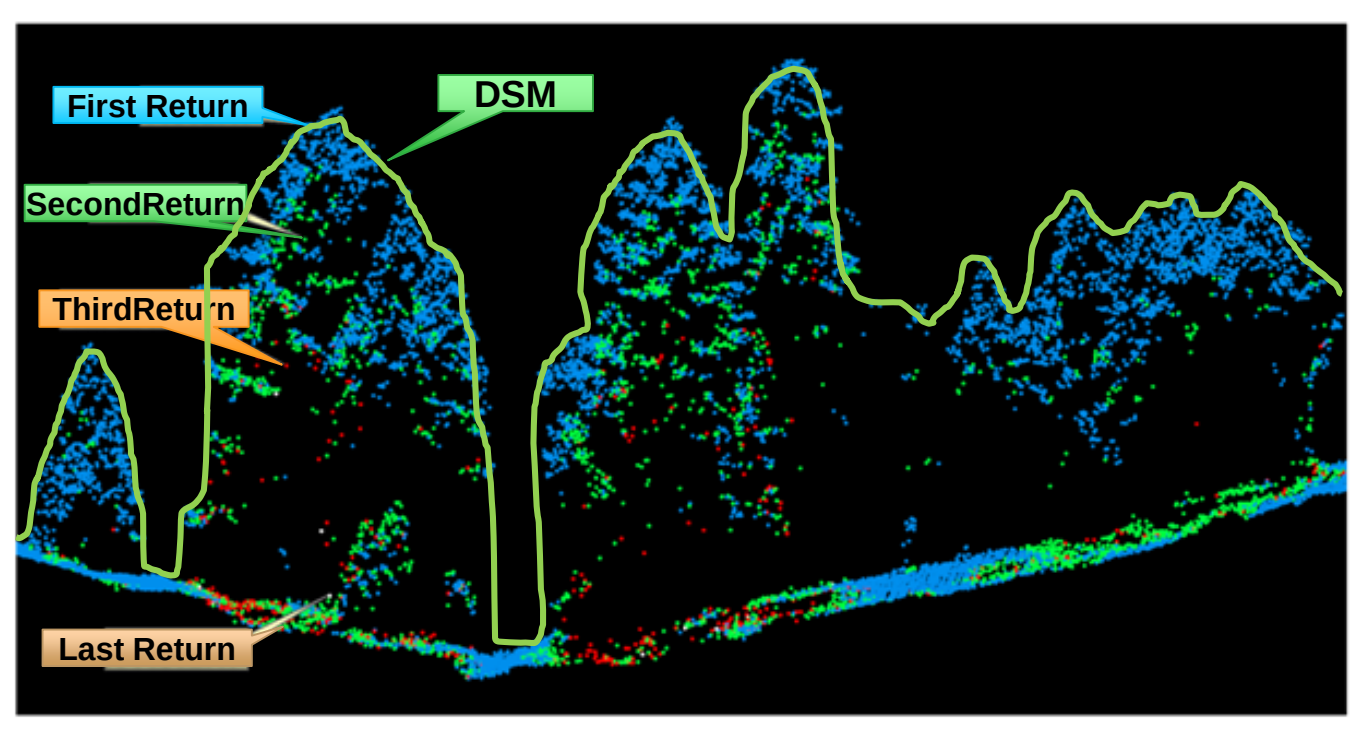

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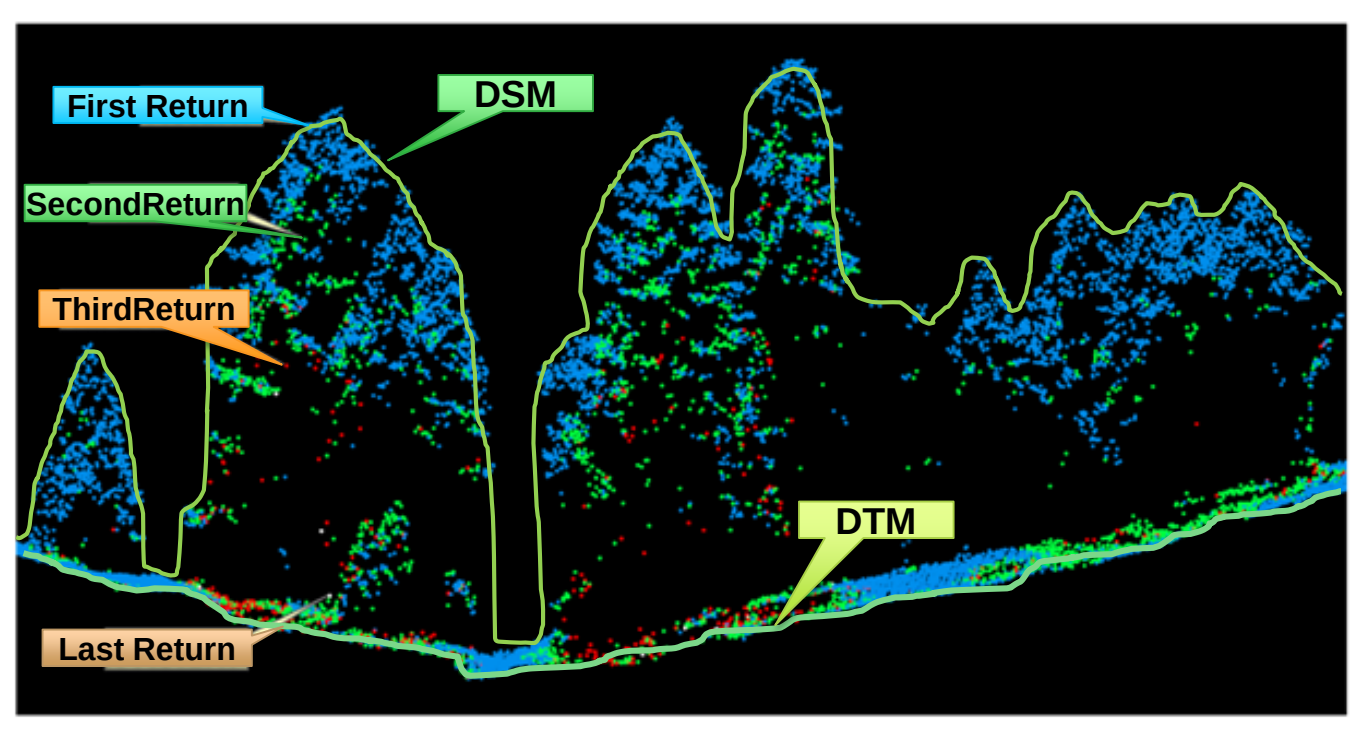

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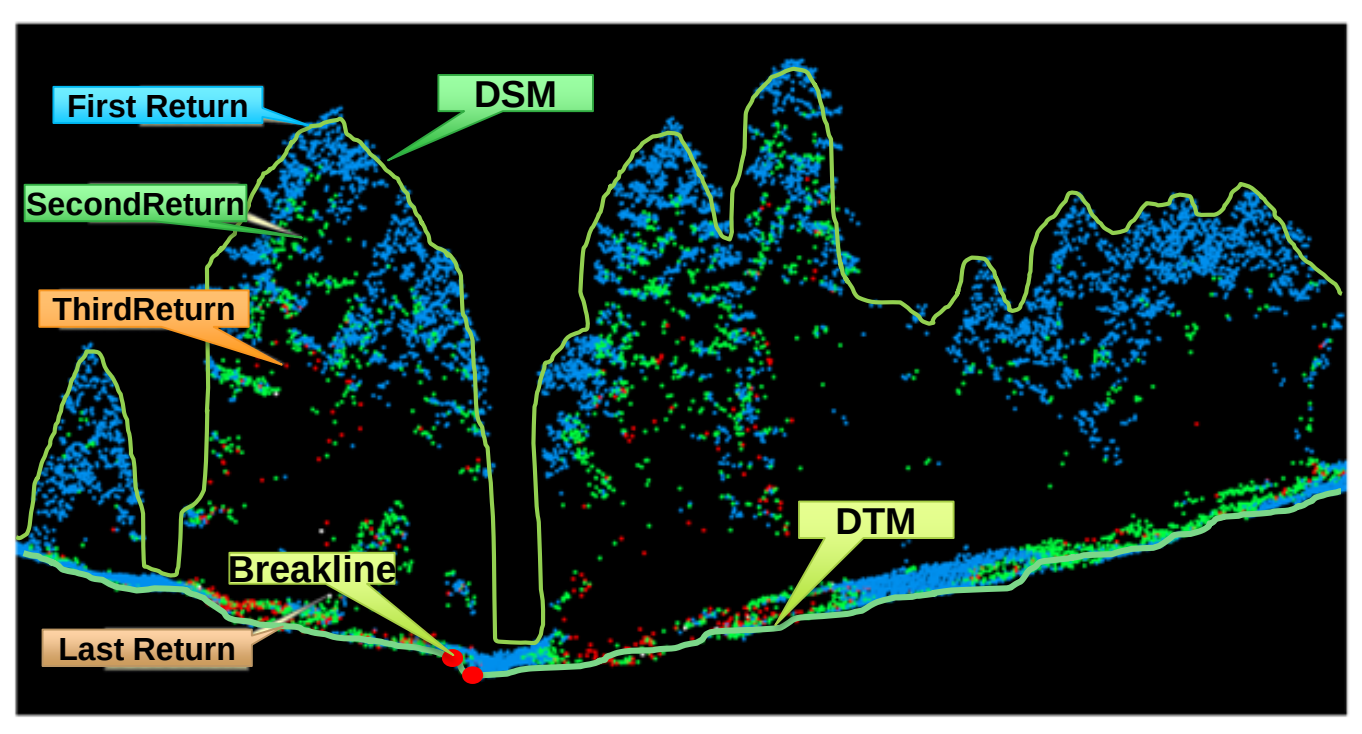
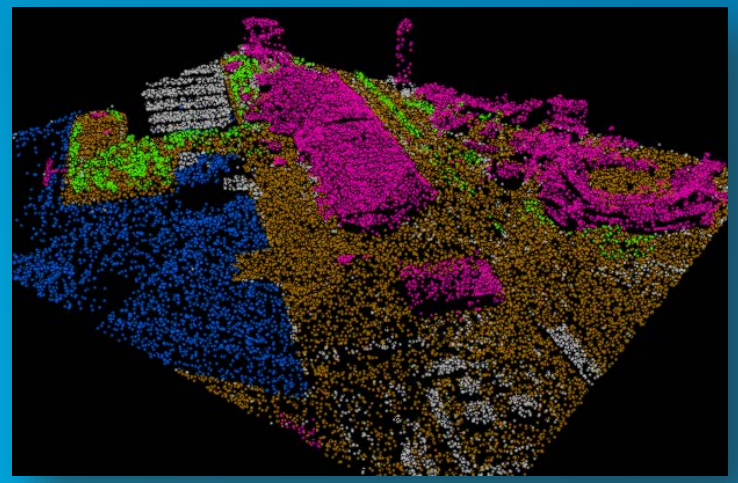
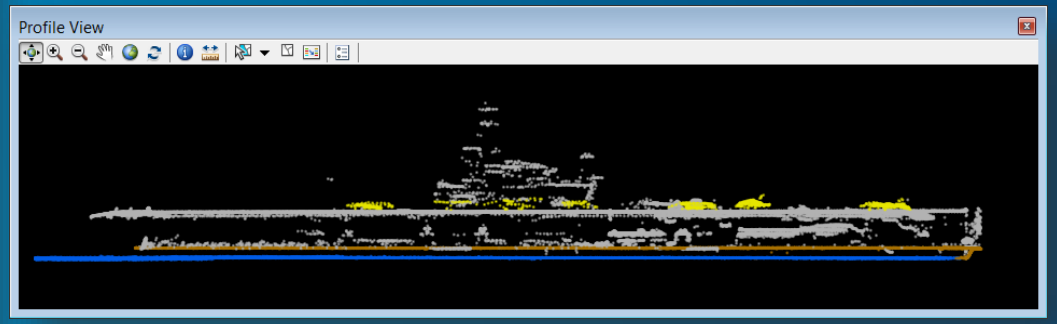


LAS Dataset

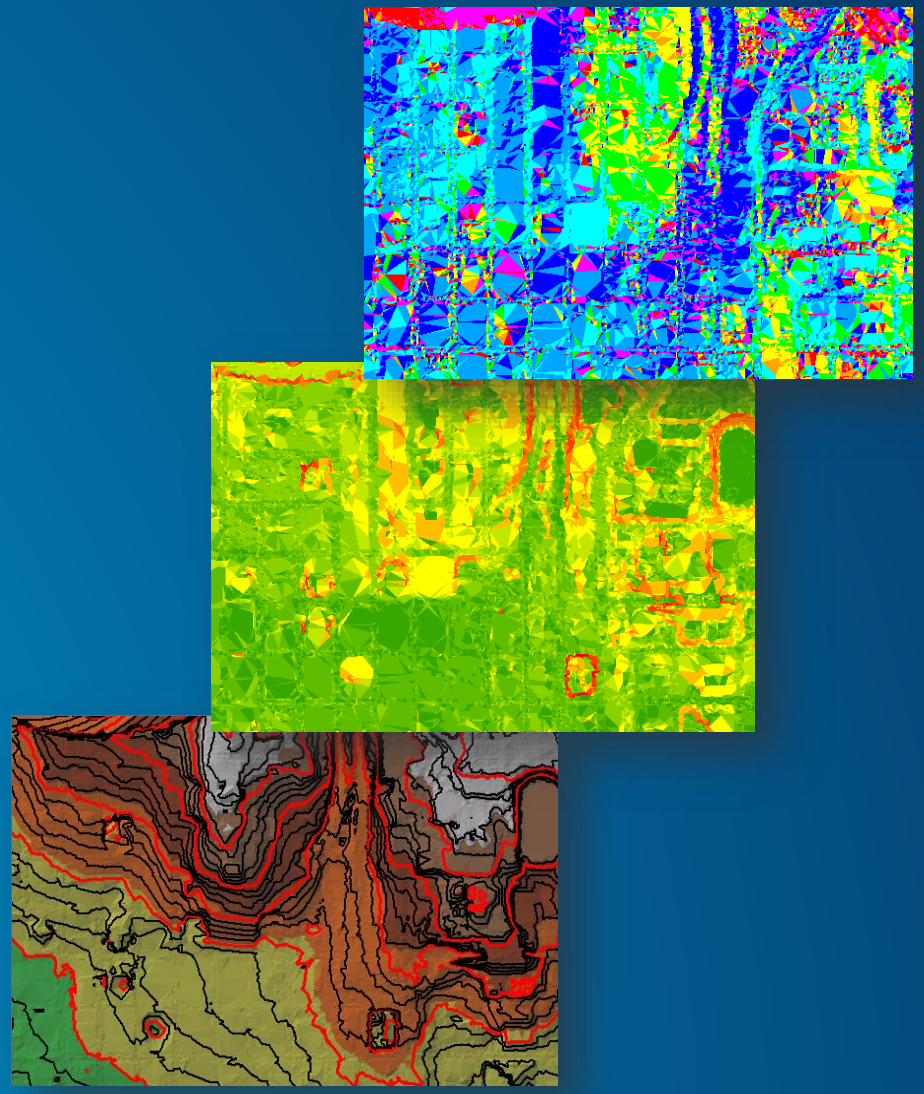
- New data type at 10.1
- File based
- References LAS files on disk
- Optionally reference breakline data
- Treats a collection of LAS files as one logical dataset



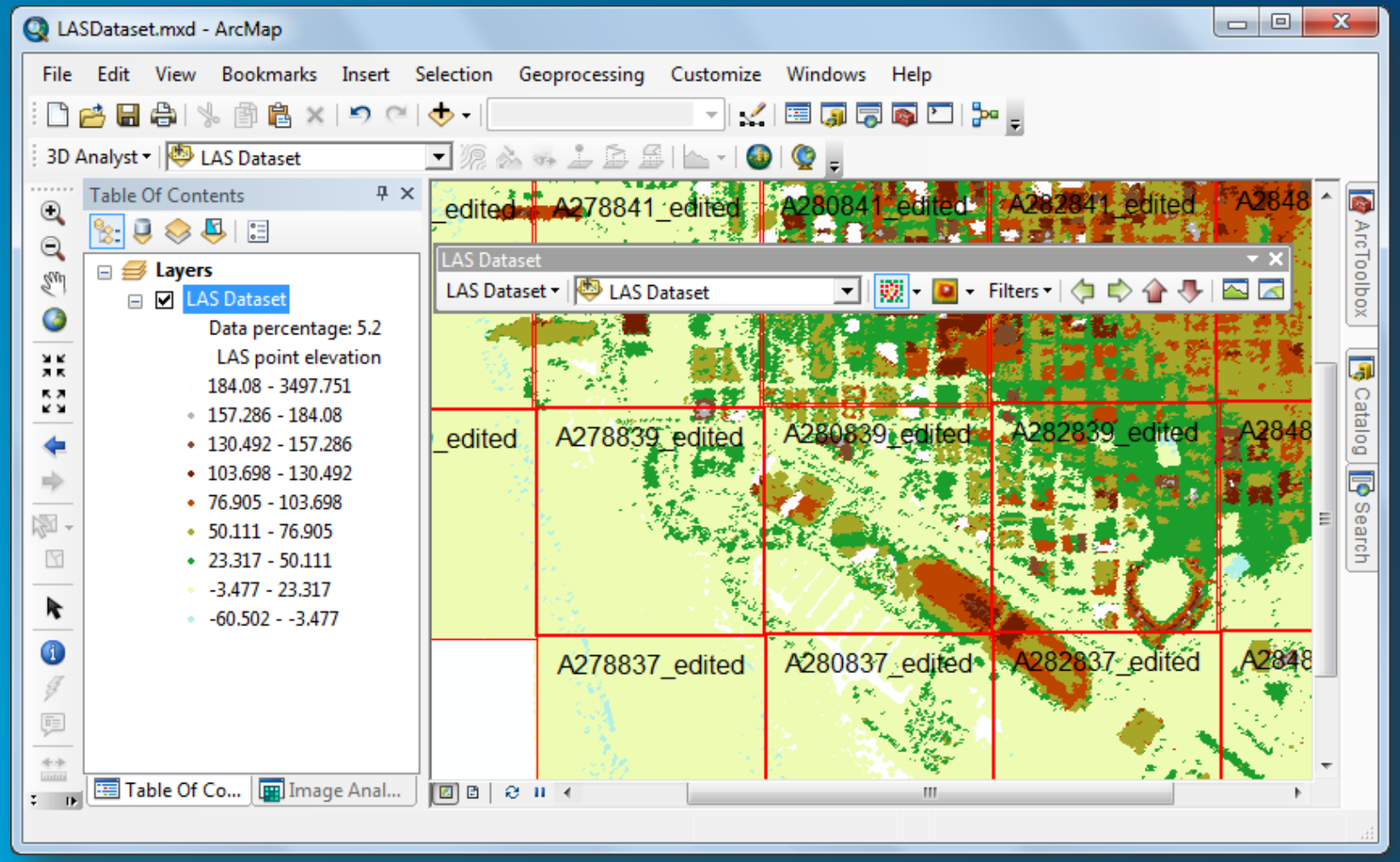


LAS Dataset Strengths

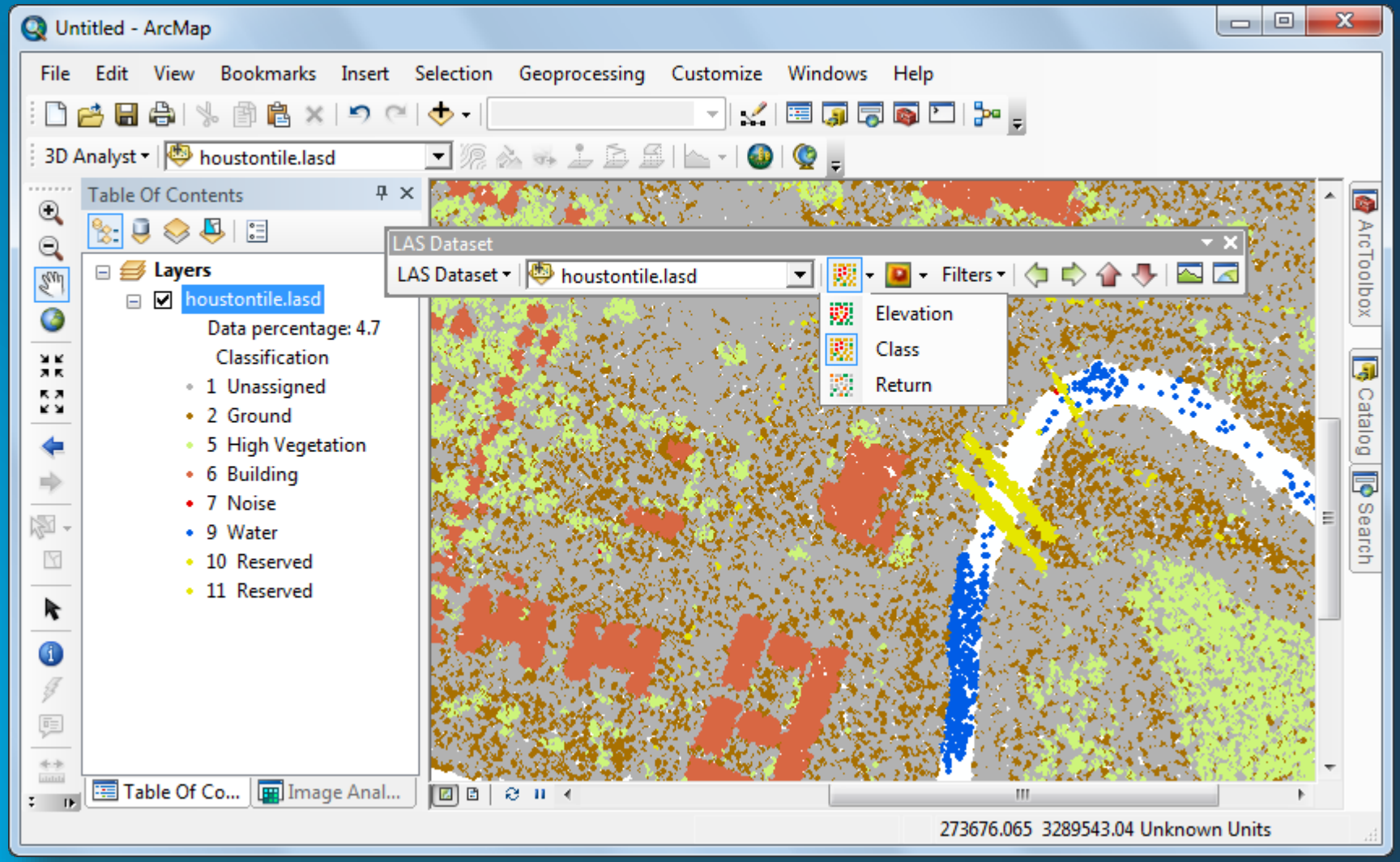
- **Scalability**
  - Works directly on LAS files
- **Data Integration**
  - Point cloud and breakline support
  - Storage efficient
- **Data Management**
  - I/O efficient
  - Edit LAS classifications



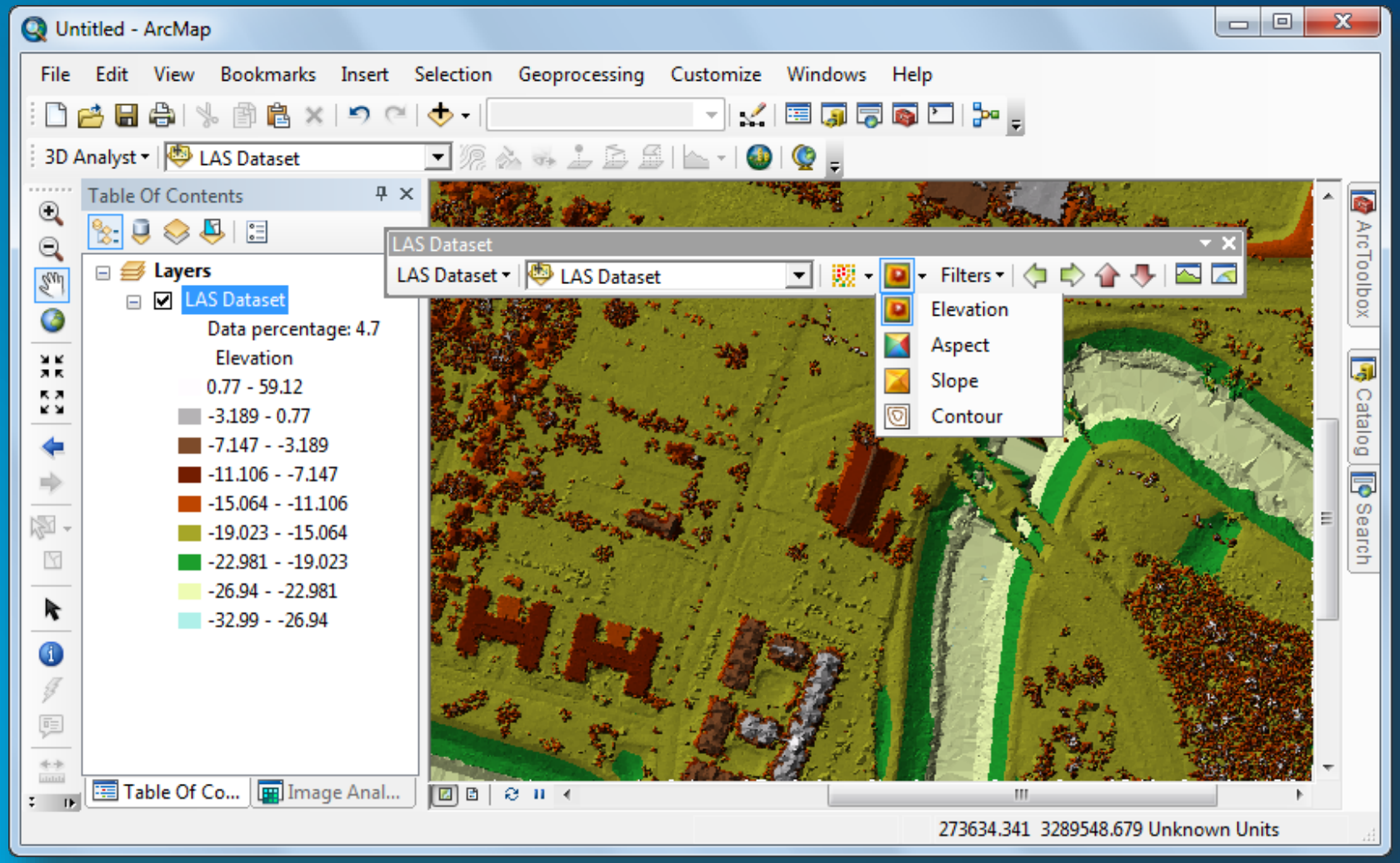
LAS Dataset – LAS File Extents



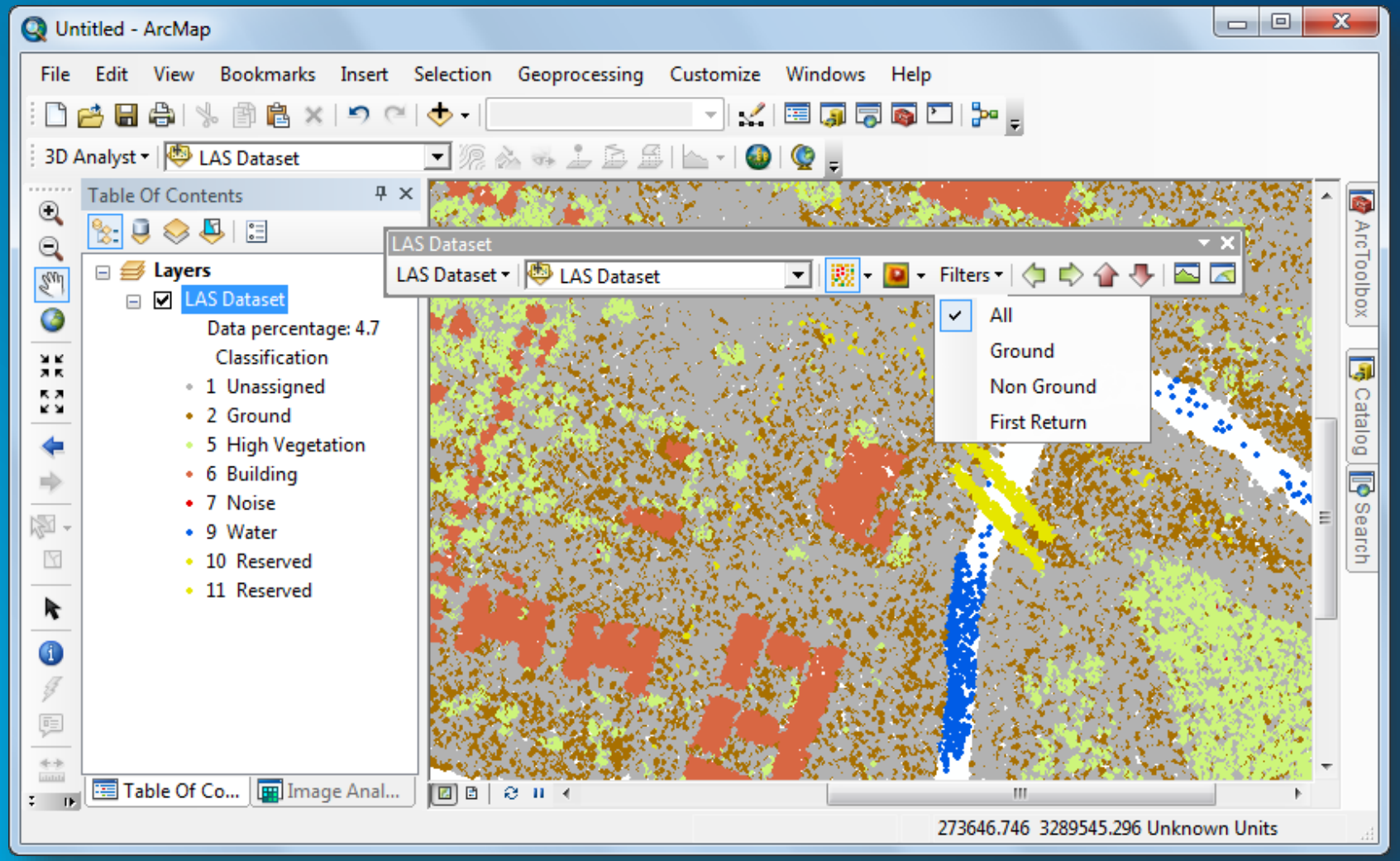
LAS Dataset – Point display



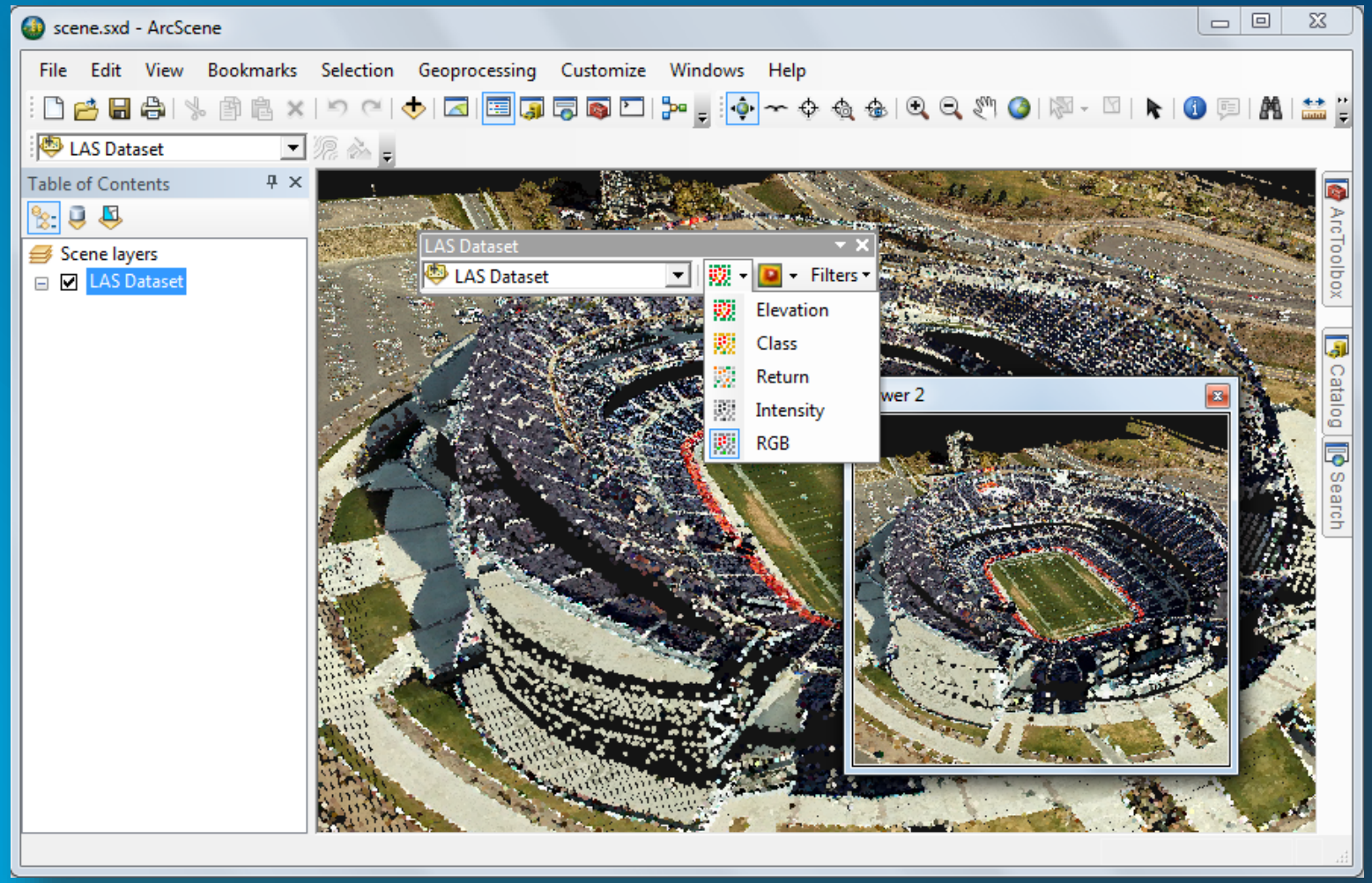
LAS Dataset – Surface Display



LAS Dataset – Filters

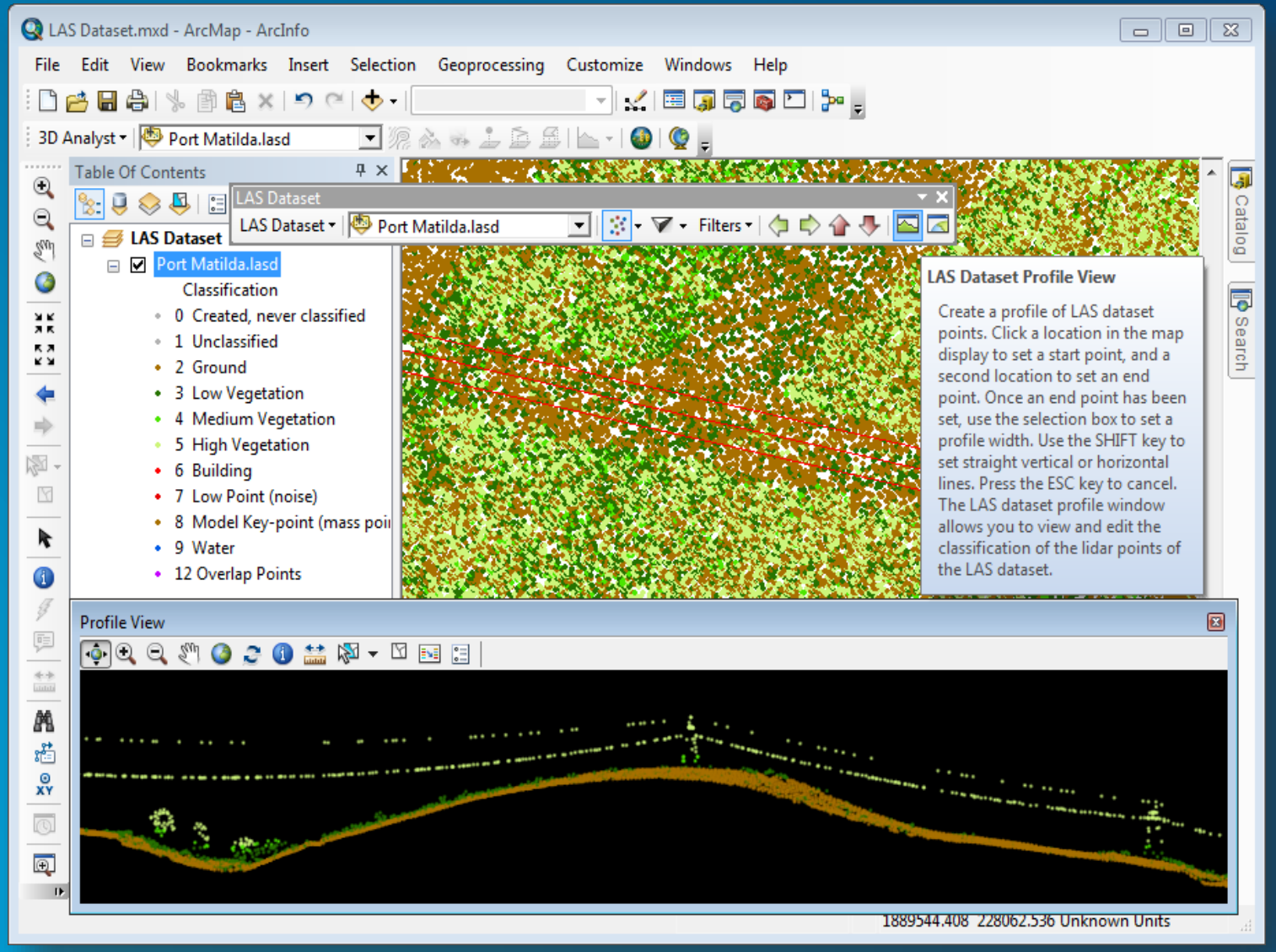


LAS Dataset – 3D Display in ArcScene



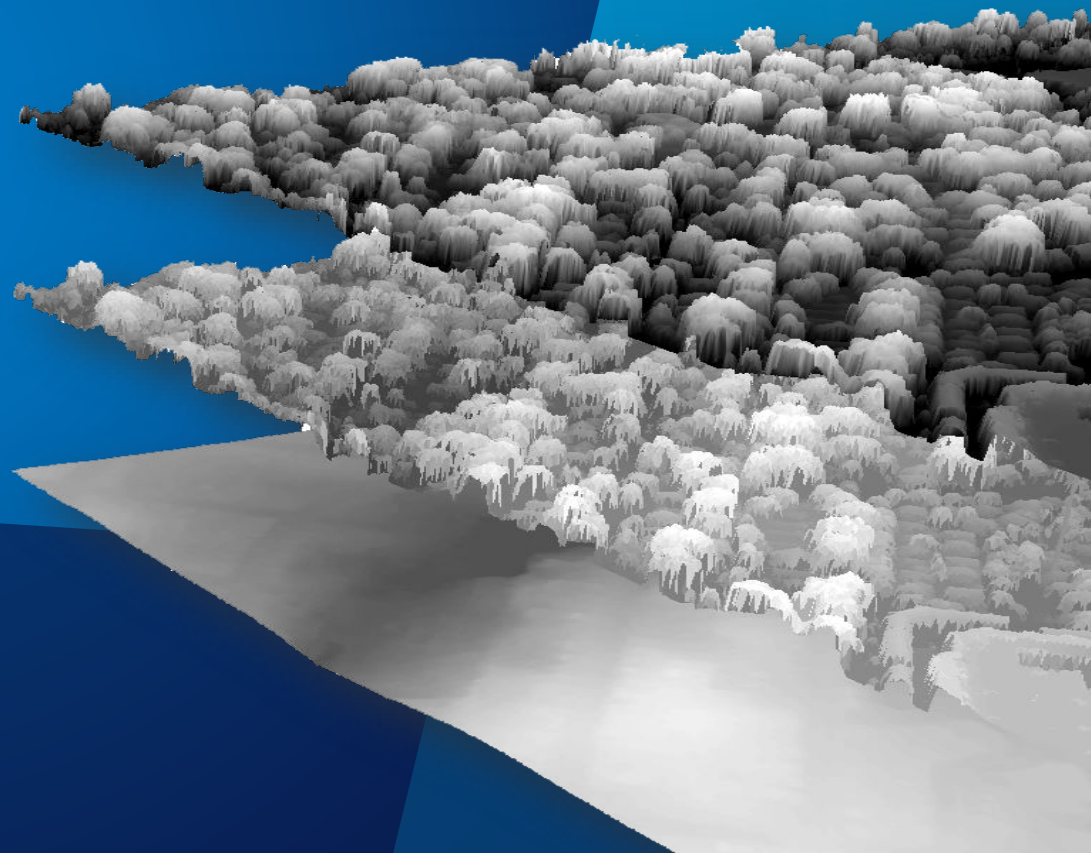
Data Courtesy of Merrick & Co.

LAS Dataset – Profile View



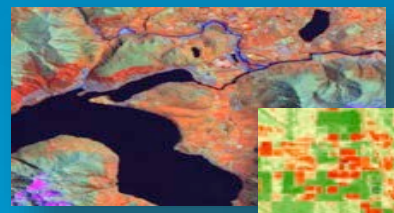
LAS Dataset

Demo

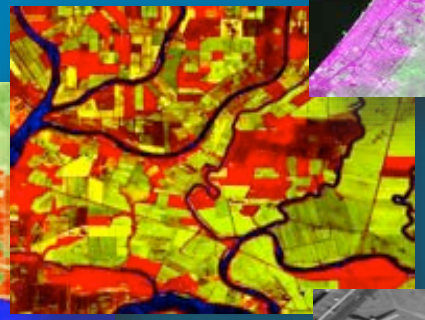


ArcGIS Tools for Imagery

Color Balance



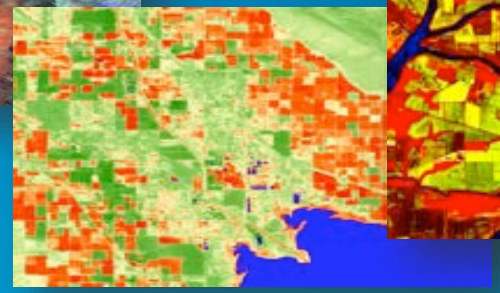
Mosaicking



Change Analysis

3D Measurement

Automatic Alignment



Ortho-Rectification

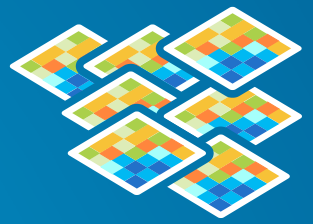
Classification

Pan Sharpen

Choices When Working with Imagery

ArcGIS and Imagery

- **One image at a time**
  - Files
  - Image Analysis Window
  - Geoprocessing
- **Collections of images**
  - Mosaic Datasets
  - Image Analysis Window
  - Geoprocessing
- **Imagery as a service**
  - Web
  - Image Analysis Window
  - Developer APIs
  - ArcGIS Online



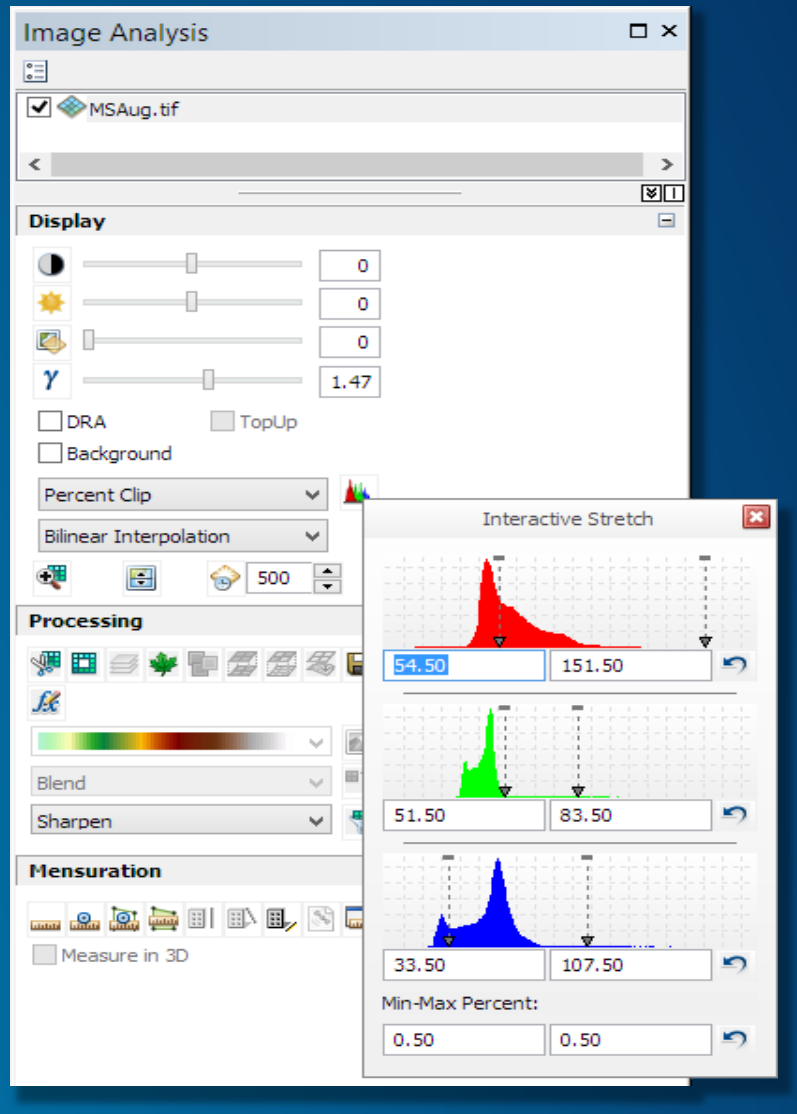


Image Analysis Window

Single click access to common imagery tools

- **Enhancement**
  - Contrast, brightness, gamma, …
  - Dynamic range adjustment
- **Interpretation**
  - Sharpen, top is up, …
- **Processing functions**
  - Clip, mask
  - StackBands, NDVI
  - Orthorectify, PanSharpen, …
- **Has its own layer list**
- **Access to accelerate display**

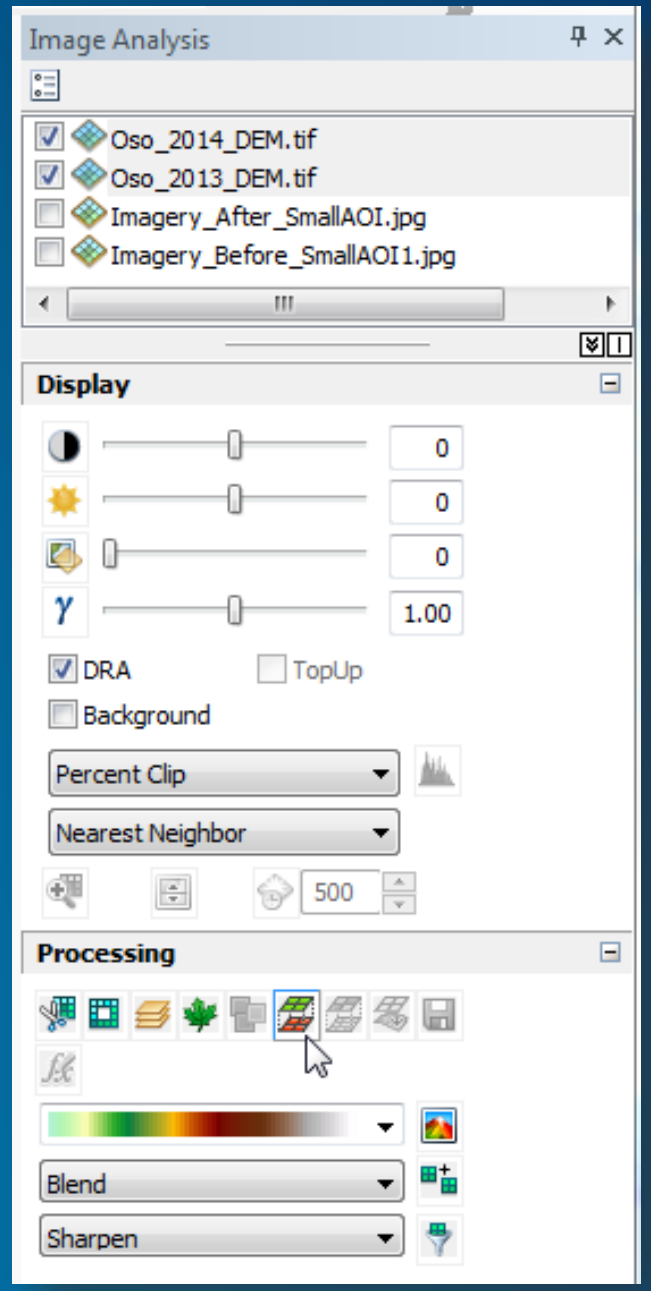


Image and Lidar Analysis

- Image classification tools
- Change detection workflows
- Geoprocessing tools

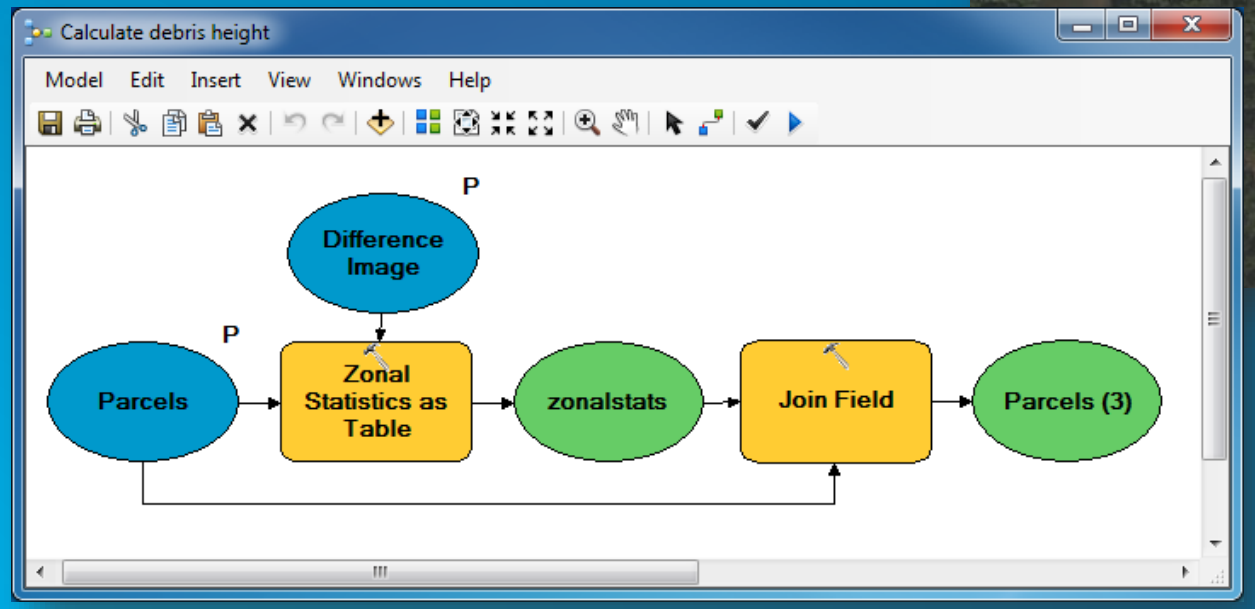
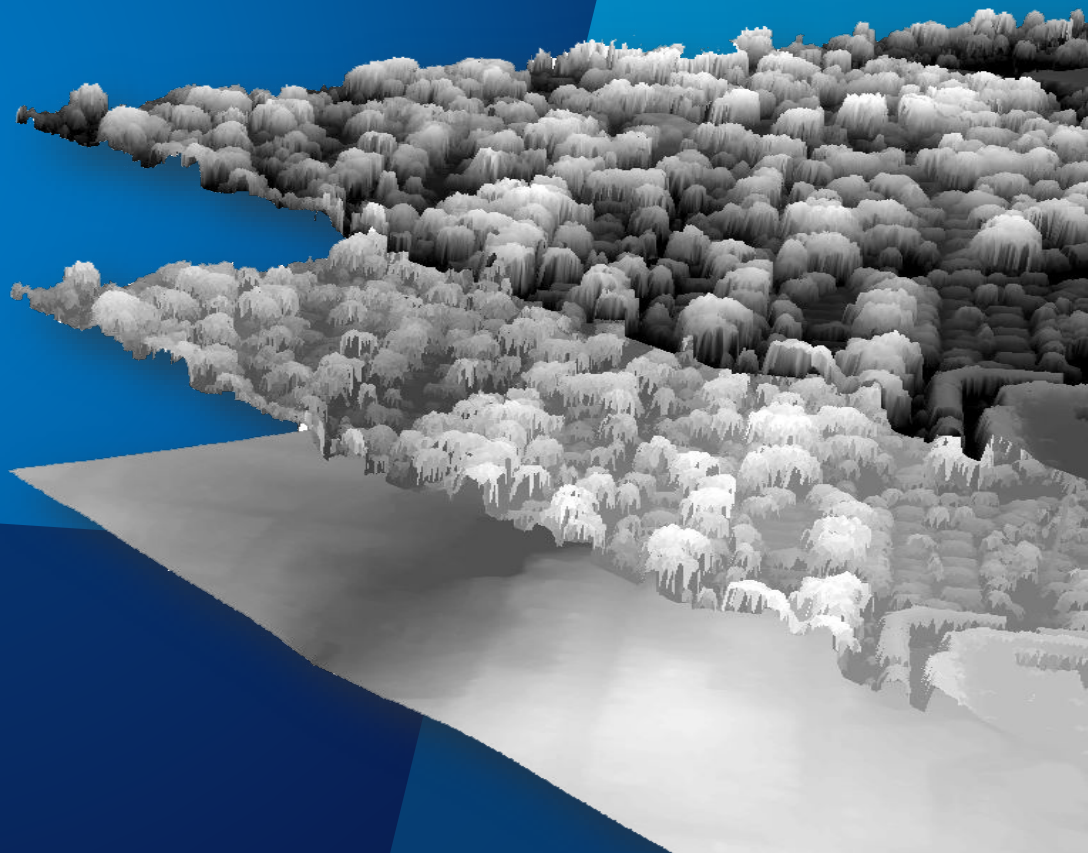


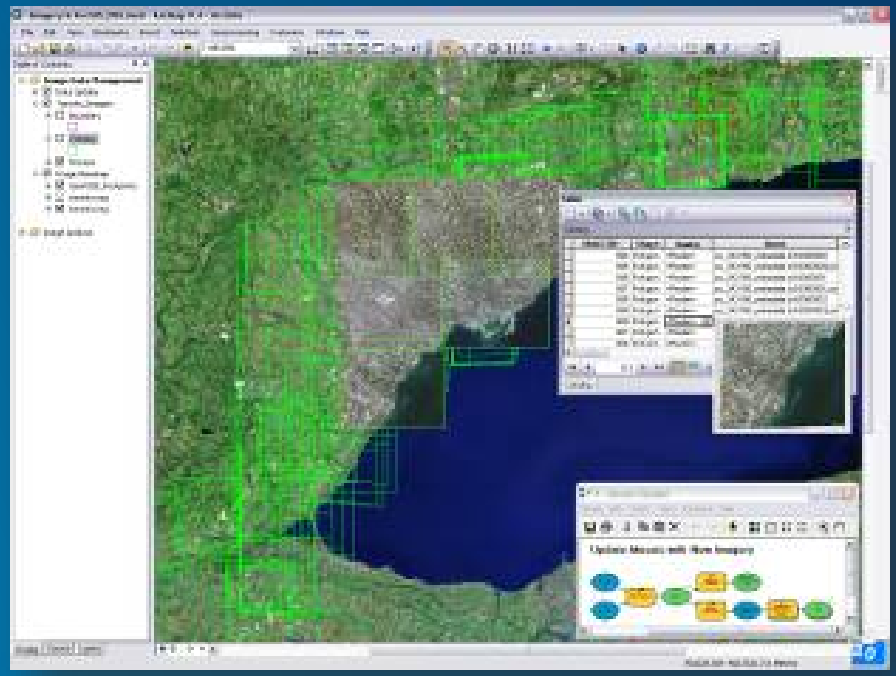
Image and Lidar Analysis



Mosaic Dataset

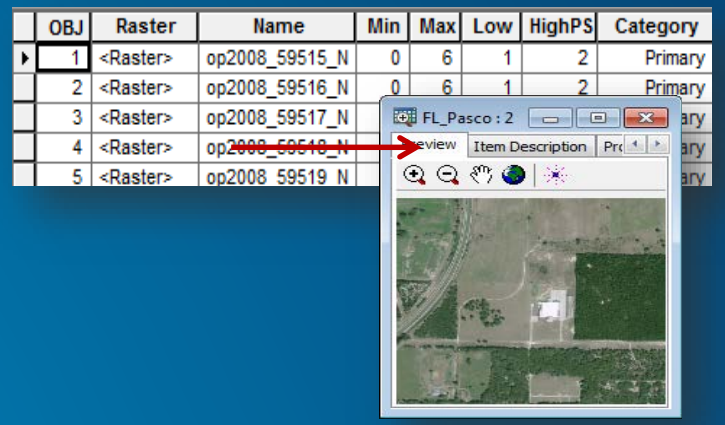
Optimum model for imagery data management

- A geodatabase data model used to catalog, process, visualize and share your collections of imagery and lidar data
- Support for
  - Multiple image formats
  - LAS files
  - LAS datasets
  - Terrain datasets
- Unlimited size*
- Provides dynamic rasterization, mosaicking, and on-the-fly processing

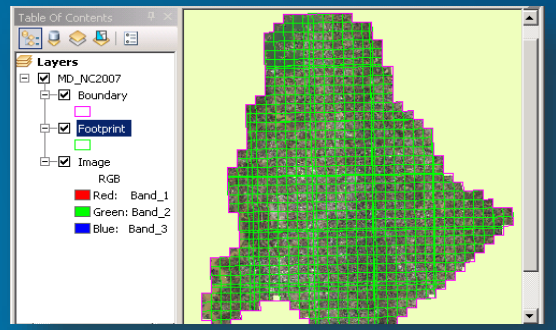


Using a Mosaic Dataset

- As a catalog
  - Selection/query
  - Add selected images to map
  - View data and metadata
  - Time aware

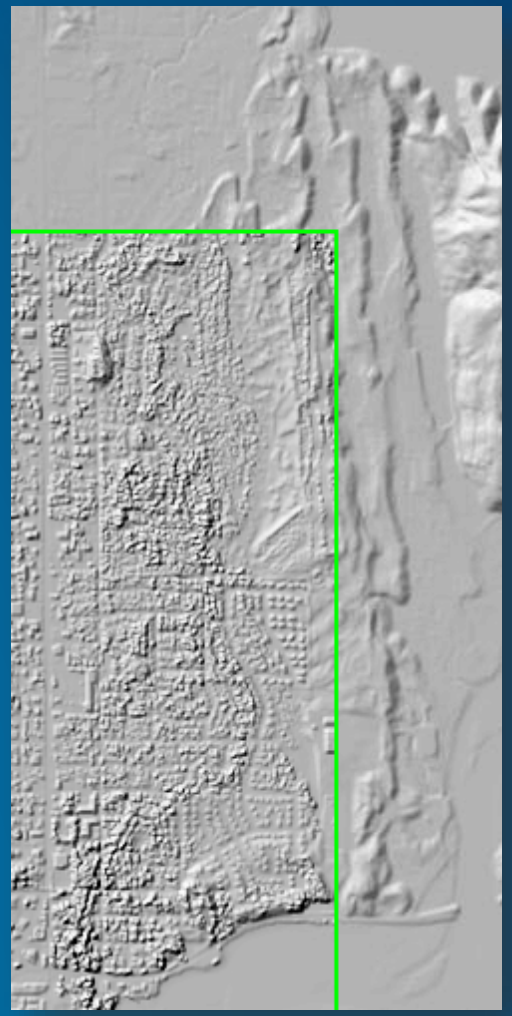


- As an image
  - Seamless display
  - Export a raster dataset
  - Perform pixel-based analysis
  - Use as an input to geoprocessing tool



Dynamic Mosaicking and Rasterization

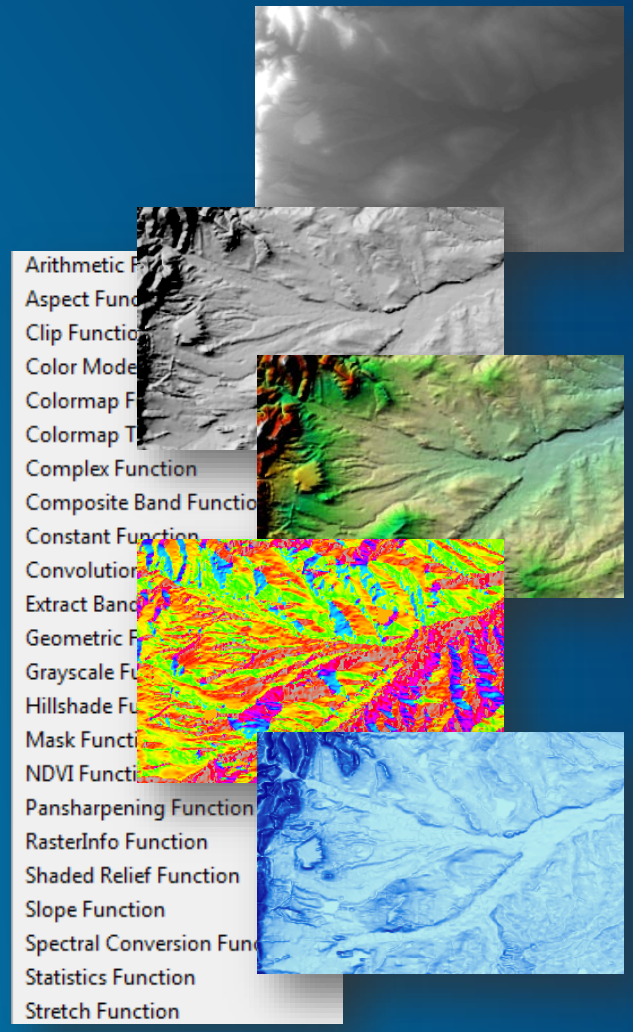
- Display multi-resolution data together
- Mosaicking rules
  - Control the order of display
    - By attribute
    - Closest to center
  - Ensure best data is always displayed
  - Can be controlled by user
- Queries
  - Refine selection of data



On-The-Fly Processing

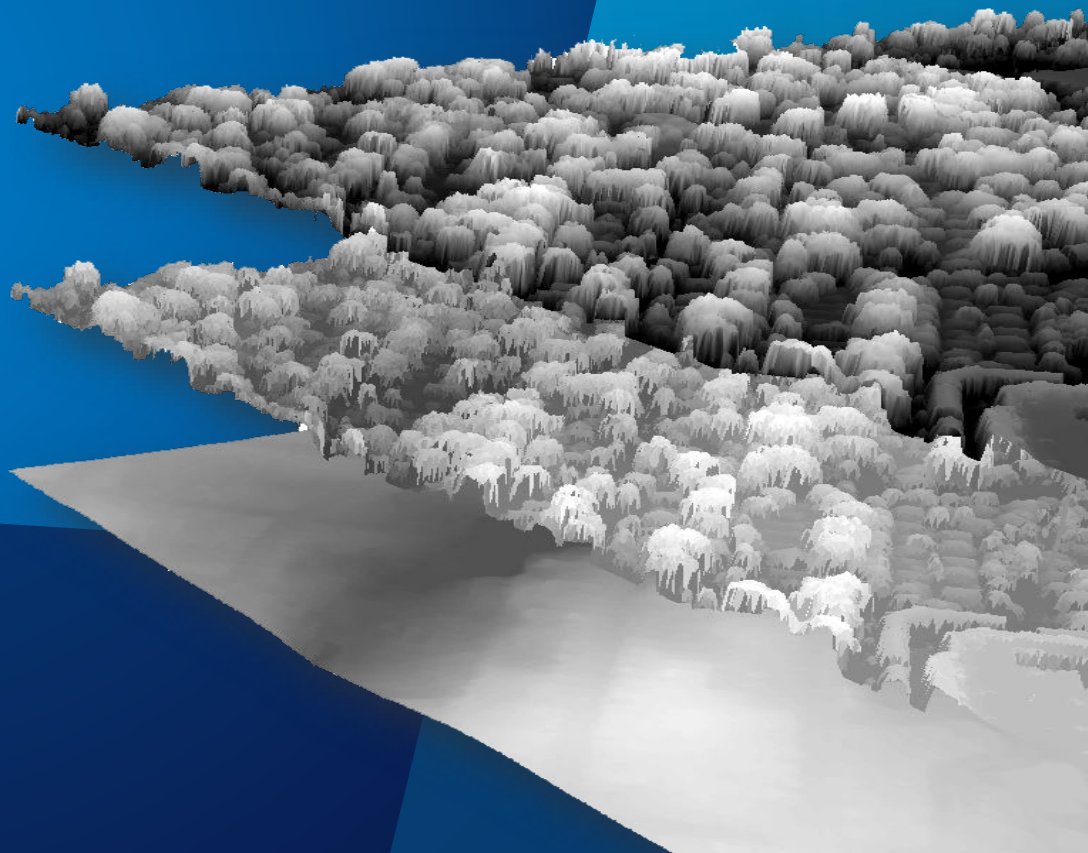
Creating multiple products from a single source

- Data is processed as it is accessed
- Create multiple products from one source
- Processing for elevation
  - Hillshade
  - Shaded Relief
  - Aspect
  - Slope
  - Convolution Filters
- Define processing functions
  - On each item
  - On entire collection



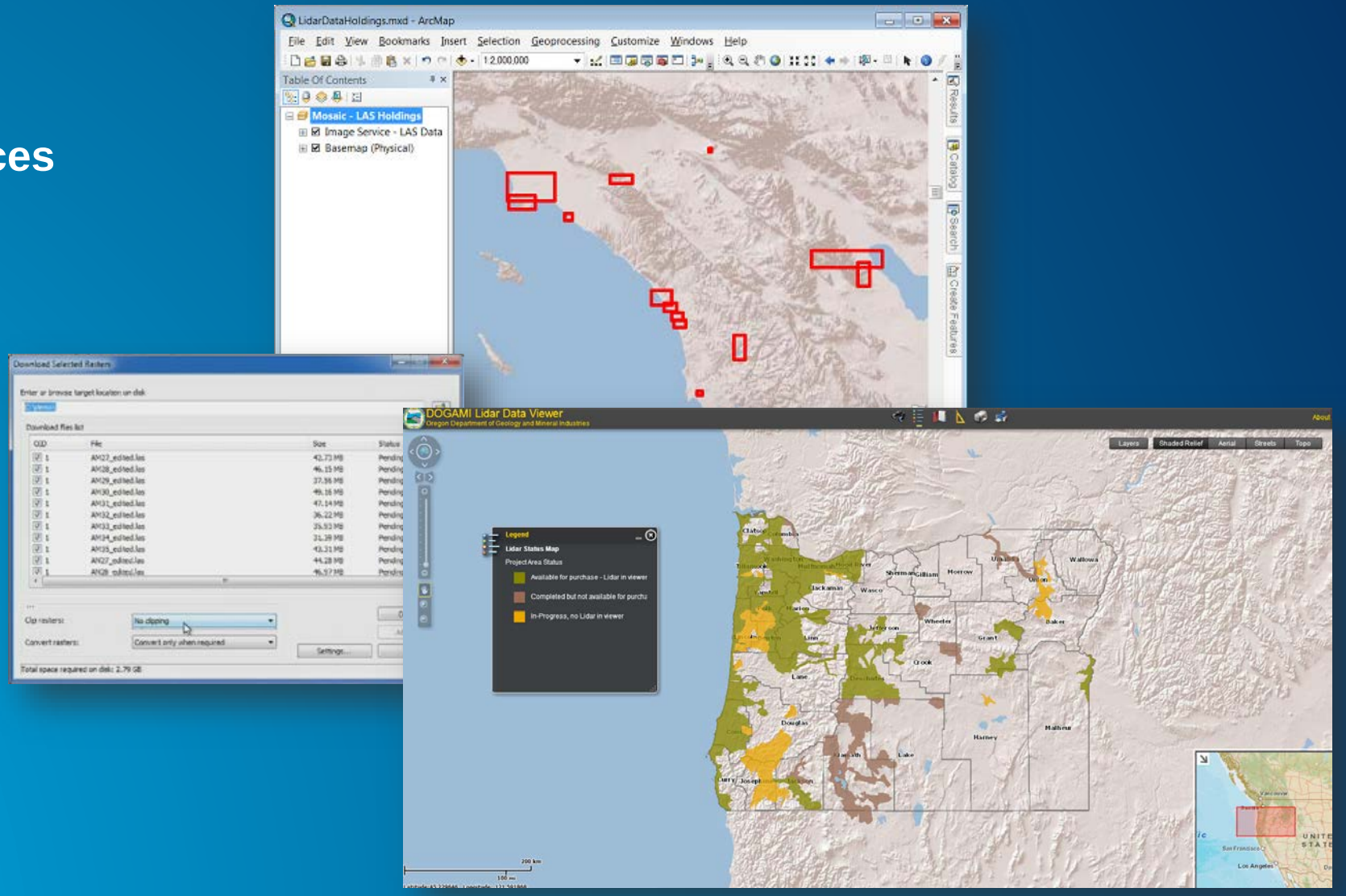
Mosaic Dataset

Demo



Sharing Imagery and LiDAR

- Share as image services
- Easy to
  - Access
  - Discover
  - Download



Sharing as an Image Service

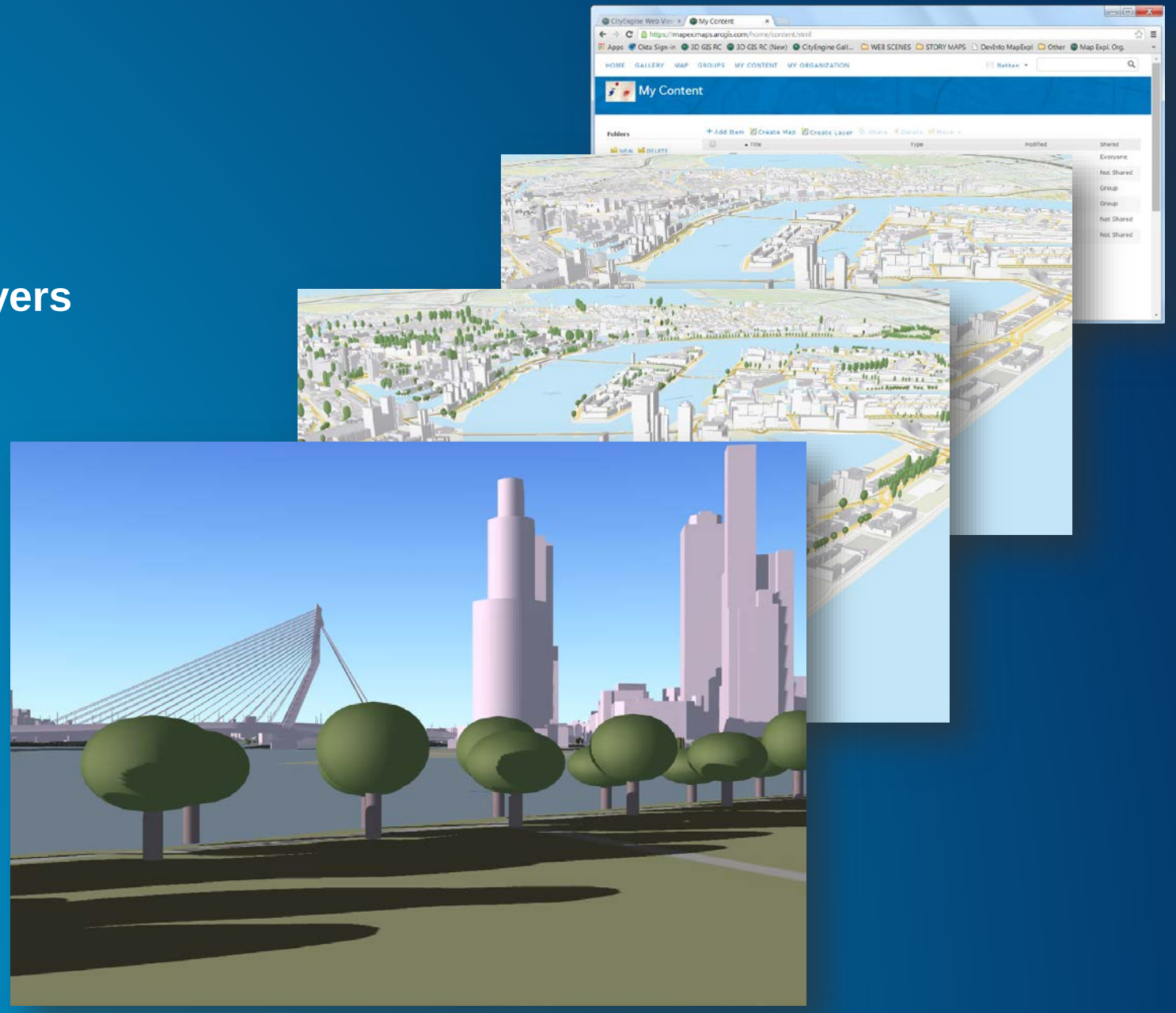
- Similar functionality as local mosaic dataset
- Access as a catalog
  - Select/download images
  - Time aware
- Access seamless mosaic
- REST
- WCS/WMS

3D Web Scenes

- Item on ArcGIS Online
- Mash-up of streaming 3D / 2D layers

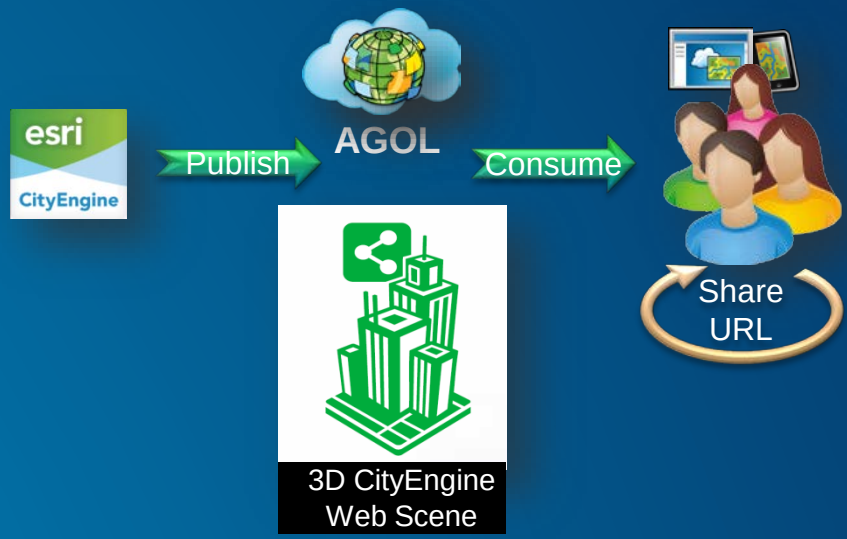
- 3D Symbology
- 3D Labels

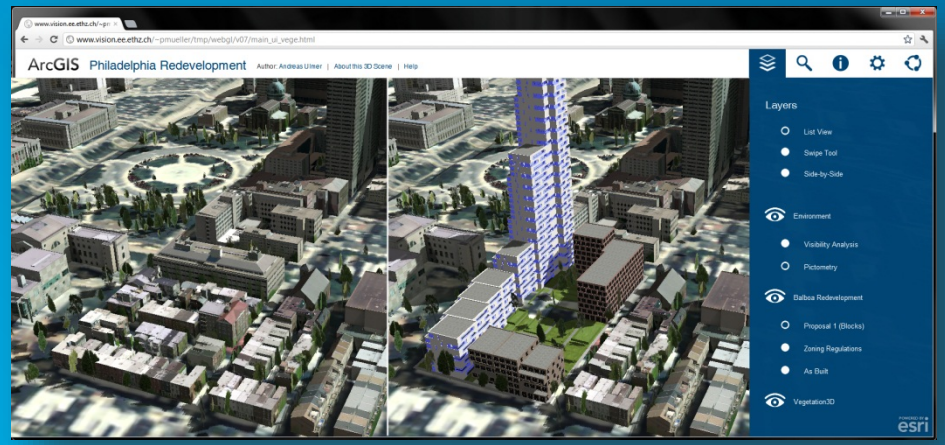
- 3D Scene Navigation
- 3D Environment

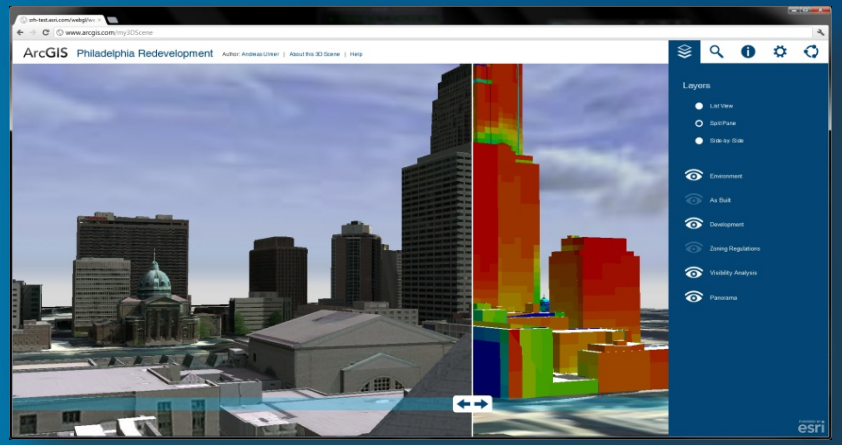


Sharing as 3D CityEngine Web Scenes

- 3D in the browser
- Easy-to-use (cloud solution)
- Chrome, Firefox & Safari
- Modern GUI & graphics

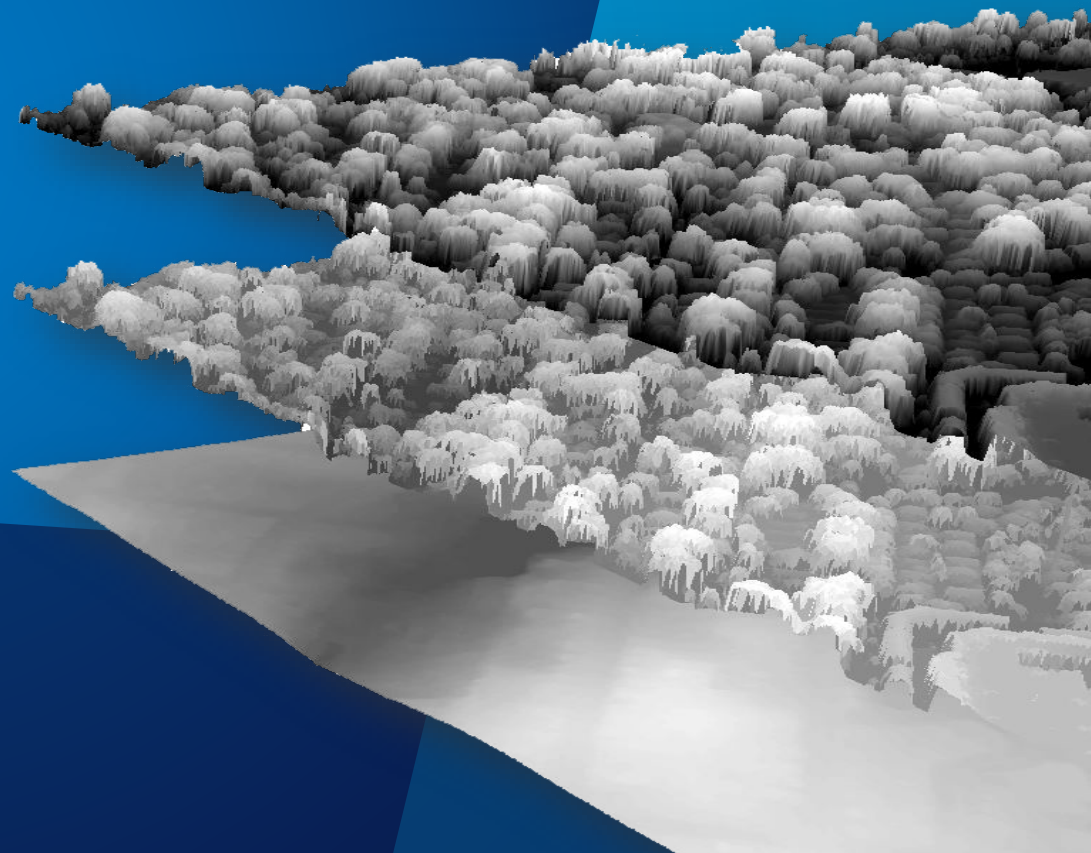






Sharing Imagery and LiDAR

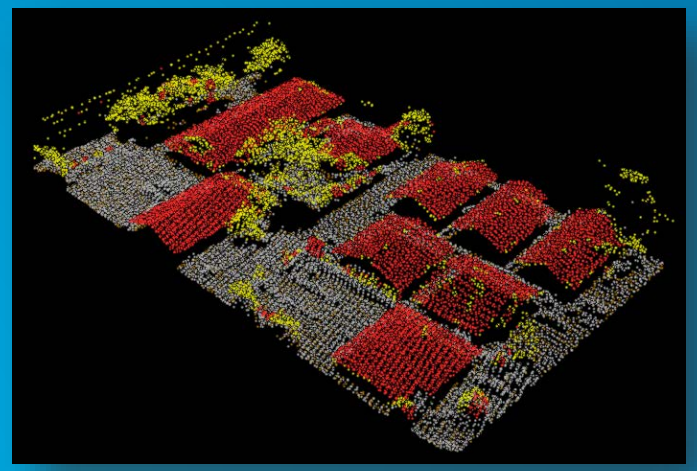
Demo

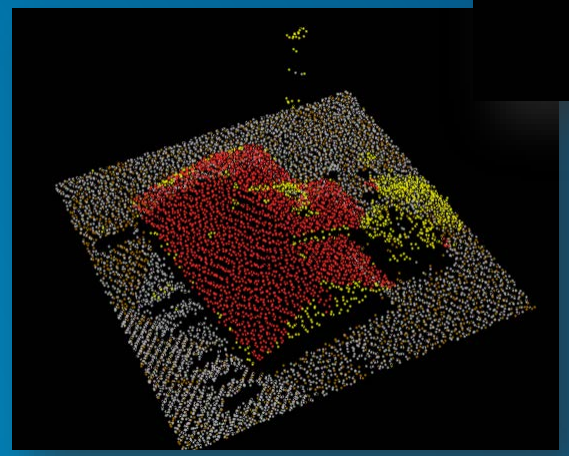


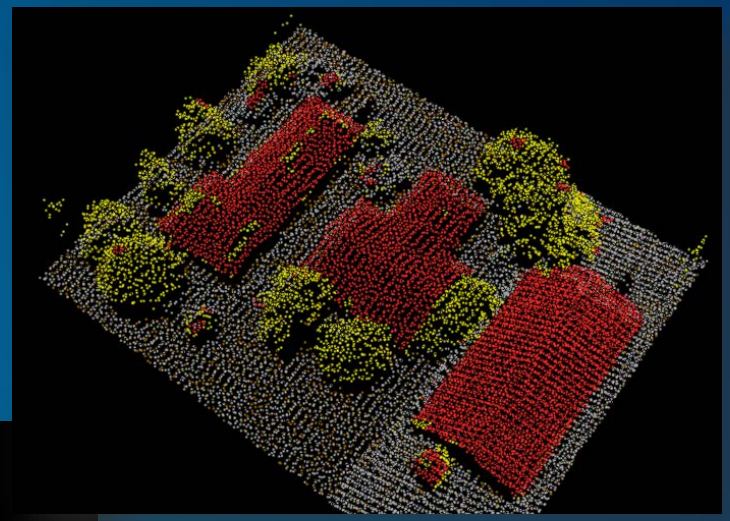
Expanding Imagery/Lidar Capabilities

- Lidar API
- Raster API

- Detect planar surfaces
- Create 3D polygons

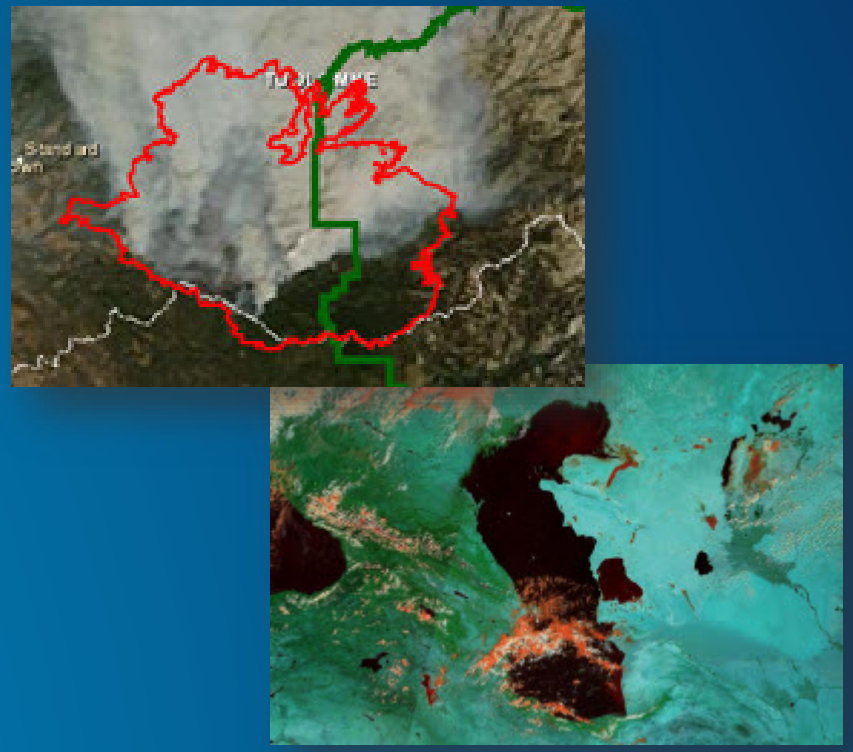




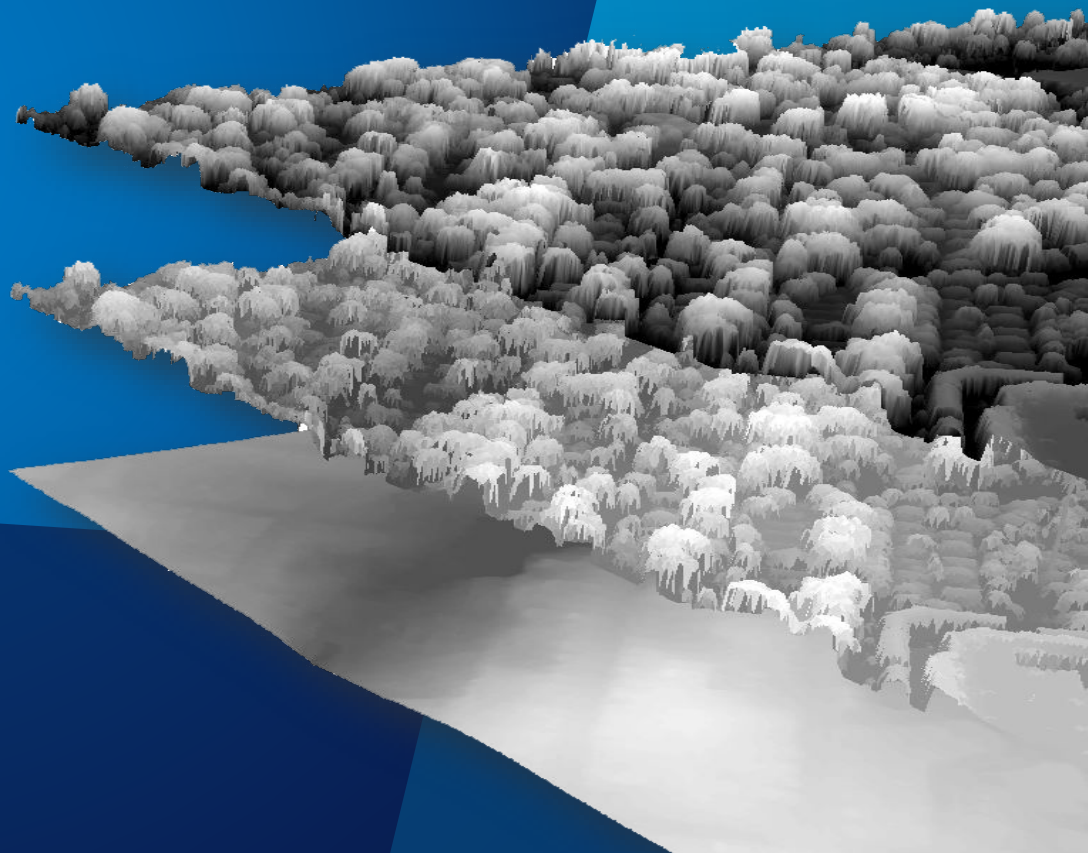


Resources

- Live Training Seminars
  - Nov 6! Smart Strategies for Managing Lidar Data
  - Workflows to Manage and Share Imagery in ArcGIS
  - Sharing Cached Imagery in ArcGIS
- Web Courses
  - Image Processing with ArcGIS
  - Georeferencing Raster Data Using ArcGIS
  - Managing Lidar Data Using LAS Datasets
  - Managing Lidar Data Using Mosaic Datasets
- GeoNet
  - https://geonet.esri.com/groups/imagery-and-rasters
  - https://geonet.esri.com/groups/lidar-resources
- http://resources.arcgis.com/en/communities/imagery/



Questions



Understanding our world.