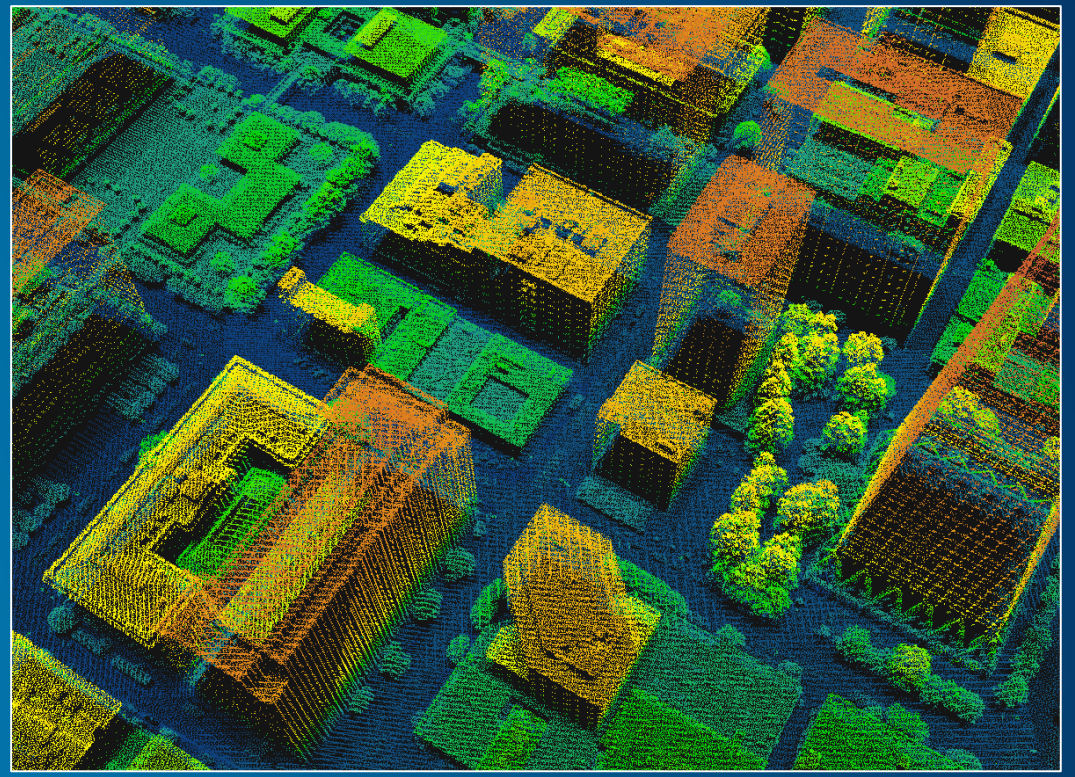
Working with Lidar and LAS Datasets

Lindsay Weitz

Agenda

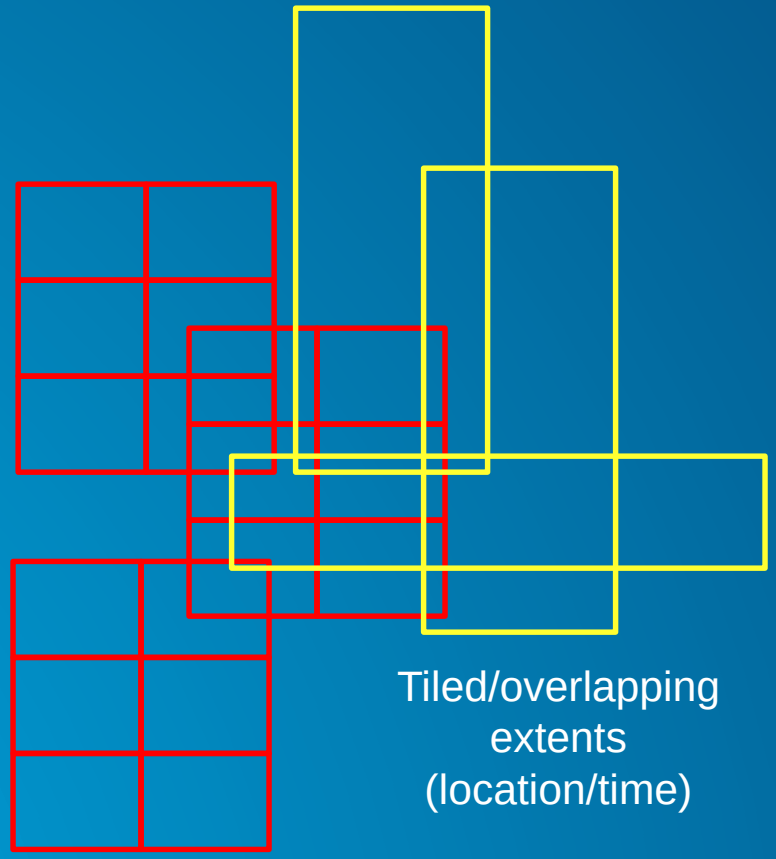
- LAS and zLAS formats
- LAS Dataset – for lidar & surface constraints
- New analysis tools for lidar
- ArcGIS Pro



Data Structures for Lidar support in ArcGIS

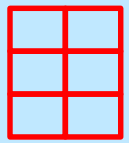
File01.las
File02.las
…
File99.las

Multiple files/folders

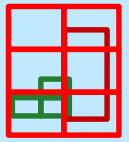


Tiled/overlapping extents (location/time)

Analyze and update



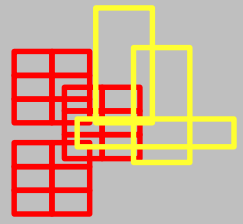
LAS dataset



Terrain dataset

LAS dataset / Terrain dataset

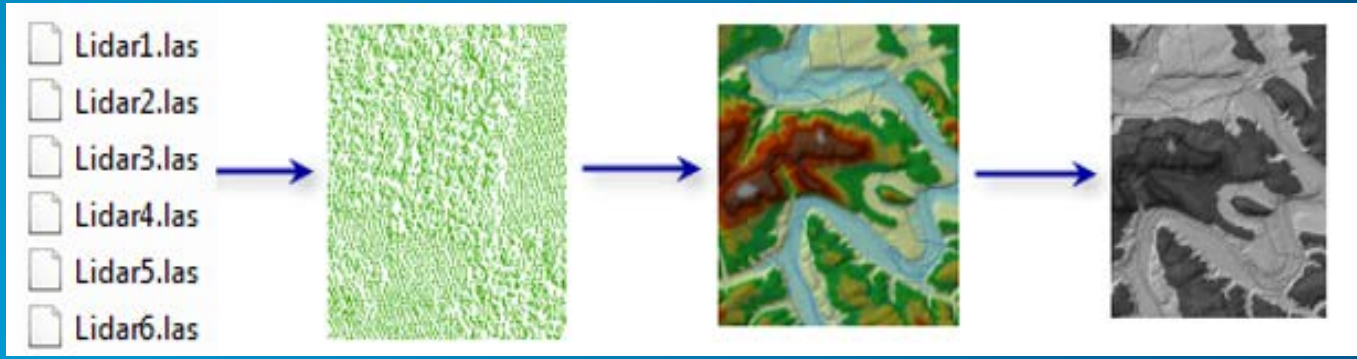
Manage, serve, share



Mosaic dataset

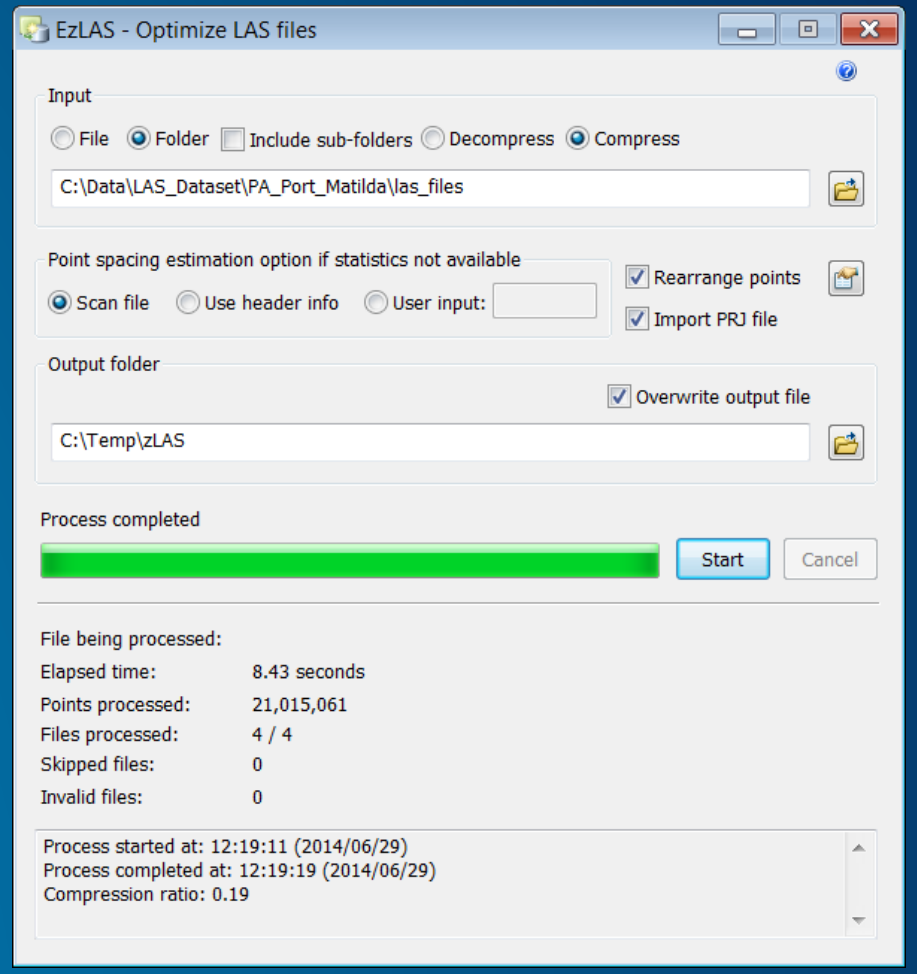
Lidar data storage – LAS files

- Binary file format developed by ASPRS
- Metadata in a header block
- Individual record for each laser pulse recorded
- Directly readable by ArcGIS
- Most common format for lidar and other point clouds (e.g. from photogrammetry), but designed as an exchange/archive format, not optimized for operational use…



Lidar data storage – zLAS

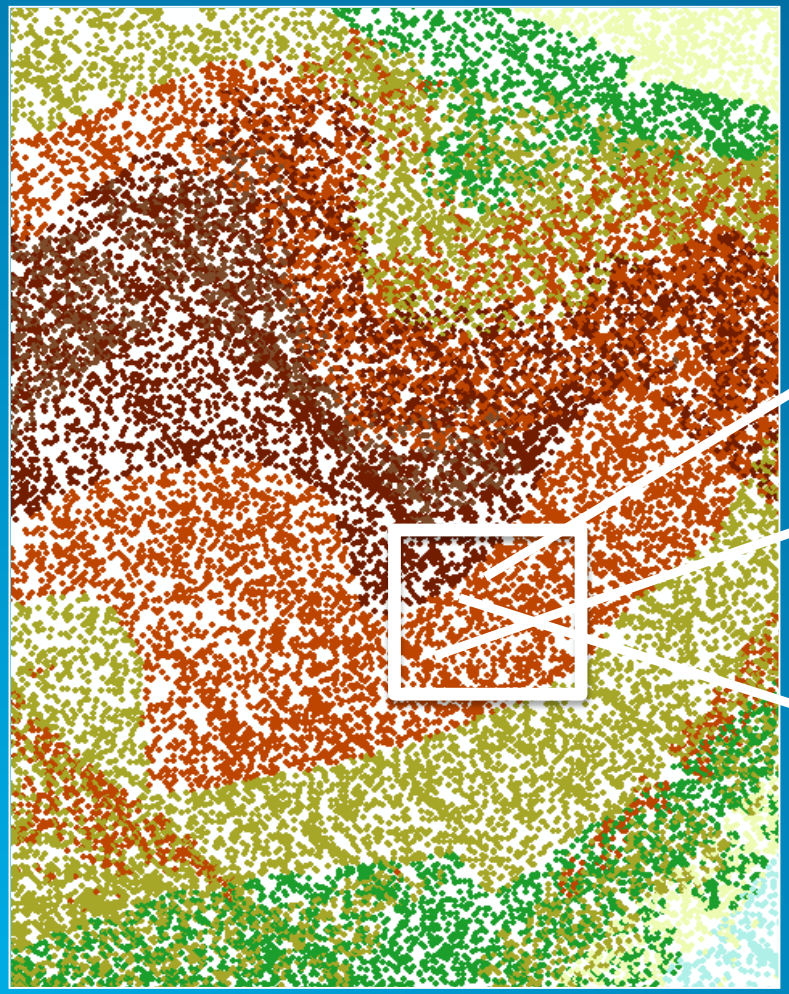
- Introduced January 2014
- Compression, sorting, and indexing
- Direct read
  - Parallel decompression added to ArcGIS apps in 10.3
- Features & Benefits
  - Re-sequence points w/ geospatial index
  - Optimized for random access
  - Lossless compression
  - Transparent integration with LAS dataset



zLAS

- Free!! Does not require ArcGIS
- Support added in 10.2.1
- Standalone application “EzLAS” on Resource Center
  - http://esriurl.com/zLAS
- API available for developers
  - https://github.com/Esri/esri-zlas-io-library
- For more info:
  - http://blogs.esri.com/esri/arcgis/2014/01/10/esri-introduces-optimized-las/
  - http://www.lidarnews.com/content/view/10214/2/

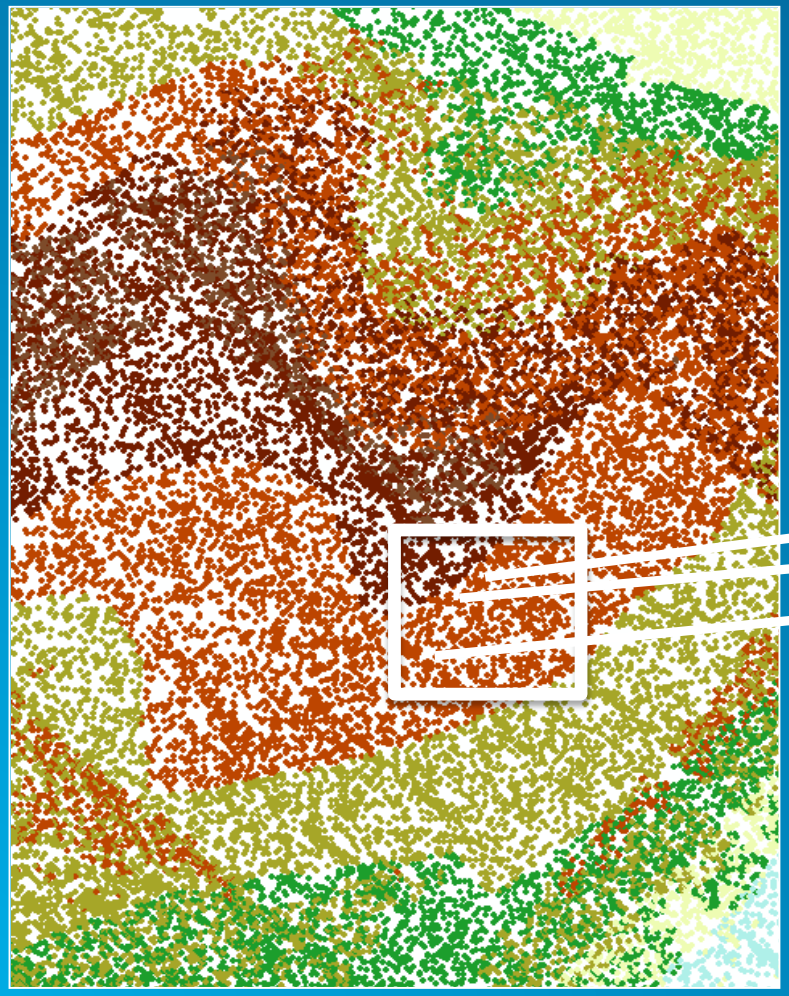
Rearranging Point Records



Spatial distribution of points

Physical location in file

Rearranging Point Records



Spatial distribution of points

Physical location in file

LAS dataset

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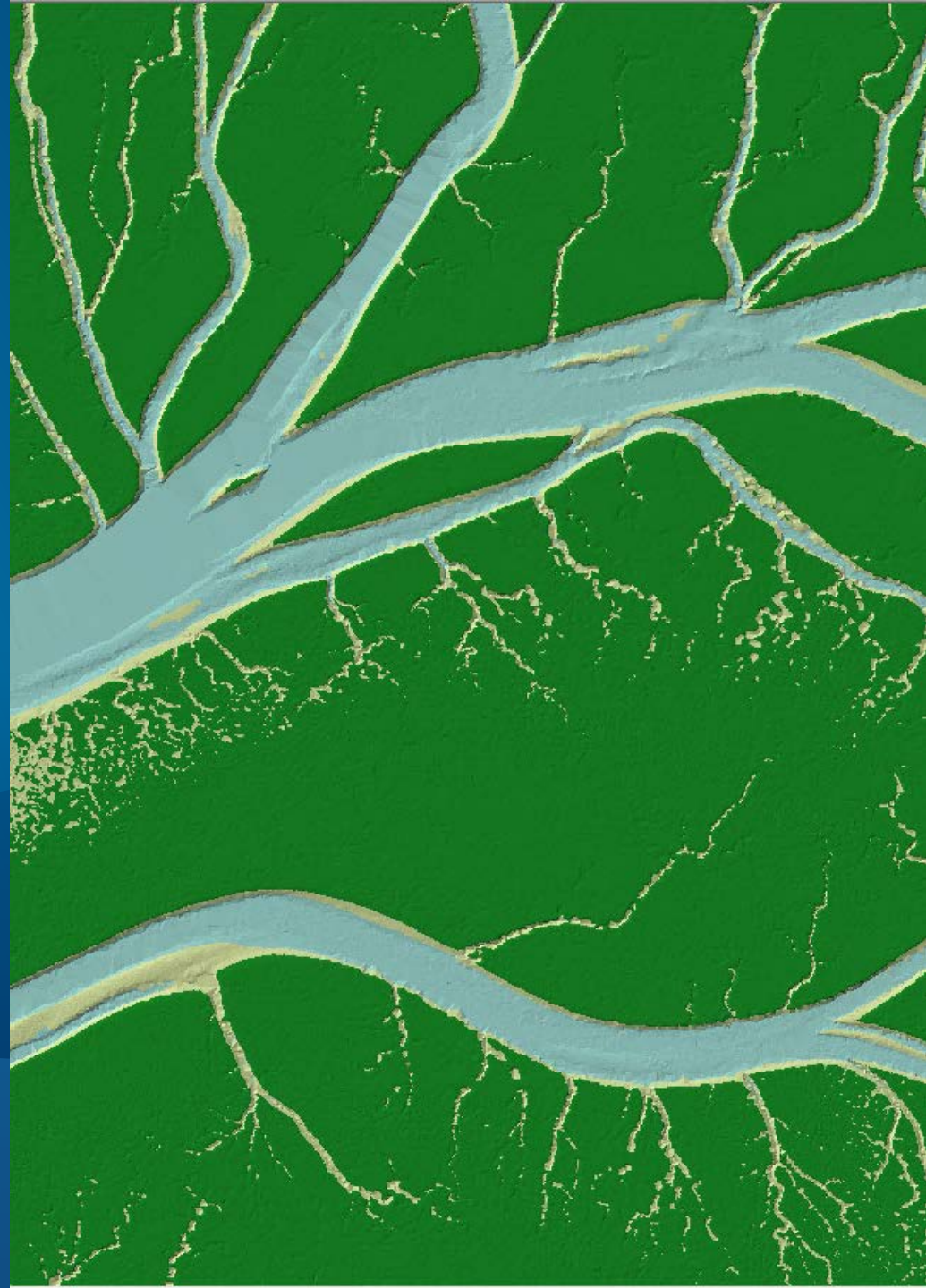
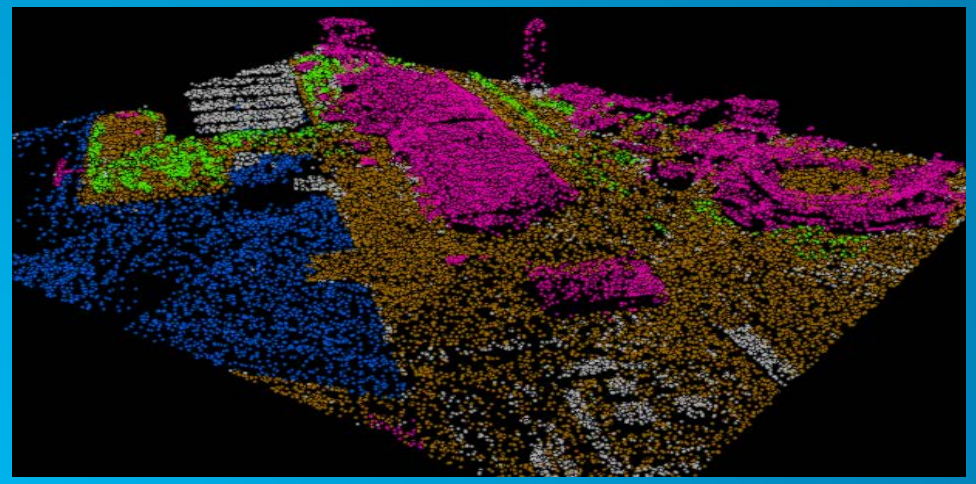
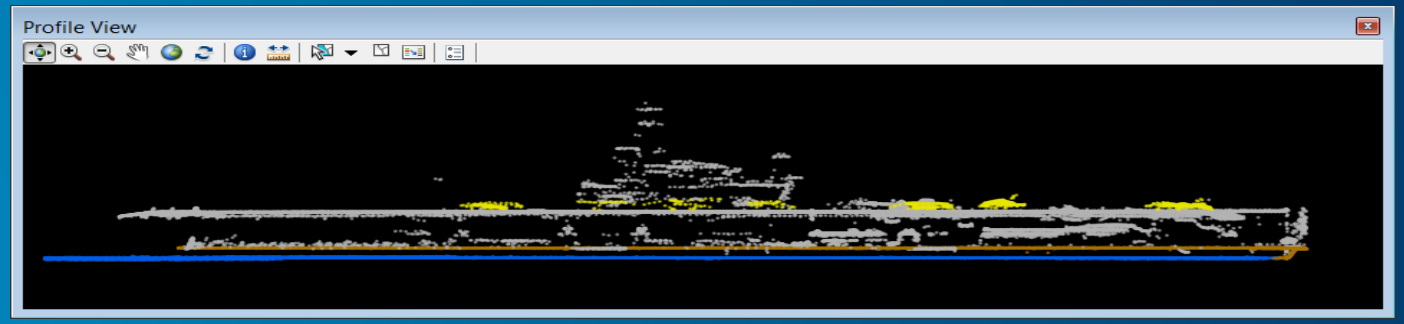


Lidar data with a LAS dataset

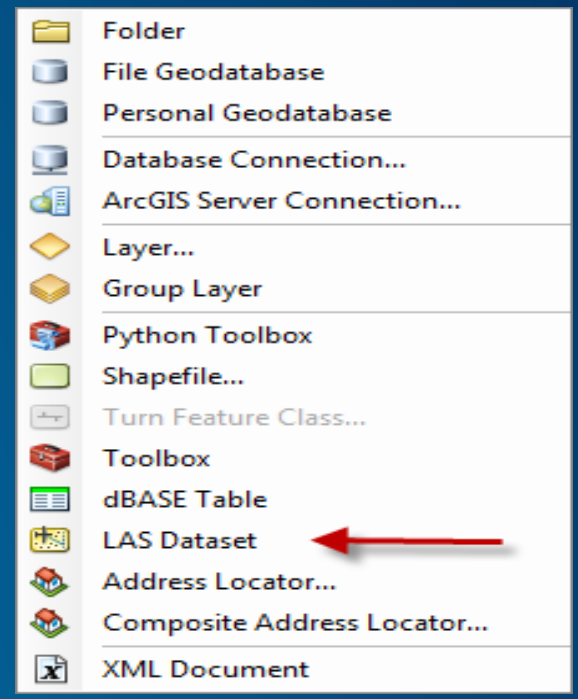
- Direct read of LAS or zLAS format lidar
- File based
- QA/QC tools
- Stores references to LAS/zLAS files on disk
- Optionally reference breakline and control point data
- Treats a collection of LAS/zLAS files as one logical dataset (“Project”)



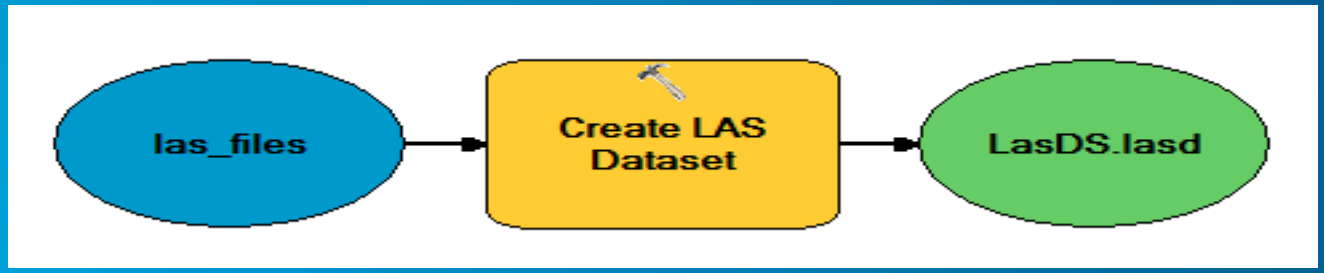


Create a LAS dataset

- Interactively through ArcCatalog
  - Use the file folder context menu

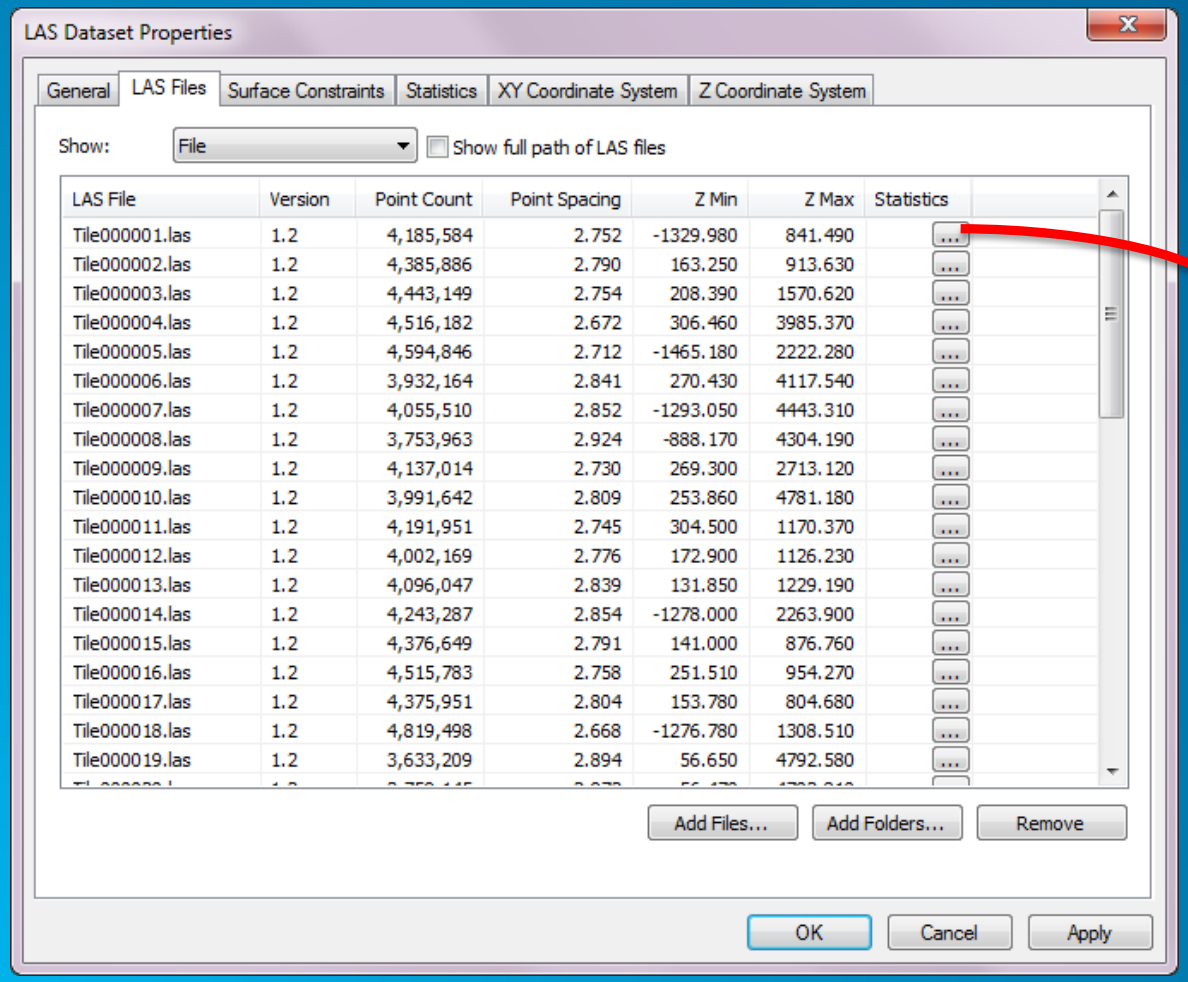


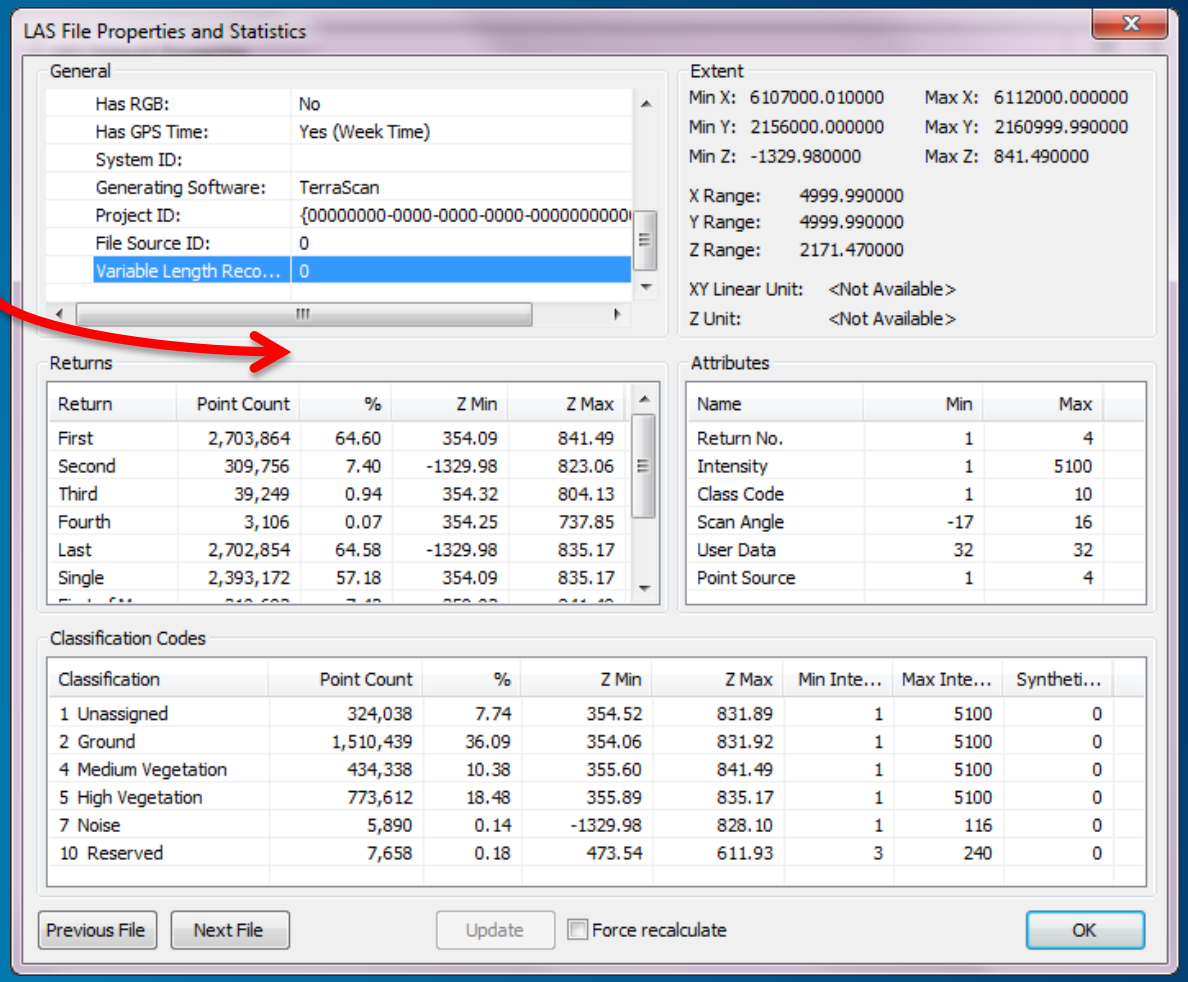
- Using scripts and models with geoprocessing tools



QA\QC: LAS file based statistics

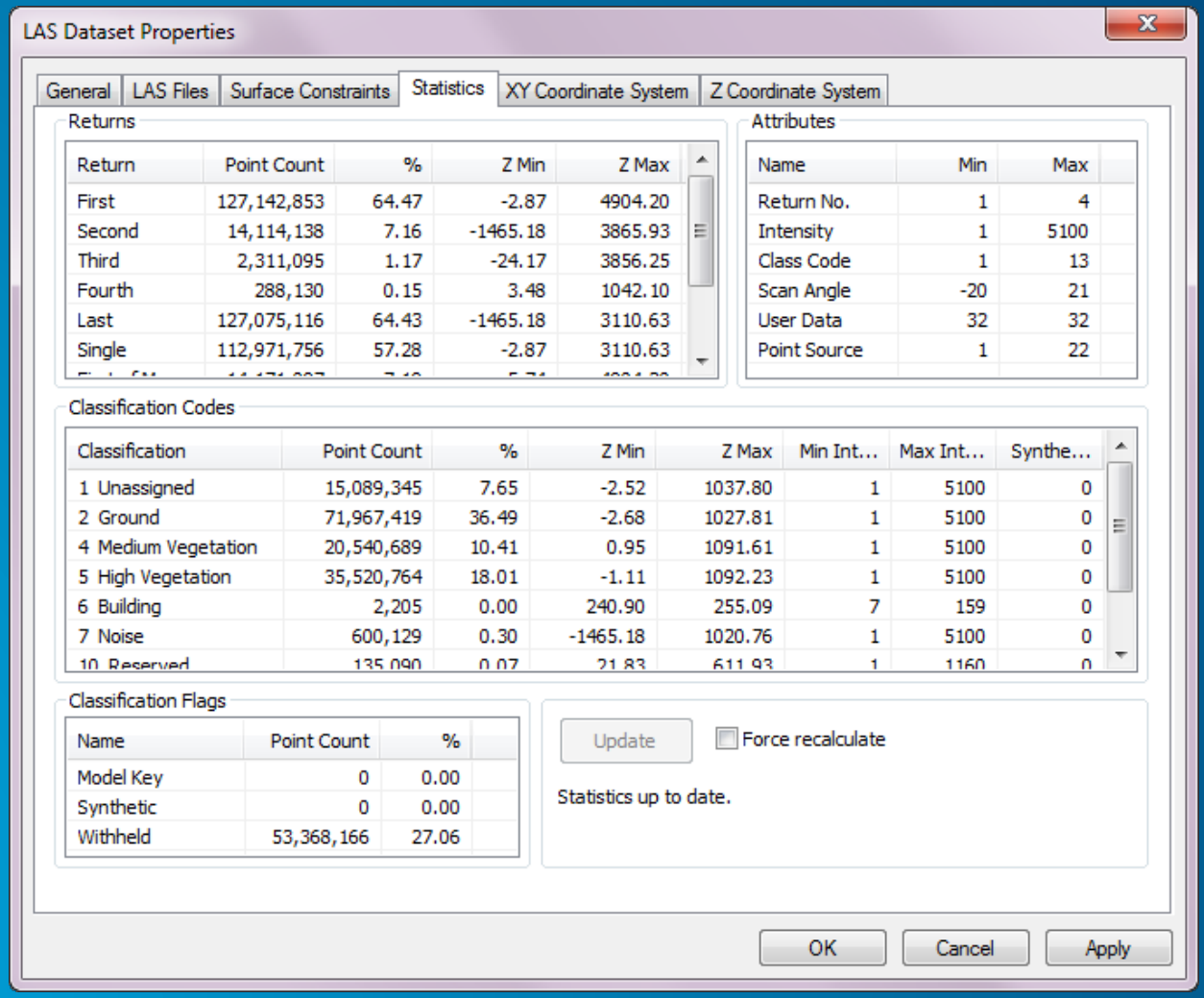
- **LAS Dataset Properties: LAS File Statistics**





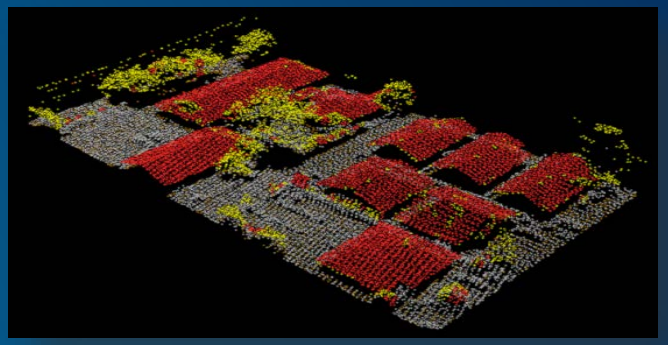
QA\QC: LAS dataset based statistics

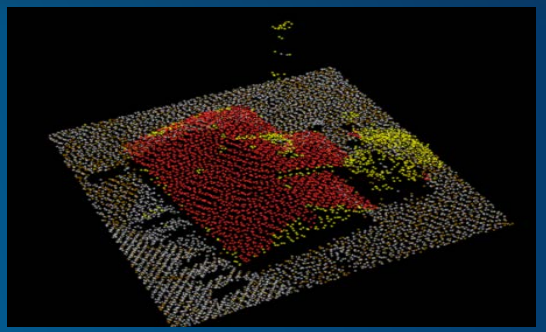
- LAS Dataset **Properties**: LAS Dataset Statistics



Edit classification codes

- Interactive
  - Fixing data anomalies and misclassifications via point profile window
- Automated (GP tools)
  - Classify relative to feature data
  - Reclassify to standard LAS specification





DEMO

LAS dataset demo

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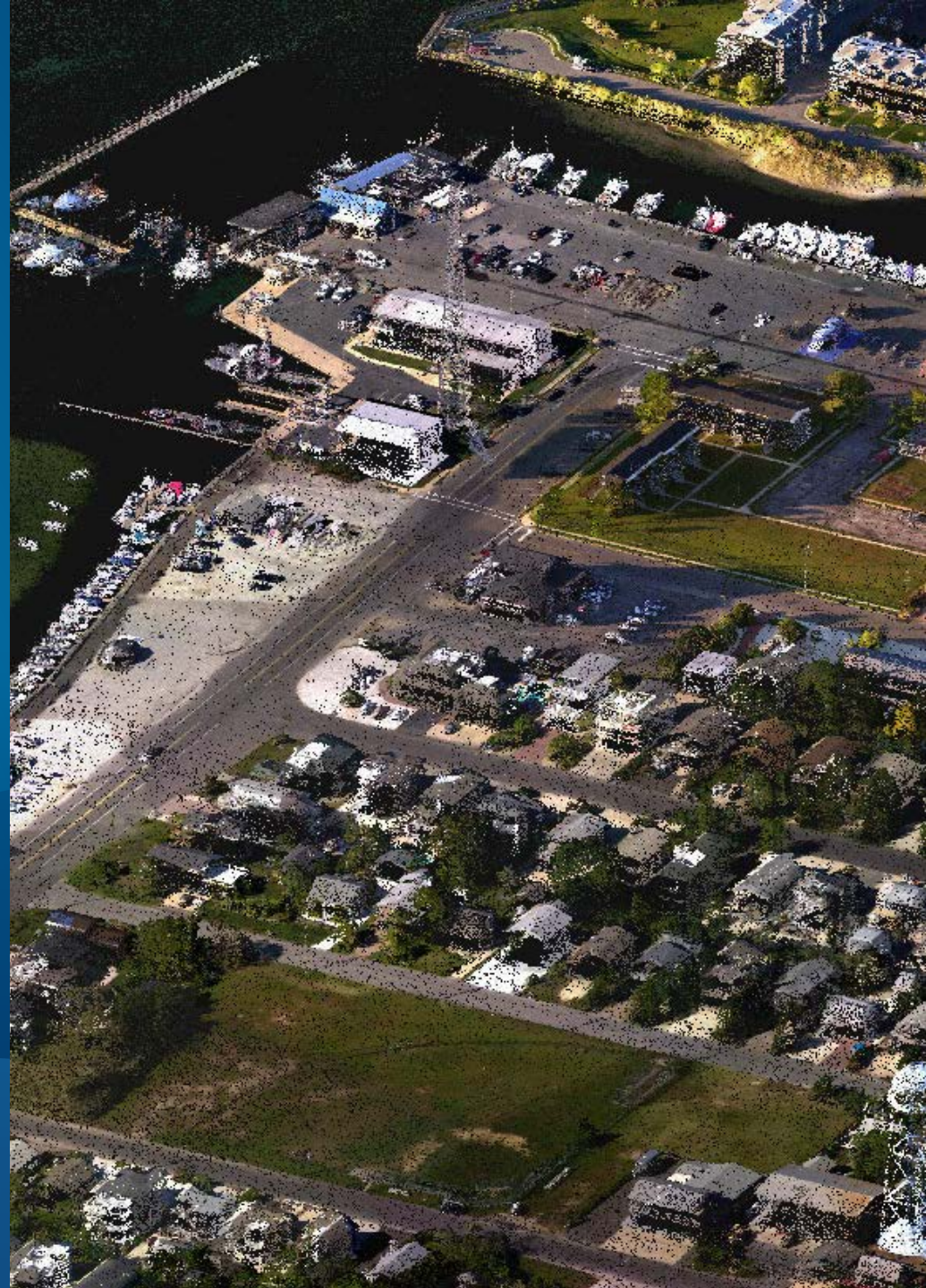
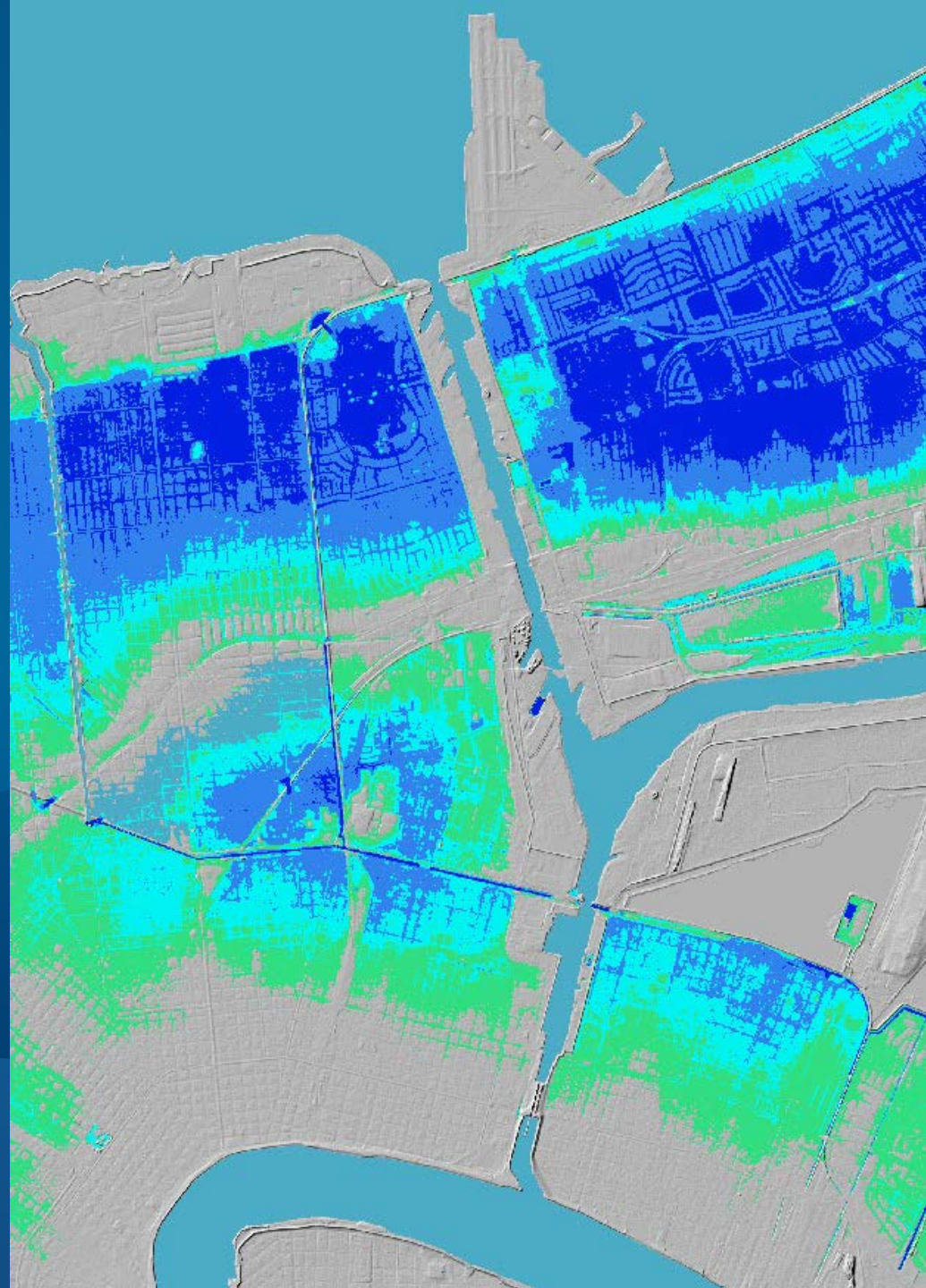
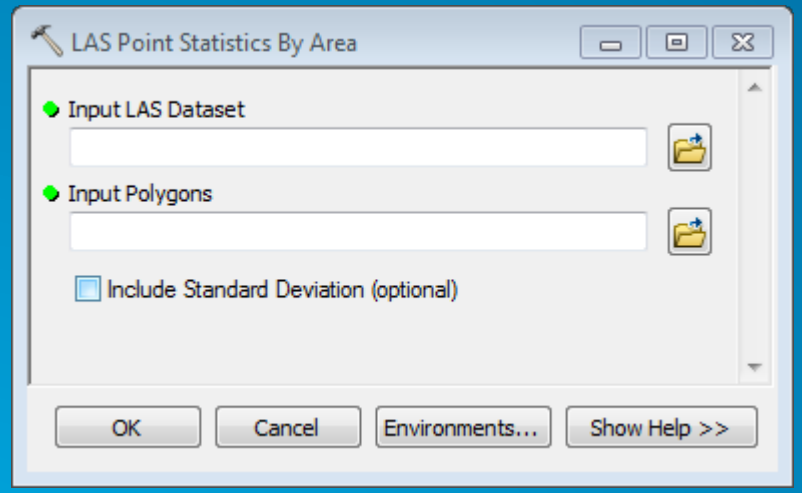
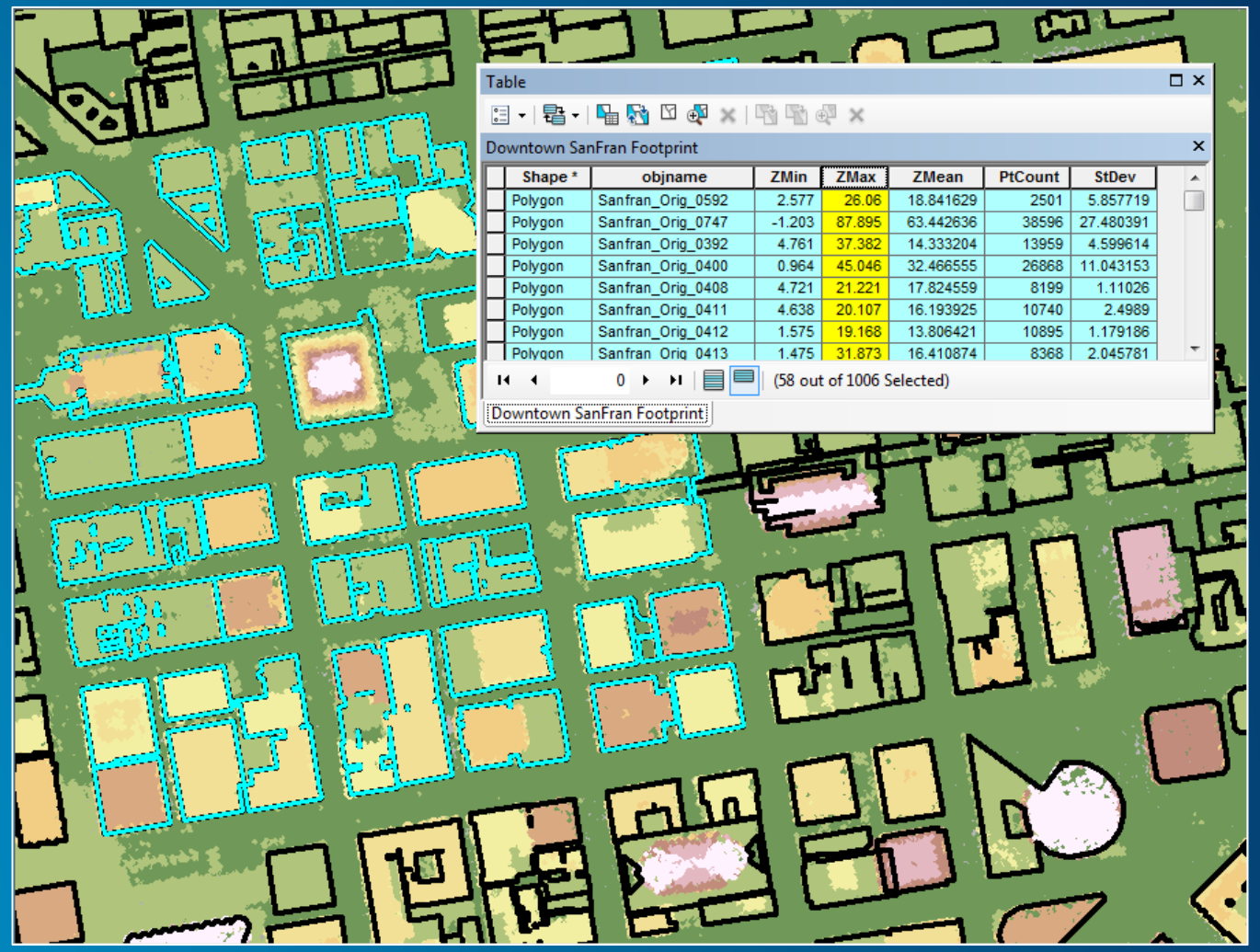


Lidar Related Analysis Tools

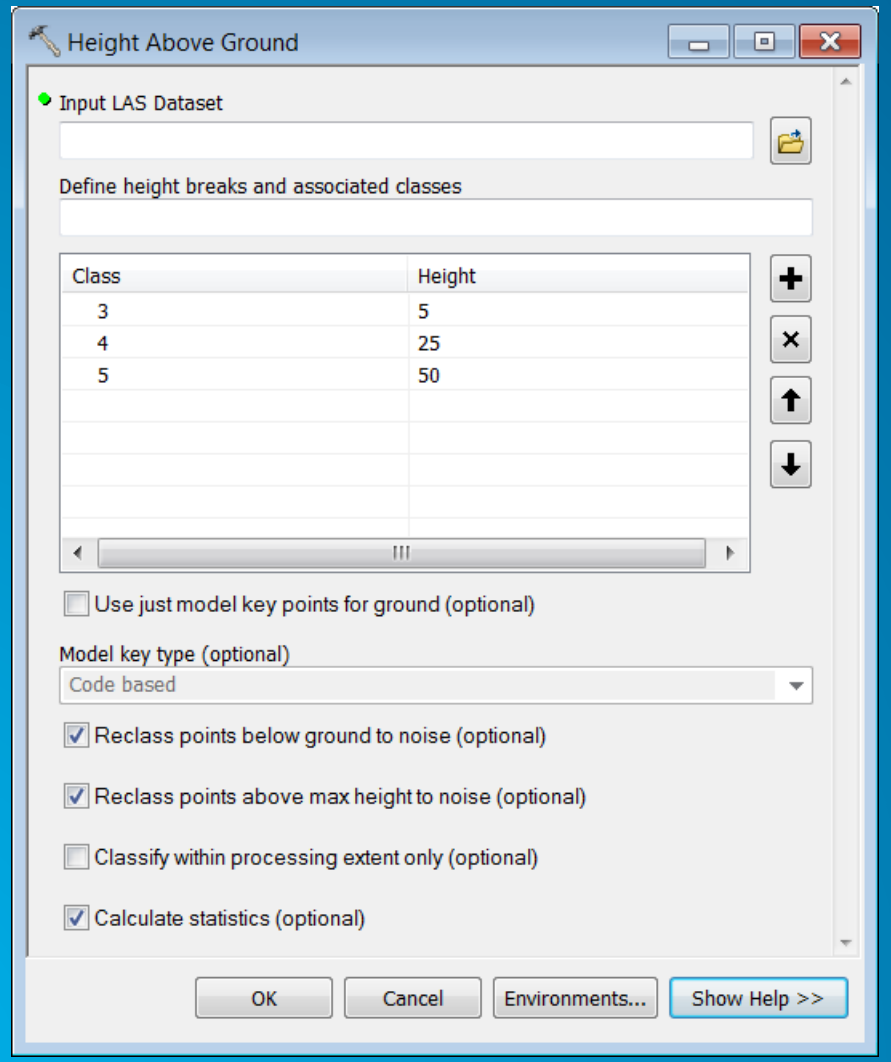


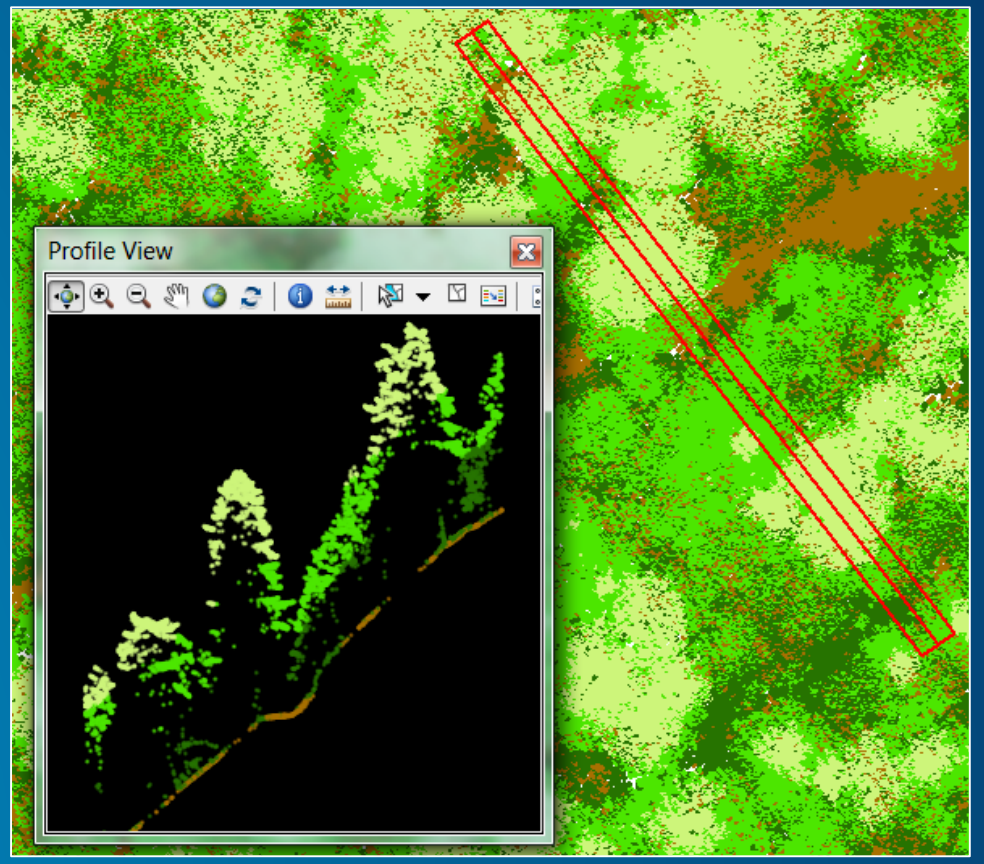
LAS Point Statistics By Area



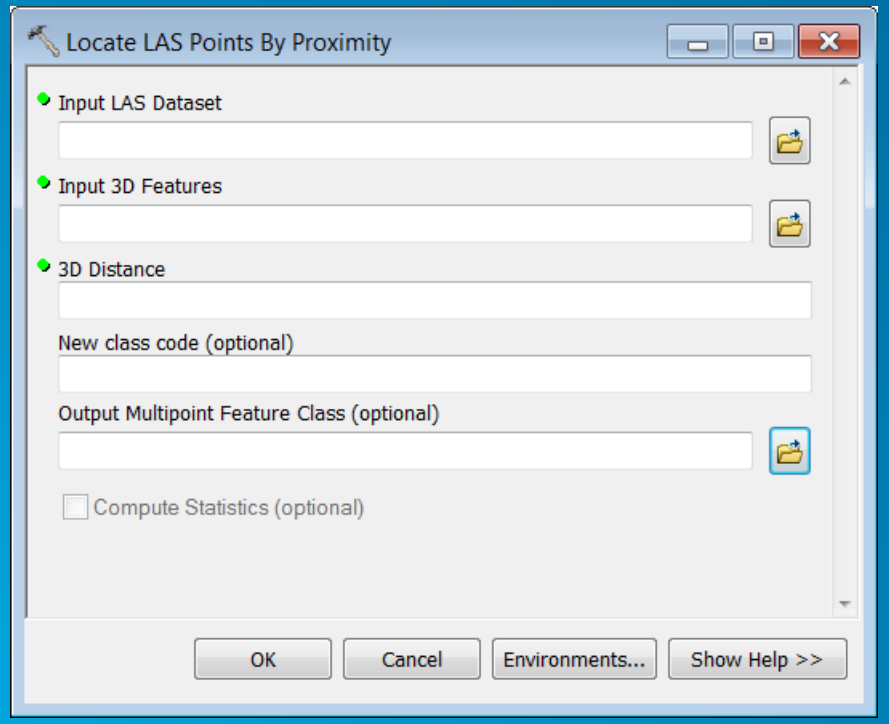


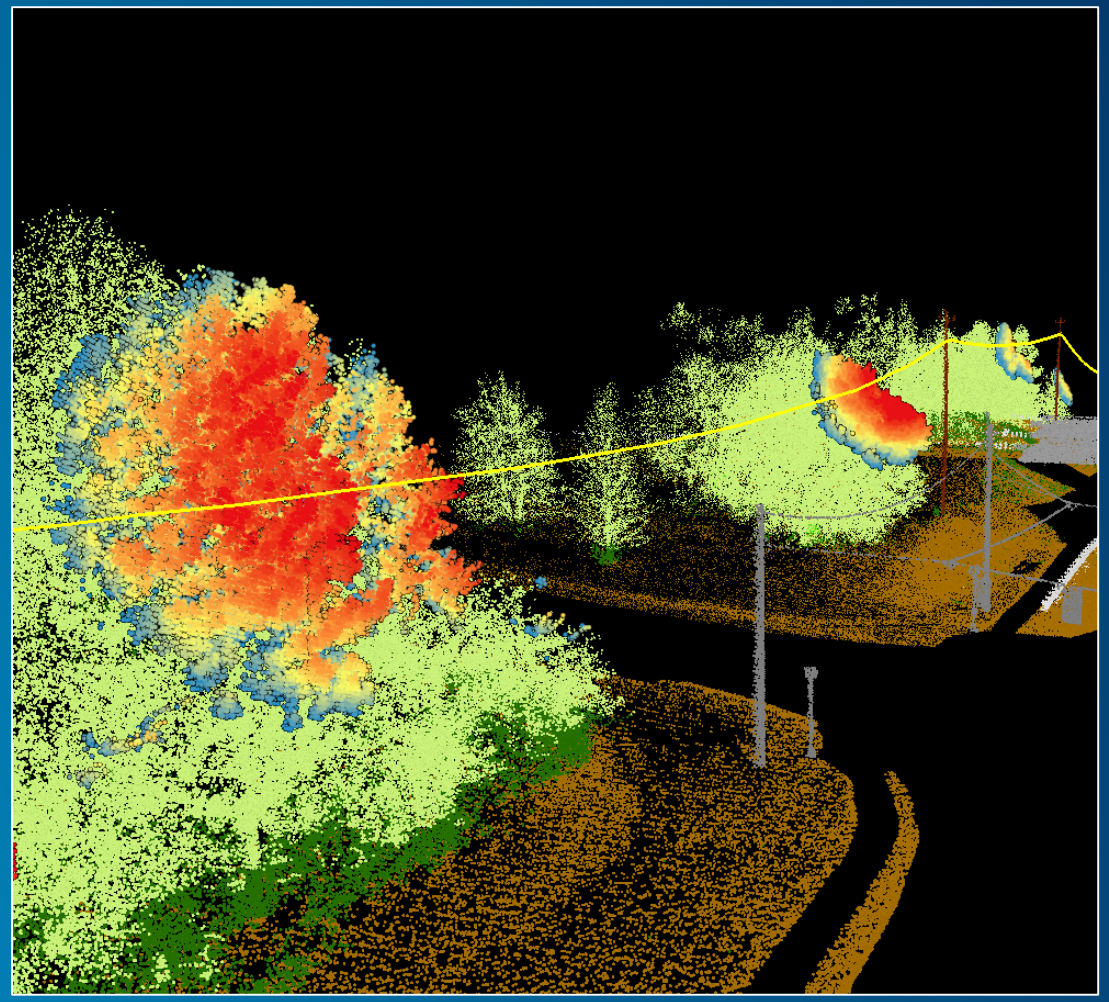
Classify LAS by Height





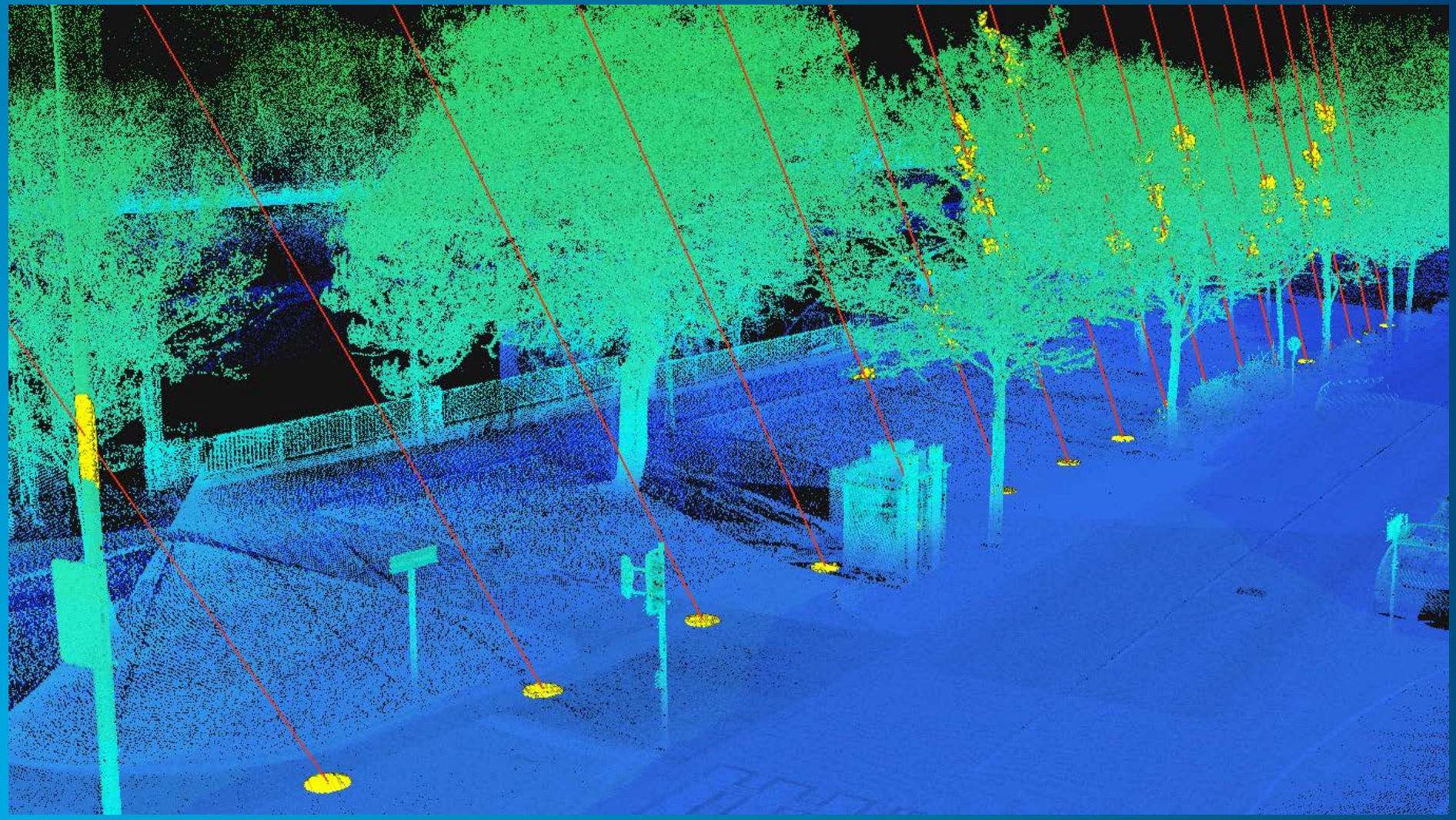
Locate LAS Points By Proximity



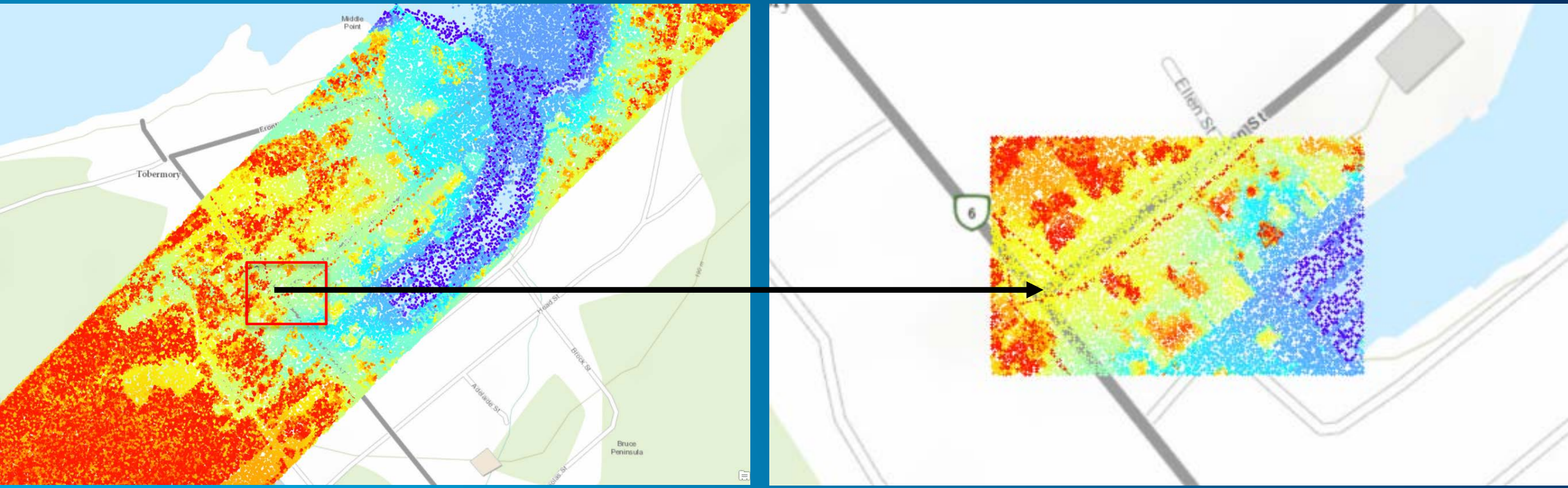


Data courtesy of PhotoScience

Locate LAS Points By Proximity



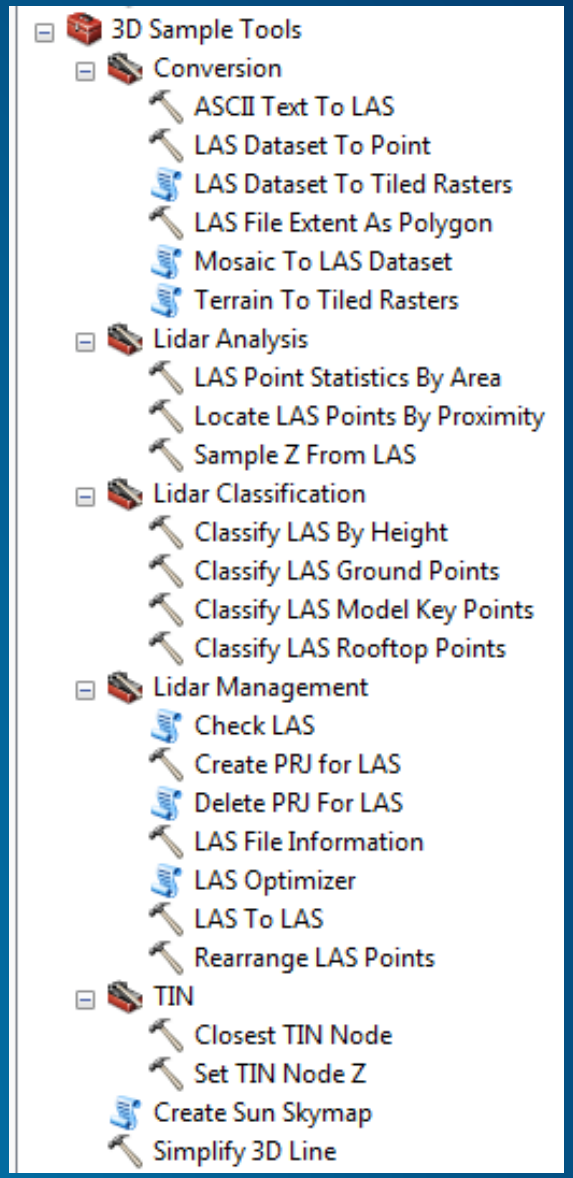
Extract LAS



Data courtesy of Optech

Lidar/3D Sample Tools

- **Available in ArcGIS 10.2 and 10.3**
- **Sample geoprocessing tools**
  - **Esri 3D Resource Center**
  - **http://links.esri.com/3dSamples**



Best Practices

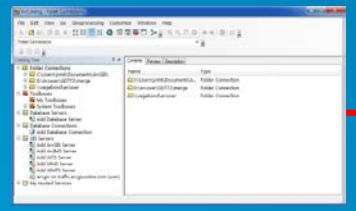
- Tiled LAS, v1.1 or higher
- Projected, rearranged, indexed
  - zLAS
- File size: 1 – 2 GB or less (<500 MB if not rearranged)
- Keep file I/O local, avoid network
- Study area boundary included as constraint
- Airborne lidar
  - Classified (bare earth, non-ground)
  - Breaklines for hydro enforcement
- Terrestrial lidar
  - RGB & intensity values, classified

* Also applies to photogrammetric point clouds

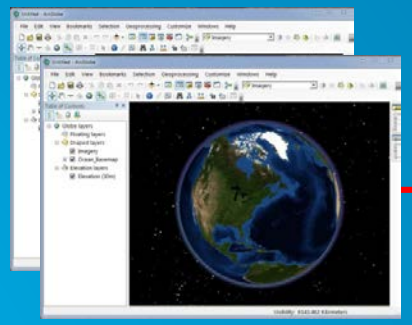
Application Fusion: ArcGIS Pro

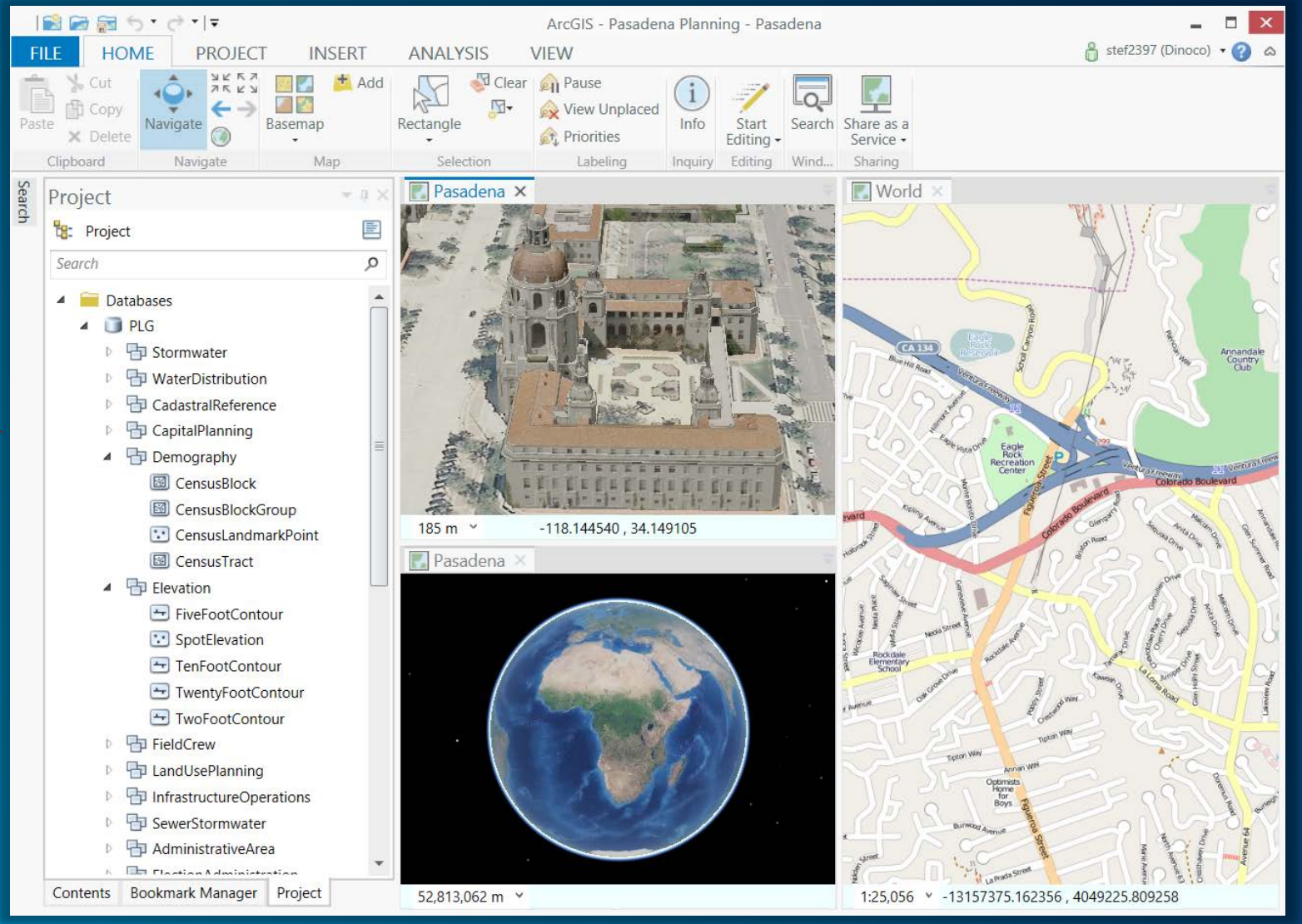
ArcMap

ArcCatalog



ArcGlobe / ArcScene





Lidar in ArcGIS Pro

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Thank you…

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