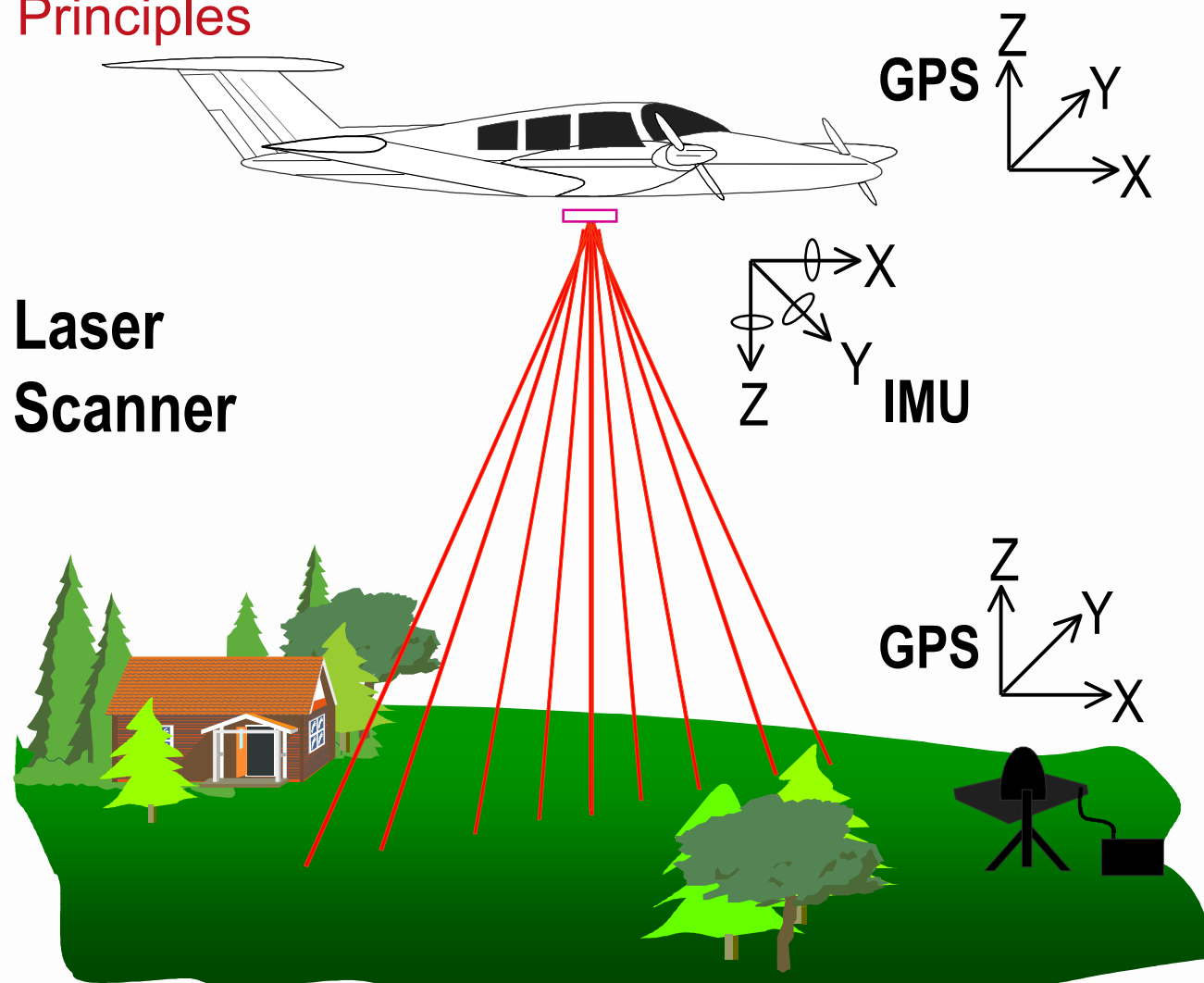


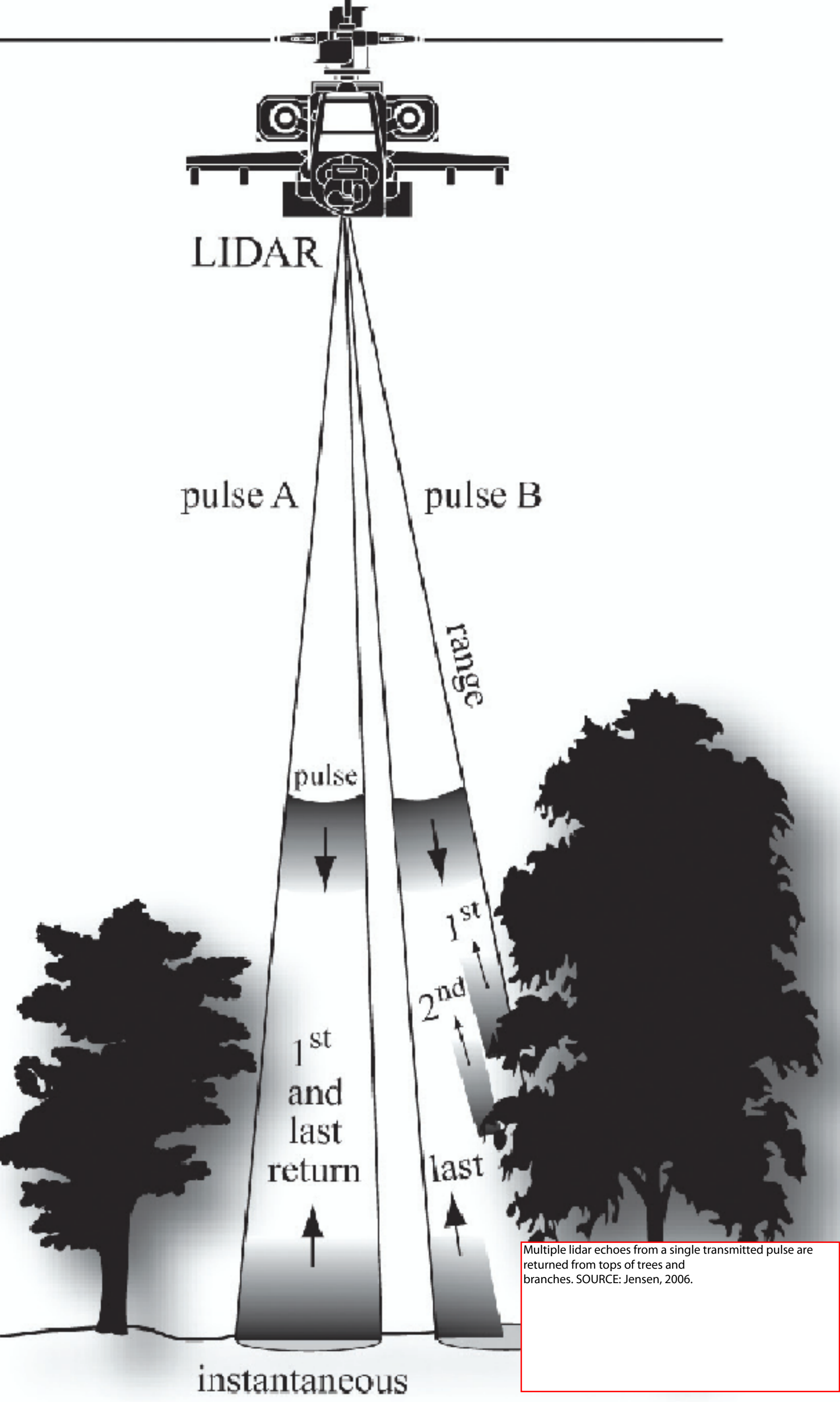
Lidar Technology

- Operating Principles
- Processing Methods
- Quality Control Methods
- Lidar Issues
- Lidar Samples
- Project Specification Design

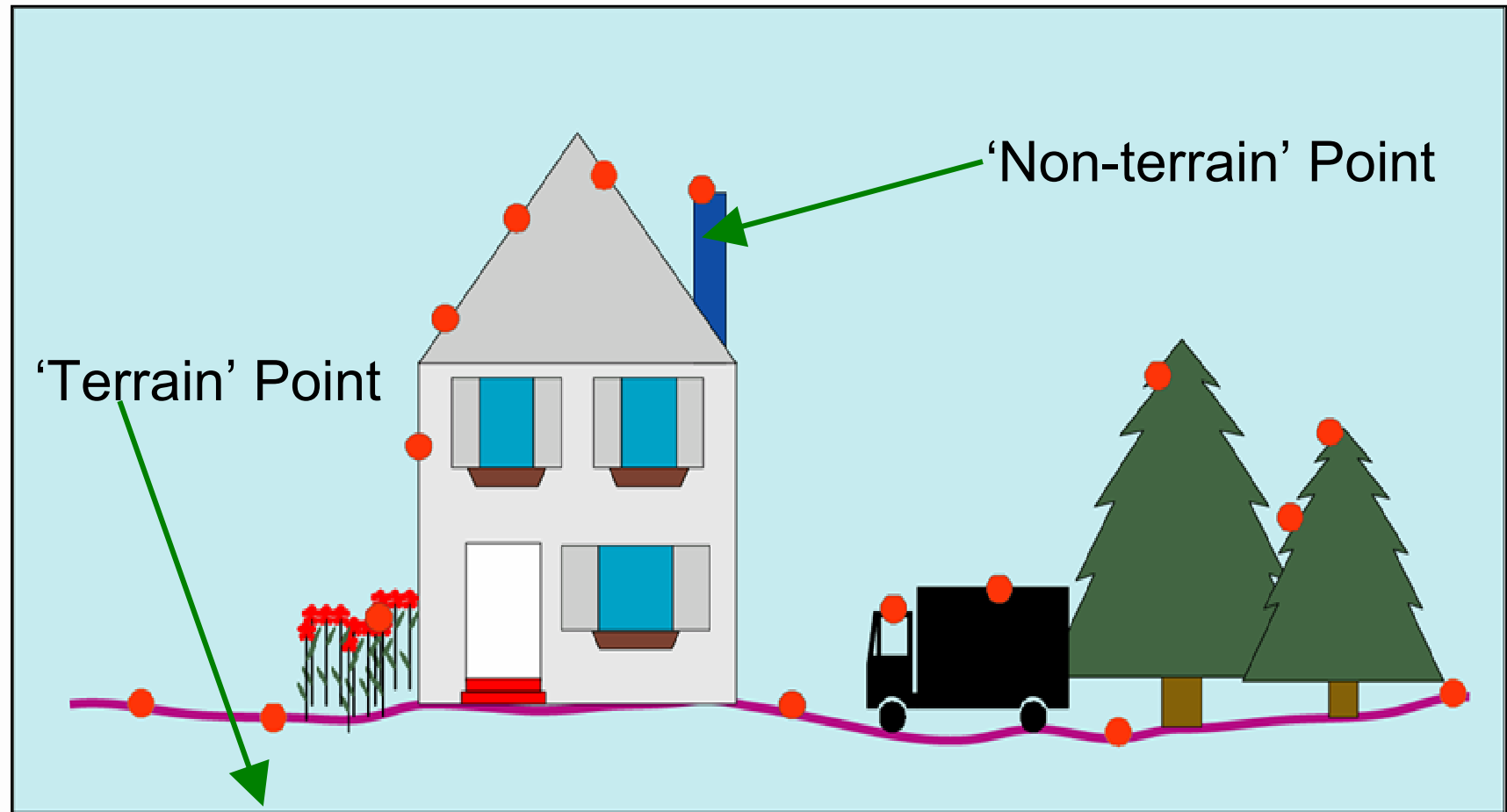
Lidar:

Operating Principles

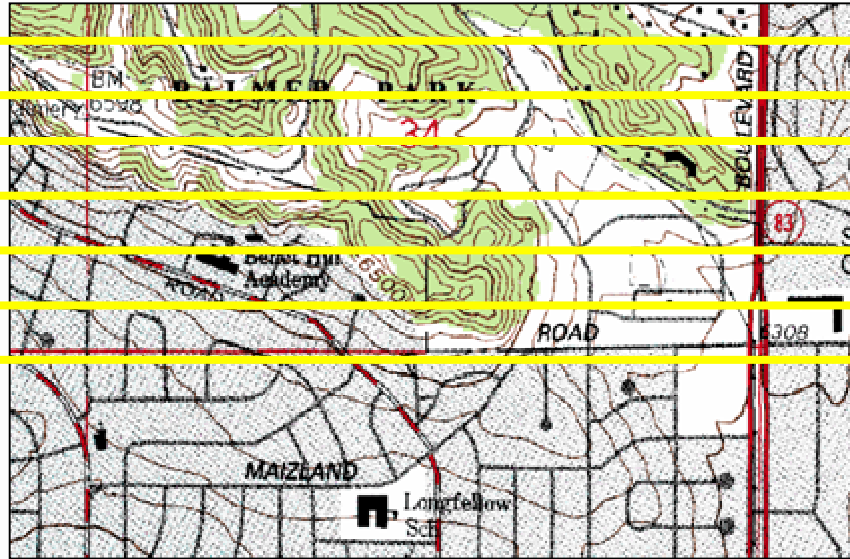




Ground Clutter



Flight Planning, Mobilization & Installation

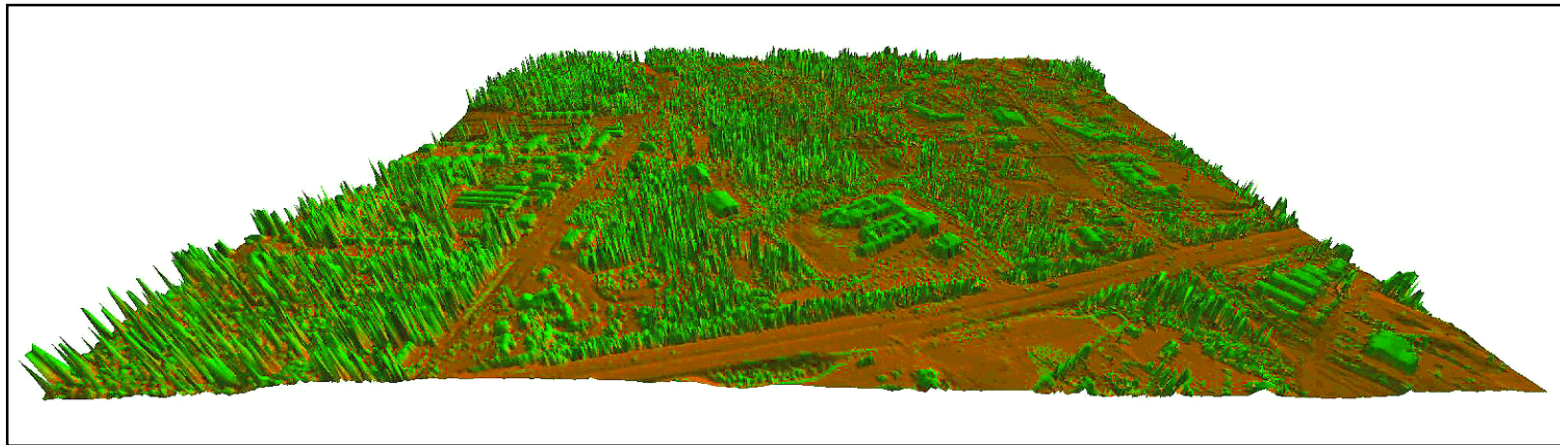


Digital Elevation Products

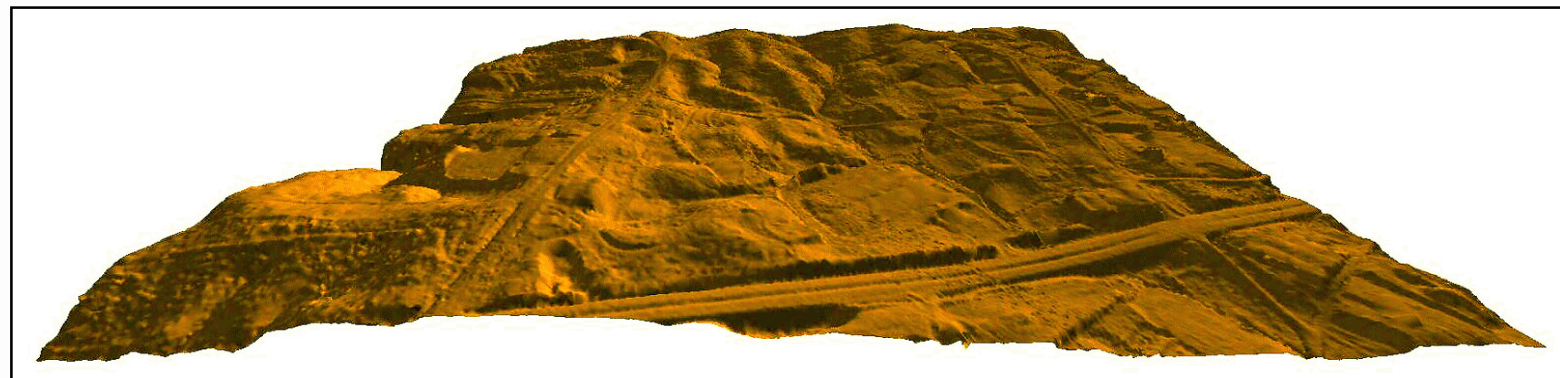
- Type I: Raw
 - 3-D Modeling
- Type II: Filtered
 - Elevation Model for Ortho
- Type III: Verified, Augmented
 - Flood Plane Modeling
- Type IV: Estimated Surface, Verified (FASE)
 - Highest Accuracy and Aesthetics for Contouring

Automated DEM Extraction

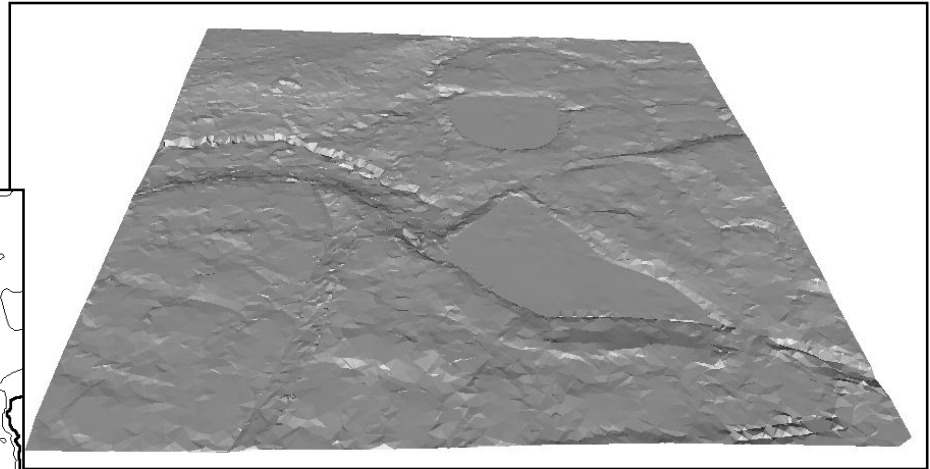
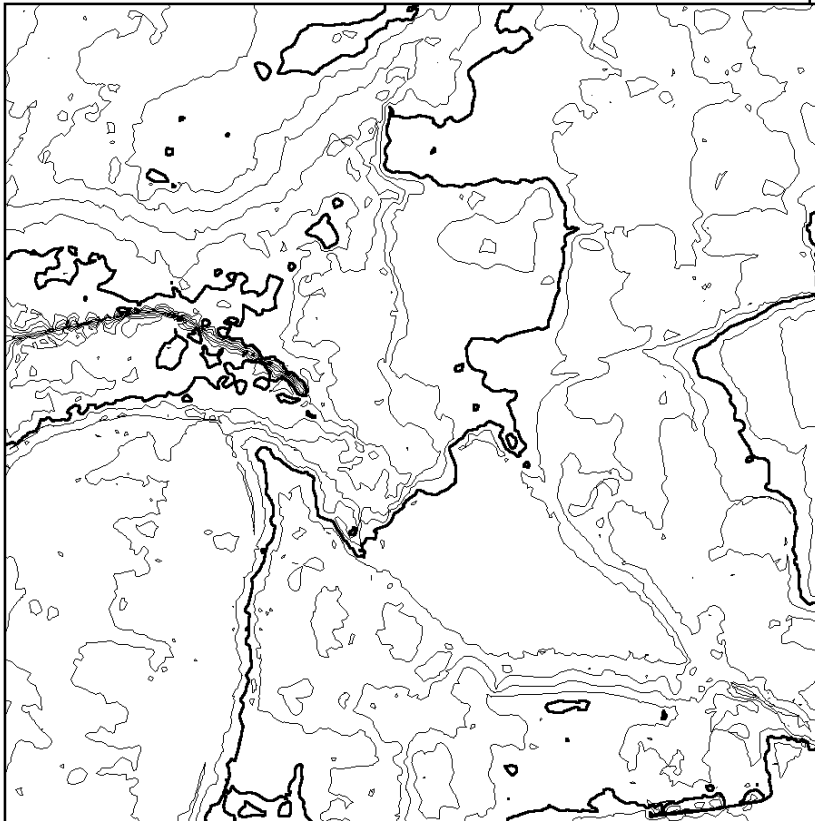
Raw Lidar Data



Filtered Lidar Data



Verified, Augmented





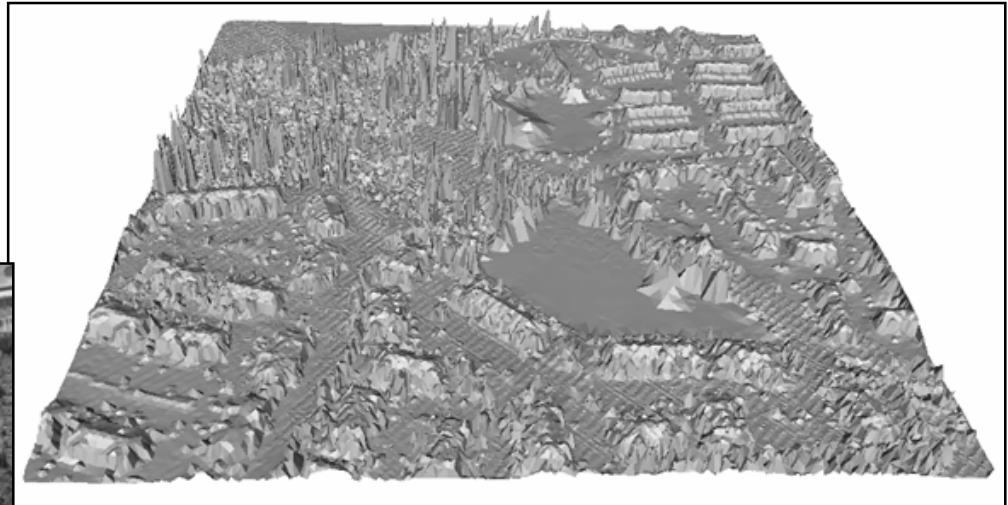
FASE™

(Filtering And Surface Estimation)

- Hybrid Approach, Combines
 - Vast LIDAR Data Sets
 - Precise, Strategically-located break-lines and mass-points
 - Land-cover Classifications
- Estimates New Surface from all Source Data
- Very Computationally Intensive – Distributed Processing
- Results:
 - Guaranteed Accuracy (Manually Verified)
 - Aesthetic Contours

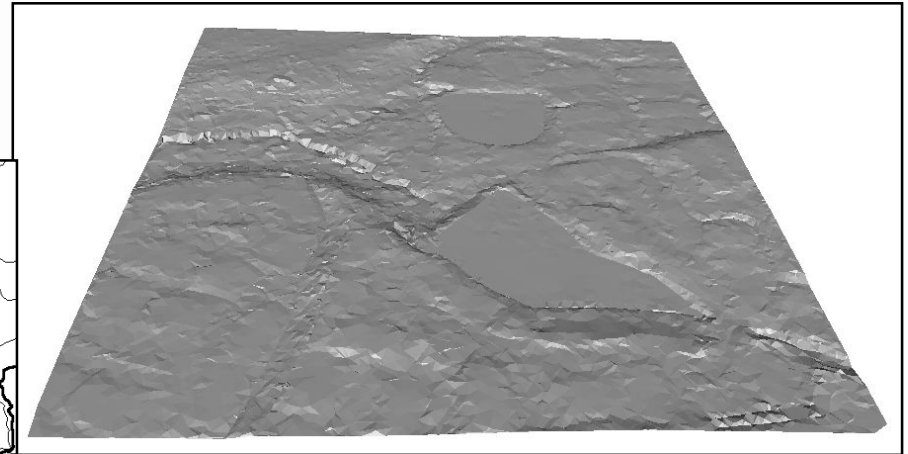
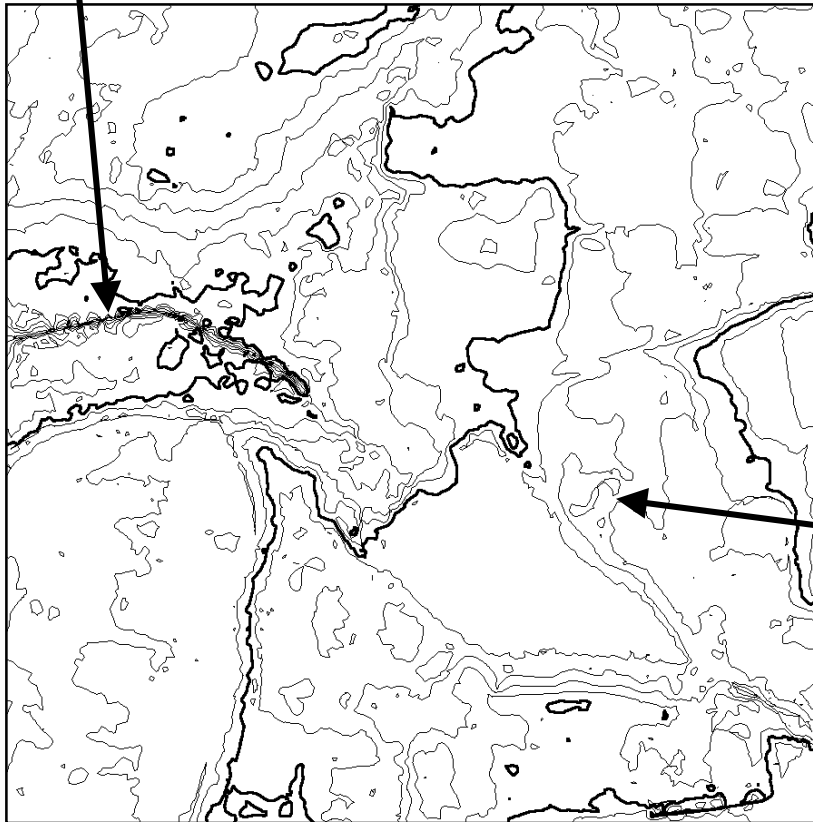
Example:

Raw Data



Example: Verified, Augmented

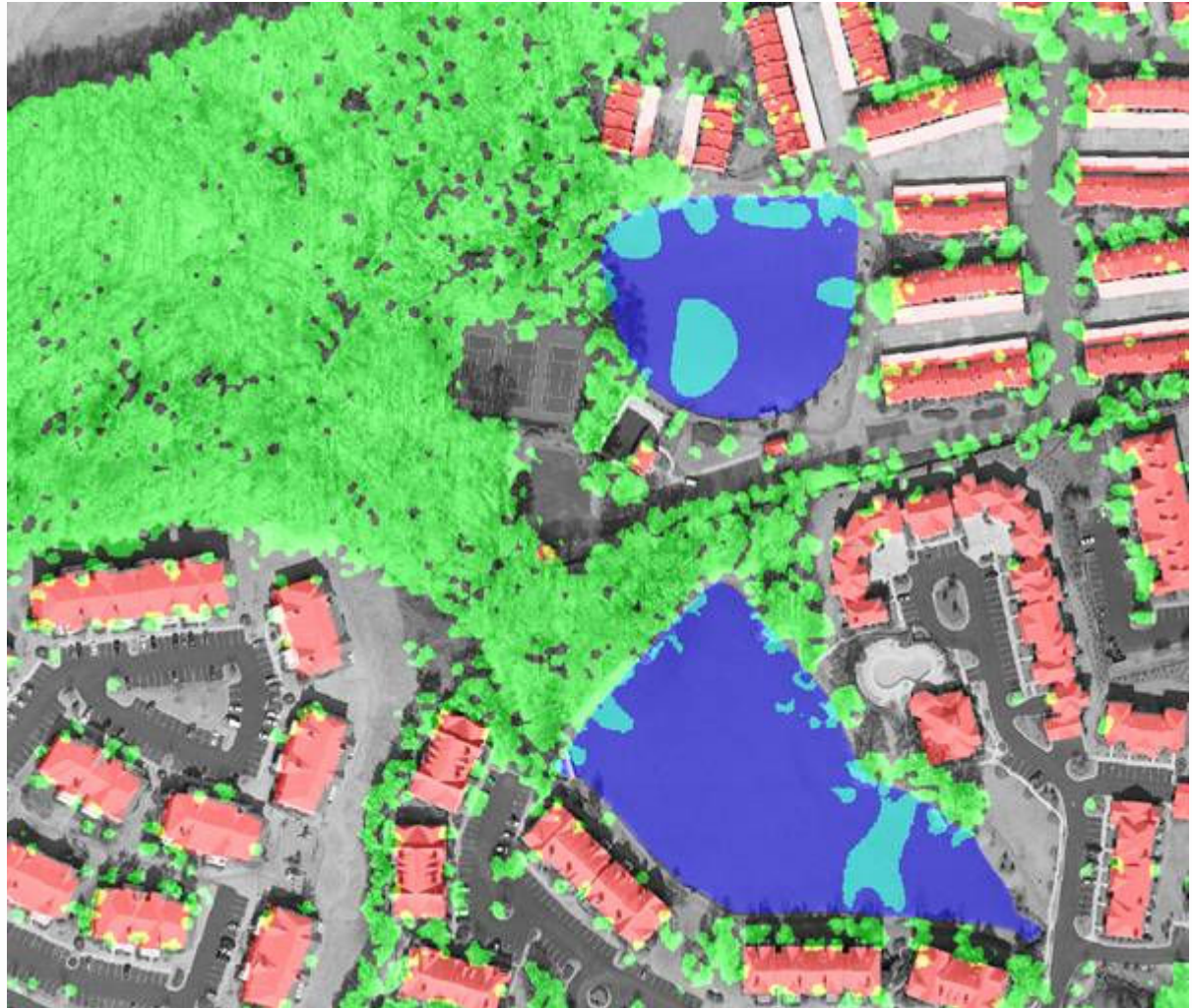
Contour “Puddles”
Along Drainage



Non Cartographic Contours

FASE:

Surface Classes



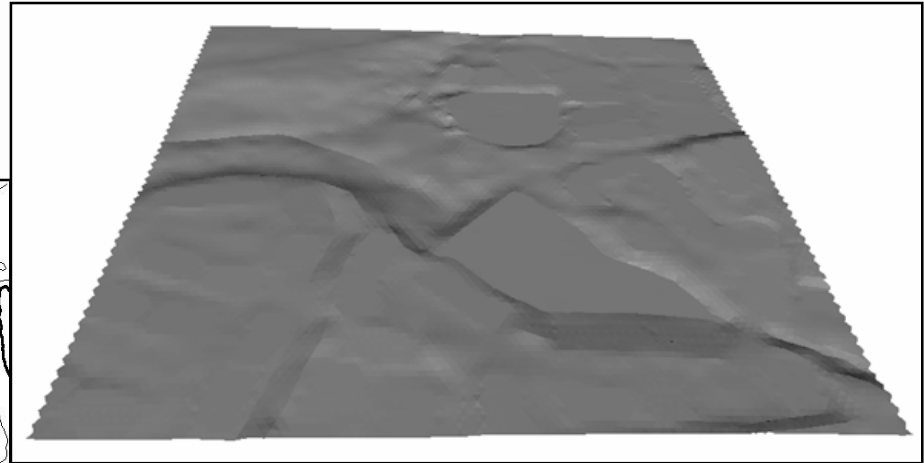
FASE:

Break-lines



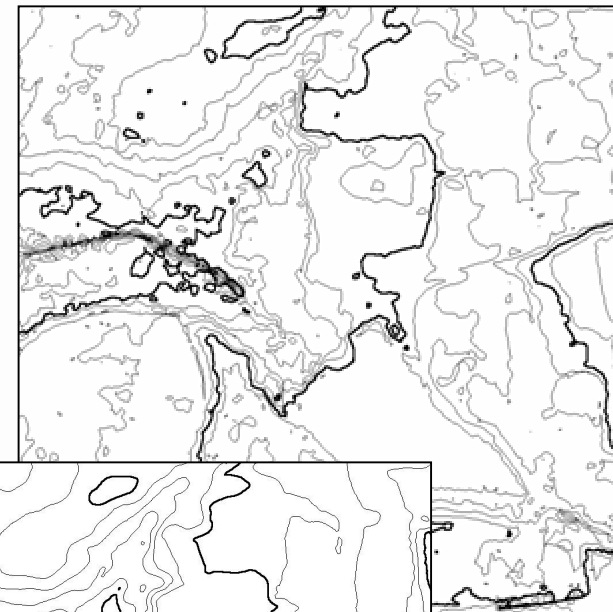
FASE:

Contours and Surface



FASE™

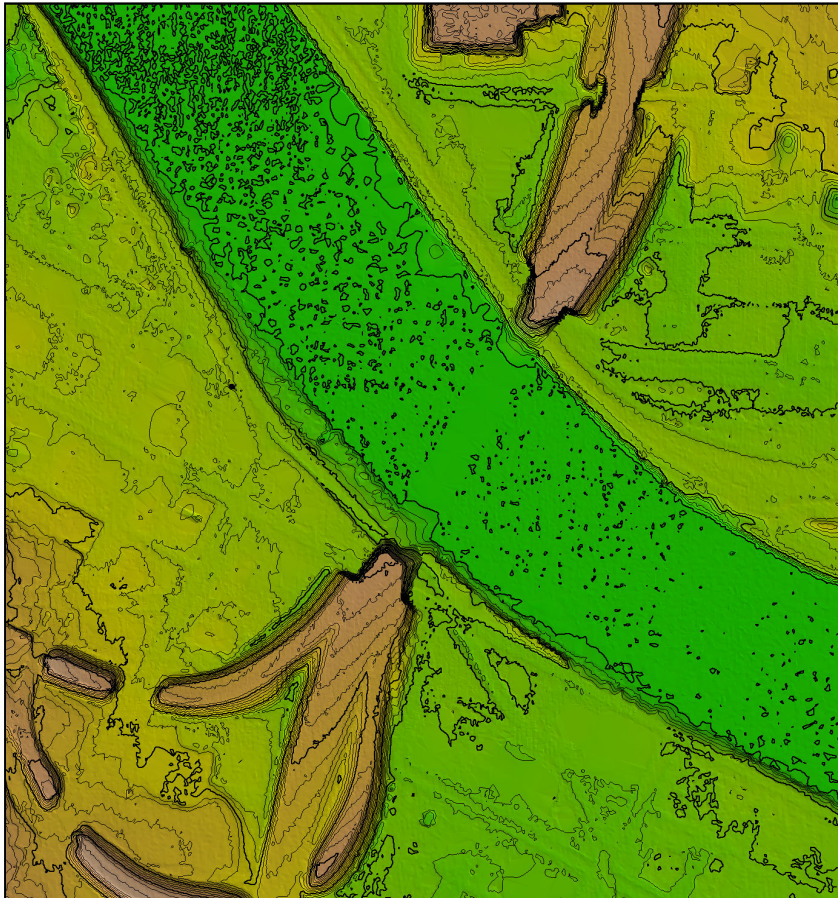
- Surface Accuracy Verified and Augmented
- Aesthetic Contours
- No Voids
- Accurately Modeled Drainage
- Topology: Water Bodies
- Contour Ready



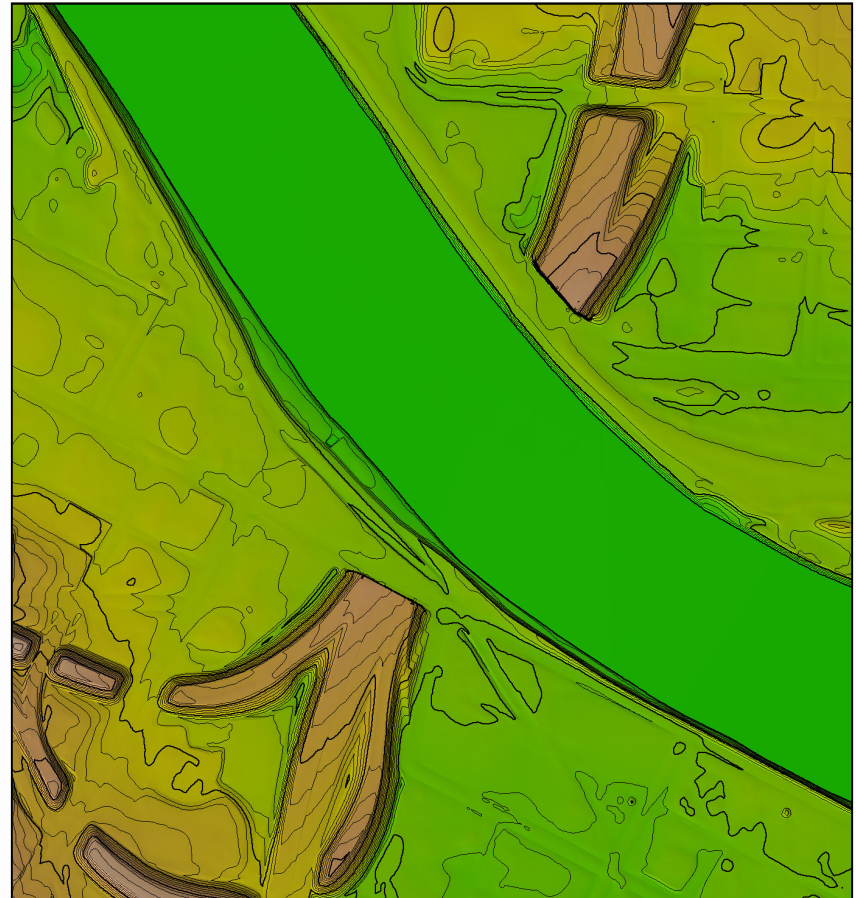
FASE

Sanborn's Lidar Processing Technology

Filtered Lidar



FASE-Processed Lidar

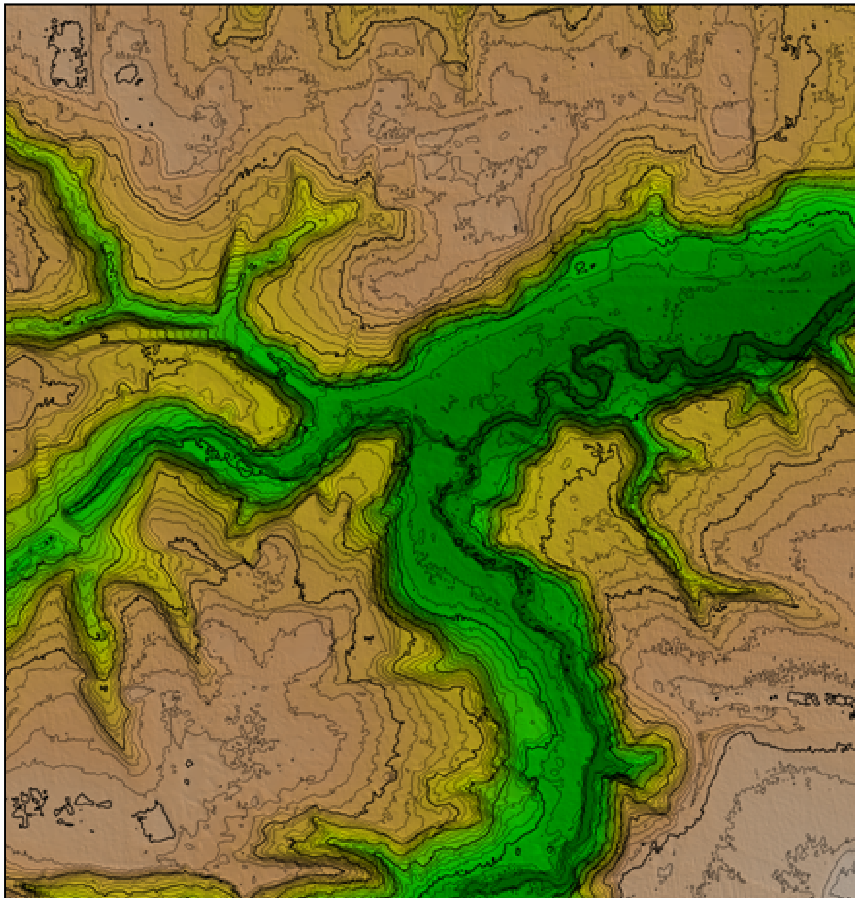


FASE

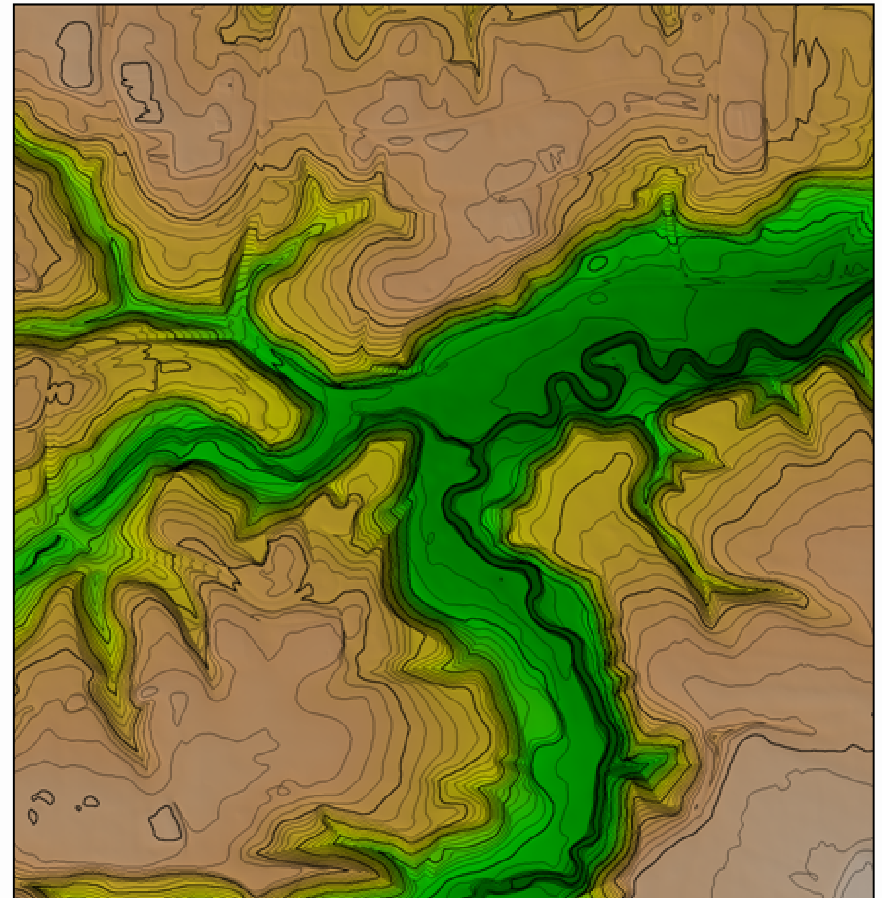
Sanborn's Lidar Processing Technology



Filtered Lidar



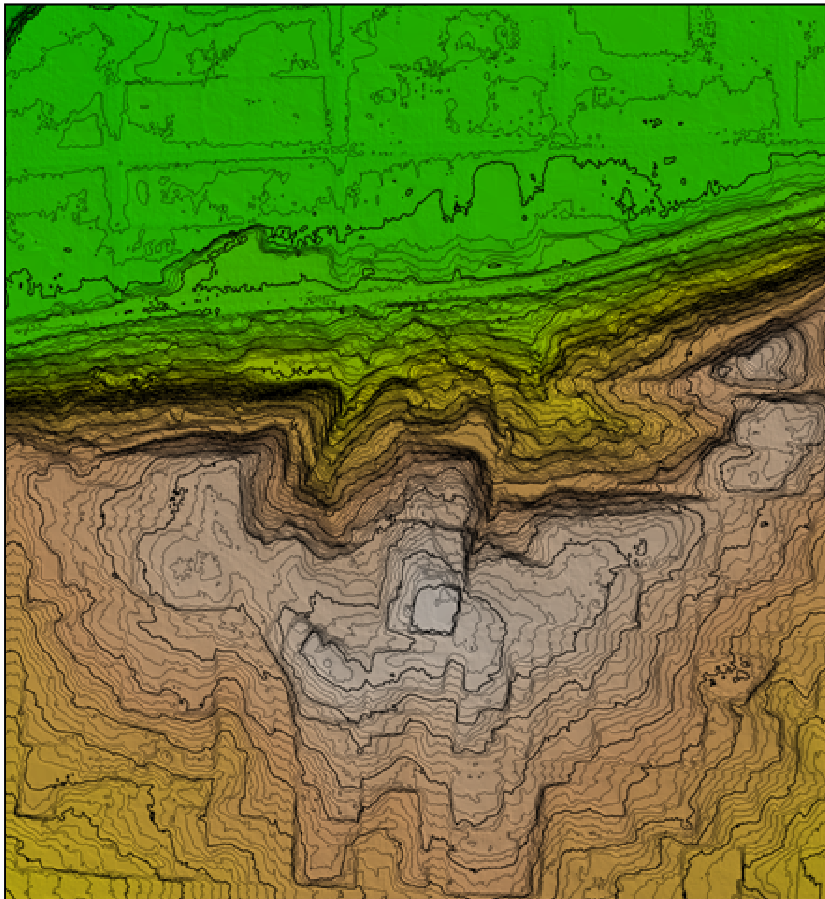
FASE-Processed Lidar



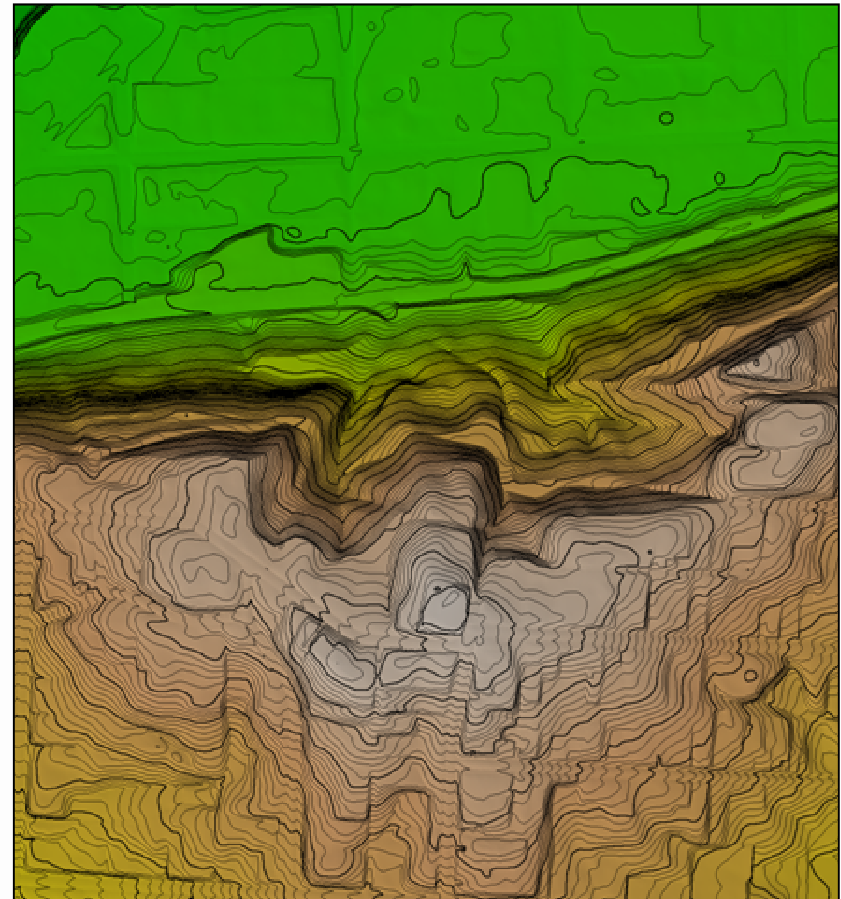
FASE

Sanborn's Lidar Processing Technology

Filtered Lidar



FASE-Processed Lidar





Vegetation Penetration

- Acquire Lidar During Leaf-off Conditions
- Acquire Denser Data Sets
 - Slower Flights
 - Lower Altitudes
 - Cross-strips
 - Narrower Scan Angles

Vegetation Anomalies

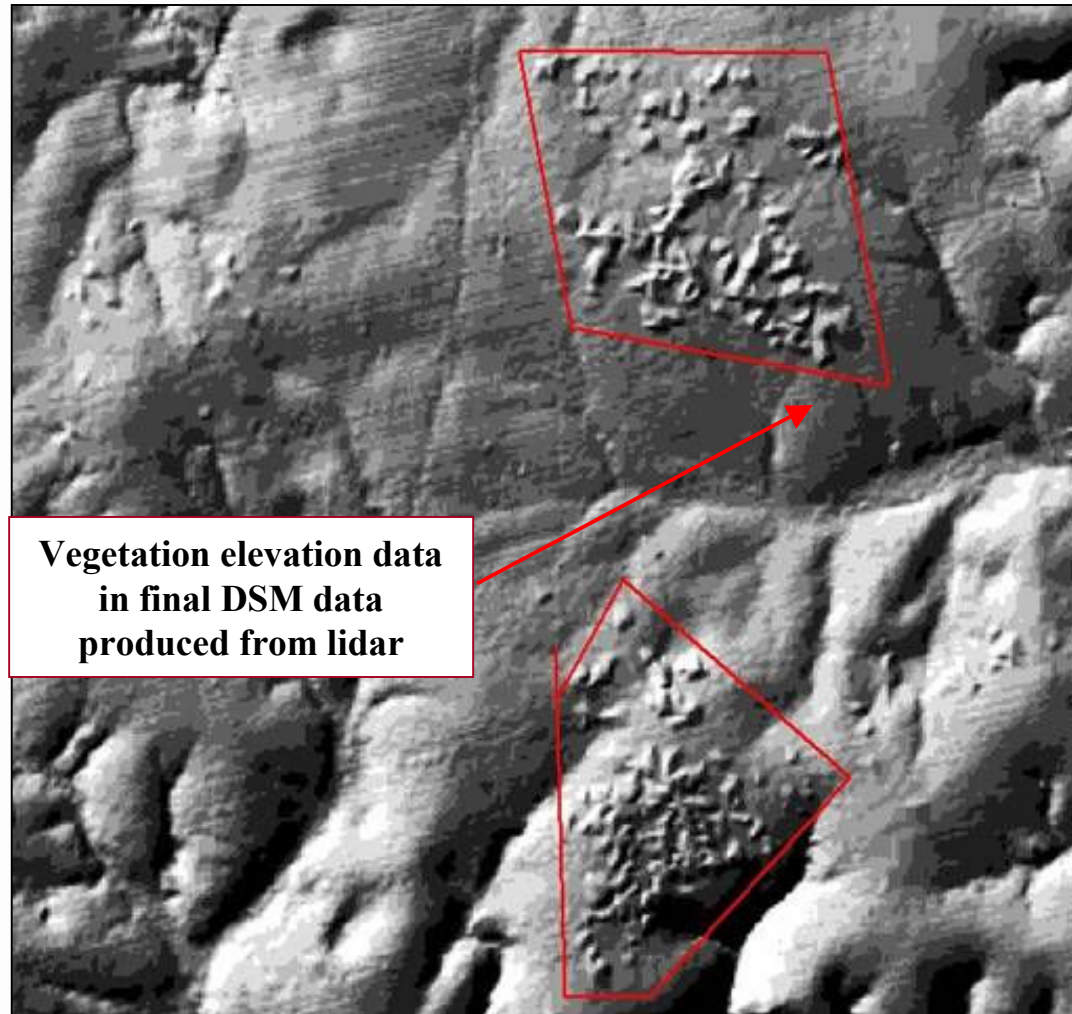
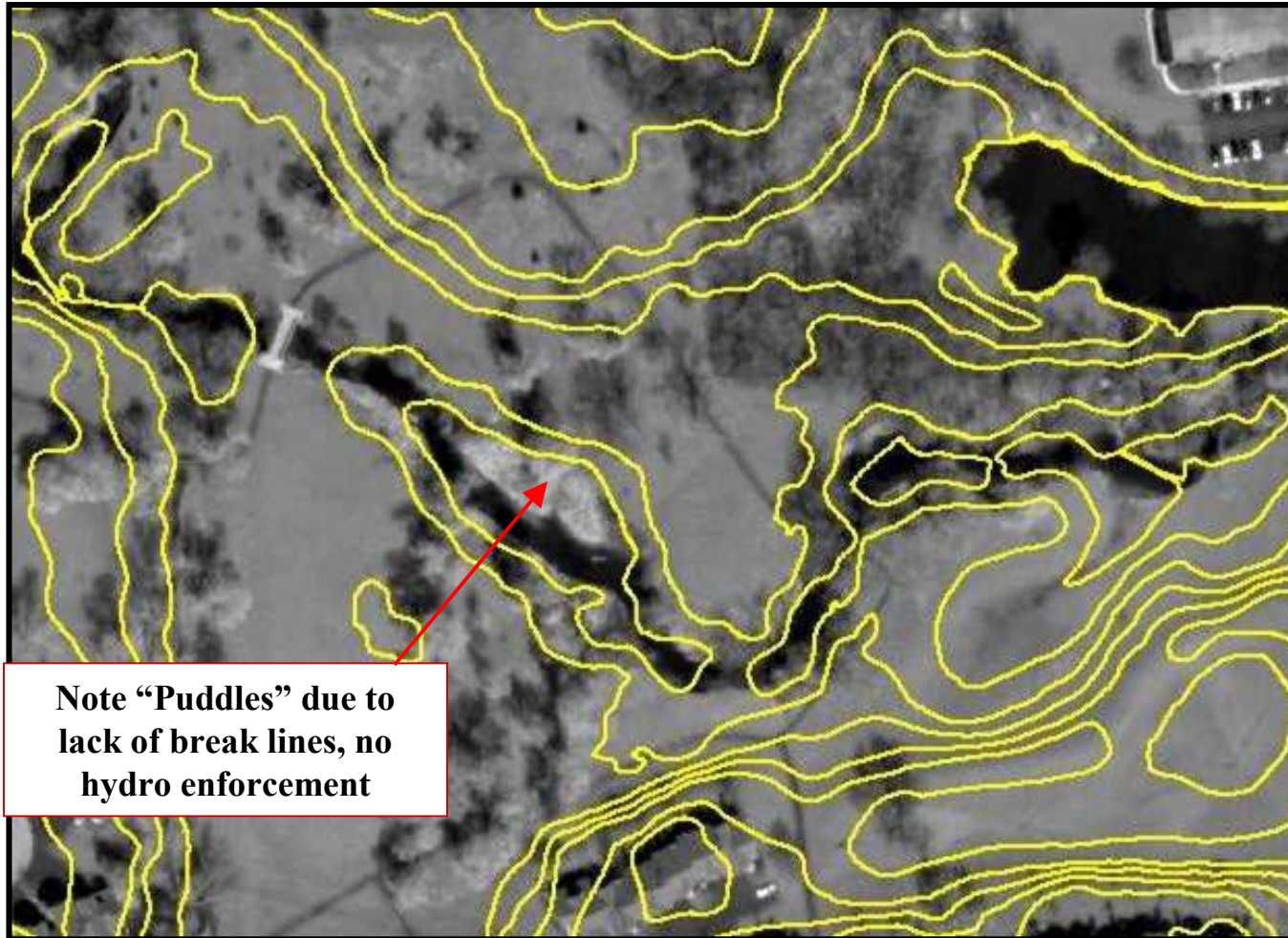


Image Courtesy of State of NC

Lidar Contours

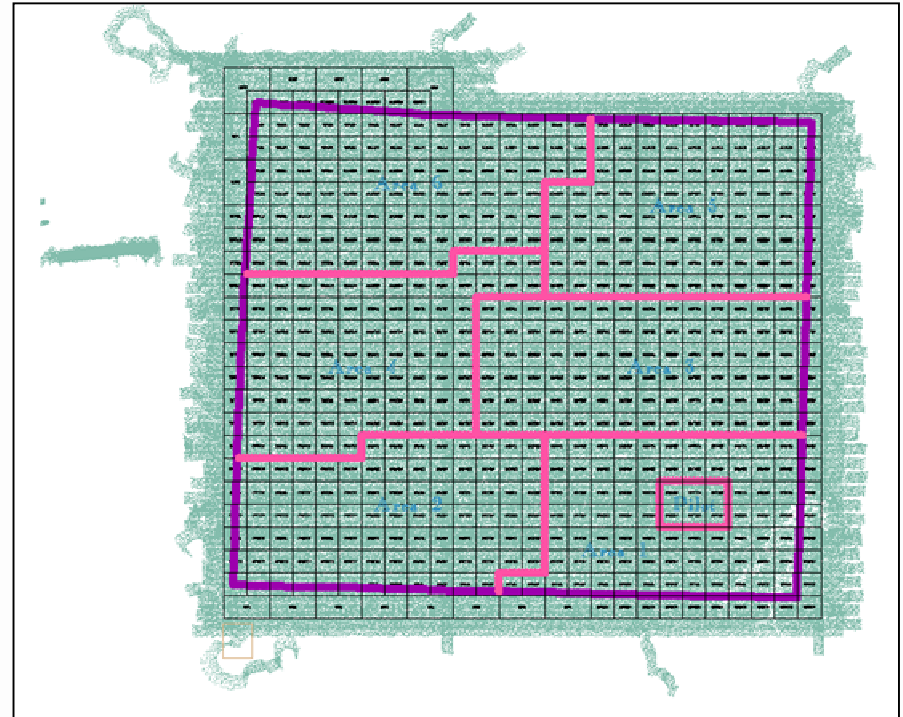
Data Courtesy of State of NC



**Note “Puddles” due to
lack of break lines, no
hydro enforcement**

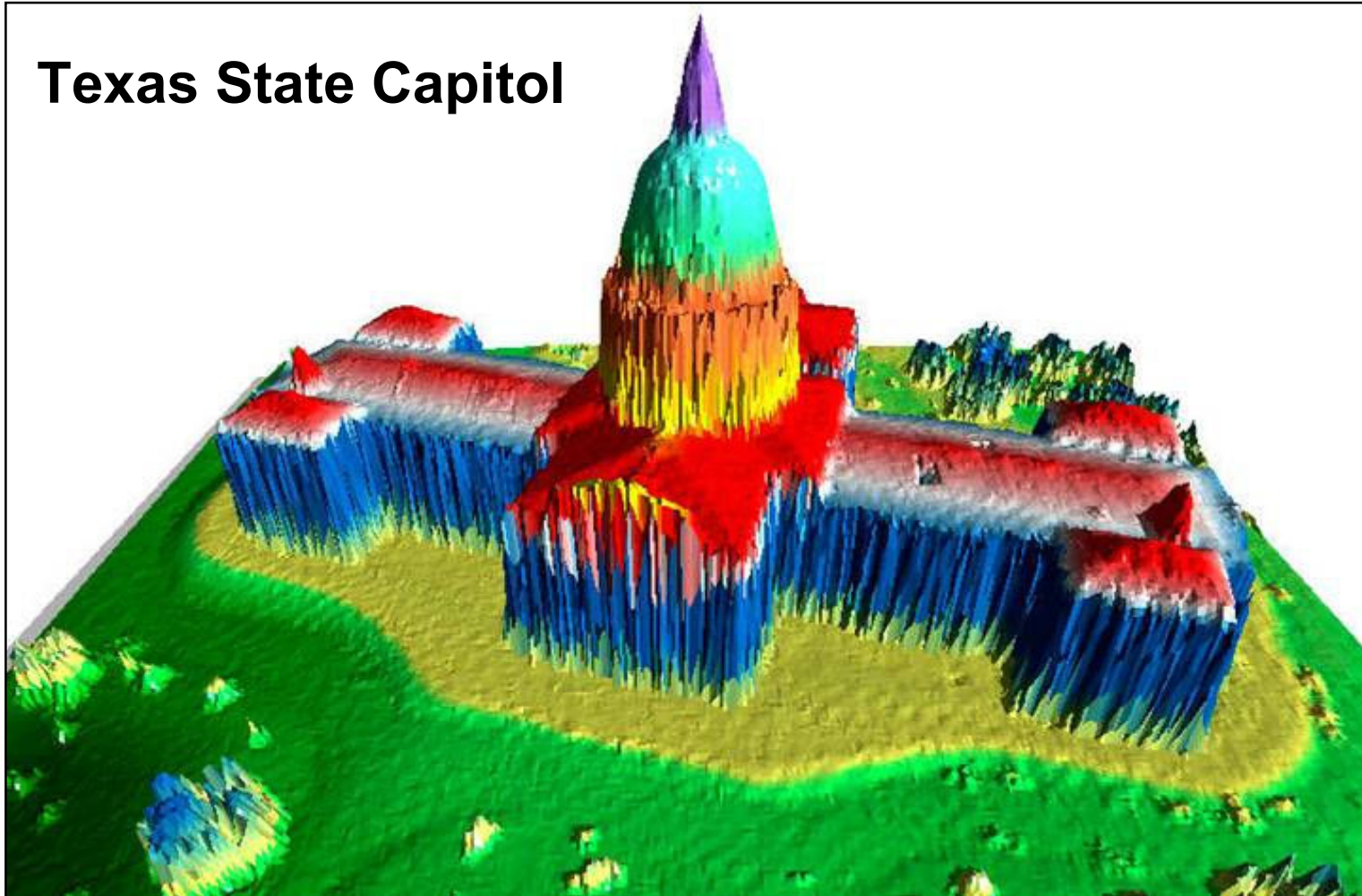
Large Data Sets

- 200-600 million points per county
- How to visualize?
- How to store and access?
- How to analyze and process?

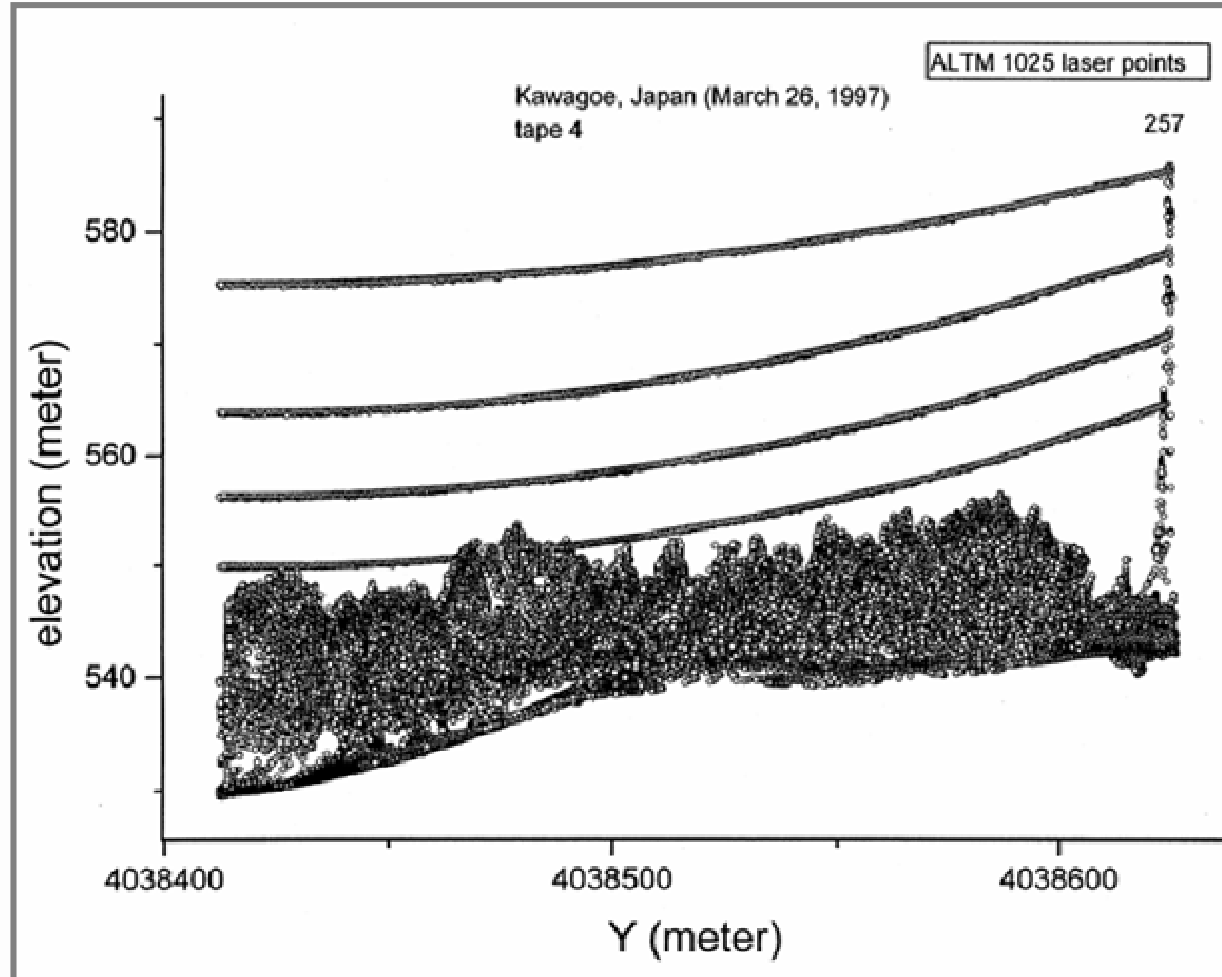


3-D Building Modeling

Texas State Capitol

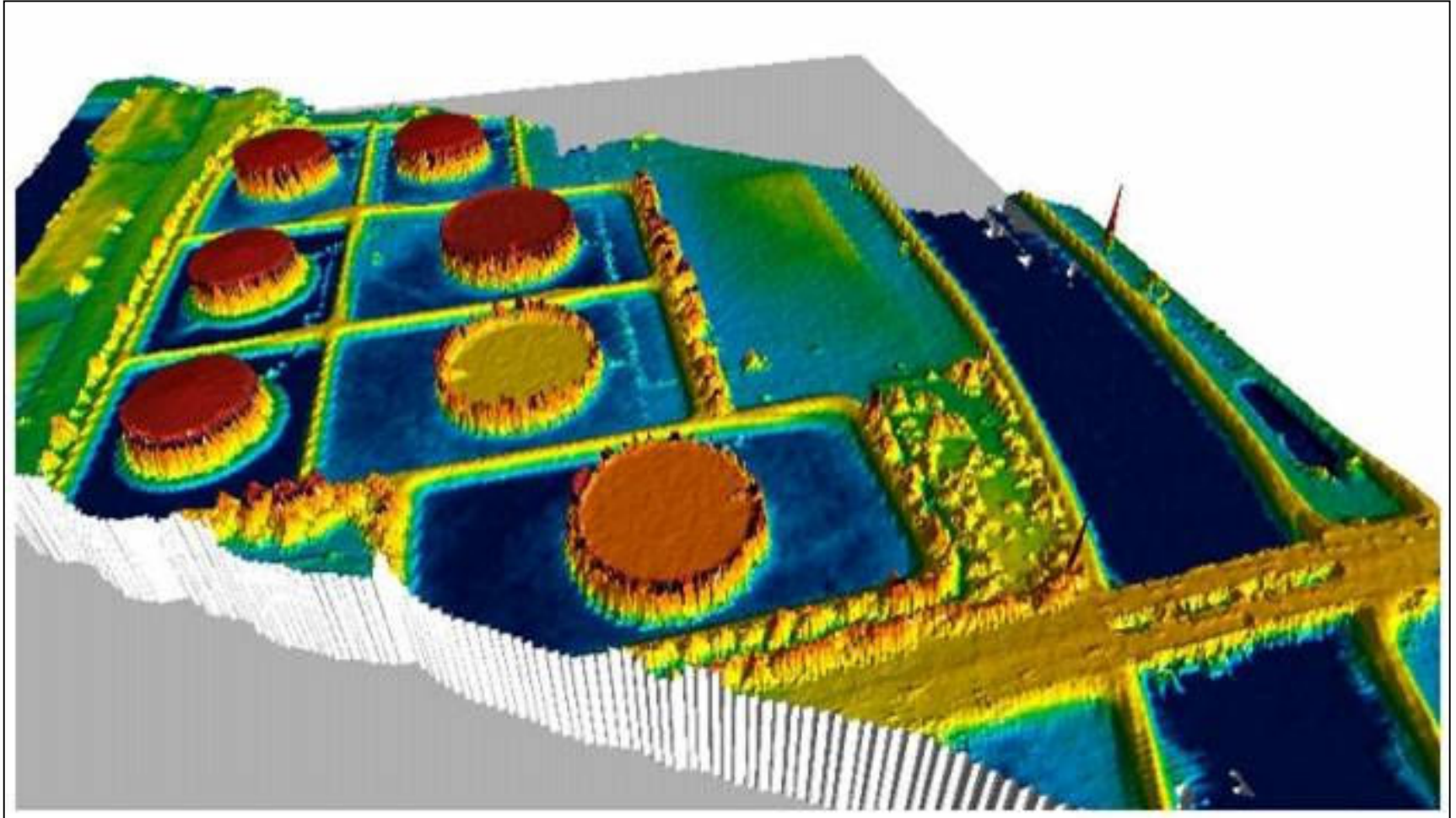


Power Line Heights



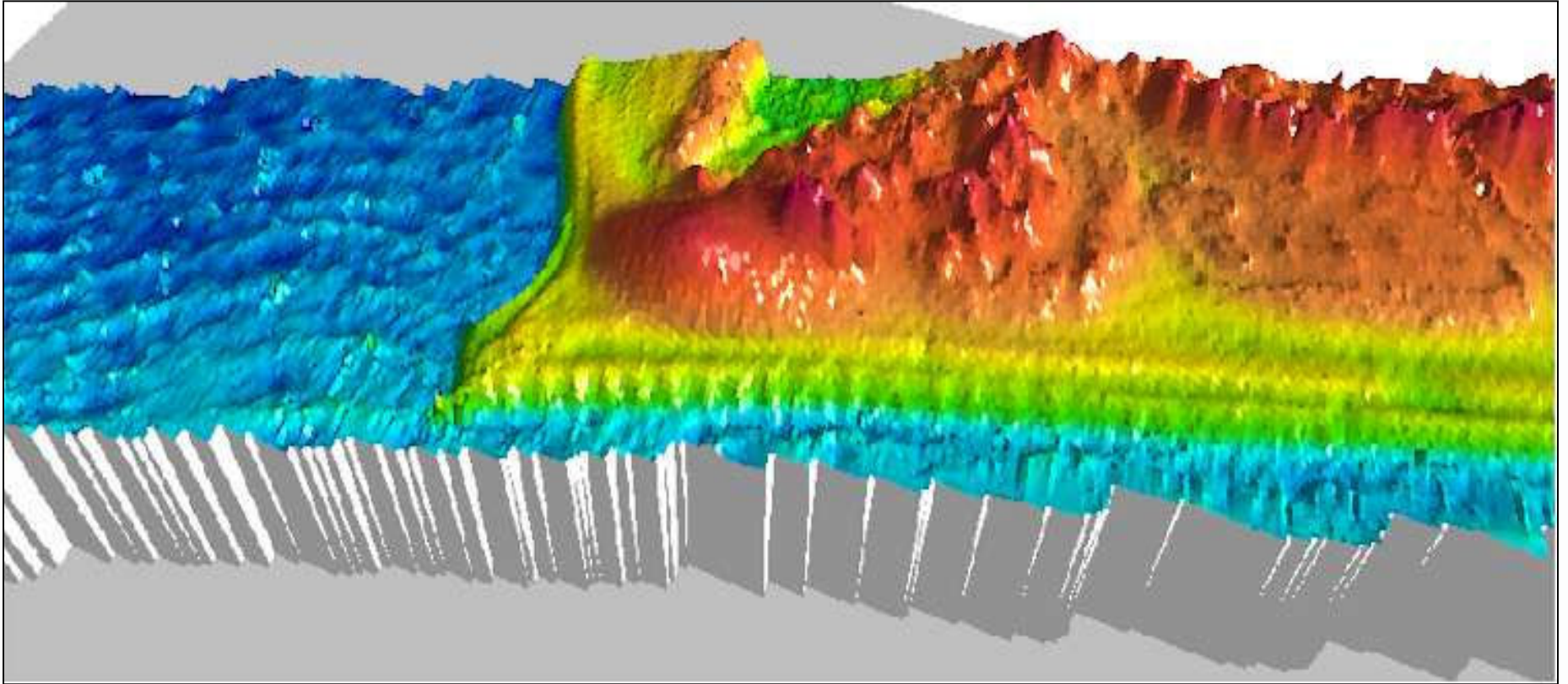
Images Courtesy of Optech

Industrial Volumetric Analysis



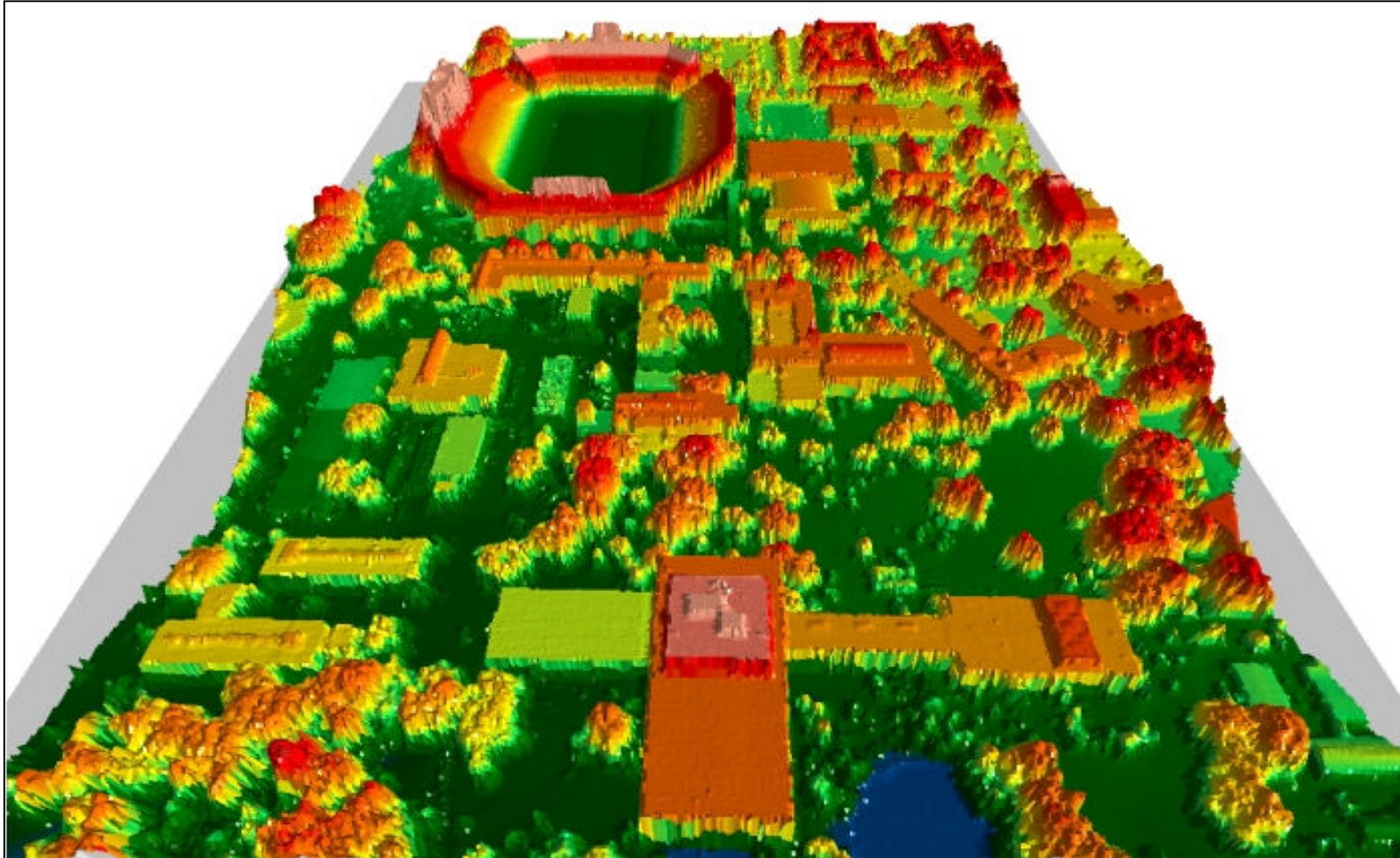
Images Courtesy of Optech

Erosion Studies



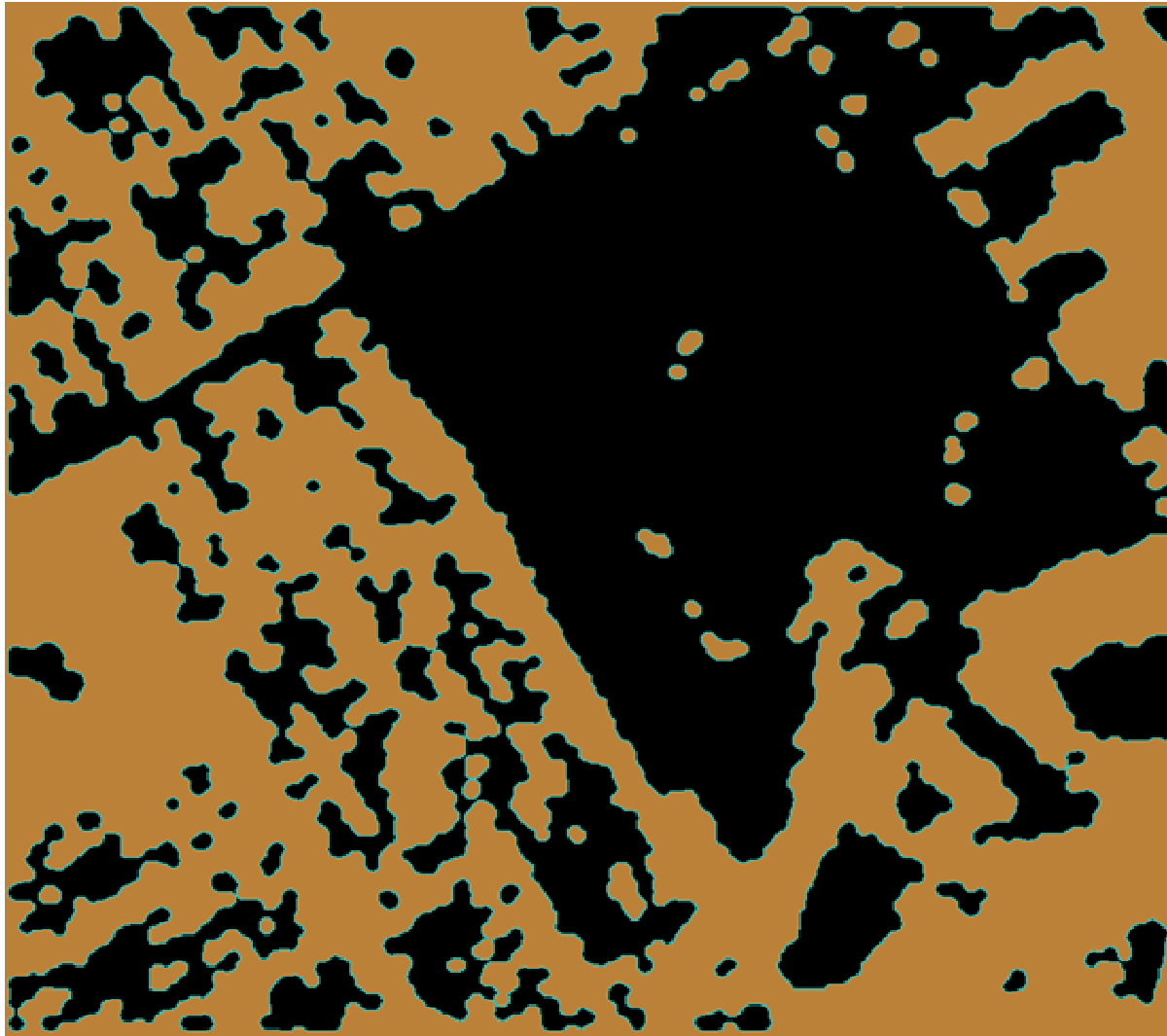
Images Courtesy of Optech

Building & Vegetation Heights

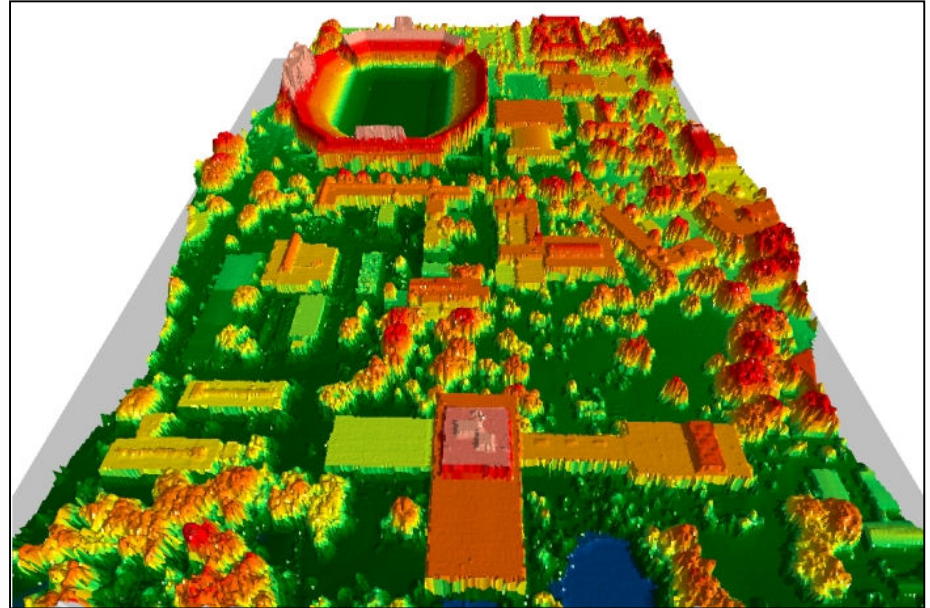
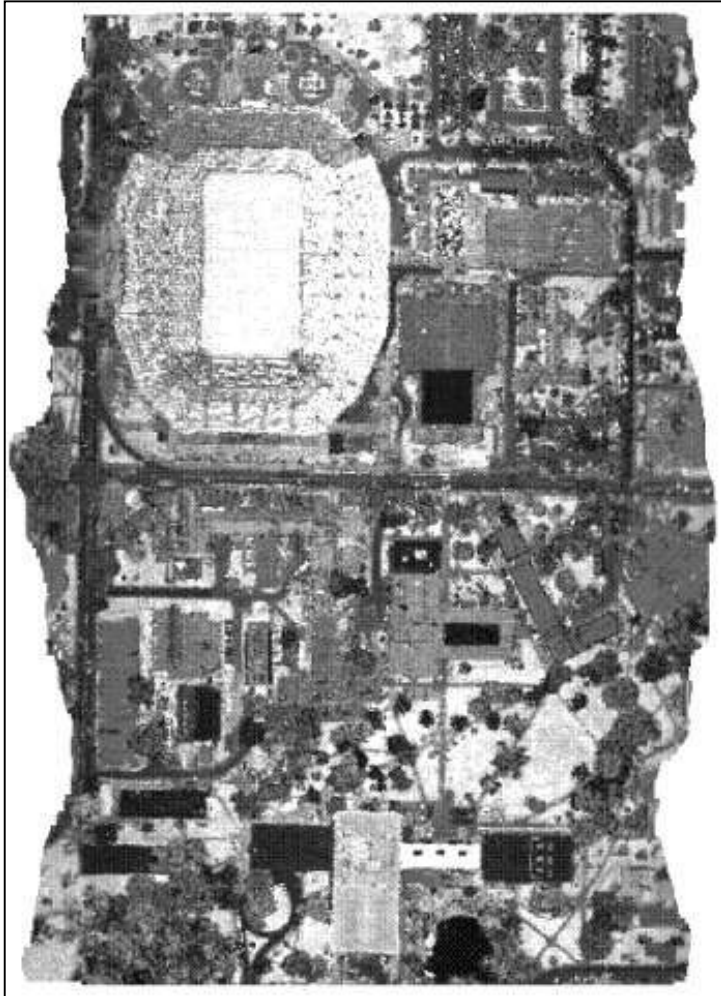


Images Courtesy of Optech

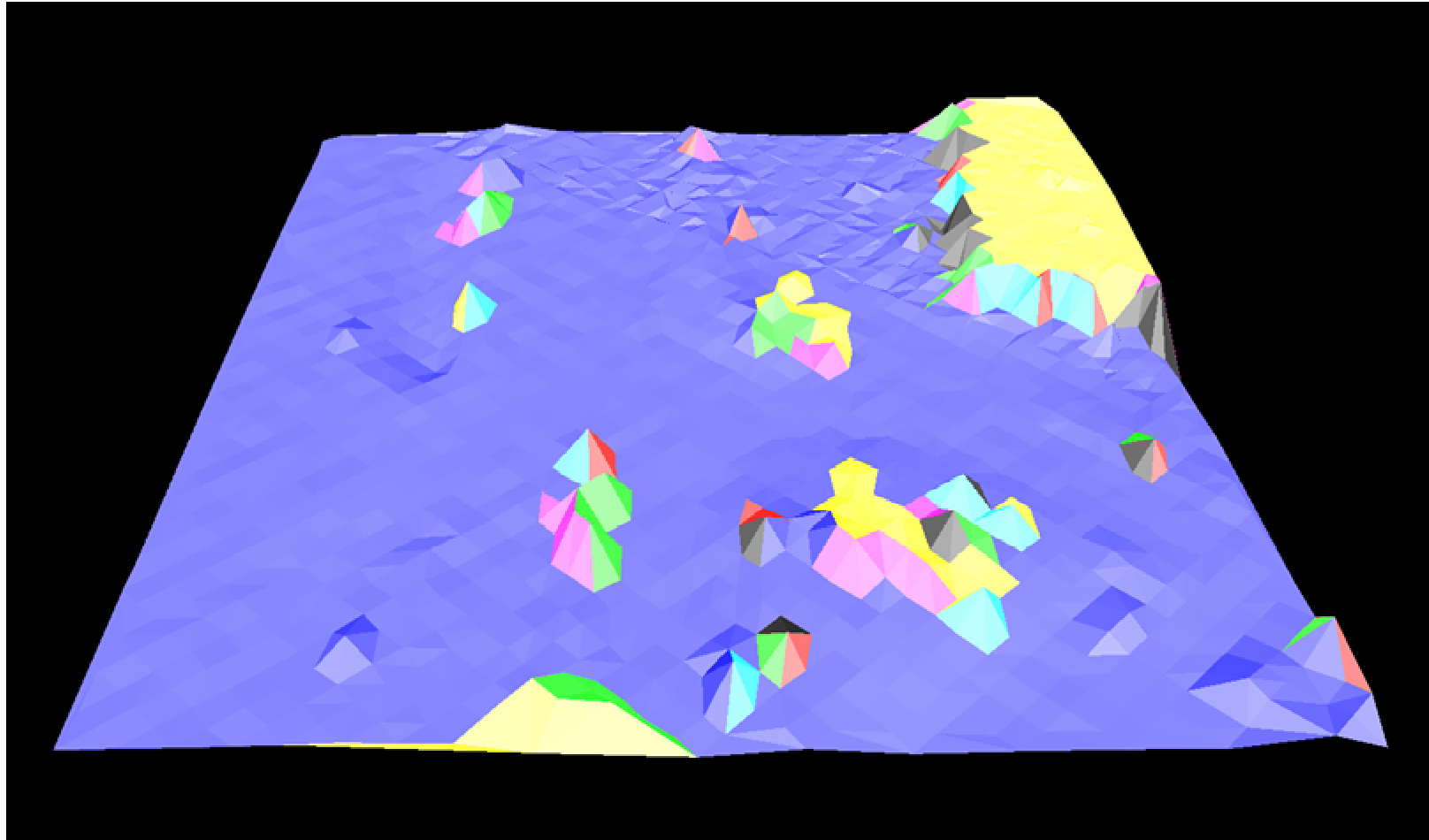
Tree Outlines



Intensity Image



Building Detection



Building Detection





How To Specify Lidar Data

- Decide on Application First, ...
- Then Determine Specifications:
 - Accuracy
 - Area
 - Time-line
 - Data format: XYZ, Shape files, DGN
 - Product level: Raw, Filtered, Verified
- How Will Data be Verified
 - Flight logs, AGPS reports
 - Check-points



Cost

- Price Range Per Square Mile: \$?
- Factors:
 - Stereo Verification
 - Point Density
 - Area Size
 - Area Shape
 - Location
 - Accuracy



Summary

- Tremendous Tool for Elevation Models
- More Data, More Quickly, for Less Cost
- New Applications
- Lidar Quality is Variable
 - Experience, Procedures, Technology
- Know what you want; make sure that's what you get!



For More Information

More information on these products can be found at:

- www.sanborn.com
- Contact Joe Stark
 - jstark@sanborn.com
 - (704) 347-4552
- Contact Andrew Brenner
 - abrenner@sanborn.com
 - (734) 213-1060