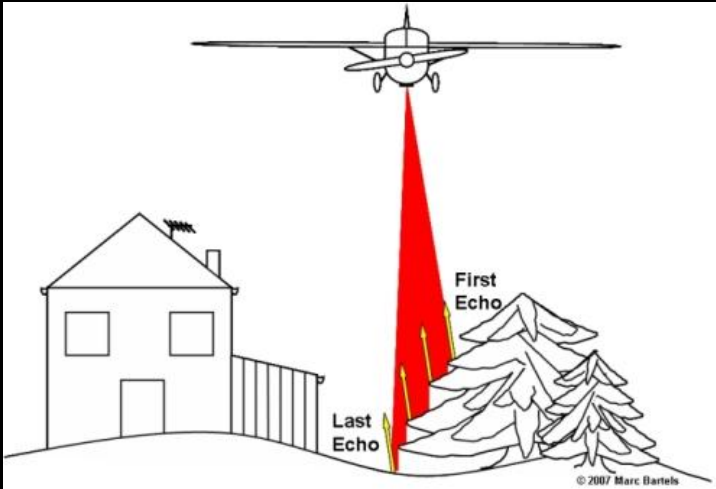


# LIDAR

## Laser point cloud and DTM



The diagram illustrates the LIDAR process. An airplane is shown in flight, emitting a red laser beam downwards. The beam passes over a house and a fence, then hits the ground, labeled 'Last Echo'. The beam then reflects off the top of a tree, labeled 'First Echo'. The diagram is credited to © 2007 Marc Bartels.

Sarah Shewell                      GEOG 593                      October 10, 2009

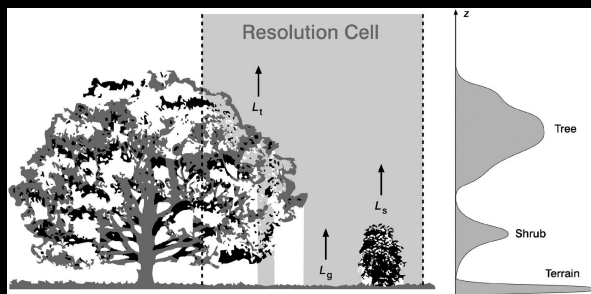
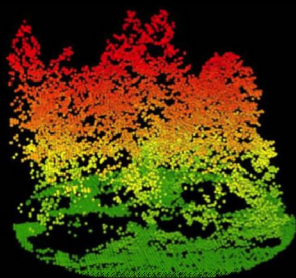
## Laser point cloud and DTM Questions:

- What is a laser point cloud?
- What are the steps involved in processing ALS data?
- How is ALS data classified?
- What is one advantage of developing a DTM from LIDAR data?

Airborne Laser Scanning (ALS) System

## What is a Laser Point Cloud?

The collection of points developed from the laser pulse returns.



## What do you do with all that data?!?

- Raw LIDAR data
  - Laser Point Cloud
  - Airborne GPS and Other Flight Reference (Orientation Parameters ) Data
  - Ground Control Points (Highly Accurate GPS)
- Initial Processing
  - Integrate Laser Point Cloud Data with Flight and Ground Reference Data

This creates a spatially coherent cloud of points in a 3D frame of reference

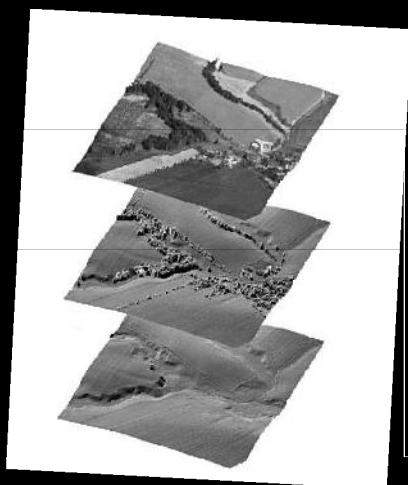


Oregon Lidar Consortium (OLC)

## What are the steps involved in processing ALS data?

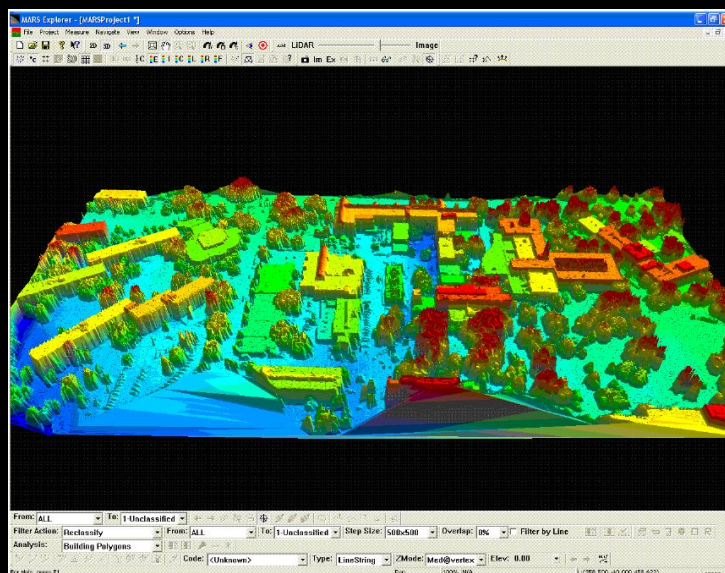
- Filtering
  - Removal of unwanted points
- Classification
  - Vegetation, Ground, Buildings...
- Modeling
  - Based on point classification the data can be filtered to create Digital Terrain Models (DTM) and others

## DTM



- **Creating Digital Terrain Models (DTM) from ALS Data**
  - Can be Highly Accurate: 10- 60cm (.1-.6 meters) vs Planimetric Accuracy: 10- 300 cm (.1- 3 meters)
  - Easily obtained with LIDAR processing software

## LIDAR Software Mars free viewer



## References

Lillesand, T. M., Kiefer, R. W., and Chipman, J. W. 2004. *Remote Sensing and Image Interpretation*, 5<sup>th</sup> edition. John Wiley & Sons.

Li, Z., Zhu, Q., and Gold, C. 2004. *Digital Terrain Modeling: Principles and Methodology*. CRC Press.

## Other Links & Image Sources:

Oregon Lidar Consortium (OLC)

<http://www.oregongeology.com/sub/projects/olc/>

<http://www.informaworld.com/>

[http://www.aspl.ece.ufl.edu/reports/GEM\\_Rep\\_2007\\_12\\_001.pdf](http://www.aspl.ece.ufl.edu/reports/GEM_Rep_2007_12_001.pdf)

<http://www.cvg.rdg.ac.uk/projects/LIDAR/index.html>

