LIDAR: Practical Uses for a Powerful Product

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Where is Clinton County
LIDAR: Laser Imaging Detection and Ranging

LIDAR uses the same principle as RADAR. The LIDAR laser sends a signal to the ground from an aircraft; some of this signal is sent (bounced) back to the aircraft; the time for the laser light to travel out to the ground and back to the aircraft is used to determine the distance to the feature on the ground that it bounced off. A tree is going to be higher (taller) than the ground it is on; a house is going to be higher than the ground on which it was built. The "lay of the land" is recorded to a great accuracy; in the case of our data here in Clinton County it is accurate in elevation to within a 6 inch error factor.
Tools We Use

3D Analyst & ArcScene

ESRI

CATALIS
Tools of a More Mature GIS Program

ME JUST PRINT MAPS

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TURNING DATA INTO INFORMATION

CATALIS
Tools of a More Mature GIS Program

- ME JUST PRINT MAPS
- TURNING DATA INTO INFORMATION
- MAKE INFORMATION REFLECT THE REAL WORLD
3D Analyst is the tool to create 3D data, such as TIN's, 3D features, contours, etc. It is an extension to the ArcGIS products (ArcView, ArcEditor, ArcInfo).
ArcScene comes with 3D Analyst. You can view data in 3D, create video clips, and fly around your 3D world.
Video’s!

The Steep Driveway

The DHL Convoy Route

Driveway Location

A FLAT Watershed
We All View the World in 3D
Best Representation of 3D World

In a Flat Plane of Reference
Which Way is the water going?

Looks rather flat; but it’s not!
2 Foot Contours – show very little
3D New Vienna
Another 3D New Vienna
One More....
Look Around!

Ditches
Dips
Swale
Creeks
Gully
Ponds
Bridges
Culverts
Buildings
All features that function in drainage management can be viewed in 3D with very accurate Z values.
Where Does The Data Come From?

FREE Data
State-Wide LIDAR Data!

Delivered in:

- Grid / Ascii
- Raster / Tiff
- LAS

Brian Stevens
Woolpert
What Format? - TXT

- .txt file – Simple!

LIDAR Raw Data Sample:
"X","Y","Z"
1553340.909999999990,571903.60999999999,873.690000000000
1553348.939999999990,571903.73999999999,873.600000000000
1553357.889999999990,571903.85999999999,873.430000000000
1553367.700000000000,571904.030000000003,873.320000000000

XYZ

Plus Intensity!
What is the LAS Format?
The LAS file format is a public file format for the interchange of LIDAR data between vendors and customers. This binary file format is an alternative to proprietary systems or a generic ASCII file interchange system used by many companies. The problem with proprietary systems is obvious in that data cannot be easily taken from one system to another. There are two major problems with the ASCII file interchange. The first problem is performance because the reading and interpretation of ASCII elevation data can be very slow and the file size can be extremely large, even for small amounts of data. The second problem is that all information specific to the LIDAR data is lost. The LAS file format is a binary file format that maintains information specific to the LIDAR nature of the data while not being overly complex.
Can I make 2 foot contours?

Beware of making Contours

Can I use LAS data with ArcGIS?

What kind of computer system will I need to process data in 3D?

Can I use a flavor of AutoCAD and work with raw LIDAR data?

Will I need larger hard drives?

Know what your going to do with the data BEFORE you get it!!!

YES YES YES

Am I smart enough to do this myself?
Data was delivered by Township / Sections in each township.

16 Sections per Township

Wilson Township
20,586,155

Liberty Township
17,865,250

Marion Township...
Word of Advice...

Get your data delivered in a nice neat Grid format
TIN
Generated
from an LAS
file

http://www.appliedimagery.com/sample.html
With LIDAR Data

You can look at the world in a whole new way…
See the Terrain

Color variation shows change in elevations
Color variation shows change in elevations
Screen Shot of Caesar Creek Park Area
Screen Shot of Caesar Creek Park Area
3D Opens Your Eyes!

See things in a completely different way!
Exaggerate Elevations

Runway…
Very Steep Driveway
Age Old Question…

HOW do we get those WITHOUT ArcView / 3D Analyst / ArcScene to be able to view some of the 3D data generated from LIDAR?

ArcGIS Explorer
Coming soon…

ArcReader – next slide!

A2E – Arc to Earth / Google Earth
Converts ESRI GIS Data formats to KML . Google Earth files.
Advantages...

- ArcReader is Free
- Each Cell of the image (previous slide) has an elevation value.
- You can click ANYWHERE and get elevation information.
- Printing from ArcReader is GREAT!
Disadvantages

- Need ArcReader Publisher
- Users can do almost NOTHING to change how they view the map data in an ArcReader “project” file.
Latest Project....

- Create 3D features for street centerlines
- Calculate 3D Length on those features
Next Set of Slides: Adding 3D Length to Lines

Delivery Format

LAS

LAS Reader in ArcCatalog

Convert to Shapefile or Geodatabase

TXT File

Add X-Y Data as an Event

Export to Shapefile: Point Data

Clip to Area

Create TIN in 3D Analyst

Create 3D Features

Calculate Elevation

Create TIN in 3D Analyst

Warp Aerial Photography

View in 3D

Calculate 3D Length
Add X-Y Data
The Process

Vast field of points

Clipped to buffer around street centerlines

TIN – 6 inch Color Difference

Zoomed-In Area…
Export to a 3D feature

The screenshot shows a software interface for exporting features to a 3D environment. The interface includes a layer manager on the left side, with various options such as Elevation Information, Highland County, Area Codes of Ohio, and more. On the right side, there is a 3D Analyst window with a dialog box titled "Convert Features to 3D." The dialog box contains input fields for specifying the input features, source of heights, and output features. The input features are set to " ortline," the source of heights is set to "infopresentation," and the output features are set to "C:\Data\GIS\Layers\dldLeaf.shp."
View in 3D
Calculate 3D Length

http://www.ian-ko.com/free/free_arcgis.htm
WWW CSC.NOAA.GOV/CRS/TCM/LIDAR_HANDLER_ARCMAP
What Does The Future Bring?

State-Wide Orthophotography program will be providing LIDAR data!

Looking at Map Data in 3D Opens a Whole New World
LIDAR Data Availability online is in the works!

Thanks For Your Time!

WWW.CLINTONCOUNTYOHGIS.ORG