

# NSF Sponsored NATIONAL CENTER FOR AIRBORNE LASER MAPPING

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## **Airborne Laser Swath Mapping Project**

### **Spatial and Temporal Patterns of Nitrogen Export and Land Use/Cover Change in Mountainous Watershed**

**PI: Kristin Gardner, Montana State University**

Date Flown: September 20 and 25, 2005 (days 263, 268)

## **List of products – quick view**

1. 1m DEMs in ESRI GRID file format, based on the filtered (“bare-earth”) and unfiltered last return laser point datasets.
2. 1m Shaded Relief Maps in ESRI GRID file format.
3. 1m Contour Maps in ESRI Coverage file format, based on the bare-earth DEMs.
4. Raw laser point data (9 columns), ASCII format.
5. Last return laser point data projected to NAVD88 (Geoid03), ASCII format, one file per flight-line.
6. Filtered and unfiltered last return laser point data (xyz), tiled with overlap, ASCII format.
7. Shaded Relief Maps and Contour Map high resolution JPEG images for quick visualization.
8. Report on the data processing.

## **Comments**

- The bare-earth classification (filtering) was performed using Terrasolid's TerraScan Lidar processing software. Details about the filtering process can be found in the Processing Report.
- You may observe a periodic fine scale elevation variation throughout the dataset (about 5 to 20 cm, similar to a “corduroy” pattern), which is a property of the Optech LIDAR system, and it's within the machine's error limits. This variation can be removed by using a smoothing routine, but this process could smooth other features as well and we feel that the decision is best left with the PI.

## What's on the DVD(s)

### DVD1

**GIS\_Data** – this folder contains the ArcInfo datasets and the associated “info” directory

- Digital Elevation Models, in ESRI GRID file format
  - “fltr\_grd” – 1m bare-earth grid
  - “unfl\_grd” – 1m unfiltered “last-return” grid

Projection: UTM zone 12N, with orthometric heights in NAVD88 computed using NGS GEOID03 model.

- Shaded Relief Maps, in ESRI GRID file format
  - “fltr\_shd” – bare-earth shaded relief map
  - “unfl\_shd” – unfiltered “last-return” shaded relief map

The shaded relief maps were generated from the 1m DEMs.

- Contour Map, in ESRI Coverage file format
  - “fltr\_cnt” – bare-earth contour coverage (1m contour spacing)

The contour map was generated from the 1m bare-earth (filtered) DEM.

**Images** – This folder contains high resolution images for quick visualization. The images follow the same naming convention as the ArcInfo datasets.

**Readme.pdf** – this document

**ProcessingReport.pdf** – detailed report describing how the data was processed

### DVD2

**FlightLines\_LR\_NAVD88\_1** – This folder contains ZIP files with unfiltered last return point data, one file per flight strip.

The flight strip number is the ID number as generated by Optech's REALM software. The numbering scheme may not start from 1 and the numbers are not necessarily consecutive. The flight strip ID numbers in this archive match the ID numbers in the 9-column archive.

The format is 3-column space delimited X Y Z:

X = Easting last return  
Y = Northing last return  
Z = Elevation last return

The projection is UTM zone 12N with orthometric heights in NAVD88 computed using the NGS GEOID03 model.

### **DVD3**

**FlightLines\_LR\_NAVD88\_2** – Second part of the unfiltered last return per flight strip point data. See description above.

**PointData\_FilteredTiles** – This folder contains a ZIP archive with filtered last return laser point data split in 2km x 2km tiles with 60m overlap.

The tile filenames start with the letter “f” (indicating the tile contains *filtered* data) followed by the lower left grid node coordinates (without taking into account the actual tile overlap).

The format is 3-column space delimited X Y Z:

X = Easting last return  
Y = Northing last return  
Z = Elevation last return

The projection is UTM zone 12N with orthometric heights in NAVD88 computed using the NGS GEOID03 model.

### **DVD4**

**PointData\_UnfilteredTiles\_1** – This folder contains ZIP files with unfiltered last return laser point data split in 2km x 2km tiles with 60m overlap. Each file was individually compressed using the Windows version of GNU GZip (any ZIP application should be able to uncompress these files. We tested it with WinZip, WinAce and UltimateZip)

The tile filenames start with the letter “u” (indicating the tile contains *unfiltered* data) followed by the lower left grid node coordinates (without taking into account the actual tile overlap).

The format is 3-column space delimited X Y Z:

X = Easting last return  
Y = Northing last return  
Z = Elevation last return

The projection is UTM zone 12N with orthometric heights in NAVD88 computed using the NGS GEOID03 model.

### **DVD5**

**PointData\_UnfilteredTiles\_2** – Second part of the unfiltered tile set. See description above.

### **DVD6 & DVD7 & DVD8 & DVD9**

The last 4 DVDs contain ZIP archives with raw laser point data files in 9-column ASCII format, one file per flight strip. The 9-column is the most complete format.

The nine columns are as follows:

1. GPS time (seconds of week);
2. Easting last return;
3. Northing last return;
4. Height last return;
5. Intensity last return;
6. Easting first return;
7. Northing first return;
8. Height first return;
9. Intensity first return.

**Note** that in these 9-column files no geoid model has been applied - height values are ellipsoid heights and these height values will NOT match orthometric heights (elevations) found in the 3-column (xyz) output or in the 1-meter DEM grid nodes. The UTM zone code (12) is appended to the Easting coordinate in this nine-column format.

### **Software required for using the data**

The ESRI Grids and Coverages can be viewed with all ESRI software, such as ArcGIS, ArcMAP, and ArcView 3.xx. Please contact NCALM if alternative formats are needed.

Some large (>2GB) ZIP archives (for the 9column dataset) were compressed using UltimateZip (<http://www.ultimatezip.com/>) . We recommend using this program to uncompress these large files, as other ZIP applications might have problems with their size.