# Canaan Valley Institute

WORKING FOR THE SUSTAINABILITY OF THE MID-ATLANTIC HIGHLANDS SINCE 1995

# Optech ALTM 3100 Lidar Sensor System

July 2008

For more information contact Paul Kinder at 888/291-5320
or send email to paul.kinder@canaanvi.org

Canaan Valley Institute (CVI) is very pleased to announce the acquisition of an Optech ALTM 3100 Lidar Sensor System. Lidar (**Li**ght **D**etection **a**nd **R**anging) works like radar, but operates at a higher frequency. The ALTM 3100 functions by sending pulses of light to the ground and measures the time and intensity of the returning light pulses. The time difference between the initial pulse and the return reflectance is calculated and by using the speed of light and the elevation of the plane, we can resolve the distance the pulse traveled and therefore the elevation of the object. The ALTM 3100 is able to emit 100,000 pulses per second and records up to four returns per pulse. The first return pulse recorded captures the first surface encountered (i.e., tree canopy). The last return captures the last objects (i.e., ground surface below the tree canopy).

CVI's ALTM Lidar sensor system is also equipped with a 3-band digital camera that captures aerial imagery in true color or color infrared format simultaneously with the lidar elevation data. Combining both of these data sets allows CVI to produce highly accurate topographic mapping along with coincidental, georeferenced aerial images with a high spatial resolution. Elevation accuracies of less than 15 centimeters are possible.

CVI has proven experience in processing lidar data into information for applied uses. CVI's accomplished Geospatial Team has worked with stakeholders and clients in both the public and private sectors throughout the Mid-Atlantic Highlands since 1995, and has increasingly used lidar data to support decision-making. With the addition of the ALTM sensor to our existing set of tools, CVI looks forward to providing the complete range of remote sensing and spatial analysis services for our collaborators.

Applications

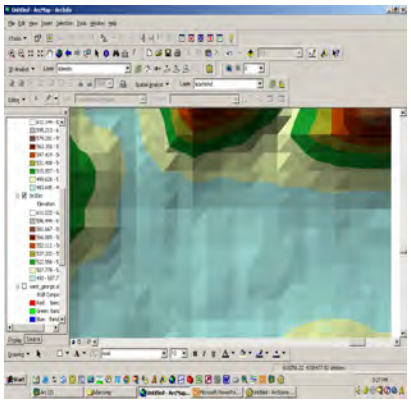
- Power line corridor mapping
- Pipeline mapping
- Real estate development
- Property assessment
- Contour mapping
- Digital elevation models
- Floodplain mapping
- Forestry
- Impervious surface mapping
- Urban modeling

Advantages

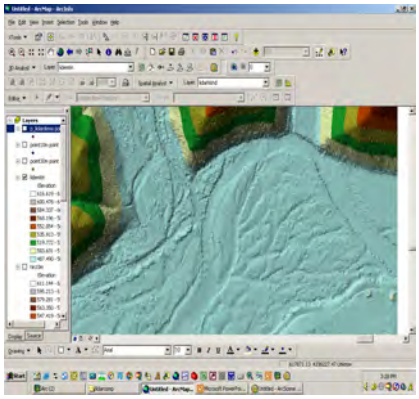
- Lidar has many incentives over traditional survey methods
- More cost effective
- More accurate
- More powerful (a level of detail impossible otherwise)
- Rapid turnover
- The 100kHz ALTM3100 system has the highest laser repetition rate of any commercial lidar system
- High-resolution (sub-meter) digital aerial photography can be flown simultaneously with the lidar data (natural color or color infrared)

*(continued on back)*

*more about:* **Optech ALTM 3100 Lidar Sensor System**



*30-meter digital elevation model*



*Lidar-derived elevation model*

*On the left is an elevation model derived from traditional photogrammetry; the right-hand image is derived from lidar data. The finer detail of the lidar-derived image vastly increases the range of potential applications.*

**Optech ALTM3100 Specifications**

| Parameter | Specification |
|---|---|
| Operating altitude | 80-3500 m nominal |
| Horizontal accuracy | 1/2000 x altitude; 1 ó+ |
| Elevation accuracy | <15 cm @ 1200 m; 1 sigma<br><25 cm @ 2000 m; 1 sigma<br><35 cm @ 3000 m; 1 sigma |
| Range resolution | 1 cm |
| Range capture | Up to 4 range measurements for each pulse, including last |
| Intensity capture | 12-bit dynamic range for each measurement |
| Scan frequency | Variable; maximum 70 Hz |
| Scan angle | Variable from 0 to ± 25°, in increments of ±1º |
| Scanner product | Scan angle x scan frequency d" 1000 |
| Roll compensation | 2-Hz update rate Scan angle + roll compensation angle = field of view: e.g., ±20° allows ±5° compensation |
| Swath width | Variable; 0 to 0.93 x altitude (m) |
| Position and orientation | Applanix: Optech custom POS including internal 12-system channel dual frequency 2-Hz GPS receiver |
| Laser repetition rate | 33 kHz (maximum AGL 3.5 km)<br>(*assuming narrow beam* 0 kHz (maximum AGL 2.5 km)<br>*divergence of 0.3 mrad [1/e])* 70 kHz (maximum AGL 1.7 km) 100 kHz (maximum AGL 1.1 km) |