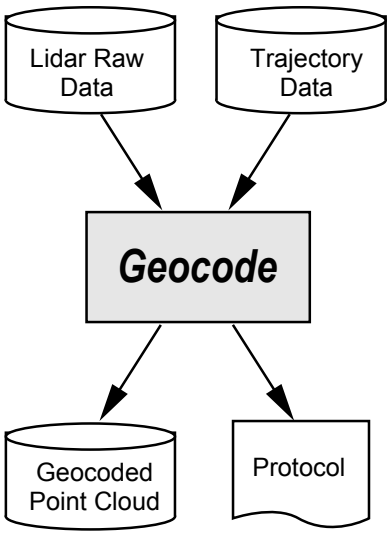
Geocode

Geocode™ is a family of software tools for processing the raw data laserscanner systems converting it into geocoded point clouds in a map-projected coordinate system.

Geocode is a stand-alone application for Microsoft Windows that interfaces smoothly with *TerraScan* and other lidar post-processing tools. *Geocode* reads native lidar data, and pre-processed trajectory and attitude data, to calculate 3-D point coordinates in the selected geographical reference frame. Output is generated in the native binary format of the *TerraScan* lidar data post-processing software for rapid data transfer, or, for *GeocodeL*, the *Normal-ized Waveform* file format that combines geocoding information and indexed waveform data for subsequent processing.



Geocode has been designed for ease-of-use and efficient production. After selection of the input files, processing and output parameters, it does not require further user interaction. All parameter settings may be saved to “flight” savesets for later reference and re-use. Also, a batch mode is available for processing data based one or several previously defined flight savesets, so that large projects can be processed efficiently over night.

The transformation and projection, and waveform analysis (*GeocodeL*) algorithms have been optimized for speed to provide time-efficient processing. Furthermore, the user has control over which processing steps are to be executed to minimize processing time during iterative processing segments. *Geocode* also provides the option to limit processing to data segments of large raw data files, so that time-intensive processing can be limited to the relevant sections.

To ensure the accuracy of the geocoding results *Geocode* uses the full calibration information available from the sensor. Installation and flightline offsets may be used to compensate for misalignment errors and GPS-effected variations in the trajectory, and to thereby further maximize the geometrical fidelity of the generated data products. Environmental parameters (air pressure, temperature) may be taken into account to compensate variations of the speed-of-light and refraction due to atmospheric conditions, to enhance measurement accuracy further.

Currently, transversal-mercator-type projected coordinate systems (UTM, Gauss-Krueger) are available, whereby the user can select from a number of pre-defined ellipsoids, datums, and projection parameters, or define his own. Other projection types can be implemented upon request.

Flavors

Geocode is served in several flavors for different types and makes of laserscanners. Currently available are:

- *GeocodeL* for ***EL-MAP***™ laserscanners. This version includes waveform processing.
- *GeocodeV* for Riegl V-line® laserscanners
- *GeocodeVLP* for Velodyne VLP™ laserscanners
- other flavors may be brewed upon request and availability of data format documentation

Features

- Reads native binary lidar data files and trajectory and attitude data files (various formats supported).
- Detects surface returns in echo waveforms and determines the accurate location of the return (*GeocodeL*)
- Provides true surface reflectance at the laser wavelength by scaling return intensity by range.
- Outputs pulse width for surface slope and roughness analysis and classification.

- Selection of preset and user-defined ellipsoids, datums, and projections available.
- Output format in ASCII, native Terrascan Binary, LAS binary format or as geocoded *Normalized Waveform* files (*GeocodeL)*.
- Generation of processing protocol and output data statistics for quality control.
- Batch processing of multiple survey flights using flight parameter savesets
- Incremental flight parameter sets can be used for modifying only few parameters
- Uses lidar sensor specific calibration files for improved accuracy
- Provides control over installation-specific boresight offsets.

File Input

- Single or multiple binary raw data files from laserscanners
- Binary or ASCII lidar trajectory and orientation files (.LPO, .POS, SBET (*.out), .NCOM etc.).
- Lidar sensor description/calibration files (optional)
- Linelist files for automatic filename assignment and line adjustment (optional)
- Geoid file (optional)

File Output

Available output formats:

- ASCII point records (.ASC)
- Terrascan binary format (.BIN)
- LAS1.0, 1.1, and 1.2 binary formats (.LAS)
- *GeocodeL Normalized Waveform* file format (.LGC, .LWF)
- Terrascan binary trajectory format (.TRJ) for geocoded trajectory or segments output

User settings

- Installation offsets for
  - boresight angles,
  - translational offsets,
  - timing offsets
- Atmospheric conditions
- Geoid
- Sensitivity of echo detection

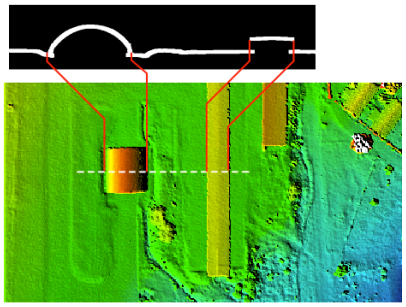
- Return selection (first, unlimited number of intermediate, last return of each laser shot)
- Range gate and noise/outlier filters
- Output ellipsoid, datum, map projection
- Definition of custom ellipsoids, datum transforms, and map projections
- Output file type, path for point cloud and trajectory outputs

System Requirements

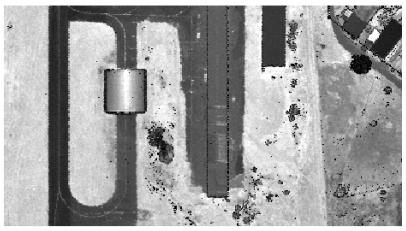
- Hardware:
  - Intel based computer
  - NTFS-formatted harddrive for file sizes larger than 4GB, SSDs recommended
  - 512 MB RAM
- Operating systems:
  - Windows 7 and above

Maintenance & Support

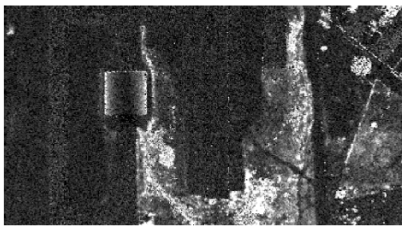
- 12 months of free maintenance (bug fixes and updates) and e-mail support included.



Elevation



Reflectance



Slope / Roughness

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