Elevation - LiDAR (DP3.30024.001)

Measurement

Elevation values are recorded for both the Digital Terrain Model (DTM) and Digital Surface Model (DSM), where DTM records only bare earth terrain and DSM records elevations related to the surface features (e.g. buildings and vegetation). Both products provided in a GeoTiff format on a spatially uniform 1 m resolution grid on 1 by 1km tiles.

Collection methodology

NEON AOP instruments, including the full waveform LiDAR, are flown at 1000 m above ground level at 100 knots in flight lines that have 37% overlap. Data are acquired at a minimum density of 4 LiDAR shots per square meter in non-overlap areas. NEON AOP LiDAR returns are full waveforms, from which up to 5 points per shot may be discretized. NEON sites are flown once per year with a target of 90% of maximum greenness or higher and at a minimum of 3 of every 4 years. Flight coverage is a minimum of 10 km by 10 km and covers both NEON tower and observational sampling sites. Aquatic sites, as well as the terrestrial sites in Hawaii and Puerto Rico, are flown in the same fashion, but at reduced frequency.

For information about disturbances, land management activities, and other incidents that may impact data at NEON sites, see the Site management and event reporting (DP1.10111.001) data product.

Maintenance and calibration

The NEON AOP LiDAR is calibrated every winter between flight seasons. Calibration/validation flights for horizontal, vertical, and timing accuracy are conducted at the beginning and end of every flight season. Nominal runway flights are conducted in each domain flown during the flight season to ensure there is no accuracy drift. Field validation exercises collecting GPS points are typically conducted once per flight season.

Data processing and derivation

Raw discrete LiDAR data are processed to projected and corrected L1 LAZ point clouds in their original flight lines. First (highest elevation) LiDAR returns are gridded to 1 m pixels to create a digital surface model (DSM). Last (lowest elevation) returns are gridded to 1 m pixels to create a bare earth digital elevation model (DEM). Triangulation and interpolation are used to fill any gaps in DEM data if the LiDAR was unable to reach the ground.

Data quality

A quality report for each flight used in producing the data product, describing weather conditions and other data quality considerations during flight, is available for download via the L1 AOP LiDAR products. The L1 AOP LiDAR products also include uncertainty point clouds in LAZ format and processing quality report PDFs.

Documentation

NEON L0-to-L1 Discrete Return LiDAR Algorithm Theoretical Basis Document (ATBD)
NEON.DOC.001292vB | 3.4 MiB | PDF

NEON Discrete LiDAR Datum Reconciliation Report
NEON.DOC.002293vB | 679.5 KiB | PDF

NEON Algorithm Theoretical Basis Document (ATBD): NEON Elevation (DTM and DSM)
NEON.DOC.002390vB | 1 MiB | PDF

For more information on data product documentation, see:
https://data.neonscience.org/data-products/DP3.30024.001

Citation

To cite data from Elevation - LiDAR (DP3.30024.001), see citation here:
https://data.neonscience.org/data-products/DP3.30024.001
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