

Metadata Report

Ray Site, Jackson County Indiana, Tree Uprooting, 2018/12/19

Summary

The topography of a private property in Southern Indiana was measured with a UAS-based lidar system. A 0.25 m DEM was produced, which shows many pit-mound topographic signatures typical of tree uprooting on soil-mantled hillslopes.

Personnel

- PIs Quinn Lewis, Brian Yanites, Douglas Edmonds, Indiana University
- Remote Pilot-in-command Steven Scott

Site Information

- Soil-mantled, shale bedrock hillslope (moderate slopes), deciduous tree cover selectively timber harvested in about 5-10 year intervals
- Observe tree uprooting
- 38°48'46.5"N 86°13'58.2"W OR 38.812927, -86.232845
- Flown with leaf-off conditions
- Full day, December 19, 2018

Survey Results

- LiDAR and aerial photography were obtained from a DJI M600 hexacopter UAS, which was customized by Phoenix LiDAR Systems and outfitted with a Reigl MiniVux LiDAR unit and a Sony A6000 digital single-lens reflex (DSLR) camera. A Northrup-Grumman inertial measurement unit (IMU) and a CHC global positioning system (GPS) were integrated with the camera, UAS, and LiDAR. The LiDAR point accuracy in x, y, and z dimensions is about 0.2–0.3 cm at a distance of 75 m based on a borehole siting test performed on the system by the manufacturer. The LiDAR point cloud was acquired during flight using software provided by Phoenix LiDAR Systems.
- The final accuracy of the point cloud and aerial photographs produced with the integrated system are dependent on the GPS base station accuracy. The base station was set up in an arbitrary location and recorded data for at least 2 h to obtain a static solution when submitted to the Online Positioning User Service. The GPS data was not used to correct the location of the UAS in real time, but rather was used in conjunction with the on-board IMU to create an accurate UAS trajectory file in the post-processing stage. The accuracy of the GPS control point determined after OPUS correction was typically between 0.5 and 1.5 cm in the x and y direction, and 1–2 cm in the z direction. Post processing was done in TerraSolid.

OPUS SOLUTION

FILE: 962582353A0.18O OP1545407470040

1008 NOTE: You provided a zero or negative antenna height.

1008 If ARP HGT = 0.0, OPUS solves for the position of your selected antenna's reference point (ARP).

1008 If ARP HGT < 0.0, OPUS solves for a location inside or above the antenna

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NGS OPUS SOLUTION REPORT

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All computed coordinate accuracies are listed as peak-to-peak values.

For additional information: <https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy>



USER: qwlewis@iu.edu
RINEX FILE: 9625353n.18o

DATE: December 21, 2018
TIME: 15:52:50 UTC

SOFTWARE: page5 1603.24 master93.pl 160321 START: 2018/12/19 13:56:00
EPHEMERIS: igr20323.eph [rapid] STOP: 2018/12/19 22:21:00
NAV FILE: brdc3530.18n OBS USED: 13352 / 20125 : 66%
ANT NAME: CHCX900R NONE # FIXED AMB: 150 / 161 : 93%
ARP HEIGHT: 0.000 OVERALL RMS: 0.016(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) IGS08 (EPOCH:2018.9665)

X: 326479.623(m) 0.003(m) 326478.743(m) 0.003(m)
Y: -4965875.670(m) 0.014(m) -4965874.260(m) 0.014(m)
Z: 3976131.729(m) 0.013(m) 3976131.633(m) 0.013(m)

LAT: 38 48 41.33012 0.012(m) 38 48 41.35748 0.012(m)
E LON: 273 45 41.31421 0.003(m) 273 45 41.28163 0.003(m)
W LON: 86 14 18.68579 0.003(m) 86 14 18.71837 0.003(m)
EL HGT: 160.567(m) 0.016(m) 159.365(m) 0.016(m)
ORTHO HGT: 193.876(m) 0.027(m) [NAVD88 (Computed using GEOID12B)]

UTM COORDINATES STATE PLANE COORDINATES

UTM (Zone 16) SPC (1301 IN E)

Northing (Y) [meters] 4296132.082 395724.108
Easting (X) [meters] 566112.593 50332.362
Convergence [degrees] 0.47728056 -0.35842500
Point Scale 0.99965382 0.99999703
Combined Factor 0.99962864 0.99997184

US NATIONAL GRID DESIGNATOR: 16SEH6611296132(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
AI5432	IUCO INDIANA UNIVERSIT	CORS ARP	N391026.605 W0863023.182	46465.7
DM4658	INSY SEYMOUR CORS ARP		N385736.280 W0855142.432	36615.3
DM4656	INSG SCOTTSBURG CORS ARP		N384103.137 W0854743.301	41035.4



NEAREST NGS PUBLISHED CONTROL POINT
JA0020 109/35 BORR N384707.000 W0861312.000 3324.3

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

Products

- December 19, 2018
- UTM 16 N
- 0.25 m (tiff), about 50-100 pts/m (las)
- 1-2 cm
- 1-2 cm
- Tiff, las
- Standard grounding algorithm in TerraSolid software suite