

OpenTopography Metadata — Mellon Farm, Guatemala

Dataset Name (citation title): UAV Lidar Survey of a Mellon Farm, near Estanzuela, Guatemala, January 2024 **Collection Platform:** Airborne Lidar **Data Products:** Point Cloud + Raster (DTM)

Summary

This flight was part of a multi-day, multi-site lidar survey of various points along the Motagua and Polochic Faults in Guatemala. UAV-based lidar survey of Mellon Farm, Guatemala, part of the 2024 Spring Campaign conducted by Missouri S&T under an NSF planning grant led by J. Obrist-Farner and Jeremy Maurer to collect and analyze high-resolution topography data along several points of the Polochic-Motagua Fault System (PMFS). The lidar data was collected to be used for analyzing fault offsets and identifying locations that might be suitable for trenching, as well as better understanding the fault system.

Personnel

- PI(s): J. Maurer
- Field staff: T. Niemi, C. Grützner, O. Flores
- Additional team members: J. Obrist-Farner

Site Information

- Description: Mellon Farm, Guatemala
- Objective: Collect lidar data using the Quantum Systems Trinity F90+ for processing to point clouds and DEMs/DTMs
- Location (approx. center): **15.0103 N, -89.5941 W** (UTM 16N)
- Conditions: Very hot and humid, sunny.
- Date(s) on site: 2024-01-23

Survey Results

- Equipment used: Quantum Systems Trinity F90+ VTOL fixed-wing UAV carrying a YellowScan Qube 240 lidar payload
- GNSS solution: Ground base station with a u-blox ANN-MB-02-00 multi-band active GNSS antenna; base position fixed by CSRS-PPP (NRCan, ITRF20). UAV trajectory PPK-processed relative to the base. Base-station RINEX + PPP reports archived per site (coordinates in base_station_ppp.csv); see absolute accuracy below.
- Errors / accuracy:
 - Relative: Relative (strip-to-strip, 3-D) RMSE 7.8–8.3 cm (post-adjustment, YellowScan CloudStation, 2 flight-line set(s)).
 - Absolute: Absolute georeferencing via CSRS-PPP base station(s) (QS023P00), 95% CI: horizontal ± 2 cm, vertical ± 6.1 cm (fixed-ambiguity PPP solution). Datum ITRF20 (2024.1); ellipsoidal heights (the CGVD2013 orthometric height in the PPP report is a Canadian geoid and is NOT valid in Guatemala).
- Alignment: Boresight-calibrated strip adjustment (YellowScan CloudStation, Precise method); per-flight reports in each flight's 'Strip Adjustment' folder.

- Collection method: Flown at ~100 m constant altitude above the base station (single flight height, no terrain-following). Missions planned and executed in Qbase (Trinity mission-planning software). 14 flight-line export(s).

Products

- Date of collection: 2024-01-23
- Horizontal CRS: **WGS 84 / UTM zone 16N (EPSG:32616)**
- Vertical: ellipsoidal height (WGS 84), no geoid applied
- Vertical CRS / EPSG: WGS 84 ellipsoidal height — **EPSG:4979** (3D geographic; no geoid)
- Spatial extent (UTM): X 218399–223697, Y 1659552–1662644 (~16.39 km²)
- Total points: **967.9 million** (~59.1 pts/m² avg)
- DTM resolution: 0.5 m
- Data formats: LAZ (point cloud), Cloud-Optimized GeoTIFF (raster)
- Processing: YellowScan post-processing (trajectory + point-cloud generation) → LAZ; DTM gridded from ground-classified returns

Files in this submission

Point clouds — 2 per-flight LAZ (EPSG:32616), both flights georeferenced to base QS023P00:
 - mellon_farm_lidar_pointcloud_153746_tile1of6.laz ... _tile6of6.laz (598.7M pts total = 598,692,856; Z 174-298 m; LAZ-compressed from YS-20240123-153746-20240127-054443-F001.las). This flight's single LAZ was 3.34 GB, over OpenTopography's 2 GB per-file limit, so it was tiled with PDAL into 6 contiguous ~1250 m spatial tiles (EPSG:32616 and header preserved), each well under 2 GB (largest ~1.0 GB). All 598,692,856 points are preserved across the 6 tiles.
 - mellon_farm_lidar_pointcloud_164614.laz (369,232,420 pts, Z 188-272 m; merged from the 13 source strips YS-20240123-164614-...-F001-S001..S013.las of a single flight). Cleanup: 4 isolated blunder points at X 237670-238012, Y 1660712-1661282 — ~14-16 km east of the survey body — were removed (cropped to X<224000). A source strip's LAS header had under-reported these strays; corrected body extent X 218399-221408. Source files in SITES/ untouched.

Raster (DTM): mellon_farm_dtm_cog.tif (0.5 m, Float32, Cloud-Optimized GeoTIFF, EPSG:32616; NoData = -99999 preserved from source; merged from both flights, source Results-DEMs/Mellon_Farm/merged_dtm.tif)

OpenTopography Community Dataspace — submission-form fields

Spatial reference - Horizontal Coordinates: WGS 84 / UTM zone 16N - Vertical Coordinates: Ellipsoidal WGS-84, no geoid applied - Horizontal EPSG Code: 32616 - Vertical EPSG Code: 4979

Other information - Survey Date (MM/DD/YYYY): 01/23/2024 - Area (m²): 16,390,000 (= 16.39 km²) - Point Density (pts/m²): 59.1 - Raster Resolution: 0.5 m - Metadata Document File: Mellon_Farm_metadata.pdf

Descriptive / administrative - Use License: CC BY 4.0 - Dataset Keywords: lidar; airborne lidar; UAV; drone; Guatemala; Polochic-Motagua Fault System; active tectonics; tectonic geomorphology; fault scarp; paleoseismology; DTM - Funding Support: NSF planning grant, J. Obrist-Farner & J. Maurer (Missouri University of Science & Technology) — 2305799 - Dataset Acknowledgement: Data collected under an NSF planning grant (Obrist-Farner & Maurer, Missouri S&T).

Field team: T. Niemi, C. Grützner, O. Flores, J. Obrist-Farner. - User Contact Information:
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