Data Collection & Product Report for 2018 Seed Project: Constraining Rheology from Lidar-Based Comparisons of Seismogenic Versus Creeping Normal Faults

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Data Collection Summary:

Collection Dates, Flights:	September 14, 2019 (DOY 257) comprising one (1) flight
Aircraft, Equipment:	Piper PA-31 Navajo Chieftain (N640WA) with Optech Titan Lidar (14SEN340)
Flight Plan Parameters:	Flying Height: 600 m AGL, Speed: 140 kt, Overlap: 50%
Equipment Parameters:	PRF: 100 kHz, Scan Angle: ± 30°, Scan Frequency: 26 Hz
Imagery Flight Plan Parameters:	N/A
Collected Area:	65.5 km²

GNSS Reference Station Summary:

Station Name	Operating Agency	Control Coordinates (NAD83(2011) epoch 2010.00/Ellipsoid)
BRAN	NCALM	38°45'36.31133" N, 109°44'38.75100" W, 1374.558 m
GSE4	NCALM	38°19'43.68180" N, 109°51'14.81134" W, 1881.620 m
P012	UNAVCO	38°05'50.74019" N, 109°20'01.76309" W, 1789.334 m

Data Processing Summary:

Scan Angle Cutoff:	± 1°
Intensity Normalization:	600 m
Data Adjustments:	Line-by-line/channel-by-channel roll orientation and elevation correction, project elevation shift of -28.7 cm
Ground Classification:	Two iterations of relaxed ground determination, and manual classification of misclassified ground
Elevation Model Generation:	Elevation values calculated from Kriging

Data Accuracy Summary

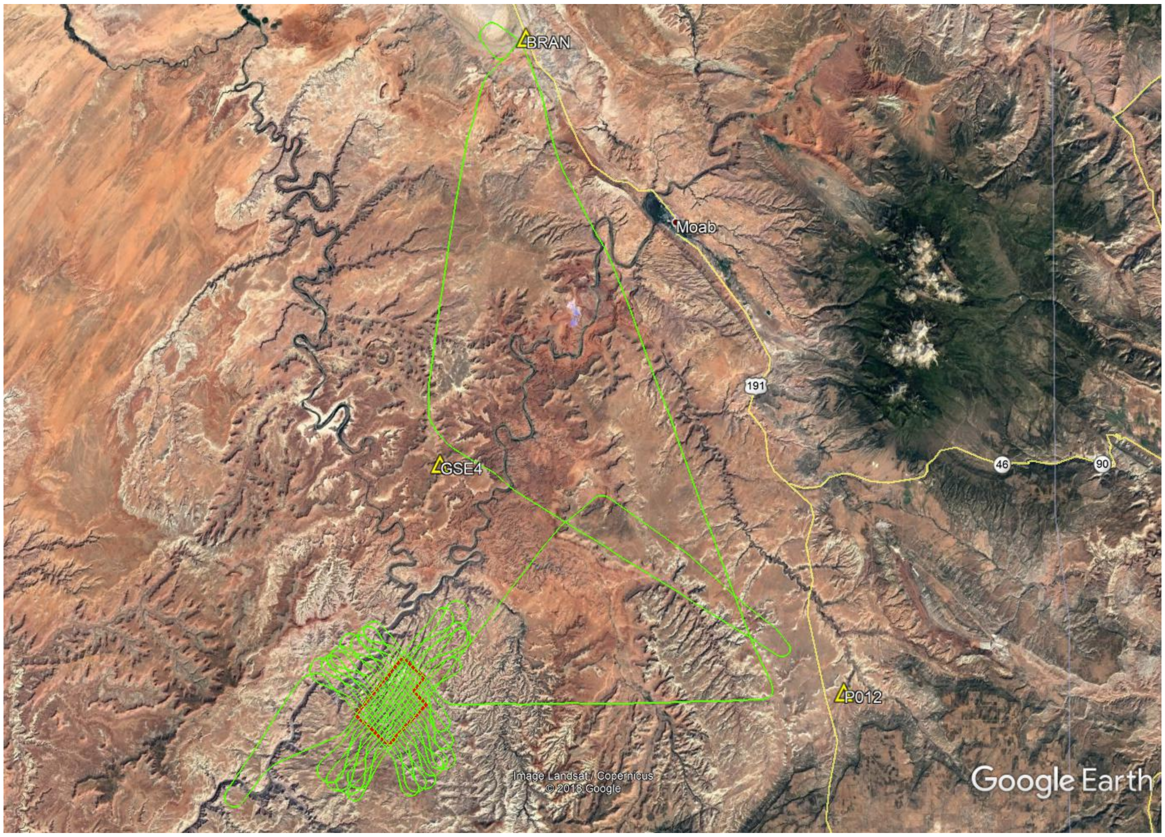
Strip-to-Strip Average	0.058 m
GCP Residual RMS	N/A

Data Product Summary:

Horizontal / Vertical Datum:	NAD83(2011) epoch 2010.00 / NAVD88 (Geoid 12B)
Projection / Units:	UTM Zone 12N / meters
Point Cloud Tiles:	1000-m × 1000-m tiles in LAS format (Version 1.4) classified by non-ground (1), ground (2), and low point (7) returns
Bare-Earth Elevation Model:	ESRI FLT format @ 1-m resolution from classified ground points
Bare-Earth Hillshade:	ESRI-created raster @ 1-m resolution
First-Surface Elevation Model:	ESRI FLT format @ 1-m resolution with canopy and buildings included
First-Surface Hillshade:	ESRI-created raster @ 1-m resolution

A detailed summary of the equipment and processing techniques used by NCALM is included in the Data Collection & Processing Summary.

Area of Interest:



Location of survey polygon (in red), aircraft trajectory, and GNSS reference stations (in yellow)

The requested survey area consisted of one polygon located southwest of Moab, UT. The polygons enclose approximately 40.0 km^2 (15.4 mi^2).

File Naming Schemes:

LAS Point Cloud Files

The 1000 m × 1000 m tiles follow a naming convention using the lower-left coordinate (minimum X, Y) of the UTM coordinates as the seed for the file name as follows: *XXXXXX_YYYYYYY*. For example, if the tile bounds are the coordinate values from Easting 590000 through 591000, and Northing 4213000 through 4214000, then the tile filename incorporates *590000_42130000*.

ESRI Files

Due to the limited number of characters that can be used for ArcGIS data products, the resulting format is followed: NNNN_TDR_##U. "NNNN" correspond to the 4-character identifier for the project or project area, "NFUT" for this project. Character "T" represent the type of raster and it can be "G" for a grid, "H" for a hillshade. Character "D" represents what kind of data was used to create the raster (an "E" for elevation). Character "R" represents the type of return that was used for creating the raster and could be a "F" for first return or "G" for ground return. The characters "##" represent the raster resolution in decimeters. Finally, the last character "U" is an indicator for the unit of measurement. For e.g. a bare earth elevation grid with ground classified points and resolution 1 m will be named as: "NFUT_GEG_01M.FLT"

Notes:

In the areas of thick and/or low vegetation, some classified ground points may not be true ground. Thick vegetation will not allow the laser to penetrate to the ground. This can cause the ground point algorithm to classify the bottom of the vegetation or tree trunks as ground. Some low vegetation or fallen trees also get classified as ground, as the laser cannot distinguish between true ground and near-ground returns, and the algorithm has an eagerness to classify low points as ground. These factors can cause a rough appearance in the bare-earth elevation models. Boulders and rugged peaks often do not get classified as ground, as the terrain changes are too abrupt for the algorithm to classify successfully while not simultaneously classifying all low vegetation as ground, too.

No visible imagery was collected over the site because of instrument/software complications.