

Calle Los Pinos, Isabela
August 01, 2023.



Centroid coordinates : 18.51482° N 67.09860° W

Ecological restoration actions

August 01, 2023



Area planted with dune vegetation = 119 m²

Area of biomimicry matrix = 119 m²

Wooden boardwalk = 75 ft

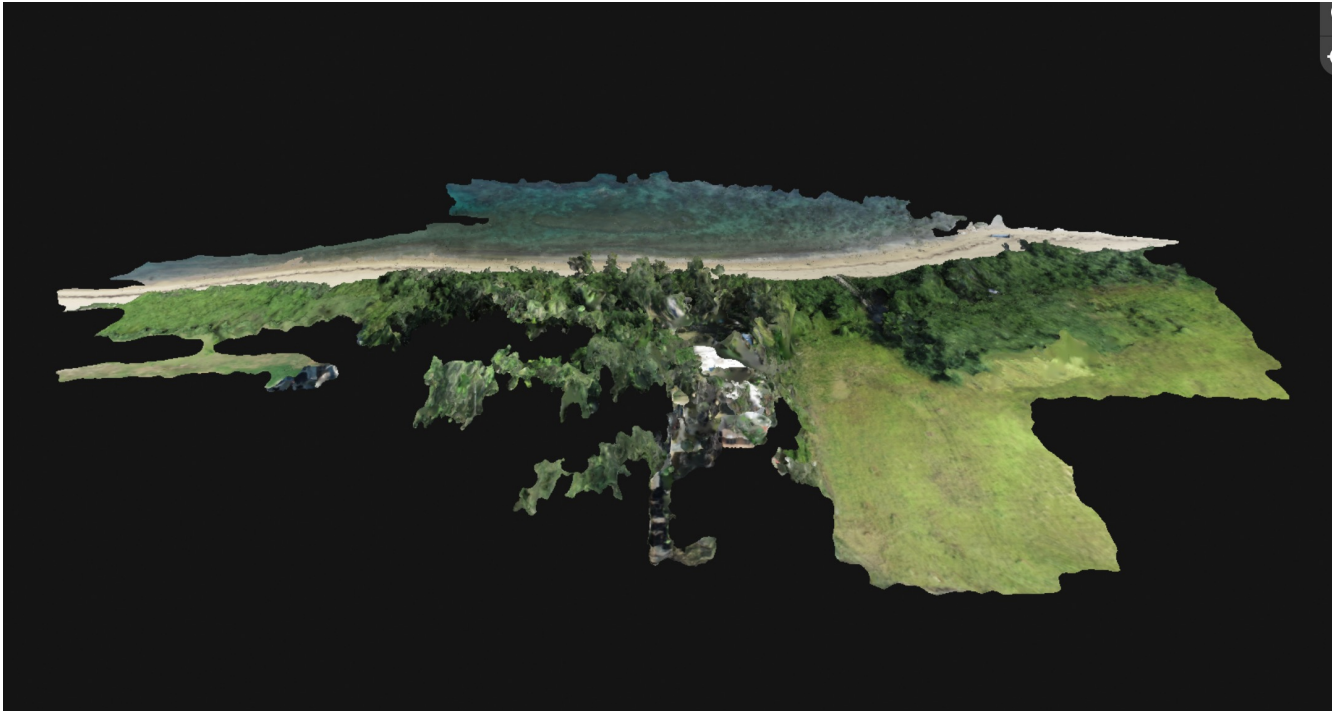
Two information signs

Note:

On this site a wooden boardwalk, biomimicry matrix and dune vegetation were planted at the end of “Los Pinos” street in the Shacks neighborhood in Isabela, Puerto Rico. This will promote an increase in vegetation cover and accumulation of sand that will increase the resilience of this area to future storms.

3D map

Calle Los Pinos, Isabela



2D map



Total area of site =

Beach length (m)
Calle Los Pinos, Isabela



Beach length = 266.825 m

Density surface model
Calle Los Pinos, Isabela



Area of the beach
Calle Los Pinos, Isabela



Area of the beach = 3,414.56 m²

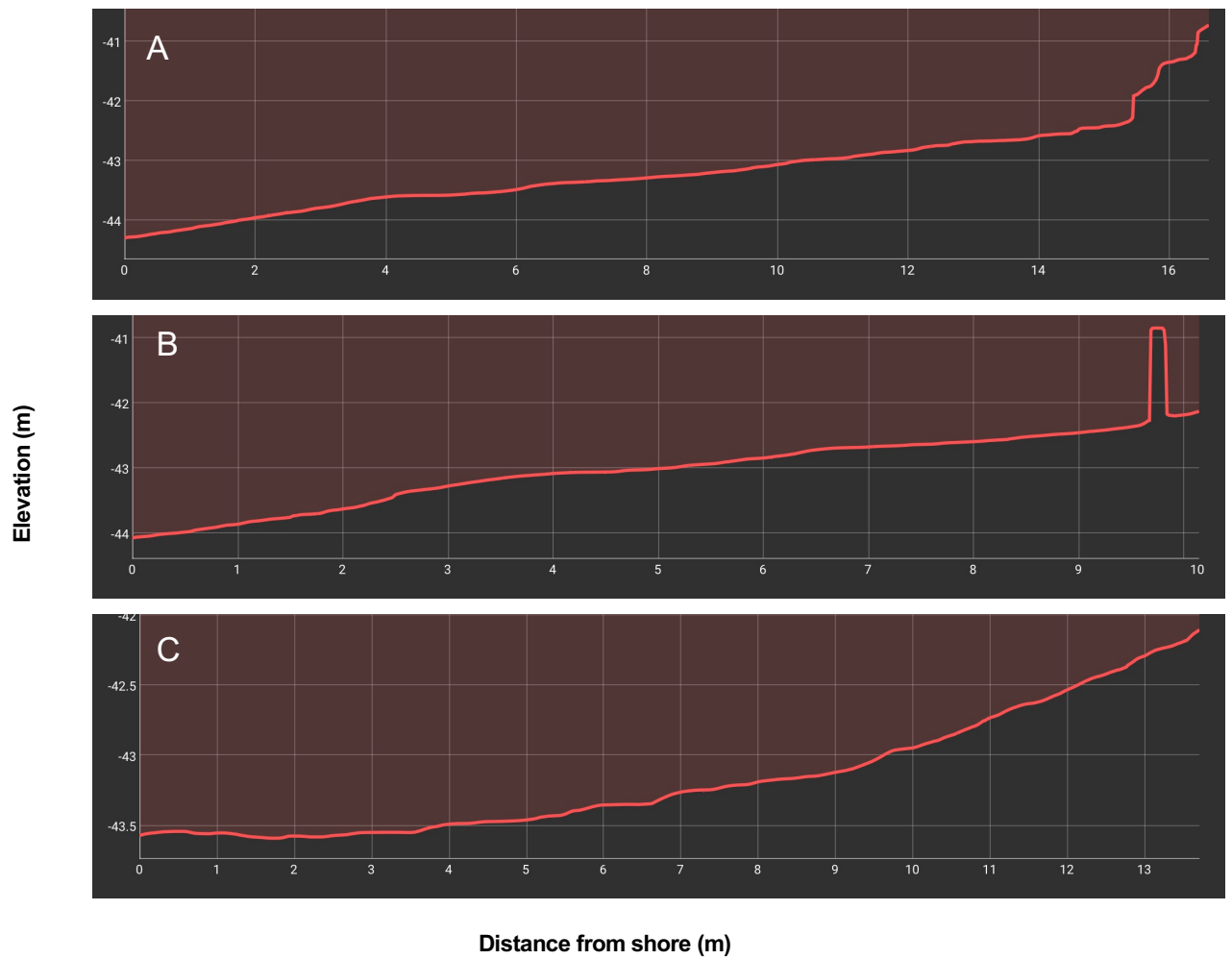
Beach volume
Calle Los Pinos, Isabela



Cut = 0.00 m³
Fill = -146,035 m³
Volume Dif. = -146,035 m³

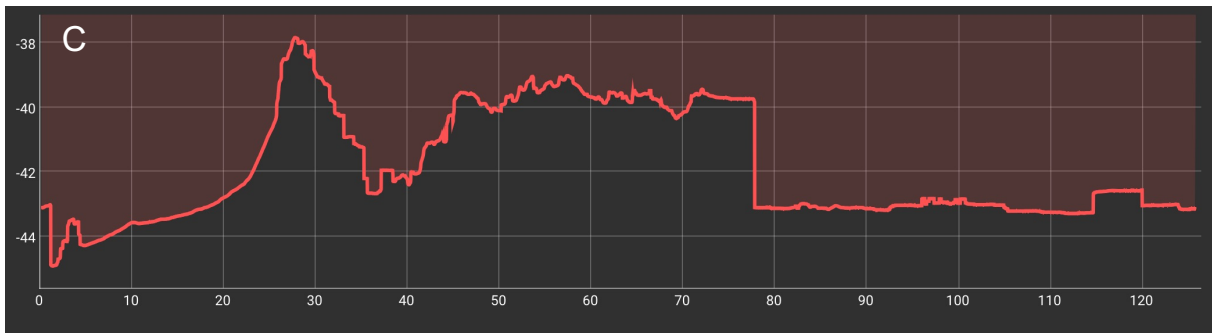
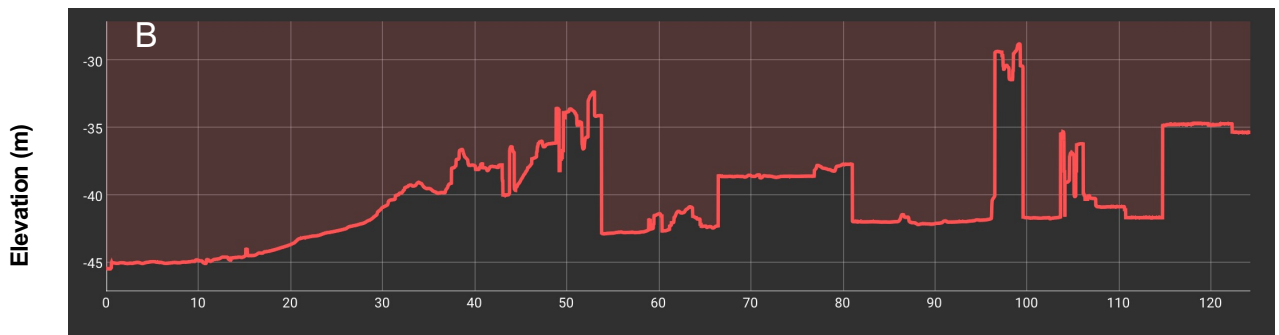
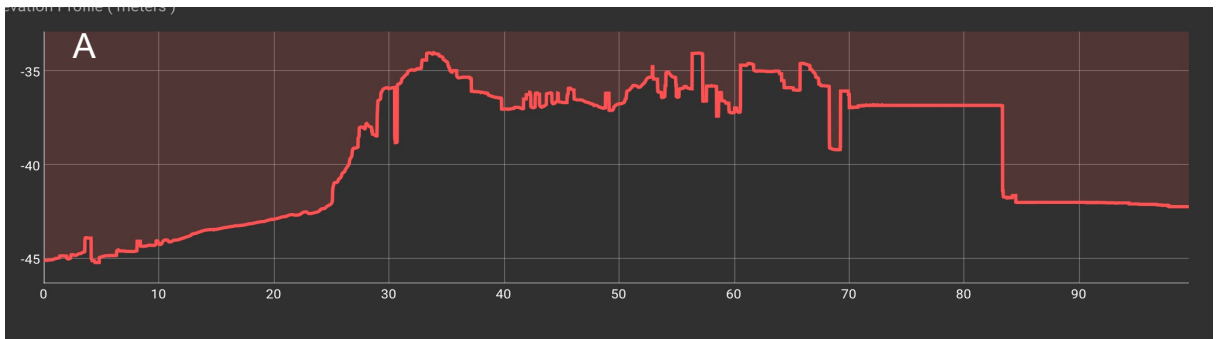
Beach elevation

Calle Los Pinos, Isabela



Site elevation (m)

Calle Los Pinos, Isabela



Distance from shore (m)

Dune height (m)
Calle Los Pinos, Isabela



Dune height	
A	= 3.114 m
B	= 8.079 m
C	= 2.237 m

Dune width (m)

Calle Los Pinos, Isabela



Dune width

A = 21.326 m

B = 26.096 m

C = 48.415 m

Area and perimeter of dune
Calle Los Pinos, Isabela



Area and perimeter of dune

2D area = 28,197.87 m²
3D area = 28,197.87 m²
2D perimeter = 656.124 m
3D perimeter = 656.124 m
Elevation difference = 0.00 m

Volume of dune

Calle Los Pinos, Isabela



Base surface	Triangulated
Cut volume	0.00 m ³
Cut error	0.00 m ³
Fill volume	-320,466 m ³
Fill error	681.523 m ³
Volume difference	-320,466 m ³

Shoreline
Calle Los Pinos, Isabela



Shoreline length = 266.274 m

Shoreline geolocation
Calle Los Pinos, Isabela



Shoreline markers

A = 18.51524° N 67.09956° W
B = 18.51522° N 67.09892° W
C = 18.51523° N 67.09815° W
D = 18.51538° N 67.09765° W

Shoreline extension
Calle Los Pinos, Isabela



Shoreline extension

A = 7.819 m

B = 5.598 m

Shoreline position
Calle Los Pinos, Isabela



Shoreline position	
A	= 14.526 m
B	= 15.266 m
C	= 15.656 m

Area of dune breaches
Calle Los Pinos, Isabela



Area of dune breaches

Breach = 15.656 m

Quality Report



Generated with Pix4Denterprise version 4.8.3
Preview

! **Important:** Click on the different icons for:

- ?** Help to analyze the results in the Quality Report
- i** Additional information about the sections

💡 Click [here](#) for additional tips to analyze the Quality Report

Summary



Project	233011-Project-2023-08-01T19:08:25.815Z
Processed	2023-08-01 20:21:06
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.39 cm / 0.55 in
Area Covered	0.030 km ² / 2.9953 ha / 0.01 sq. mi. / 7.4053 acres
Time for Initial Processing (without report)	50m:18s

Quality Check



? Images	median of 65159 keypoints per image	✓
? Dataset	210 out of 300 images calibrated (70%), all images enabled, 3 blocks	⚠
? Camera Optimization	1.32% relative difference between initial and optimized internal camera parameters	✓
? Matching	median of 8660.6 matches per calibrated image	✓
? Georeferencing	yes, no 3D GCP	⚠

? Preview

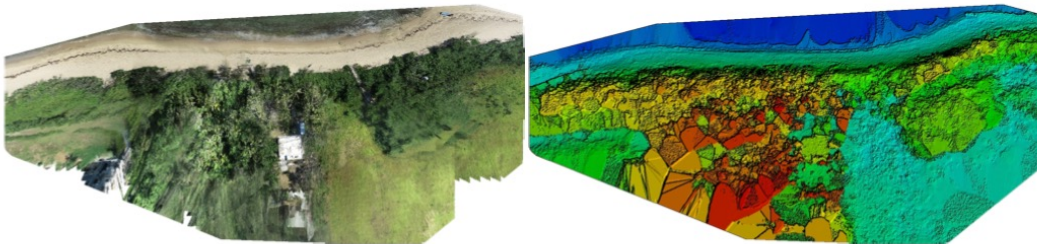


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	210 out of 300
Number of Geolocated Images	300 out of 300

? Initial Image Positions



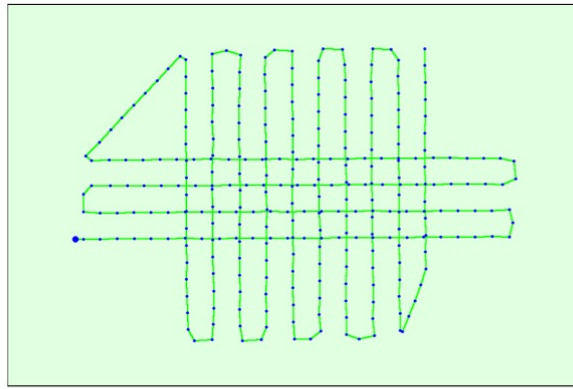
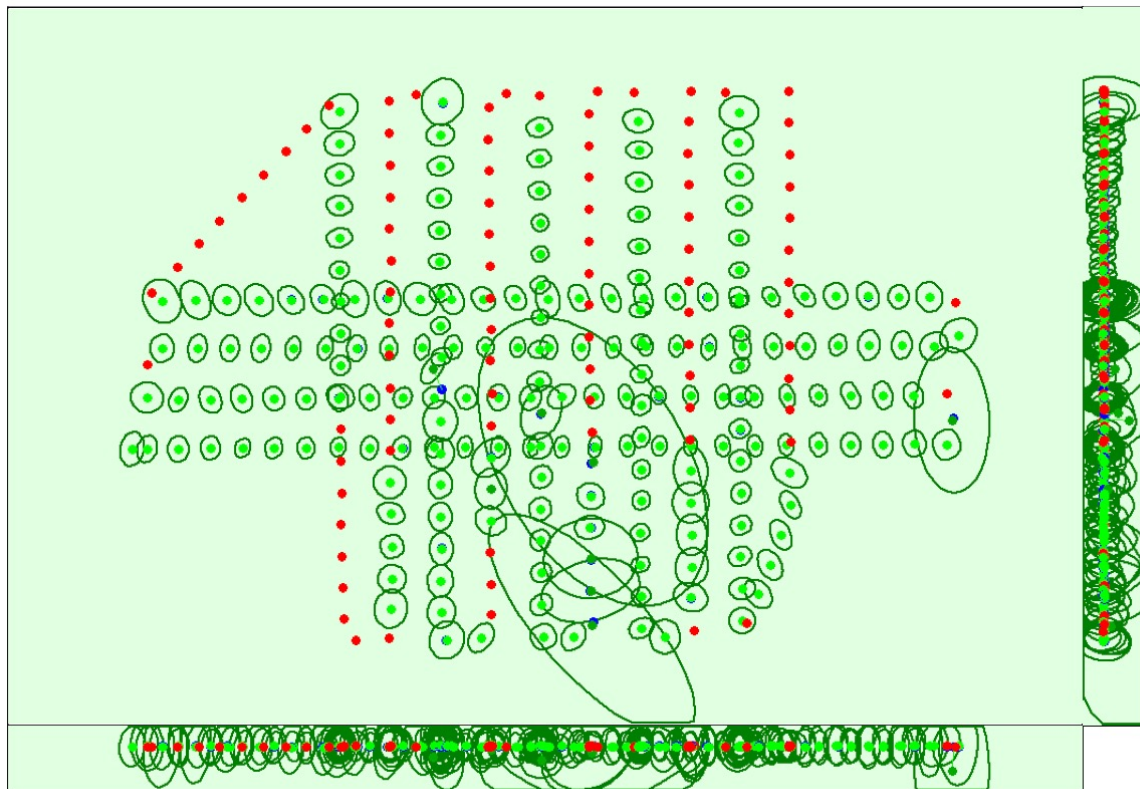


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 1000x magnified

Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled or uncalibrated images. Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

Absolute camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.002	0.003	0.004	0.006	0.005	0.006
Sigma	0.002	0.002	0.002	0.002	0.004	0.003

Overlap

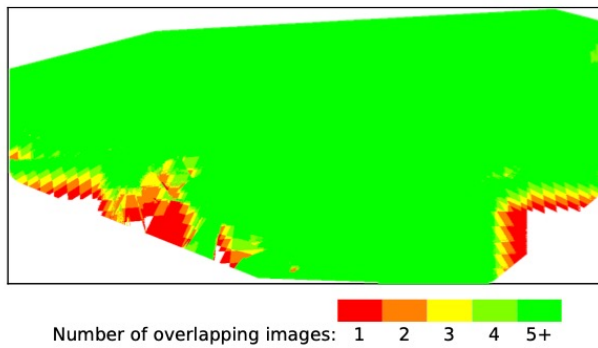


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
 Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).

Bundle Block Adjustment Details

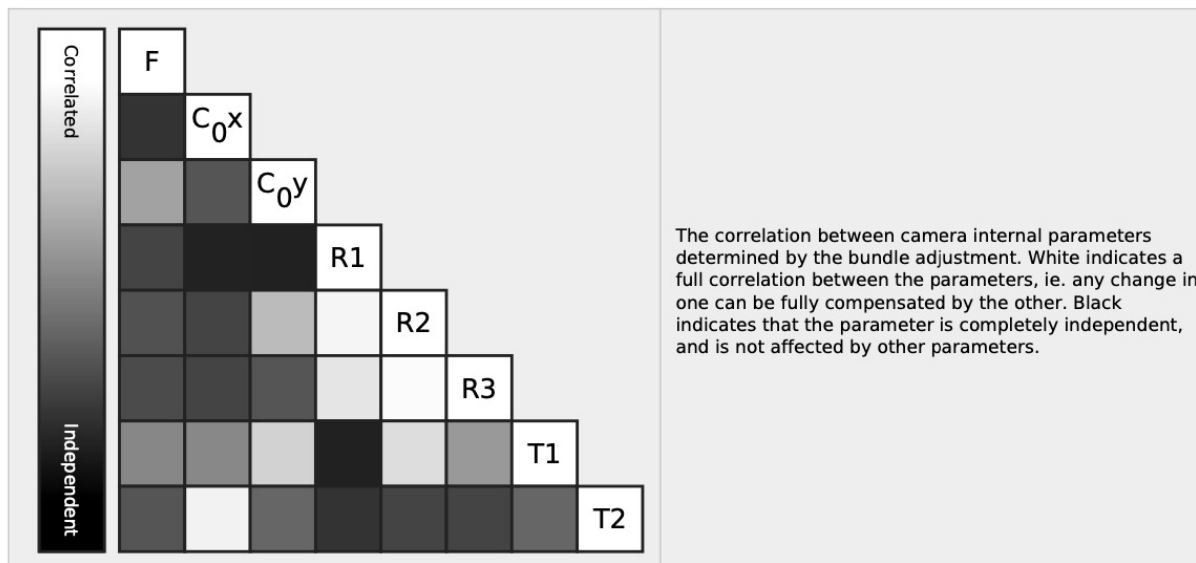
Number of 2D Keypoint Observations for Bundle Block Adjustment	1893969
Number of 3D Points for Bundle Block Adjustment	694439
Mean Reprojection Error [pixels]	0.171

Internal Camera Parameters

FC6310R_8.8_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]

EXIF ID: FC6310R_8.8_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3658.300 [pixel] 8.580 [mm]	2722.500 [pixel] 6.385 [mm]	1835.100 [pixel] 4.304 [mm]	-0.269	0.112	-0.033	0.000	-0.001
Optimized Values	3706.850 [pixel] 8.694 [mm]	2731.115 [pixel] 6.405 [mm]	1810.153 [pixel] 4.245 [mm]	-0.012	0.000	0.008	-0.002	-0.001
Uncertainties (Sigma)	0.120 [pixel] 0.000 [mm]	0.191 [pixel] 0.000 [mm]	0.237 [pixel] 0.001 [mm]	0.000	0.000	0.000	0.000	0.000





The number of Automatic Tie Points (ATPs) per pixel, averaged over all images of the camera model, is color coded between black and white. White indicates that, on average, more than 16 ATPs have been extracted at the pixel location. Black indicates that, on average, 0 ATPs have been extracted at the pixel location. Click on the image to see the average direction and magnitude of the re-projection error for each pixel. Note that the vectors are scaled for better visualization. The scale bar indicates the magnitude of 1 pixel error.

2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	65159	8661
Min	51697	97
Max	79686	21612
Mean	65378	9019

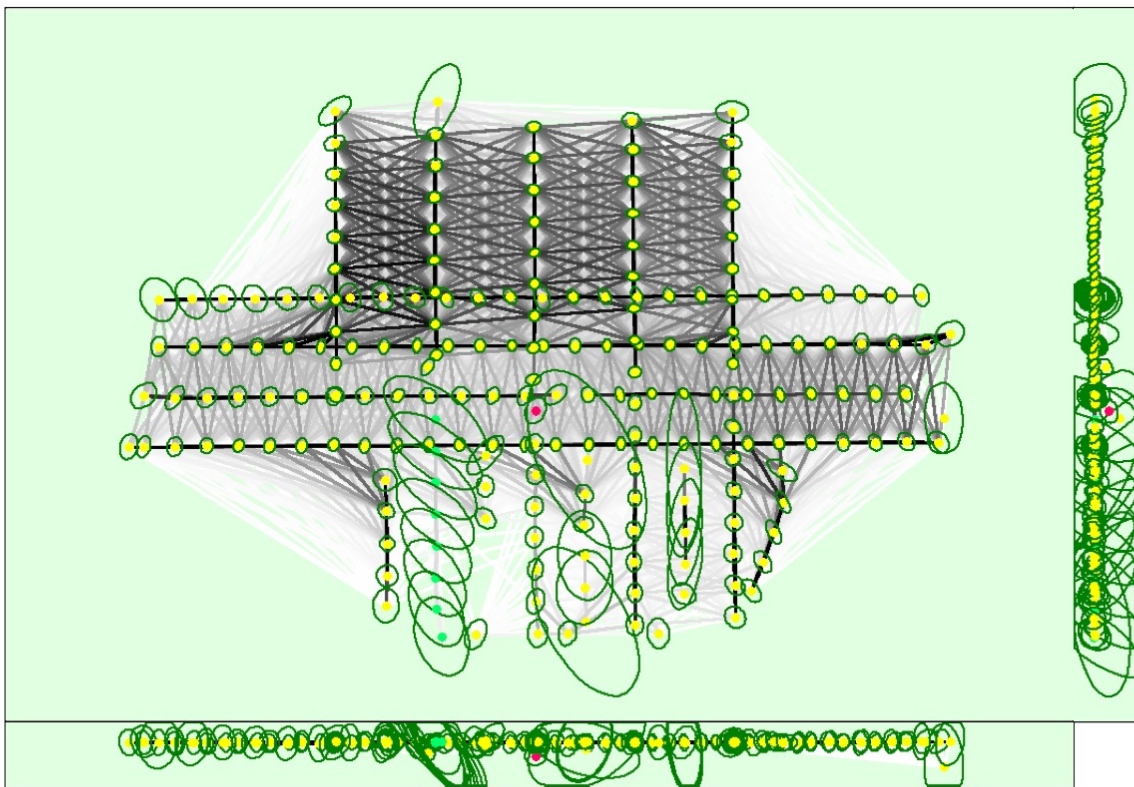
3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	476936
In 3 Images	110569
In 4 Images	46138
In 5 Images	23594
In 6 Images	13189
In 7 Images	7954
In 8 Images	5016
In 9 Images	3072
In 10 Images	2189
In 11 Images	1478
In 12 Images	1100
In 13 Images	793
In 14 Images	559
In 15 Images	441
In 16 Images	332
In 17 Images	255
In 18 Images	194
In 19 Images	138
In 20 Images	100
In 21 Images	79
In 22 Images	70
In 23 Images	63
In 24 Images	48
In 25 Images	32
In 26 Images	30
In 27 Images	18
In 28 Images	18
In 29 Images	11
In 30 Images	10
In 31 Images	3
In 32 Images	4
In 33 Images	1
In 34 Images	2
In 35 Images	1
In 36 Images	1
In 39 Images	1

2D Keypoint Matches





Uncertainty ellipses 500x magnified

Number of matches 25 222 444 666 888 1111 1333 1555 1777 2000

Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties



	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.004	0.004	0.005	0.007	0.006	0.008
Sigma	0.003	0.004	0.004	0.004	0.004	0.005

Geolocation Details



Absolute Geolocation Variance



Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.05	0.00	0.00	8.42
-0.05	-0.04	0.00	0.00	3.47
-0.04	-0.03	0.00	0.00	5.45
-0.03	-0.02	1.49	0.99	7.43
-0.02	-0.01	7.92	11.88	17.33
-0.01	0.00	37.62	39.60	16.34
0.00	0.01	44.06	34.16	9.90
0.01	0.02	7.92	11.39	13.86
0.02	0.03	0.99	0.99	4.95
0.03	0.04	0.00	0.00	3.96

0.04	0.05	0.00	0.50	0.99
0.05	-	0.00	0.50	7.92
Mean [m]		0.000042	0.000032	-0.000037
Sigma [m]		0.007514	0.009381	0.045212
RMS Error [m]		0.007514	0.009381	0.045212

Min Error and Max Error represent geolocation error intervals between -1.5 and 1.5 times the maximum accuracy of all the images. Columns X, Y, Z show the percentage of images with geolocation errors within the predefined error intervals. The geolocation error is the difference between the initial and computed image positions. Note that the image geolocation errors do not correspond to the accuracy of the observed 3D points.

Relative Geolocation Variance

Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]	
[-1.00, 1.00]	84.65	80.20	70.79	
[-2.00, 2.00]	99.01	97.52	88.12	
[-3.00, 3.00]	100.00	99.01	94.55	
Mean of Geolocation Accuracy [m]		0.010687	0.010687	0.027891
Sigma of Geolocation Accuracy [m]		0.000324	0.000324	0.000962

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	2.233
Phi	1.595
Kappa	3.518

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

Initial Processing Details

System Information

Hardware	CPU: Intel(R) Xeon(R) Platinum 8124M CPU @ 3.00GHz RAM: 69GB GPU: no info (Driver: unknown)
Operating System	Linux 5.15.0-1040-aws x86_64

Coordinate Systems

Image Coordinate System	WGS 84
Output Coordinate System	WGS 84 / UTM zone 19N

Processing Options

Detected Template	cloud-3d-maps-1*
Keypoints Image Scale	Full, Image Scale: 1
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: no
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Standard Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, yes

Point Cloud Densification details



Processing Options



Image Scale	multiscale, 1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	yes
3D Textured Mesh Settings:	Resolution: Medium Resolution (default) Color Balancing: no
LOD	Generated: no
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	10m:13s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	06m:14s

Results



Number of Generated Tiles	1
Number of 3D Densified Points	13935624
Average Density (per m ³)	885.16

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	1 x GSD (1.39 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	04m:03s
Time for Orthomosaic Generation	11m:39s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s

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