

East Secret Spot, Isabela
July 31, 2023.



Centroid coordinates : 18.51328° N 67.04772° W

Ecological restoration action

July 31, 2023



Length of biomimicry matrix = 690 m

Area of biomimicry matrix = 995 m²

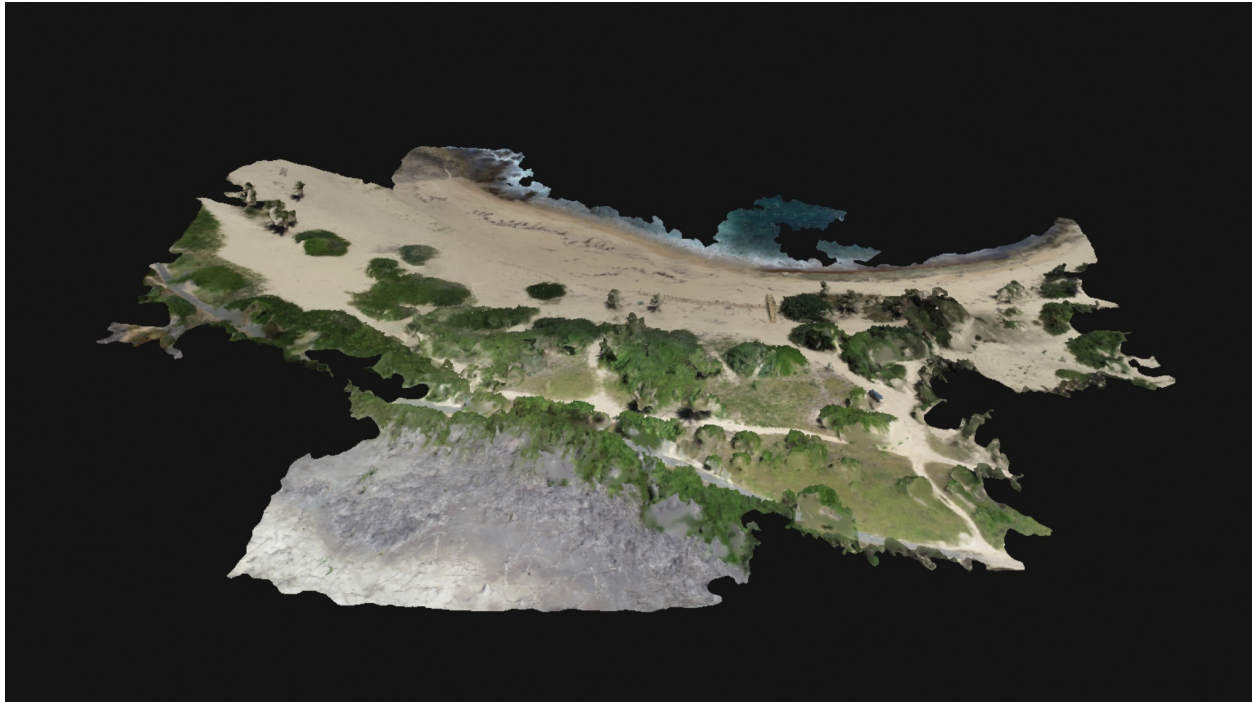
Area planted with dune vegetation = 948 m²

Wooden boardwalk = 55 ft

Note:

There used to be a significant primary dune in this area but the sand was extracted for commercial purposes and what was left of the dune was destroyed by recent storms. The sand has accumulated between the beach and the mangrove. The biomimicry matrix has promoted the accumulation of significant volumes of sand. Beach beans, beach grapes and

3D map
East Secret Spot, Isabela



2D map



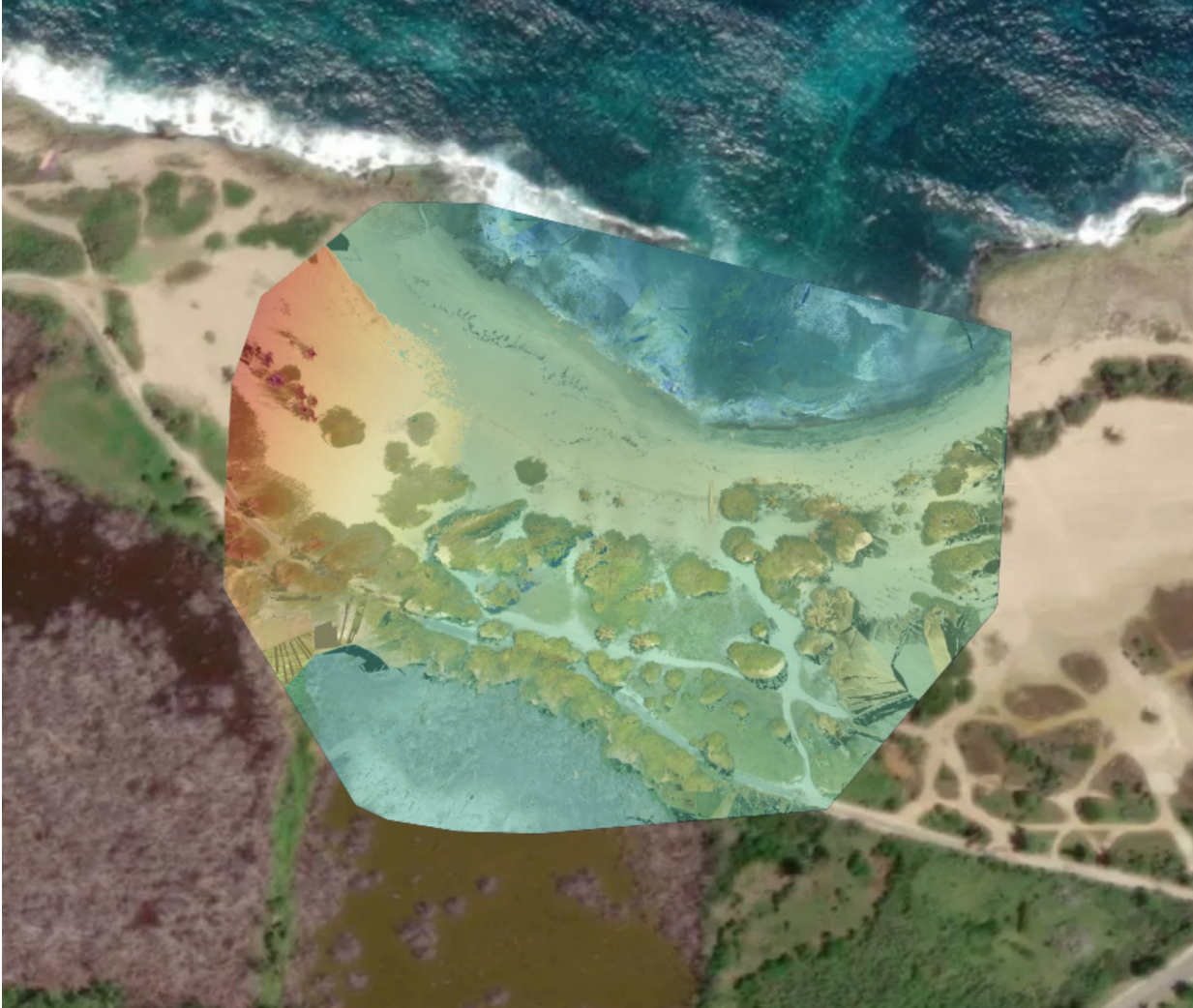
Total area of site =

Beach length (m)
East Secret Spot, Isabela



Beach length = 300.741 m

Density surface model
East Secret Spot, Isabela



Area of the beach
East Secret Spot, Isabela



Area of the beach = 1.31034 ha

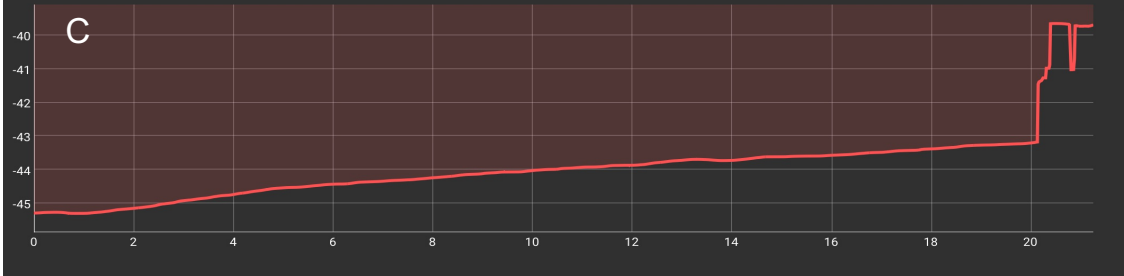
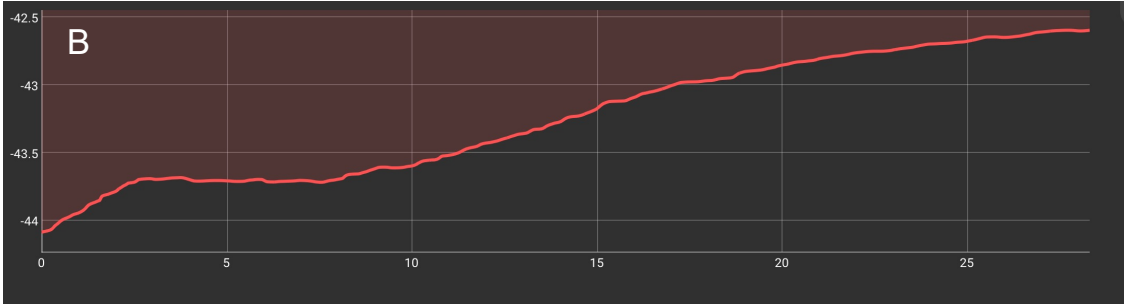
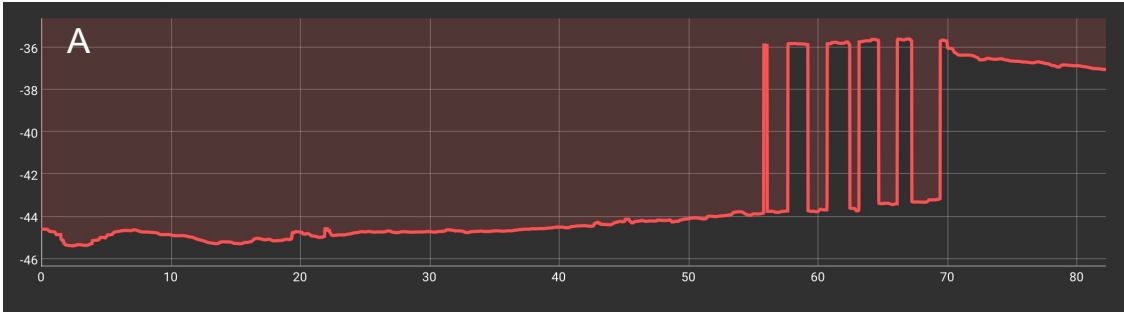
Beach volume
East Secret Spot, Isabela



Cut = 0.00 m³
Fill = -532,803 m³
Volume Dif. = -532,803 m³

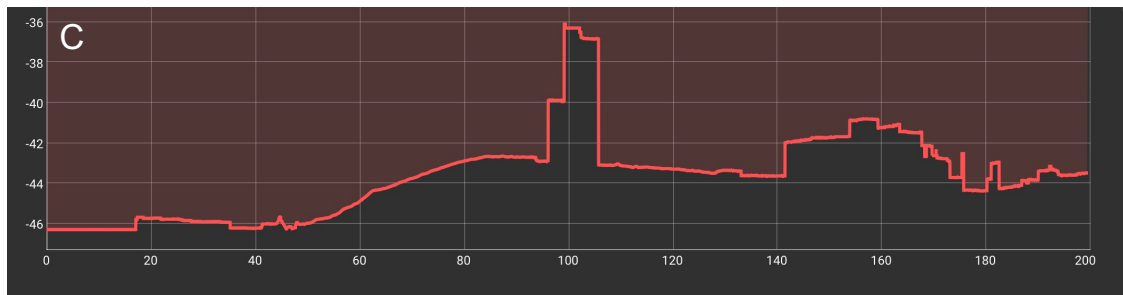
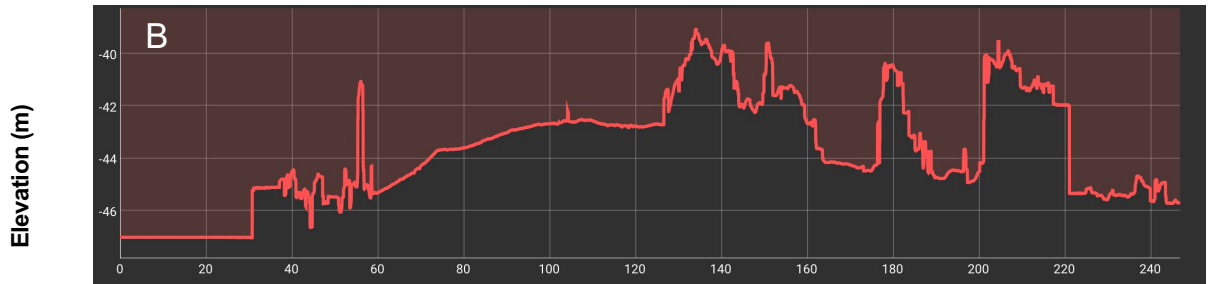
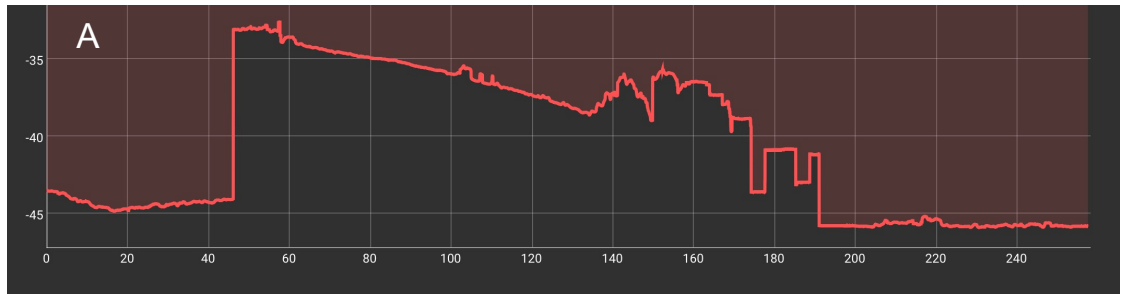
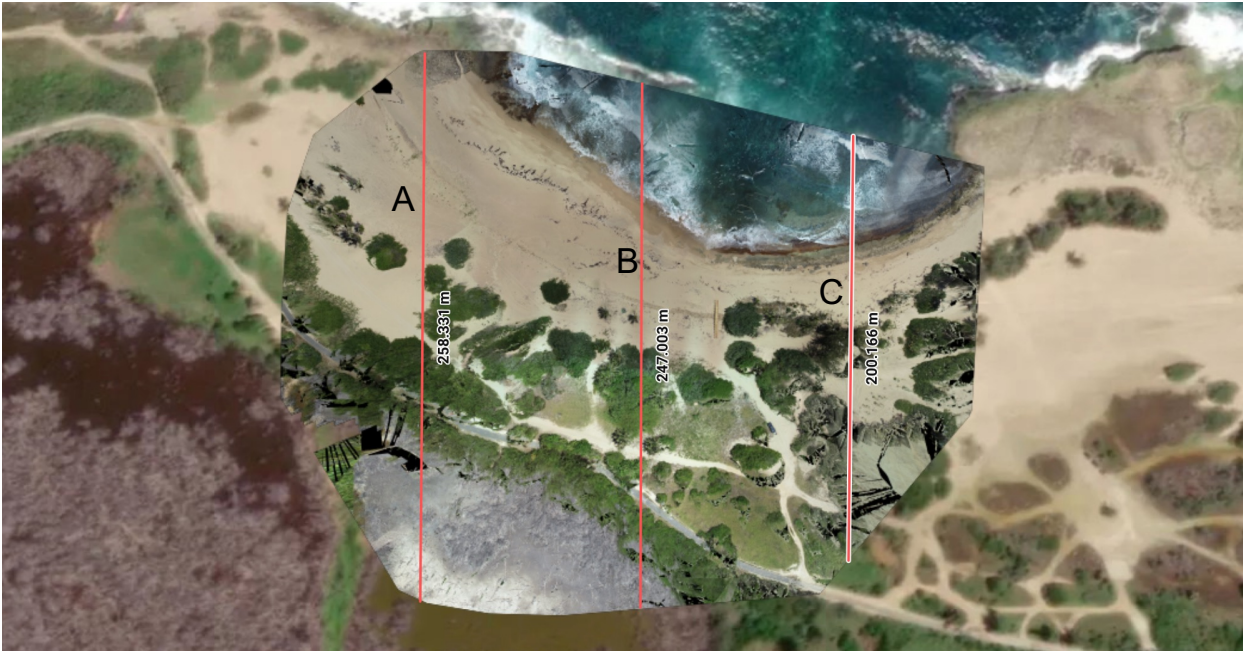
Beach elevation

East Secret Spot, Isabela



Distance from shore (m)

Site elevation (m)
East Secret Spot, Isabela



Distance from shore (m)

Dune height (m)
East Secret Spot, Isabela



Dune height	
A	= 10.178 m
B	= 1.13 m
C	= 0.339 m

Dune width (m)
East Secret Spot, Isabela



Dune width	
A	= 19.78 m
B	= 18.251 m
C	= 20.16 m

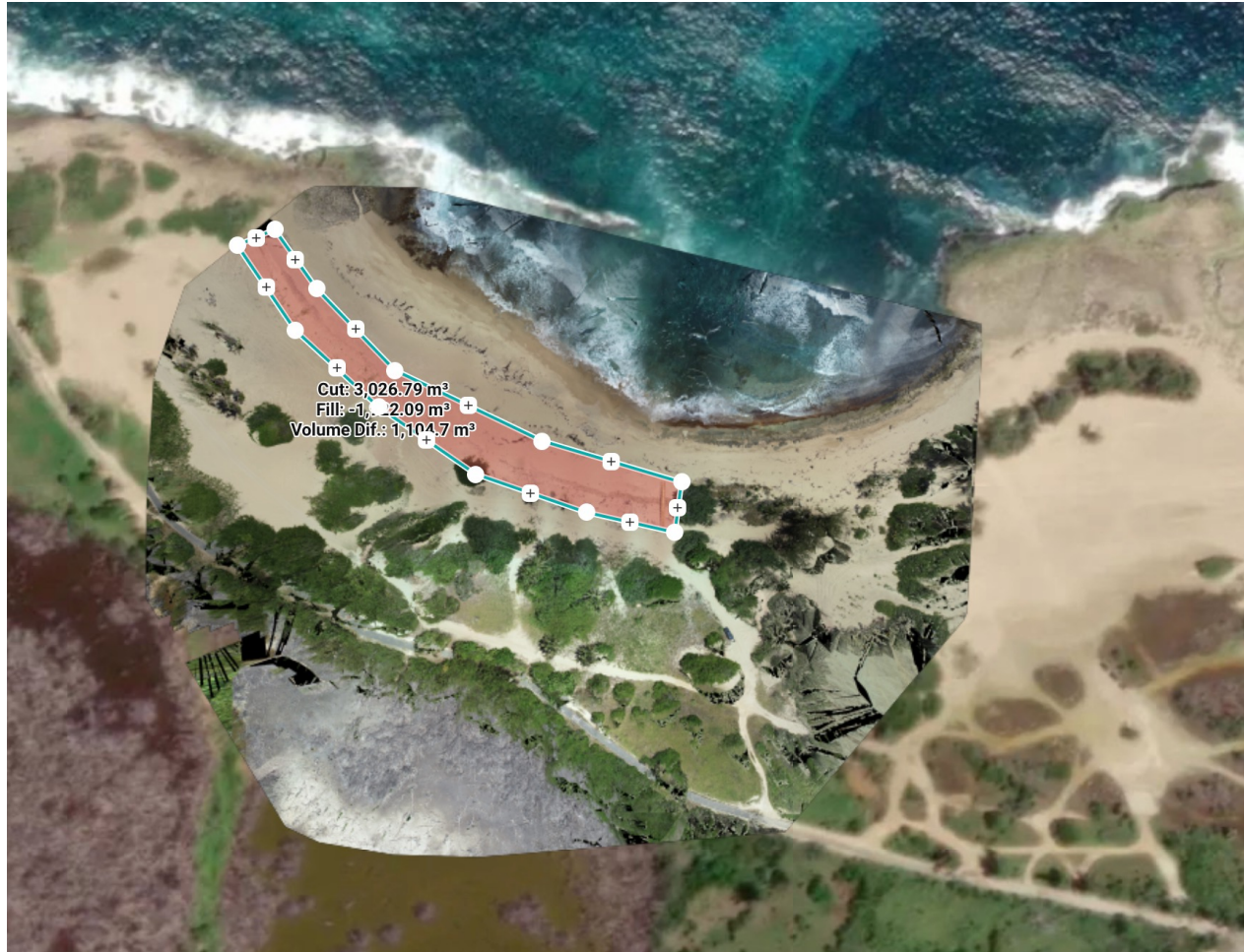
Area and perimeter of dune
East Secret Spot, Isabela



Area and perimeter of dune	
2D area	= 3,928.59 m ² m ²
3D area	= 4,24,234.3 m ²
2D perimeter	= 449.302 m
3D perimeter	= 456.63 m
Elevation difference	= 15.981 m

Volume of dune

East Secret Spot, Isabela



Base surface	Triangulated
Cut volume	3,026.79 m ³
Cut error	207.549 m ³
Fill volume	-1,922.09 m ³
Fill error	180.901 m ³
Volume difference	1,104.7 m ³

Shoreline
East Secret Spot, Isabela



Shoreline length = 322.067 m

Shoreline geolocation
East Secret Spot, Isabela



Shoreline markers	
A	= 18.51443° N 67.04844° W
B	= 18.51399° N 67.04789° W
C	= 18.51363° N 67.04719° W
D	= 18.51370° N 67.04639° W

Shoreline extension
East Secret Spot, Isabela



Shoreline extension
A = 12.721 m
B = 10.945 m

Shoreline position
East Secret Spot, Isabela



Shoreline position

A = 70.855 m
B = 48.76 m

Area of dune breaches
East Secret Spot, Isabela



Area of dune breaches

Breach = 3,833.18 m²

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
 - Additional information about the sections

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

Summary

Project	232785-Project-2023-07-31T19:37:57.030Z
Processed	2023-07-31 20:27:12
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.65 cm / 0.65 in
Area Covered	0.071 km ² / 7.1235 ha / 0.03 sq. mi. / 17.6116 acres
Time for Initial Processing (without report)	36m:17s

Quality Check

Images	median of 43044 keypoints per image	✓
Dataset	304 out of 346 images calibrated (87%), all images enabled, 3 blocks	⚠
Camera Optimization	1.41% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 10338.7 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

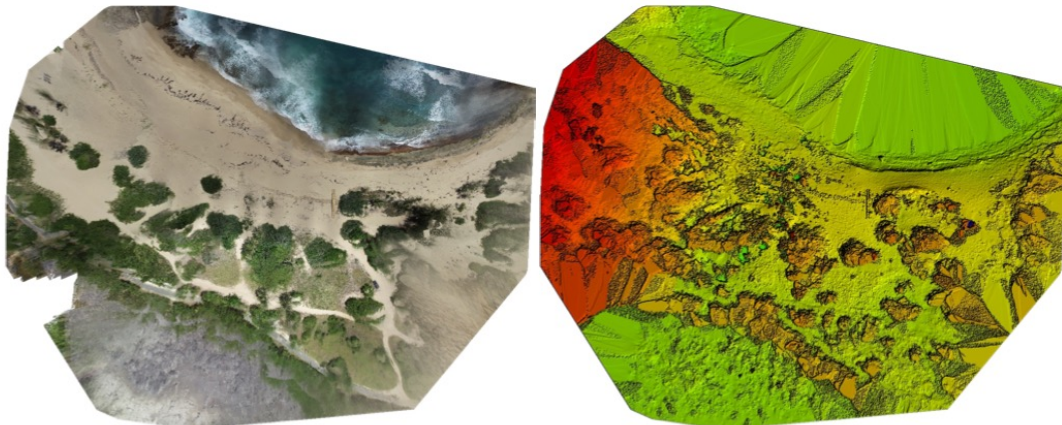


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	304 out of 346
Number of Geolocated Images	346 out of 346

Initial Image Positions

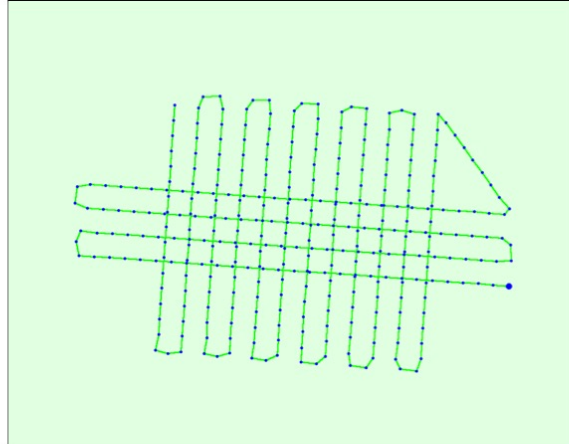
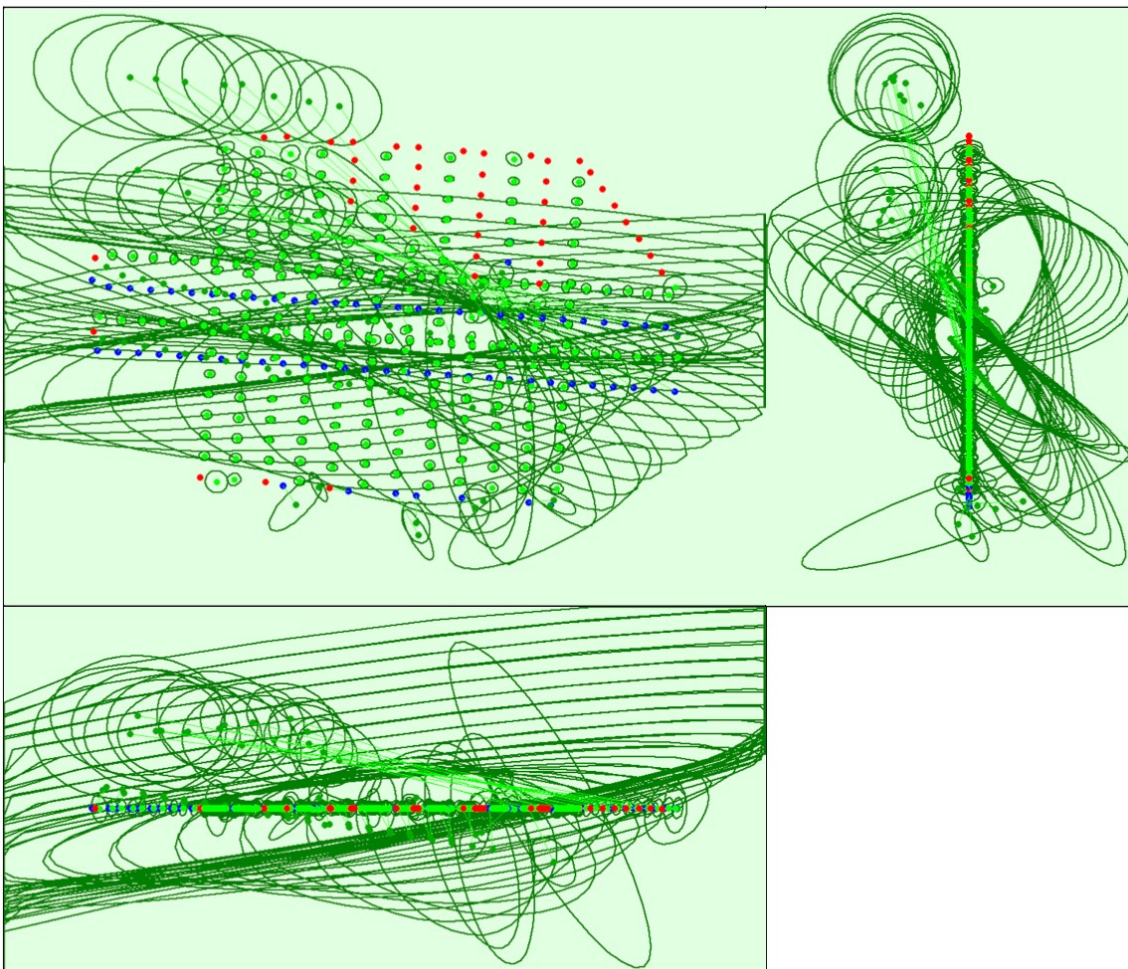


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 500x 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	0.038	0.011	0.013	0.014	0.018	0.044
Sigma	0.099	0.020	0.020	0.018	0.029	0.097

🔍 Overlap

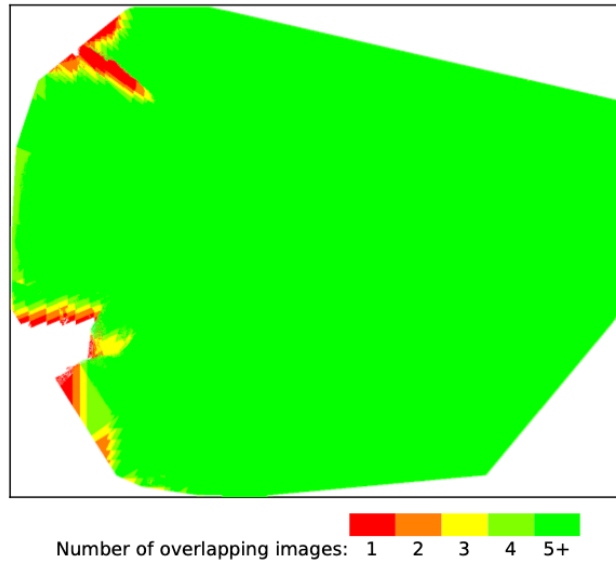


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.

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	3004331
Number of 3D Points for Bundle Block Adjustment	1132841
Mean Reprojection Error [pixels]	0.172

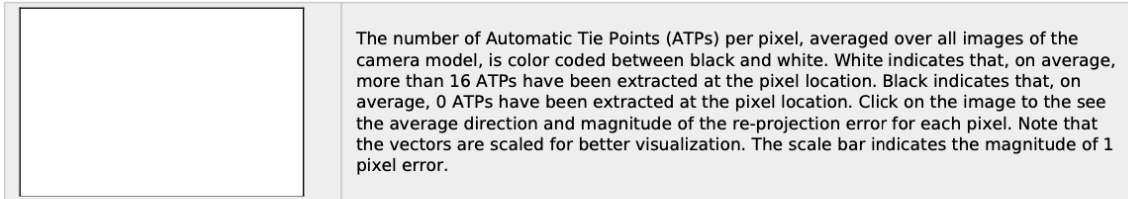
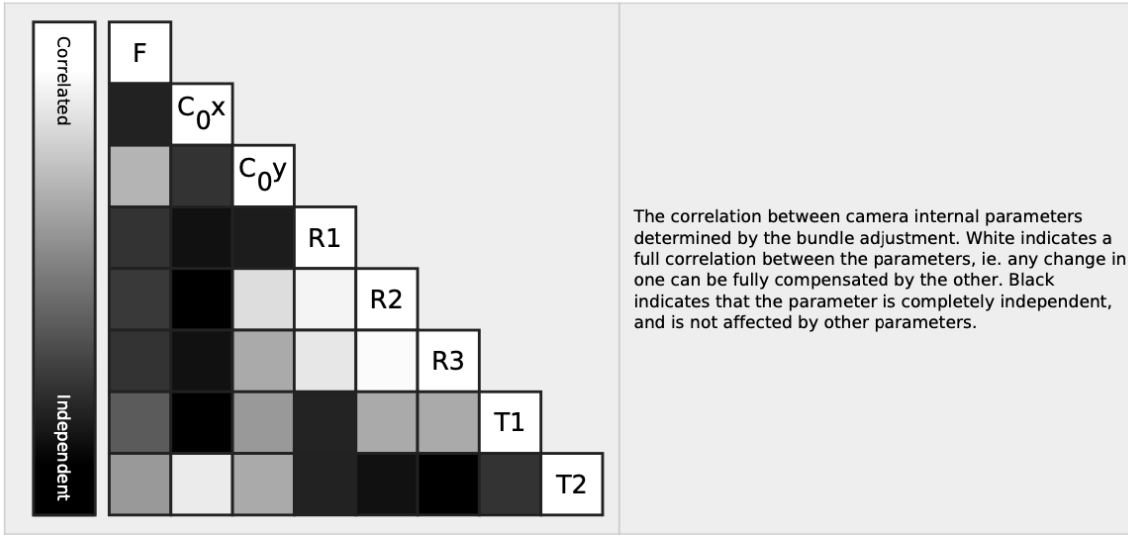
🔍 Internal Camera Parameters

📁 **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	3710.192 [pixel] 8.701 [mm]	2731.448 [pixel] 6.406 [mm]	1808.261 [pixel] 4.241 [mm]	-0.012	0.001	0.007	-0.002	-0.001
Uncertainties (Sigma)	0.185 [pixel] 0.000 [mm]	0.274 [pixel] 0.001 [mm]	0.342 [pixel] 0.001 [mm]	0.000	0.001	0.000	0.000	0.000



? 2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	43044	10339
Min	20135	163
Max	79710	22389
Mean	46010	9883

? 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	790348
In 3 Images	183199
In 4 Images	73542
In 5 Images	35280
In 6 Images	19190
In 7 Images	11015
In 8 Images	6679
In 9 Images	4223
In 10 Images	2715
In 11 Images	1889
In 12 Images	1289
In 13 Images	948
In 14 Images	632
In 15 Images	468
In 16 Images	298
In 17 Images	261
In 18 Images	183
In 19 Images	127
In 20 Images	120
In 21 Images	100
In 22 Images	75
In 23 Images	58

In 24 Images	40
In 25 Images	29
In 26 Images	25
In 27 Images	19
In 28 Images	19
In 29 Images	17
In 30 Images	9
In 31 Images	6
In 32 Images	5
In 33 Images	2
In 34 Images	5
In 35 Images	2
In 36 Images	2
In 37 Images	3
In 38 Images	5
In 39 Images	2
In 40 Images	1
In 41 Images	1
In 42 Images	2
In 45 Images	2
In 46 Images	1
In 48 Images	2
In 52 Images	1
In 53 Images	2

2D Keypoint Matches

1

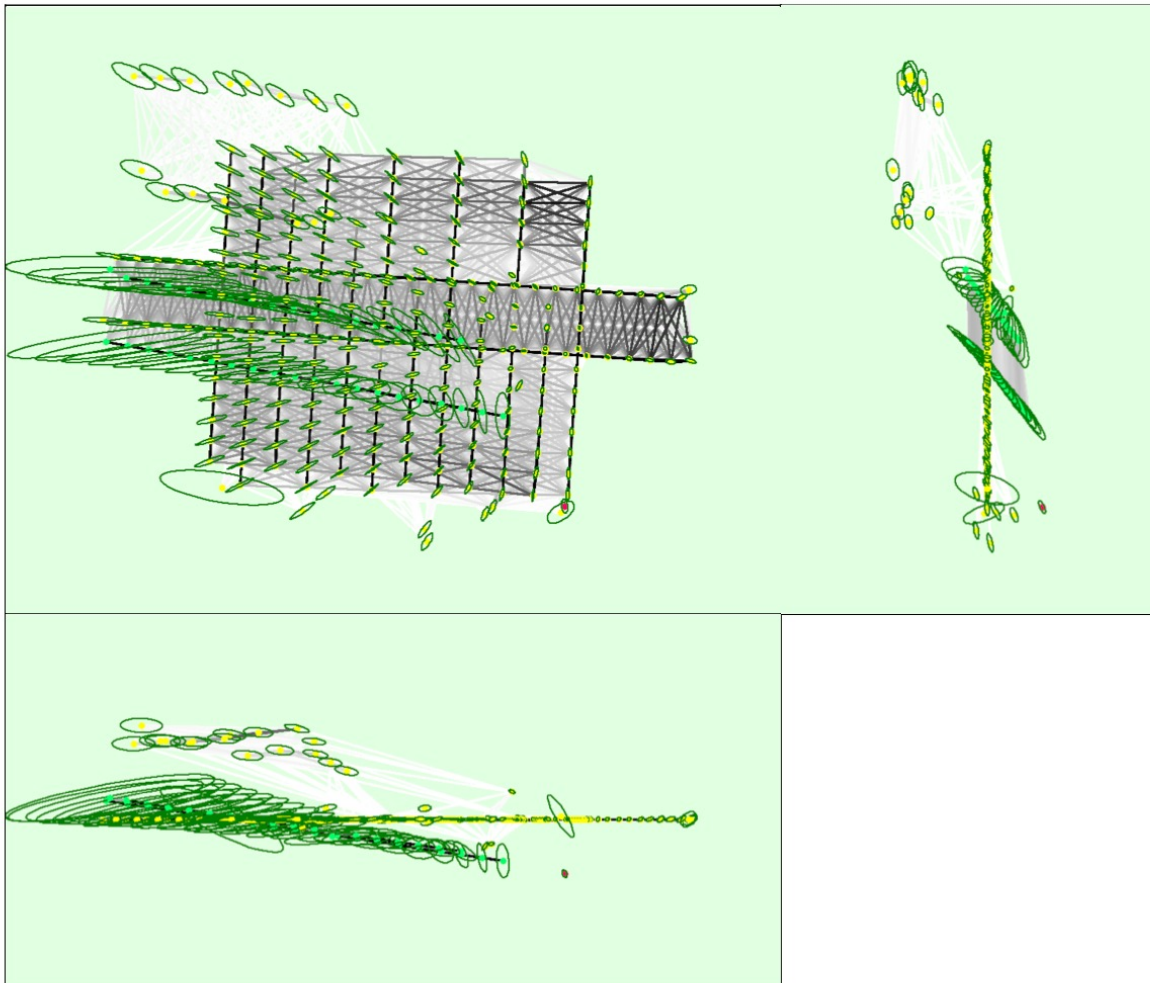




Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty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

? Relative camera position and orientation uncertainties i

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.039	0.015	0.011	0.012	0.016	0.034
Sigma	0.052	0.012	0.012	0.012	0.022	0.066

Geolocation Details i

? Absolute Geolocation Variance i

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.05	0.00	0.00	0.42
-0.05	-0.04	0.00	0.00	0.00
-0.04	-0.03	0.00	0.00	2.11
-0.03	-0.02	0.42	0.00	3.80
-0.02	-0.01	2.53	2.11	16.88
-0.01	0.00	51.05	45.99	24.05
0.00	0.01	41.77	47.68	32.49
0.01	0.02	2.95	3.80	16.46
0.02	0.03	0.84	0.00	3.80
0.03	0.04	0.00	0.00	0.00
0.04	0.05	0.42	0.42	0.00
0.05	-	0.00	0.00	0.00
Mean [m]		-0.000064	0.000599	-0.001019
Sigma [m]		0.005885	0.005161	0.013041
RMS Error [m]		0.005885	0.005195	0.013081

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 i

Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	96.20	94.94	97.47
[-2.00, 2.00]	98.73	99.58	99.58
[-3.00, 3.00]	99.58	99.58	99.58
Mean of Geolocation Accuracy [m]	0.010443	0.010443	0.027470
Sigma of Geolocation Accuracy [m]	0.000167	0.000167	0.001073

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

Geolocation Orientational Variance	RMS [degree]
Omega	1.683

Phi	1.802
Kappa	2.885

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	17m:39s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	09m:45s

Results

Number of Generated Tiles	1
Number of 3D Densified Points	24702199
Average Density (per m ³)	793.03

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	1 x GSD (1.65 [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	10m:28s
Time for Orthomosaic Generation	21m:07s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s

East Secret Spot, Isabela

