

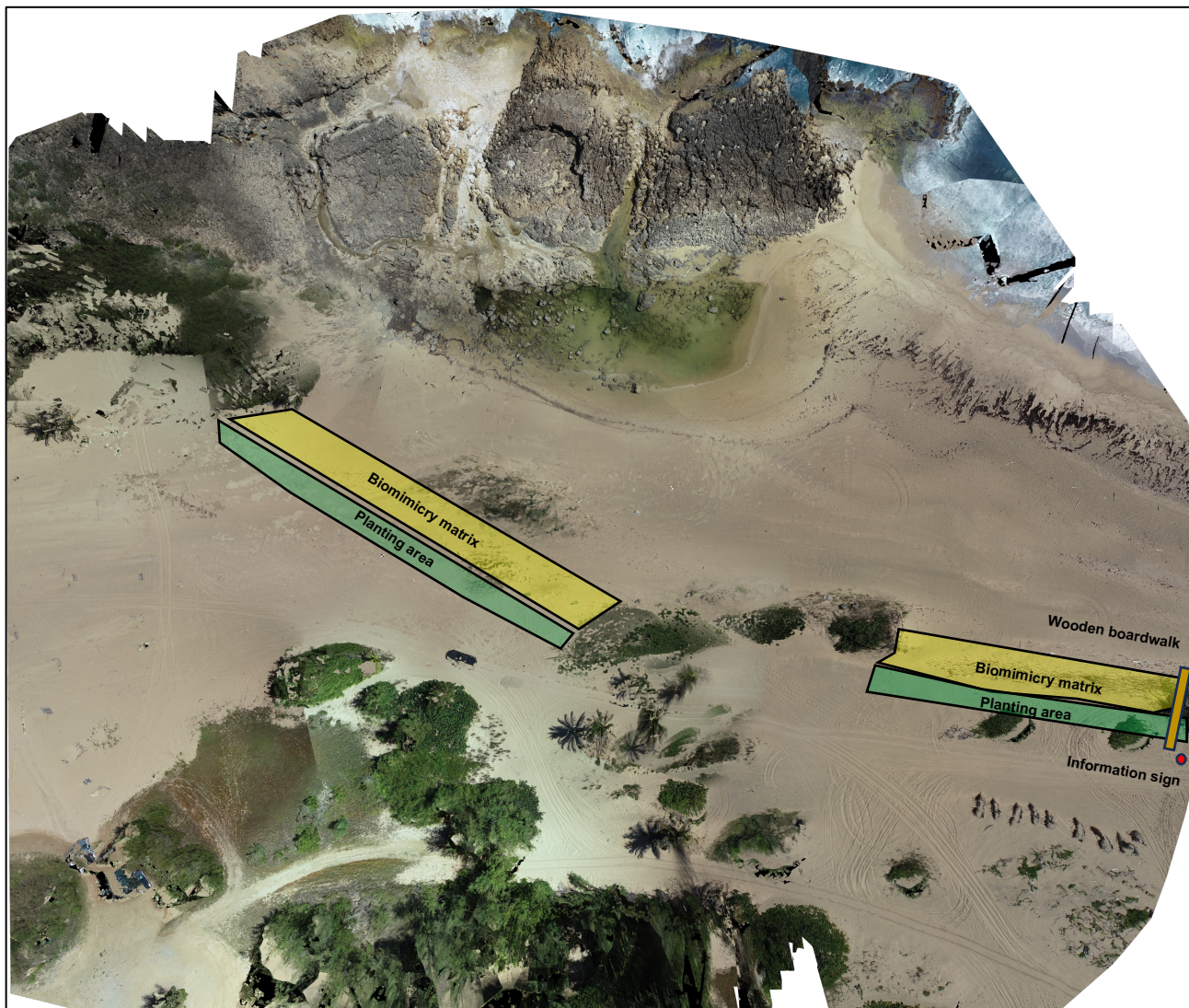
Biomimicry between Middles and Secret Spot, Isabela
August 02, 2023.



Centroid coordinates : 18.51337° N 67.04470° W

Ecological restoration actions

August 02, 2023



Length of biomimicry matrix = 183 m

Area of biomimicry matrix = 1,679 m²

Area planted with dune vegetation = 577 m²

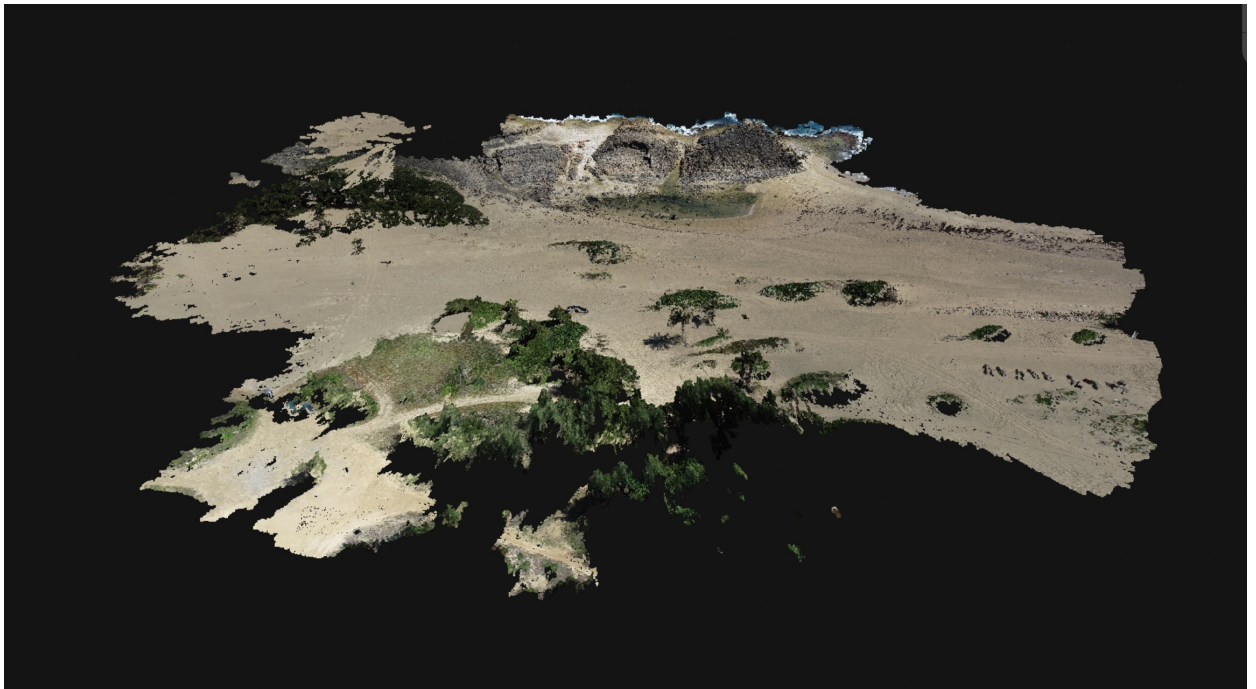
Wooden boardwalk = 31 m

Note:

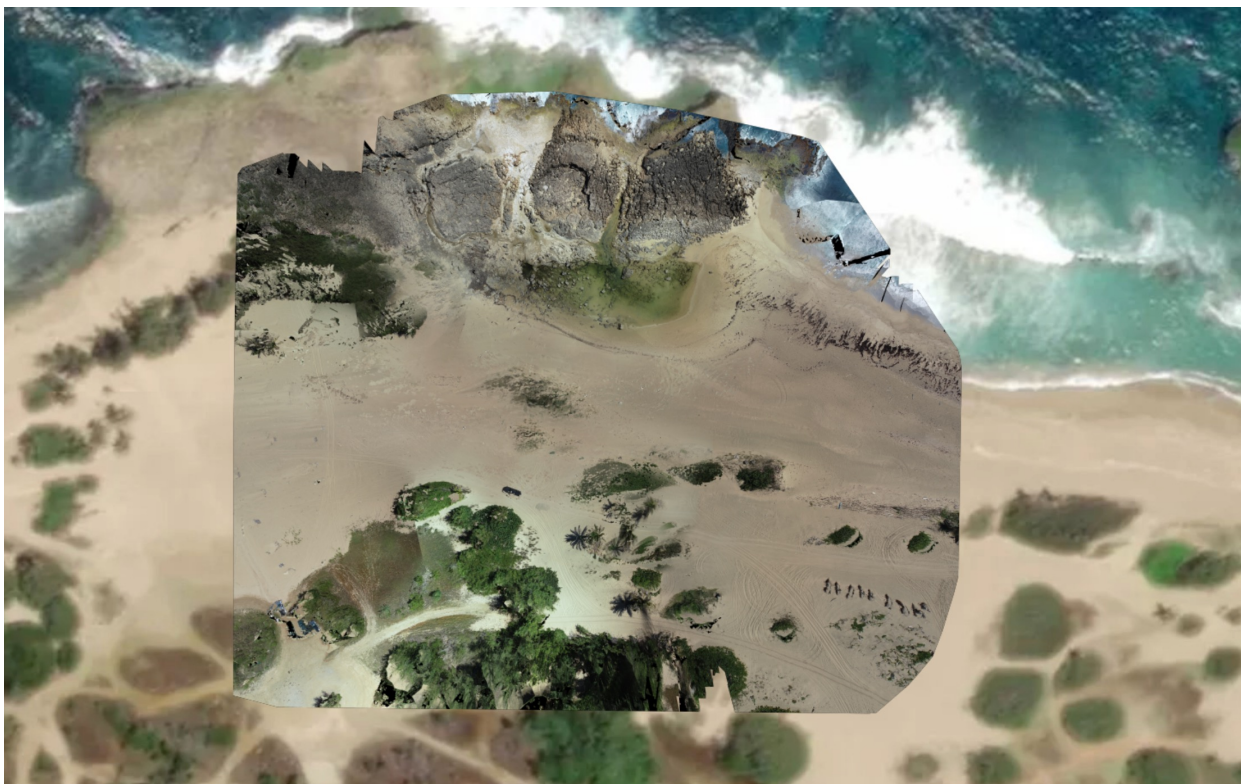
Both segments of biomimicry on this site have been covered with sand during hurricane Fiona. The matrices need to be adjusted (lifted). Beach bean, sea purslane and beach morning glory.

3D map

Biomimicry between Middles and Secret Spot, Isabela



2D map



Total area of site = 4.40034 ha

Beach length (m)

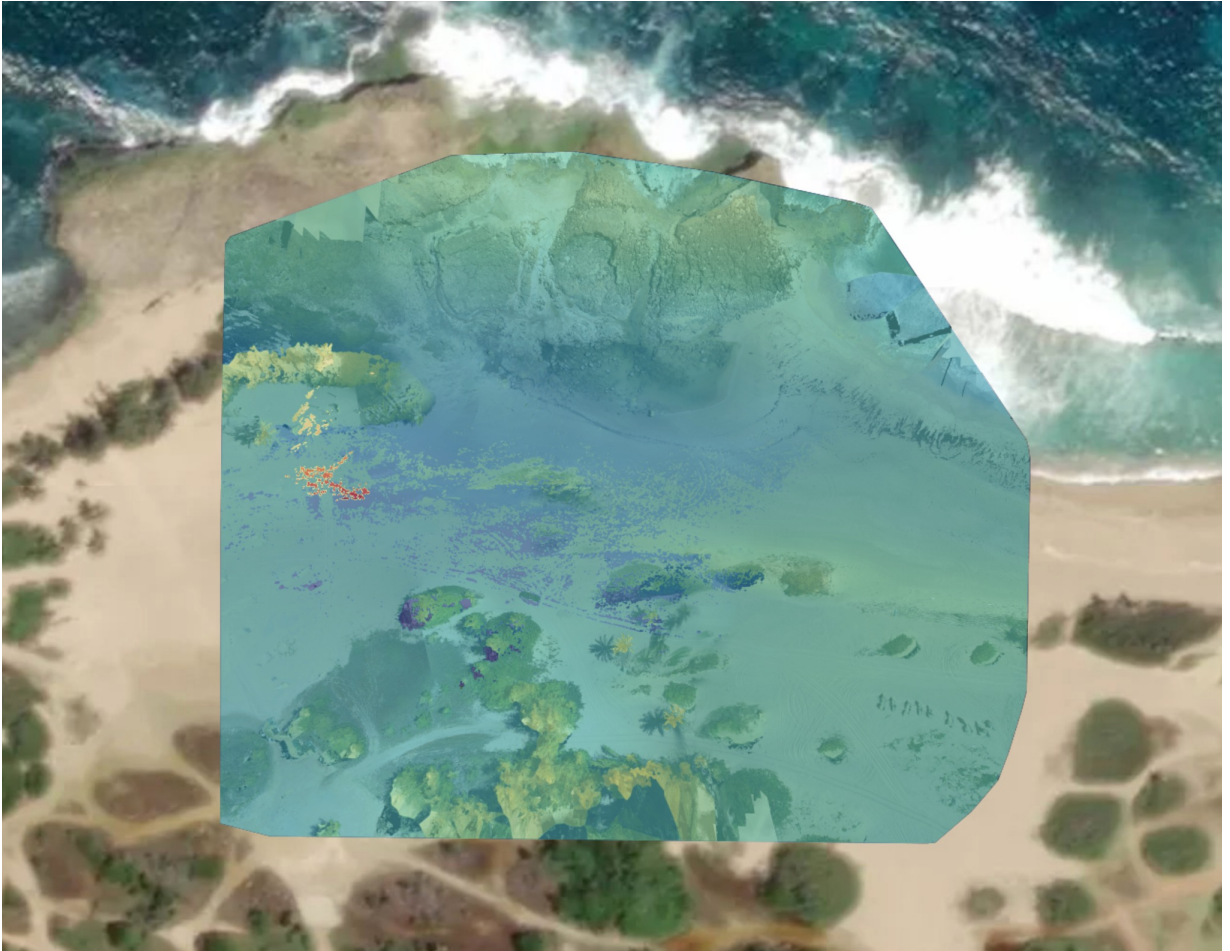
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Beach length = 100.248 m

Density surface model

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Area of the beach

Biomimicry between Middles and Secret Spot, Isabela



Area of the beach = 1.05253 ha

Beach volume

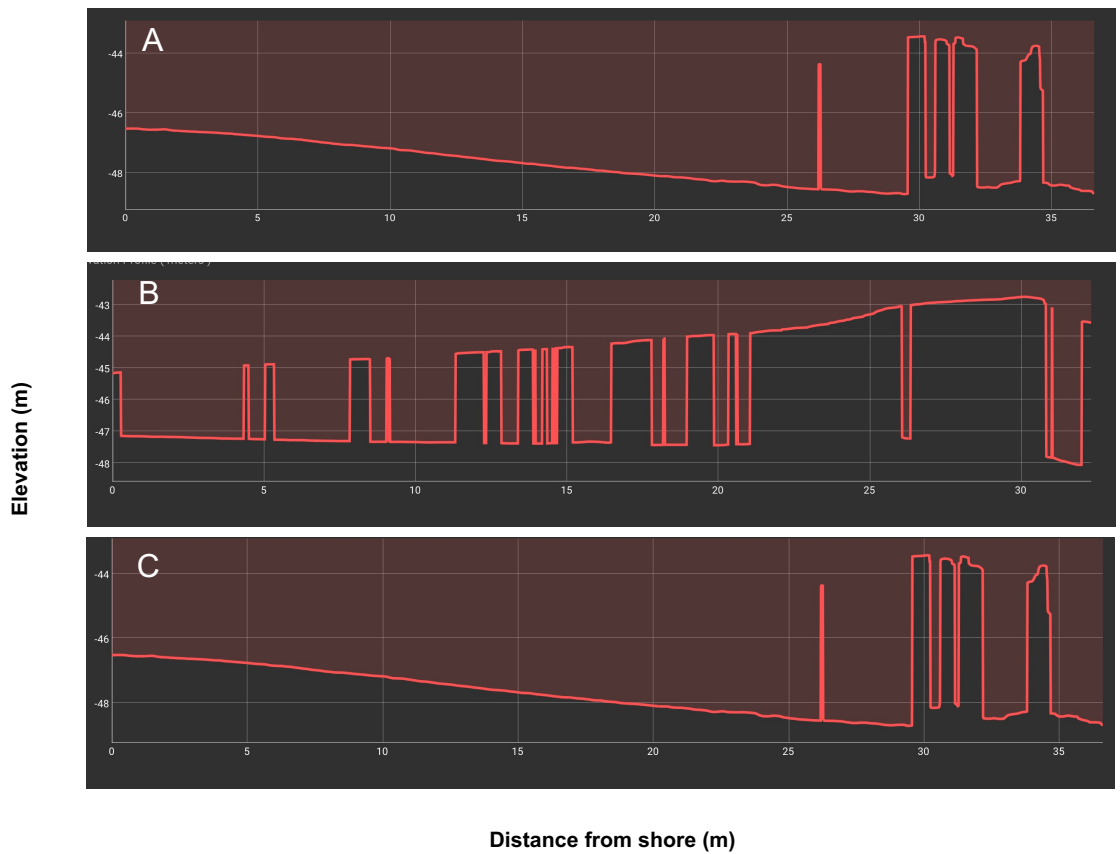
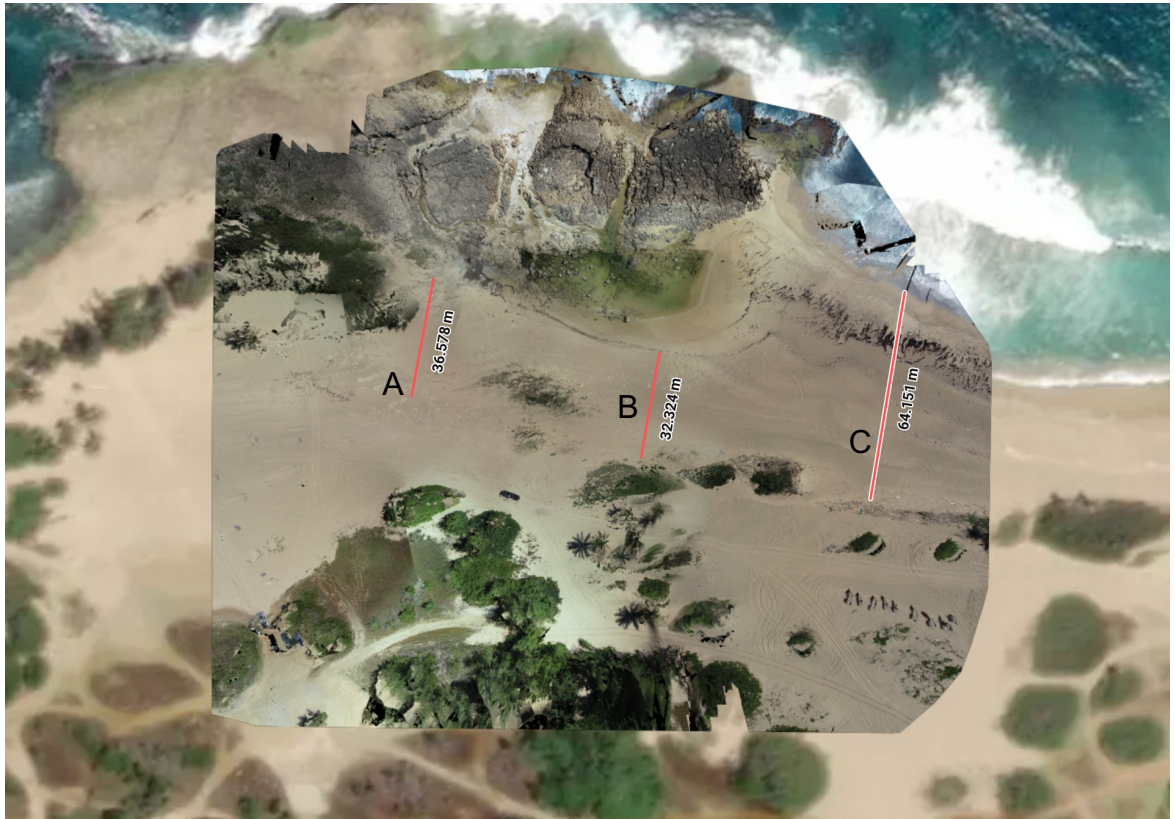
Biomimicry between Middles and Secret Spot, Isabela



Cut = 0.00 m³
Fill = -473,284 m³
Volume Dif. = -473,284 m³

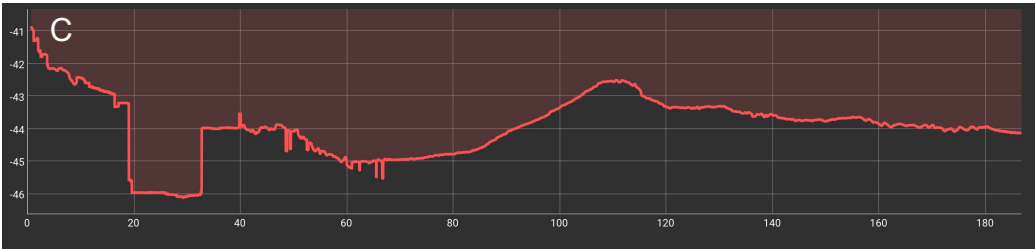
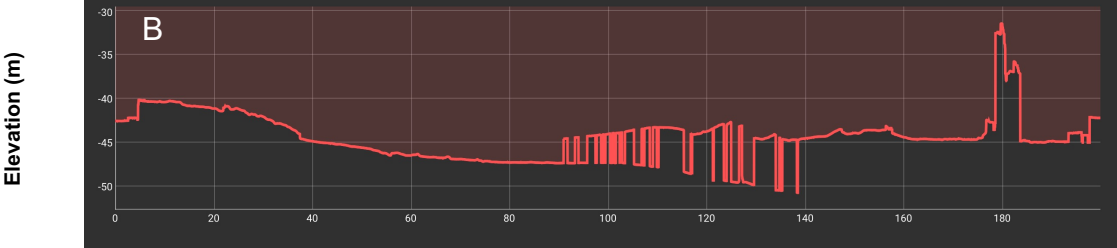
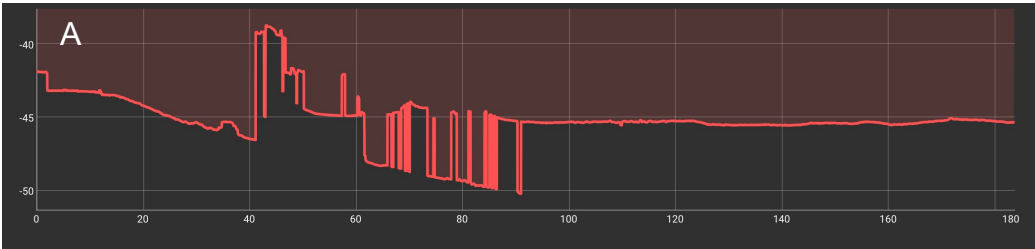
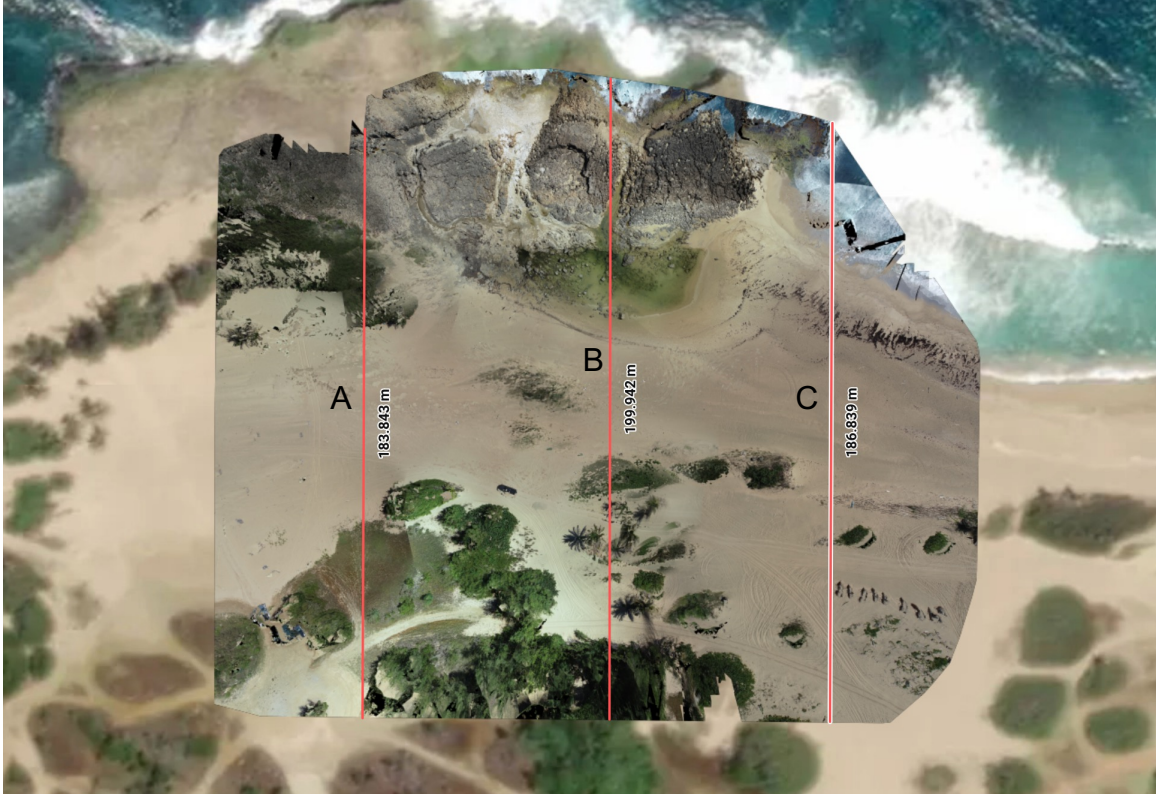
Beach elevation

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Site elevation (m)

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Distance from shore (m)

Dune height (m)

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Dune height

A = 0.125 m

B = 1.035 m

C = 1.039 m

D = 0.722 m

Dune width (m)

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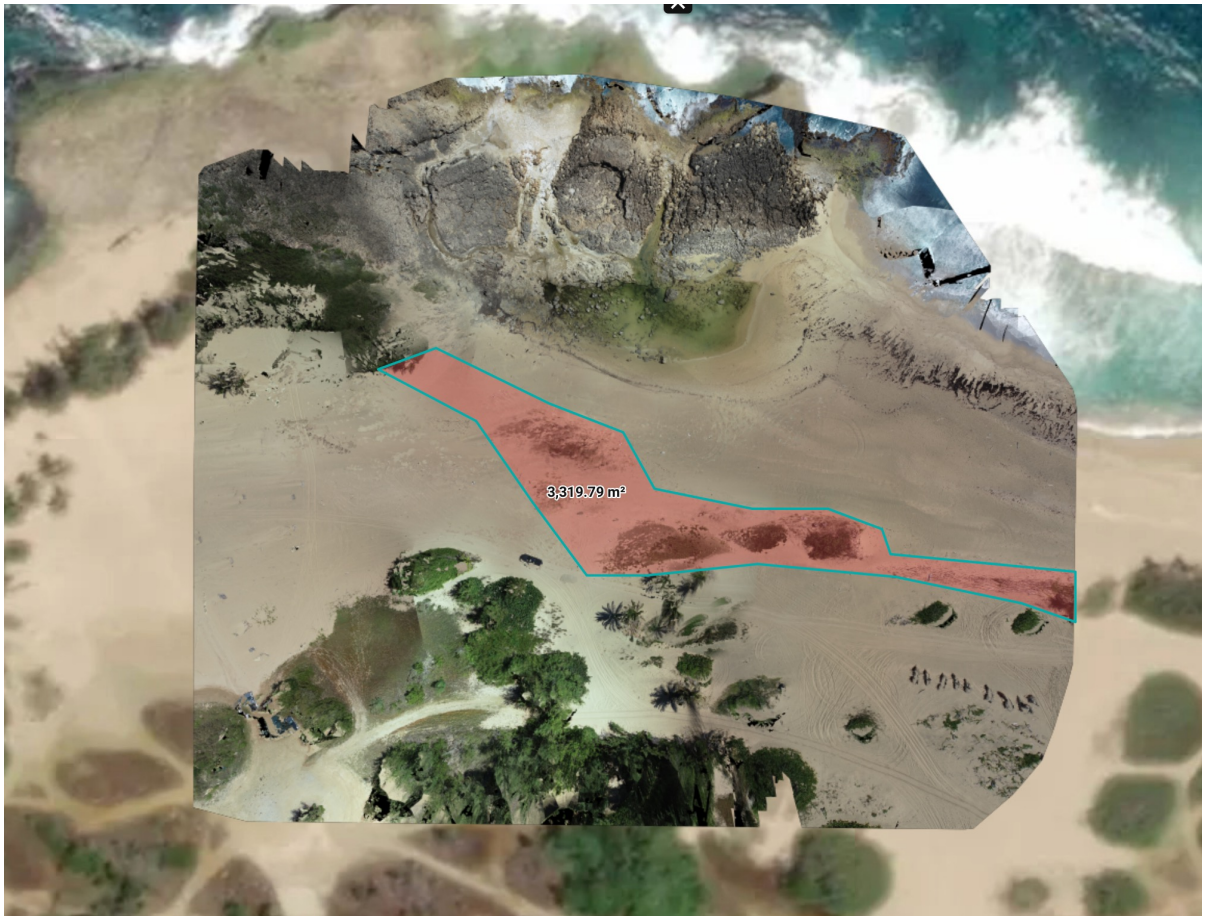


Dune width

A = 18.051 m
B = 23.552 m
C = 16.379 m
D = 7.821 m

Area and perimeter of dune

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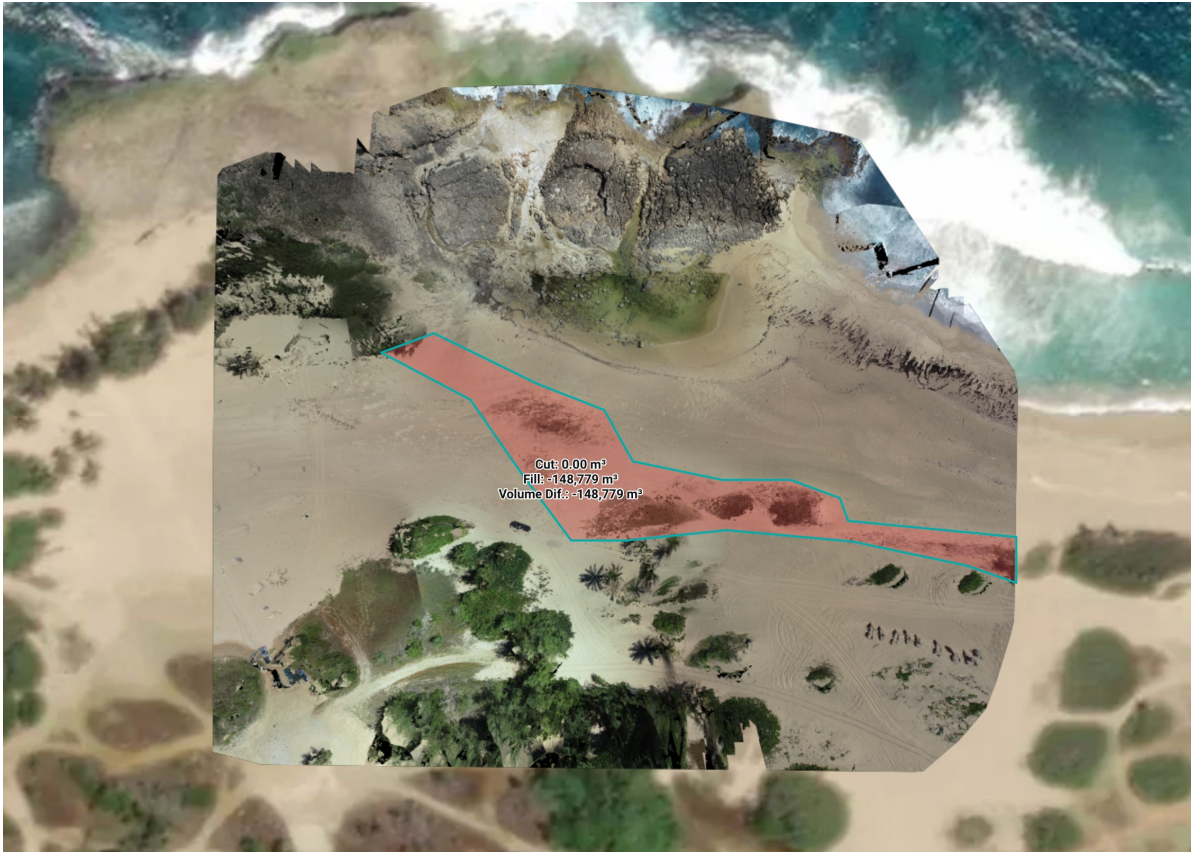


Area and perimeter of dune

2D area = 3,319.79 m²
2D perimeter = 441.563 m
3D perimeter = 441.563 m
Elevation difference = 0.00 m

Volume of dune

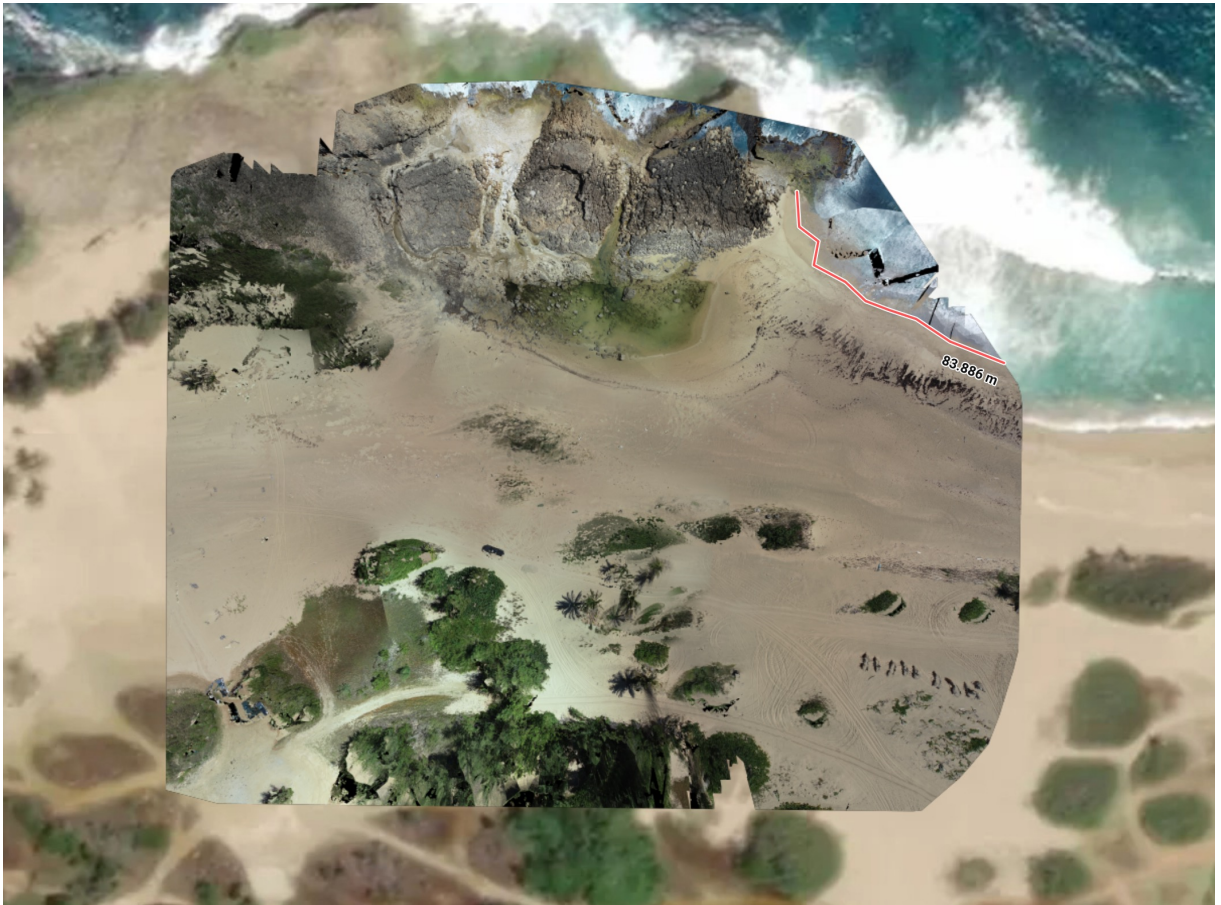
Biomimicry between Middles and Secret Spot, Isabela



Base surface	Triangulated
Cut volume	0.00 m ³
Cut error	0.00 m ³
Fill volume	-148,779 m ³
Fill error	316.567 m ³
Volume difference	-148,779 m ³

Shoreline

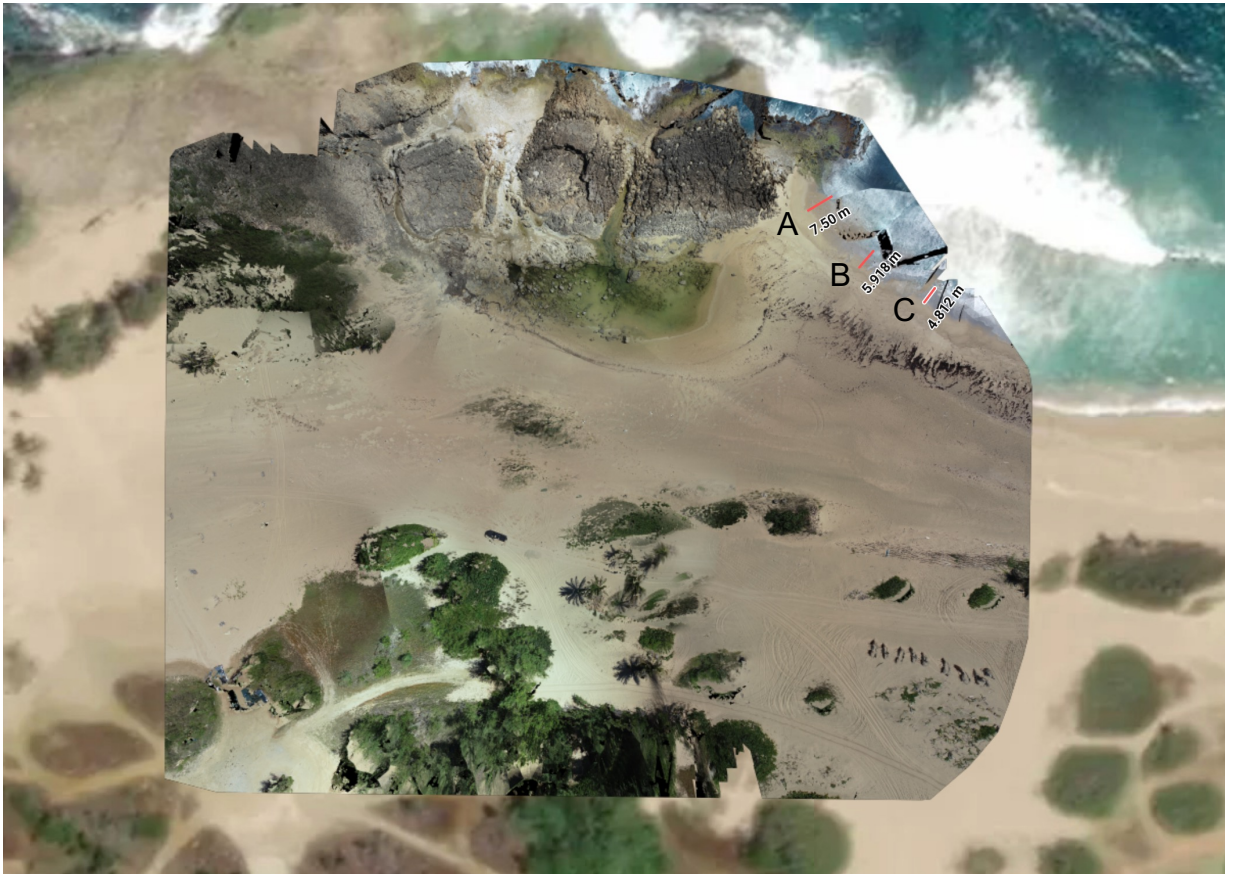
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Shoreline length = 83.886 m

Shoreline extension

Biomimicry between Middles and Secret Spot, Isabela



Shoreline extension

A = 7.50 m

B = 5.918 m

C = 4.812 m

Shoreline position

Biomimicry between Middles and Secret Spot, Isabela



Shoreline position

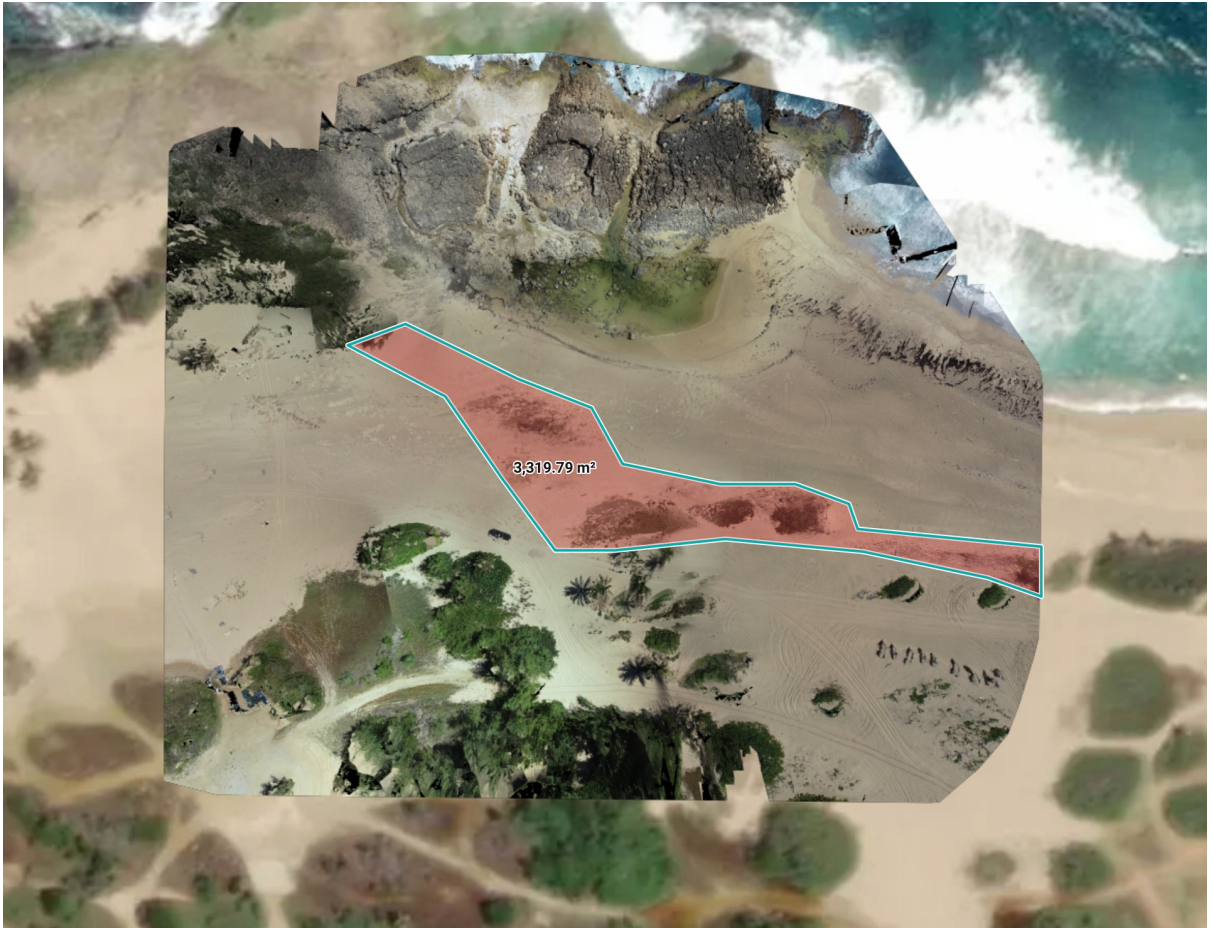
A = 88.812 m

B = 66.318 m

C = 59.577 m

Area of dune breaches

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Area of dune breaches

Breach = 3,319.79 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	233253-Project-2023-08-02T21:10:43.986Z
Processed	2023-08-02 22:06:13
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.59 cm / 0.63 in
Area Covered	0.044 km ² / 4.3838 ha / 0.02 sq. mi. / 10.8381 acres
Time for Initial Processing (without report)	20m:06s

Quality Check



Images	median of 33745 keypoints per image	
Dataset	219 out of 224 images calibrated (97%), all images enabled, 4 blocks	
Camera Optimization	1.45% relative difference between initial and optimized internal camera parameters	
Matching	median of 15569 matches per calibrated image	
Georeferencing	yes, no 3D GCP	

Preview

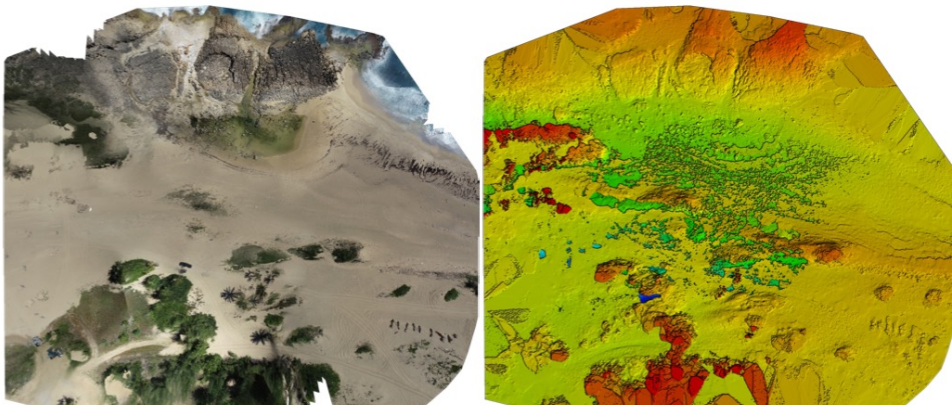


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	219 out of 224
Number of Geolocated Images	224 out of 224

2 Initial Image Positions

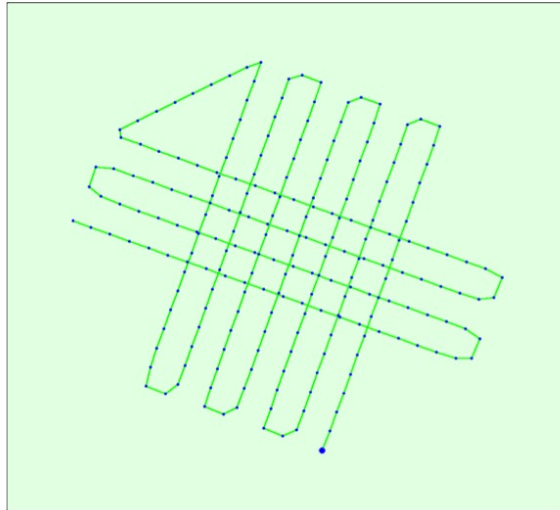
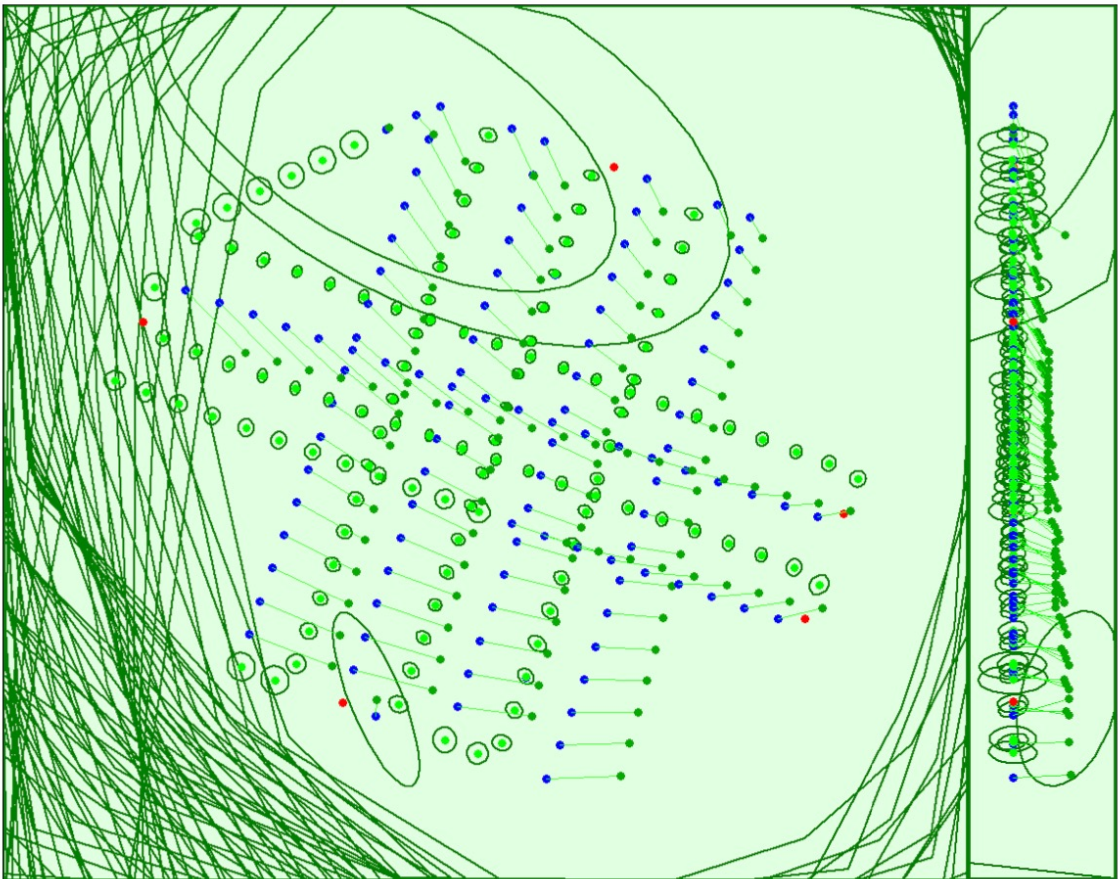
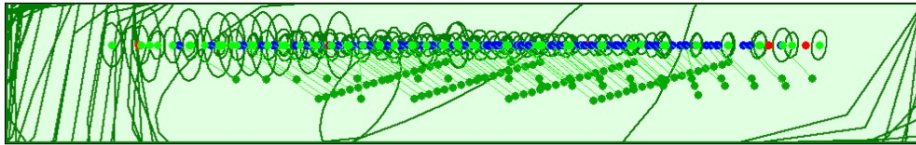


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

2 Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 1000x magnified

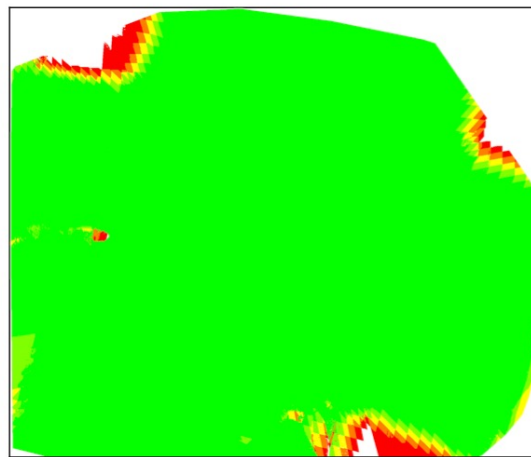
Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled 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	0.060	0.090	0.069	0.063	0.079	0.080
Sigma	0.067	0.101	0.073	0.069	0.131	0.088

? Overlap



Number of overlapping images: 1 2 3 4 5+

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	3640242
Number of 3D Points for Bundle Block Adjustment	1238370
Mean Reprojection Error [pixels]	0.158

? Internal Camera Parameters

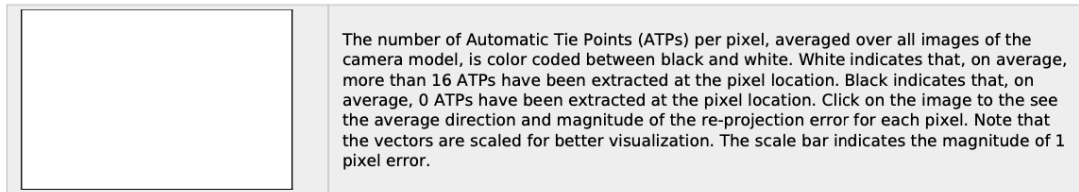
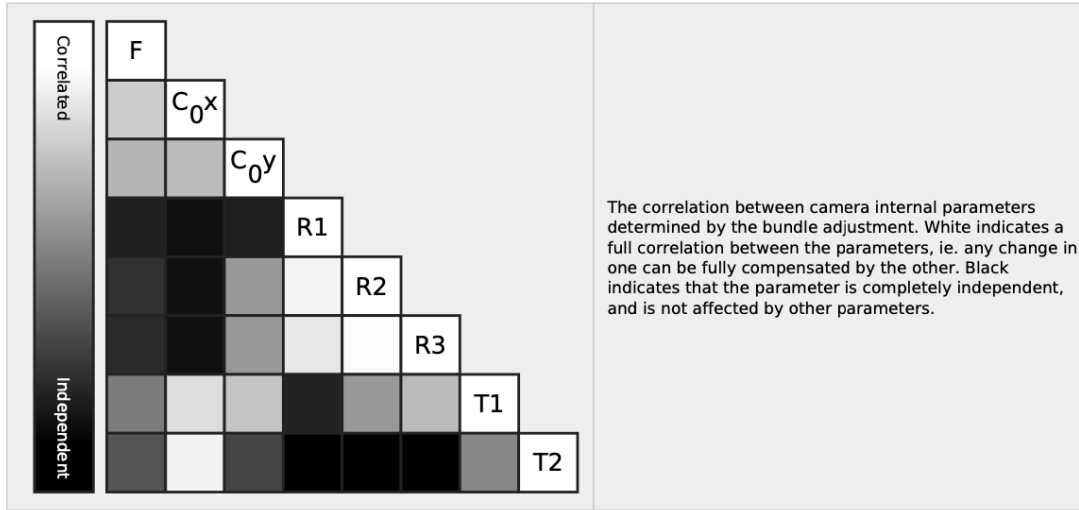
FC6310R_8.8_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]



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	3711.436 [pixel] 8.704 [mm]	2731.184 [pixel] 6.405 [mm]	1806.612 [pixel] 4.237 [mm]	-0.013	0.003	0.006	-0.002	-0.001
Uncertainties (Sigma)	0.115 [pixel] 0.000 [mm]	0.159 [pixel] 0.000 [mm]	0.188 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	33745	15569
Min	20325	284
Max	77229	45512
Mean	38283	16622

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	775248
In 3 Images	223142
In 4 Images	98878
In 5 Images	51880
In 6 Images	30027
In 7 Images	18408
In 8 Images	11810
In 9 Images	7840
In 10 Images	5302
In 11 Images	3831
In 12 Images	2665
In 13 Images	1898
In 14 Images	1447
In 15 Images	1061
In 16 Images	941
In 17 Images	694

In 18 Images	596
In 19 Images	447
In 20 Images	379
In 21 Images	314
In 22 Images	227
In 23 Images	199
In 24 Images	165
In 25 Images	141
In 26 Images	126
In 27 Images	115
In 28 Images	88
In 29 Images	83
In 30 Images	56
In 31 Images	47
In 32 Images	42
In 33 Images	39
In 34 Images	42
In 35 Images	32
In 36 Images	22
In 37 Images	25
In 38 Images	20
In 39 Images	9
In 40 Images	18
In 41 Images	7
In 42 Images	15
In 43 Images	9
In 44 Images	3
In 45 Images	8
In 46 Images	6
In 47 Images	7
In 48 Images	7
In 49 Images	1
In 50 Images	1
In 52 Images	1
In 53 Images	1

2D Keypoint Matches



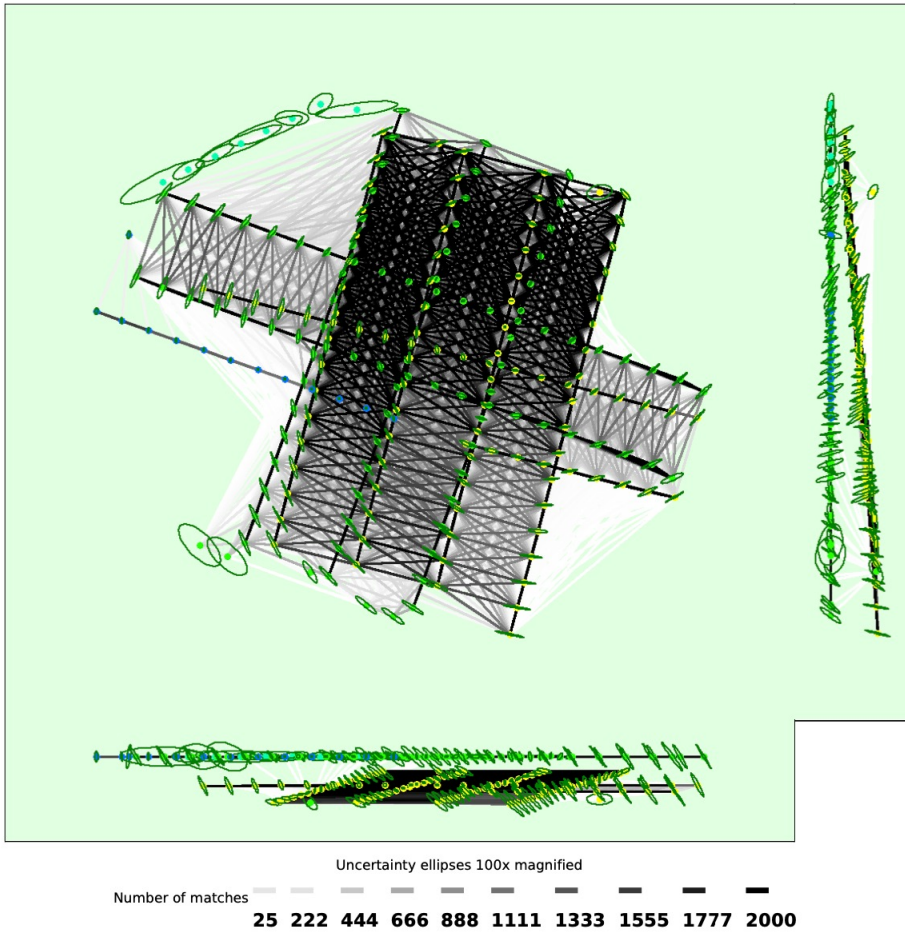


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.011	0.011	0.010	0.025	0.019	0.032
Sigma	0.012	0.008	0.007	0.039	0.027	0.040

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.04	0.00	0.00	0.00
-0.04	-0.03	0.00	0.00	0.00

-0.03	-0.02	0.00	0.00	0.86
-0.02	-0.02	0.00	0.00	0.86
-0.02	-0.01	0.86	1.72	11.21
-0.01	0.00	45.69	43.10	37.93
0.00	0.01	53.45	55.17	33.62
0.01	0.02	0.00	0.00	12.93
0.02	0.02	0.00	0.00	1.72
0.02	0.03	0.00	0.00	0.86
0.03	0.04	0.00	0.00	0.00
0.04	-	0.00	0.00	0.00
Mean [m]		-0.000000	-0.000004	-0.000081
Sigma [m]		0.002063	0.003041	0.007836
RMS Error [m]		0.002063	0.003041	0.007837

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]	100.00	98.28	98.28
[-2.00, 2.00]	100.00	100.00	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	0.008436	0.008436	0.023772
Sigma of Geolocation Accuracy [m]	0.000226	0.000226	0.000560

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

Geolocation Orientational Variance	RMS [degree]
Omega	5.806
Phi	5.997
Kappa	15.797

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	11m:10s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	08m:22s

Results

Number of Generated Tiles	1
Number of 3D Densified Points	21151479
Average Density (per m ³)	914.39

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (1.59 [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	07m:11s
Time for Orthomosaic Generation	18m:30s
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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