Calle Elena, Ocean Park, San Juan
August 10, 2023.

3.43496 ha

Centroid coordinates : 18.45429° N 66.05643° W

Ecological restoration action
August 10, 2023

Area planted with dune vegetation = 22 m²

Wooden boardwalk = 31 m

Sand accumulation fence = 13 m

Note:

This site is located at the end of Elena street in Ocean Park, San Juan. This area experiences a high transport of sand onto the road. We installed a wooden boardwalk to protect vegetation and promote vegetation cover in this area. In addition to this an exclusion fence was installed to guide people onto the boardwalk and an information sign was installed in the area.

3D map
Ocean Park, San Juan
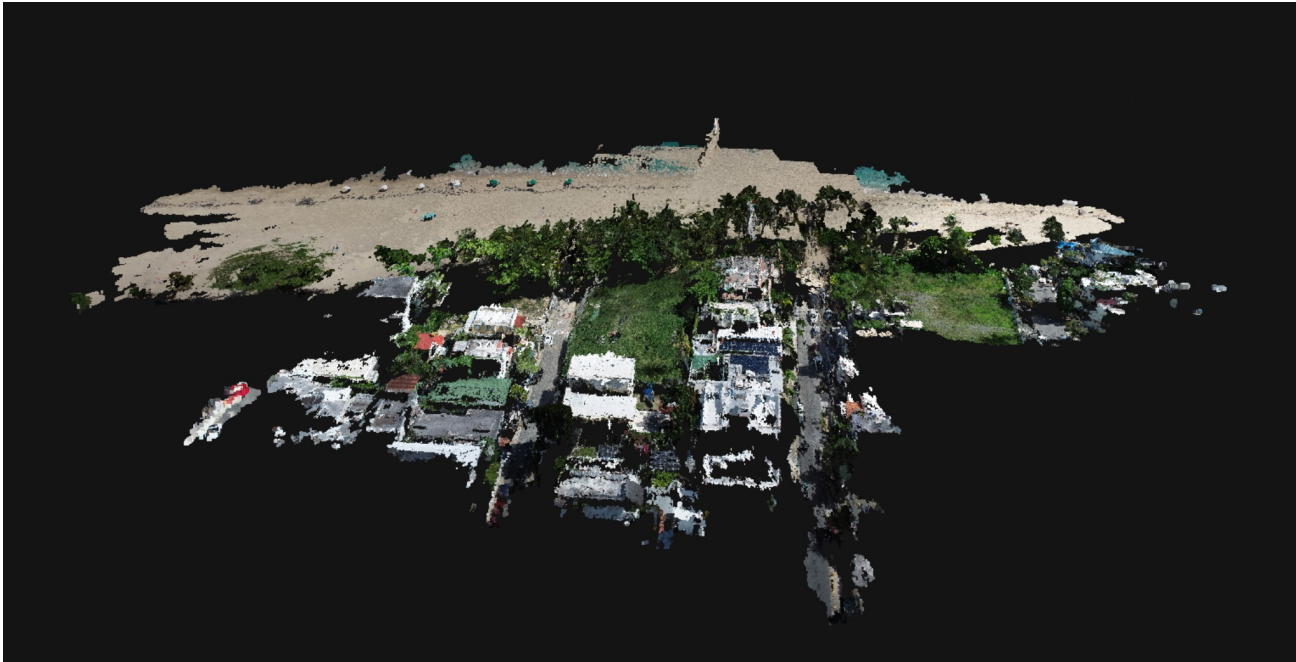
2D map
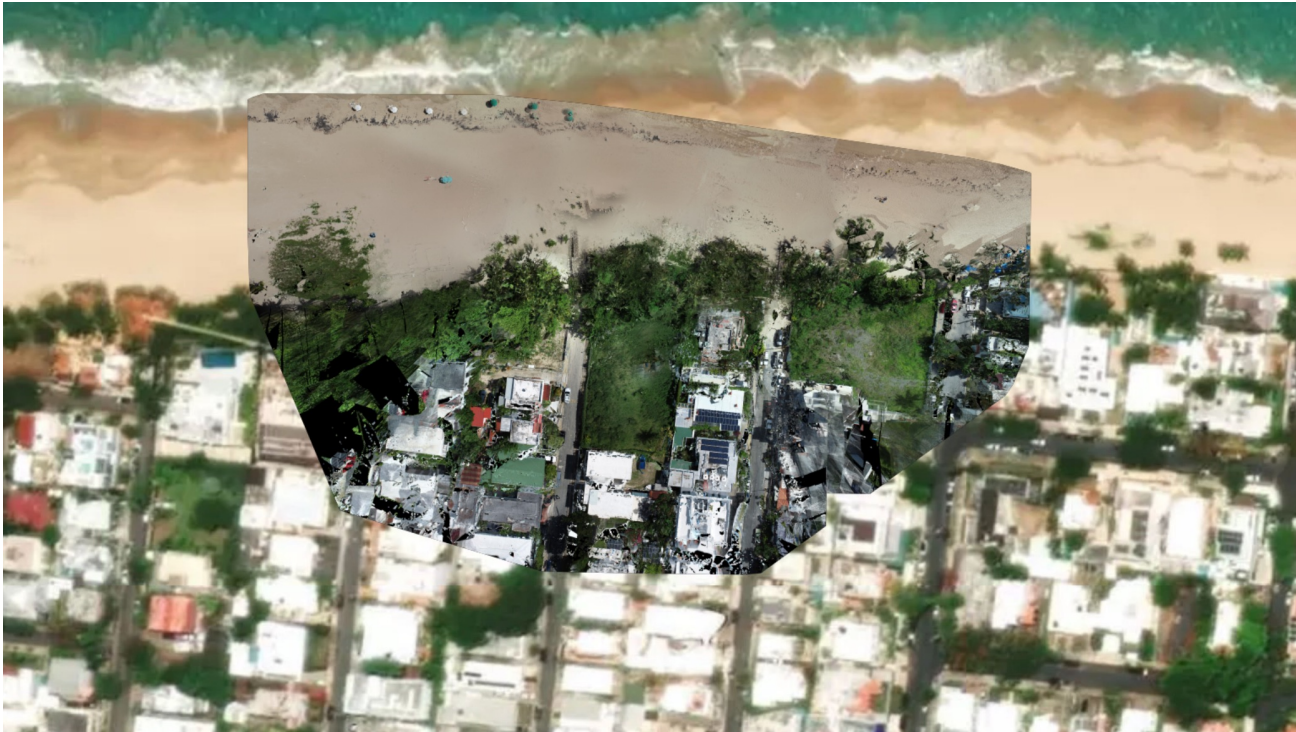
Total area of site = 3.43496 ha

Beach length (m)
Ocean Park, San Juan

273.086 m

Beach length = 273.086 m

Density surface model
Ocean Park, San Juan

Area of the beach
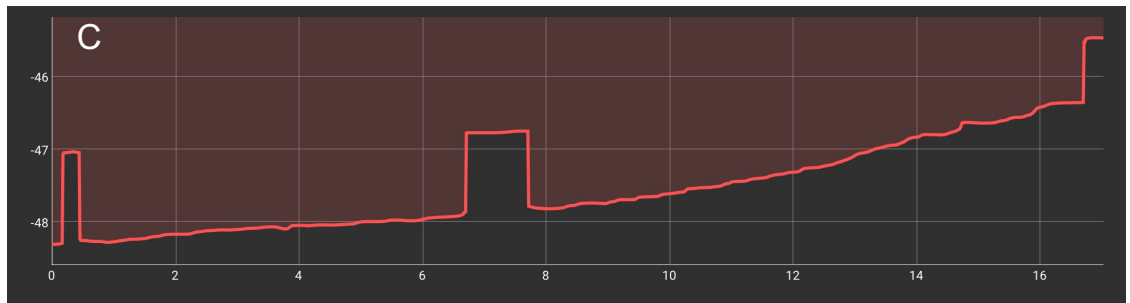Ocean Park, San Juan
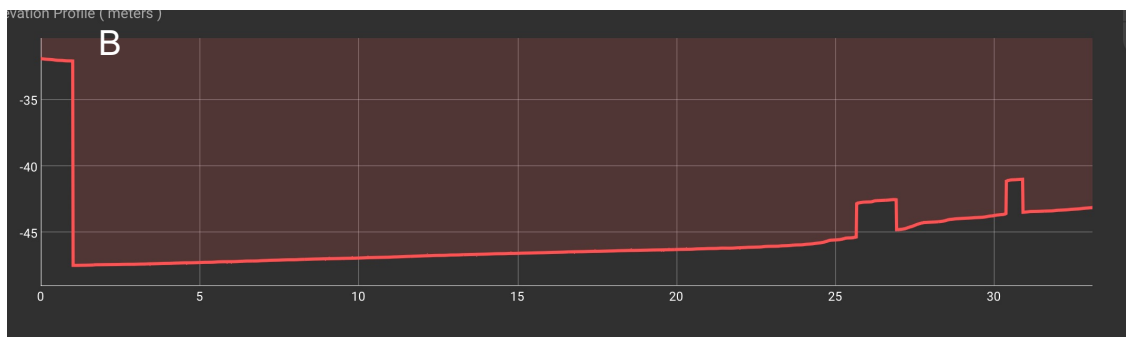

Area of the beach = 7,891.2 m²

Beach volume
Ocean Park, San Juan

Cut = 0.00 m³
Fill: -364,363 m³
Volume Dif.: -364,363 m³

Cut = 0.00 m³
Fill = --364,363 m³
Volume Dif. = -364,363 m³

Beach elevation
Ocean Park, San Juan
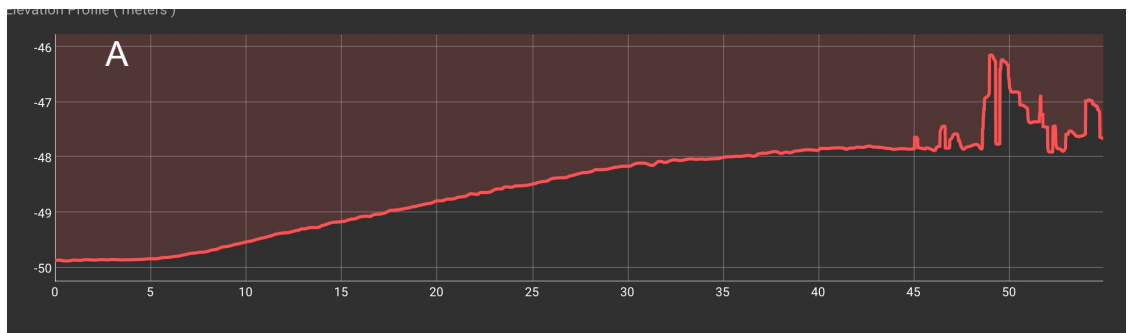
Distance from shore (m)

Elevation (m)

Site elevation (m)
Ocean Park, San Juan

Elevation (m)
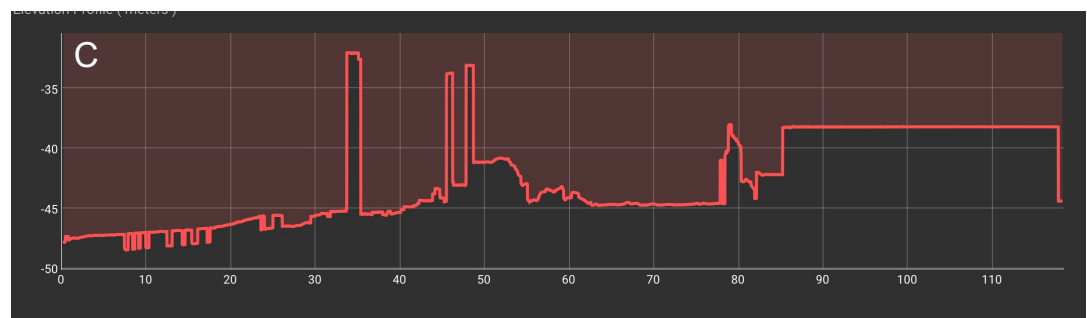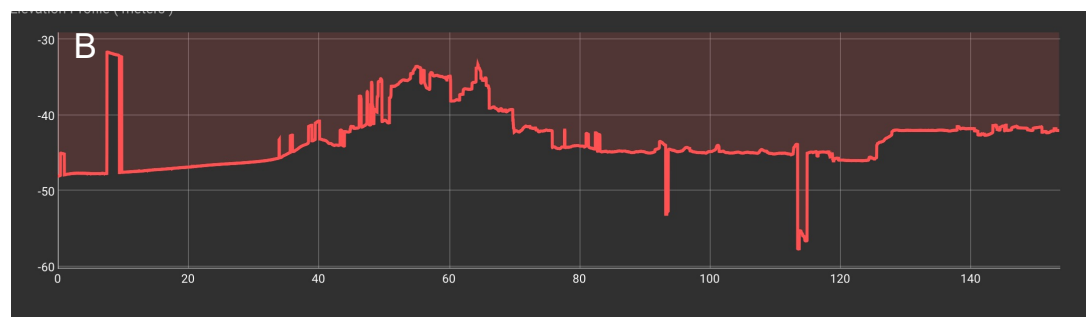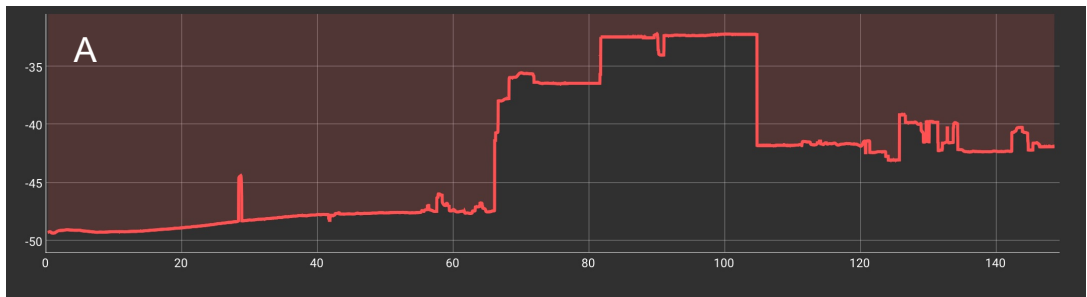
Distance from shore (m)

Dune height (m)
Ocean Park, San Juan

Dune height
A= 0.835 m
B= 2.381 m
C= 0.325 m

Dune width (m)
Ocean Park, San Juan

Dune width
A= 49.4 m   **B=** 31.009 m   **C=** 13.886 m

Area and perimeter of dune
Ocean Park, San Juan

6,084.09 m²

Area and perimeter of dune

2D area = 6,084.09 m²
3D area= 6,084.09 m²
2D perimeter = 602.305 m
3D perimeter = 602.305 m
Elevation difference = 0.00 m

Volume of dune
Ocean Park, San Juan

Base surface	Triangulated
Cut volume	0.00 m³
Cut error	0.00 m³
Fill volume	-250,971 m³
Fill error	476.893 m³
Volume difference	-250,971 m³

Shoreline
Ocean Park, San Juan

Shoreline length = 271.474 m

Shoreline geolocation
Ocean Park, San Juan
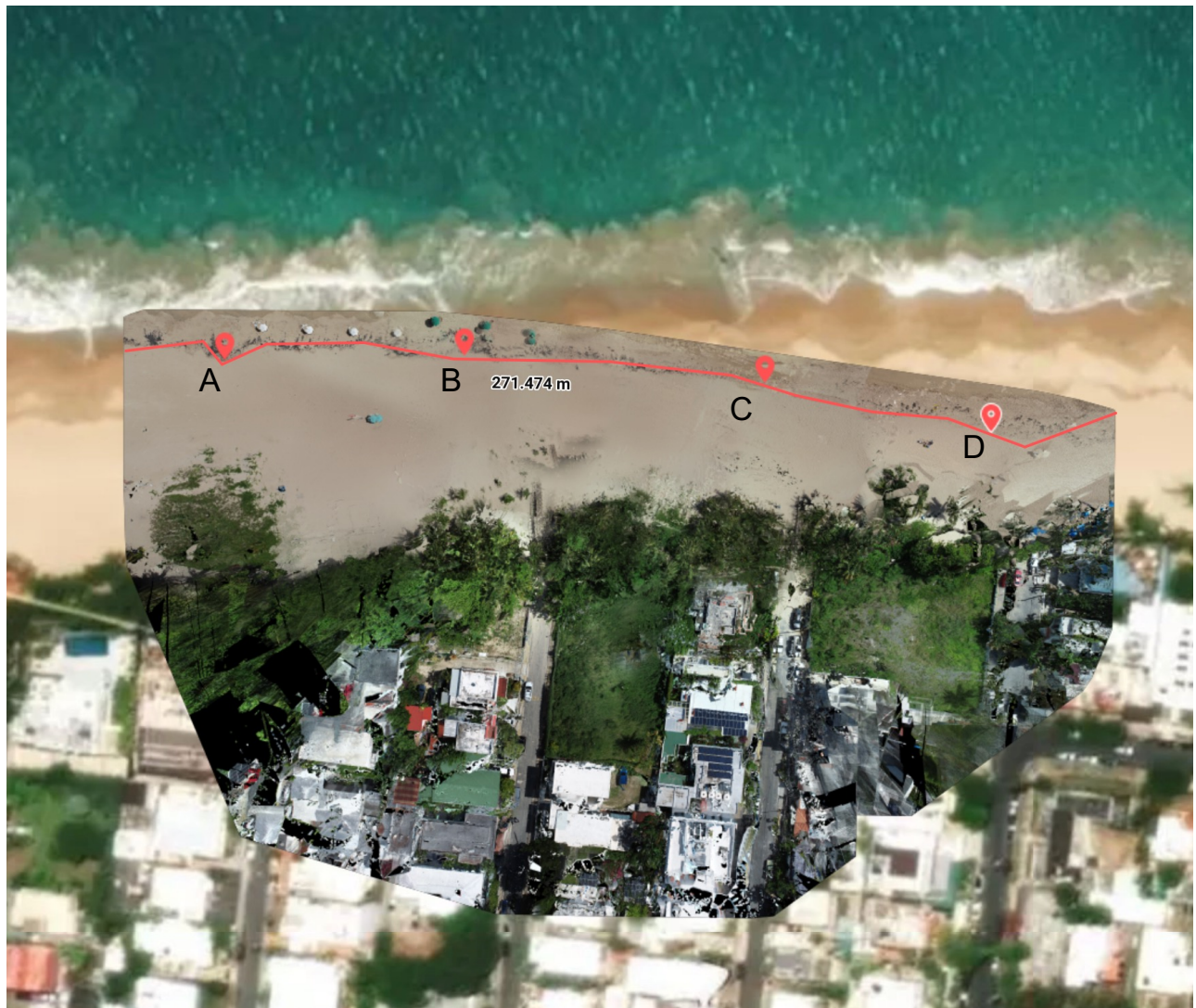
Shoreline markers

A = 18.45492° N 66.05733° W
B = 18.45493° N 66.05673° W
C = 18.45487° N 66.05597° W
D = 18.45475° N 66.05540° W

Shoreline extension
Ocean Park, San Juan

Shoreline extension

A = 11.782 m
B = 11.086 m

Shoreline position
Ocean Park, San Juan

A = 27.845 m

B = 38.542 m

C = 18.204 m

Shoreline position

A = 27.845 m
B = 38.542 m
C = 18.204 m

Area of dune breaches
Ocean Park, San Juan

Cut: 0.00 m³
Fill: -250,971 m³
Volume Dif.: -250,971 m³

Area of dune breaches

Breach = 6,084.09 m²

Quality Report

> ⚠ **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 ℹ

Project	234740-Project-2023-08-10T16:03:44.074Z
Processed	2023-08-10 16:48:59
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.31 cm / 0.52 in
Area Covered	0.034 km^2 / 3.4357 ha / 0.01 sq. mi. / 8.4941 acres
Time for Initial Processing (without report)	30m:34s

Quality Check ℹ

❓ **Images**	median of 52700 keypoints per image	✅
❓ **Dataset**	225 out of 255 images calibrated (88%), all images enabled, 4 blocks	⚠
❓ **Camera Optimization**	5.5% relative difference between initial and optimized internal camera parameters	⚠
❓ **Matching**	median of 9637.44 matches per calibrated image	✅
❓ **Georeferencing**	yes, no 3D GCP	⚠

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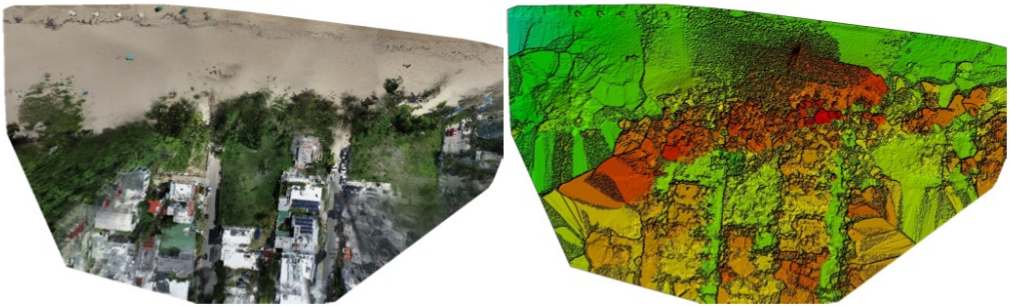
Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details ℹ

Number of Calibrated Images	225 out of 255
Number of Geolocated Images	255 out of 255

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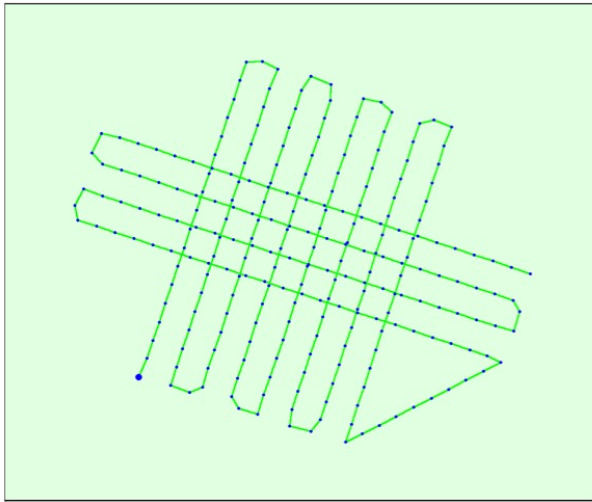
Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions
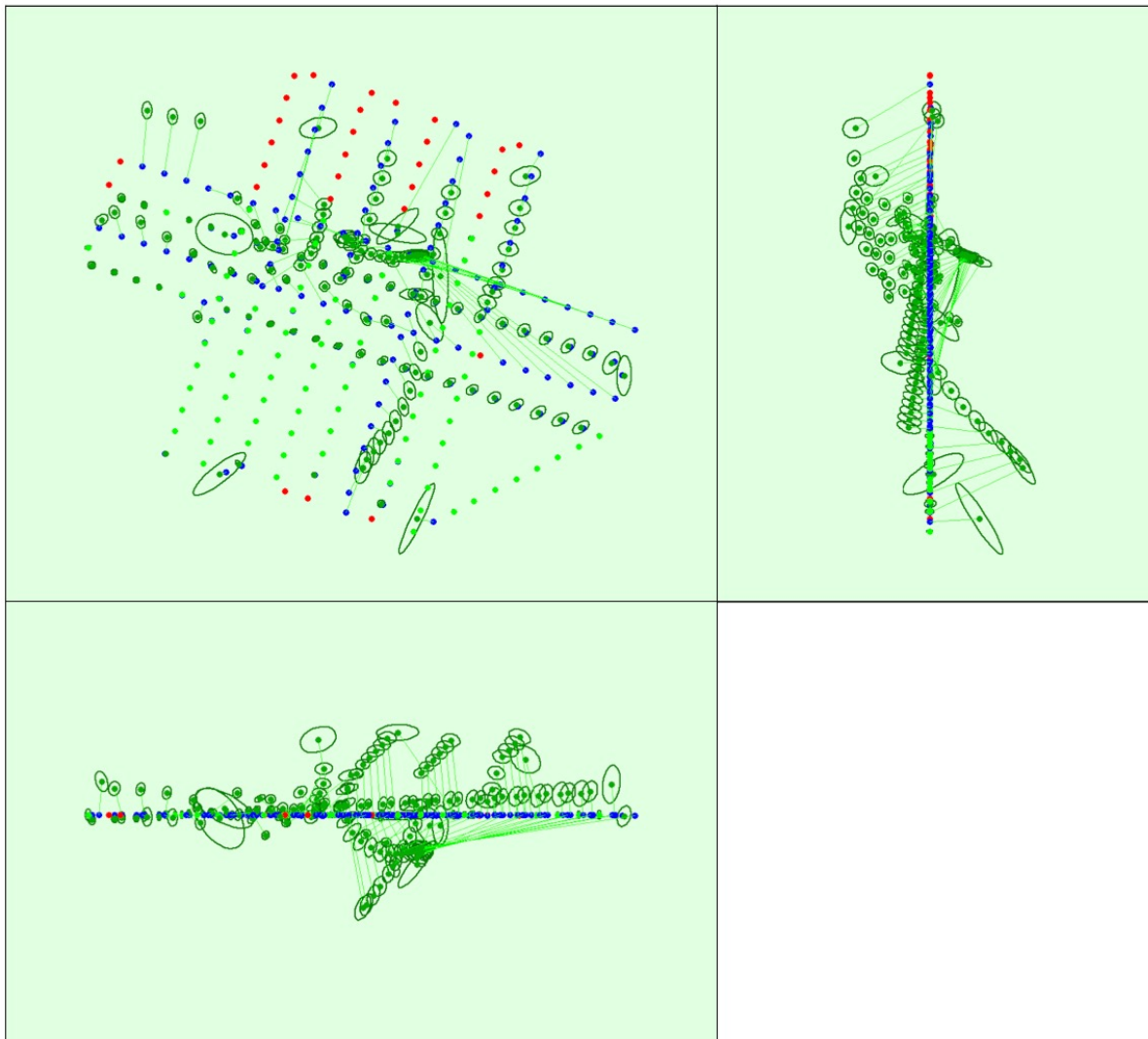
Uncertainty ellipses 100x magnified

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	0.013	0.012	0.014	0.041	0.021	0.046
Sigma	0.011	0.012	0.010	0.109	0.011	0.103

ⓘ Overlap

Number of overlapping images: 1 2 3 4 5+
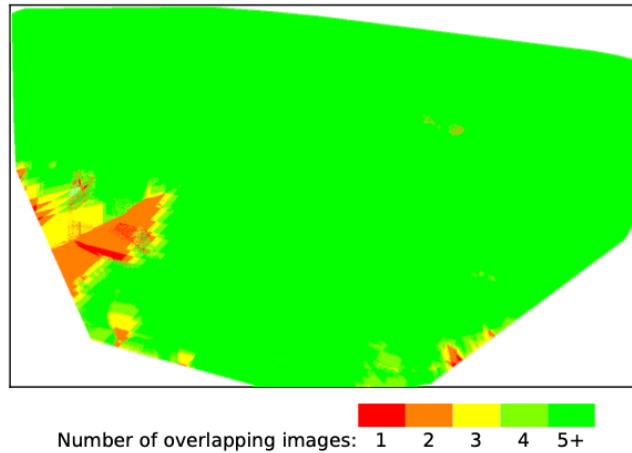
Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	2343920
Number of 3D Points for Bundle Block Adjustment	949399
Mean Reprojection Error [pixels]	0.234

ⓘ 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	3859.762 [pixel] 9.052 [mm]	2744.005 [pixel] 6.435 [mm]	1613.070 [pixel] 3.783 [mm]	-0.018	0.004	0.006	-0.002	0.000
Uncertainties (Sigma)	0.624 [pixel] 0.001 [mm]	0.810 [pixel] 0.002 [mm]	1.227 [pixel] 0.003 [mm]	0.000	0.001	0.001	0.000	0.000

The correlation between camera internal parameters determined by the bundle adjustment. White indicates a full correlation between the parameters, ie. any change in one can be fully compensated by the other. Black indicates that the parameter is completely independent, and is not affected by other parameters.

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 the 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	52700	9637
Min	20129	23
Max	72160	27720
Mean	49985	10417

⦿ 3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	698308
In 3 Images	153597
In 4 Images	53706
In 5 Images	22180
In 6 Images	9941
In 7 Images	4950
In 8 Images	2603
In 9 Images	1497
In 10 Images	872
In 11 Images	521
In 12 Images	336
In 13 Images	256
In 14 Images	197
In 15 Images	128
In 16 Images	88
In 17 Images	56
In 18 Images	39
In 19 Images	37
In 20 Images	25
In 21 Images	9
In 22 Images	16
In 23 Images	14

In 24 Images	11
In 25 Images	4
In 26 Images	2
In 27 Images	5
In 28 Images	1

2D Keypoint Matches
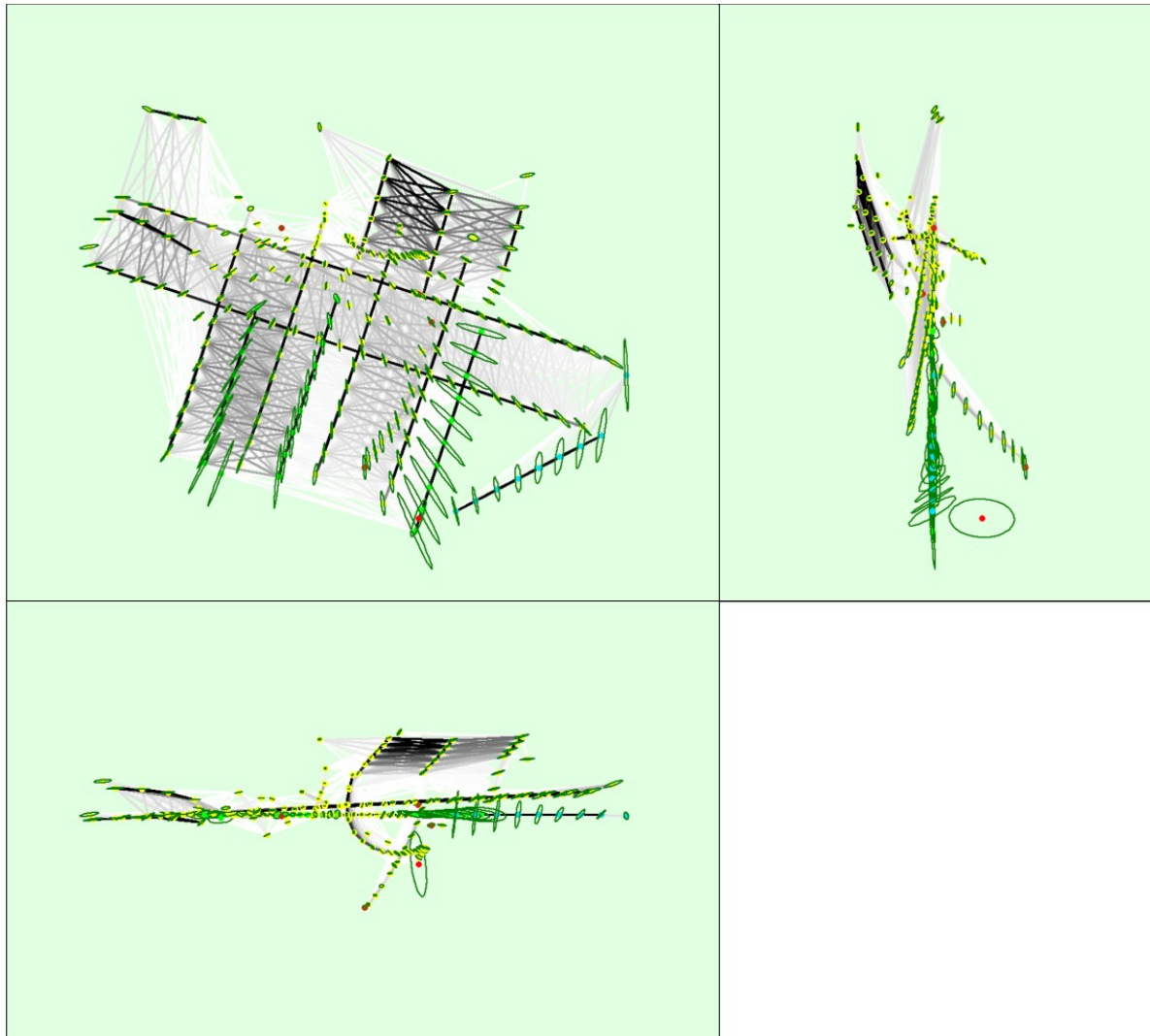
Uncertainty ellipses 5x magnified

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	0.225	0.337	0.107	0.338	0.147	0.252
Sigma	0.221	0.365	0.164	0.647	0.211	0.472

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.04	1.22	0.00	0.00
-0.04	-0.03	0.00	1.22	2.44
-0.03	-0.02	1.22	0.00	4.88
-0.02	-0.02	7.32	2.44	8.54
-0.02	-0.01	10.98	9.76	14.63
-0.01	0.00	36.59	40.24	14.63
0.00	0.01	21.95	28.05	20.73
0.01	0.02	4.88	13.41	19.51
0.02	0.02	9.76	3.66	12.20
0.02	0.03	1.22	0.00	1.22
0.03	0.04	2.44	1.22	1.22
0.04	-	2.44	0.00	0.00
Mean [m]		0.000076	-0.000031	0.000067
Sigma [m]		0.015648	0.009623	0.015346
RMS Error [m]		0.015648	0.009624	0.015346

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]	63.41	76.83	90.24
[-2.00, 2.00]	81.71	96.34	100.00
[-3.00, 3.00]	92.68	97.56	100.00
Mean of Geolocation Accuracy [m]	0.009957	0.009957	0.025460
Sigma of Geolocation Accuracy [m]	0.000233	0.000233	0.000491

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

Geolocation Orientational Variance	RMS [degree]
Omega	2.940
Phi	1.794
Kappa	3.522

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	07m:30s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	03m:39s

Results

Number of Generated Tiles	1
Number of 3D Densified Points	11944649
Average Density (per m^3)	784.13

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (1.31 [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	03m:47s
Time for Orthomosaic Generation	18m:16s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s

Calle Elena, Ocean Park, San Juan