Quality Report

Generated with Pix4Denterprise version 4.3.27

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	sier_4k_2_x3
Processed	2018-10-05 00:12:17
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.38 cm / 2.12 in
Area Covered	0.694 km^2 / 69.3620 ha / 0.27 sq. mi. / 171.4859 acres
Time for Initial Processing (without report)	55m:19s

Quality Check

Images	median of 12156 keypoints per image	✓
Dataset	1884 out of 1892 images calibrated (99%), all images enabled	✓
Camera Optimization	5.47% relative difference between initial and optimized internal camera parameters	⚠
Matching	median of 1963.96 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

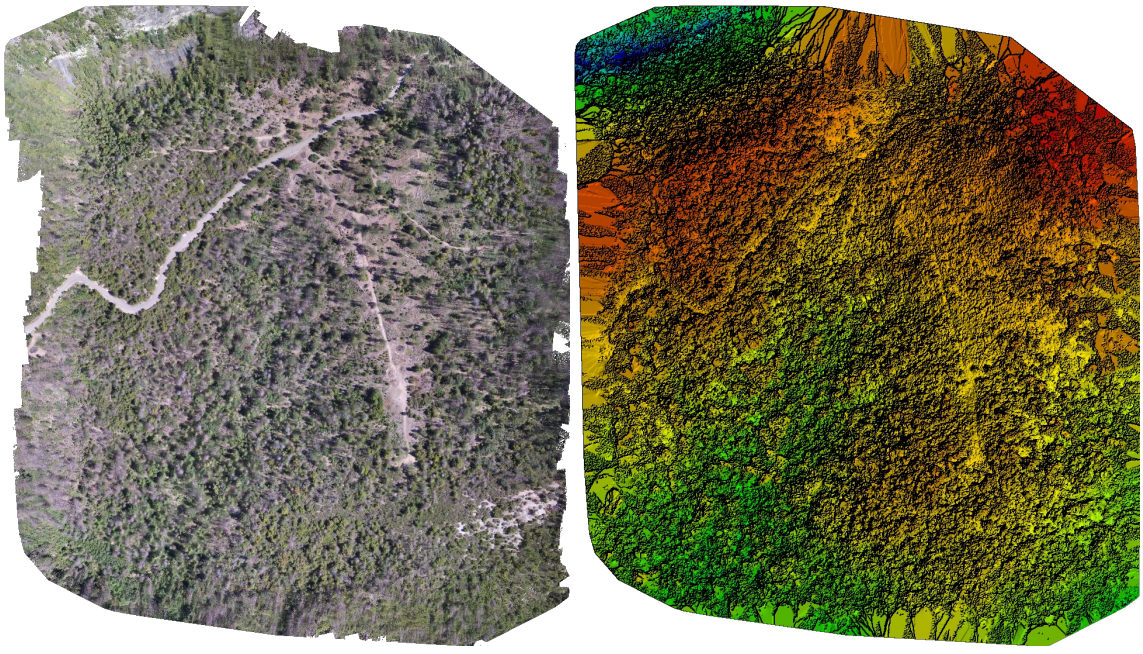


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1884 out of 1892
Number of Geolocated Images	1892 out of 1892

Initial Image Positions

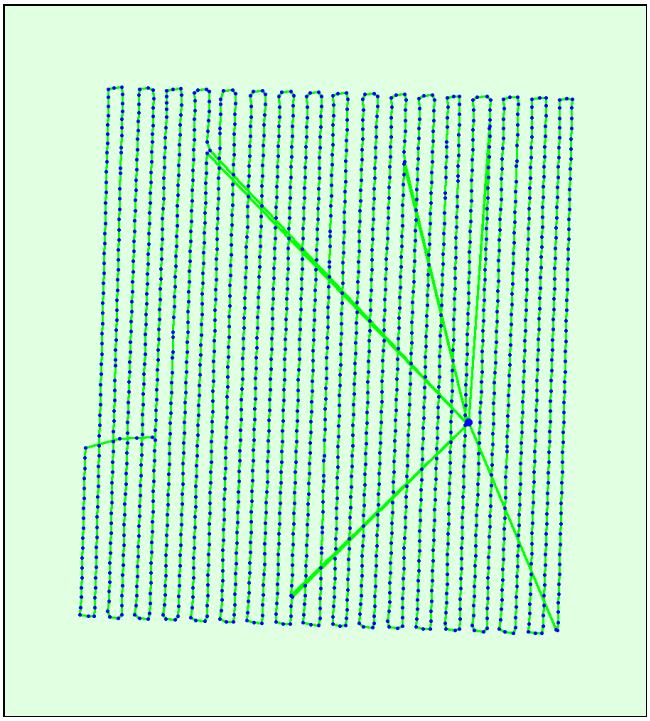
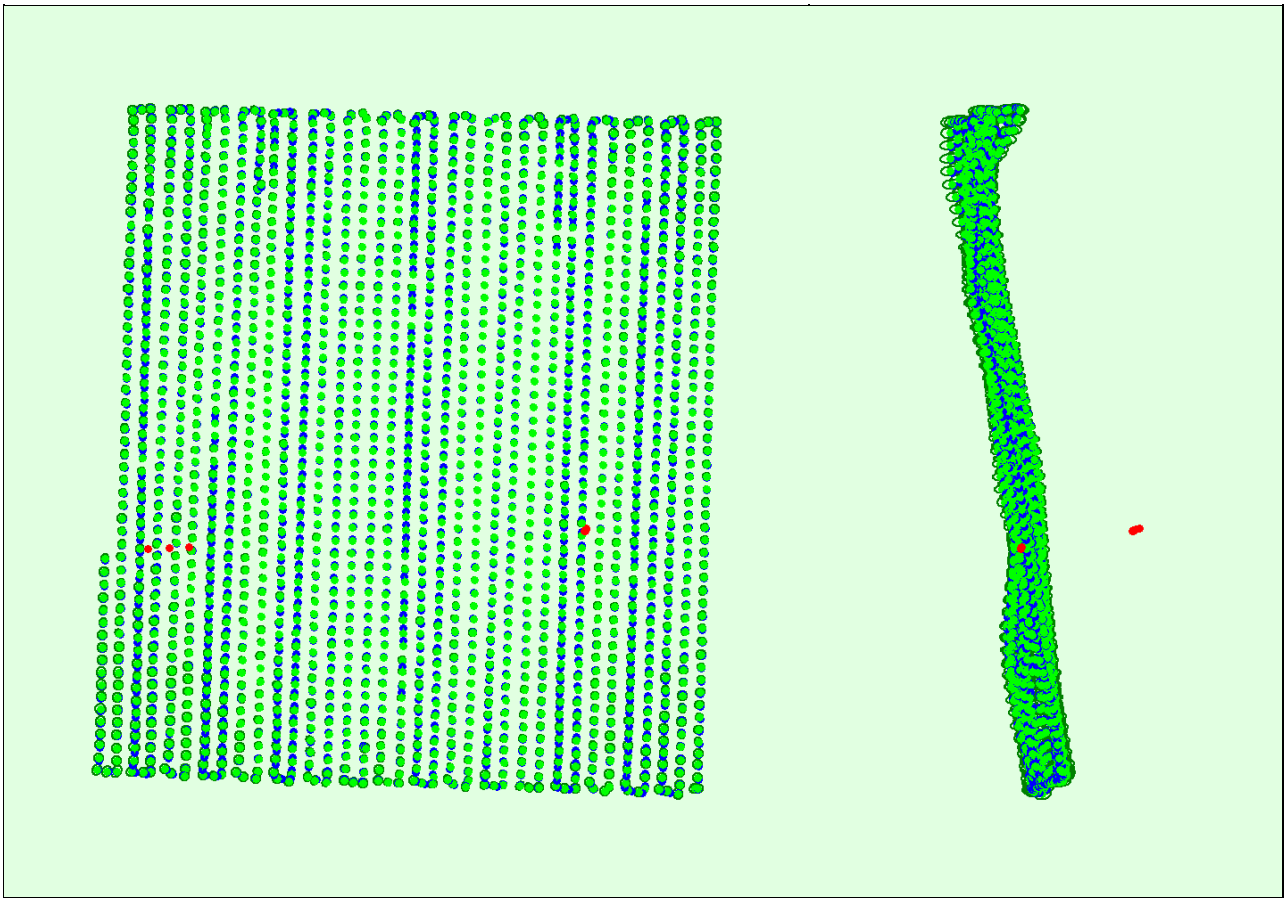
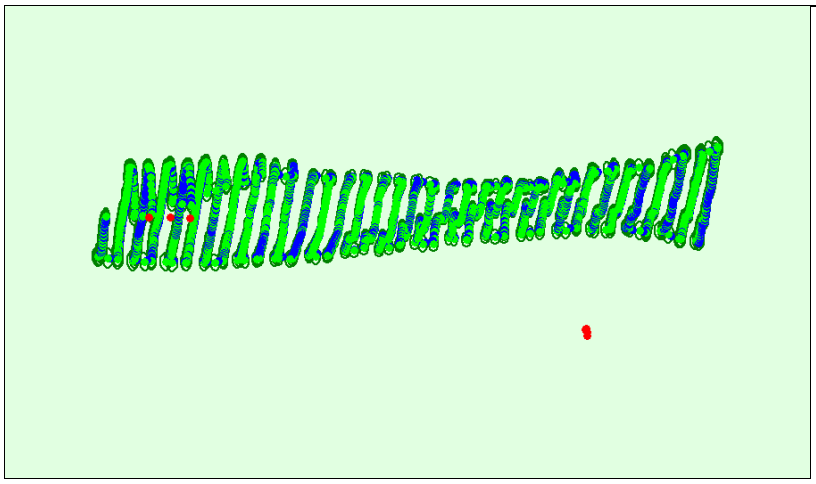


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 50x 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	0.067	0.069	0.127	0.026	0.025	0.011
Sigma	0.010	0.010	0.020	0.003	0.003	0.001

Overlap

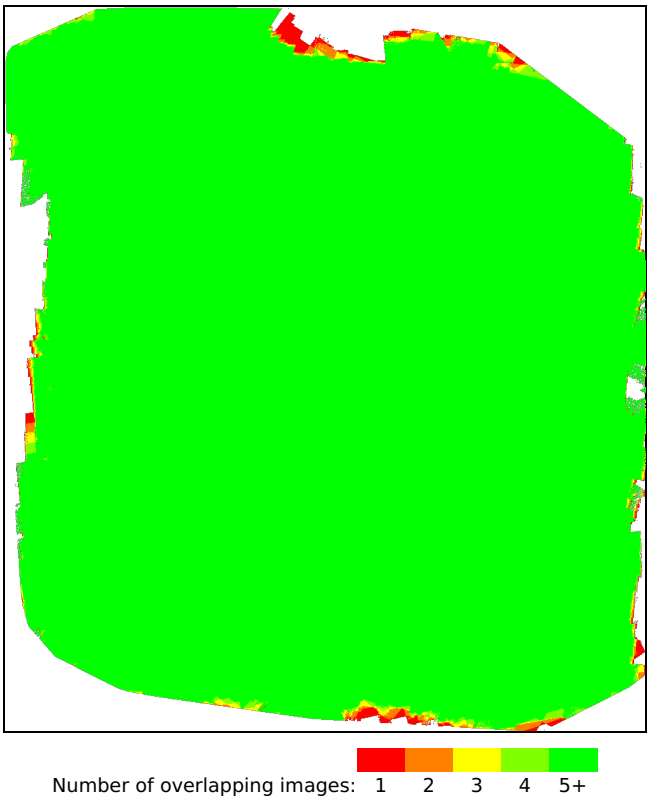


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

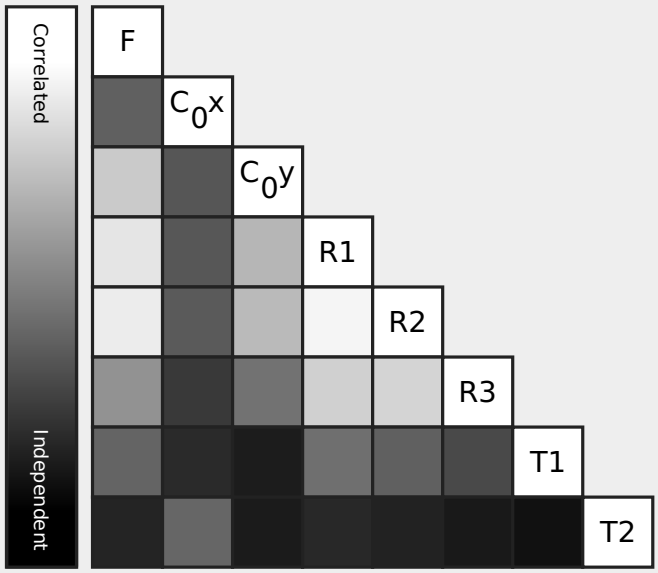
Number of 2D Keypoint Observations for Bundle Block Adjustment	3715823
Number of 3D Points for Bundle Block Adjustment	1143471
Mean Reprojection Error [pixels]	0.130

Internal Camera Parameters

FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

EXIF ID: FC350_3.6_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2285.722 [pixel] 3.610 [mm]	2000.006 [pixel] 3.159 [mm]	1500.003 [pixel] 2.369 [mm]	-0.130	0.106	-0.016	-0.000	0.000
Optimized Values	2410.777 [pixel] 3.808 [mm]	1983.961 [pixel] 3.133 [mm]	1500.787 [pixel] 2.370 [mm]	-0.137	0.128	-0.017	0.001	0.000
Uncertainties (Sigma)	1.761 [pixel] 0.003 [mm]	0.038 [pixel] 0.000 [mm]	0.055 [pixel] 0.000 [mm]	0.000	0.000	0.000	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	12156	1964
Min	11270	584
Max	14063	3960
Mean	12197	1972

3D Points from 2D Keypoint Matches

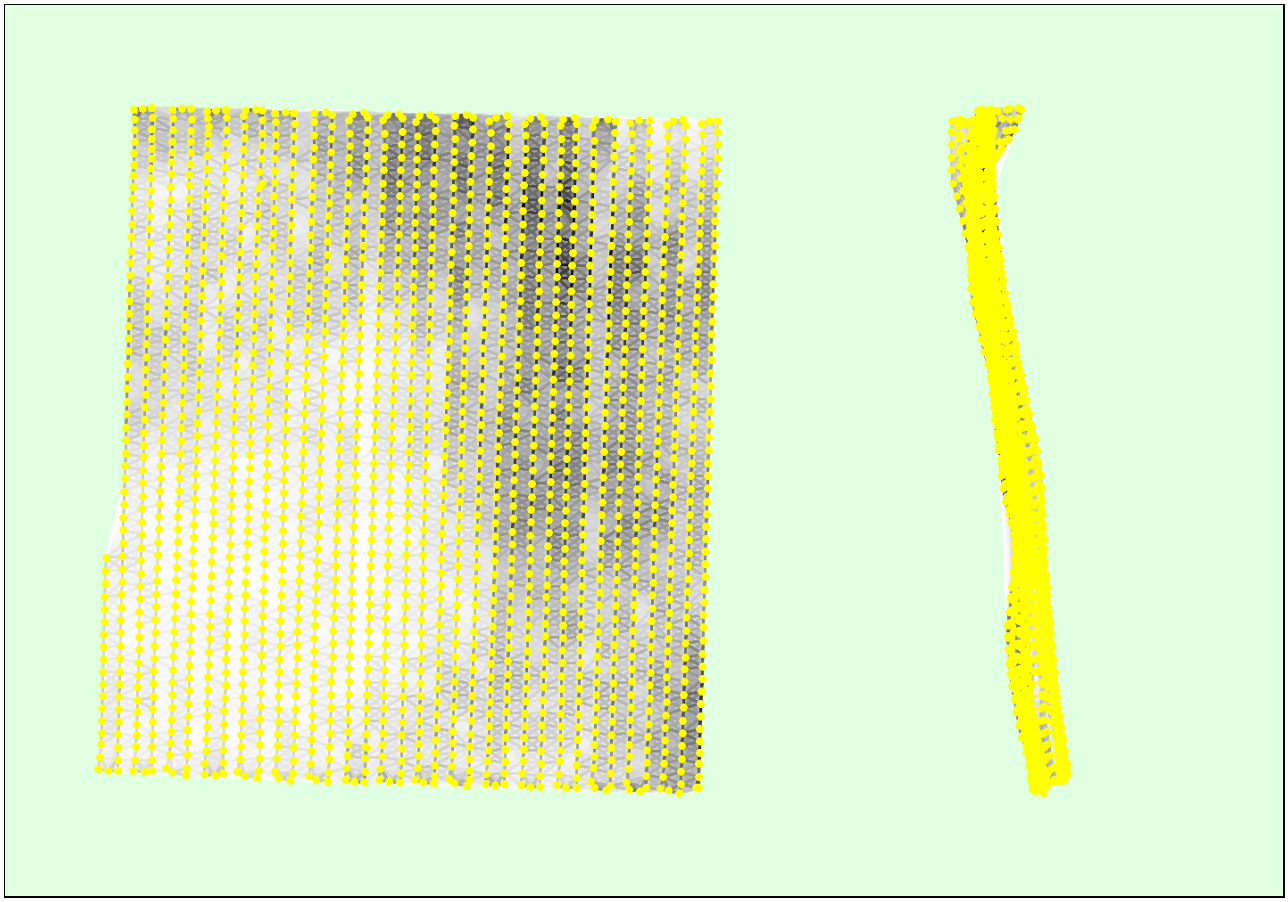
	Number of 3D Points Observed
In 2 Images	713395

In 3 Images	196476
In 4 Images	84713
In 5 Images	45285
In 6 Images	27161
In 7 Images	17679
In 8 Images	12060
In 9 Images	8872
In 10 Images	6510
In 11 Images	4992
In 12 Images	3865
In 13 Images	3163
In 14 Images	2512
In 15 Images	2134
In 16 Images	1718
In 17 Images	1372
In 18 Images	1182
In 19 Images	1051
In 20 Images	912
In 21 Images	792
In 22 Images	704
In 23 Images	655
In 24 Images	545
In 25 Images	470
In 26 Images	415
In 27 Images	366
In 28 Images	351
In 29 Images	319
In 30 Images	292
In 31 Images	261
In 32 Images	238
In 33 Images	202
In 34 Images	186
In 35 Images	179
In 36 Images	135
In 37 Images	137
In 38 Images	128
In 39 Images	140
In 40 Images	133
In 41 Images	101
In 42 Images	120
In 43 Images	89
In 44 Images	94
In 45 Images	87
In 46 Images	64
In 47 Images	75
In 48 Images	65
In 49 Images	58
In 50 Images	59
In 51 Images	60
In 52 Images	52
In 53 Images	38
In 54 Images	56
In 55 Images	35
In 56 Images	31
In 57 Images	29
In 58 Images	42
In 59 Images	38
In 60 Images	29
In 61 Images	17

In 62 Images	17
In 63 Images	27
In 64 Images	16
In 65 Images	17
In 66 Images	24
In 67 Images	20
In 68 Images	17
In 69 Images	10
In 70 Images	24
In 71 Images	18
In 72 Images	23
In 73 Images	15
In 74 Images	17
In 75 Images	8
In 76 Images	9
In 77 Images	11
In 78 Images	10
In 79 Images	5
In 80 Images	14
In 81 Images	10
In 82 Images	10
In 83 Images	9
In 84 Images	8
In 85 Images	6
In 86 Images	5
In 87 Images	4
In 88 Images	8
In 89 Images	9
In 90 Images	6
In 91 Images	1
In 92 Images	3
In 93 Images	4
In 94 Images	8
In 95 Images	3
In 96 Images	4
In 97 Images	10
In 98 Images	1
In 99 Images	5
In 100 Images	2
In 101 Images	3
In 102 Images	6
In 103 Images	5
In 104 Images	1
In 105 Images	4
In 106 Images	8
In 107 Images	3
In 109 Images	4
In 110 Images	1
In 111 Images	3
In 112 Images	2
In 113 Images	1
In 115 Images	1
In 116 Images	1
In 117 Images	2
In 118 Images	6
In 119 Images	1
In 120 Images	2
In 121 Images	4
In 122 Images	5

In 123 Images	3
In 124 Images	5
In 126 Images	1
In 127 Images	2
In 128 Images	2
In 129 Images	2
In 130 Images	3
In 132 Images	3
In 133 Images	2
In 134 Images	2
In 135 Images	2
In 136 Images	2
In 137 Images	3
In 138 Images	2
In 139 Images	2
In 140 Images	1
In 141 Images	2
In 142 Images	1
In 143 Images	1
In 144 Images	1
In 145 Images	2
In 147 Images	2
In 149 Images	1
In 151 Images	1
In 152 Images	2
In 157 Images	1

2D Keypoint Matches



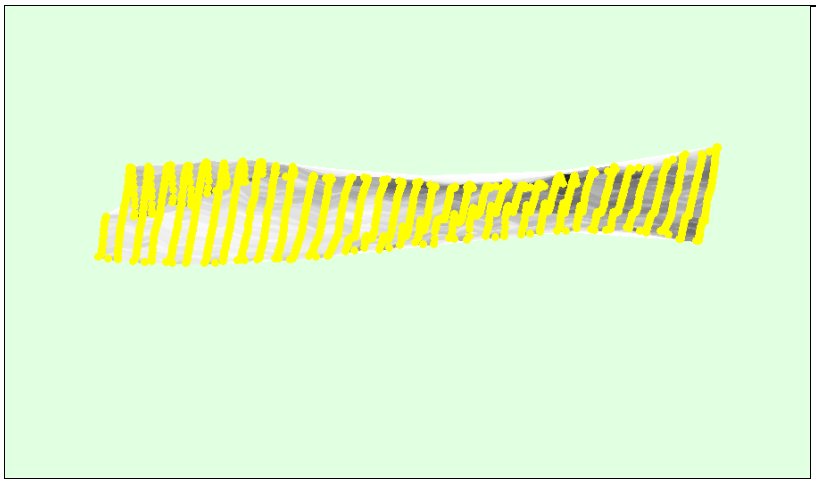


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-15.00	0.00	0.00	0.00
-15.00	-12.00	0.00	0.00	0.00
-12.00	-9.00	0.00	0.00	0.00
-9.00	-6.00	0.00	0.00	0.00
-6.00	-3.00	0.00	12.31	0.53
-3.00	0.00	58.12	37.31	47.51
0.00	3.00	41.24	37.69	51.54
3.00	6.00	0.64	12.58	0.42
6.00	9.00	0.00	0.11	0.00
9.00	12.00	0.00	0.00	0.00
12.00	15.00	0.00	0.00	0.00
15.00	-	0.00	0.00	0.00
Mean [m]		0.000000	0.000000	0.000000
Sigma [m]		0.503671	2.369492	1.172934
RMS Error [m]		0.503671	2.369492	1.172934

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	97.35	100.00
[-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]	5.000000	5.000000	10.000000
Sigma of Geolocation Accuracy [m]	0.000000	0.000000	0.000000

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

Geolocation Orientational Variance	RMS [degree]
Omega	0.964
Phi	0.791
Kappa	5.411

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 4.15.0-1021-aws x86_64

Coordinate Systems

Image Coordinate System	WGS 84 (EGM 96 Geoid)
Output Coordinate System	WGS 84 / UTM zone 11N (EGM 96 Geoid)

Processing Options

Detected Template	No Template Available
Keypoints Image Scale	Custom, Image Scale: 0.5
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, no

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	02h:43m:41s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	47m:55s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	78835842
Average Density (per m^3)	27.26

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.38 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Triangulation Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	05m:05s
Time for Orthomosaic Generation	04h:21m:51s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s