Quality Report

Generated with Pix4Dmapper Pro version 4.2.27

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_5k_3_x3
Processed	2018-09-25 18:12:38
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	4.92 cm / 1.94 in
Area Covered	0.599 km^2 / 59.8814 ha / 0.23 sq. mi. / 148.0467 acres
Time for Initial Processing (without report)	01h:22m:06s

Quality Check

Images	median of 11806 keypoints per image	✓
Dataset	1871 out of 1878 images calibrated (99%), all images enabled	✓
Camera Optimization	0.71% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 841.875 matches per calibrated image	⚠
Georeferencing	yes, no 3D GCP	⚠

Preview

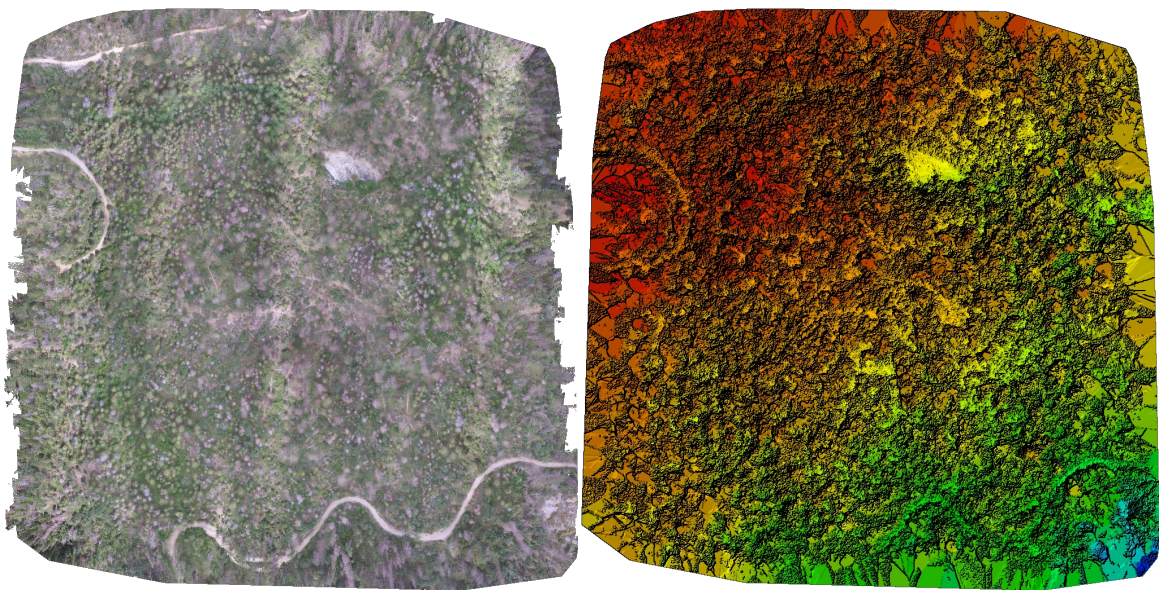


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1871 out of 1878
Number of Geolocated Images	1878 out of 1878

Initial Image Positions

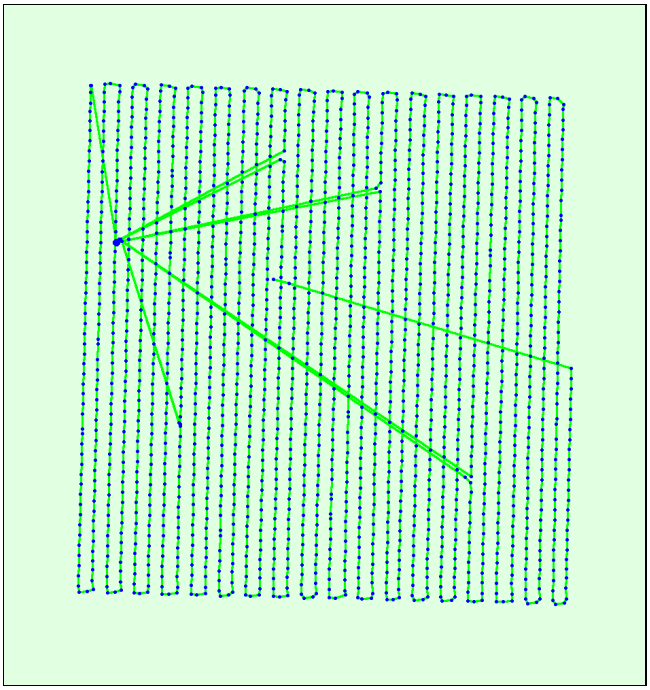
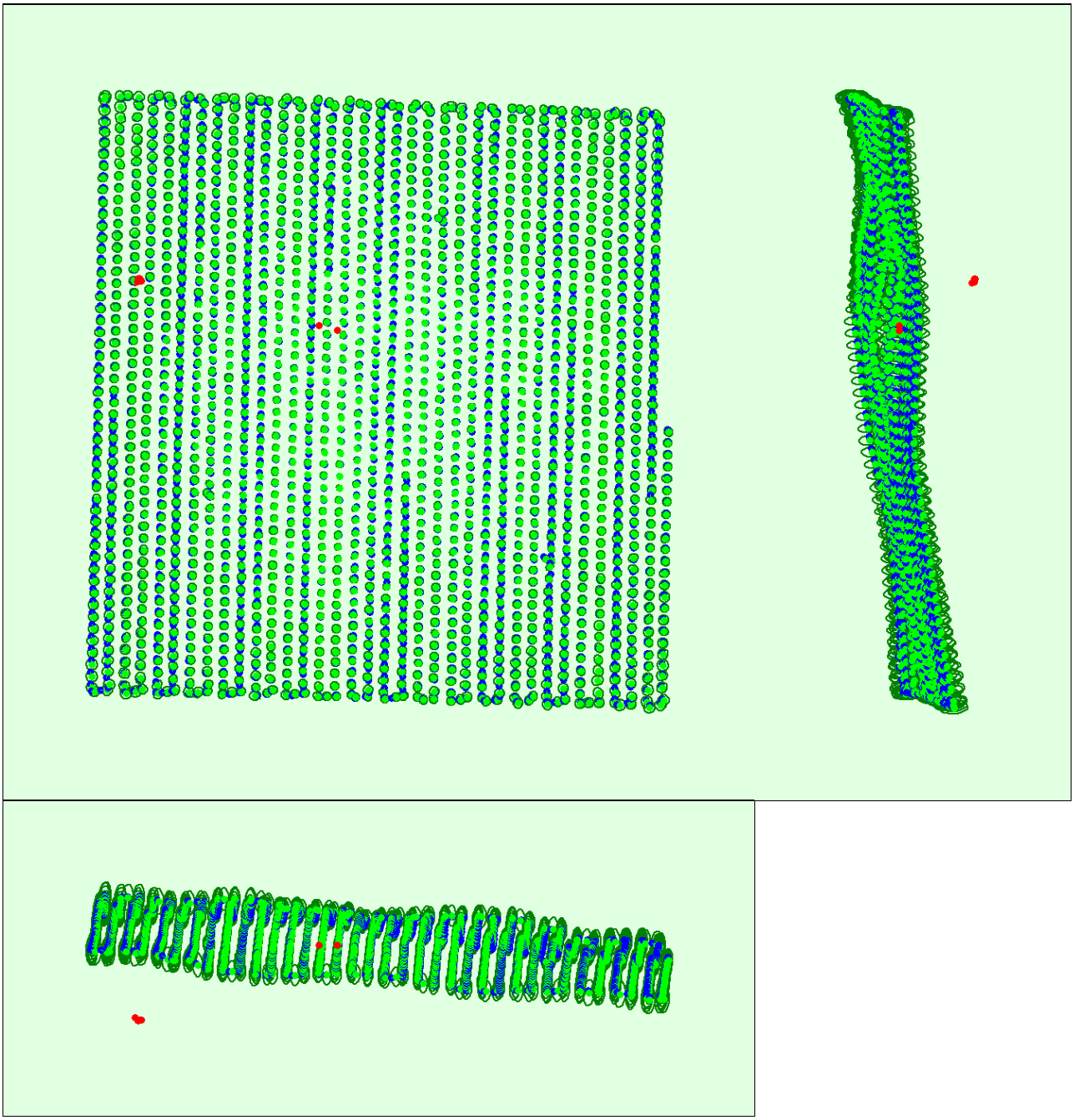


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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	0.083	0.084	0.185	0.039	0.040	0.015
Sigma	0.013	0.013	0.039	0.003	0.003	0.001

Overlap

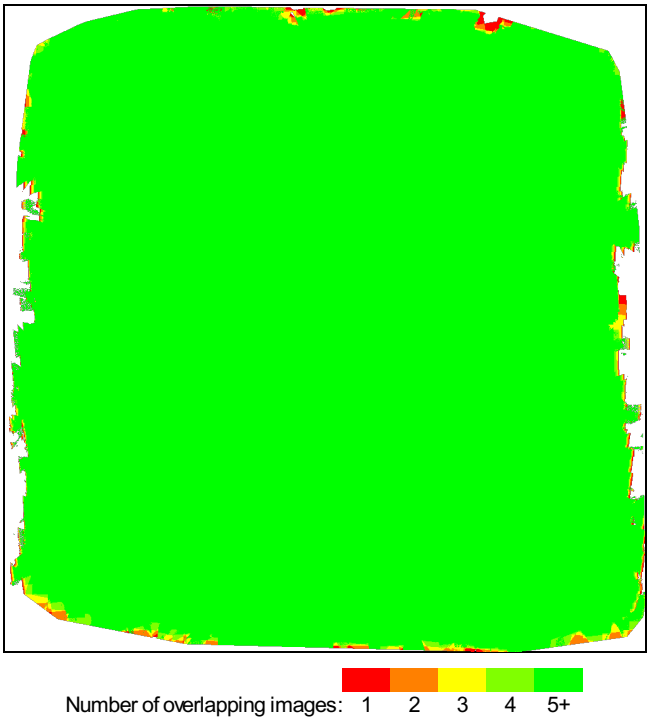


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

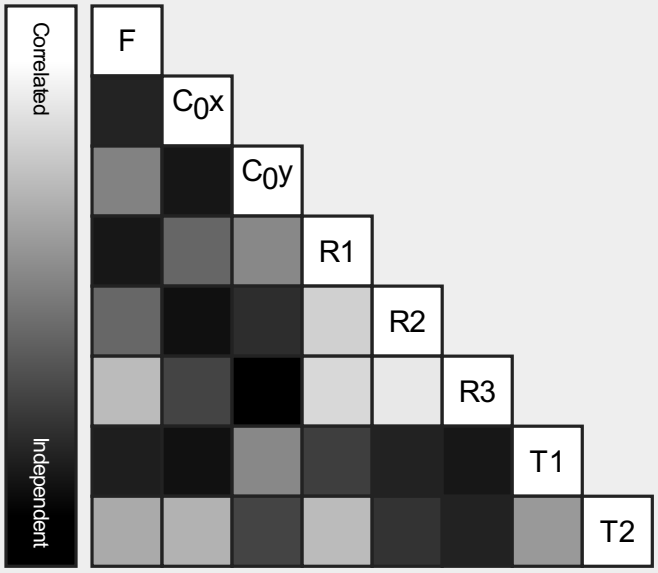
Number of 2D Keypoint Observations for Bundle Block Adjustment	1661295
Number of 3D Points for Bundle Block Adjustment	641270
Mean Reprojection Error [pixels]	0.120

Internal Camera Parameters

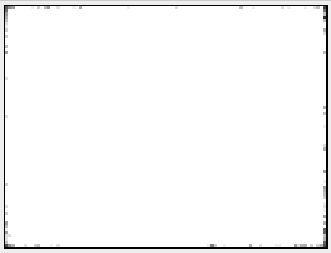
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2302.073 [pixel] 3.636 [mm]	1985.704 [pixel] 3.136 [mm]	1502.947 [pixel] 2.374 [mm]	-0.126	0.108	-0.013	0.001	0.000
Uncertainties (Sigma)	0.469 [pixel] 0.001 [mm]	0.050 [pixel] 0.000 [mm]	0.050 [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	11806	842
Min	10563	343
Max	14328	3135
Mean	11926	888

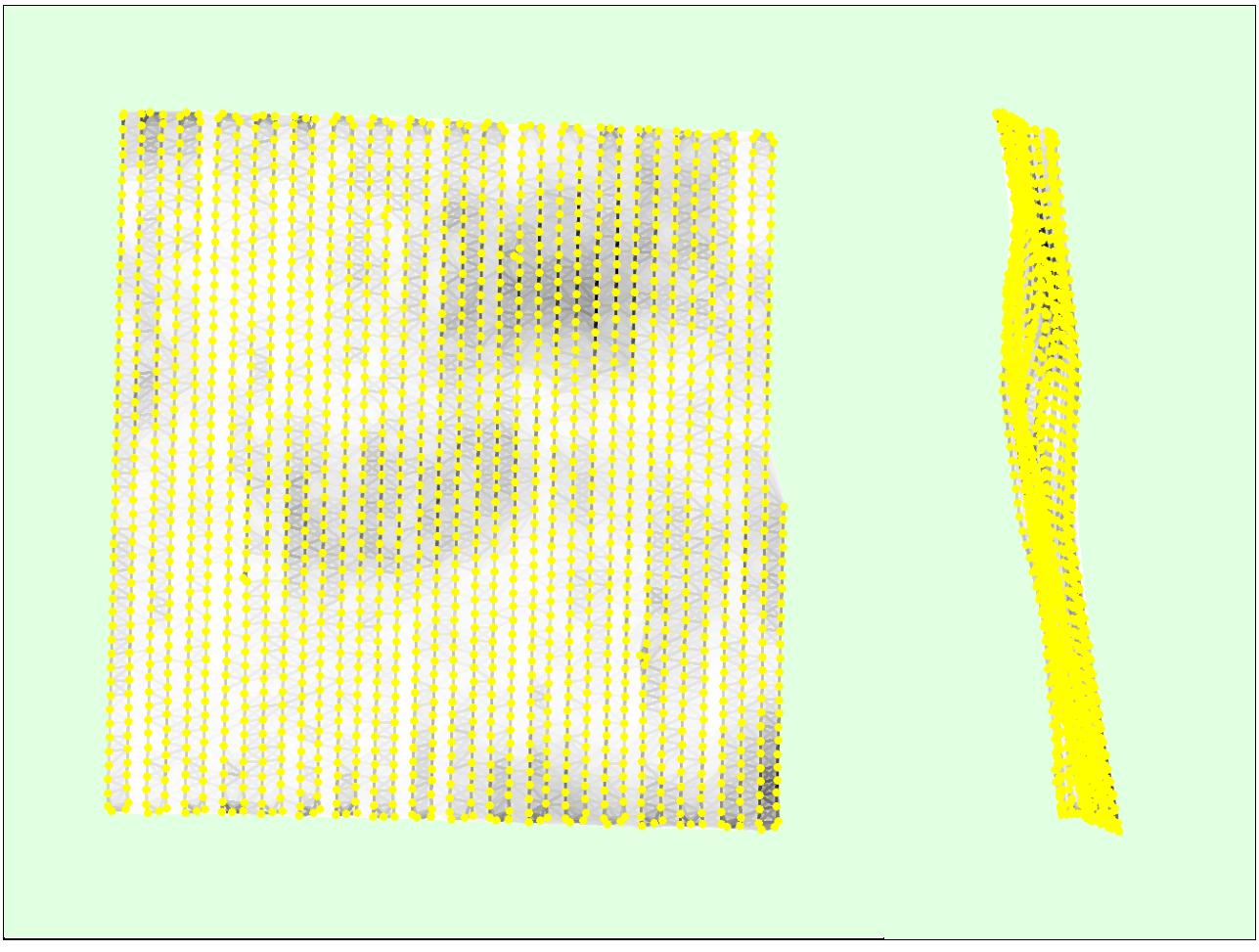
3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	478516
In 3 Images	93487
In 4 Images	31817
In 5 Images	14435
In 6 Images	7542
In 7 Images	4442
In 8 Images	2697
In 9 Images	1843
In 10 Images	1244
In 11 Images	895
In 12 Images	740
In 13 Images	580
In 14 Images	444
In 15 Images	345
In 16 Images	294
In 17 Images	210
In 18 Images	192
In 19 Images	162
In 20 Images	166
In 21 Images	113
In 22 Images	105

In 23 Images	100
In 24 Images	89
In 25 Images	88
In 26 Images	71
In 27 Images	59
In 28 Images	46
In 29 Images	43
In 30 Images	42
In 31 Images	32
In 32 Images	22
In 33 Images	33
In 34 Images	12
In 35 Images	13
In 36 Images	24
In 37 Images	31
In 38 Images	13
In 39 Images	18
In 40 Images	18
In 41 Images	15
In 42 Images	12
In 43 Images	11
In 44 Images	8
In 45 Images	10
In 46 Images	8
In 47 Images	10
In 48 Images	14
In 49 Images	12
In 50 Images	5
In 51 Images	7
In 52 Images	6
In 53 Images	5
In 54 Images	4
In 55 Images	4
In 56 Images	7
In 57 Images	2
In 58 Images	5
In 59 Images	6
In 60 Images	2
In 61 Images	4
In 62 Images	2
In 63 Images	5
In 64 Images	4
In 65 Images	3
In 66 Images	3
In 67 Images	3
In 68 Images	3
In 69 Images	3
In 70 Images	2
In 71 Images	3
In 72 Images	1
In 73 Images	4
In 74 Images	1
In 75 Images	3
In 76 Images	3
In 78 Images	2
In 79 Images	1
In 80 Images	2
In 81 Images	2
In 82 Images	2

In 83 Images	1
In 84 Images	2
In 86 Images	3
In 88 Images	1
In 89 Images	1
In 90 Images	3
In 92 Images	2
In 99 Images	1
In 104 Images	2
In 105 Images	2
In 106 Images	1
In 108 Images	1
In 109 Images	3
In 111 Images	1
In 121 Images	1
In 123 Images	2
In 124 Images	3
In 125 Images	1
In 127 Images	1
In 133 Images	1
In 135 Images	2
In 165 Images	1
In 167 Images	1
In 172 Images	1

2D Keypoint Matches



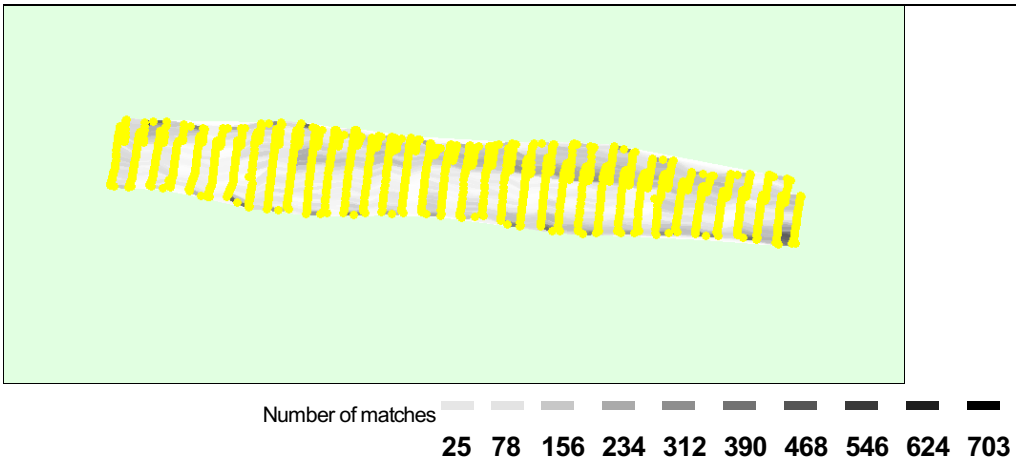


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	0.05	0.05	0.00
-6.00	-3.00	0.75	15.93	0.05
-3.00	0.00	45.43	34.90	54.09
0.00	3.00	53.77	32.50	45.43
3.00	6.00	0.00	16.14	0.43
6.00	9.00	0.00	0.48	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]		0.848989	2.612204	1.088817
RMS Error [m]		0.848989	2.612204	1.088817

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]	99.89	96.21	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	0.760
Phi	0.966
Kappa	5.819

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) Core(TM) i7-8700K CPU @ 3.70GHz RAM: 64GB GPU: NVIDIA GeForce GTX 1080 Ti (Driver: 24.21.13.9882), Intel(R) UHD Graphics 630 (Driver: 22.20.16.4758)
Operating System	Windows 10 Education, 64-bit

Coordinate Systems

Image Coordinate System	WGS84 (egm96)
Output Coordinate System	WGS 84 / UTM zone 11N (egm96)

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	06h:53m:54s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	42m:54s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	84626754
Average Density (per m^3)	28.18

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (4.92 [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	08m:47s
Time for Orthomosaic Generation	11h:05m:43s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s