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	eldo_4k_2_x3
Processed	2018-08-22 15:23:33
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.47 cm / 2.15 in
Area Covered	0.691 km^2 / 69.0700 ha / 0.27 sq. mi. / 170.7641 acres
Time for Initial Processing (without report)	02h:22m:13s

Quality Check

Images	median of 11966 keypoints per image	✓
Dataset	1877 out of 1882 images calibrated (99%), all images enabled	✓
Camera Optimization	0.76% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 2196.51 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

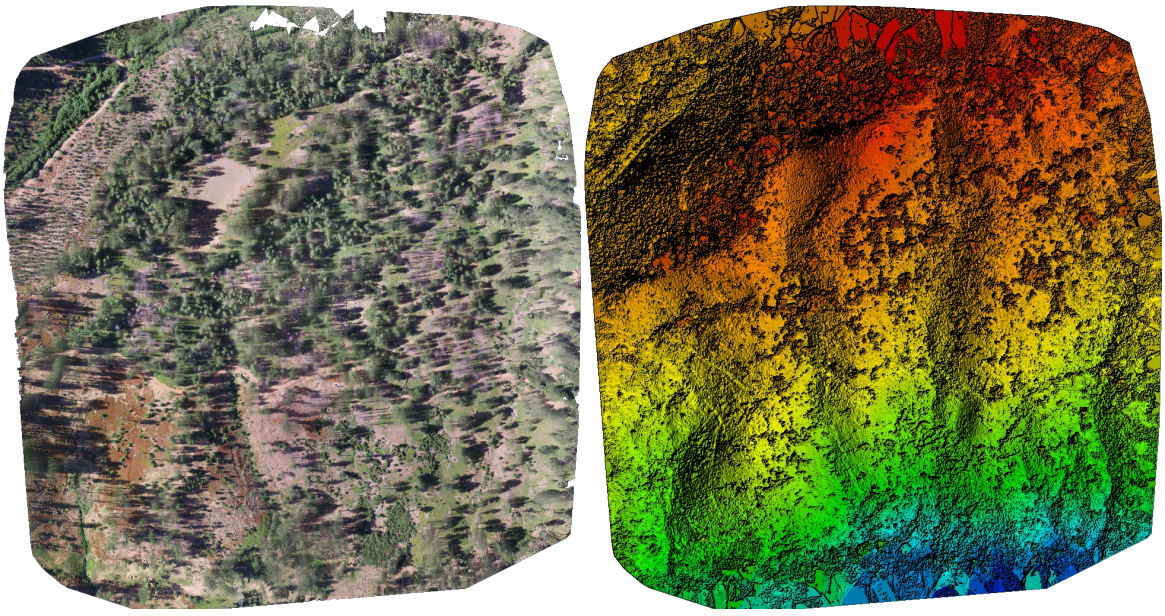


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1877 out of 1882
Number of Geolocated Images	1882 out of 1882

Initial Image Positions

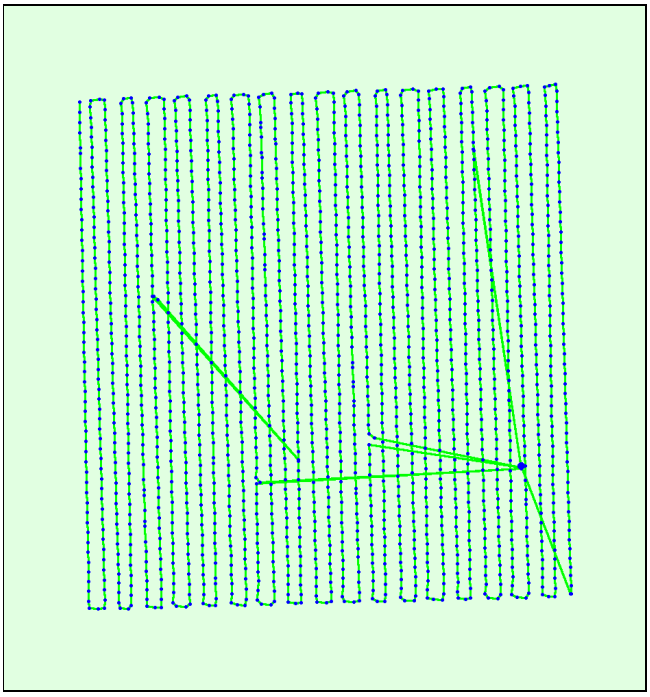
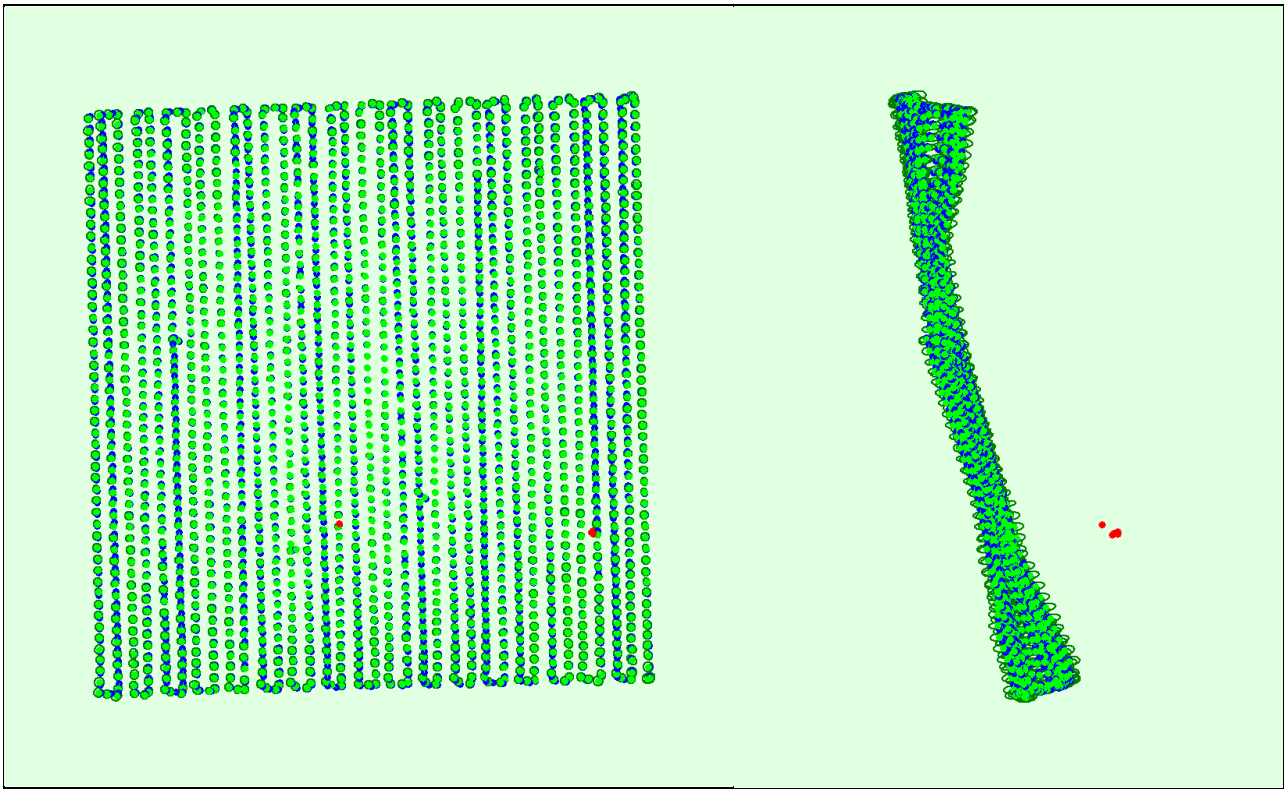


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



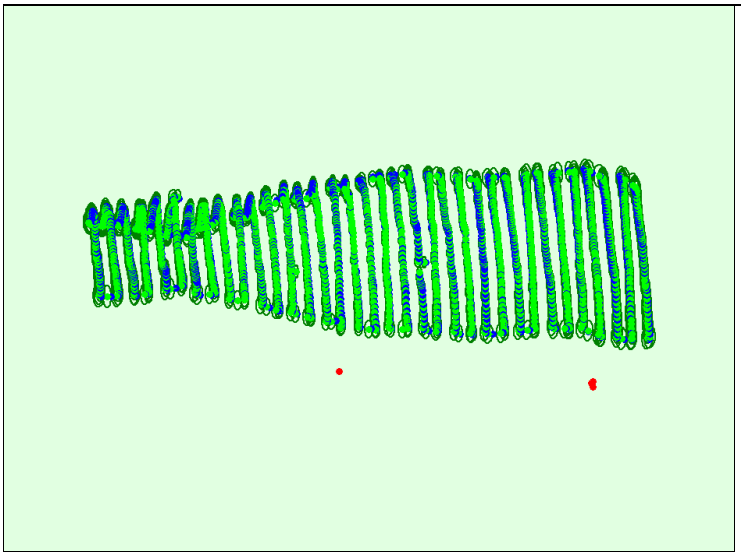


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled 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	0.072	0.073	0.157	0.030	0.032	0.012
Sigma	0.011	0.011	0.032	0.001	0.001	0.000

Overlap

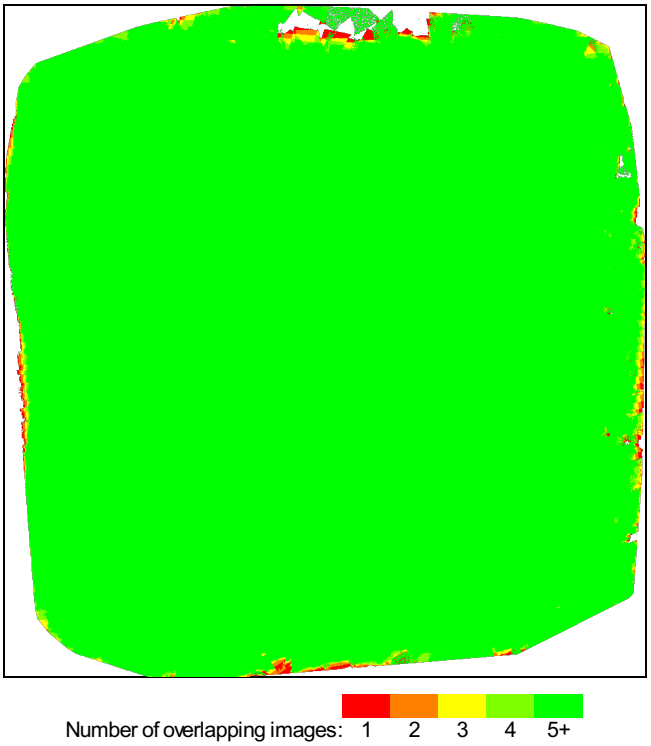


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

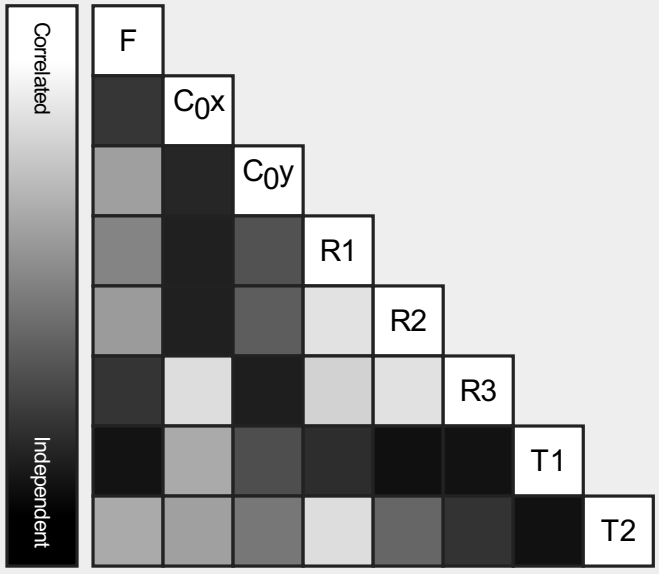
Number of 2D Keypoint Observations for Bundle Block Adjustment	4608175
Number of 3D Points for Bundle Block Adjustment	1236628
Mean Reprojection Error [pixels]	0.149

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	2303.247 [pixel] 3.638 [mm]	1985.761 [pixel] 3.136 [mm]	1503.194 [pixel] 2.374 [mm]	-0.127	0.108	-0.014	0.001	0.000
Uncertainties (Sigma)	0.525 [pixel] 0.001 [mm]	0.031 [pixel] 0.000 [mm]	0.034 [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	11966	2197
Min	10844	858
Max	13829	5573
Mean	11993	2455

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed

In 2 Images	661450
In 3 Images	224877
In 4 Images	112094
In 5 Images	65378
In 6 Images	42018
In 7 Images	28951
In 8 Images	20667
In 9 Images	15401
In 10 Images	11588
In 11 Images	9064
In 12 Images	7188
In 13 Images	5748
In 14 Images	4771
In 15 Images	3762
In 16 Images	3264
In 17 Images	2663
In 18 Images	2167
In 19 Images	1801
In 20 Images	1681
In 21 Images	1390
In 22 Images	1203
In 23 Images	1046
In 24 Images	907
In 25 Images	767
In 26 Images	691
In 27 Images	576
In 28 Images	528
In 29 Images	457
In 30 Images	394
In 31 Images	336
In 32 Images	296
In 33 Images	297
In 34 Images	290
In 35 Images	265
In 36 Images	215
In 37 Images	219
In 38 Images	183
In 39 Images	155
In 40 Images	131
In 41 Images	126
In 42 Images	115
In 43 Images	86
In 44 Images	94
In 45 Images	87
In 46 Images	71
In 47 Images	95
In 48 Images	77
In 49 Images	79
In 50 Images	65
In 51 Images	60
In 52 Images	54
In 53 Images	59
In 54 Images	49
In 55 Images	45
In 56 Images	48
In 57 Images	31
In 58 Images	39
In 59 Images	28
In 60 Images	30

In 61 Images	21
In 62 Images	22
In 63 Images	26
In 64 Images	23
In 65 Images	19
In 66 Images	24
In 67 Images	26
In 68 Images	19
In 69 Images	15
In 70 Images	16
In 71 Images	7
In 72 Images	13
In 73 Images	10
In 74 Images	6
In 75 Images	11
In 76 Images	9
In 77 Images	8
In 78 Images	7
In 79 Images	5
In 80 Images	9
In 81 Images	8
In 82 Images	11
In 83 Images	6
In 84 Images	9
In 85 Images	8
In 86 Images	4
In 87 Images	5
In 88 Images	6
In 90 Images	3
In 91 Images	5
In 92 Images	5
In 93 Images	4
In 94 Images	4
In 95 Images	5
In 96 Images	1
In 97 Images	4
In 100 Images	1
In 101 Images	1
In 103 Images	2
In 104 Images	1
In 105 Images	2
In 109 Images	1
In 110 Images	1
In 112 Images	3
In 113 Images	1
In 116 Images	2
In 119 Images	1
In 120 Images	1
In 124 Images	1
In 125 Images	1
In 126 Images	1
In 128 Images	1
In 129 Images	2
In 134 Images	1
In 136 Images	1
In 138 Images	1
In 156 Images	1

2D Keypoint Matches

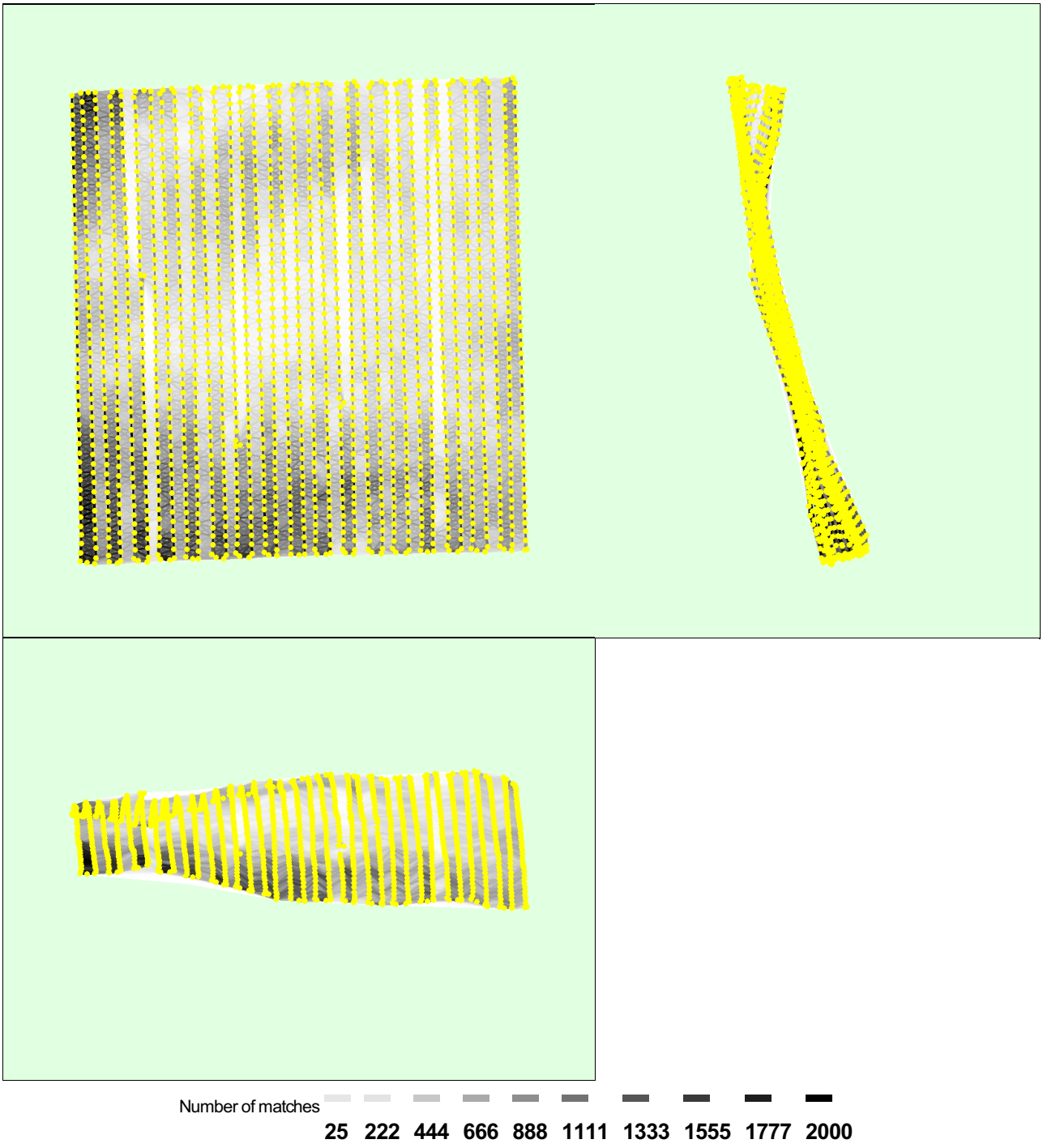


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	10.87	0.53

-3.00	0.00	49.12	41.56	51.41
0.00	3.00	50.13	34.31	47.20
3.00	6.00	0.75	13.21	0.85
6.00	9.00	0.00	0.05	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]		0.791813	2.526178	1.121420
RMS Error [m]		0.791813	2.526178	1.121420

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]	99.95	96.16	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	0.790
Phi	0.699
Kappa	4.894

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: 23.21.13.9125), 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 10N (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	05h:59m:46s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	35m:01s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	75479521
Average Density (per m^3)	34.73

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.47 [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	07m:01s
Time for Orthomosaic Generation	09h:00m:16s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s