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_5k_2_x3
Processed	2018-08-26 12:11:50
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.88 cm / 2.32 in
Area Covered	0.711 km^2 / 71.0910 ha / 0.27 sq. mi. / 175.7606 acres
Time for Initial Processing (without report)	01h:37m:18s

Quality Check

Images	median of 12964 keypoints per image	✓
Dataset	1997 out of 2002 images calibrated (99%), all images enabled	✓
Camera Optimization	2.01% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1625.97 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

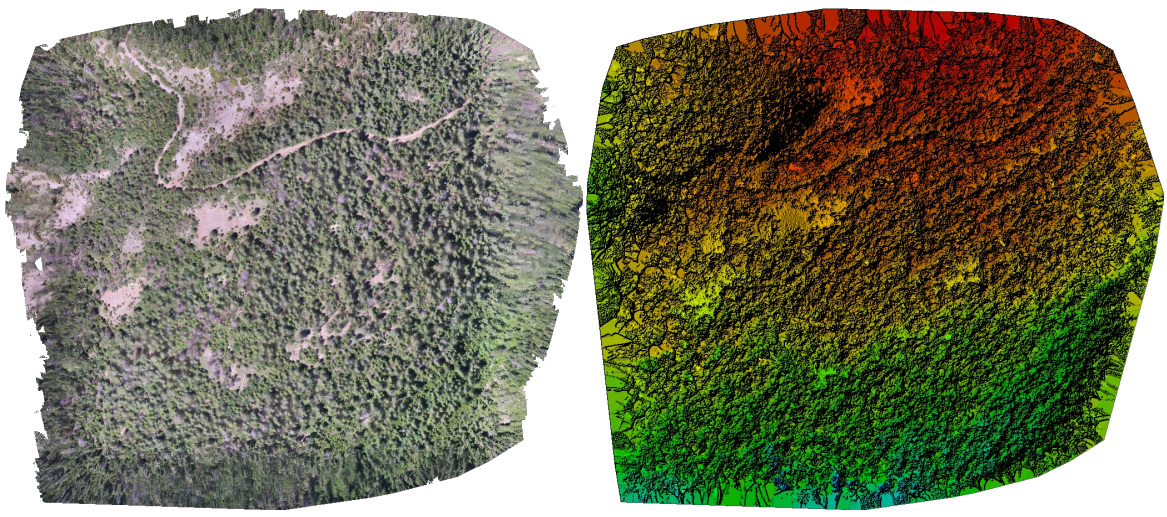


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1997 out of 2002

Number of Geolocated Images	2002 out of 2002

Initial Image Positions

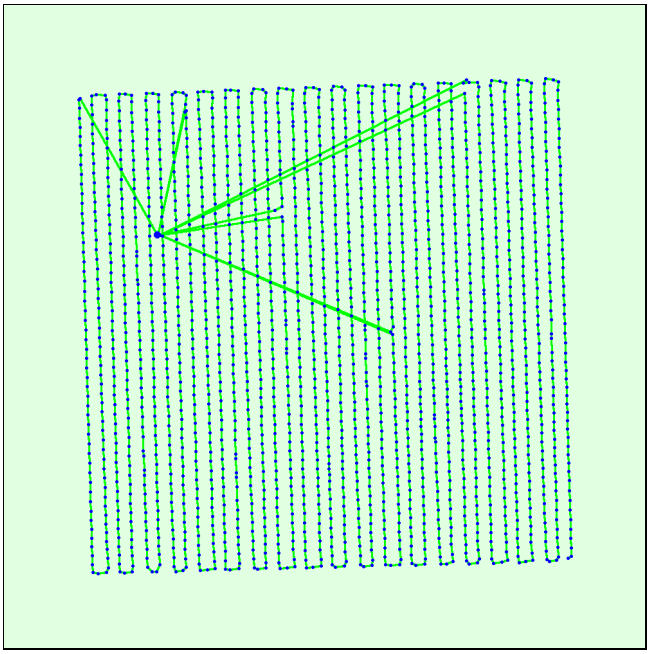
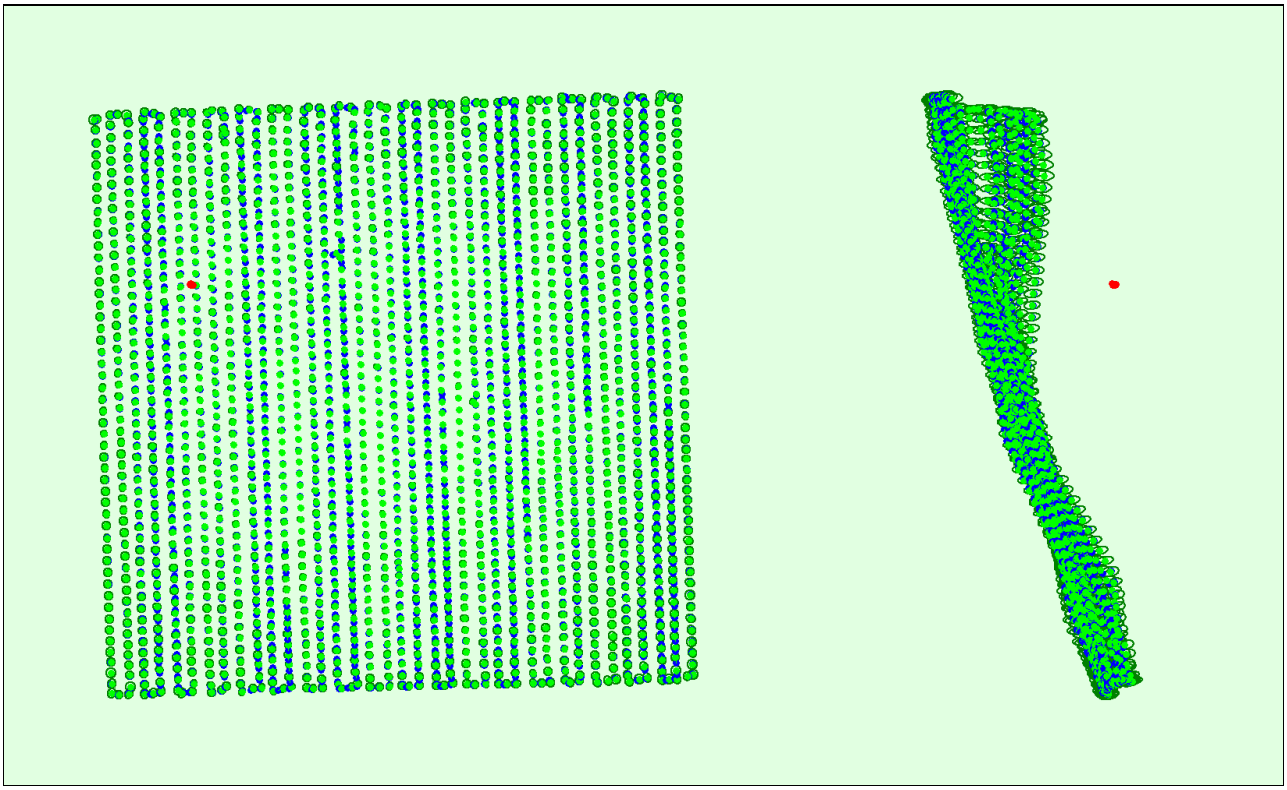
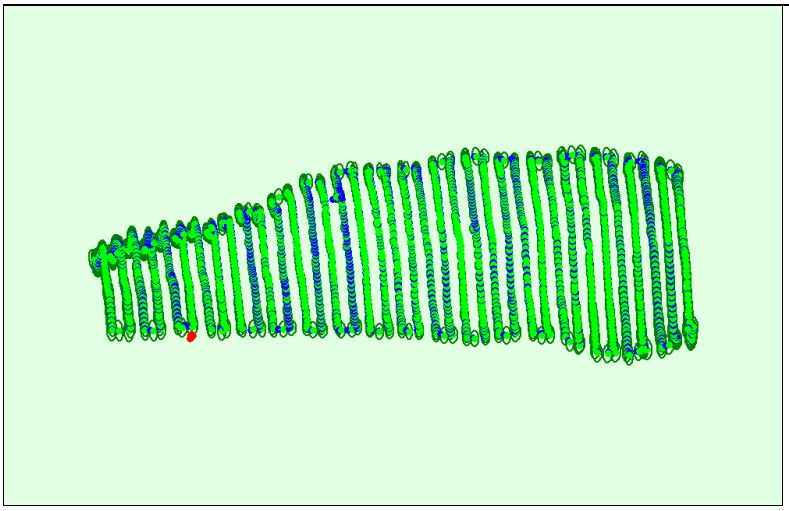


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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	0.070	0.071	0.147	0.029	0.029	0.012
Sigma	0.011	0.011	0.030	0.002	0.002	0.000

Overlap

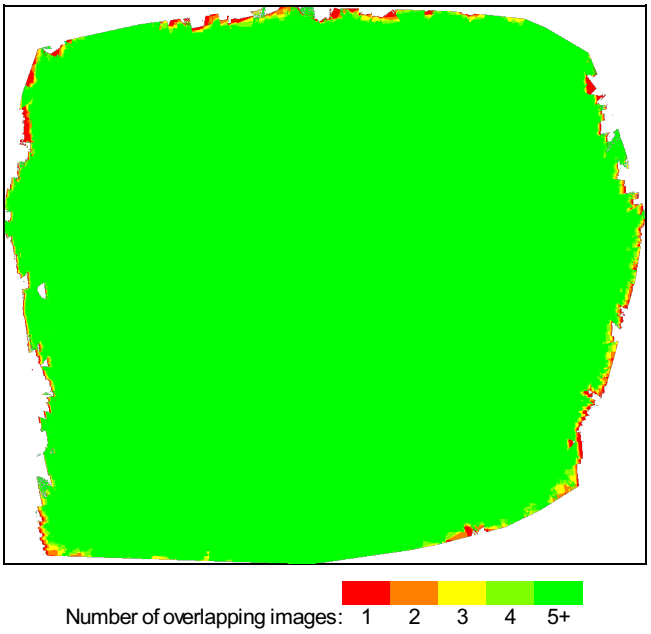


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

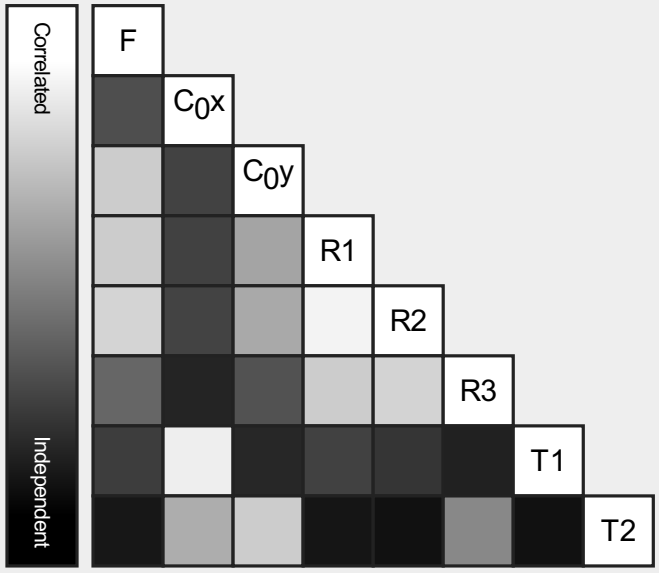
Number of 2D Keypoint Observations for Bundle Block Adjustment	3398964
Number of 3D Points for Bundle Block Adjustment	1201645
Mean Reprojection Error [pixels]	0.123

Internal Camera Parameters

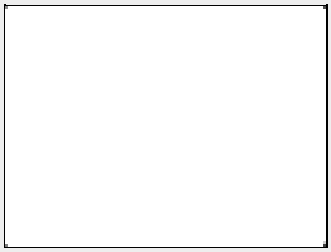
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2331.845 [pixel] 3.683 [mm]	1985.019 [pixel] 3.135 [mm]	1502.918 [pixel] 2.374 [mm]	-0.129	0.112	-0.013	0.001	0.000
Uncertainties (Sigma)	1.201 [pixel] 0.002 [mm]	0.032 [pixel] 0.000 [mm]	0.043 [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	12964	1626
Min	11834	753
Max	20051	3630
Mean	13081	1702

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	826781
In 3 Images	196189
In 4 Images	75513
In 5 Images	36676
In 6 Images	20190
In 7 Images	12392
In 8 Images	7985

In 9 Images	5517
In 10 Images	3890
In 11 Images	2899
In 12 Images	2250
In 13 Images	1695
In 14 Images	1363
In 15 Images	1087
In 16 Images	896
In 17 Images	710
In 18 Images	631
In 19 Images	506
In 20 Images	454
In 21 Images	360
In 22 Images	329
In 23 Images	294
In 24 Images	274
In 25 Images	207
In 26 Images	199
In 27 Images	166
In 28 Images	144
In 29 Images	141
In 30 Images	129
In 31 Images	133
In 32 Images	126
In 33 Images	107
In 34 Images	82
In 35 Images	62
In 36 Images	89
In 37 Images	83
In 38 Images	59
In 39 Images	55
In 40 Images	68
In 41 Images	41
In 42 Images	59
In 43 Images	47
In 44 Images	41
In 45 Images	50
In 46 Images	32
In 47 Images	30
In 48 Images	33
In 49 Images	34
In 50 Images	23
In 51 Images	34
In 52 Images	35
In 53 Images	20
In 54 Images	21
In 55 Images	19
In 56 Images	19
In 57 Images	13
In 58 Images	18
In 59 Images	19
In 60 Images	17
In 61 Images	21
In 62 Images	14
In 63 Images	16
In 64 Images	17
In 65 Images	12
In 66 Images	10
In 67 Images	9

In 68 Images	8
In 69 Images	8
In 70 Images	4
In 71 Images	9
In 72 Images	12
In 73 Images	11
In 74 Images	7
In 75 Images	3
In 76 Images	7
In 77 Images	7
In 78 Images	13
In 79 Images	13
In 80 Images	3
In 81 Images	5
In 82 Images	6
In 83 Images	6
In 84 Images	11
In 85 Images	2
In 86 Images	6
In 87 Images	1
In 88 Images	4
In 89 Images	5
In 90 Images	5
In 91 Images	3
In 92 Images	1
In 93 Images	1
In 94 Images	2
In 95 Images	4
In 96 Images	1
In 97 Images	4
In 98 Images	3
In 99 Images	5
In 100 Images	4
In 101 Images	1
In 102 Images	1
In 103 Images	1
In 104 Images	2
In 105 Images	1
In 107 Images	1
In 108 Images	2
In 110 Images	2
In 111 Images	4
In 112 Images	1
In 113 Images	1
In 114 Images	1
In 116 Images	1
In 117 Images	1
In 118 Images	1
In 119 Images	2
In 123 Images	1
In 128 Images	1
In 146 Images	1

2D Keypoint Matches

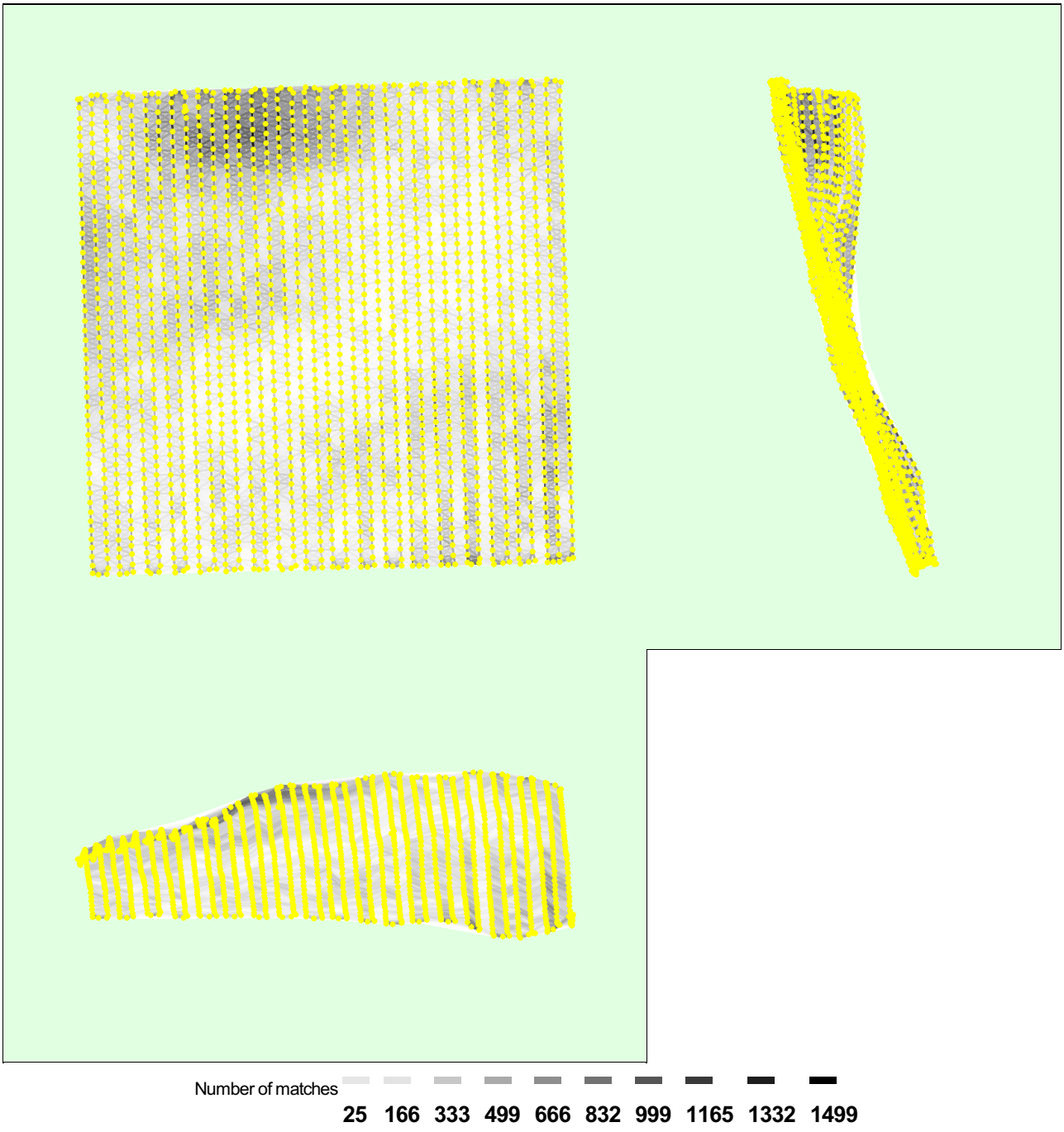


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	0.10	0.00
-6.00	-3.00	0.75	10.27	0.15
-3.00	0.00	47.92	40.21	47.07
0.00	3.00	51.28	35.00	52.73
3.00	6.00	0.05	14.42	0.05

6.00	9.00	0.00	0.00	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]		0.549683	2.283707	1.123278
RMS Error [m]		0.549683	2.283707	1.123278

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	98.75	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	0.828
Phi	0.909
Kappa	5.256

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 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	08h:28m:58s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	43m:02s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	81395631
Average Density (per m^3)	18.35

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.88 [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:51s
Time for Orthomosaic Generation	12h:57m:01s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s