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_3k_1_x3
Processed	2018-07-26 22:51:58
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.00 cm / 1.97 in
Area Covered	0.640 km^2 / 63.9569 ha / 0.25 sq. mi. / 158.1228 acres
Time for Initial Processing (without report)	49m:26s

Quality Check

Images	median of 13580 keypoints per image	✓
Dataset	1957 out of 1966 images calibrated (99%), all images enabled	✓
Camera Optimization	1.75% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1128.4 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

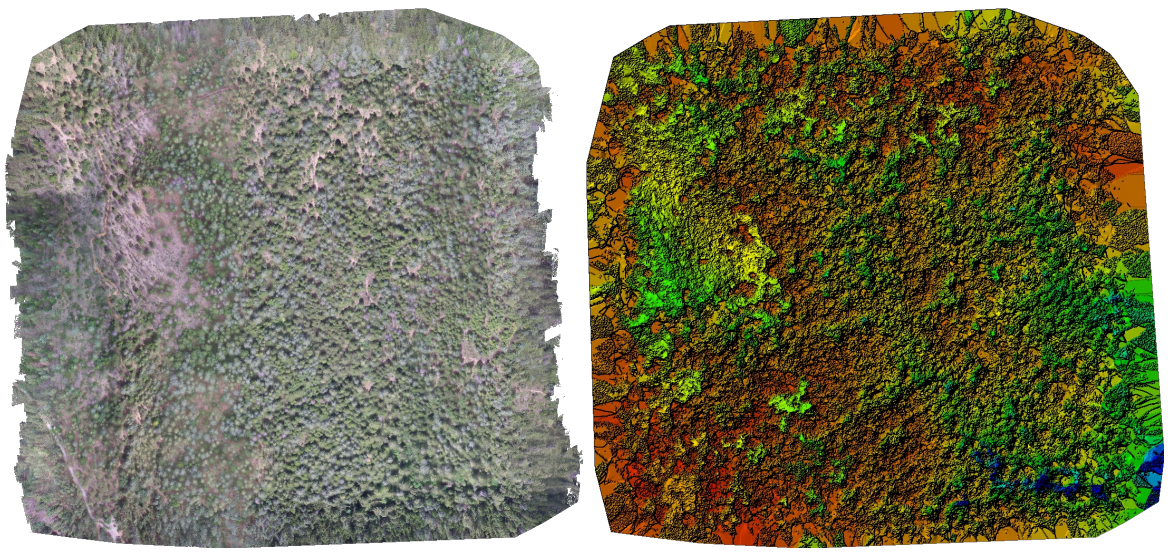


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1957 out of 1966
Number of Geolocated Images	1966 out of 1966

Initial Image Positions

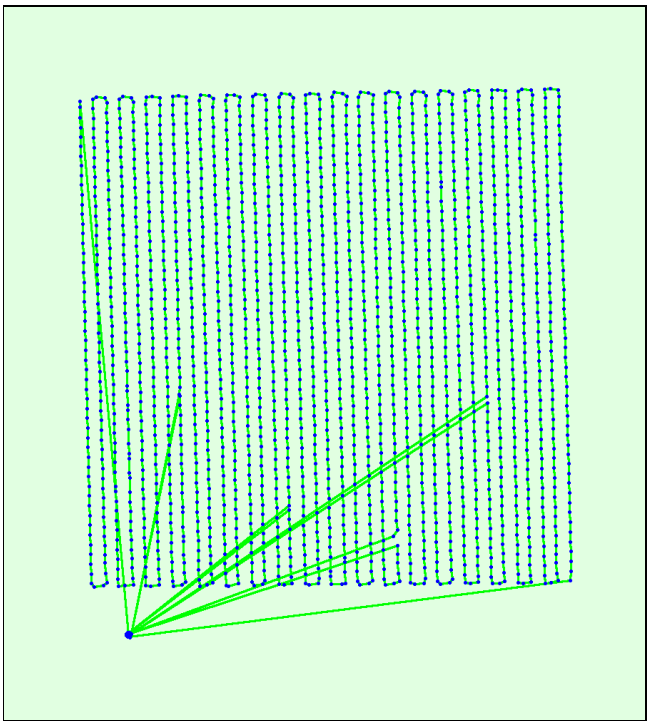
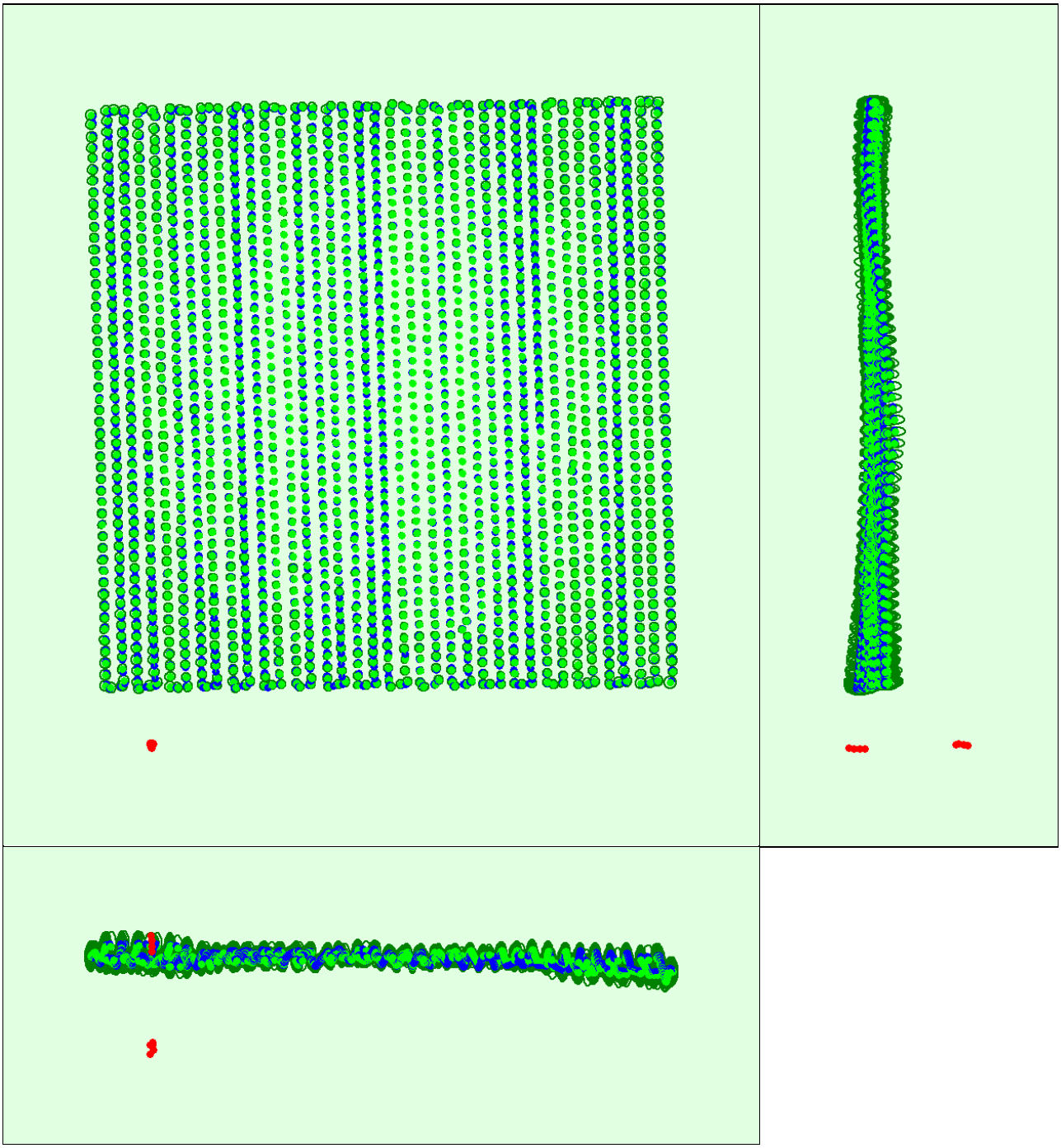


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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	0.084	0.084	0.190	0.044	0.044	0.014
Sigma	0.013	0.013	0.039	0.007	0.007	0.001

Overlap

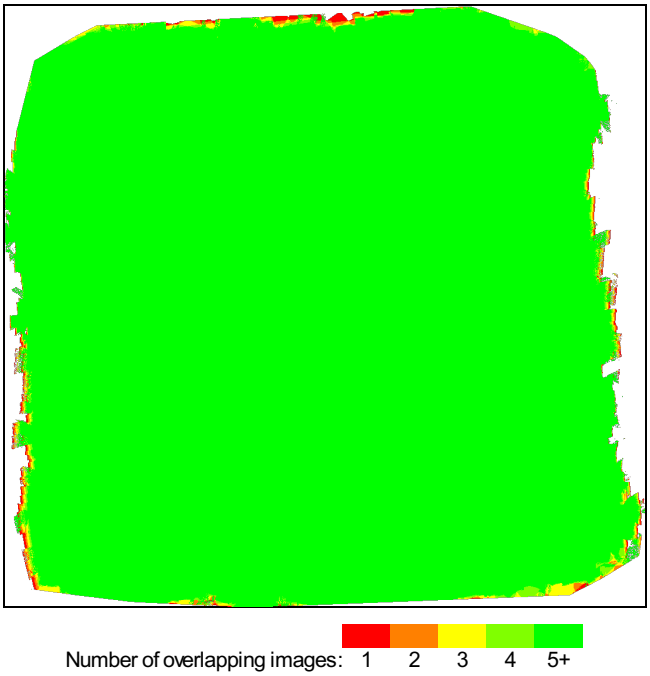


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

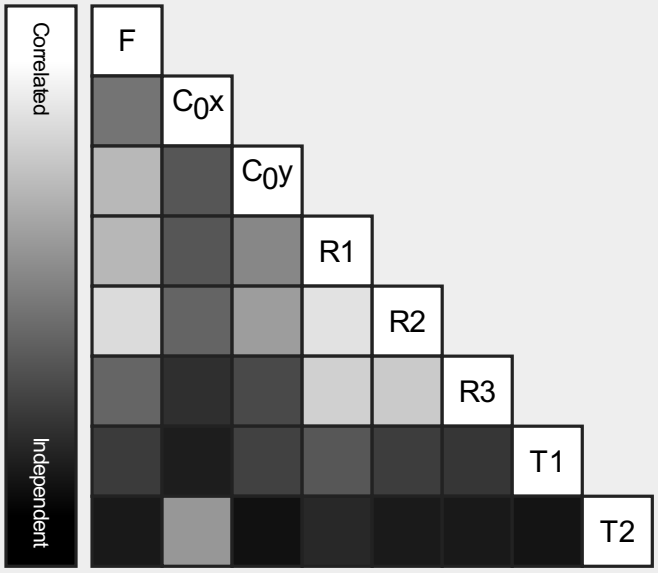
Number of 2D Keypoint Observations for Bundle Block Adjustment	2204791
Number of 3D Points for Bundle Block Adjustment	881062
Mean Reprojection Error [pixels]	0.120

Internal Camera Parameters

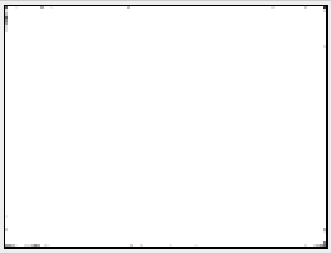
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2325.785 [pixel] 3.673 [mm]	1985.479 [pixel] 3.136 [mm]	1503.124 [pixel] 2.374 [mm]	-0.127	0.111	-0.013	0.001	0.000
Uncertainties (Sigma)	1.851 [pixel] 0.003 [mm]	0.055 [pixel] 0.000 [mm]	0.063 [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	13580	1128
Min	10567	445
Max	21103	2675
Mean	13312	1127

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	661717
In 3 Images	129763
In 4 Images	44020
In 5 Images	19260
In 6 Images	9711
In 7 Images	5587
In 8 Images	3298
In 9 Images	2167
In 10 Images	1406
In 11 Images	994
In 12 Images	701
In 13 Images	494
In 14 Images	406
In 15 Images	279
In 16 Images	231
In 17 Images	173
In 18 Images	158
In 19 Images	125
In 20 Images	86
In 21 Images	71
In 22 Images	66

In 23 Images	63
In 24 Images	27
In 25 Images	29
In 26 Images	23
In 27 Images	27
In 28 Images	28
In 29 Images	25
In 30 Images	24
In 31 Images	13
In 32 Images	16
In 33 Images	9
In 34 Images	5
In 35 Images	13
In 36 Images	9
In 37 Images	3
In 38 Images	2
In 39 Images	3
In 40 Images	1
In 41 Images	4
In 42 Images	4
In 43 Images	1
In 45 Images	7
In 46 Images	5
In 47 Images	2
In 48 Images	3
In 53 Images	1
In 57 Images	1
In 59 Images	1

2D Keypoint Matches

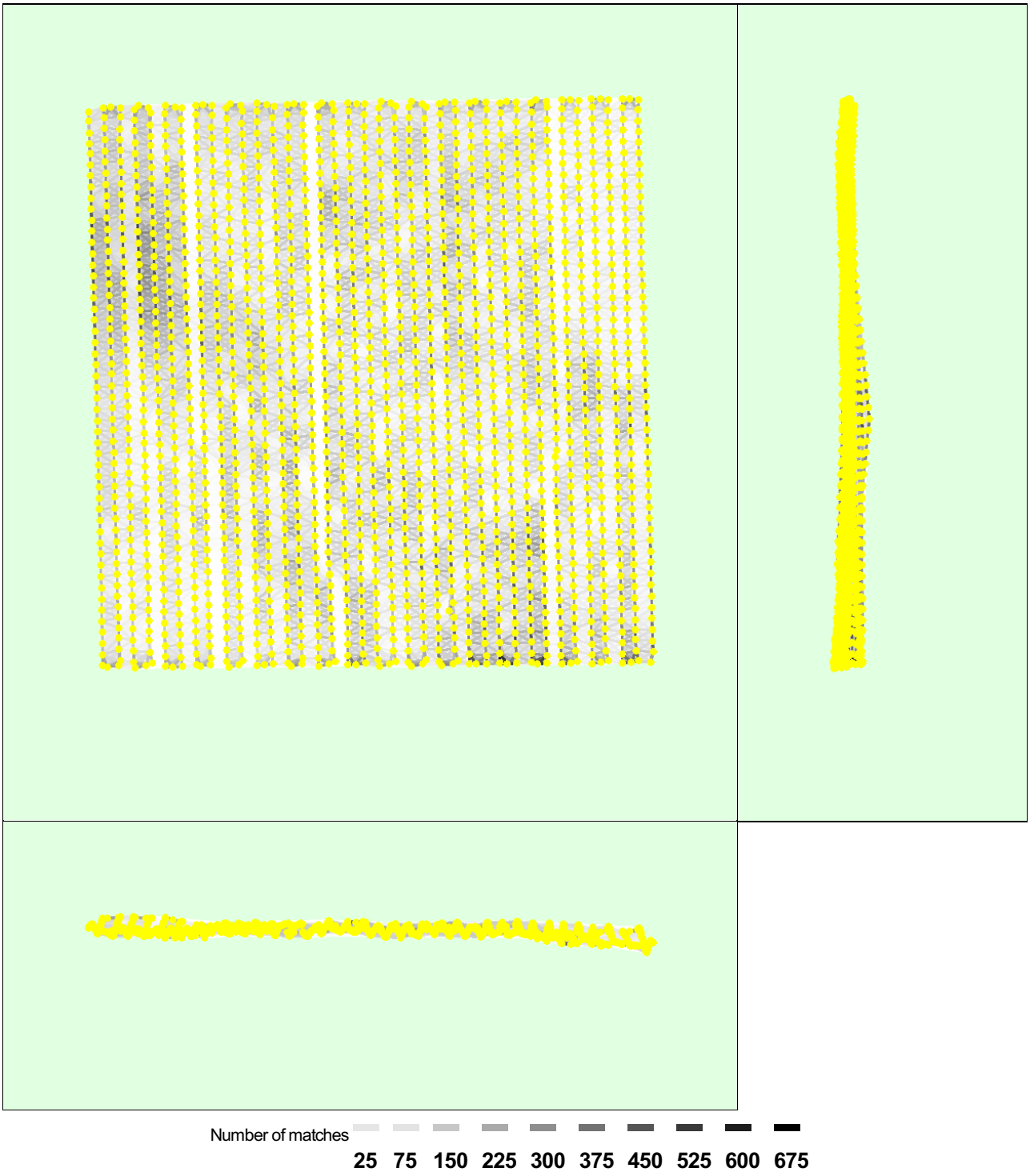


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	0.20	0.00
-6.00	-3.00	0.82	15.38	0.10

-3.00	0.00	42.51	34.85	48.13
0.00	3.00	56.67	36.48	50.89
3.00	6.00	0.00	13.03	0.87
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]		0.635344	2.523471	1.300100
RMS Error [m]		0.635344	2.523471	1.300100

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]	99.85	96.73	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	0.811
Phi	1.792
Kappa	6.442

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: 23.21.13.8795), 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	RGB Local structure bark beetle severity*
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:04m:36s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	47m:27s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	86611091
Average Density (per m^3)	23.61

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5 [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	12m:16s
Time for Orthomosaic Generation	13h:36m:50s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s