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	sequ_6k_1_x3
Processed	2018-08-31 10:18:27
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.45 cm / 2.15 in
Area Covered	0.635 km^2 / 63.5024 ha / 0.25 sq. mi. / 156.9990 acres
Time for Initial Processing (without report)	01h:39m:42s

Quality Check

Images	median of 12011 keypoints per image	✓
Dataset	1800 out of 1805 images calibrated (99%), all images enabled	✓
Camera Optimization	3.36% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1631.38 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

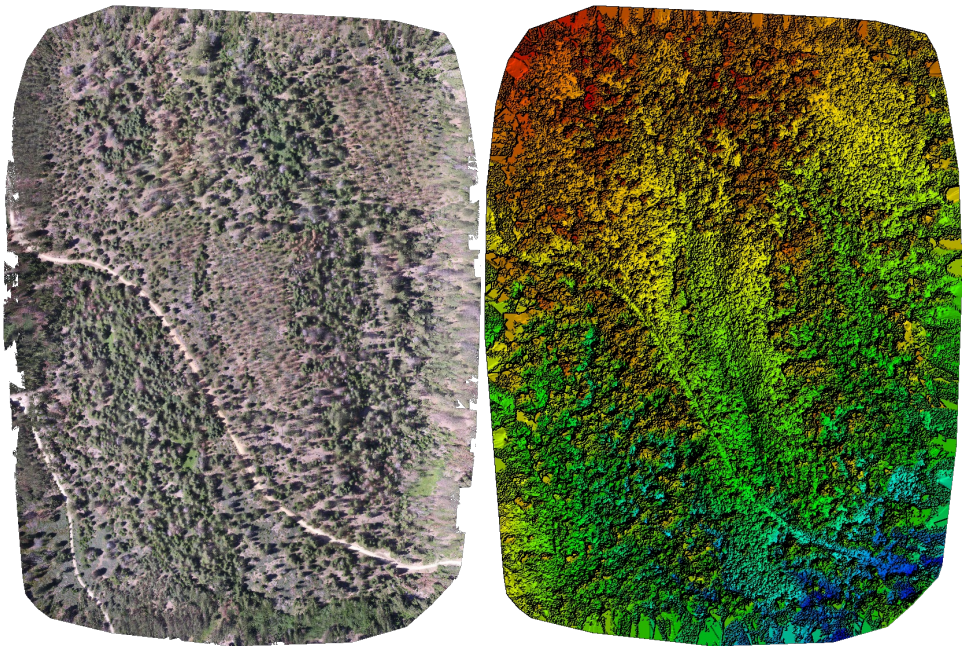


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1800 out of 1805
Number of Geolocated Images	1805 out of 1805

Initial Image Positions

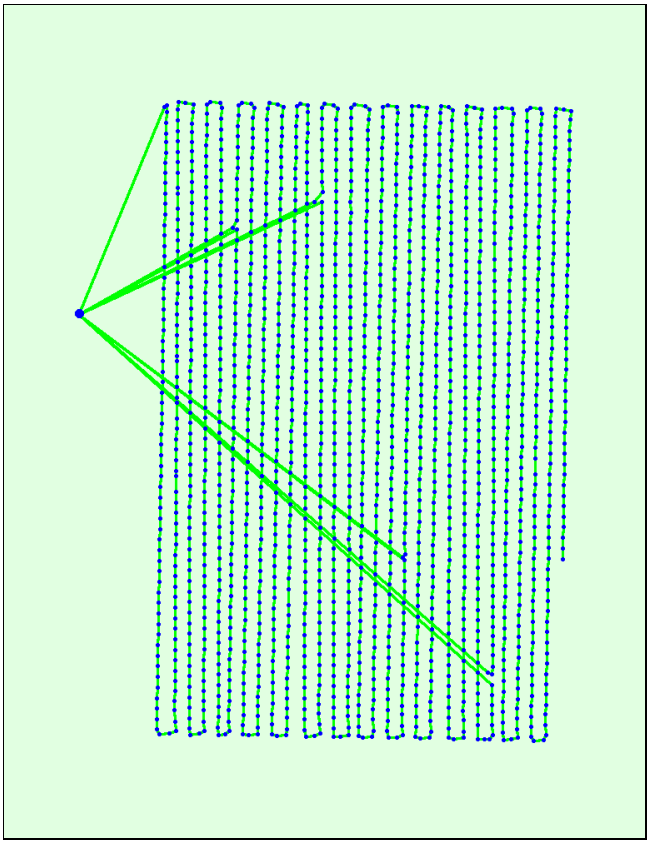
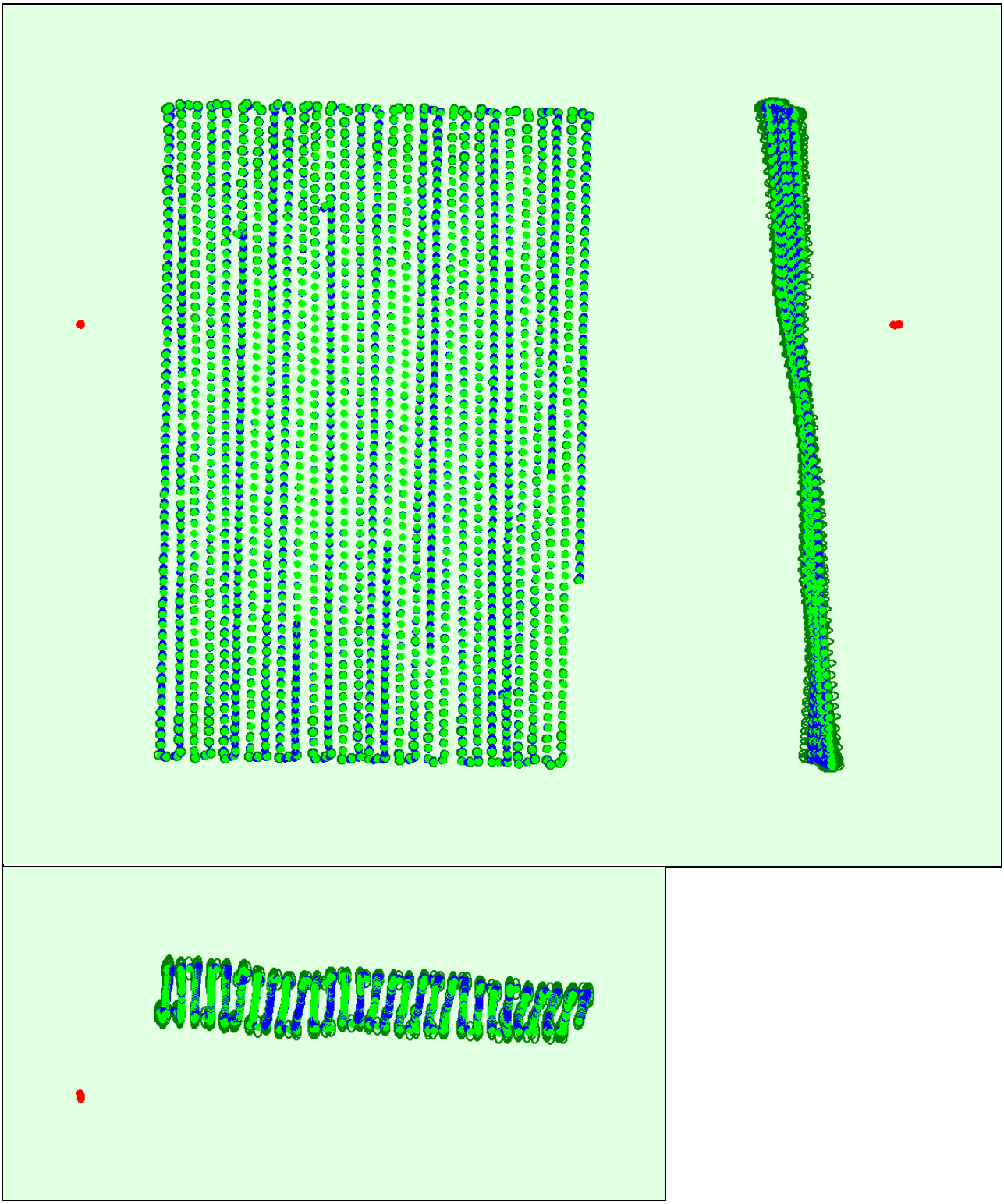


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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	0.073	0.075	0.171	0.036	0.043	0.012
Sigma	0.012	0.012	0.035	0.007	0.003	0.000

Overlap

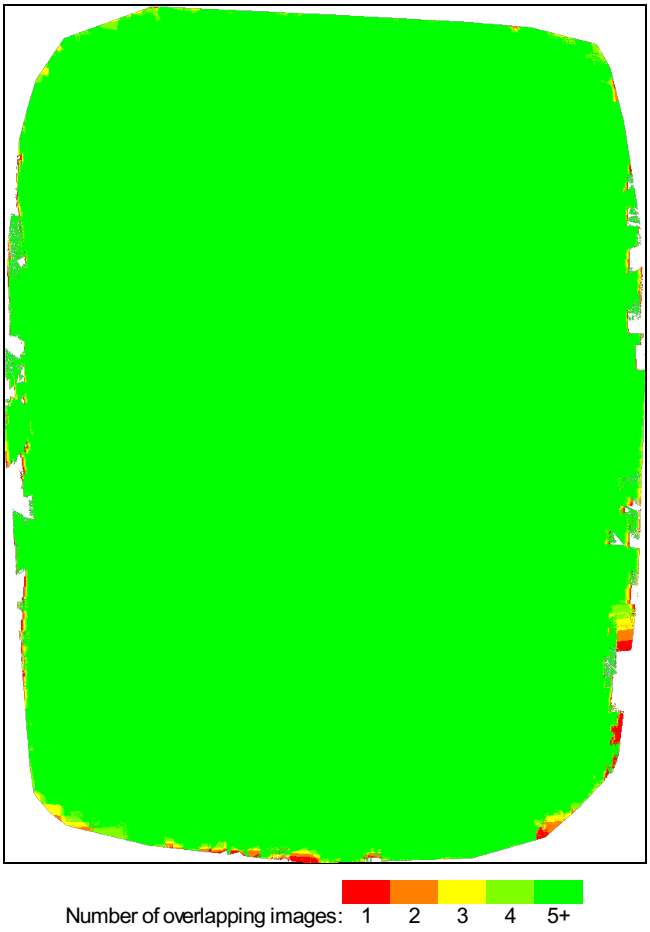


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

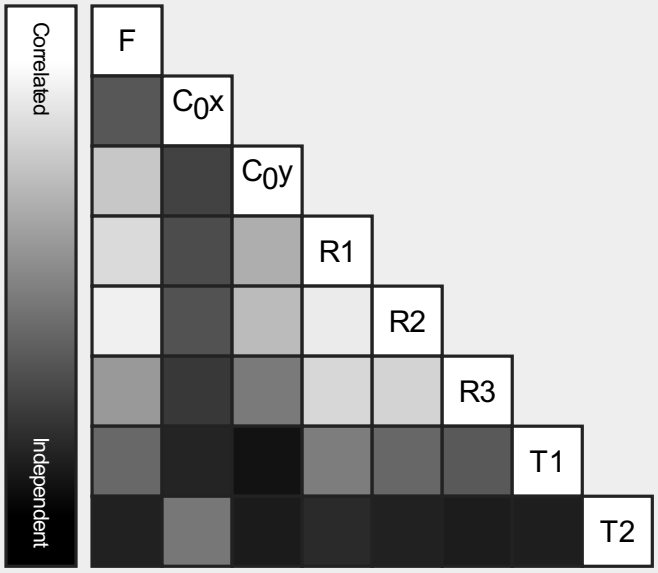
Number of 2D Keypoint Observations for Bundle Block Adjustment	3081082
Number of 3D Points for Bundle Block Adjustment	996842
Mean Reprojection Error [pixels]	0.133

Internal Camera Parameters

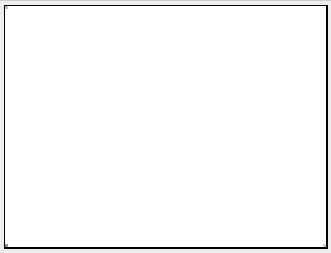
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2362.622 [pixel] 3.731 [mm]	1985.108 [pixel] 3.135 [mm]	1502.011 [pixel] 2.372 [mm]	-0.132	0.119	-0.015	0.001	0.000
Uncertainties (Sigma)	2.153 [pixel] 0.003 [mm]	0.043 [pixel] 0.000 [mm]	0.060 [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	12011	1631
Min	10907	962
Max	13280	3326
Mean	12039	1712

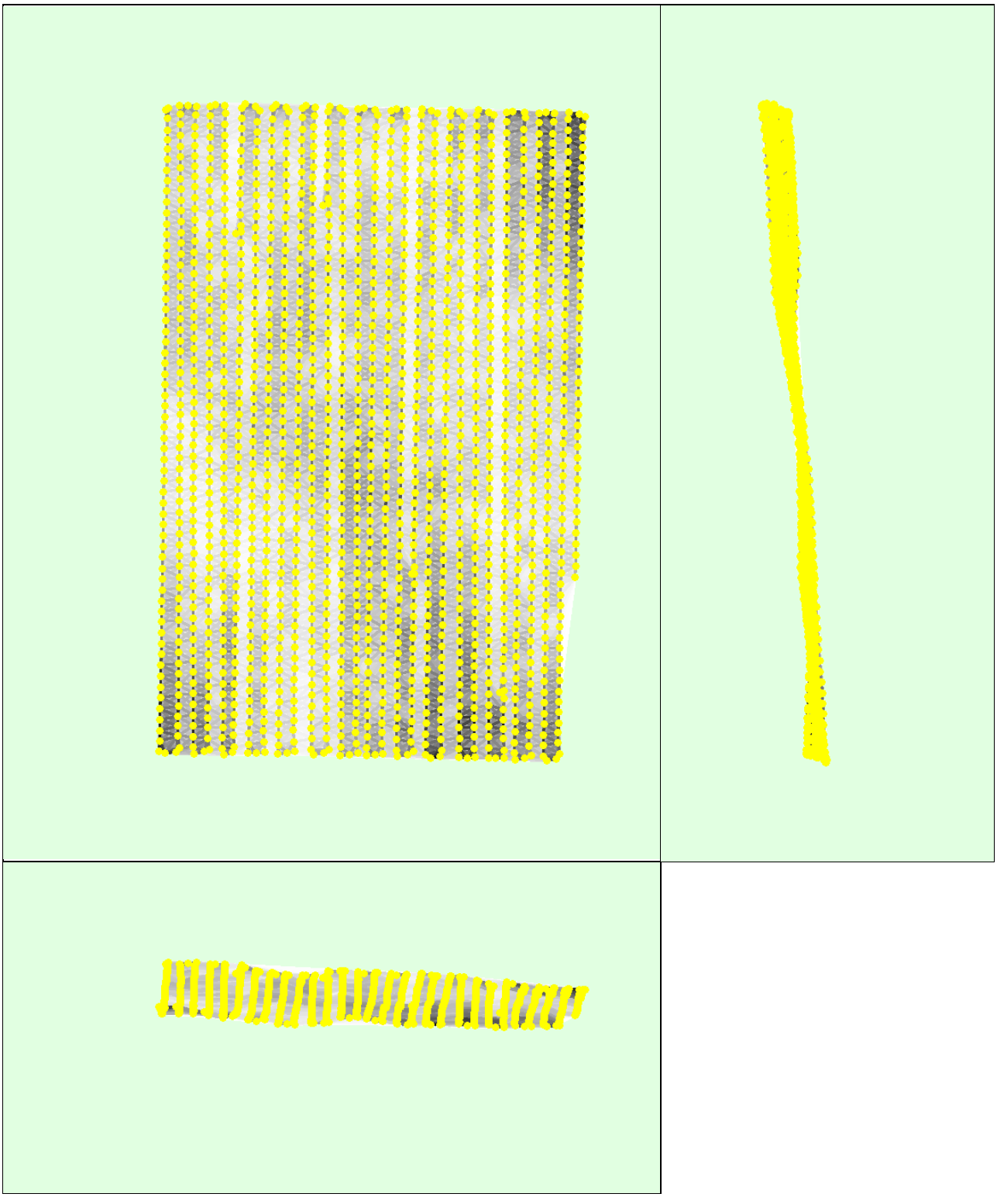
3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	636295
In 3 Images	166939
In 4 Images	71416
In 5 Images	37983
In 6 Images	22927
In 7 Images	15054
In 8 Images	10260
In 9 Images	7542
In 10 Images	5705
In 11 Images	4205
In 12 Images	3248
In 13 Images	2580
In 14 Images	2104
In 15 Images	1625
In 16 Images	1274
In 17 Images	1068
In 18 Images	943
In 19 Images	707
In 20 Images	666
In 21 Images	532
In 22 Images	449

In 23 Images	398
In 24 Images	318
In 25 Images	314
In 26 Images	234
In 27 Images	199
In 28 Images	174
In 29 Images	181
In 30 Images	136
In 31 Images	146
In 32 Images	129
In 33 Images	103
In 34 Images	93
In 35 Images	99
In 36 Images	66
In 37 Images	79
In 38 Images	60
In 39 Images	47
In 40 Images	40
In 41 Images	46
In 42 Images	42
In 43 Images	34
In 44 Images	33
In 45 Images	25
In 46 Images	21
In 47 Images	29
In 48 Images	21
In 49 Images	27
In 50 Images	16
In 51 Images	18
In 52 Images	20
In 53 Images	17
In 54 Images	10
In 55 Images	8
In 56 Images	12
In 57 Images	12
In 58 Images	8
In 59 Images	10
In 60 Images	6
In 61 Images	2
In 62 Images	3
In 63 Images	4
In 64 Images	6
In 65 Images	4
In 66 Images	8
In 67 Images	4
In 68 Images	4
In 69 Images	6
In 70 Images	7
In 71 Images	2
In 72 Images	1
In 73 Images	3
In 74 Images	6
In 75 Images	1
In 76 Images	2
In 77 Images	3
In 78 Images	3
In 79 Images	2
In 80 Images	2
In 81 Images	1

In 82 Images	2
In 83 Images	2
In 85 Images	2
In 87 Images	1
In 88 Images	2
In 91 Images	1
In 92 Images	1
In 96 Images	1
In 98 Images	1
In 99 Images	1
In 102 Images	1

2D Keypoint Matches



Number of matches

25 138 276 414 552 691 829 967 1105 1244

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	0.78	0.00
-6.00	-3.00	0.67	15.11	0.28
-3.00	0.00	53.61	33.33	50.83
0.00	3.00	45.72	34.17	47.67
3.00	6.00	0.00	16.61	1.22
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]		0.626060	2.672280	1.257421
RMS Error [m]		0.626060	2.672280	1.257421

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	96.61	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	0.837
Phi	1.276
Kappa	5.225

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	RGB local structure bark beetle severity with classification and DTM*
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	07h:08m:45s
Time for Point Cloud Classification	15m:14s
Time for 3D Textured Mesh Generation	39m:30s

Results

Number of Generated Tiles	5
Number of 3D Densified Points	82779342
Average Density (per m^3)	19.83

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.45 [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
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	5 x GSD (5.45 [cm/pixel])
Time for DSM Generation	05m:42s
Time for Orthomosaic Generation	08h:14m:51s
Time for DTM Generation	02m:45s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s