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_3_x3
Processed	2018-09-01 23:08:09
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.38 cm / 2.12 in
Area Covered	0.622 km^2 / 62.1555 ha / 0.24 sq. mi. / 153.6690 acres
Time for Initial Processing (without report)	01h:38m:07s

Quality Check

Images	median of 12846 keypoints per image	✓
Dataset	1729 out of 1734 images calibrated (99%), all images enabled	✓
Camera Optimization	0.58% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1388.48 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

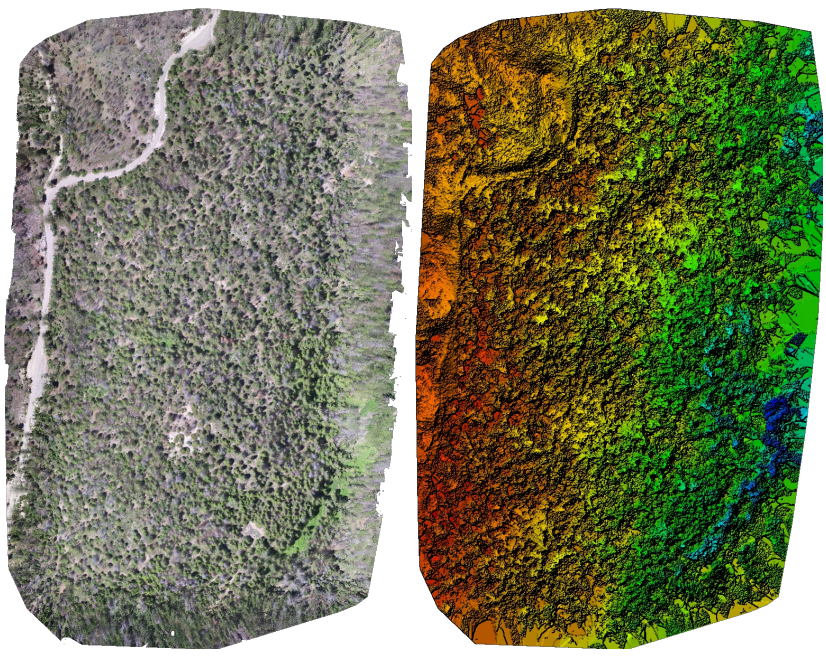


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1729 out of 1734
Number of Geolocated Images	1734 out of 1734

Initial Image Positions

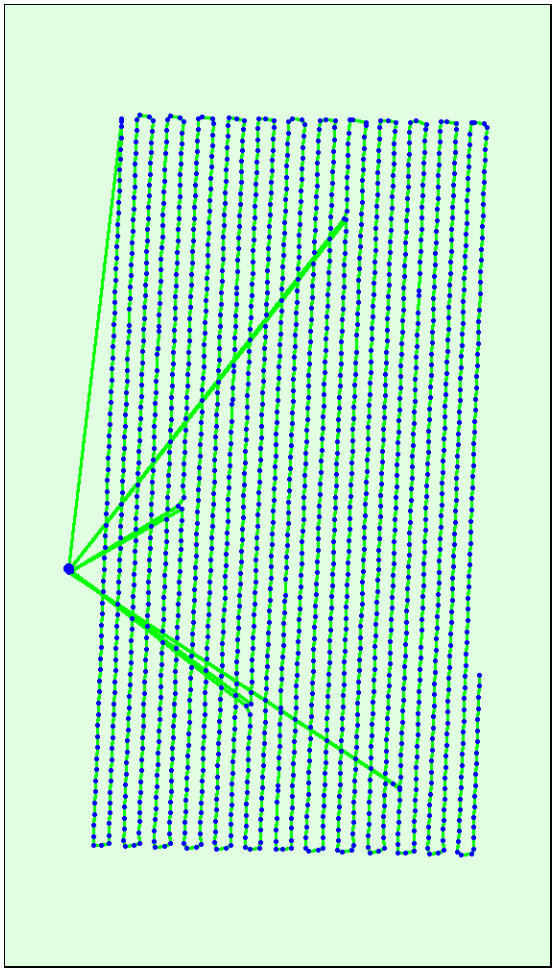


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions

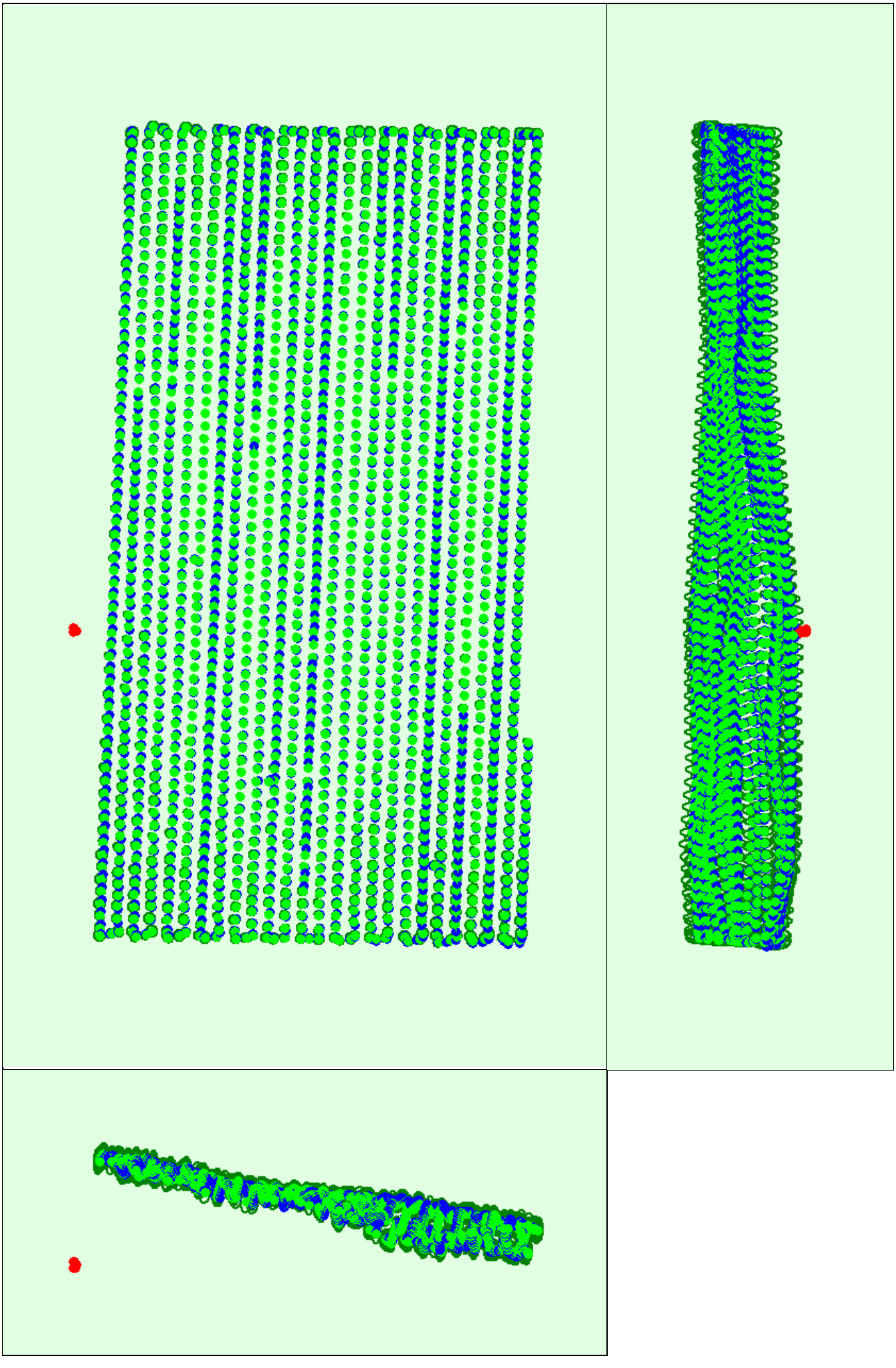


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled 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	0.076	0.076	0.169	0.029	0.044	0.012
Sigma	0.013	0.013	0.035	0.004	0.001	0.001

Overlap

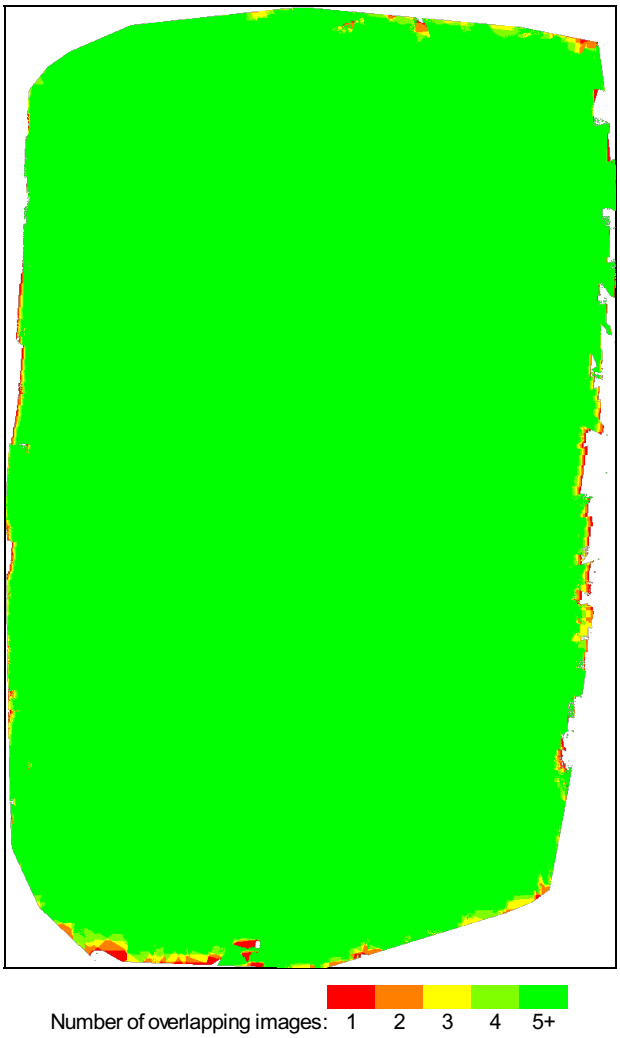


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	2452547
Number of 3D Points for Bundle Block Adjustment	848433
Mean Reprojection Error [pixels]	0.124

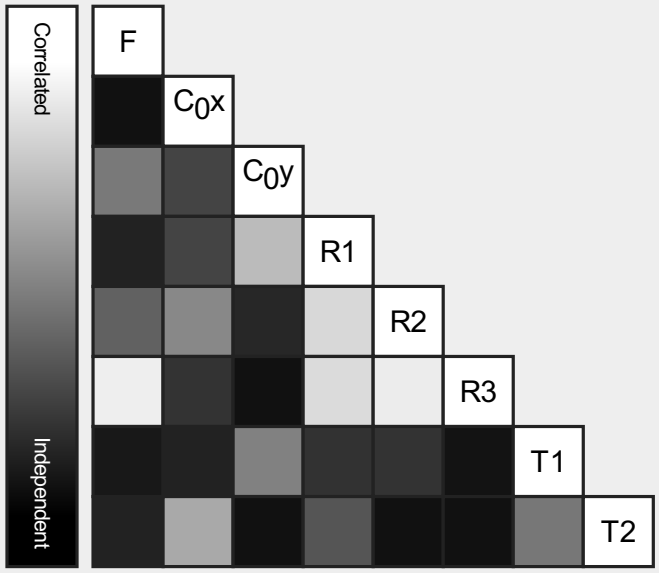
Internal Camera Parameters

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

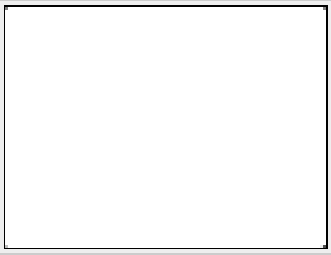
EXIF ID: FC350_3.6_4000x3000

	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	2299.191 [pixel] 3.631 [mm]	1985.804 [pixel] 3.136 [mm]	1503.157 [pixel] 2.374 [mm]	-0.126	0.108	-0.014	0.001	0.000
Uncertainties (Sigma)	0.348 [pixel] 0.001 [mm]	0.036 [pixel] 0.000 [mm]	0.039 [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	12846	1388
Min	11413	702
Max	14001	2903
Mean	12816	1418

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	570960
In 3 Images	139441
In 4 Images	55443
In 5 Images	27863
In 6 Images	16235
In 7 Images	10105
In 8 Images	6692
In 9 Images	4684
In 10 Images	3310
In 11 Images	2523
In 12 Images	1929
In 13 Images	1468
In 14 Images	1230
In 15 Images	997
In 16 Images	801

In 17 Images	664
In 18 Images	546
In 19 Images	447
In 20 Images	374
In 21 Images	326
In 22 Images	290
In 23 Images	238
In 24 Images	215
In 25 Images	197
In 26 Images	140
In 27 Images	125
In 28 Images	110
In 29 Images	108
In 30 Images	85
In 31 Images	97
In 32 Images	77
In 33 Images	68
In 34 Images	62
In 35 Images	54
In 36 Images	40
In 37 Images	40
In 38 Images	28
In 39 Images	35
In 40 Images	32
In 41 Images	23
In 42 Images	40
In 43 Images	21
In 44 Images	19
In 45 Images	25
In 46 Images	15
In 47 Images	17
In 48 Images	11
In 49 Images	11
In 50 Images	12
In 51 Images	6
In 52 Images	11
In 53 Images	9
In 54 Images	6
In 55 Images	7
In 56 Images	10
In 57 Images	7
In 58 Images	5
In 59 Images	3
In 60 Images	7
In 61 Images	8
In 62 Images	7
In 63 Images	5
In 64 Images	3
In 65 Images	3
In 66 Images	3
In 67 Images	2
In 68 Images	3
In 69 Images	1
In 70 Images	3
In 71 Images	7
In 72 Images	6
In 73 Images	1
In 74 Images	3
In 75 Images	1

In 76 Images	4
In 77 Images	3
In 82 Images	2
In 84 Images	2
In 85 Images	3
In 87 Images	2
In 88 Images	1
In 89 Images	1
In 93 Images	3
In 94 Images	1
In 98 Images	1
In 101 Images	1
In 103 Images	2
In 105 Images	1
In 106 Images	1
In 107 Images	3
In 108 Images	1
In 129 Images	1

2D Keypoint Matches

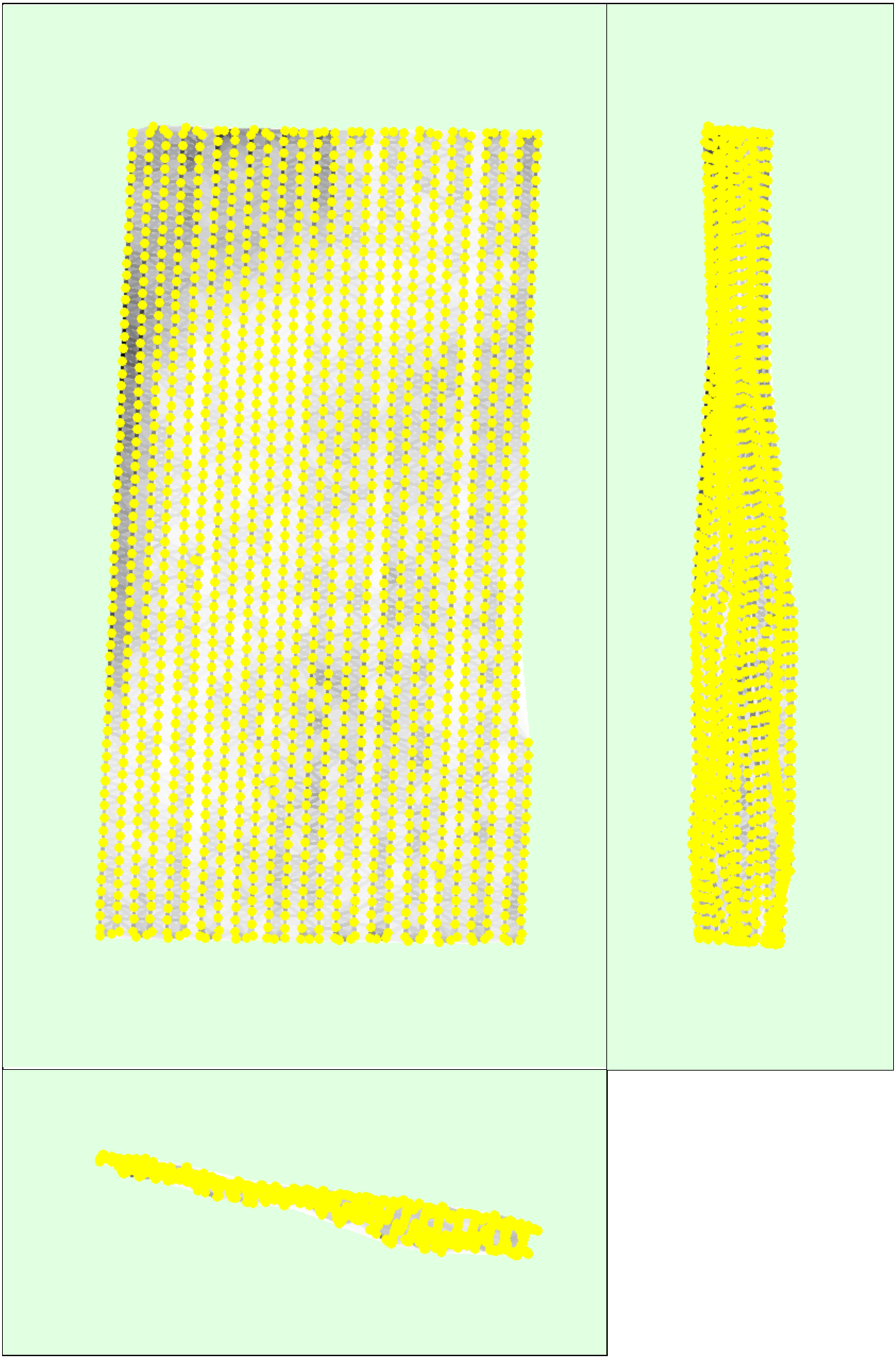


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	0.12	1.04	0.00
-6.00	-3.00	0.52	12.32	0.12
-3.00	0.00	48.76	37.94	55.47
0.00	3.00	50.61	30.71	43.15
3.00	6.00	0.00	16.77	1.27
6.00	9.00	0.00	1.21	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]		0.829717	2.839494	1.172882
RMS Error [m]		0.829717	2.839494	1.172882

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]	99.77	93.18	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	0.819
Phi	1.812
Kappa	5.185

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	06h:33m:53s
Time for Point Cloud Classification	12m:40s
Time for 3D Textured Mesh Generation	36m:01s

Results

Number of Generated Tiles	6
Number of 3D Densified Points	73716032
Average Density (per m^3)	18.45

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.38 [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 (5.38 [cm/pixel])

Time for DSM Generation	04m:49s
Time for Orthomosaic Generation	09h:56m:10s
Time for DTM Generation	04m:13s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s