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_3_x3
Processed	2018-08-27 22:46:36
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.03 cm / 1.98 in
Area Covered	0.638 km^2 / 63.7623 ha / 0.25 sq. mi. / 157.6417 acres
Time for Initial Processing (without report)	01h:48m:07s

Quality Check

Images	median of 12502 keypoints per image	✓
Dataset	1902 out of 1907 images calibrated (99%), all images enabled	✓
Camera Optimization	0.6% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1750.49 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

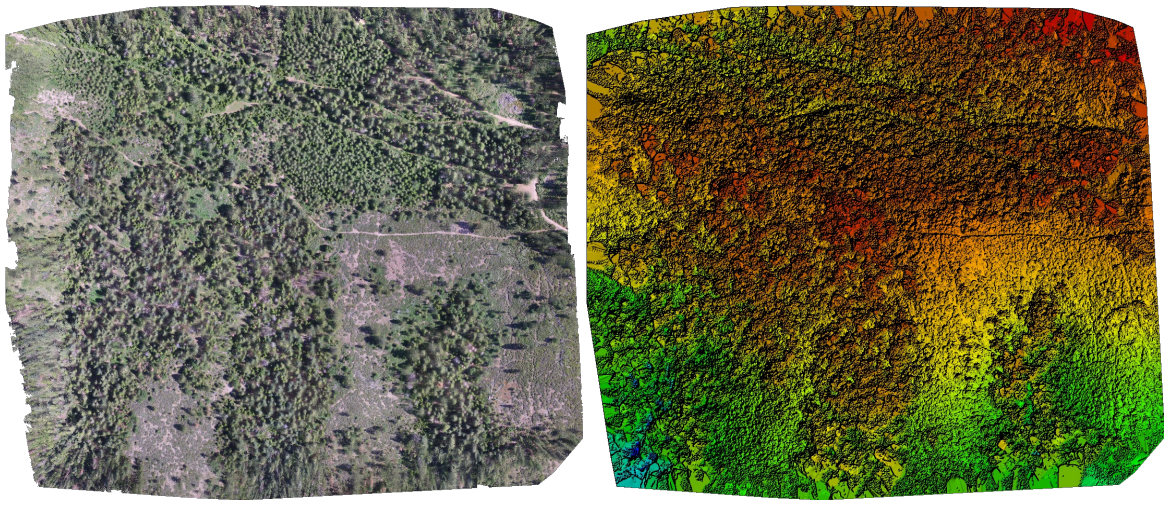


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1902 out of 1907

Number of Geolocated Images	1907 out of 1907

Initial Image Positions

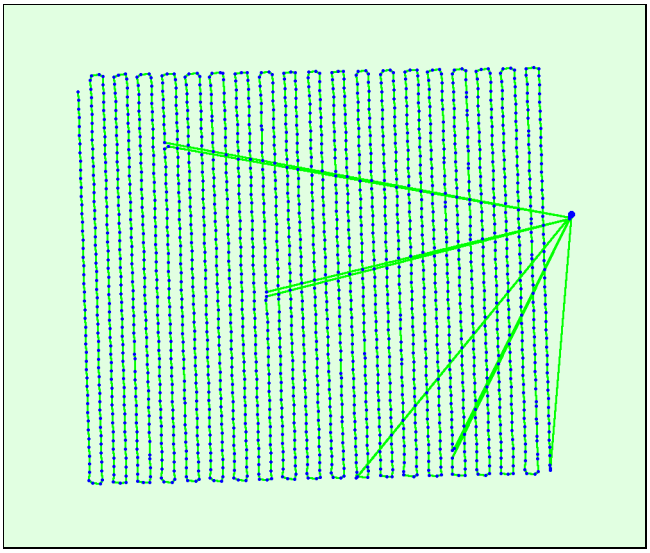
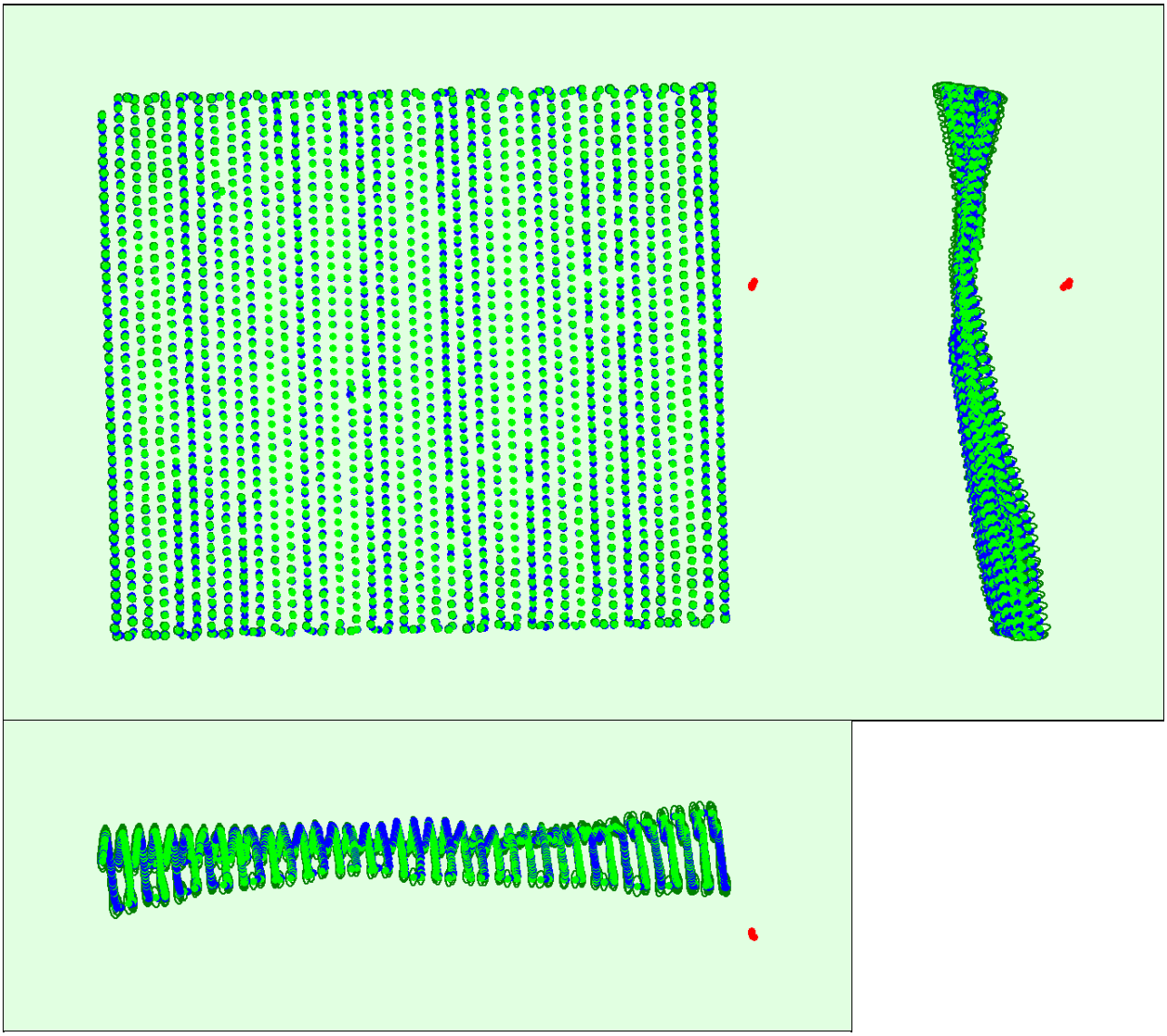


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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	0.067	0.068	0.151	0.033	0.030	0.011
Sigma	0.010	0.010	0.032	0.002	0.003	0.000

Overlap

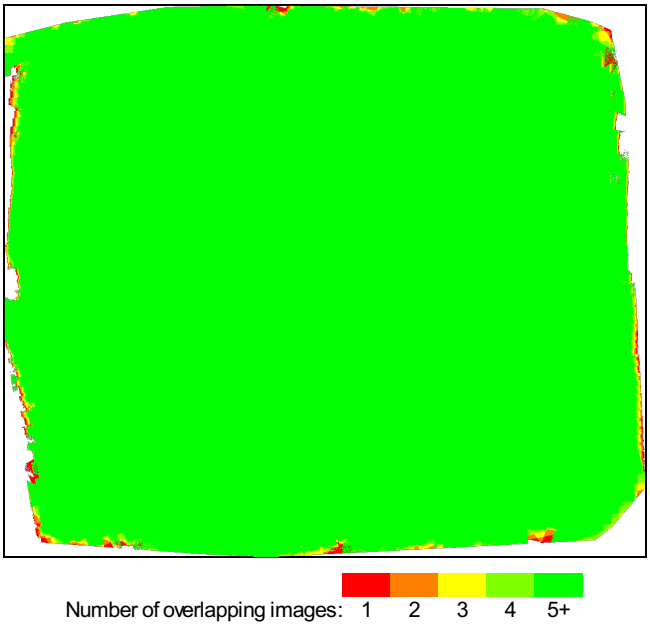


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

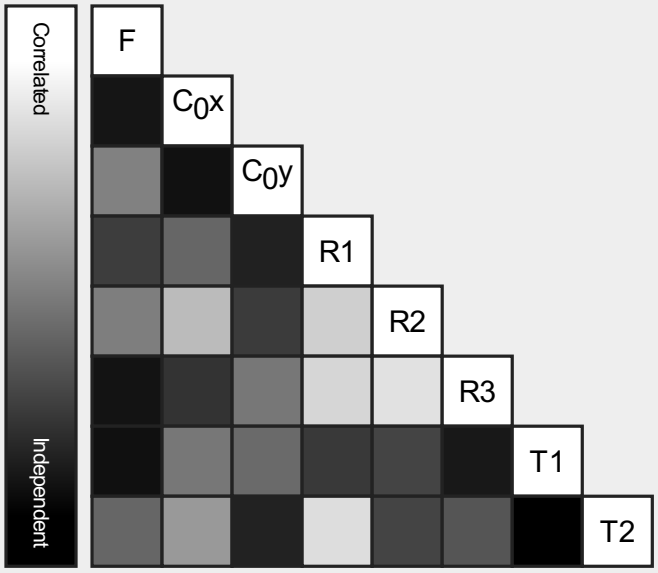
Number of 2D Keypoint Observations for Bundle Block Adjustment	3730794
Number of 3D Points for Bundle Block Adjustment	1155114
Mean Reprojection Error [pixels]	0.128

Internal Camera Parameters

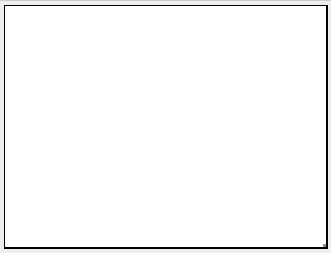
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2299.500 [pixel] 3.632 [mm]	1985.863 [pixel] 3.136 [mm]	1503.292 [pixel] 2.374 [mm]	-0.125	0.106	-0.013	0.001	0.000
Uncertainties (Sigma)	0.431 [pixel] 0.001 [mm]	0.035 [pixel] 0.000 [mm]	0.037 [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	12502	1750
Min	10825	626
Max	14613	5278
Mean	12395	1962

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	722677
In 3 Images	197077
In 4 Images	85047
In 5 Images	45724
In 6 Images	27841
In 7 Images	17757
In 8 Images	12326
In 9 Images	8863
In 10 Images	6715
In 11 Images	5064
In 12 Images	4020
In 13 Images	3106
In 14 Images	2450
In 15 Images	2089
In 16 Images	1757
In 17 Images	1406
In 18 Images	1216
In 19 Images	1053
In 20 Images	899
In 21 Images	771
In 22 Images	668

In 23 Images	569
In 24 Images	532
In 25 Images	477
In 26 Images	437
In 27 Images	367
In 28 Images	317
In 29 Images	293
In 30 Images	265
In 31 Images	234
In 32 Images	222
In 33 Images	217
In 34 Images	196
In 35 Images	165
In 36 Images	153
In 37 Images	156
In 38 Images	114
In 39 Images	116
In 40 Images	104
In 41 Images	106
In 42 Images	111
In 43 Images	93
In 44 Images	85
In 45 Images	93
In 46 Images	62
In 47 Images	64
In 48 Images	60
In 49 Images	56
In 50 Images	55
In 51 Images	47
In 52 Images	62
In 53 Images	45
In 54 Images	43
In 55 Images	41
In 56 Images	29
In 57 Images	36
In 58 Images	24
In 59 Images	27
In 60 Images	32
In 61 Images	30
In 62 Images	26
In 63 Images	33
In 64 Images	17
In 65 Images	26
In 66 Images	20
In 67 Images	18
In 68 Images	19
In 69 Images	23
In 70 Images	17
In 71 Images	12
In 72 Images	15
In 73 Images	11
In 74 Images	14
In 75 Images	11
In 76 Images	14
In 77 Images	10
In 78 Images	20
In 79 Images	5
In 80 Images	11
In 81 Images	5

In 82 Images	9
In 83 Images	4
In 84 Images	7
In 85 Images	7
In 86 Images	8
In 87 Images	4
In 88 Images	4
In 89 Images	3
In 90 Images	4
In 91 Images	2
In 92 Images	2
In 93 Images	3
In 94 Images	5
In 95 Images	6
In 96 Images	4
In 97 Images	2
In 98 Images	5
In 100 Images	5
In 101 Images	2
In 102 Images	1
In 103 Images	3
In 105 Images	1
In 106 Images	5
In 107 Images	2
In 108 Images	2
In 109 Images	1
In 110 Images	2
In 113 Images	2
In 114 Images	3
In 115 Images	3
In 116 Images	2
In 117 Images	1
In 118 Images	1
In 119 Images	1
In 120 Images	2
In 121 Images	2
In 123 Images	2
In 125 Images	1
In 126 Images	1
In 131 Images	1
In 139 Images	1

2D Keypoint Matches

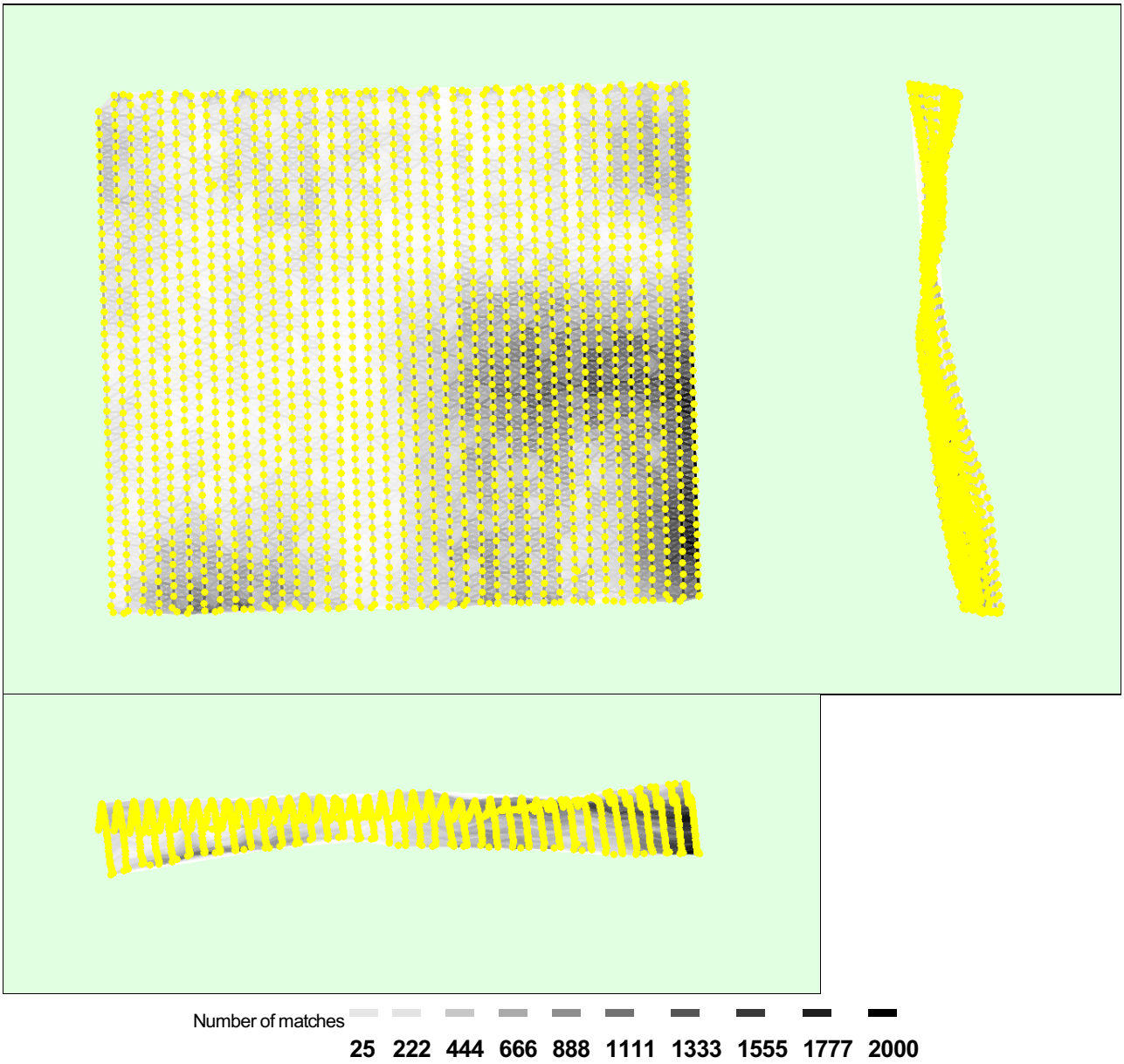


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	15.93	1.68
-3.00	0.00	48.05	34.81	48.53
0.00	3.00	51.16	34.33	48.69
3.00	6.00	0.79	14.83	1.10
6.00	9.00	0.00	0.11	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]	0.632625	2.569799	1.475597
RMS Error [m]	0.632625	2.569799	1.475597

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	97.16	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	0.701
Phi	0.698
Kappa	4.335

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	06h:38m:51s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	43m:55s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	90635159
Average Density (per m^3)	32.08

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.03 [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	09m:10s
Time for Orthomosaic Generation	10h:38m:54s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s