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_2_x3
Processed	2018-09-01 10:45:58
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.62 cm / 2.21 in
Area Covered	0.378 km^2 / 37.8405 ha / 0.15 sq. mi. / 93.5542 acres
Time for Initial Processing (without report)	28m:46s

Quality Check

Images	median of 12031 keypoints per image	✓
Dataset	955 out of 966 images calibrated (98%), all images enabled	✓
Camera Optimization	1.45% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1804.94 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

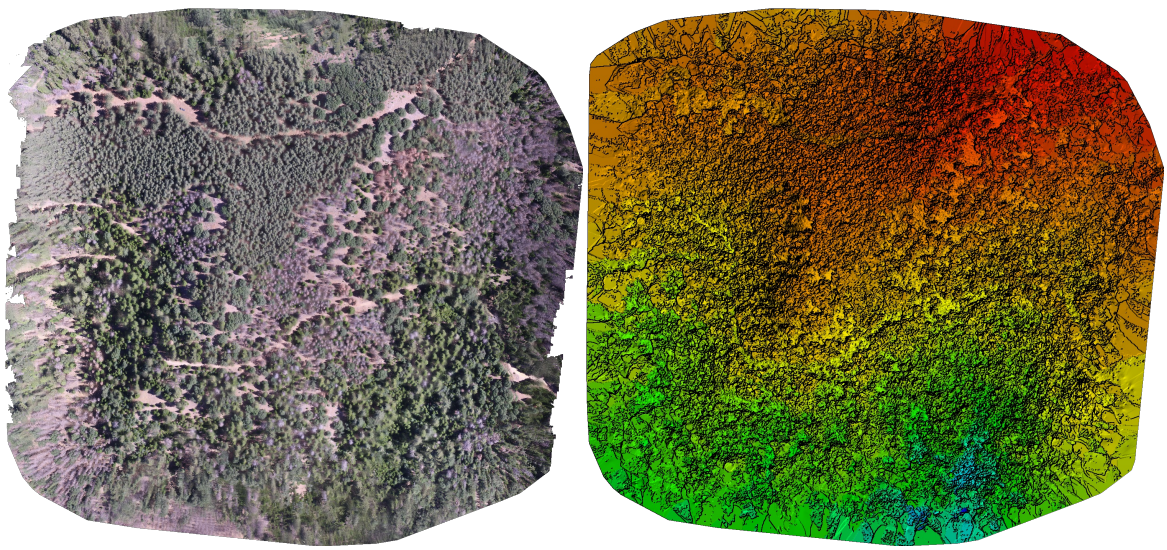


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	955 out of 966
Number of Geolocated Images	966 out of 966

Initial Image Positions

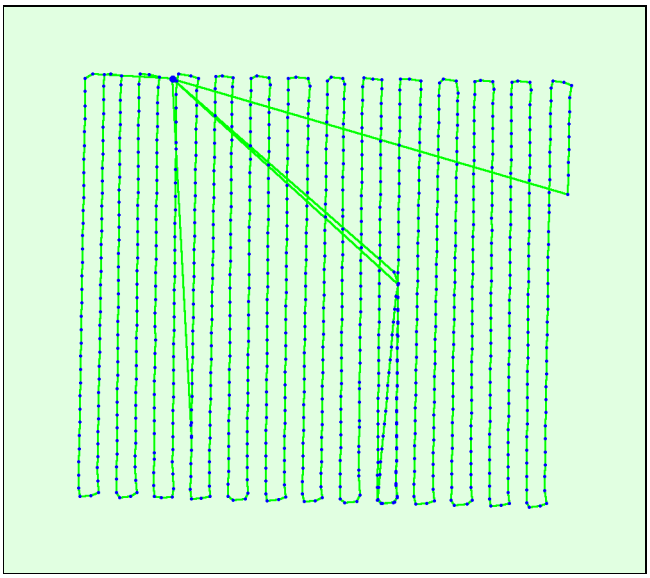
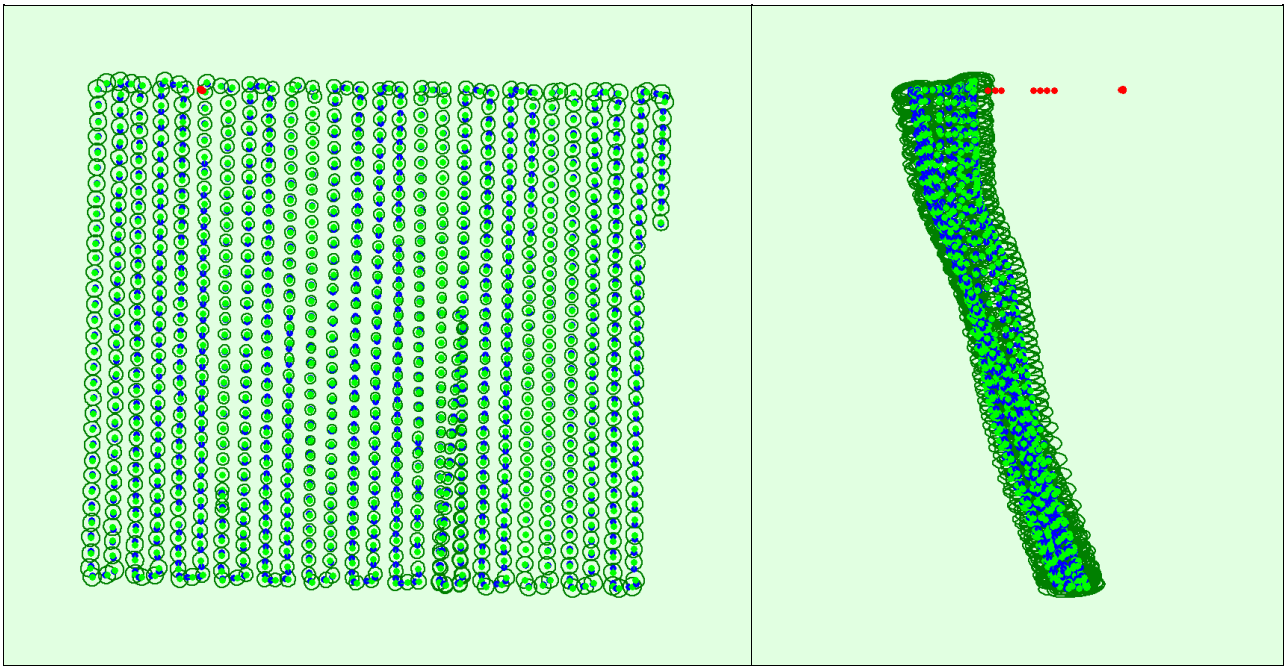
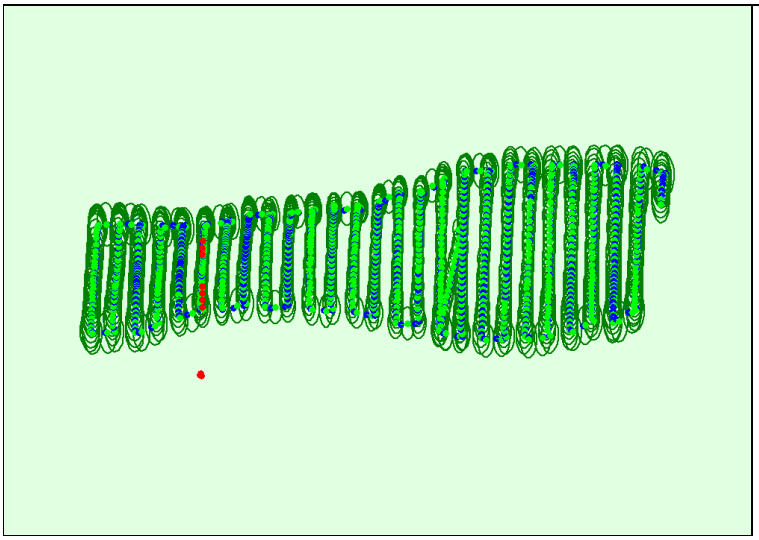


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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	0.105	0.107	0.228	0.063	0.060	0.025
Sigma	0.018	0.018	0.047	0.001	0.002	0.000

Overlap

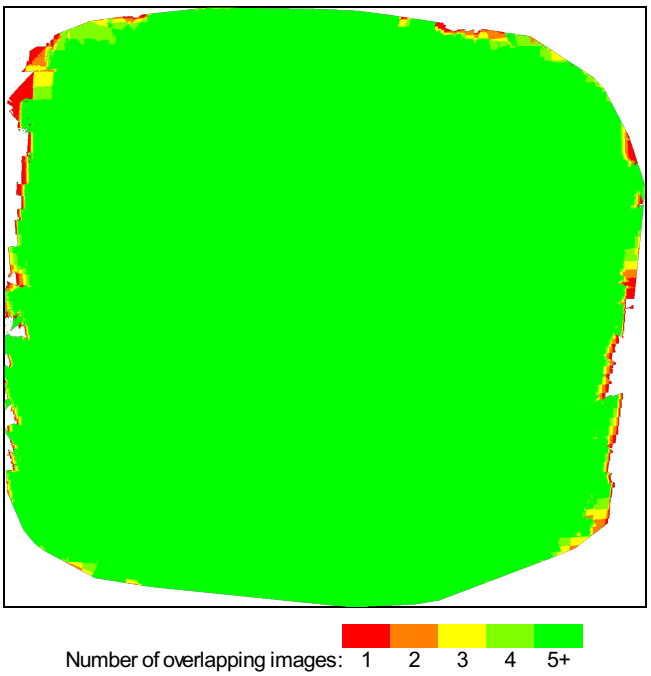


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	1758331

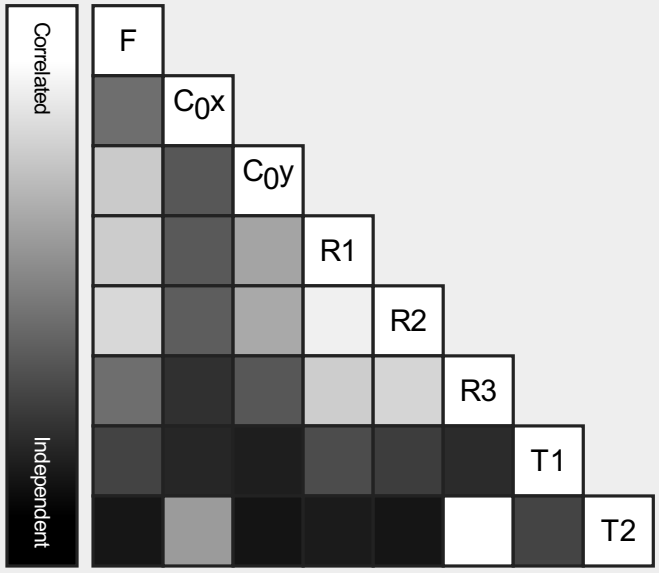
Number of 3D Points for Bundle Block Adjustment	637385
Mean Reprojection Error [pixels]	0.131

Internal Camera Parameters

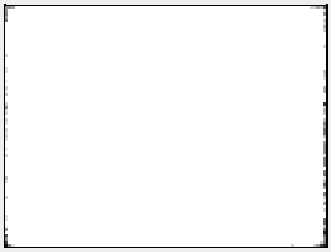
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2318.925 [pixel] 3.662 [mm]	1985.021 [pixel] 3.135 [mm]	1503.348 [pixel] 2.374 [mm]	-0.130	0.112	-0.015	0.001	0.000
Uncertainties (Sigma)	1.990 [pixel] 0.003 [mm]	0.053 [pixel] 0.000 [mm]	0.069 [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	12031	1805
Min	11293	849
Max	14249	3603
Mean	12149	1841

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	436537
In 3 Images	106451
In 4 Images	41479
In 5 Images	19737
In 6 Images	10774

In 7 Images	6375
In 8 Images	4136
In 9 Images	2759
In 10 Images	2040
In 11 Images	1472
In 12 Images	1100
In 13 Images	796
In 14 Images	645
In 15 Images	507
In 16 Images	404
In 17 Images	341
In 18 Images	265
In 19 Images	230
In 20 Images	205
In 21 Images	164
In 22 Images	118
In 23 Images	96
In 24 Images	96
In 25 Images	74
In 26 Images	76
In 27 Images	73
In 28 Images	43
In 29 Images	54
In 30 Images	40
In 31 Images	32
In 32 Images	37
In 33 Images	24
In 34 Images	28
In 35 Images	21
In 36 Images	20
In 37 Images	20
In 38 Images	14
In 39 Images	15
In 40 Images	9
In 41 Images	8
In 42 Images	5
In 43 Images	5
In 44 Images	7
In 45 Images	7
In 46 Images	7
In 47 Images	4
In 48 Images	5
In 49 Images	2
In 50 Images	1
In 51 Images	1
In 52 Images	4
In 53 Images	2
In 54 Images	3
In 55 Images	1
In 56 Images	4
In 60 Images	1
In 62 Images	2
In 63 Images	1
In 64 Images	1
In 67 Images	1
In 72 Images	1
In 73 Images	1
In 75 Images	1
In 81 Images	2

In 88 Images	1

2D Keypoint Matches

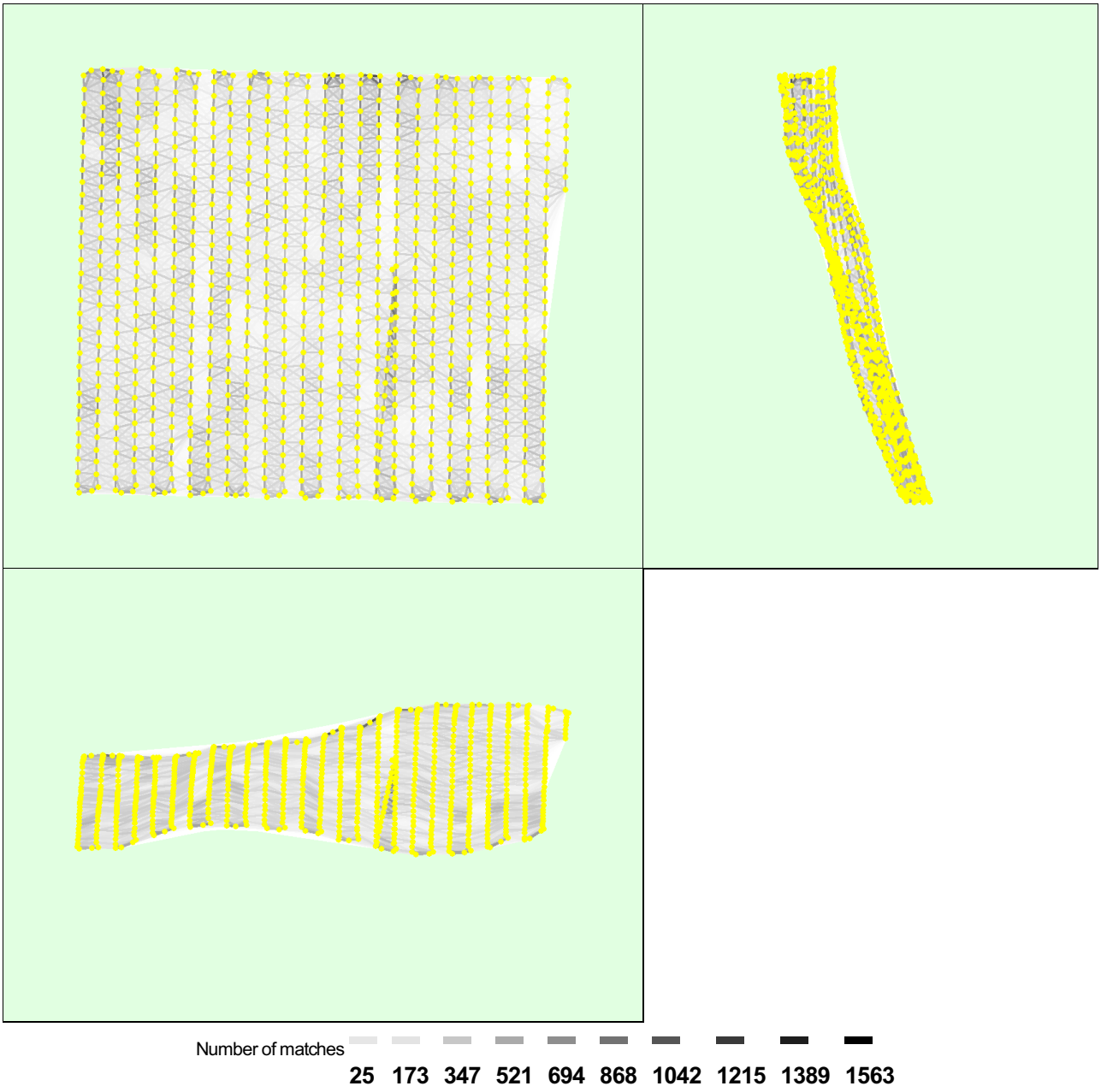


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	0.84	18.53	0.10
-3.00	0.00	37.80	30.58	50.99
0.00	3.00	61.36	30.16	48.48

3.00	6.00	0.00	20.73	0.42
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	-0.000001
Sigma [m]		0.637084	2.741104	1.167419
RMS Error [m]		0.637084	2.741104	1.167419

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]	100.00	98.32	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	0.921
Phi	0.651
Kappa	4.292

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	04h:03m:57s
Time for Point Cloud Classification	07m:52s
Time for 3D Textured Mesh Generation	21m:06s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	41800114
Average Density (per m^3)	20.48

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.62 [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 (5.62 [cm/pixel])
Time for DSM Generation	03m:11s
Time for Orthomosaic Generation	04h:09m:01s
Time for DTM Generation	02m:25s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s