Quality Report

Generated with Pix4Dmapper Pro version 4.2.26

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	sequoia_5000_3_rgb
Processed	2018-04-20 09:12:57
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	4.82 cm / 1.90 in
Area Covered	0.558 km^2 / 55.8250 ha / 0.22 sq. mi. / 138.0180 acres
Time for Initial Processing (without report)	01h:19m:48s

Quality Check

Images	median of 11022 keypoints per image	✓
Dataset	1250 out of 1256 images calibrated (99%), all images enabled	✓
Camera Optimization	0.47% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1690.25 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

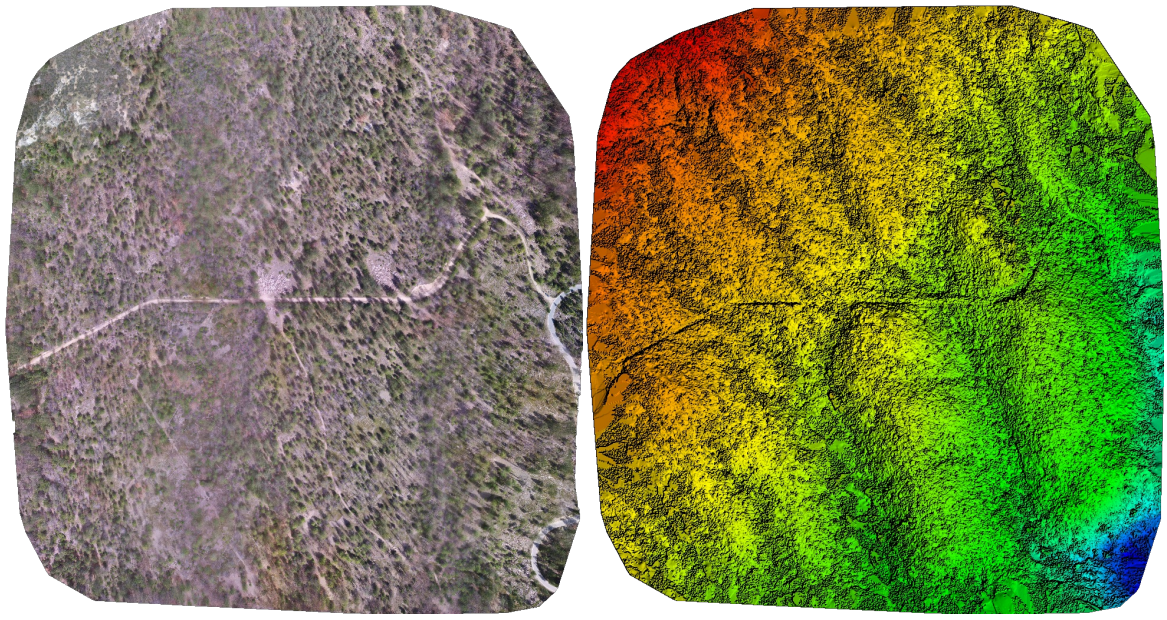


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1250 out of 1256
Number of Geolocated Images	1256 out of 1256

Initial Image Positions

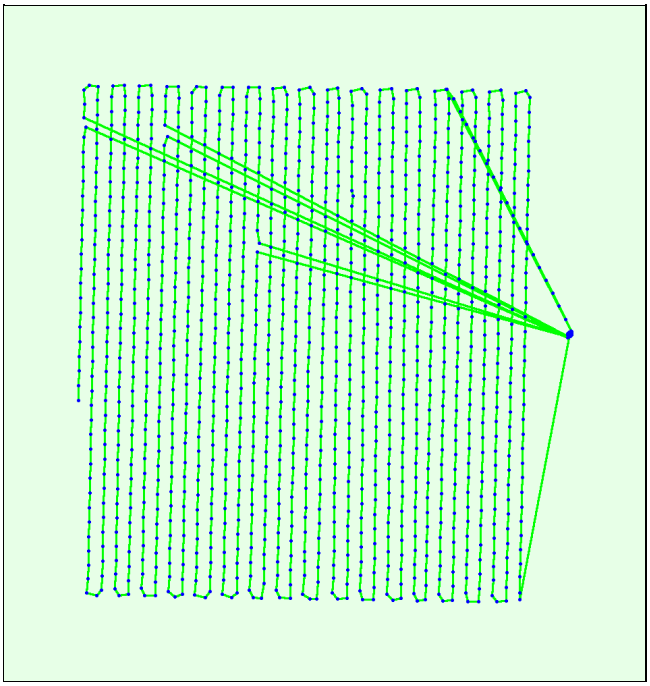
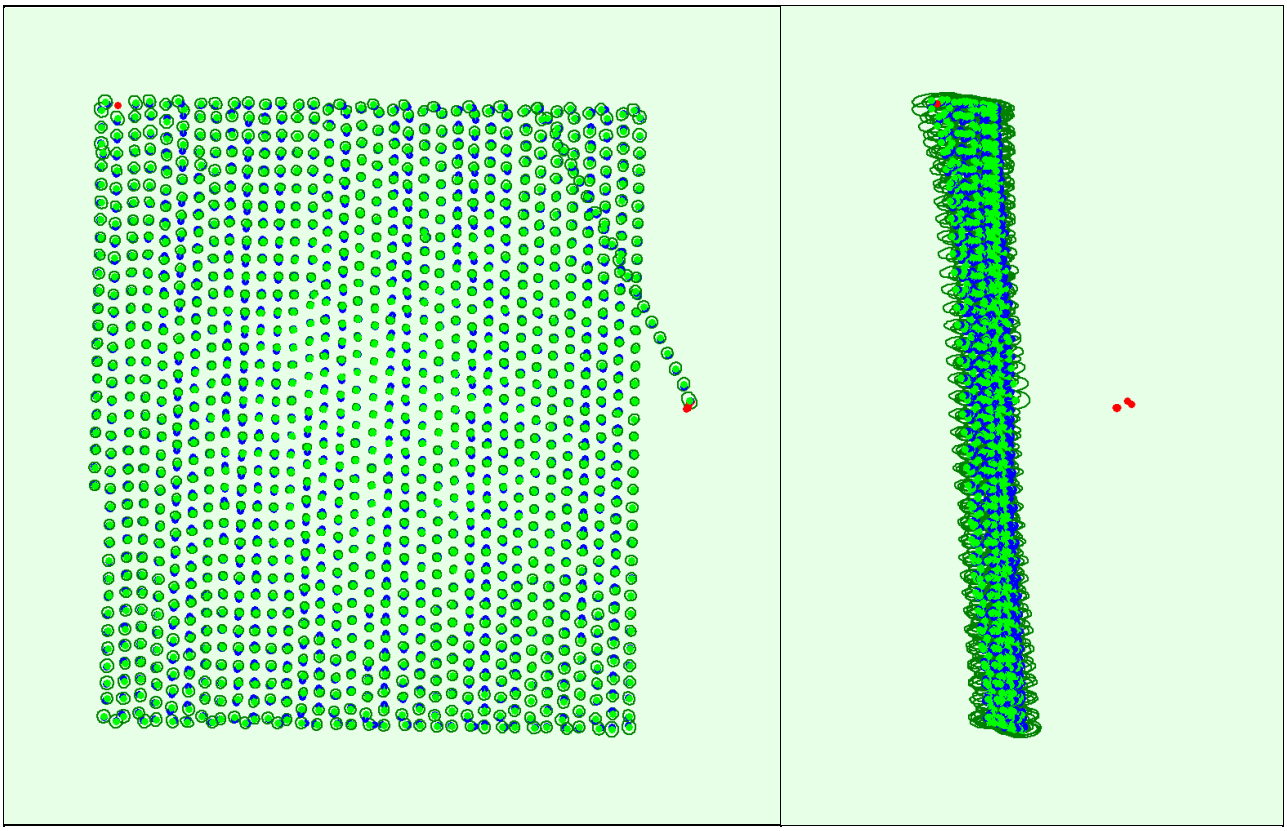


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



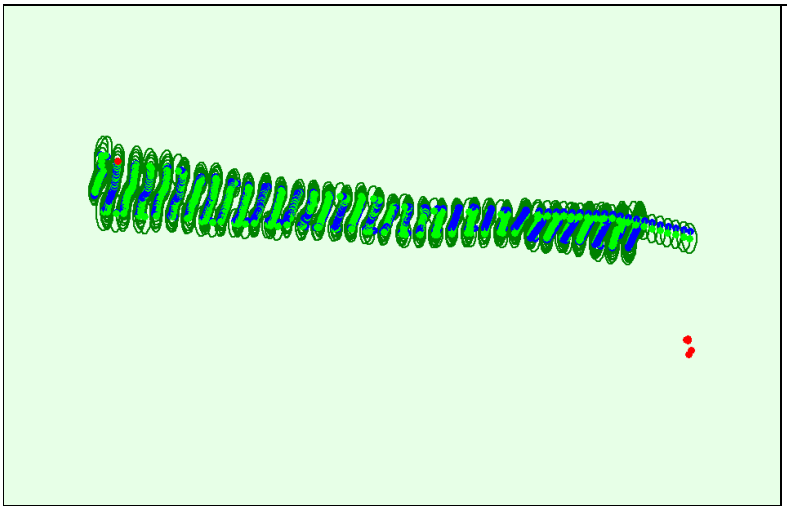


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled 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	0.100	0.101	0.236	0.055	0.057	0.016
Sigma	0.016	0.016	0.048	0.011	0.008	0.001

Overlap

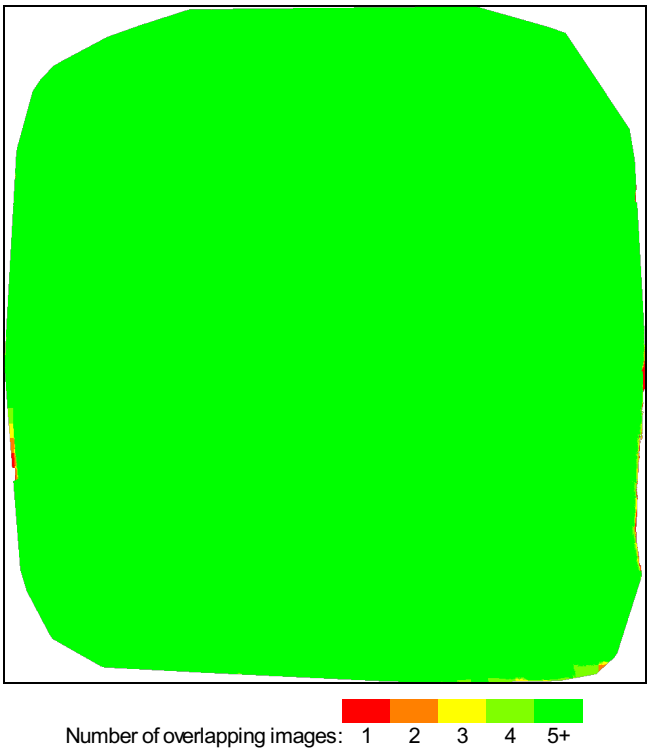


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

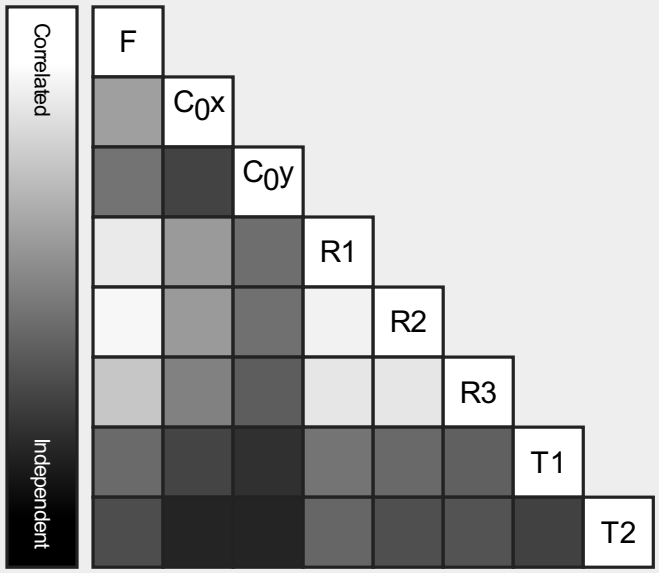
Number of 2D Keypoint Observations for Bundle Block Adjustment	2134729
Number of 3D Points for Bundle Block Adjustment	626997
Mean Reprojection Error [pixels]	0.176

Internal Camera Parameters

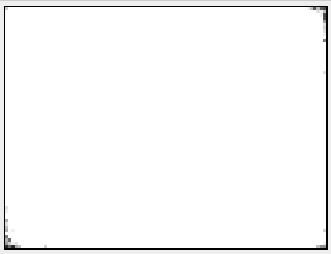
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2296.637 [pixel] 3.627 [mm]	1986.173 [pixel] 3.137 [mm]	1501.648 [pixel] 2.372 [mm]	-0.127	0.111	-0.016	0.001	0.000
Uncertainties (Sigma)	3.953 [pixel] 0.006 [mm]	0.103 [pixel] 0.000 [mm]	0.094 [pixel] 0.000 [mm]	0.000	0.001	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	11022	1690
Min	9991	689
Max	13444	3183
Mean	11009	1708

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	375656
In 3 Images	102927
In 4 Images	48019
In 5 Images	27938

In 6 Images	17896
In 7 Images	12086
In 8 Images	8591
In 9 Images	6478
In 10 Images	4935
In 11 Images	3919
In 12 Images	3076
In 13 Images	2487
In 14 Images	2016
In 15 Images	1630
In 16 Images	1386
In 17 Images	1204
In 18 Images	923
In 19 Images	828
In 20 Images	670
In 21 Images	560
In 22 Images	503
In 23 Images	414
In 24 Images	363
In 25 Images	284
In 26 Images	257
In 27 Images	273
In 28 Images	211
In 29 Images	162
In 30 Images	148
In 31 Images	146
In 32 Images	128
In 33 Images	111
In 34 Images	91
In 35 Images	82
In 36 Images	70
In 37 Images	67
In 38 Images	62
In 39 Images	53
In 40 Images	48
In 41 Images	43
In 42 Images	36
In 43 Images	23
In 44 Images	22
In 45 Images	25
In 46 Images	14
In 47 Images	16
In 48 Images	16
In 49 Images	14
In 50 Images	13
In 51 Images	4
In 52 Images	6
In 53 Images	11
In 54 Images	9
In 55 Images	10
In 56 Images	10
In 57 Images	3
In 59 Images	3
In 60 Images	7
In 61 Images	3
In 62 Images	1
In 64 Images	2
In 65 Images	1
In 66 Images	2

In 69 Images	2
In 70 Images	2
In 78 Images	1

2D Keypoint Matches

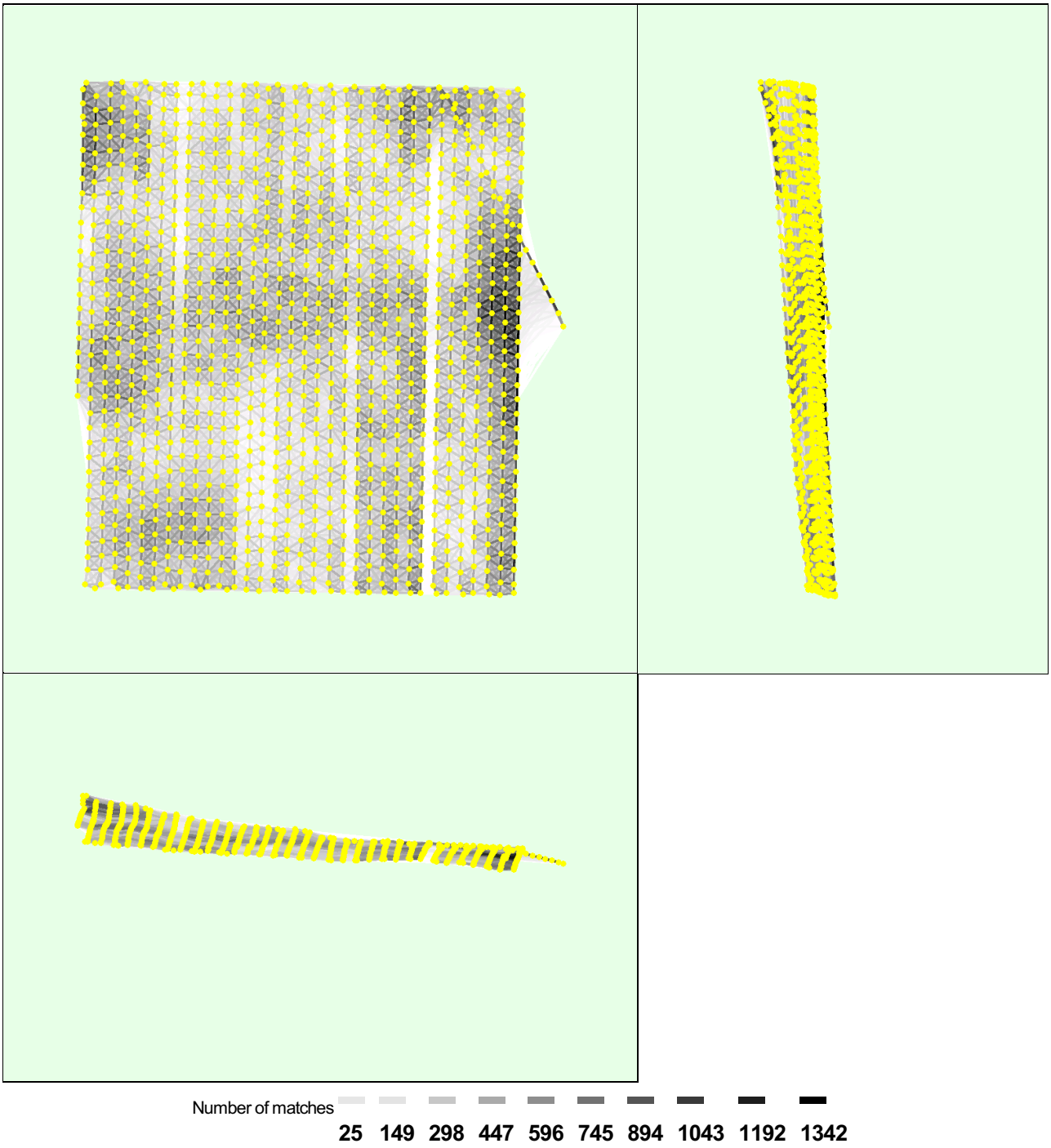


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	0.40	0.00
-6.00	-3.00	0.00	15.52	10.96
-3.00	0.00	51.76	32.80	41.76
0.00	3.00	47.52	35.12	35.52
3.00	6.00	0.72	16.16	11.12
6.00	9.00	0.00	0.00	0.64
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]		-0.002721	-0.000415	-0.008154
Sigma [m]		0.803002	2.675798	2.379556
RMS Error [m]		0.803006	2.675798	2.379570

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]	99.92	95.92	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	0.577
Phi	1.908
Kappa	4.973

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) i7-4770 CPU @ 3.40GHz RAM: 32GB GPU: RDPDD Chained DD (Driver: unknown), RDPDD Chained DD (Driver: unknown), RDP Encoder Mirror Driver (Driver: unknown), RDP Reflector Display Driver (Driver: unknown)
Operating System	Windows 7 Enterprise, 64-bit

Coordinate Systems

Image Coordinate System	WGS84 (egm96)
Output Coordinate System	WGS 84 / UTM zone 11N (egm96)

Processing Options

Detected Template	Local structure outbreak intensity RGB*

Keypoints Image Scale	Custom, Image Scale: 0.5
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: yes
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Alternative Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, no

Point Cloud Densification details

Processing Options

Image Scale	multiscale, 1/4 (Quarter image size, Fast)
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	01h:19m:50s
Time for Point Cloud Classification	04m:19s
Time for 3D Textured Mesh Generation	15m:55s

Results

Number of Generated Tiles	1
Number of 3D Densified Points	13662964
Average Density (per m^3)	9.88

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (4.82 [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 (4.82 [cm/pixel])
Time for DSM Generation	03m:29s
Time for Orthomosaic Generation	05h:37m:47s
Time for DTM Generation	07m:35s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s