Quality Report

Generated with PIX4Dmapper version 4.8.4

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	warsaw
Processed	2025-10-18 00:04:22
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	4.74 cm / 1.87 in
Area Covered	1.930 km^2 / 192.9877 ha / 0.75 sq. mi. / 477.1297 acres

Quality Check

Images	median of 42834 keypoints per image	✓
Dataset	731 out of 731 images calibrated (100%), all images enabled	✓
Camera Optimization	0.13% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 8566.55 matches per calibrated image	✓
Georeferencing	yes, 10 GCPs (10 3D), mean RMS error = 0.013 m	✓

Preview

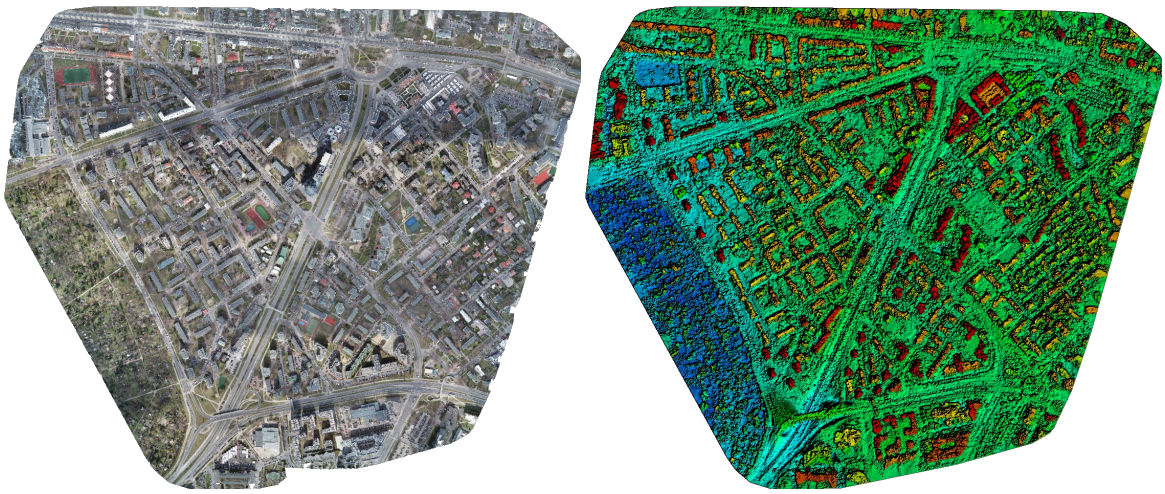


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	731 out of 731
Number of Geolocated Images	731 out of 731

Initial Image Positions

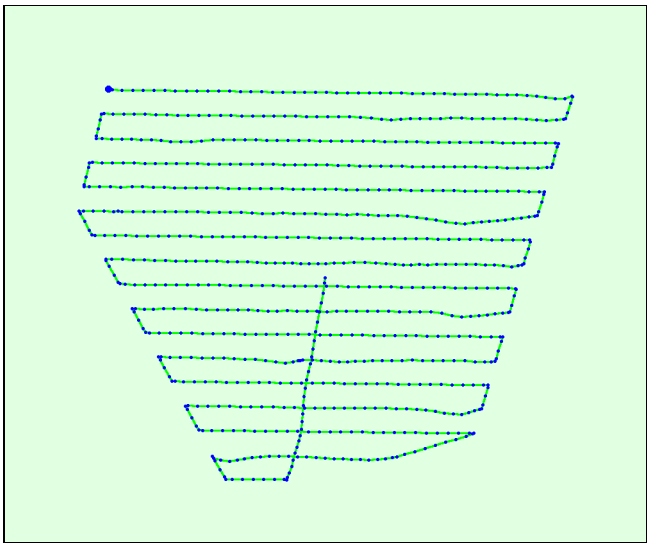


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions

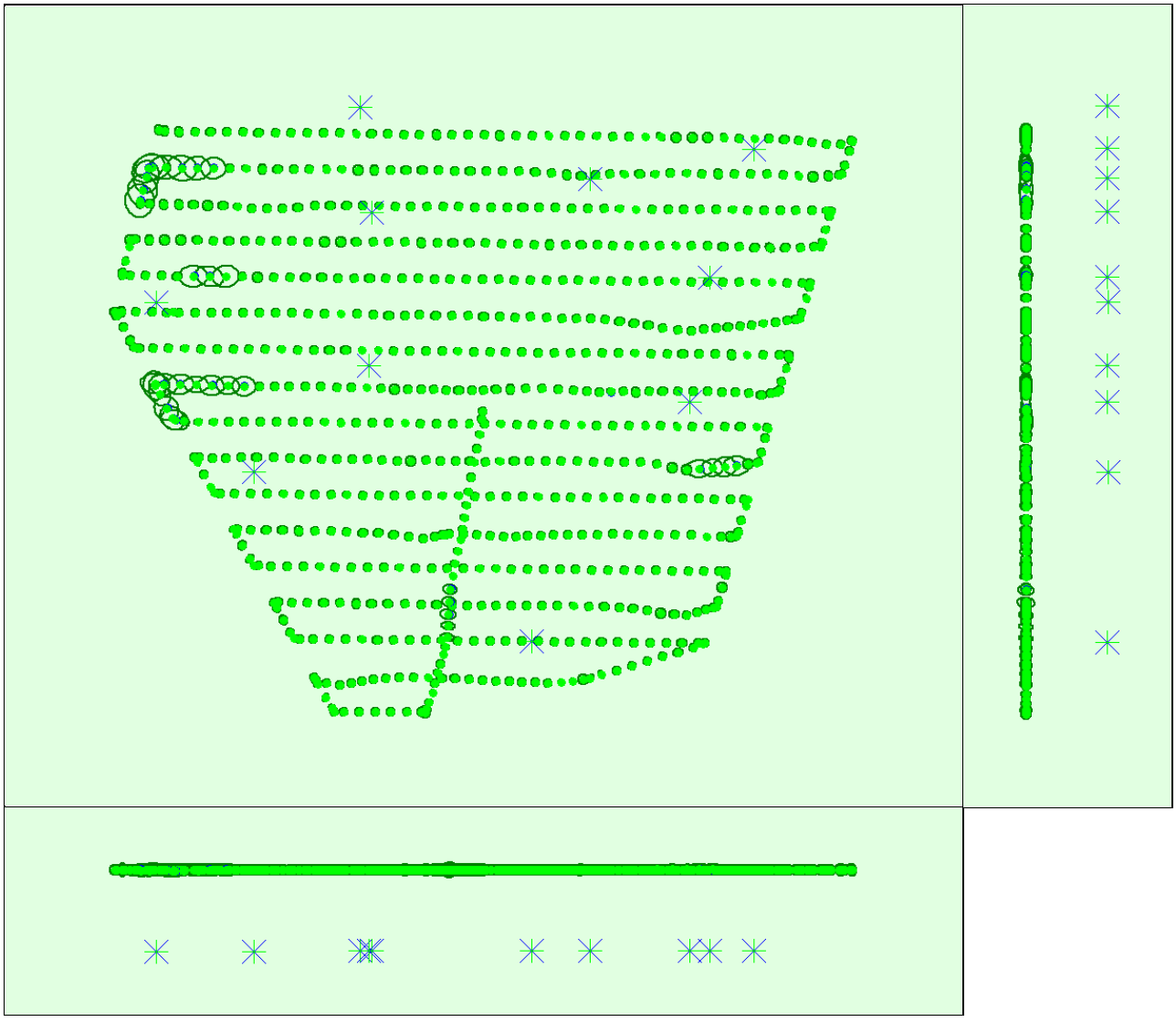


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses 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	0.009	0.008	0.009	0.003	0.003	0.002
Sigma	0.004	0.003	0.001	0.001	0.001	0.000

Overlap

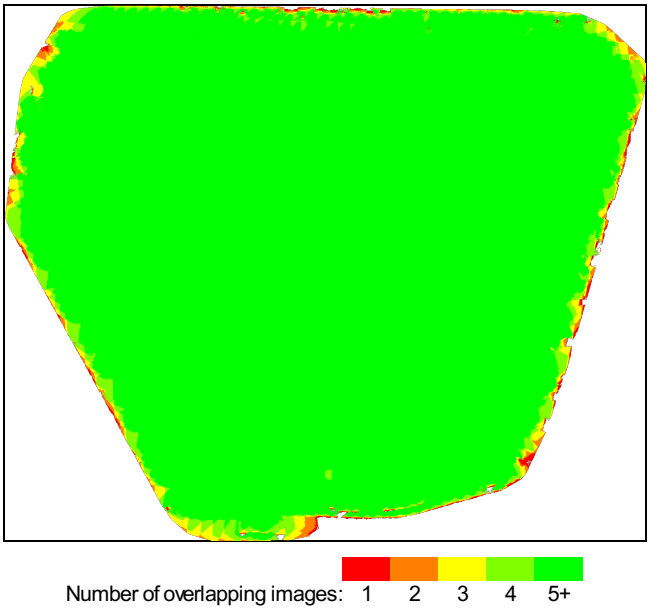


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

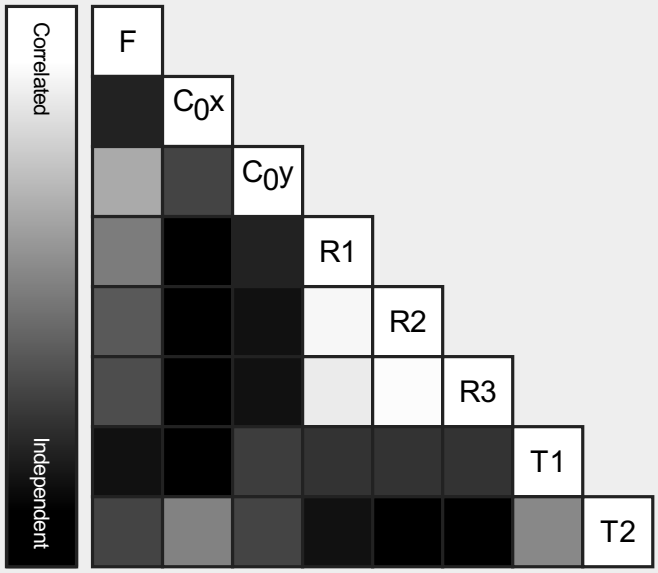
Number of 2D Keypoint Observations for Bundle Block Adjustment	6716690
Number of 3D Points for Bundle Block Adjustment	2220954
Mean Reprojection Error [pixels]	0.114

Internal Camera Parameters

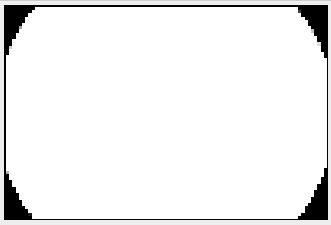
FC6310R_8.8_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]

EXIF ID: FC6310R_8.8_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3658.300 [pixel] 8.580 [mm]	2722.500 [pixel] 6.385 [mm]	1835.100 [pixel] 4.304 [mm]	-0.269	0.112	-0.033	0.000	-0.001
Optimized Values	3653.536 [pixel] 8.569 [mm]	2726.965 [pixel] 6.395 [mm]	1837.389 [pixel] 4.309 [mm]	-0.266	0.111	-0.033	-0.000	-0.000
Uncertainties (Sigma)	0.106 [pixel] 0.000 [mm]	0.062 [pixel] 0.000 [mm]	0.045 [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	42834	8567
Min	32637	4443
Max	68304	21150
Mean	44018	9188

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	1310444
In 3 Images	432992
In 4 Images	194788
In 5 Images	103435
In 6 Images	58501
In 7 Images	35266
In 8 Images	24597
In 9 Images	17150
In 10 Images	12205
In 11 Images	8797
In 12 Images	6259
In 13 Images	4349
In 14 Images	3201
In 15 Images	2416
In 16 Images	1872
In 17 Images	1314
In 18 Images	983
In 19 Images	704
In 20 Images	520
In 21 Images	420
In 22 Images	272
In 23 Images	179

In 24 Images	122
In 25 Images	74
In 26 Images	48
In 27 Images	22
In 28 Images	14
In 29 Images	7
In 30 Images	2
In 33 Images	1

2D Keypoint Matches

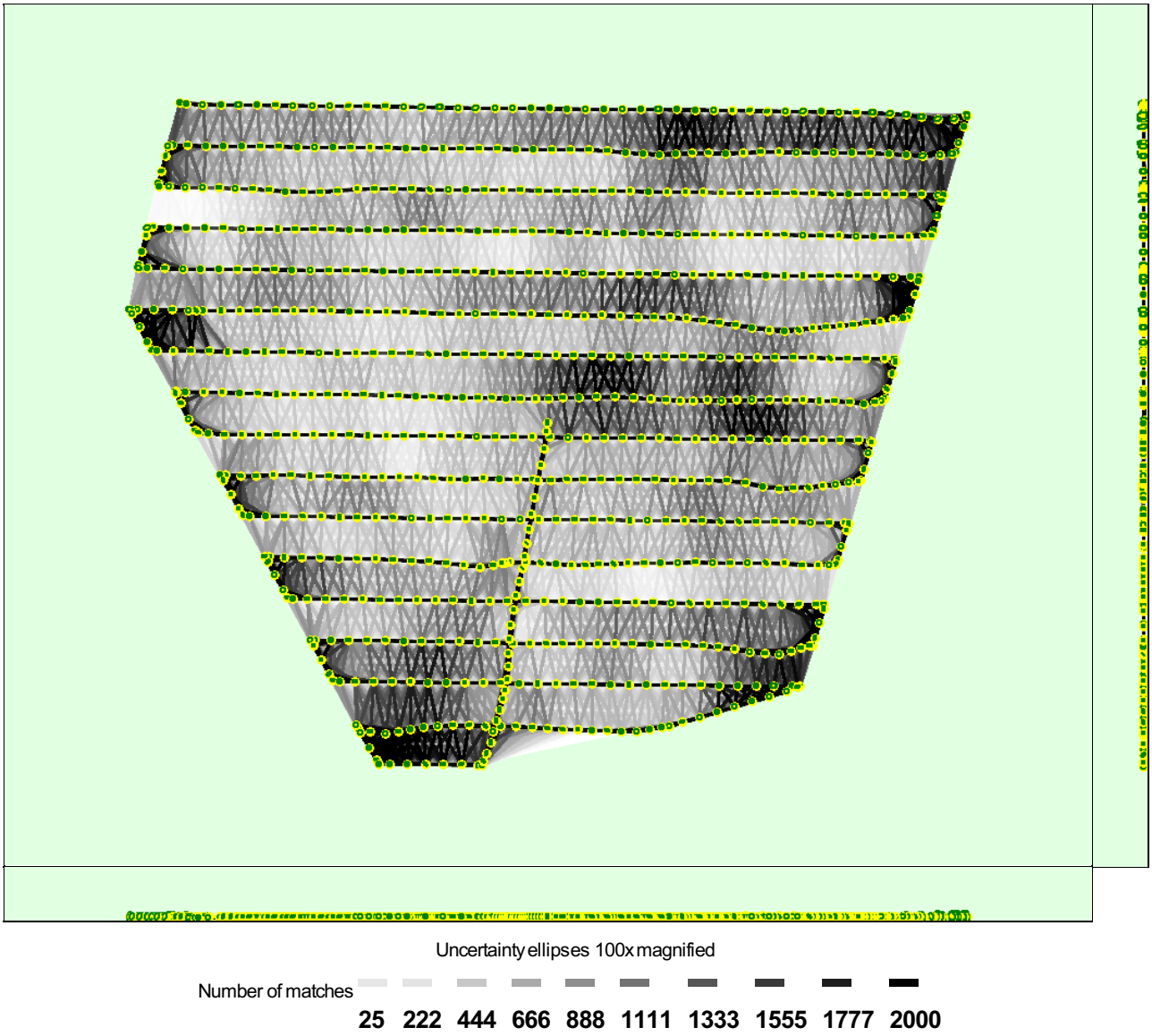


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.034	0.027	0.034	0.010	0.013	0.003
Sigma	0.005	0.005	0.013	0.003	0.003	0.001

Manual Tie Points

MTP Name	Projection Error [pixel]	Verified/Marked
mtp58	0.685	19 / 19

Projection errors for manual tie points.The last column counts the number of images where the manual tie point has been automatically verified vs. manually marked.

Geolocation Details

Ground Control Points

GCP Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
0012 (3D)	0.020/ 0.020	0.013	0.014	-0.013	0.350	19 / 19
0017 (3D)	0.020/ 0.020	-0.009	-0.020	-0.064	0.461	18 / 18
0018 (3D)	0.020/ 0.020	0.004	0.004	0.015	0.346	13 / 13
0028 (3D)	0.020/ 0.020	-0.001	0.002	-0.002	0.147	6 / 6
0029 (3D)	0.020/ 0.020	0.001	0.002	0.000	0.085	9 / 9
0050 (3D)	0.020/ 0.020	-0.002	-0.009	0.023	0.212	9 / 9
0051 (3D)	0.020/ 0.020	-0.002	0.002	0.011	0.241	3 / 3
0052 (3D)	0.020/ 0.020	-0.006	-0.004	0.014	0.685	29 / 29
0053 (3D)	0.020/ 0.020	0.002	-0.001	0.034	0.574	23 / 23
0054 (3D)	0.020/ 0.020	-0.003	0.001	-0.019	0.171	30 / 30
Mean [m]		-0.000266	-0.000937	-0.000238		
Sigma [m]		0.005720	0.008428	0.026177		
RMS Error [m]		0.005726	0.008480	0.026178		

0 out of 4 check points have been labeled as inaccurate.

Check Point Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
0011		0.0030	-0.0049	0.0012	0.3196	23 / 23
0013		-0.0010	-0.0085	0.0084	0.2819	31 / 32
0049		0.0026	-0.0021	-0.0116	0.1394	9 / 9
0055		0.0057	-0.0038	0.0546	0.5185	27 / 27
Mean [m]		0.002564	-0.004827	0.013155		
Sigma [m]		0.002354	0.002347	0.025011		
RMS Error [m]		0.003481	0.005367	0.028259		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of calibrated images where the GCP has been automatically verified vs. manually marked.

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-10.20	0.00	0.00	0.00
-10.20	-8.16	0.00	0.00	0.00
-8.16	-6.12	0.00	0.00	0.00
-6.12	-4.08	0.00	0.00	0.00
-4.08	-2.04	0.00	0.00	0.00
-2.04	0.00	46.92	48.15	48.43
0.00	2.04	53.08	51.71	51.57
2.04	4.08	0.00	0.14	0.00
4.08	6.12	0.00	0.00	0.00
6.12	8.16	0.00	0.00	0.00
8.16	10.20	0.00	0.00	0.00
10.20	-	0.00	0.00	0.00
Mean [m]		0.024600	0.045381	-0.027688
Sigma [m]		0.129271	0.252822	0.115685
RMS Error [m]		0.131591	0.256863	0.118952

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.

Geolocation Bias	X	Y	Z
Translation [m]	-0.001513	-0.002761	-0.023605

Bias between image initial and computed geolocation given in output coordinate system.

Relative Geolocation Variance

Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	100.00	98.08	90.70
[-2.00, 2.00]	100.00	99.73	98.50
[-3.00, 3.00]	100.00	100.00	99.73
Mean of Geolocation Accuracy [m]	0.073255	0.073255	0.147966
Sigma of Geolocation Accuracy [m]	0.298875	0.298875	0.595809

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	0.419
Phi	0.401
Kappa	4.841

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) i7-4790K CPU @ 4.00GHz RAM: 32GB GPU: Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown), Microsoft Remote Display Adapter (Driver: unknown)
Operating System	Windows 11, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84
Ground Control Point (GCP) Coordinate System	ETRF2000-PL / CS2000/21 (EGM96 Geoid)
Output Coordinate System	ETRF2000-PL / CS2000/21 (EGM96 Geoid)

Processing Options

Detected Template	3D Maps
Keypoints Image Scale	Full, Image Scale: 1
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, 1/4 (Quarter image size, Fast)
Point Density	High (Slow)
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	02h:10m:21s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	02h:22m:10s

Results

Number of Processed Clusters	2
Number of Generated Tiles	4
Number of 3D Densified Points	84442262
Average Density (per m^3)	24.74

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (4.74 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	38m:58s
Time for Orthomosaic Generation	01h:47m:46s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s