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	umtoval_oblique_rgb400ft
Processed	2025-09-21 12:42:38
Camera Model Name(s)	M3T_4.4_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	7.33 cm / 2.89 in
Area Covered	0.354 km^2 / 35.3940 ha / 0.14 sq. mi. / 87.5057 acres
Time for Initial Processing (without report)	54m:00s

Quality Check

Images	median of 37816 keypoints per image	✓
Dataset	287 out of 287 images calibrated (100%), all images enabled	✓
Camera Optimization	0.65% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 16159 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

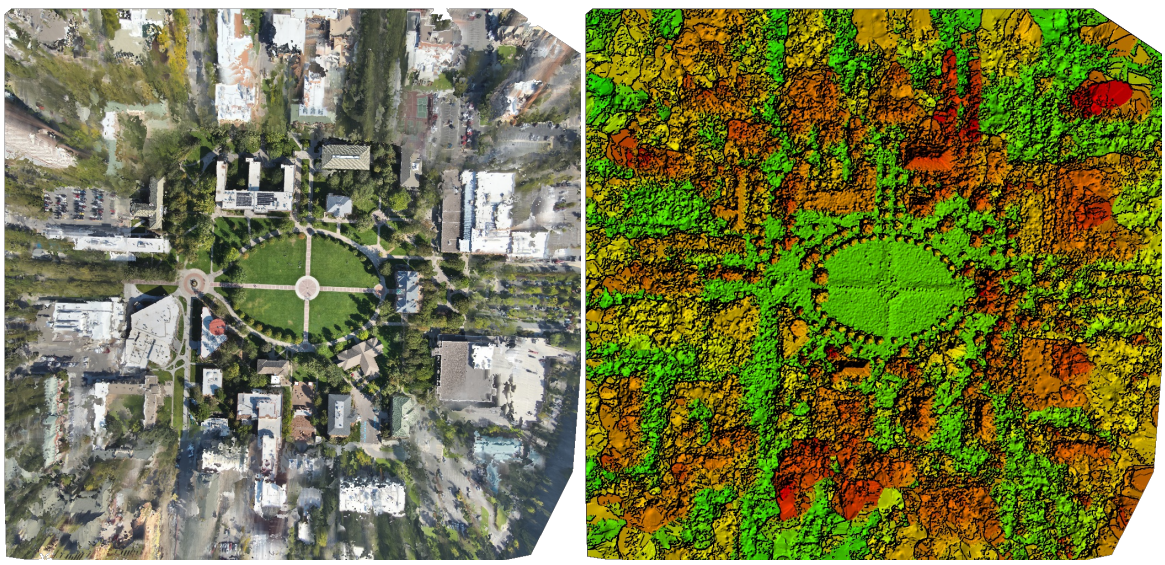


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	287 out of 287
Number of Geolocated Images	287 out of 287

Initial Image Positions

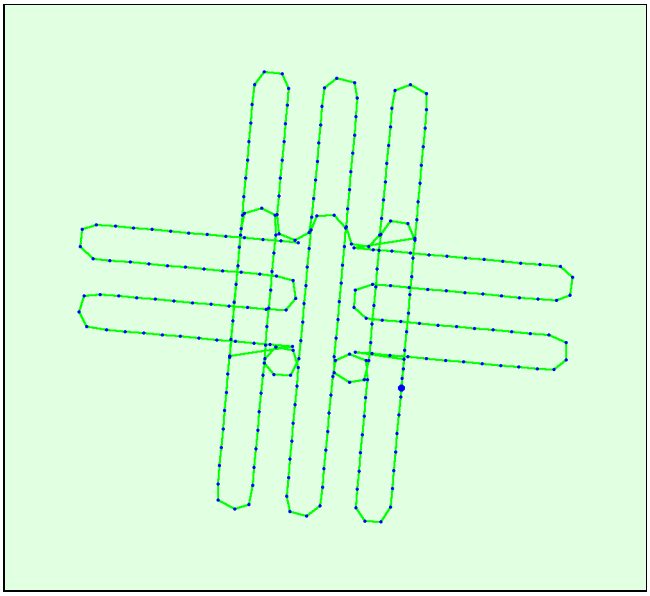
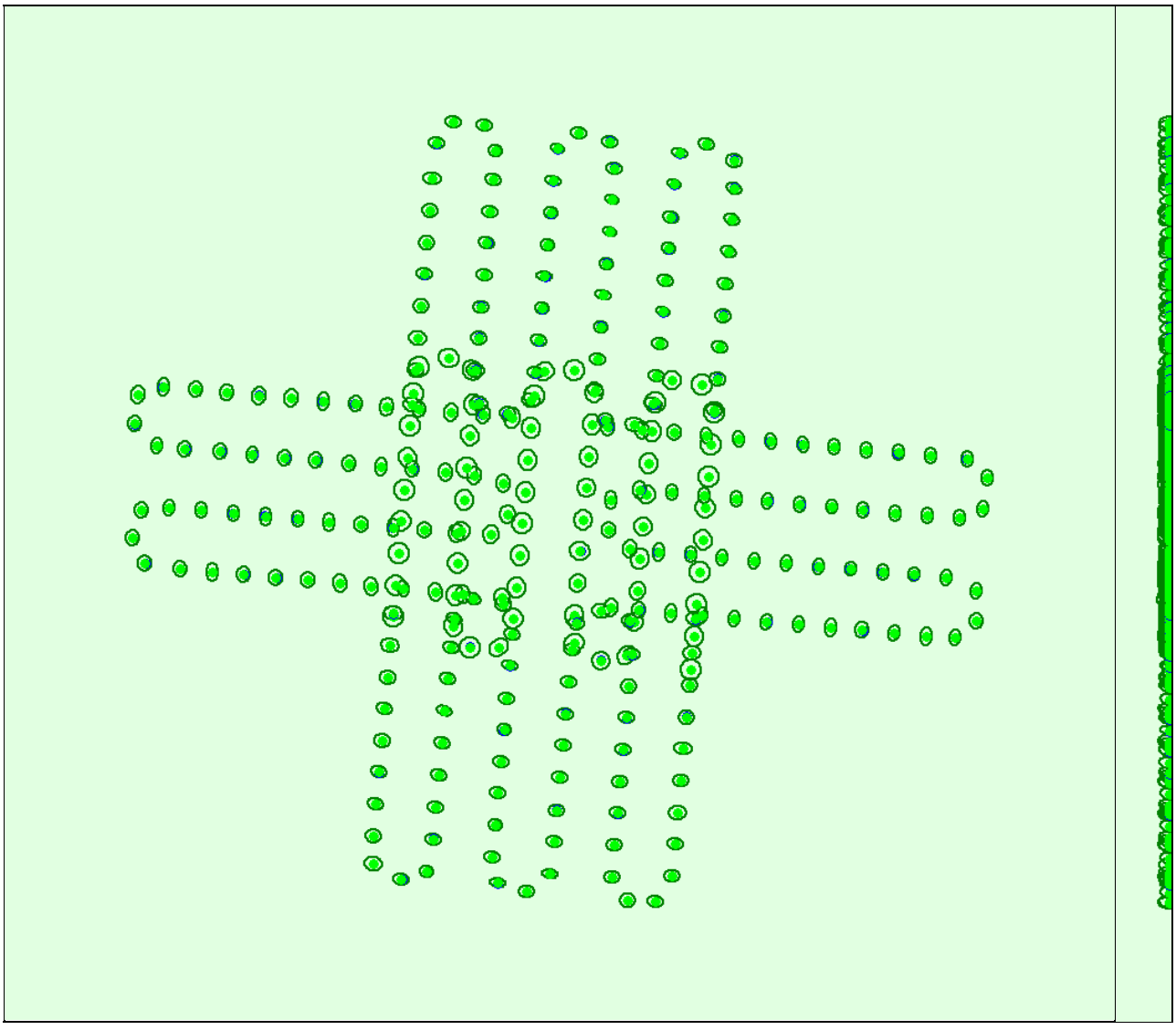


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 500x 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). 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	0.008	0.008	0.009	0.004	0.003	0.004
Sigma	0.001	0.002	0.002	0.001	0.001	0.001

Overlap

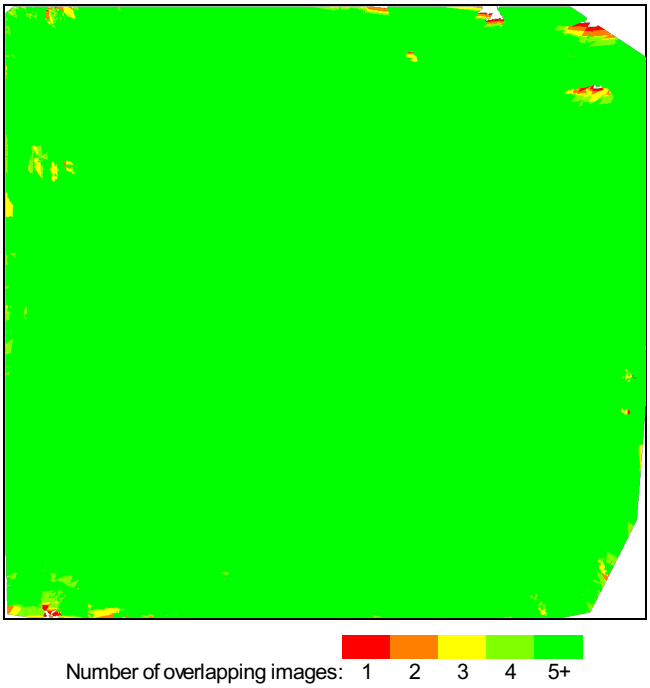


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	4668524
Number of 3D Points for Bundle Block Adjustment	1407464
Mean Reprojection Error [pixels]	0.281

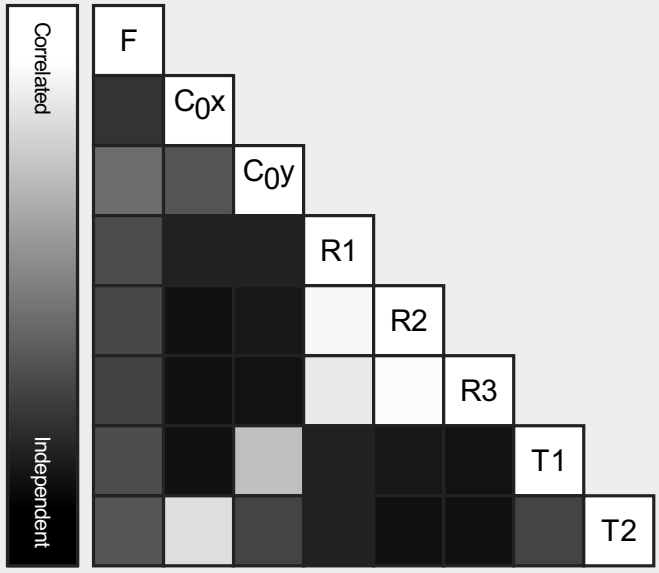
Internal Camera Parameters

M3T_4.4_4000x3000 (RGB). Sensor Dimensions: 6.400 [mm] x 4.800 [mm]

EXIF ID: M3T_4.4_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2873.340 [pixel] 4.597 [mm]	2009.980 [pixel] 3.216 [mm]	1485.010 [pixel] 2.376 [mm]	0.178	-0.431	0.218	-0.000	0.000

Optimized Values	2892.254 [pixel] 4.628 [mm]	1982.036 [pixel] 3.171 [mm]	1511.334 [pixel] 2.418 [mm]	0.171	-0.425	0.217	-0.000	0.000
Uncertainties (Sigma)	0.090 [pixel] 0.000 [mm]	0.085 [pixel] 0.000 [mm]	0.093 [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	37816	16159
Min	27133	10497
Max	45459	19965
Mean	37801	16267

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	880789
In 3 Images	229852
In 4 Images	99806
In 5 Images	53963
In 6 Images	33705
In 7 Images	22882
In 8 Images	16239
In 9 Images	12404
In 10 Images	9537
In 11 Images	7383
In 12 Images	6037
In 13 Images	5000
In 14 Images	4095
In 15 Images	3470
In 16 Images	2834
In 17 Images	2537
In 18 Images	2171

In 19 Images	1914
In 20 Images	1620
In 21 Images	1414
In 22 Images	1244
In 23 Images	1073
In 24 Images	917
In 25 Images	817
In 26 Images	702
In 27 Images	556
In 28 Images	495
In 29 Images	430
In 30 Images	366
In 31 Images	351
In 32 Images	319
In 33 Images	266
In 34 Images	201
In 35 Images	198
In 36 Images	190
In 37 Images	159
In 38 Images	147
In 39 Images	139
In 40 Images	113
In 41 Images	110
In 42 Images	99
In 43 Images	89
In 44 Images	96
In 45 Images	69
In 46 Images	73
In 47 Images	43
In 48 Images	56
In 49 Images	45
In 50 Images	43
In 51 Images	37
In 52 Images	29
In 53 Images	38
In 54 Images	24
In 55 Images	22
In 56 Images	17
In 57 Images	26
In 58 Images	23
In 59 Images	20
In 60 Images	7
In 61 Images	11
In 62 Images	8
In 63 Images	12
In 64 Images	11
In 65 Images	7
In 66 Images	6
In 67 Images	7
In 68 Images	6
In 69 Images	8
In 70 Images	4
In 71 Images	7
In 72 Images	4
In 73 Images	2
In 74 Images	3
In 75 Images	1
In 76 Images	6
In 77 Images	5

In 78 Images	4
In 79 Images	3
In 80 Images	3
In 81 Images	2
In 82 Images	3
In 83 Images	3
In 84 Images	4
In 85 Images	1
In 86 Images	1
In 87 Images	1
In 88 Images	2
In 90 Images	1
In 91 Images	2
In 92 Images	2
In 93 Images	1
In 94 Images	2
In 99 Images	1
In 100 Images	1
In 101 Images	2
In 102 Images	1
In 103 Images	2
In 105 Images	1
In 106 Images	1
In 110 Images	1
In 114 Images	1
In 116 Images	1
In 119 Images	1
In 121 Images	1
In 124 Images	1
In 125 Images	1
In 134 Images	1
In 135 Images	1
In 142 Images	1
In 148 Images	1

2D Keypoint Matches

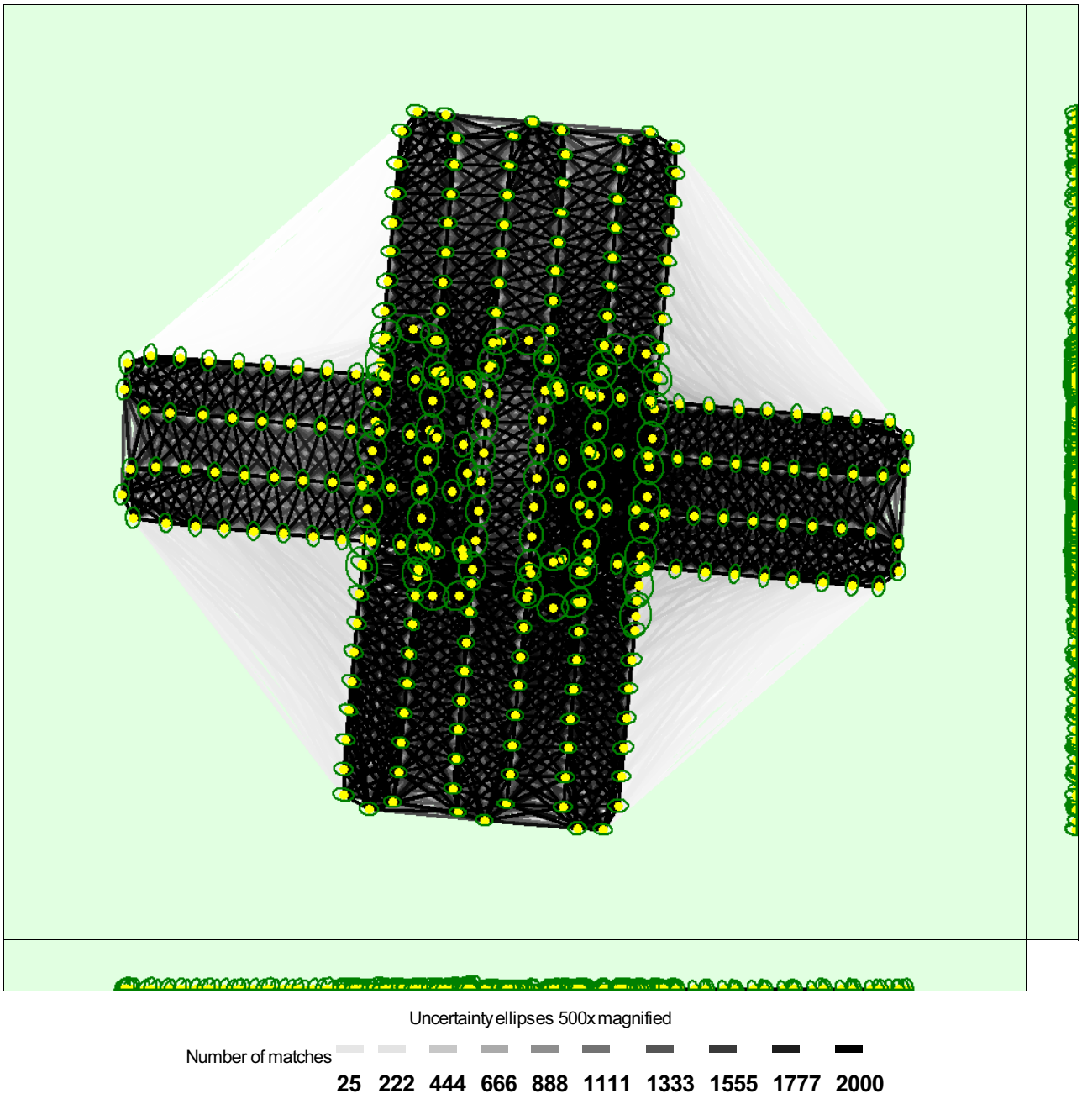


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.010	0.011	0.010	0.005	0.004	0.004
Sigma	0.003	0.005	0.002	0.002	0.002	0.001

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.06	23.00	22.65	8.36
-0.06	-0.05	2.79	2.09	5.92

-0.05	-0.04	2.79	3.83	3.48
-0.04	-0.03	4.88	5.92	9.06
-0.03	-0.01	8.36	7.67	9.06
-0.01	0.00	10.45	6.62	8.36
0.00	0.01	9.06	8.01	11.15
0.01	0.03	5.92	7.67	11.15
0.03	0.04	3.48	5.23	12.54
0.04	0.05	2.79	5.92	9.06
0.05	0.06	3.48	2.09	9.06
0.06	-	23.00	22.30	2.79
Mean [m]		-0.000245	0.000416	0.000460
Sigma [m]		0.136879	0.150903	0.043456
RMS Error [m]		0.136879	0.150903	0.043459

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]	30.66	26.13	62.72
[-2.00, 2.00]	45.99	49.13	93.38
[-3.00, 3.00]	57.84	55.75	99.30
Mean of Geolocation Accuracy [m]	0.022730	0.022730	0.039087
Sigma of Geolocation Accuracy [m]	0.000240	0.000240	0.000652

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

Geolocation Orientational Variance	RMS [degree]
Omega	0.497
Phi	0.440
Kappa	0.716

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: 13th Gen Intel(R) Core(TM) i7-13700 RAM: 16GB GPU: AMD Radeon RX 6500 (Driver: 32.0.21010.10), Intel(R) UHD Graphics 770 (Driver: 32.0.101.6881)
Operating System	Windows 11, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84
Output Coordinate System	WGS 84 / UTM zone 12N

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, yes

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	31m:25s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	07m:15s

Results

Number of Processed Clusters	5
Number of Generated Tiles	1
Number of 3D Densified Points	14410193
Average Density (per m^3)	14.02

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (7.33 [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	04m:14s
Time for Orthomosaic Generation	14m:29s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s