

Quality Report



Generated with PIX4Dmapper version 4.7.5



Important: Click on the different icons for:



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Additional information about the sections



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Summary



Project	Test_Process_by_code_PSN
Processed	2022-11-16 19:00:46
Camera Model Name(s)	ZenmuseP1_35.0_8192x5460 (RGB)
Average Ground Sampling Distance (GSD)	2.46 cm / 0.97 in
Area Covered	1.156 km ² / 115.5575 ha / 0.45 sq. mi. / 285.6965 acres
Time for Initial Processing (without report)	10m:32s

Quality Check



Images	median of 29277 keypoints per image	
Dataset	584 out of 584 images calibrated (100%), all images enabled	
Camera Optimization	0.06% relative difference between initial and optimized internal camera parameters	
Matching	median of 10663.6 matches per calibrated image	
Georeferencing	yes, 25 GCPs (25 3D), mean RMS error = 0.016 m	

Preview

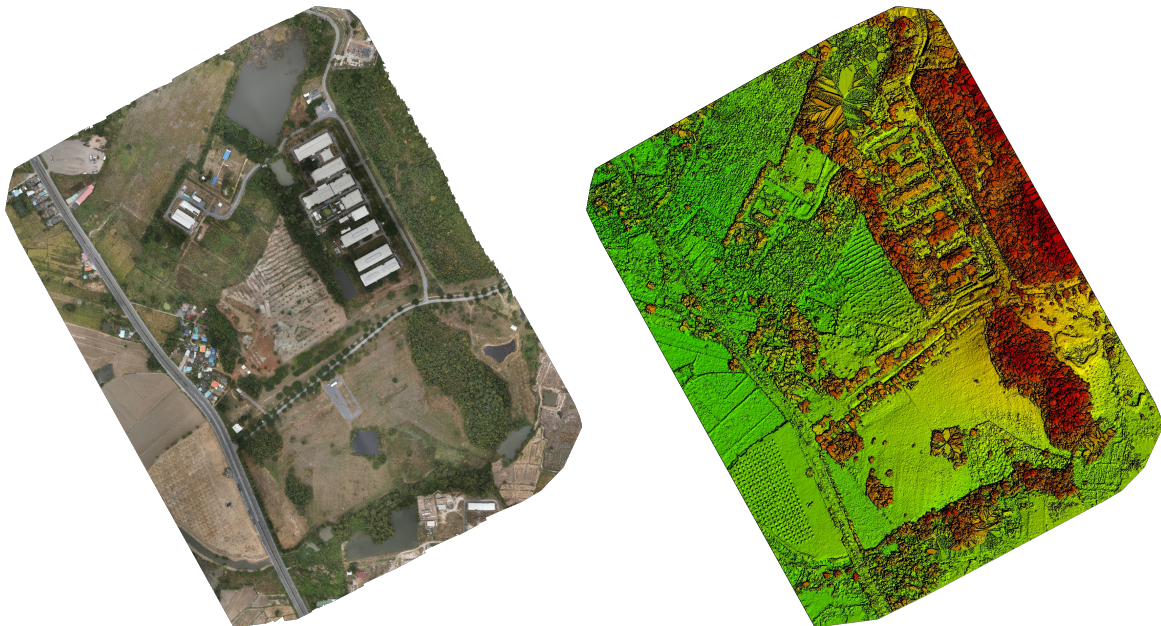


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	584 out of 584
Number of Geolocated Images	584 out of 584

Initial Image Positions

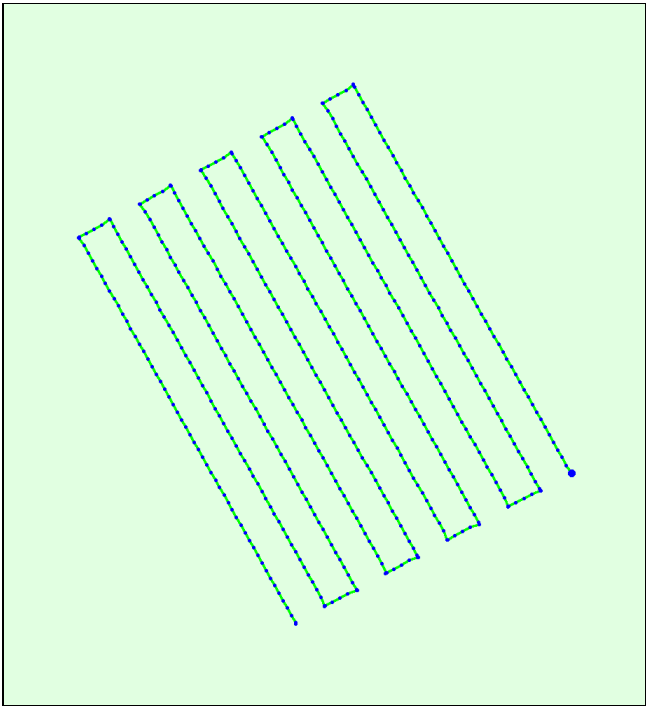
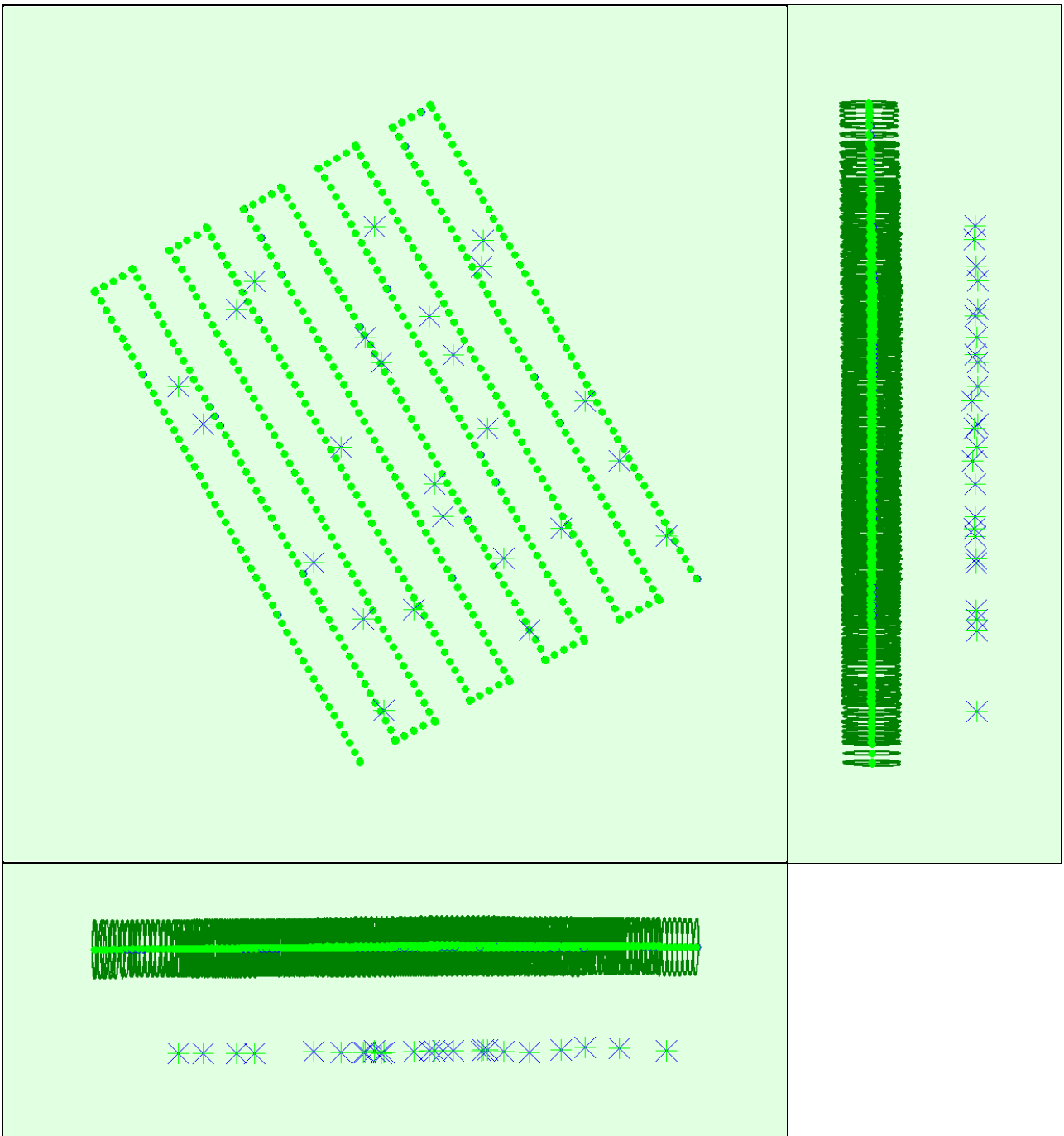


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 1000x 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	0.004	0.005	0.055	0.002	0.002	0.001
Sigma	0.000	0.000	0.000	0.000	0.000	0.000

? Overlap



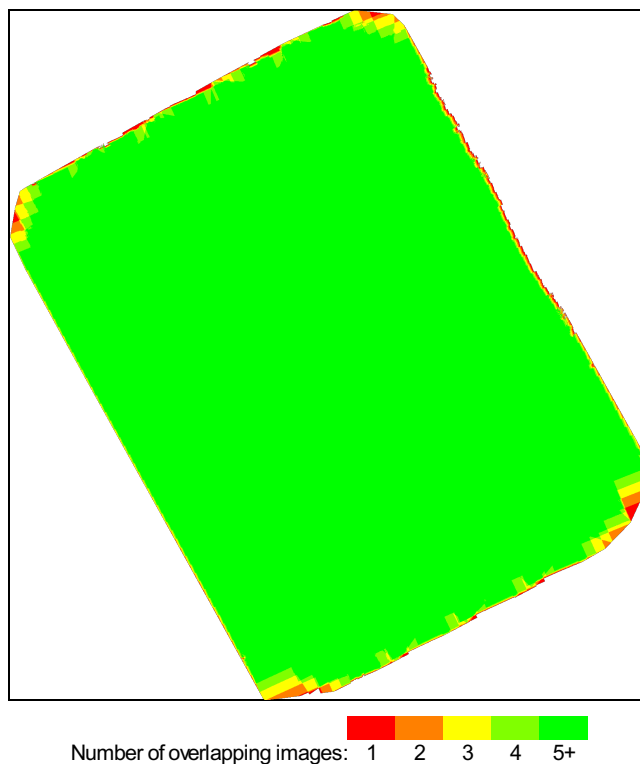


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	6576486
Number of 3D Points for Bundle Block Adjustment	1779482
Mean Reprojection Error [pixels]	0.087

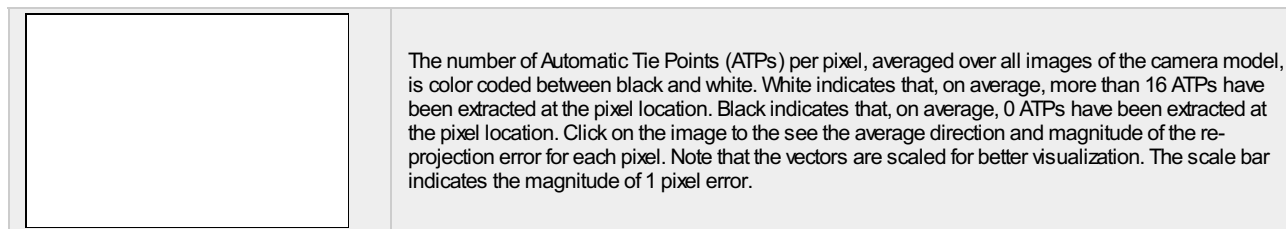
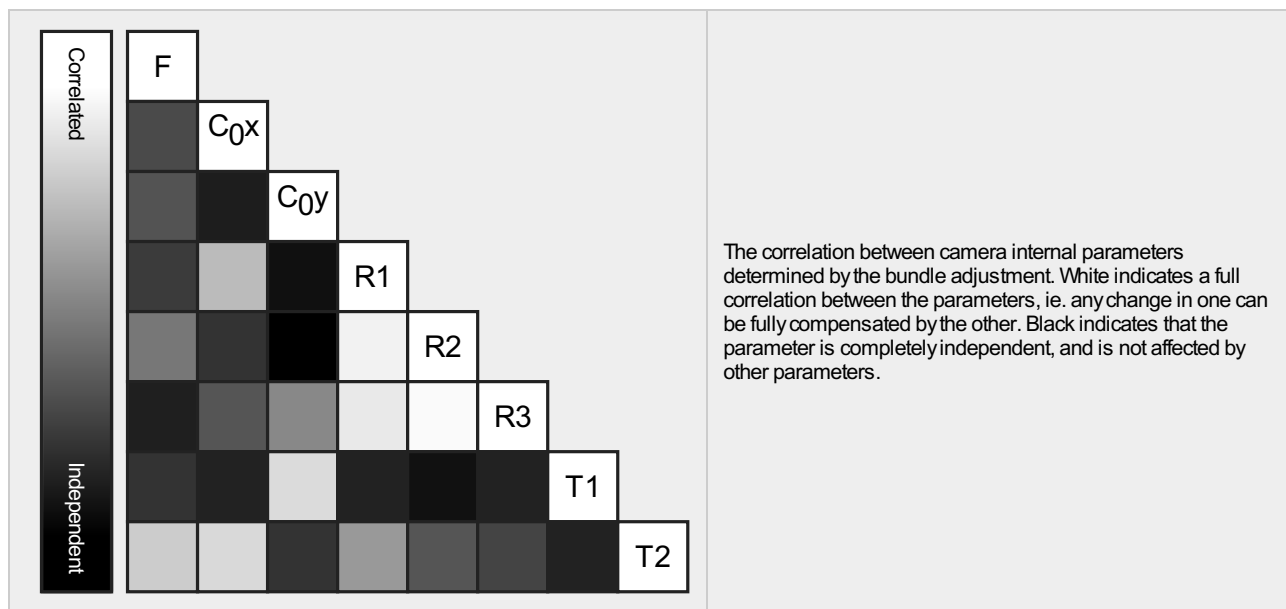
? Internal Camera Parameters

ZenmuseP1_35.0_8192x5460 (RGB). Sensor Dimensions: 35.000 [mm] x 23.328 [mm]



EXIF ID: ZenmuseP1_35.0_8192x5460

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	8194.340 [pixel] 35.010 [mm]	4096.001 [pixel] 17.500 [mm]	2729.996 [pixel] 11.664 [mm]	-0.048	0.021	-0.097	0.002	-0.001
Optimized Values	8199.356 [pixel] 35.031 [mm]	4076.450 [pixel] 17.416 [mm]	2747.215 [pixel] 11.737 [mm]	-0.048	0.017	-0.093	0.001	-0.001
Uncertainties (Sigma)	2.233 [pixel] 0.010 [mm]	0.120 [pixel] 0.001 [mm]	0.111 [pixel] 0.000 [mm]	0.000	0.001	0.001	0.000	0.000



2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	29277	10664
Min	12629	1413
Max	43463	24218
Mean	28734	11261

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	914969
In 3 Images	336703
In 4 Images	159958
In 5 Images	95982
In 6 Images	69349
In 7 Images	44362
In 8 Images	25086
In 9 Images	20553
In 10 Images	18351
In 11 Images	17240
In 12 Images	18169
In 13 Images	19727
In 14 Images	9710
In 15 Images	5200
In 16 Images	4575
In 17 Images	4316
In 18 Images	4302
In 19 Images	4802
In 20 Images	3872
In 21 Images	1237
In 22 Images	281
In 23 Images	249

In 24 Images	192
In 25 Images	149
In 26 Images	84
In 27 Images	46
In 28 Images	18

2D Keypoint Matches

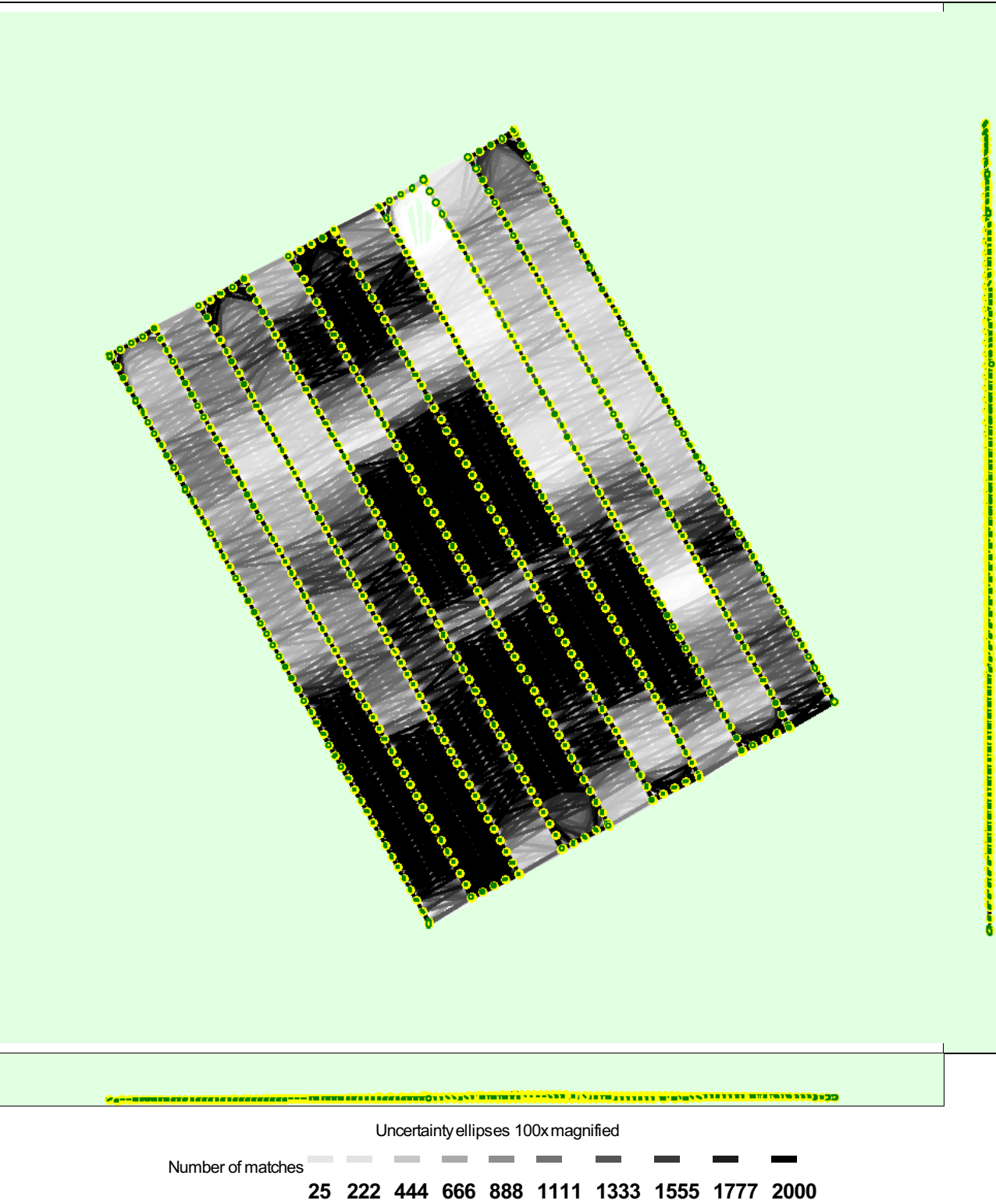


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.026	0.029	0.013	0.008	0.007	0.002
Sigma	0.006	0.006	0.004	0.002	0.002	0.001

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
LCP-01 (3D)	0.020/ 0.050	-0.008	-0.004	0.006	0.187	8 / 8
LCP-03 (3D)	0.020/ 0.050	-0.007	0.000	-0.002	0.185	8 / 8
LCP-05 (3D)	0.020/ 0.050	-0.000	0.000	-0.007	0.206	8 / 8
LCP-07 (3D)	0.020/ 0.050	0.018	0.021	0.043	0.267	8 / 8
LCP-09 (3D)	0.020/ 0.050	-0.002	-0.014	0.023	0.190	8 / 8
LCP-11 (3D)	0.020/ 0.050	0.020	0.002	0.007	0.284	8 / 8
LCP-13 (3D)	0.020/ 0.050	-0.022	-0.007	0.047	0.184	8 / 8
LCP-15 (3D)	0.020/ 0.050	0.005	-0.002	0.011	0.141	8 / 8
LCP-17 (3D)	0.020/ 0.050	0.005	-0.004	0.007	0.280	8 / 8
LCP-19 (3D)	0.020/ 0.050	0.007	-0.011	0.012	0.170	8 / 8
LCP-21 (3D)	0.020/ 0.050	0.001	0.005	0.027	0.250	8 / 8
LCP-23 (3D)	0.020/ 0.050	-0.006	-0.003	-0.021	0.304	8 / 8
LCP-25 (3D)	0.020/ 0.050	-0.010	-0.006	0.012	0.191	8 / 8
LCP-27 (3D)	0.020/ 0.050	0.005	0.009	0.035	0.218	8 / 8
LCP-29 (3D)	0.020/ 0.050	-0.020	0.018	0.015	0.221	8 / 8
LCP-32 (3D)	0.020/ 0.050	-0.005	0.034	0.028	0.162	8 / 8
GCP-01 (3D)	0.020/ 0.050	-0.004	0.006	-0.060	0.300	8 / 8
GCP-03 (3D)	0.020/ 0.050	0.013	0.005	-0.035	0.195	8 / 8
GCP-05 (3D)	0.020/ 0.050	-0.010	-0.015	-0.014	0.265	8 / 8
GCP-07 (3D)	0.020/ 0.050	0.008	-0.006	-0.000	0.290	8 / 8
GCP-09 (3D)	0.020/ 0.050	-0.006	-0.002	-0.023	0.396	8 / 8
GCP-13 (3D)	0.020/ 0.050	0.012	-0.013	-0.034	0.356	8 / 8
GCP-14 (3D)	0.020/ 0.050	0.018	-0.010	-0.012	0.483	8 / 8
GCP-15 (3D)	0.020/ 0.050	-0.005	-0.003	-0.023	0.182	8 / 8
GCP-18 (3D)	0.020/ 0.050	-0.010	-0.001	-0.045	0.353	8 / 8
Mean [m]		-0.000028	0.000012	-0.000114		
Sigma [m]		0.010925	0.011086	0.026747		
RMS Error [m]		0.010925	0.011086	0.026747		

0 out of 24 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
LCP-02		-0.0047	-0.0268	0.0318	0.2708	8 / 8
LCP-04		0.0435	-0.0178	0.0126	0.2039	8 / 8
LCP-06		-0.0237	0.0125	-0.0046	0.1804	8 / 8
LCP-08		0.0068	0.0093	0.0563	0.2299	8 / 8
LCP-10		0.0167	-0.0617	0.0406	0.1410	8 / 8
LCP-12		0.0237	0.0028	0.0394	0.2186	8 / 8
LCP-14		0.0210	-0.0014	0.0208	0.2167	8 / 8
LCP-16		0.0083	0.0164	0.0166	0.2592	8 / 8
LCP-18		0.0928	-0.0184	0.0409	0.2319	8 / 8
LCP-20		-0.0194	-0.0170	0.0408	0.2574	8 / 8
LCP-22		-0.0181	0.0060	0.0945	0.1338	8 / 8
LCP-24		-0.0085	0.0060	0.0708	0.2098	8 / 8
LCP-26		-0.0123	-0.0113	0.0019	0.2367	8 / 8
LCP-28		-0.0166	0.0128	0.0137	0.2025	8 / 8
LCP-30		0.0023	0.0067	-0.0133	0.2372	8 / 8
GCP-02		-0.0018	0.0059	-0.0653	0.4175	8 / 8

GCP-04		-0.0081	0.0009	-0.0336	0.2509	8 / 8
GCP-06		0.0003	0.0111	-0.0845	0.2485	8 / 8
GCP-08		0.0146	0.0014	0.0031	0.2991	8 / 8
GCP-10		-0.0059	-0.0109	0.0277	0.2215	8 / 8
GCP-11		0.0209	0.0007	-0.0436	0.3498	8 / 8
GCP-12		0.0024	0.0014	0.0269	0.1428	8 / 8
GCP-16		0.0148	-0.0268	-0.0486	0.2654	8 / 8
GCP-17		0.0122	-0.0219	-0.0100	0.1806	8 / 8
Mean [m]		0.006724	-0.005006	0.009794		
Sigma [m]		0.023927	0.017412	0.041837		
RMS Error [m]		0.024853	0.018117	0.042968		

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 v.s. manually marked.

? Absolute Geolocation Variance



Mn Error [m]	Max Error [m]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
-	-0.08	0.00	0.00	0.00
-0.08	-0.06	0.00	0.00	0.00
-0.06	-0.05	0.00	0.00	0.00
-0.05	-0.03	0.00	0.00	0.51
-0.03	-0.01	0.00	0.00	5.31
-0.01	0.00	48.46	49.83	42.98
0.00	0.01	51.54	50.17	44.86
0.01	0.03	0.00	0.00	5.99
0.03	0.05	0.00	0.00	0.34
0.05	0.06	0.00	0.00	0.00
0.06	0.08	0.00	0.00	0.00
0.08	-	0.00	0.00	0.00
Mean [m]		0.052829	0.017473	-0.277339
Sigma [m]		0.002403	0.002199	0.009794
RMS Error [m]		0.052883	0.017611	0.277512

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]	0.052829	0.017473	-0.277339

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	100.00	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]	0.020000	0.020000	0.050000
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.

Initial Processing Details



System Information



Hardware	CPU: Intel(R) Core(TM) i9-10900F CPU @ 2.80GHz RAM: 64GB GPU: NVIDIA GeForce RTX 2070 SUPER (Driver: 30.0.15.1277)
Operating System	Windows 10 Pro, 64-bit


Coordinate Systems



Image Coordinate System	WGS 84 (2D)
Ground Control Point (GCP) Coordinate System	WGS 84 / UTM zone 47N (2D)
Output Coordinate System	WGS 84 / UTM zone 47N (2D)

Processing Options



Detected Template	 3D Maps
Keypoints Image Scale	Full, 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