Quality Report

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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	CA502R_NADIR_FullBlock_CU_SBR
Processed	2022-12-10 16:22:11
Camera Model Name(s)	CA502R_NADIR_28.0_6000x4000 (RGB)
Average Ground Sampling Distance (GSD)	2.57 cm / 1.01 in
Area Covered	1.024 km^2 / 102.4359 ha / 0.40 sq. mi. / 253.2557 acres
Time for Initial Processing (without report)	54m:34s

Quality Check

Images	median of 7143 keypoints per image	✓
Dataset	1213 out of 1213 images calibrated (100%), all images enabled	✓
Camera Optimization	0.17% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1928.64 matches per calibrated image	✓
Georeferencing	yes, 48 GCPs (48 3D), mean RMS error = 0.013 m	✓

Preview

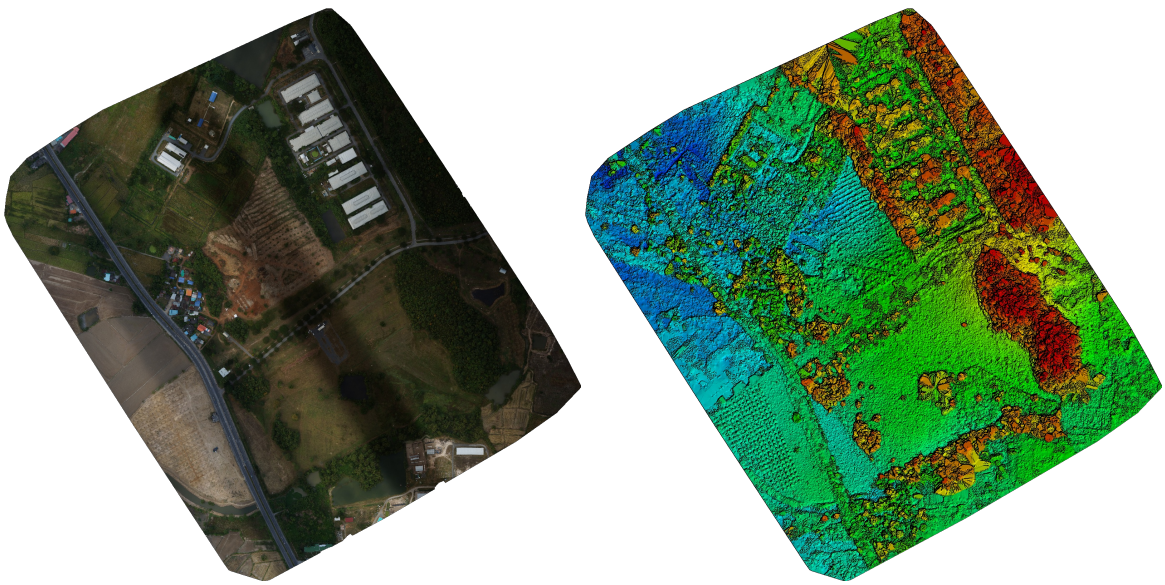


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1213 out of 1213
Number of Geolocated Images	1213 out of 1213

Initial Image Positions

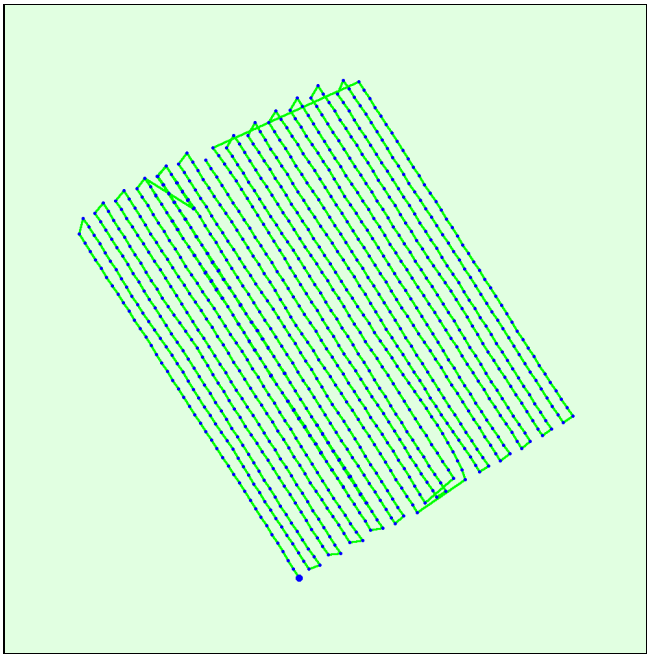
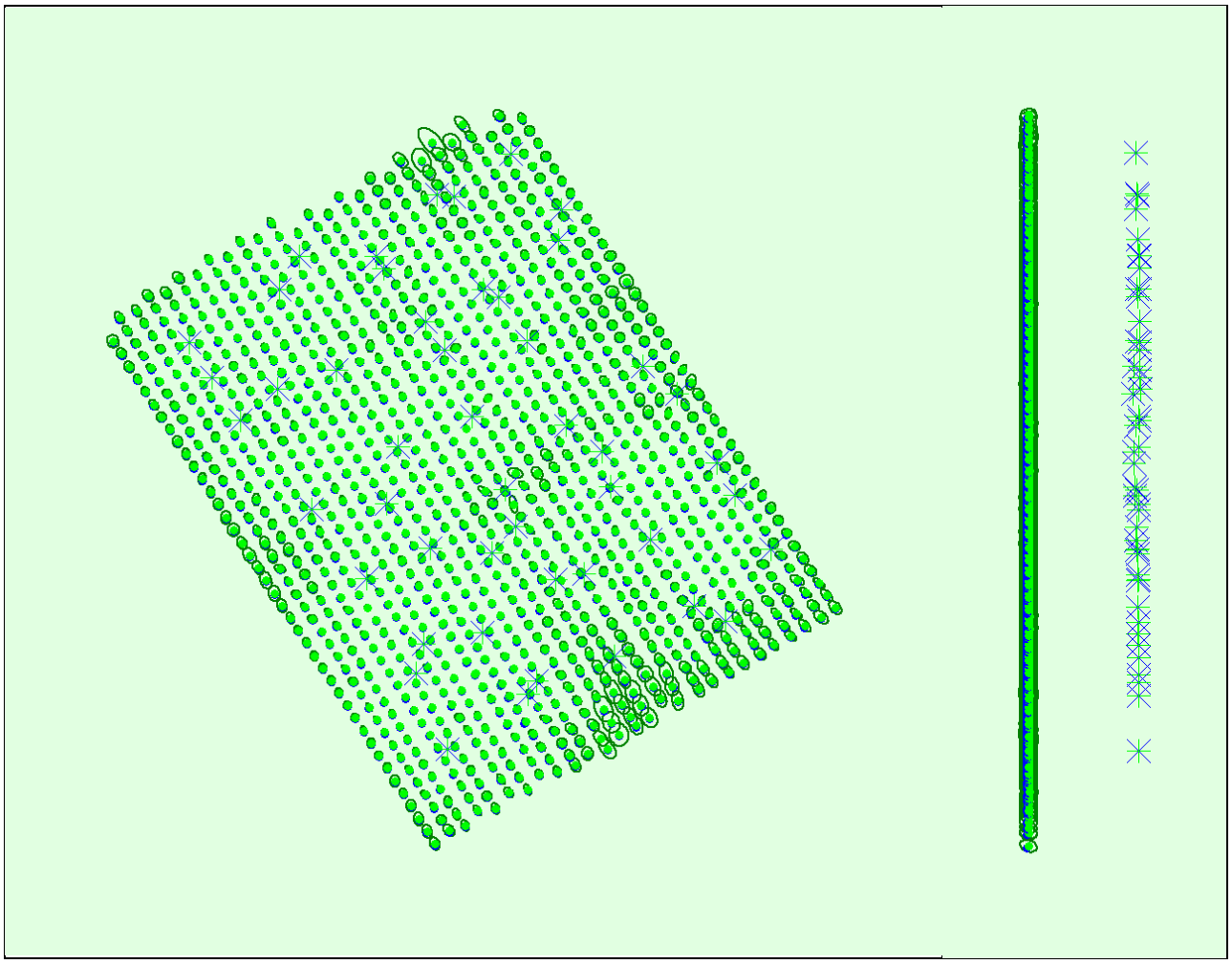
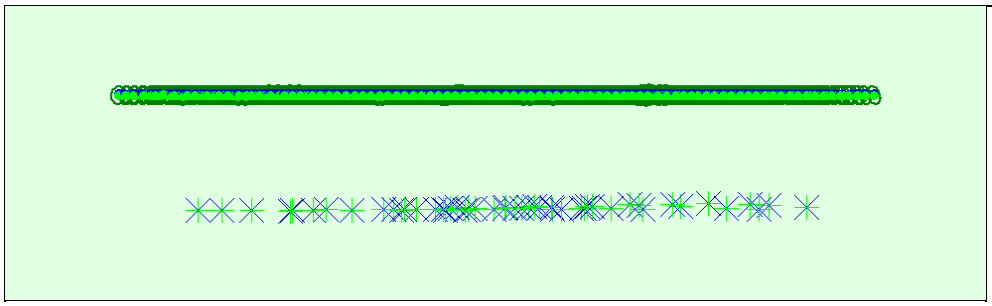


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 100x 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	0.065	0.072	0.138	0.022	0.020	0.004
Sigma	0.019	0.023	0.003	0.007	0.007	0.002

Overlap

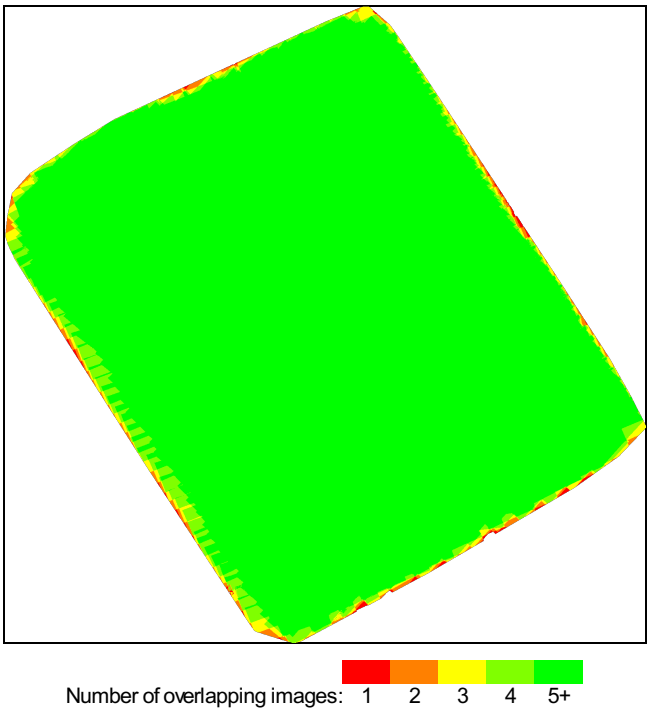


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

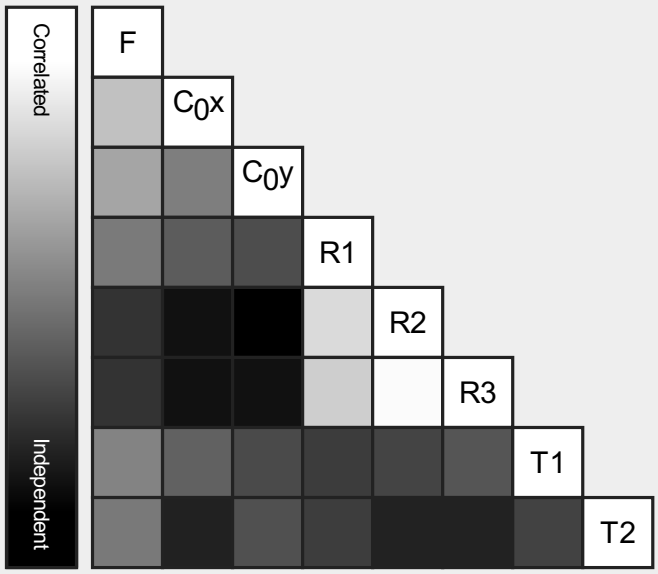
Number of 2D Keypoint Observations for Bundle Block Adjustment	2531636
Number of 3D Points for Bundle Block Adjustment	668629
Mean Reprojection Error [pixels]	0.110

Internal Camera Parameters

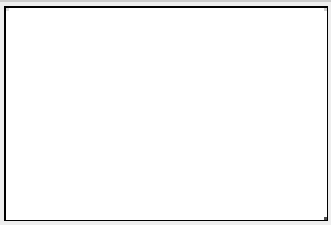
CA502R_NADIR_28.0_6000x4000 (RGB). Sensor Dimensions: 23.520 [mm] x 15.680 [mm]

EXIF ID: ILCE-5100_0.0_6000x4000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	7142.860 [pixel] 28.000 [mm]	3000.000 [pixel] 11.760 [mm]	2000.000 [pixel] 7.840 [mm]	-0.048	0.037	-0.011	-0.000	-0.001
Optimized Values	7155.641 [pixel] 28.050 [mm]	3036.164 [pixel] 11.902 [mm]	1912.980 [pixel] 7.499 [mm]	-0.107	-0.000	-0.002	-0.001	0.001
Uncertainties (Sigma)	5.390 [pixel] 0.021 [mm]	0.458 [pixel] 0.002 [mm]	0.332 [pixel] 0.001 [mm]	0.000	0.003	0.007	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	7143	1929
Min	3854	306
Max	9889	5216
Mean	7124	2087

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	355409
In 3 Images	120308
In 4 Images	58913
In 5 Images	32799
In 6 Images	21449
In 7 Images	14906
In 8 Images	11169
In 9 Images	8432
In 10 Images	6924
In 11 Images	6071
In 12 Images	5306

In 13 Images	4420
In 14 Images	3673
In 15 Images	3283
In 16 Images	2917
In 17 Images	2462
In 18 Images	2195
In 19 Images	1896
In 20 Images	1524
In 21 Images	1191
In 22 Images	825
In 23 Images	609
In 24 Images	418
In 25 Images	311
In 26 Images	283
In 27 Images	227
In 28 Images	214
In 29 Images	156
In 30 Images	125
In 31 Images	90
In 32 Images	55
In 33 Images	37
In 34 Images	15
In 35 Images	11
In 36 Images	5
In 37 Images	1

2D Keypoint Matches

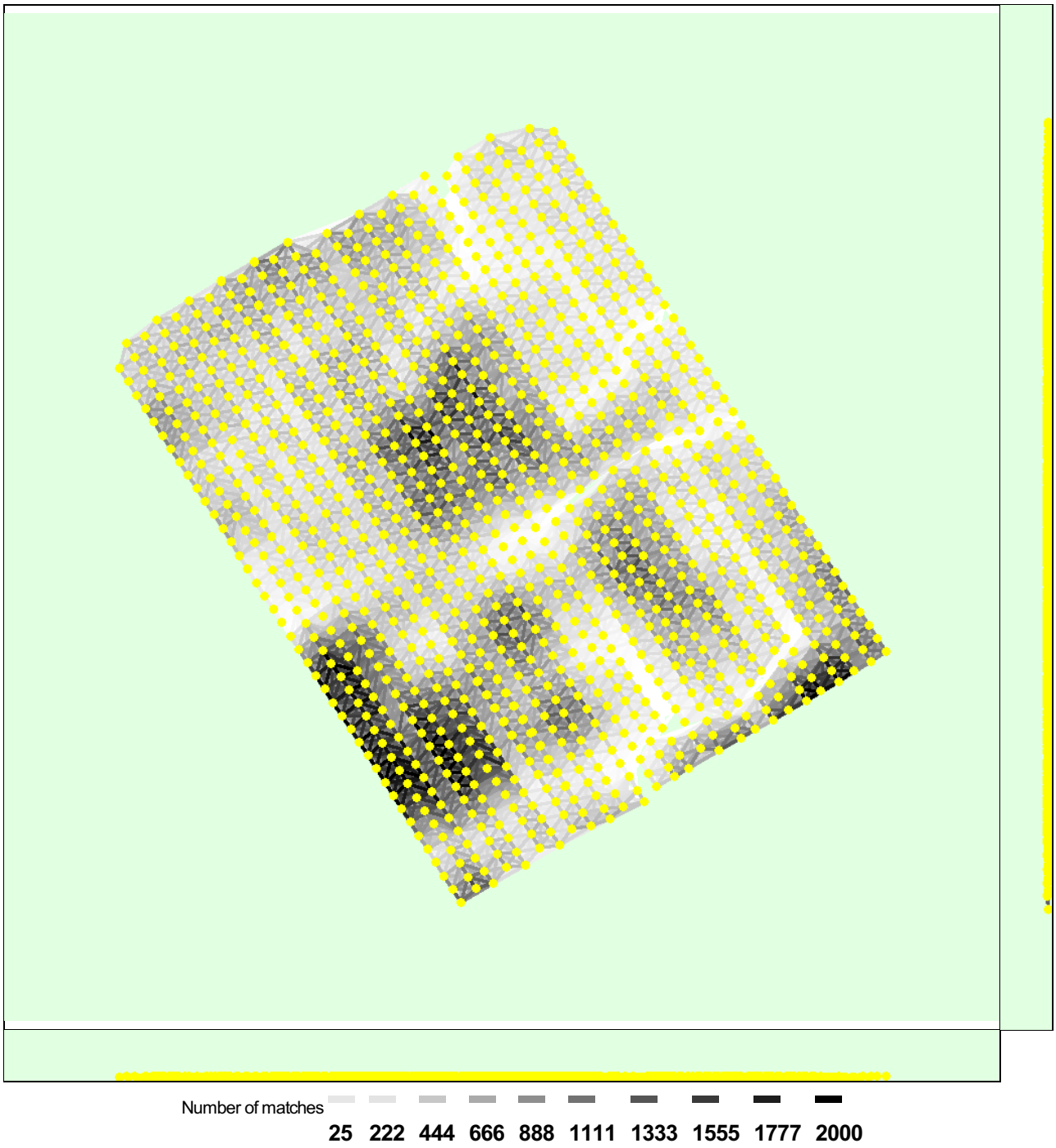


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details

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	0.018	-0.002	0.002	0.099	10 / 10
LCP-02 (3D)	0.020/ 0.050	0.006	-0.017	0.015	0.191	10 / 10
LCP-03 (3D)	0.020/ 0.050	-0.001	-0.002	-0.001	0.037	10 / 10
LCP-04 (3D)	0.020/ 0.050	0.020	-0.003	0.014	0.080	10 / 10
LCP-05 (3D)	0.020/ 0.050	0.001	-0.003	-0.008	0.096	10 / 10
LCP-06 (3D)	0.020/ 0.050	0.002	0.034	-0.008	0.121	10 / 10
LCP-07 (3D)	0.020/ 0.050	0.017	0.004	0.039	0.123	10 / 10

LCP-08 (3D)	0.020/ 0.050	0.005	0.001	0.004	0.088	10 / 10
LCP-09 (3D)	0.020/ 0.050	-0.001	-0.011	-0.009	0.089	10 / 10
LCP-10 (3D)	0.020/ 0.050	0.004	-0.023	0.007	0.106	10 / 10
LCP-11 (3D)	0.020/ 0.050	0.015	0.016	-0.002	0.156	10 / 10
LCP-12 (3D)	0.020/ 0.050	0.009	0.003	0.023	0.101	10 / 10
LCP-13 (3D)	0.020/ 0.050	-0.015	-0.010	0.002	0.069	10 / 10
LCP-14 (3D)	0.020/ 0.050	-0.003	0.003	-0.008	0.056	10 / 10
LCP-15 (3D)	0.020/ 0.050	0.001	0.003	0.004	0.057	10 / 10
LCP-16 (3D)	0.020/ 0.050	0.017	0.024	-0.002	0.110	10 / 10
LCP-17 (3D)	0.020/ 0.050	-0.013	-0.002	0.010	0.155	10 / 10
LCP-18 (3D)	0.020/ 0.050	0.053	-0.027	0.018	0.119	10 / 10
LCP-19 (3D)	0.020/ 0.050	-0.005	-0.017	-0.005	0.087	10 / 10
LCP-21 (3D)	0.020/ 0.050	0.007	0.012	0.006	0.083	10 / 10
LCP-22 (3D)	0.020/ 0.050	-0.020	-0.003	-0.004	0.143	10 / 10
LCP-23 (3D)	0.020/ 0.050	-0.014	-0.002	0.017	0.071	10 / 10
LCP-24 (3D)	0.020/ 0.050	-0.018	0.004	0.016	0.159	10 / 10
LCP-25 (3D)	0.020/ 0.050	-0.003	-0.013	0.009	0.090	10 / 10
LCP-26 (3D)	0.020/ 0.050	-0.004	0.012	0.013	0.123	10 / 10
LCP-27 (3D)	0.020/ 0.050	-0.011	0.007	0.001	0.073	10 / 10
LCP-28 (3D)	0.020/ 0.050	-0.007	0.006	-0.007	0.109	10 / 10
LCP-29 (3D)	0.020/ 0.050	-0.011	0.012	0.021	0.114	10 / 10
LCP-30 (3D)	0.020/ 0.050	-0.009	0.002	0.001	0.076	10 / 10
LCP-32 (3D)	0.020/ 0.050	-0.001	0.026	0.016	0.095	10 / 10
GCP-01 (3D)	0.020/ 0.050	-0.012	0.012	0.001	0.127	10 / 10
GCP-02 (3D)	0.020/ 0.050	0.000	-0.002	-0.020	0.126	10 / 10
GCP-03 (3D)	0.020/ 0.050	0.014	0.005	-0.023	0.124	10 / 10
GCP-04 (3D)	0.020/ 0.050	-0.002	-0.002	0.002	0.193	10 / 10
GCP-05 (3D)	0.020/ 0.050	-0.007	-0.008	-0.008	0.102	10 / 10
GCP-06 (3D)	0.020/ 0.050	0.003	0.008	0.007	0.122	10 / 10
GCP-07 (3D)	0.020/ 0.050	-0.002	-0.011	-0.023	0.182	10 / 10
GCP-08 (3D)	0.020/ 0.050	0.013	0.006	-0.025	0.310	10 / 10
GCP-09 (3D)	0.020/ 0.050	0.001	-0.009	0.007	0.114	10 / 10
GCP-10 (3D)	0.020/ 0.050	-0.008	-0.009	-0.006	0.087	10 / 10
GCP-11 (3D)	0.020/ 0.050	-0.015	0.000	-0.019	0.178	10 / 10
GCP-12 (3D)	0.020/ 0.050	-0.016	-0.004	-0.013	0.133	10 / 10
GCP-13 (3D)	0.020/ 0.050	0.007	-0.001	-0.026	0.168	10 / 10
GCP-14 (3D)	0.020/ 0.050	0.014	-0.009	0.009	0.108	10 / 10
GCP-15 (3D)	0.020/ 0.050	-0.018	0.005	-0.001	0.070	10 / 10
GCP-16 (3D)	0.020/ 0.050	0.009	-0.016	-0.019	0.205	10 / 10
GCP-17 (3D)	0.020/ 0.050	-0.000	0.000	-0.007	0.045	10 / 10
GCP-18 (3D)	0.020/ 0.050	-0.019	-0.001	-0.028	0.127	10 / 10
Mean [m]		0.000004	0.000001	-0.000165		
Sigma [m]		0.013243	0.011685	0.014159		
RMS Error [m]		0.013243	0.011685	0.014160		

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 [%]
-	-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	0.00	0.00	0.00
-3.00	0.00	50.62	50.04	50.21

0.00	3.00	49.38	49.96	49.79
3.00	6.00	0.00	0.00	0.00
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]		-0.316458	-1.841135	2.482469
Sigma [m]		0.192268	0.256246	0.110650
RMS Error [m]		0.370287	1.858881	2.484934

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]	-0.316458	-1.841135	2.482469

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]	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.

Initial Processing Details

System Information

Hardware	CPU: Intel(R) Core(TM) i7-5930K CPU @ 3.50GHz RAM: 32GB GPU: NVIDIA GeForce GTX 1660 Ti (Driver: 31.0.15.2686)
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	No Template Available
Keypoints Image Scale	Rapid, Image Scale: 0.25
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