Quality Report

Generated with Pix4Ddiscovery version 4.7.5

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	trans_2_5
Processed	2023-02-26 15:30:50
Camera Model Name(s)	CanonIXUS127HS_4.3_4608x3456 (RGB)
Average Ground Sampling Distance (GSD)	4.22 cm / 1.66 in
Area Covered	0.093 km^2 / 9.3416 ha / 0.04 sq. mi. / 23.0955 acres
Time for Initial Processing (without report)	01m:28s

Quality Check

Images	median of 48503 keypoints per image	✓
Dataset	20 out of 21 images calibrated (95%), all images enabled	✓
Camera Optimization	0.31% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 8665.77 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

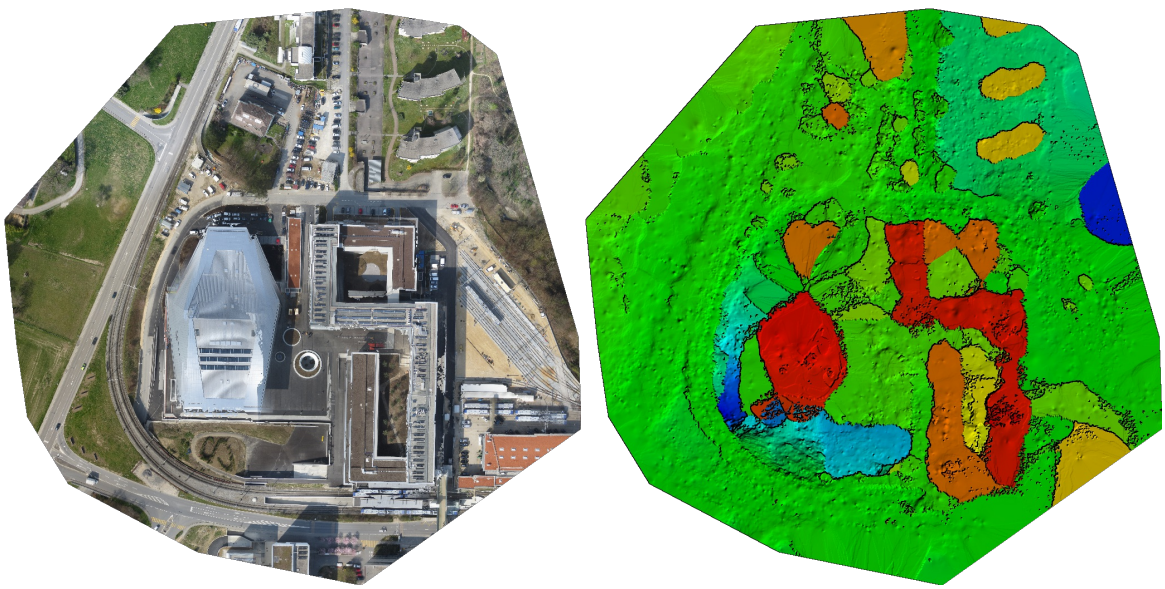


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	20 out of 21
Number of Geolocated Images	21 out of 21

Initial Image Positions

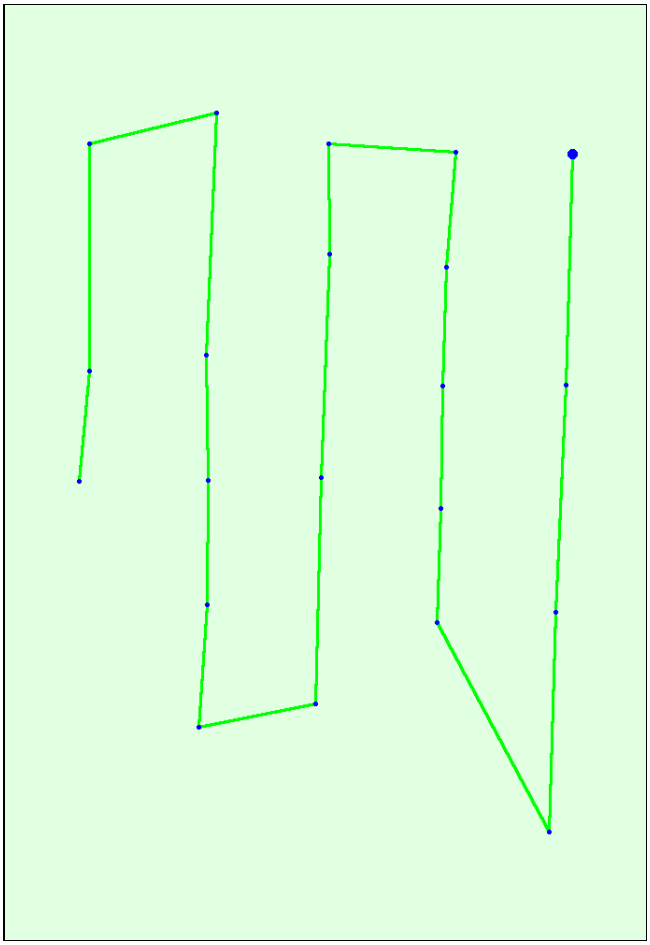
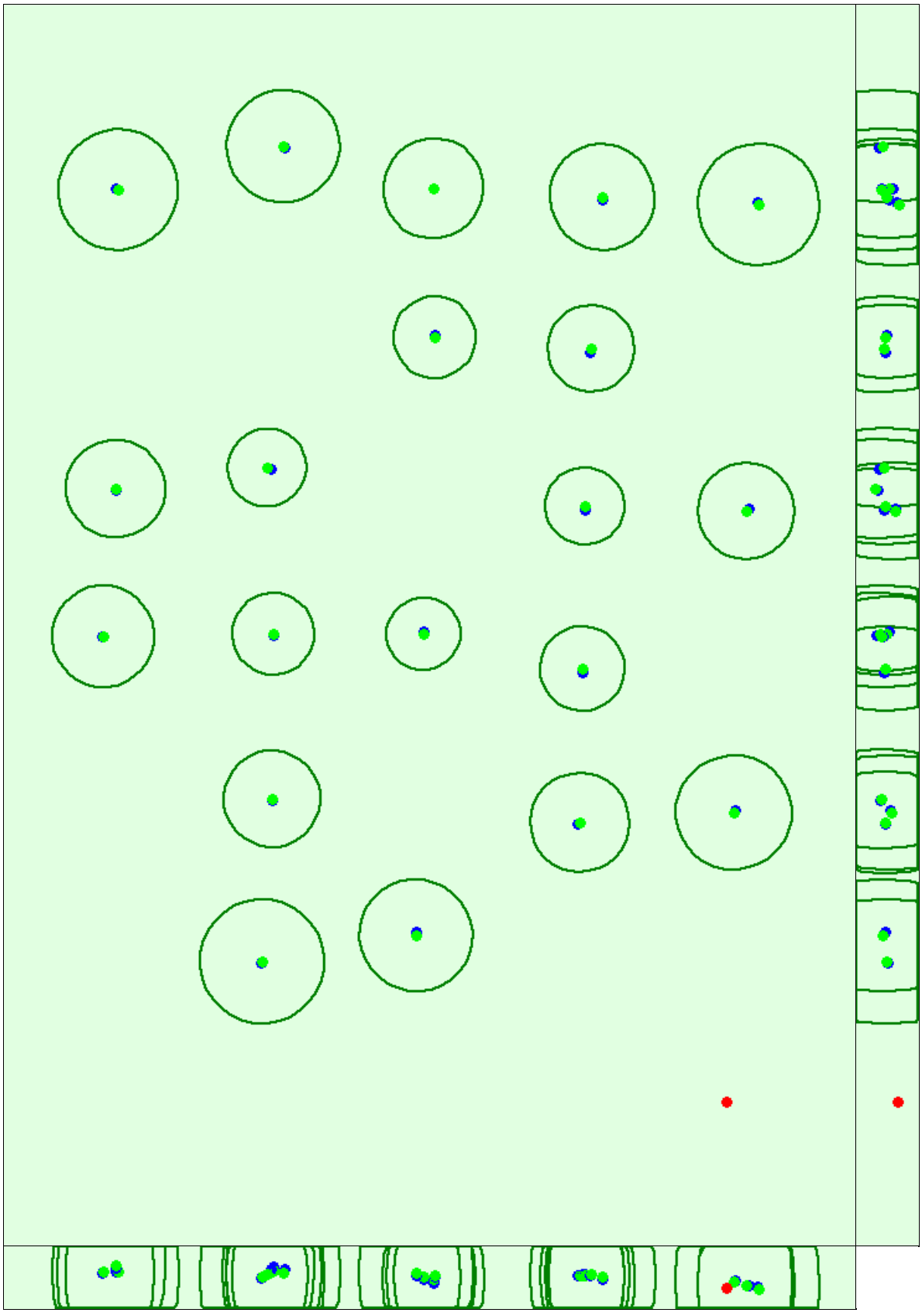


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 50x 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). 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	0.349	0.349	0.846	0.326	0.387	0.138
Sigma	0.054	0.054	0.173	0.011	0.008	0.014

Overlap

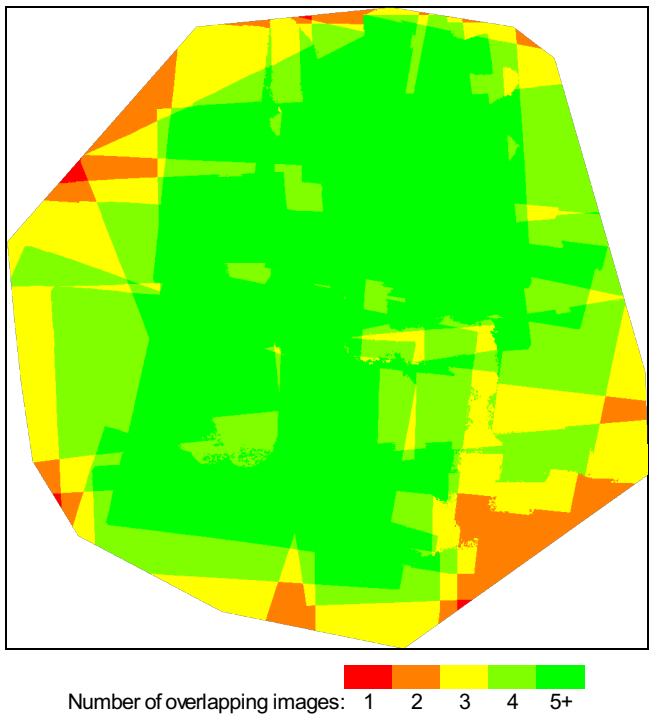


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

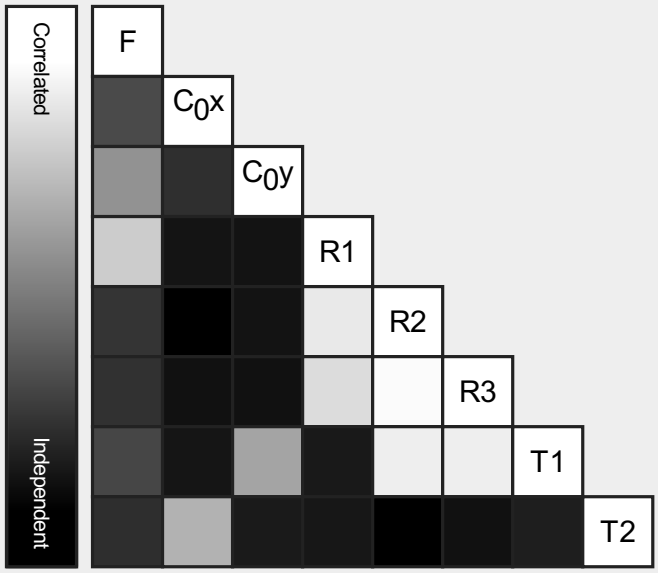
Number of 2D Keypoint Observations for Bundle Block Adjustment	169685
Number of 3D Points for Bundle Block Adjustment	75162
Mean Reprojection Error [pixels]	0.188

Internal Camera Parameters

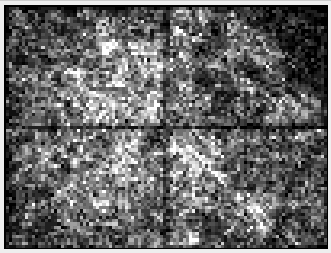
CanonIXUS127HS_4.3_4608x3456 (RGB). Sensor Dimensions: 6.170 [mm] x 4.628 [mm]

EXIF ID: CanonIXUS127HS_4.3_4608x3456

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3270.924 [pixel] 4.380 [mm]	2303.999 [pixel] 3.085 [mm]	1728.000 [pixel] 2.314 [mm]	-0.049	0.059	-0.036	0.000	-0.003
Optimized Values	3281.126 [pixel] 4.393 [mm]	2311.723 [pixel] 3.095 [mm]	1844.450 [pixel] 2.470 [mm]	-0.048	0.052	-0.027	0.008	0.000
Uncertainties (Sigma)	0.891 [pixel] 0.001 [mm]	0.282 [pixel] 0.000 [mm]	0.235 [pixel] 0.000 [mm]	0.000	0.001	0.001	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	48503	8666
Min	44920	4614
Max	60040	11649
Mean	49048	8484

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	61368
In 3 Images	9722
In 4 Images	2900
In 5 Images	900
In 6 Images	222
In 7 Images	49
In 8 Images	1

2D Keypoint Matches

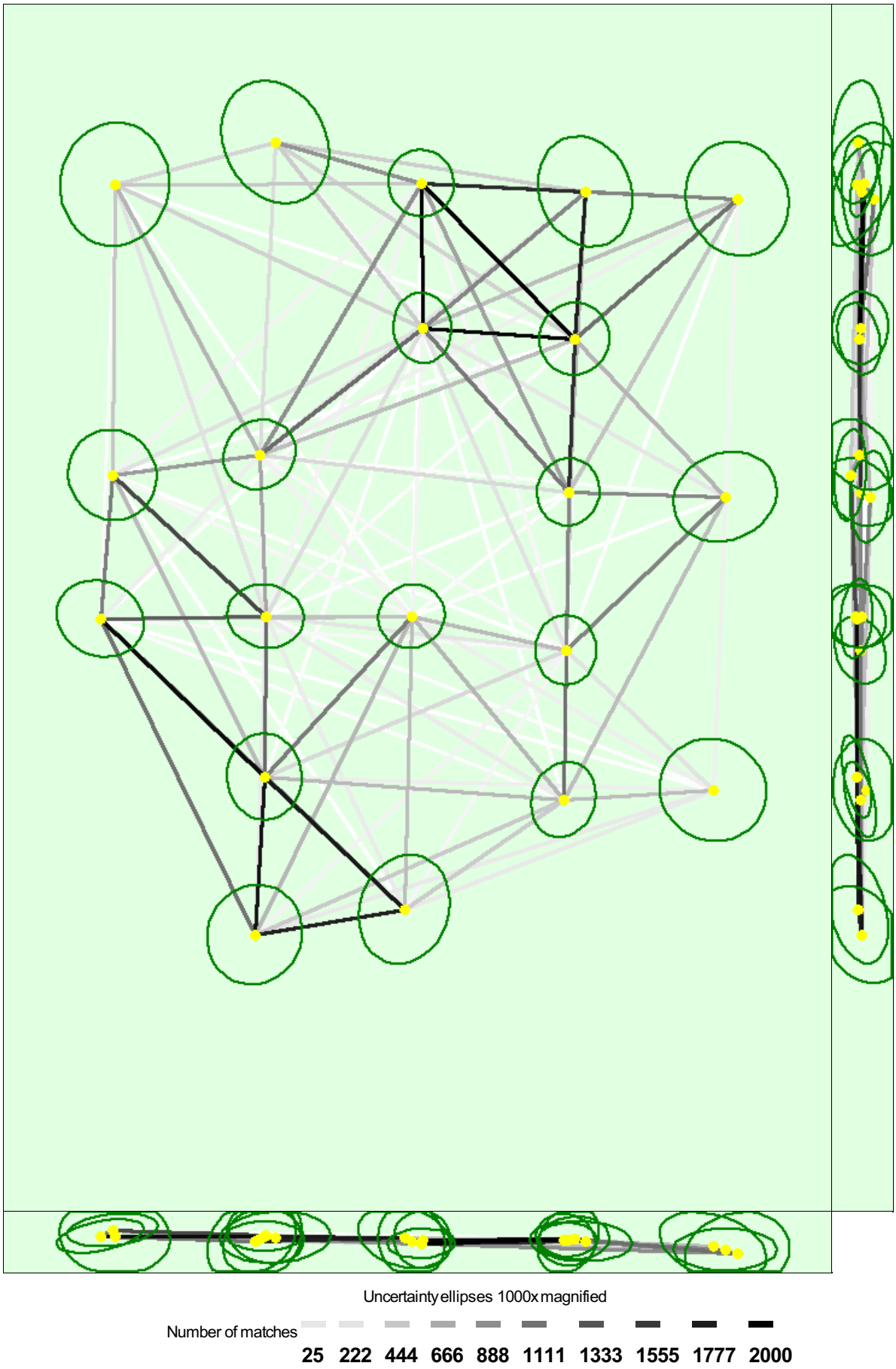


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.015	0.016	0.010	0.013	0.010	0.004
Sigma	0.003	0.004	0.003	0.005	0.004	0.002

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	0.00	0.00
-6.00	-3.00	0.00	0.00	0.00
-3.00	0.00	65.00	55.00	50.00
0.00	3.00	35.00	45.00	50.00
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]		-0.013339	-0.011480	-0.065211
Sigma [m]		0.407372	0.822317	0.820706
RMS Error [m]		0.407591	0.822397	0.823293

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]	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) i7-9750H CPU @ 2.60GHz RAM: 16GB GPU: Intel(R) UHD Graphics 630 (Driver: 27.20.100.9316), NVIDIA Quadro T1000 (Driver: 31.0.15.1713)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84
Output Coordinate System	WGS 84 / UTM zone 32N

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	01m:23s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	01m:30s

Results

Number of Processed Clusters	3
Number of Generated Tiles	1
Number of 3D Densified Points	2161446
Average Density (per m^3)	33.66