Quality Report

Generated with Pix4Dmapper version 4.5.6

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	TEST_CAMERA
Processed	2021-03-19 17:17:49
Camera Model Name(s)	_0.0_6000x4000 (RGB)
Average Ground Sampling Distance (GSD)	2.81 cm / 1.11 in

Quality Check

Images	median of 6732 keypoints per image	✓
Dataset	558 out of 558 images calibrated (100%), 27 images disabled	✓
Camera Optimization	0% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 3212.36 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Calibration Details

Number of Calibrated Images	558 out of 585
Number of Geolocated Images	581 out of 585

Initial Image Positions

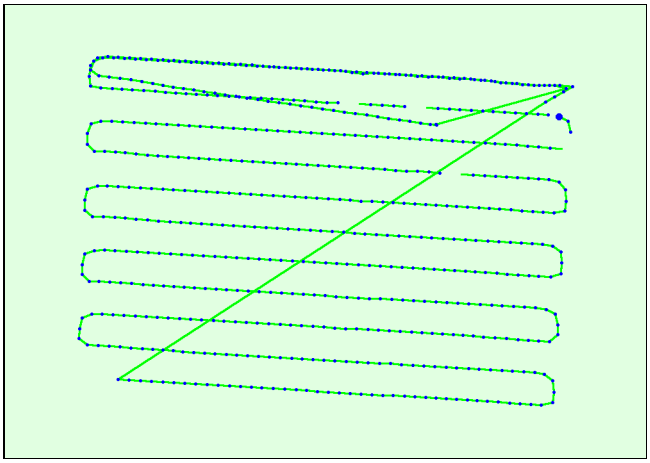
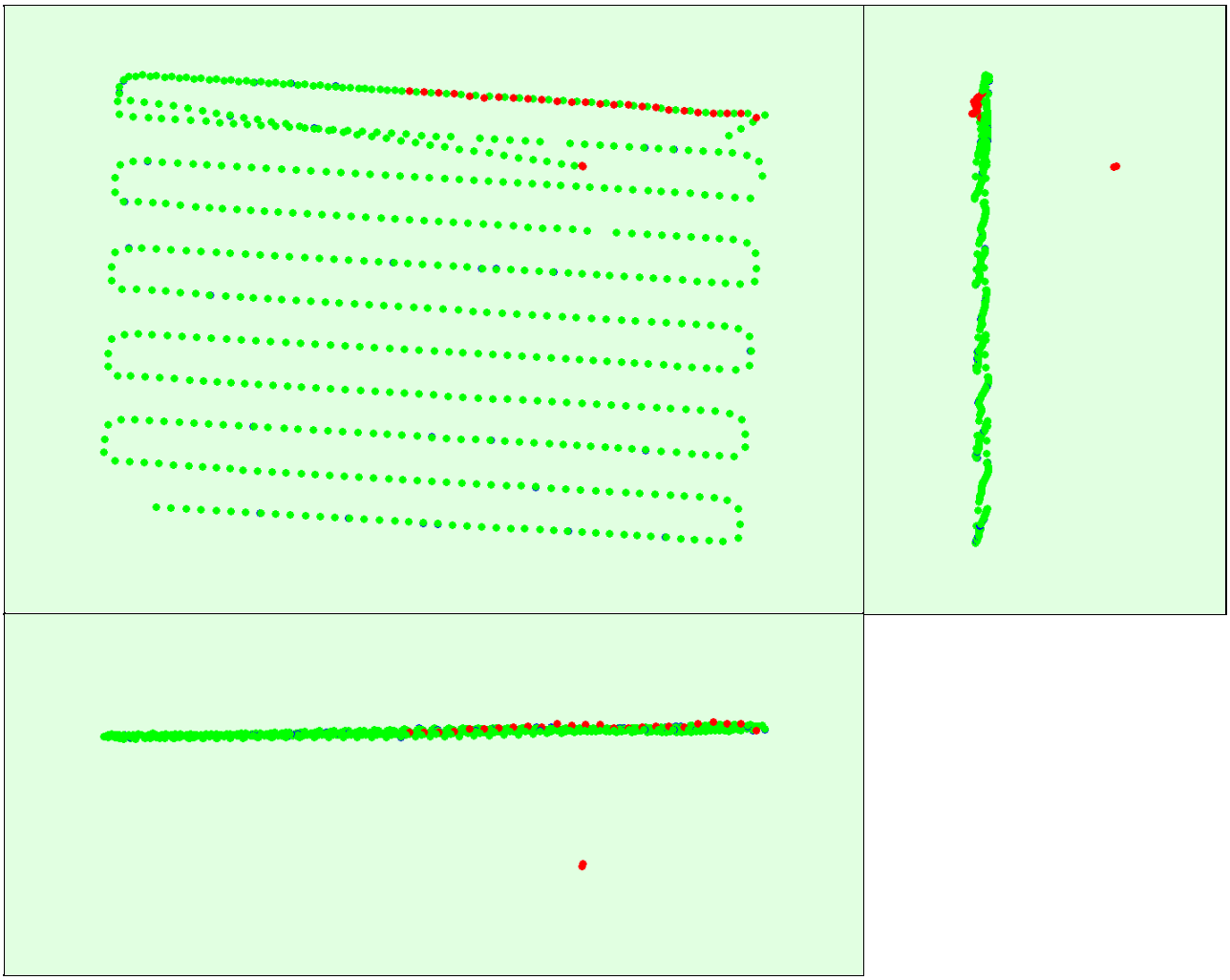


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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). 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	0.014	0.013	0.009	0.006	0.007	0.004
Sigma	0.002	0.002	0.003	0.001	0.001	0.001

Bundle Block Adjustment Details

Number of 2D Keypoint Observations for Bundle Block Adjustment	1772576
Number of 3D Points for Bundle Block Adjustment	587169
Mean Reprojection Error [pixels]	0.105

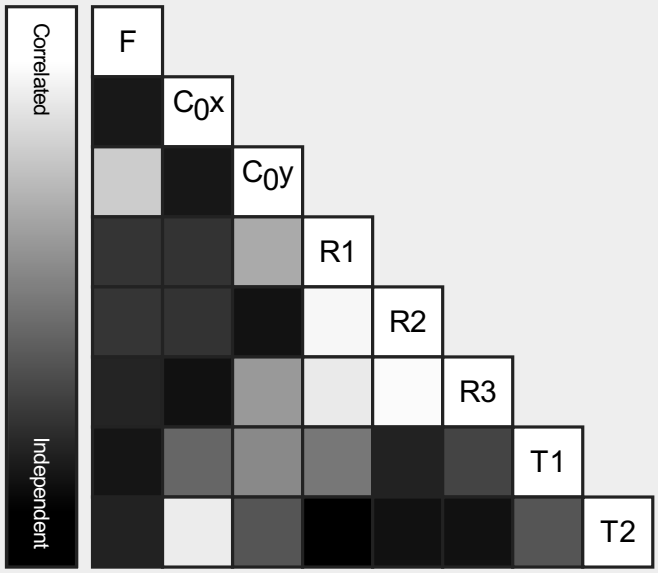
Internal Camera Parameters

_0.0_6000x4000 (RGB). Sensor Dimensions: 25.400 [mm] x 16.933 [mm]

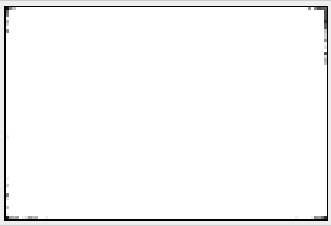
EXIF ID: _0.0_6000x4000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2

Initial Values	4074.290 [pixel] 17.248 [mm]	2998.040 [pixel] 12.692 [mm]	1909.670 [pixel] 8.084 [mm]	-0.062	0.089	0.003	-0.004	-0.000
Optimized Values	4074.297 [pixel] 17.248 [mm]	2998.041 [pixel] 12.692 [mm]	1909.667 [pixel] 8.084 [mm]	-0.062	0.089	0.003	-0.004	-0.000
Uncertainties (Sigma)	0.409 [pixel] 0.002 [mm]	0.129 [pixel] 0.001 [mm]	0.158 [pixel] 0.001 [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	6732	3212
Min	3456	264
Max	9669	5840
Mean	6559	3177

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	404271
In 3 Images	83867
In 4 Images	34068
In 5 Images	18086
In 6 Images	11260
In 7 Images	7916
In 8 Images	5757
In 9 Images	4396
In 10 Images	3356
In 11 Images	2336
In 12 Images	1761
In 13 Images	1460
In 14 Images	1253
In 15 Images	1050
In 16 Images	887
In 17 Images	749

In 18 Images	617
In 19 Images	538
In 20 Images	445
In 21 Images	375
In 22 Images	302
In 23 Images	293
In 24 Images	261
In 25 Images	220
In 26 Images	183
In 27 Images	181
In 28 Images	146
In 29 Images	115
In 30 Images	115
In 31 Images	94
In 32 Images	105
In 33 Images	77
In 34 Images	56
In 35 Images	69
In 36 Images	69
In 37 Images	75
In 38 Images	62
In 39 Images	44
In 40 Images	34
In 41 Images	30
In 42 Images	33
In 43 Images	26
In 44 Images	23
In 45 Images	23
In 46 Images	25
In 47 Images	13
In 48 Images	9
In 49 Images	8
In 50 Images	9
In 51 Images	3
In 52 Images	4
In 53 Images	3
In 54 Images	2
In 55 Images	3
In 56 Images	2
In 57 Images	1
In 59 Images	1
In 60 Images	1
In 64 Images	1

2D Keypoint Matches

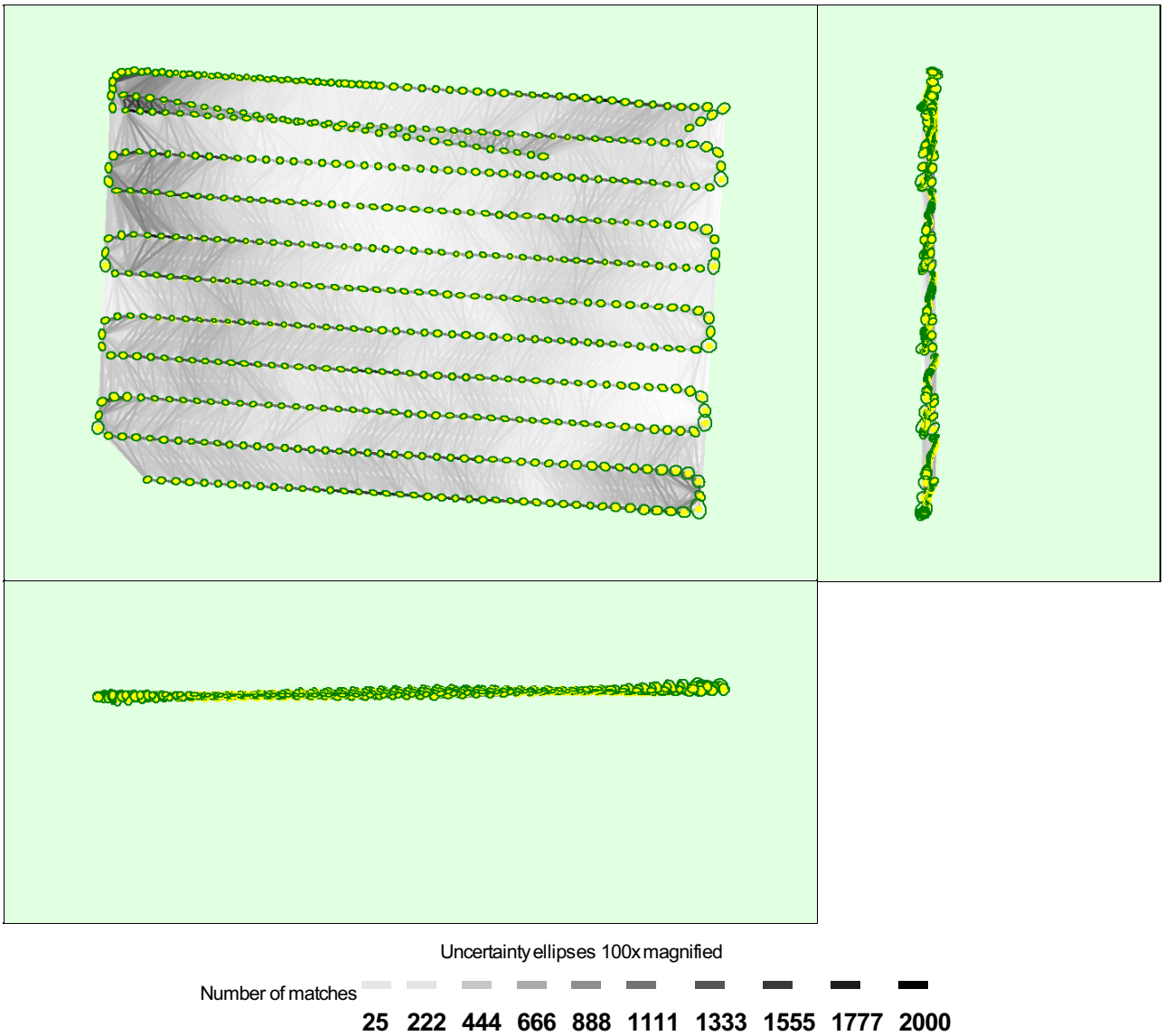


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.032	0.027	0.023	0.016	0.021	0.007
Sigma	0.006	0.007	0.010	0.006	0.006	0.005

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.15	0.00	0.00	0.54
-0.15	-0.12	0.00	0.00	0.00
-0.12	-0.09	0.36	0.18	1.26
-0.09	-0.06	3.25	0.54	6.32
-0.06	-0.03	10.83	7.40	15.16
-0.03	0.00	30.14	41.52	27.62

0.00	0.03	43.50	43.68	23.65
0.03	0.06	9.03	5.96	17.33
0.06	0.09	2.71	0.54	6.14
0.09	0.12	0.18	0.18	1.81
0.12	0.15	0.00	0.00	0.18
0.15	-	0.00	0.00	0.00
Mean [m]		-0.000000	-0.000000	-0.000000
Sigma [m]		0.029787	0.022143	0.043497
RMS Error [m]		0.029787	0.022143	0.043497

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]	89.53	97.11	97.47
[-2.00, 2.00]	99.82	99.64	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	0.050000	0.050000	0.100000
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) i9-7900X CPU @ 3.30GHz RAM: 32GB GPU: NVIDIA GeForce GTX 1080 Ti (Driver: 27.21.14.5751)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84
Output Coordinate System	WGS 84 / UTM zone 43N

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

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	no
LOD	Generated: no
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	01h:14m:34s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	NA

Results

Number of Generated Tiles	4
Number of 3D Densified Points	56685108
Average Density (per m^3)	121.71

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (2.81 [cm/pixel])
DSM Filters	Noise Filtering: no Surface Smoothing: no
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	00s
Time for Orthomosaic Generation	01h:54m:39s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s