Quality Report

Generated with Pix4Ddiscovery version 4.5.4 Preview

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	Old_Orchard
Processed	2020-02-11 00:55:33
Camera Model Name(s)	PeauPro82_3.97_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	4.76 cm / 1.88 in
Area Covered	0.130 km^2 / 12.9569 ha / 0.05 sq. mi. / 32.0339 acres
Time for Initial Processing (without report)	08m:10s

Quality Check

Images	median of 5044 keypoints per image	✓
Dataset	170 out of 171 images calibrated (99%), all images enabled	✓
Camera Optimization	0% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 3297.5 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

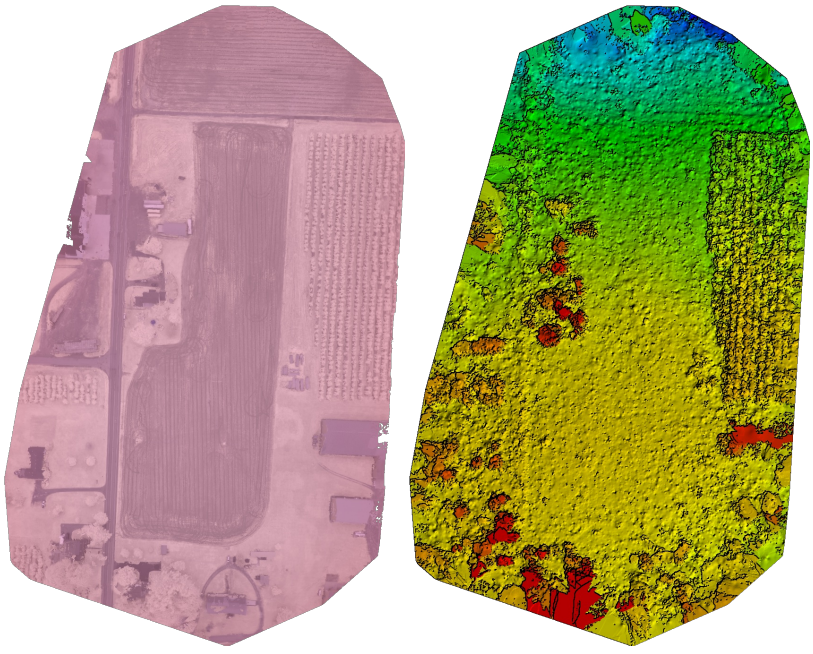


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	170 out of 171
Number of Geolocated Images	171 out of 171

Initial Image Positions

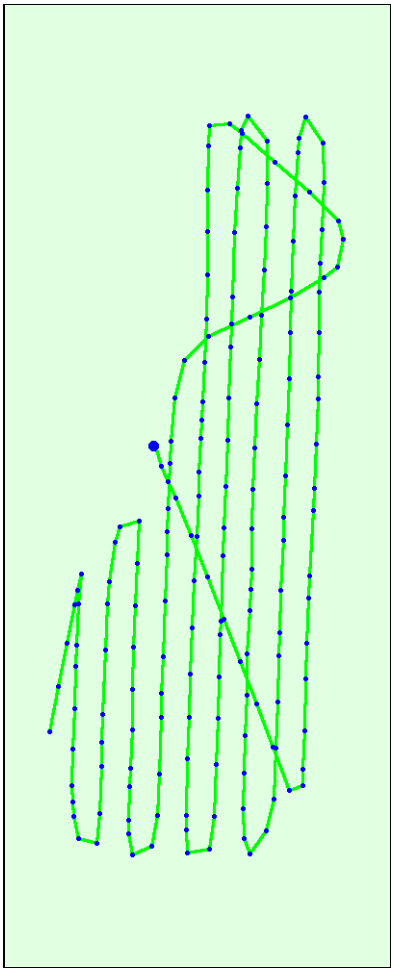
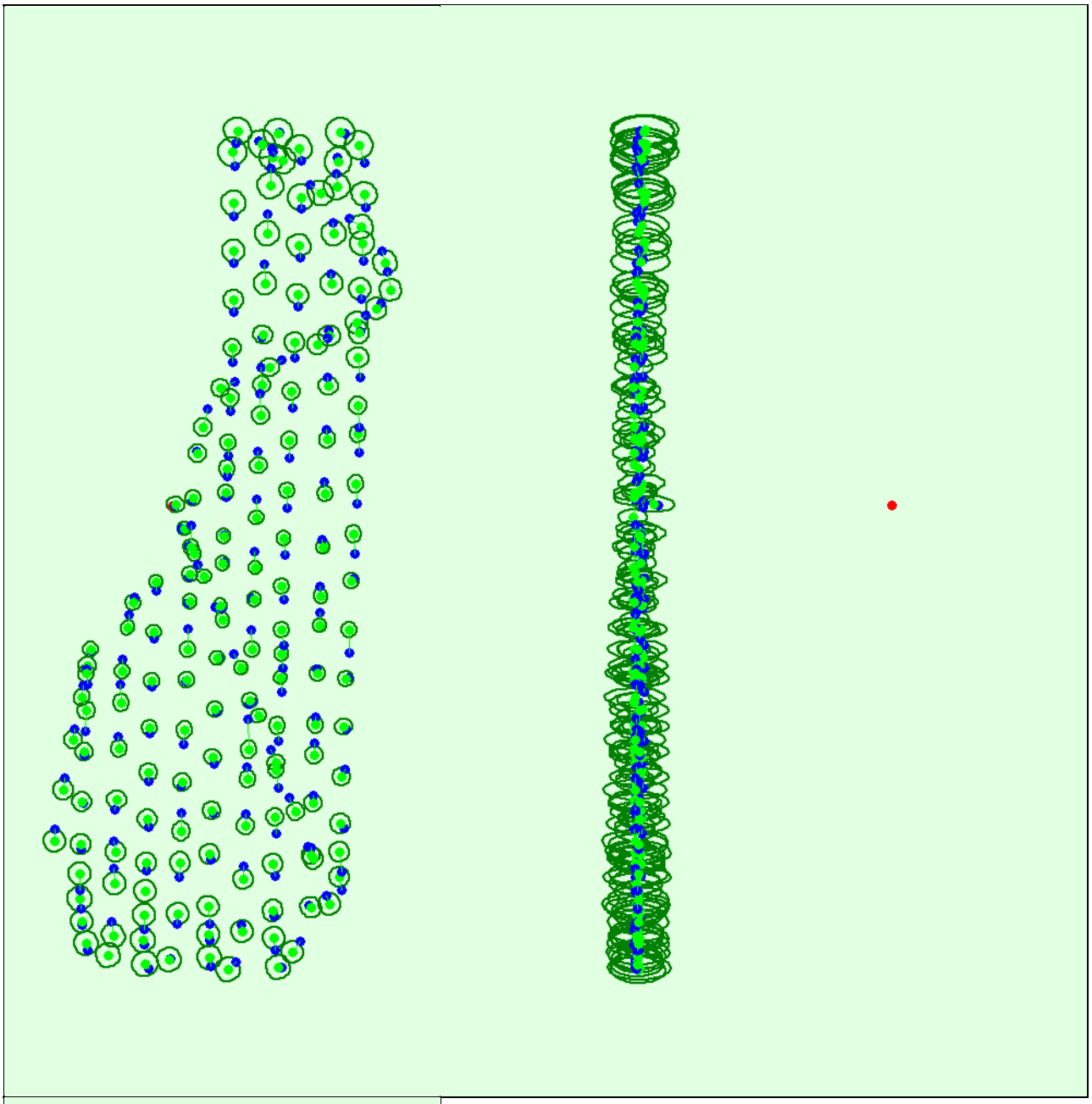
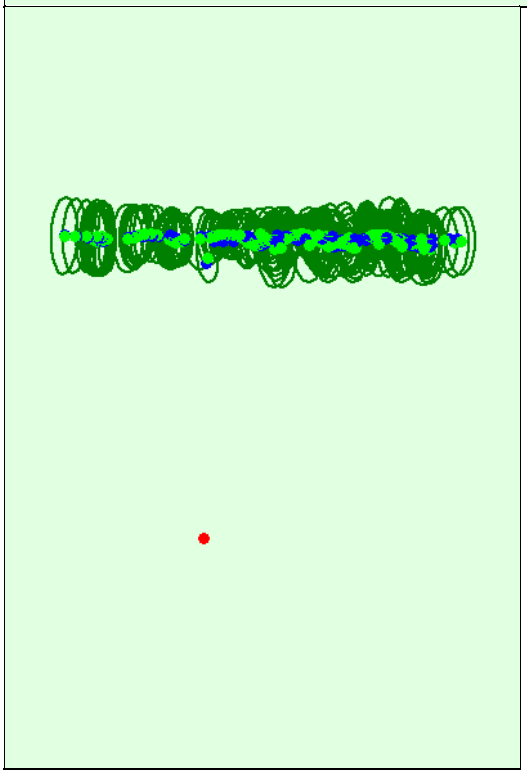


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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	0.080	0.080	0.192	0.093	0.200	0.031
Sigma	0.017	0.017	0.043	0.039	0.030	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

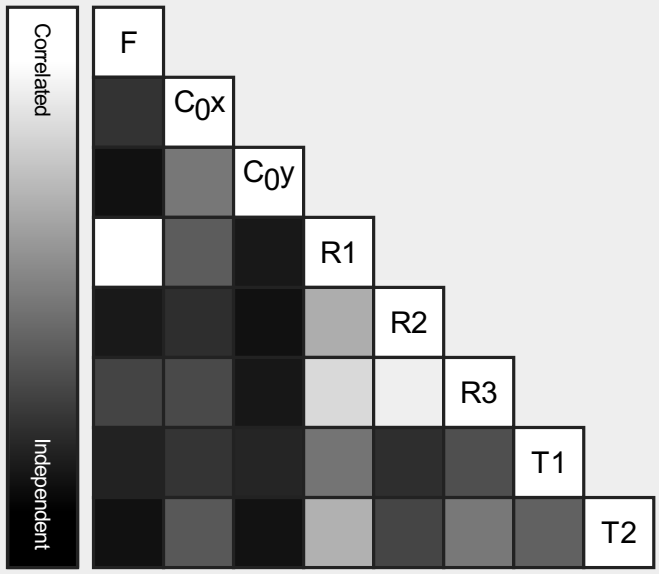
Number of 2D Keypoint Observations for Bundle Block Adjustment	553483
Number of 3D Points for Bundle Block Adjustment	53887
Mean Reprojection Error [pixels]	0.159

Internal Camera Parameters

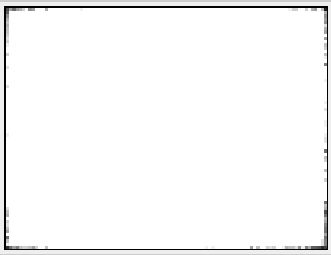
PeauPro82_3.97_4000x3000 (RGB). Sensor Dimensions: 6.200 [mm] x 4.650 [mm]

EXIF ID: HERO4Black_3.0_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2681.130 [pixel] 4.156 [mm]	2027.460 [pixel] 3.143 [mm]	1471.850 [pixel] 2.281 [mm]	-0.105	0.120	0.029	-0.000	0.001
Optimized Values	2681.186 [pixel] 4.156 [mm]	2033.742 [pixel] 3.152 [mm]	1467.846 [pixel] 2.275 [mm]	-0.131	0.122	0.014	0.000	0.000
Uncertainties (Sigma)	0.251 [pixel] 0.000 [mm]	0.138 [pixel] 0.000 [mm]	0.141 [pixel] 0.000 [mm]	0.000	0.000	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	5044	3298
Min	4353	1991
Max	5600	3899
Mean	5022	3256

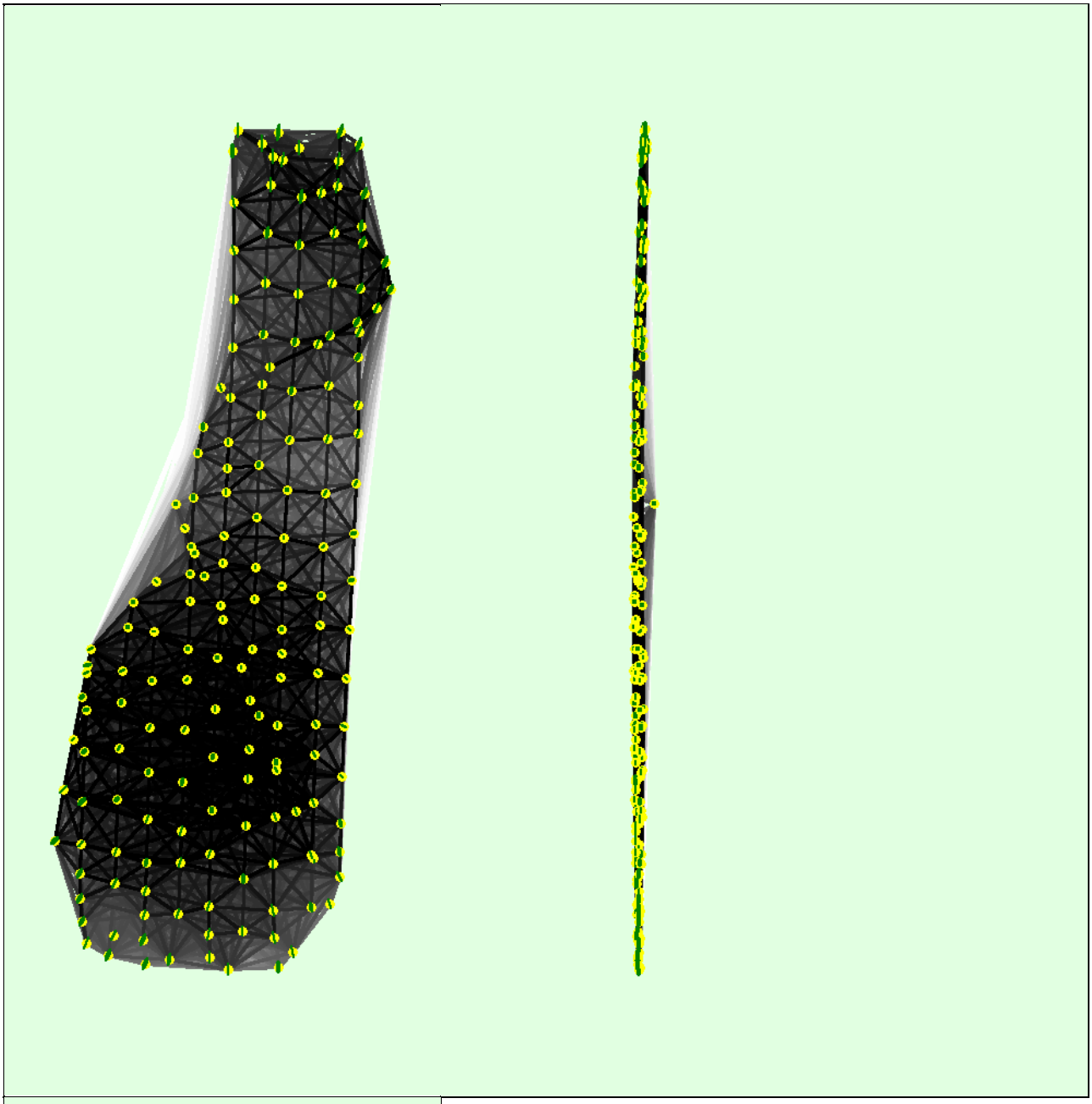
3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	21650
In 3 Images	7050
In 4 Images	3737
In 5 Images	2518
In 6 Images	1851
In 7 Images	1527
In 8 Images	1159
In 9 Images	917
In 10 Images	838
In 11 Images	735

In 12 Images	600
In 13 Images	584
In 14 Images	501
In 15 Images	479
In 16 Images	465
In 17 Images	376
In 18 Images	396
In 19 Images	349
In 20 Images	317
In 21 Images	336
In 22 Images	310
In 23 Images	235
In 24 Images	276
In 25 Images	247
In 26 Images	253
In 27 Images	255
In 28 Images	201
In 29 Images	182
In 30 Images	181
In 31 Images	191
In 32 Images	158
In 33 Images	174
In 34 Images	172
In 35 Images	129
In 36 Images	128
In 37 Images	122
In 38 Images	145
In 39 Images	142
In 40 Images	151
In 41 Images	124
In 42 Images	112
In 43 Images	123
In 44 Images	125
In 45 Images	142
In 46 Images	113
In 47 Images	123
In 48 Images	131
In 49 Images	116
In 50 Images	100
In 51 Images	131
In 52 Images	128
In 53 Images	104
In 54 Images	110
In 55 Images	87
In 56 Images	128
In 57 Images	93
In 58 Images	100
In 59 Images	81
In 60 Images	78
In 61 Images	84
In 62 Images	76
In 63 Images	80
In 64 Images	59
In 65 Images	47
In 66 Images	82
In 67 Images	58
In 68 Images	77
In 69 Images	77
In 70 Images	83

In 71 Images	93
In 72 Images	89
In 73 Images	74
In 74 Images	59
In 75 Images	58
In 76 Images	48
In 77 Images	49
In 78 Images	47
In 79 Images	50
In 80 Images	51
In 81 Images	43
In 82 Images	49
In 83 Images	39
In 84 Images	32
In 85 Images	41
In 86 Images	27
In 87 Images	10
In 88 Images	10
In 89 Images	6
In 90 Images	3

2D Keypoint Matches



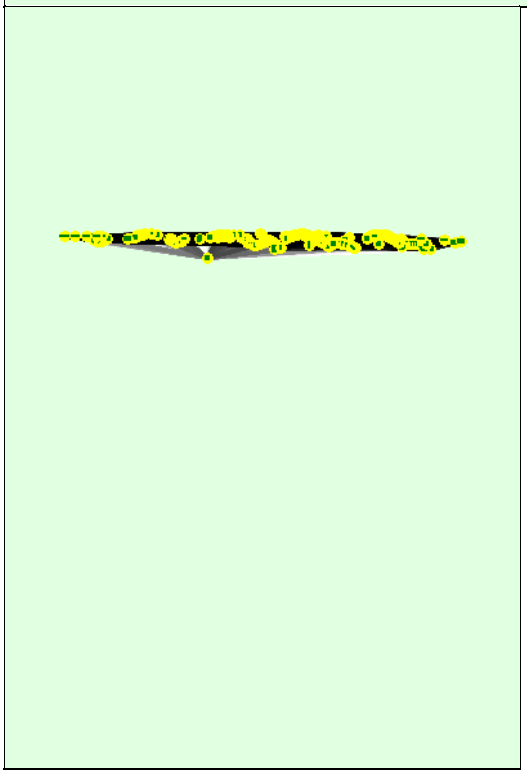


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.048	0.132	0.029	0.033	0.017	0.003
Sigma	0.026	0.077	0.016	0.018	0.014	0.001

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	0.59	0.00
-9.00	-6.00	0.00	13.53	0.00
-6.00	-3.00	4.12	17.06	0.00
-3.00	0.00	44.12	20.00	53.53
0.00	3.00	48.24	12.94	46.47
3.00	6.00	3.53	25.88	0.00
6.00	9.00	0.00	9.41	0.00
9.00	12.00	0.00	0.00	0.00
12.00	15.00	0.00	0.59	0.00
15.00	-	0.00	0.00	0.00
Mean [m]		-0.000000	-0.000000	-0.000000
Sigma [m]		1.291429	4.921060	0.805583
RMS Error [m]		1.291429	4.921060	0.805583

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]	99.41	59.41	100.00
[-2.00, 2.00]	100.00	99.41	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) i7-6700K CPU @ 4.00GHz RAM: 32GB GPU: NVIDIA GeForce GTX 1050 Ti (Driver: 27.21.14.5012)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	WGS 84 / UTM zone 18N (EGM96 Geoid)

Processing Options

Detected Template	Low Quality Initial Processing All Prior*
Keypoints Image Scale	Rapid, Image Scale: 0.25
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: yes
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Alternative Internal Parameters Optimization: All prior External Parameters Optimization: All Rematch: Custom, yes