Quality Report

> **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	woodberry_50m_09_06_16_-0.03,-13cm
Processed	2016-06-15 09:19:02
Average Ground Sampling Distance (GSD)	1.58 cm / 0.62 in
Area Covered	0.0391 km^2 / 3.9107 ha / 0.0151 sq. mi. / 9.6685 acres
Time for Initial Processing (without report)	23m:27s

Quality Check

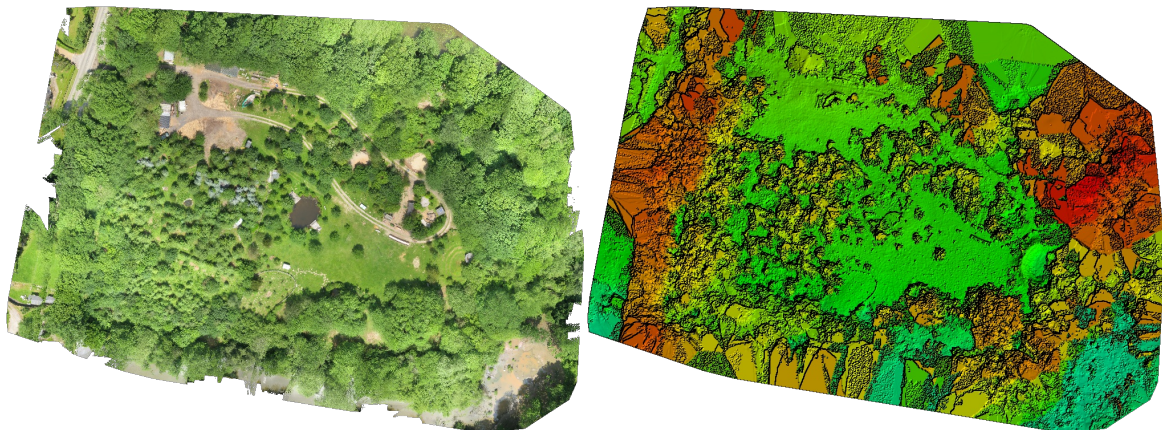|		
Images	median of 63512 keypoints per image	✓
Dataset	322 out of 339 images calibrated (94%), all images enabled, 3 blocks	⚠
Camera Optimization	0.72% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 8776.72 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

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

Calibration Details

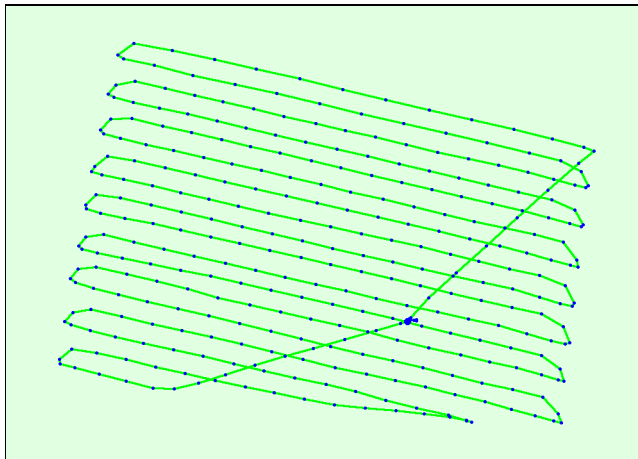|	
Number of Calibrated Images	322 out of 339
Number of Geolocated Images	339 out of 339

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.
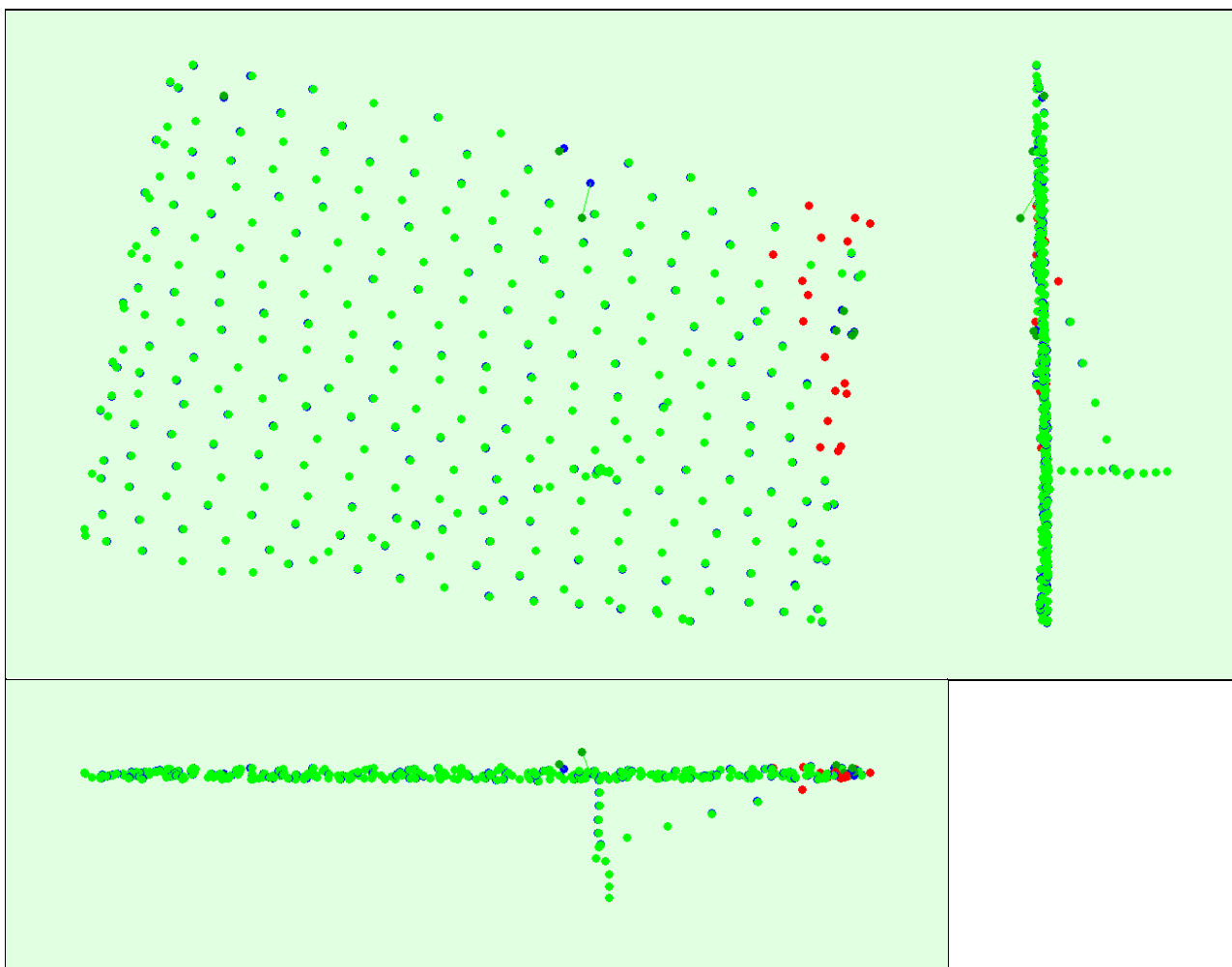
⊘ Computed Image/GCPs/Manual Tie Points Positions ⓘ

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.

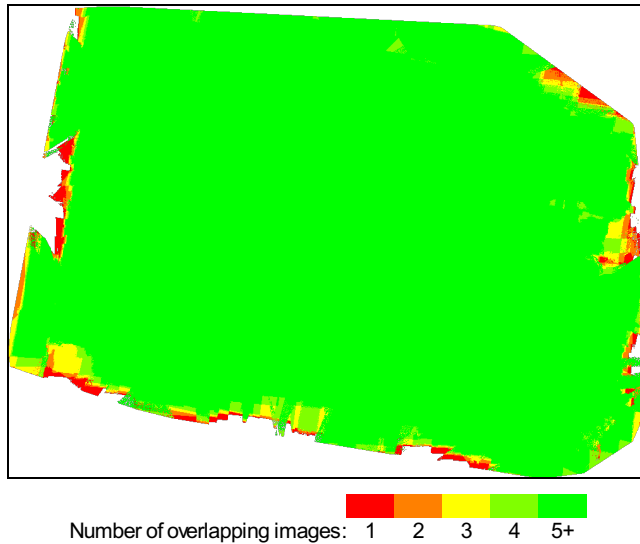## ⊘ Overlap ⓘ

Number of overlapping images: 1 2 3 4 5+

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	2881920
Number of 3D Points for Bundle Block Adjustment	1015228
Mean Reprojection Error [pixels]	0.259156

Internal Camera Parameters

CanonPowerShotS100_5.2_4000x3000 (RGB). Sensor Dimensions: 7.440 [mm] x 5.580 [mm]

EXIF ID: CanonPowerShotS100_5.2_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2937.940 [pixel] 5.465 [mm]	1979.433 [pixel] 3.682 [mm]	1472.028 [pixel] 2.738 [mm]	-0.041	-0.004	0.018	-0.001	-0.002
Optimized Values	2916.748 [pixel] 5.425 [mm]	2035.278 [pixel] 3.786 [mm]	1461.408 [pixel] 2.718 [mm]	-0.045	0.013	0.002	-0.003	0.004

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, in average, more than 16 ATPs are extracted at this pixel location. Black indicates that, in average, 0 ATP has been extracted at this pixel location. Click on the image to the see the average direction and magnitude of the reprojection error for each pixel. Note that the vectors are scaled for better visualization.

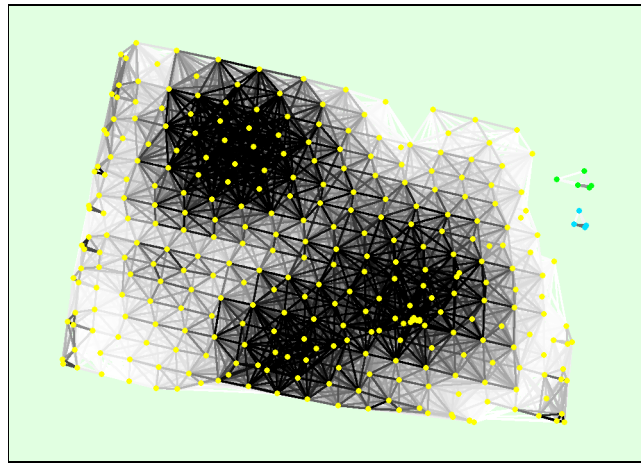## 2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	63512	8777
Min	21941	304
Max	79901	29685
Mean	61486	8950

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	795287
In 3 Images	102262
In 4 Images	36752
In 5 Images	19871
In 6 Images	12645
In 7 Images	8575
In 8 Images	6344
In 9 Images	4980
In 10 Images	3841
In 11 Images	3042
In 12 Images	2568
In 13 Images	2100
In 14 Images	1770
In 15 Images	1628
In 16 Images	1415
In 17 Images	1216
In 18 Images	1115
In 19 Images	959
In 20 Images	848
In 21 Images	791
In 22 Images	765
In 23 Images	648
In 24 Images	625
In 25 Images	538
In 26 Images	559
In 27 Images	429
In 28 Images	379
In 29 Images	351
In 30 Images	344
In 31 Images	336
In 32 Images	309
In 33 Images	283
In 34 Images	222
In 35 Images	201
In 36 Images	169
In 37 Images	142
In 38 Images	128
In 39 Images	99
In 40 Images	95
In 41 Images	83
In 42 Images	81
In 43 Images	68
In 44 Images	64
In 45 Images	70
In 46 Images	45
In 47 Images	42
In 48 Images	46
In 49 Images	38
In 50 Images	31
In 51 Images	13
In 52 Images	8
In 53 Images	5
In 54 Images	1
In 55 Images	2

2D Keypoint Matches

Number of matches

| 25 | 222 | 444 | 666 | 888 | 1111 | 1333 | 1555 | 1777 | 2000 |

Figure 5: Top view of the image computed positions with a link between matching 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

0 out of 4 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
base station	0.020/0.020	0.015	-0.001	-0.047	0.073	3 / 3
GCP 1	0.020/0.020	-0.322	0.213	-0.728	0.405	4 / 4
GCP 2	0.020/0.020	-0.144	0.187	-0.262	0.304	4 / 4
GCP 3	0.020/0.020	-0.049	0.454	1.968	5.150	10 / 10
Mean [m]		-0.124838	0.213340	0.232955		
Sigma [m]		0.127307	0.161490	1.031839		
RMS Error [m]		0.178302	0.267569	1.057809		

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

7 out of 322 geolocated and calibrated images have been labeled as inaccurate.

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.22	0.32	0.32	0.00
-0.22	-0.18	1.59	0.95	0.63
-0.18	-0.13	8.25	2.22	0.32
-0.13	-0.09	10.16	8.57	1.90
-0.09	-0.04	17.14	17.46	13.33
-0.04	0.00	11.43	21.27	42.86
0.00	0.04	11.11	21.27	24.44
0.04	0.09	22.22	16.51	9.84
0.09	0.14	10.79	6.35	4.44
0.14	0.18	4.13	3.17	0.63
0.18	0.23	1.90	0.63	1.27
0.23	-	0.95	1.27	0.32
Mean [m]		-0.000060	0.000152	-0.000019

Sigma [m]	0.102031	0.088220	0.056317
RMS Error [m]	0.102031	0.088220	0.056317

Min Error and Max Error represent geolocation error intervalsbetween -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 intial 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]	89.21	93.65	97.14
[-2.00, 2.00]	99.37	98.73	100.00
[-3.00, 3.00]	99.68	99.68	100.00
Mean of Geolocation Accuracy [m]	0.150000	0.150000	0.150000
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.

Processing Options ⓘ

Hardware	CPU: Intel(R) Core(TM) i7-5960X CPU @ 3.00GHz RAM: 64GB GPU: NVIDIA GeForce GTX 980 Ti (Driver: 10.18.13.6519)
Operating System	Windows 10 Home, 64-bit
Camera Model Name	CanonPowerShotS100_5.2_4000x3000 (RGB)
Image Coordinate System	WGS84 (egm96)
Output Coordinate System	WGS84 / UTM zone 30N (egm96)
Detected template:	No template available
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 (Original image size, Slow)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	yes, Maximum Number of Triangles: 20000000, Texture Size: 131072x131072
Advanced: Matching Window Size	9x9 pixels
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Advanced: Limit Camera Depth Automatically	no
Time for Point Cloud Densification	03h:32m:49s
Time for 3D Textured Mesh Generation	07h:06m:48s

Results ⓘ

Number of Generated Tiles	4
Number of 3D Densified Points	90553229

| Average Density (per m^3) | 2657.75 |