

- !** **Important:** Click on the different icons for:
- ?** Help to analyze the results in the Quality Report
 - i** Additional information about the sections

💡 Click [here](#) for additional tips to analyze the Quality Report

Summary **i**

Project	20150608_it-ren_nadir
Processed	2015-10-02 17:15:45
Average Ground Sampling Distance (GSD)	1.59 cm / 0.62 in
Area Covered	0.022 km ² / 2.1978 ha / 0.0085 sq. mi. / 5.4336 acres
Time for Initial Processing (without report)	02h:00m:11s

Quality Check **i**

? Images	median of 59646 keypoints per image	✓
? Dataset	253 out of 253 images calibrated (100%), all images enabled	✓
? Camera Optimization	1.12% relative difference between initial and optimized internal camera parameters	✓
? Matching	median of 16388.6 matches per calibrated image	✓
? Georeferencing	yes, 10 GCPs (10 3D), mean RMS error = 3.481 m	⚠

? Preview **i**

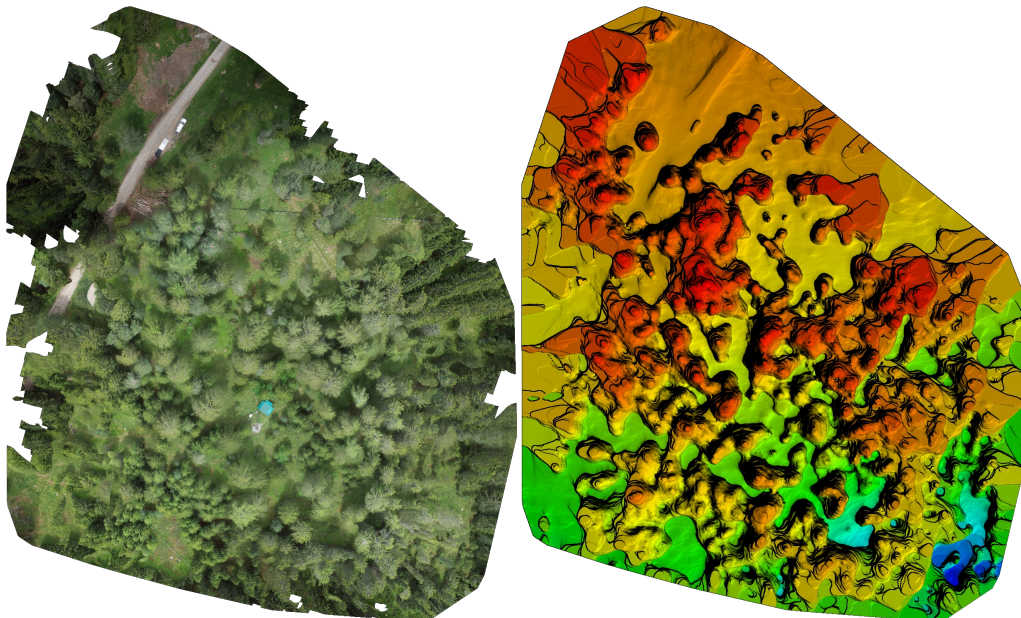


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details **i**

Number of Calibrated Images

253 out of 253

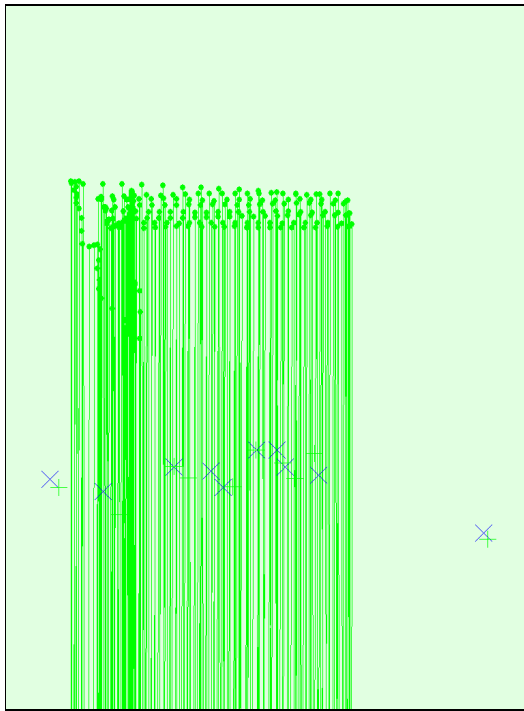
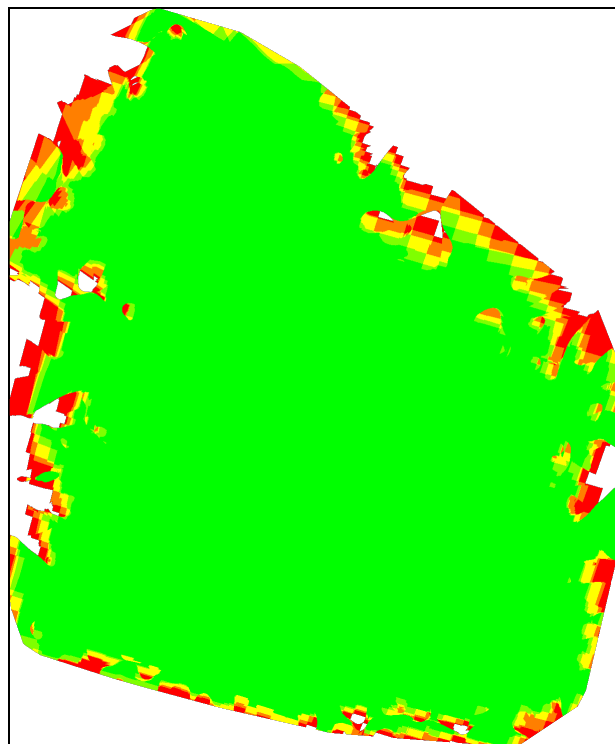


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane).

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 3D Points for Bundle Block Adjustment	1466108
Mean Reprojection Error [pixels]	0.144225

Internal Camera Parameters

GR_GRLENS_18.3_4928x3264 (RGB). Sensor Dimensions: 23.500 [mm] x 15.565 [mm]

EXIF ID: GR_GRLENS_18.3_4928x3264

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3837.548 [pixel] 18.300 [mm]	2463.999 [pixel] 11.750 [mm]	1632.000 [pixel] 7.782 [mm]	-0.075	0.093	-0.023	0.000	0.000
Optimized Values	3880.895 [pixel] 18.507 [mm]	2419.011 [pixel] 11.535 [mm]	1623.060 [pixel] 7.740 [mm]	-0.067	0.089	-0.017	-0.001	-0.002

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 see the average direction and magnitude of the reprojection error for each pixel. Note that the vectors are scaled for better visualization.

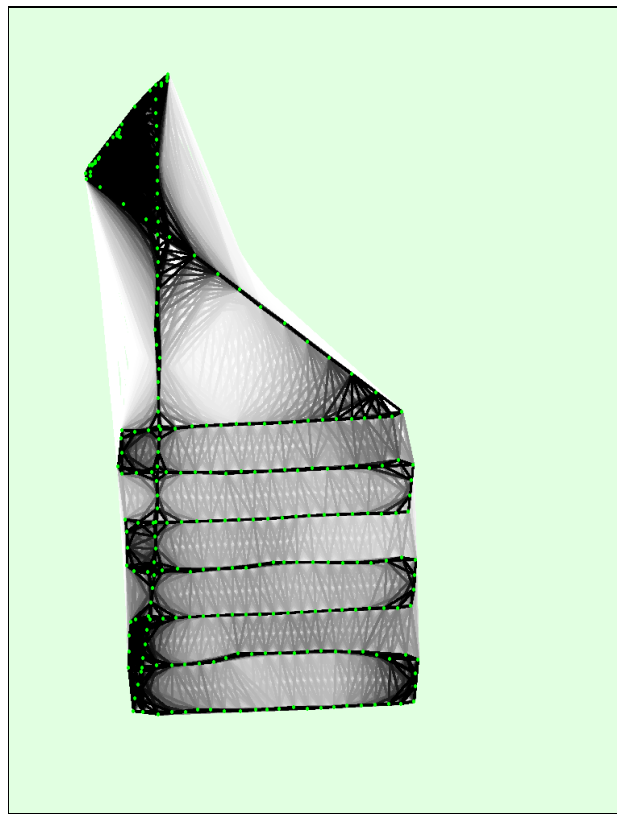
2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	59646	16389
Mn	28175	8777
Max	70212	32177
Mean	56695	16974

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	1014462
In 3 Images	223507
In 4 Images	85295
In 5 Images	43588
In 6 Images	25675
In 7 Images	17034
In 8 Images	11531
In 9 Images	8406
In 10 Images	6603
In 11 Images	4871
In 12 Images	3848
In 13 Images	3134
In 14 Images	2502
In 15 Images	2101
In 16 Images	1718
In 17 Images	1424
In 18 Images	1279
In 19 Images	1092
In 20 Images	933
In 21 Images	774
In 22 Images	648
In 23 Images	596
In 24 Images	545
In 25 Images	462
In 26 Images	413
In 27 Images	379
In 28 Images	365
In 29 Images	298

In 30 Images	233
In 31 Images	235
In 32 Images	193
In 33 Images	222
In 34 Images	209
In 35 Images	176
In 36 Images	158
In 37 Images	160
In 38 Images	130
In 39 Images	135
In 40 Images	93
In 41 Images	112
In 42 Images	82
In 43 Images	70
In 44 Images	72
In 45 Images	67
In 46 Images	46
In 47 Images	36
In 48 Images	28
In 49 Images	31
In 50 Images	22
In 51 Images	17
In 52 Images	14
In 53 Images	6
In 54 Images	8
In 55 Images	11
In 56 Images	5
In 57 Images	6
In 58 Images	4
In 59 Images	3
In 60 Images	1
In 61 Images	3
In 62 Images	2
In 63 Images	3
In 64 Images	1
In 65 Images	2
In 66 Images	2
In 67 Images	2
In 68 Images	1
In 71 Images	3
In 73 Images	1
In 74 Images	2
In 75 Images	1
In 76 Images	1
In 77 Images	3
In 83 Images	1
In 86 Images	1
In 87 Images	2
In 92 Images	1
In 93 Images	1
In 94 Images	1
In 95 Images	1
In 120 Images	1
In 128 Images	1
In 139 Images	1
In 140 Images	1
In 143 Images	1



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 i

? Ground Control Points i

GCP Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
282 (3D)	0.020/ 0.020	0.182	0.303	-0.019	0.275	36 / 36
283 (3D)	0.020/ 0.020	0.963	3.480	-5.234	0.467	38 / 38
285 (3D)	0.020/ 0.020	-0.900	0.241	1.635	0.911	27 / 27
286 (3D)	0.020/ 0.020	-3.683	4.992	5.576	0.863	19 / 19
288 (3D)	0.020/ 0.020	-2.193	-14.464	2.028	0.345	44 / 44
289 (3D)	0.020/ 0.020	-2.273	1.129	-0.119	0.366	79 / 79
290 (3D)	0.020/ 0.020	5.420	-1.840	1.759	0.737	59 / 59
291 (3D)	0.020/ 0.020	-0.055	-0.356	-0.040	0.559	72 / 72
292 (3D)	0.020/ 0.020	-2.312	-3.104	2.881	0.433	66 / 66
293 (3D)	0.020/ 0.020	-1.365	5.045	3.152	0.685	15 / 15
Mean [m]		-0.621486	-0.457412	1.161967		
Sigma [m]		2.409103	5.330869	2.704196		
RMS Error [m]		2.487976	5.350457	2.943271		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of images where the GCP has been automatically verified vs. manually marked.

? Absolute Geolocation Variance i

0 out of 253 geolocated and calibrated images have been labeled as inaccurate.

Mn Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-15.00	0.00	0.00	0.79

-15.00	-12.00	0.00	0.00	0.40
-12.00	-9.00	0.00	0.00	0.40
-9.00	-6.00	0.00	0.00	3.95
-6.00	-3.00	5.14	4.35	8.70
-3.00	0.00	48.22	49.01	24.90
0.00	3.00	35.97	41.11	46.64
3.00	6.00	10.67	5.53	14.23
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]		-1.676850	7.682894	-1757.778199
Sigma [m]		2.219223	1.697726	3.281788
RMS Error [m]		2.781506	7.868236	1757.781263

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]	-1.676850	7.682894	-1757.778199

Bias between image initial and computed geolocation given in output coordinate system.

Relative Geolocation Variance



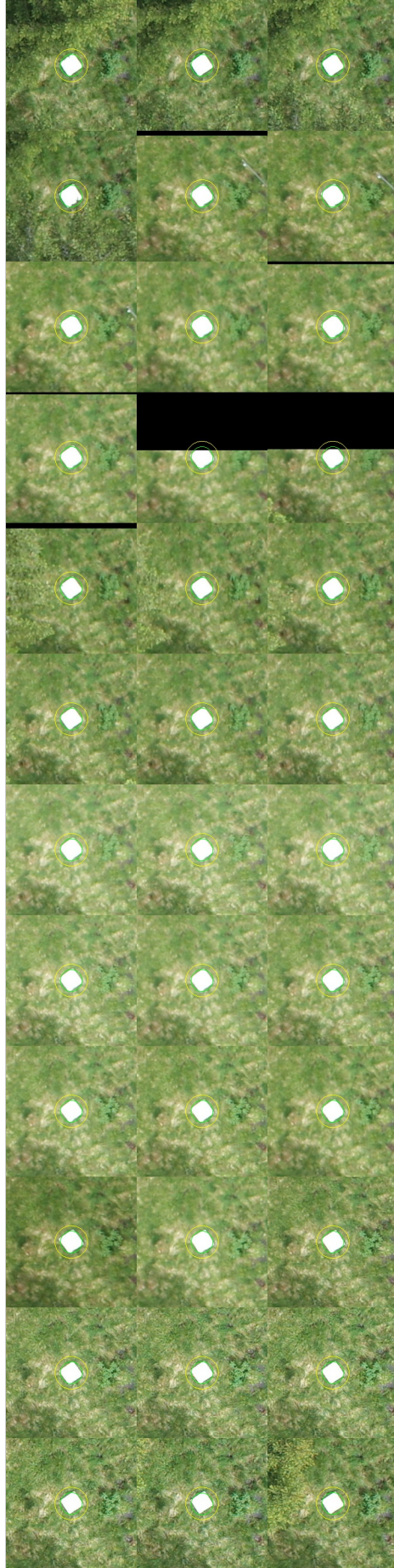
Relative Geolocation Error	Images X[%]	Images Y[%]	Images Z[%]
[-1.00, 1.00]	98.81	100.00	98.81
[-2.00, 2.00]	100.00	100.00	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	5.000000	5.000000	10.000000
Sigma of Geolocation Accuracy [m]	0.000000	0.000000	0.000000

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Georeference Verification

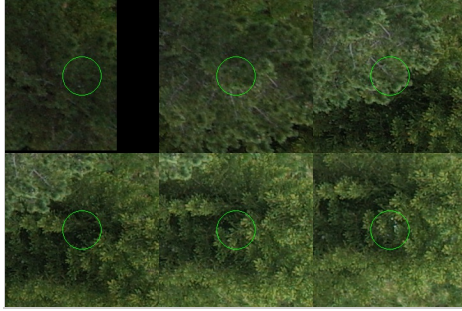


GCP Name: 282 (686450.998,5162188.016,1760.000)



- R1023155.JPG
- R1023158.JPG
- R1023161.JPG
- R1023164.JPG
- R1023602.JPG
- R1023605.JPG
- R1023608.JPG
- R1023611.JPG
- R1023614.JPG
- R1023617.JPG
- R1023620.JPG
- R1023626.JPG
- R1023692.JPG
- R1023695.JPG
- R1023698.JPG
- R1023701.JPG
- R1023704.JPG
- R1023707.JPG
- R1023710.JPG
- R1023713.JPG
- R1023716.JPG
- R1023719.JPG
- R1023722.JPG
- R1023725.JPG
- R1023728.JPG
- R1023731.JPG
- R1023734.JPG
- R1023737.JPG
- R1023740.JPG
- R1023743.JPG
- R1023746.JPG
- R1023749.JPG
- R1023752.JPG
- R1023755.JPG
- R1023758.JPG
- R1023761.JPG

GCP 282 was not marked on the following images (only up to 6 images shown). If the circle is too far away from the initial GCP position, also measure the GCP in these images to improve the accuracy.



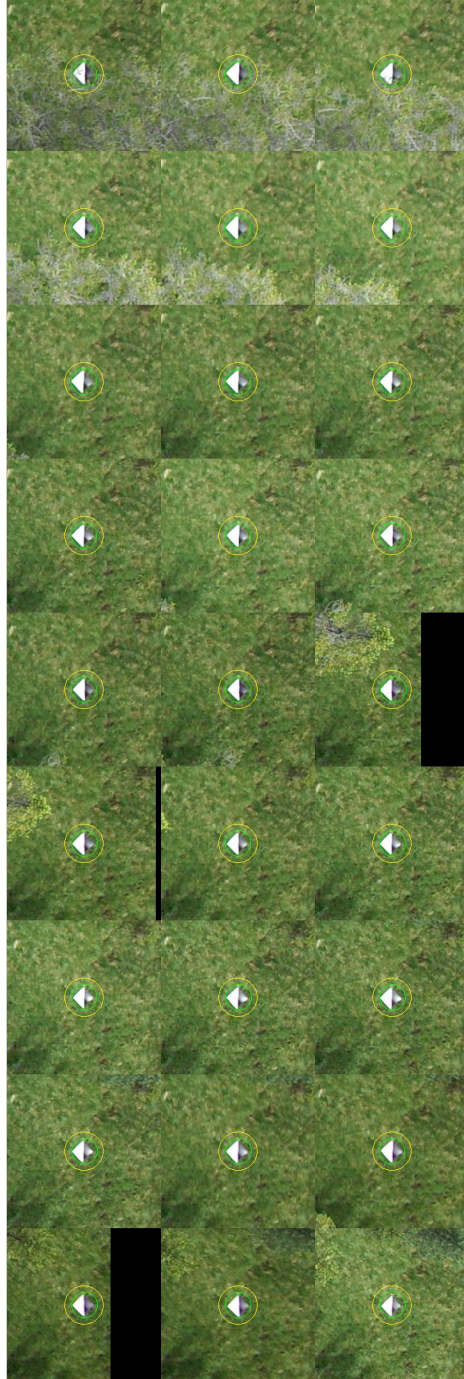
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R1023131.JPG
R1023134.JPG
R1023137.JPG
R1023140.JPG
R1023143.JPG

GCP Name: 283 (686465.998,5162188.016,1754.000)



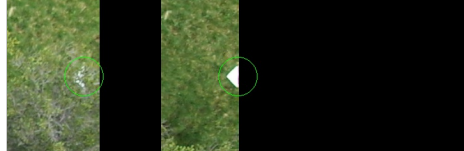
- R1023161.JPG
- R1023167.JPG
- R1023170.JPG
- R1023173.JPG
- R1023176.JPG
- R1023179.JPG
- R1023182.JPG
- R1023602.JPG
- R1023605.JPG
- R1023608.JPG
- R1023611.JPG
- R1023614.JPG
- R1023617.JPG
- R1023692.JPG
- R1023695.JPG
- R1023698.JPG
- R1023701.JPG
- R1023704.JPG
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- R1023710.JPG
- R1023713.JPG
- R1023716.JPG
- R1023719.JPG
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- R1023725.JPG
- R1023728.JPG
- R1023731.JPG
- R1023734.JPG
- R1023737.JPG
- R1023740.JPG
- R1023743.JPG
- R1023746.JPG
- R1023749.JPG
- R1023752.JPG
- R1023755.JPG
- R1023758.JPG
- R1023761.JPG
- R1023764.JPG

GCP Name: 285 (686505.997,5162106.016,1740.000)



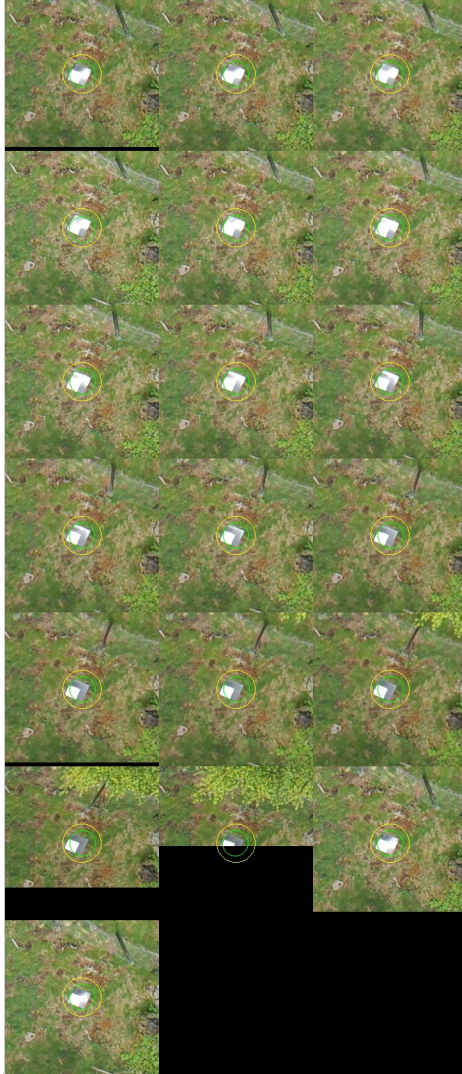
- R1023296.JPG
- R1023299.JPG
- R1023302.JPG
- R1023305.JPG
- R1023308.JPG
- R1023311.JPG
- R1023314.JPG
- R1023317.JPG
- R1023320.JPG
- R1023323.JPG
- R1023326.JPG
- R1023329.JPG
- R1023332.JPG
- R1023335.JPG
- R1023443.JPG
- R1023446.JPG
- R1023449.JPG
- R1023452.JPG
- R1023455.JPG
- R1023458.JPG
- R1023461.JPG
- R1023464.JPG
- R1023467.JPG
- R1023470.JPG
- R1023590.JPG
- R1023593.JPG
- R1023596.JPG

GCP 285 was not marked on the following images (only up to 6 images shown). If the circle is too far away from the initial GCP position, also measure the GCP in these images to improve the accuracy.



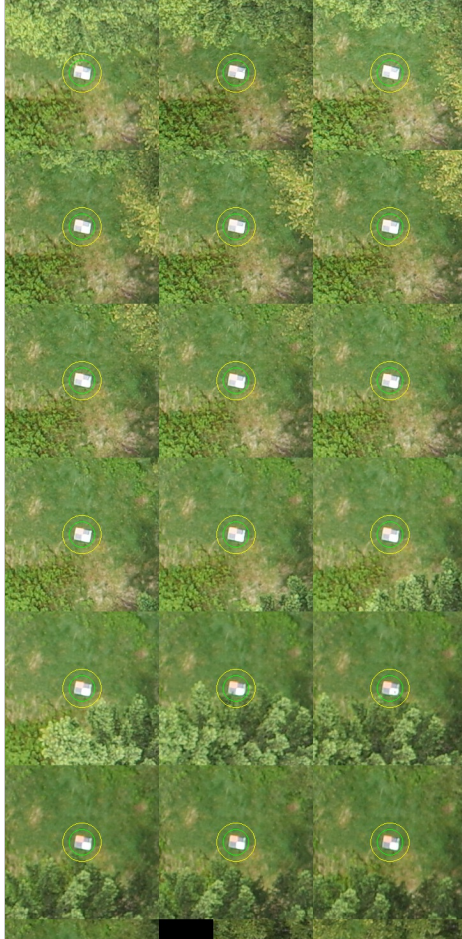
- R1023293.JPG
- R1023338.JPG

GCP Name: 286 (686413.997,5162096.016,1750.000)

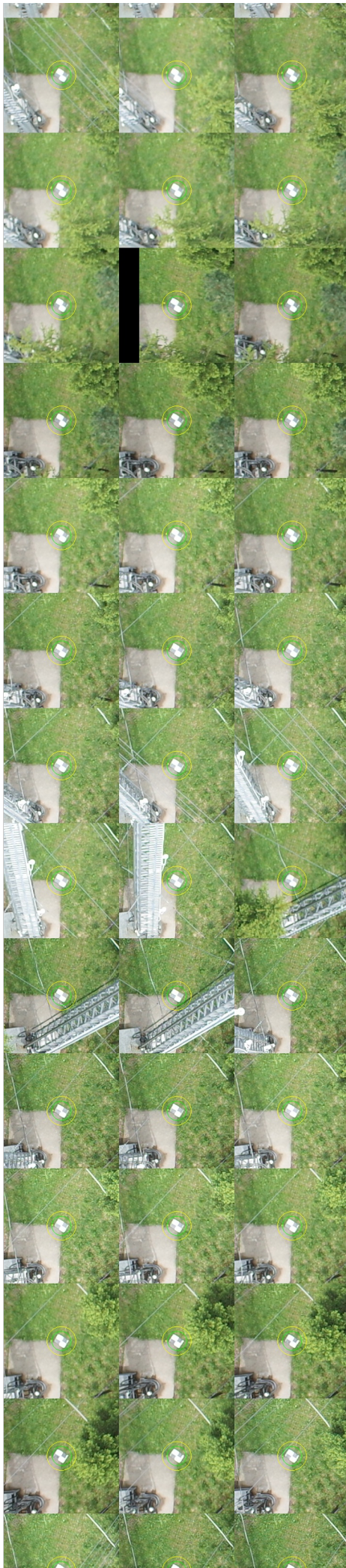


R1023239.JPG
R1023242.JPG
R1023245.JPG
R1023248.JPG
R1023251.JPG
R1023254.JPG
R1023257.JPG
R1023260.JPG
R1023263.JPG
R1023266.JPG
R1023269.JPG
R1023272.JPG
R1023275.JPG
R1023278.JPG
R1023281.JPG
R1023287.JPG
R1023290.JPG
R1023380.JPG
R1023383.JPG

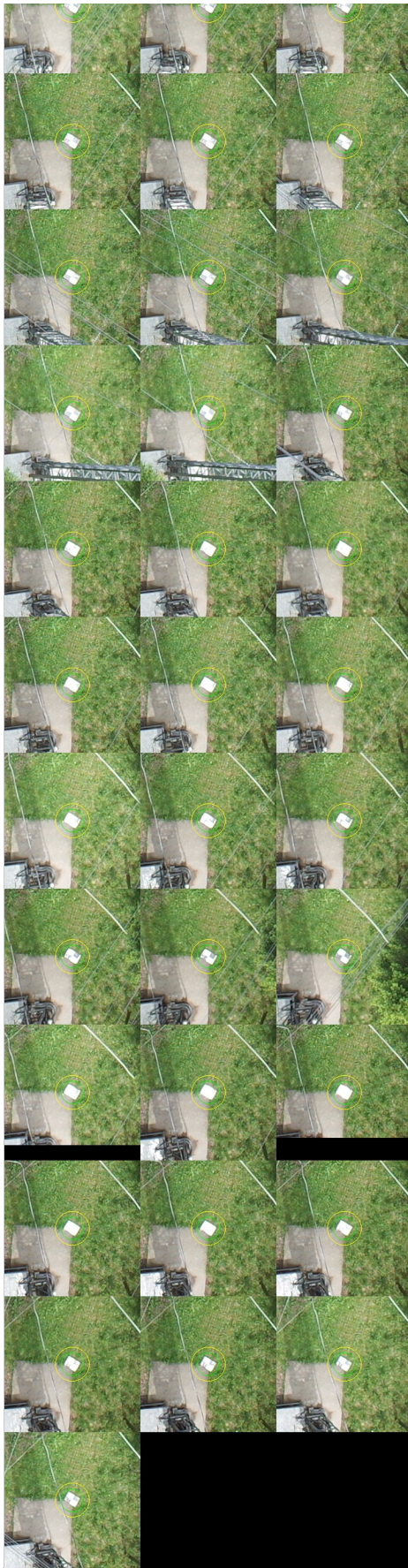
GCP Name: 288 (686400.998,5162116.016,1753.000)



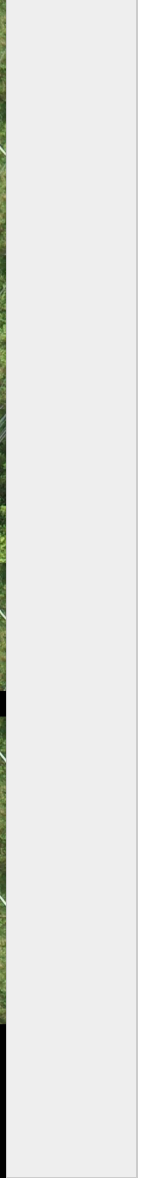
R1023209.JPG
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R1023215.JPG
R1023218.JPG
R1023221.JPG
R1023224.JPG
R1023227.JPG
R1023230.JPG
R1023233.JPG
R1023236.JPG
R1023239.JPG
R1023242.JPG
R1023245.JPG
R1023254.JPG



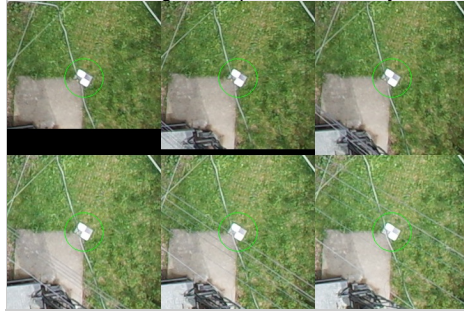
R1023269.JPG
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R1023275.JPG
R1023278.JPG
R1023281.JPG
R1023284.JPG
R1023287.JPG
R1023293.JPG
R1023296.JPG
R1023299.JPG
R1023302.JPG
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R1023641.JPG
R1023644.JPG
R1023647.JPG
R1023650.JPG
R1023653.JPG



GCP 289 was not marked on the following images (only up to 6 images shown). If the circle is too far away from the initial GCP position, also measure the GCP in these images to improve the accuracy.

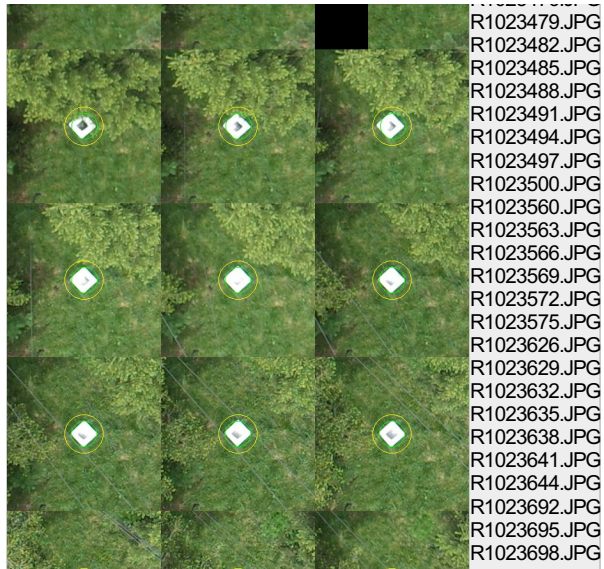


R1023185.JPG
R1023188.JPG
R1023191.JPG
R1023194.JPG
R1023197.JPG
R1023200.JPG

GCP Name: 290 (686439.998,5162138.016,1755.000)

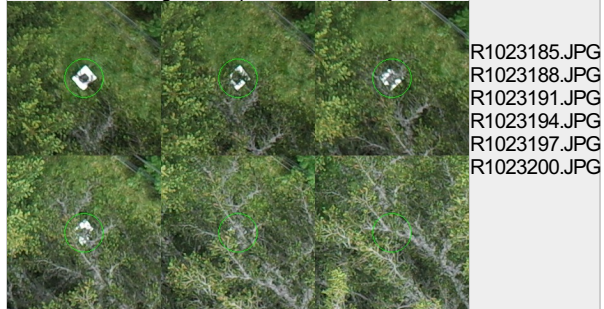


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GCP 290 was not marked on the following images (only up to 6 images shown). If the circle is too far away from the initial GCP position, also measure the GCP in these images to improve the accuracy.



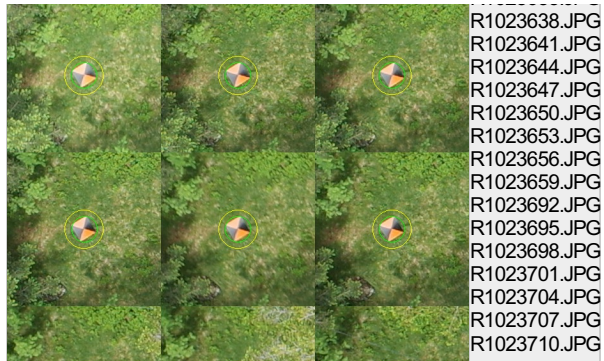
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 R1023188.JPG
 R1023191.JPG
 R1023194.JPG
 R1023197.JPG
 R1023200.JPG

GCP Name: 291 (686430.998,5162154.016,1756.000)





R1023191.JPG
R1023194.JPG
R1023197.JPG
R1023200.JPG
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 R1023707.JPG
 R1023710.JPG



GCP 291 was not marked on the following images (only up to 6 images shown). If the circle is too far away from the initial GCP position, also measure the GCP in these images to improve the accuracy.



R1023167.JPG
 R1023170.JPG
 R1023173.JPG
 R1023176.JPG
 R1023179.JPG
 R1023182.JPG

GCP Name: 292 (686457.998,5162143.016,1756.000)





R1023200.JPG
R1023203.JPG
R1023206.JPG
R1023209.JPG
R1023212.JPG
R1023215.JPG
R1023218.JPG
R1023221.JPG
R1023224.JPG
R1023227.JPG
R1023326.JPG
R1023329.JPG
R1023332.JPG
R1023335.JPG
R1023338.JPG
R1023341.JPG
R1023344.JPG
R1023347.JPG
R1023401.JPG
R1023404.JPG
R1023407.JPG
R1023410.JPG
R1023413.JPG
R1023416.JPG
R1023419.JPG
R1023422.JPG
R1023425.JPG
R1023428.JPG
R1023431.JPG
R1023434.JPG
R1023437.JPG
R1023440.JPG
R1023443.JPG
R1023446.JPG
R1023449.JPG
R1023452.JPG
R1023455.JPG
R1023479.JPG
R1023482.JPG
R1023485.JPG
R1023488.JPG
R1023491.JPG
R1023494.JPG
R1023497.JPG
R1023500.JPG
R1023503.JPG
R1023506.JPG
R1023509.JPG
R1023512.JPG
R1023515.JPG
R1023518.JPG
R1023521.JPG
R1023524.JPG
R1023527.JPG
R1023530.JPG
R1023533.JPG
R1023539.JPG
R1023542.JPG
R1023545.JPG
R1023548.JPG
R1023635.JPG
R1023638.JPG
R1023641.JPG



R1023689.JPG
R1023692.JPG
R1023695.JPG

GCP 292 was not marked on the following images (only up to 6 images shown). If the circle is too far away from the initial GCP position, also measure the GCP in these images to improve the accuracy.



R1023170.JPG
R1023185.JPG
R1023188.JPG
R1023191.JPG
R1023194.JPG
R1023197.JPG



Figure 7: Images in which GCPs have been marked (yellow circle) and in which their computed 3D points have been projected (green circle). A green circle outside of the yellow circle indicates either an accuracy issue or a GCP issue.

Processing Options



Hardware	CPU: Intel(R) Xeon(R) CPU E5-1620 v2 @ 3.70GHz RAM: 40GB GPU: NVIDIA Quadro K2000 (Driver: 9.18.13.3250)
Operating System	Windows 8.1 Enterprise, 64-bit
Camera Model Name	GR_GRLens_18.3_4928x3264 (RGB)
Image Coordinate System	WGS84
Ground Control Point (GCP) Coordinate System	WGS84
Output Coordinate System	WGS84 / UTMzone 32N
Keypoints Image Scale	Custom, 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: 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, Maximum Number of Triangles: 1000000, Texture Size: 8192x8192
Advanced: Matching Window Size	7x7 pixels
Advanced: Image Groups	group1
Advanced: Use Densification Area	yes
Advanced: Use Annotations	yes
Advanced: Limit Camera Depth Automatically	no
Time for Point Cloud Densification	02h:10m:15s
Time for 3D Textured Mesh Generation	20m:41s

Results



Number of Generated Tiles	4
Number of 3D Densified Points	25797964
Average Density (per m ³)	800.2

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	1 x GSD (1.59 [cm/pixel])
DSM Filters	Noise Filtering: yes, Surface Smoothing: yes, Sharp
DSM Generation	yes, Method: Inverse Distance Weighting, Merge Tiles: yes
Time for DSM Generation	24m:09s
Time for Orthomosaic Generation	44m:46s