

Quality Report



Generated with Pro version 2.1.61

! **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



Project	swindale_2_random
Processed	2016-07-11 16:28:48
Average Ground Sampling Distance (GSD)	2.74 cm / 1.08 in
Area Covered	0.2582 km ² / 25.8236 ha / 0.0998 sq. mi. / 63.8445 acres

Quality Check



? Images	median of 54198 keypoints per image	
? Dataset	206 out of 220 images calibrated (93%), all images enabled	
? Camera Optimization	0.98% relative difference between initial and optimized internal camera parameters	
? Matching	median of 12570.4 matches per calibrated image	
? Georeferencing	yes, 27 GCPs (27 3D), mean RMS error = 0.013 m	

Preview

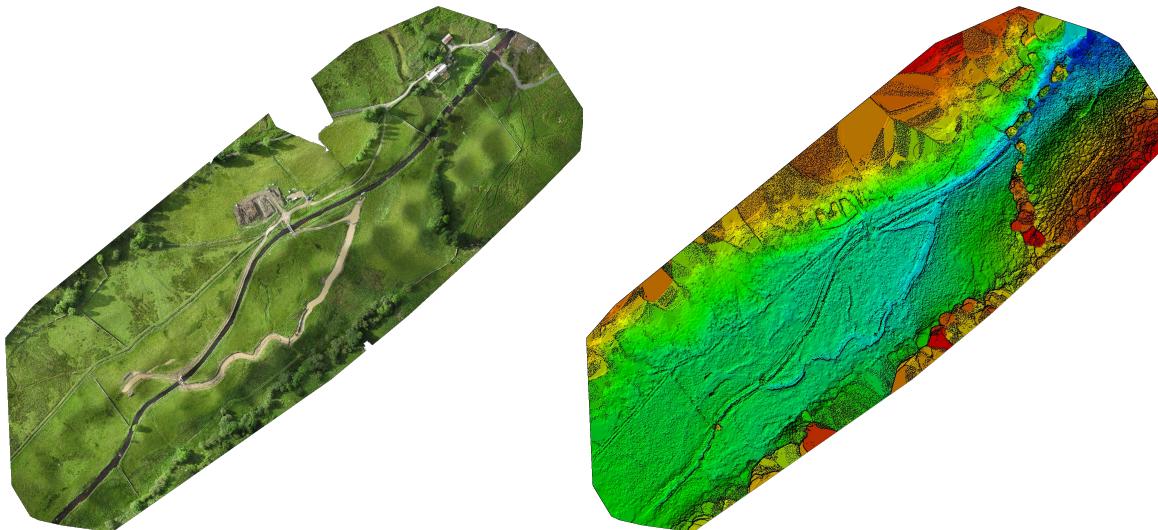


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	206 out of 220
Number of Geolocated Images	216 out of 220

ⓘ Initial Image Positions

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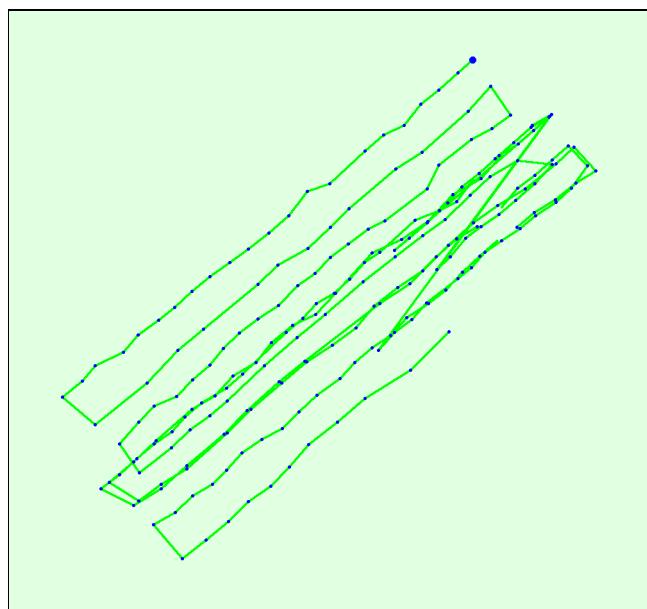


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

ⓘ Computed Image/GCPs/Manual Tie Points Positions

i

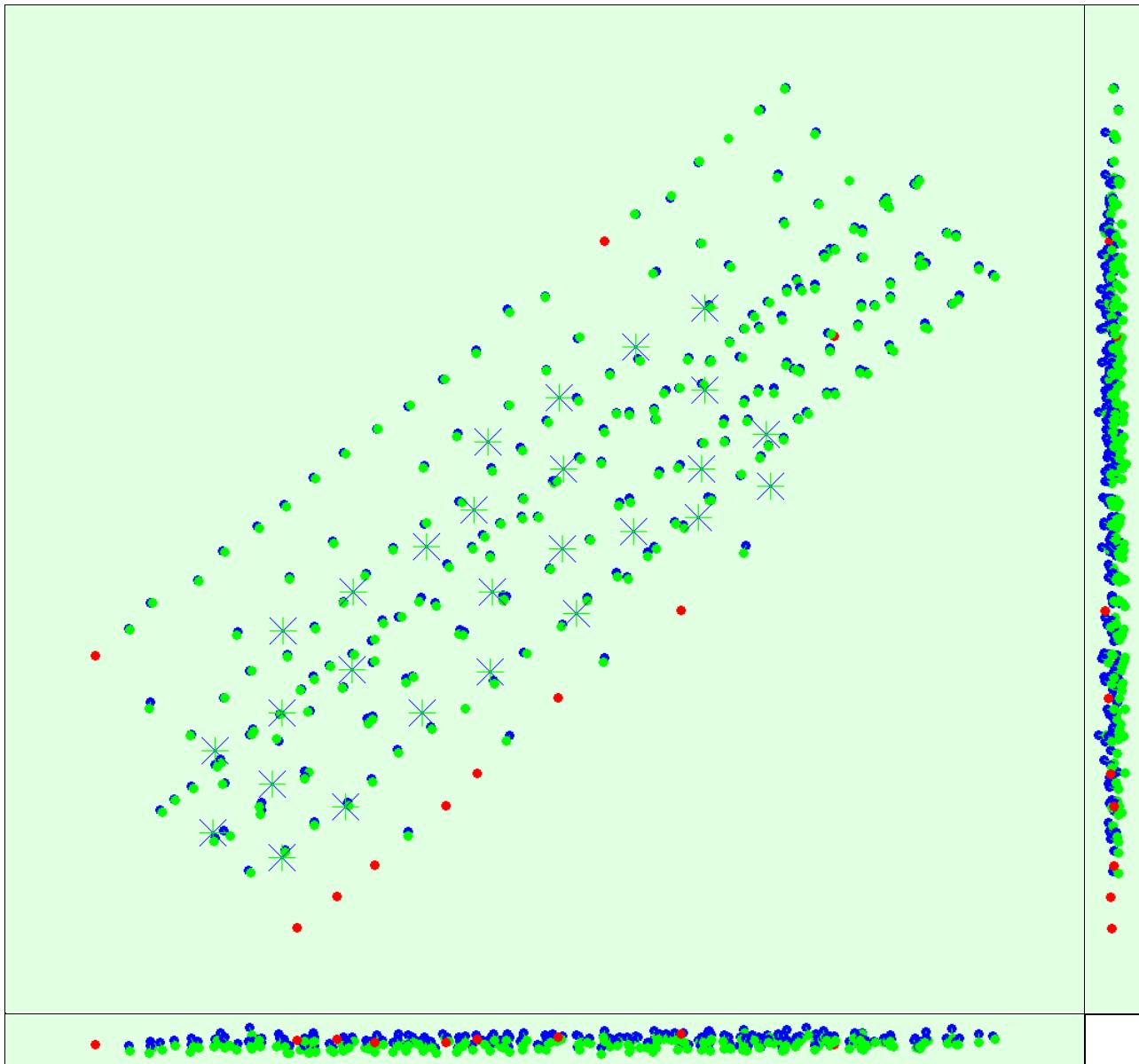


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled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

Overlap

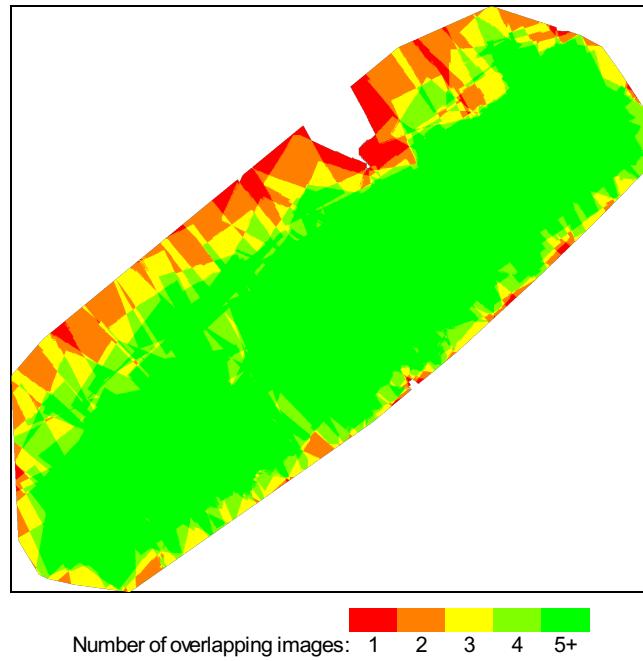


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

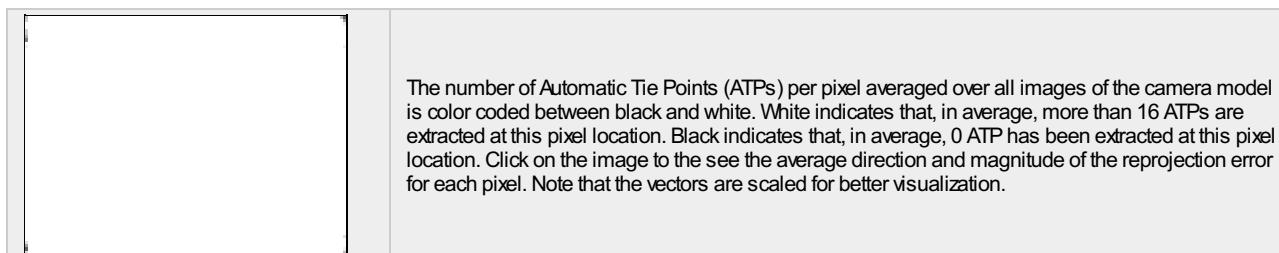
Number of 2D Keypoint Observations for Bundle Block Adjustment	2742666
Number of 3D Points for Bundle Block Adjustment	1208646
Mean Reprojection Error [pixels]	0.159493

Internal Camera Parameters

CanonIXUS220HS_4.3_4000x3000 (RGB). Sensor Dimensions: 6.198 [mm] x 4.648 [mm]

EXIF ID: CanonIXUS220HS_4.3_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2839.640 [pixel] 4.400 [mm]	2019.760 [pixel] 3.129 [mm]	1547.000 [pixel] 2.397 [mm]	-0.043	0.026	-0.006	0.001	0.002
Optimized Values	2811.531 [pixel] 4.356 [mm]	1967.970 [pixel] 3.049 [mm]	1551.114 [pixel] 2.403 [mm]	-0.043	0.022	-0.002	0.003	-0.002



2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	54198	12570
Min	23809	272
Max	75565	32686
Mean	53686	13314

💡 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	1001048
In 3 Images	140669
In 4 Images	38688
In 5 Images	15453
In 6 Images	7130
In 7 Images	3213
In 8 Images	1383
In 9 Images	650
In 10 Images	253
In 11 Images	111
In 12 Images	24
In 13 Images	17
In 14 Images	5
In 15 Images	1
In 16 Images	1

💡 2D Keypoint Matches

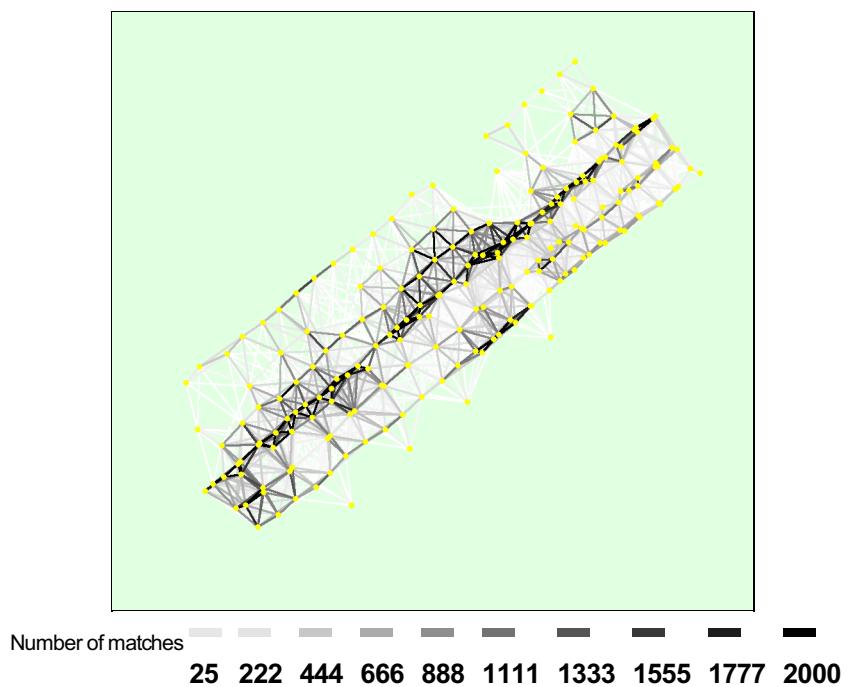


Figure 5: Top view of the image computed positions with a link between matching images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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
StkdT_12389 (3D)	0.005/ 0.011	0.002	0.014	0.015	0.620	7 / 7
StkdT_12388 (3D)	0.004/ 0.008	-0.001	0.002	0.009	0.345	8 / 8
StkdT_12387 (3D)	0.004/ 0.009	0.023	0.025	-0.027	0.541	5 / 5
StkdT_12319 (3D)	0.004/ 0.008	0.001	-0.012	-0.008	0.461	5 / 5
StkdT_12383 (3D)	0.004/ 0.007	-0.004	-0.001	-0.012	0.663	13 / 13
StkdT_12382 (3D)	0.004/ 0.008	-0.008	0.001	0.014	0.332	8 / 8
StkdT_12320 (3D)	0.005/ 0.009	-0.002	0.000	0.001	0.417	8 / 8
StkdT_12378 (3D)	0.007/ 0.015	-0.016	-0.012	-0.039	0.320	10 / 10
StkdT_12379 (3D)	0.006/ 0.013	0.009	0.014	-0.000	0.485	5 / 5
StkdT_12380 (3D)	0.008/ 0.018	-0.020	-0.006	0.001	0.358	6 / 6
StkdT_12303 (3D)	0.005/ 0.011	0.024	-0.008	-0.009	0.512	3 / 3
StkdT_12376 (3D)	0.008/ 0.018	-0.010	-0.006	0.021	0.472	4 / 4
StkdT_12386 (3D)	0.004/ 0.009	0.007	0.000	0.002	0.457	4 / 4
StkdT_12385 (3D)	0.004/ 0.011	0.016	-0.023	0.008	0.536	7 / 7
StkdT_12384 (3D)	0.004/ 0.010	0.012	0.004	0.010	0.466	5 / 5
StkdT_12371 (3D)	0.004/ 0.008	0.005	0.025	-0.009	0.485	5 / 5
StkdT_12317 (3D)	0.004/ 0.008	-0.006	-0.015	-0.034	0.640	4 / 4
StkdT_12362 (3D)	0.004/ 0.008	0.000	0.009	0.001	0.531	6 / 6
StkdT_12316 (3D)	0.004/ 0.008	0.006	0.013	-0.000	0.391	8 / 8
StkdT_12369 (3D)	0.005/ 0.009	-0.006	0.018	-0.001	0.649	7 / 7
StkdT_12373 (3D)	0.004/ 0.008	0.004	-0.012	0.010	0.629	7 / 7
StkdT_12370 (3D)	0.004/ 0.007	0.004	0.002	0.020	0.299	3 / 3
StkdT_12372 (3D)	0.011/ 0.019	-0.031	0.010	0.036	0.570	4 / 4
StkdT_12374 (3D)	0.006/ 0.010	-0.008	-0.013	-0.018	0.549	7 / 7
StkdT_12361 (3D)	0.006/ 0.014	0.001	-0.009	-0.007	0.216	4 / 4
StkdT_12364 (3D)	0.005/ 0.012	-0.005	-0.007	-0.000	0.205	5 / 5
StkdT_12363 (3D)	0.004/ 0.009	0.009	-0.005	-0.004	0.304	8 / 8
Mean [m]		0.000239	0.000290	-0.000837		
Sigma [m]		0.011921	0.012140	0.016213		
RMS Error [m]		0.011924	0.012143	0.016235		

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
StkdT_12381	0.0049/0.0093	0.0070	-0.0279	0.0393	0.3371	9 / 9
StkdT_12375	0.0091/0.0205	-0.0000	0.0113	0.0577	0.3839	5 / 5
StkdT_12318	0.0043/0.0074	-0.0014	0.0287	0.0616	0.4363	6 / 6
StkdT_12360	0.0057/0.0107	-0.0094	-0.0060	-0.0244	0.3477	6 / 6
Mean [m]		-0.000942	0.001524	0.033529		
Sigma [m]		0.005823	0.020964	0.034505		
RMS Error [m]		0.005899	0.021019	0.048112		

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



0 out of 206 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	0.00
-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	0.49	1.46	6.31
-3.00	0.00	51.46	51.46	45.63
0.00	3.00	47.09	45.63	40.78
3.00	6.00	0.97	1.46	7.28
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]		-0.482377	1.769847	4.926021
Sigma [m]		1.133919	1.296240	1.968192
RMS Error [m]		1.232258	2.193763	5.304665

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]	-0.482377	1.769847	4.926021

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

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 Relative Geolocation Variance

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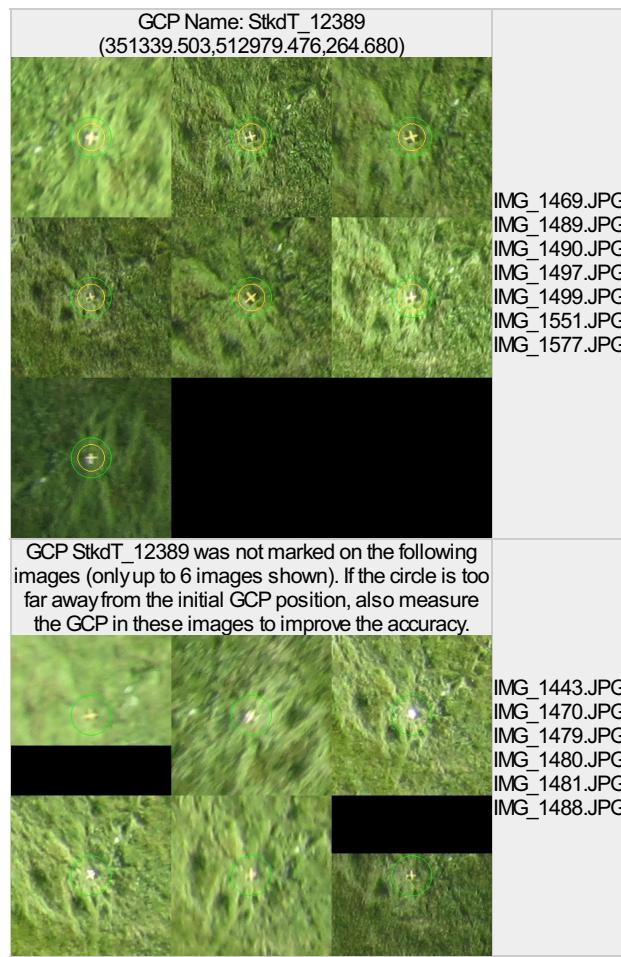
Relative Geolocation Error	Images X[%]	Images Y[%]	Images Z[%]
[-1.00, 1.00]	100.00	99.51	100.00
[-2.00, 2.00]	100.00	100.00	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	5.000000	5.000000	10.000000
Sigma of Geolocation Accuracy [m]	0.000000	0.000000	0.000000

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

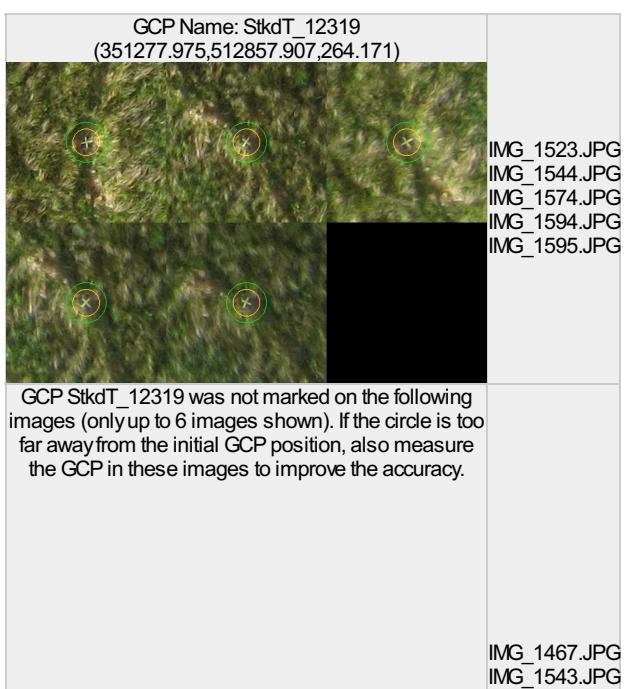
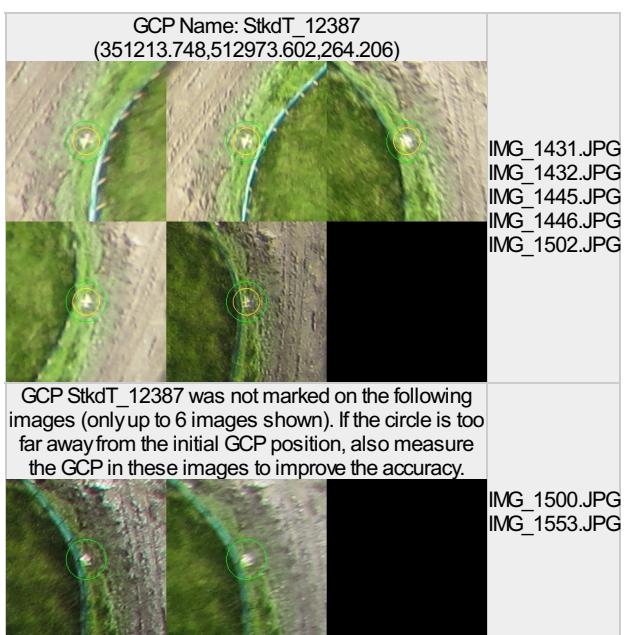
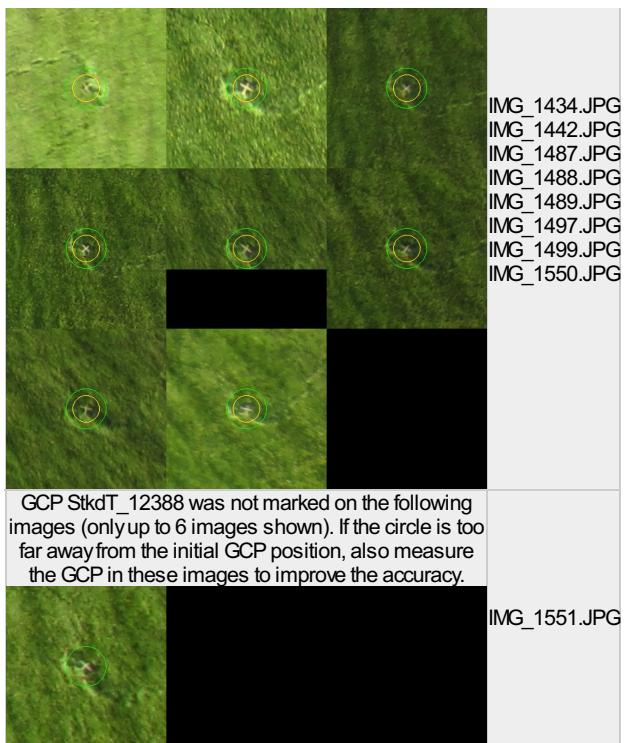
?

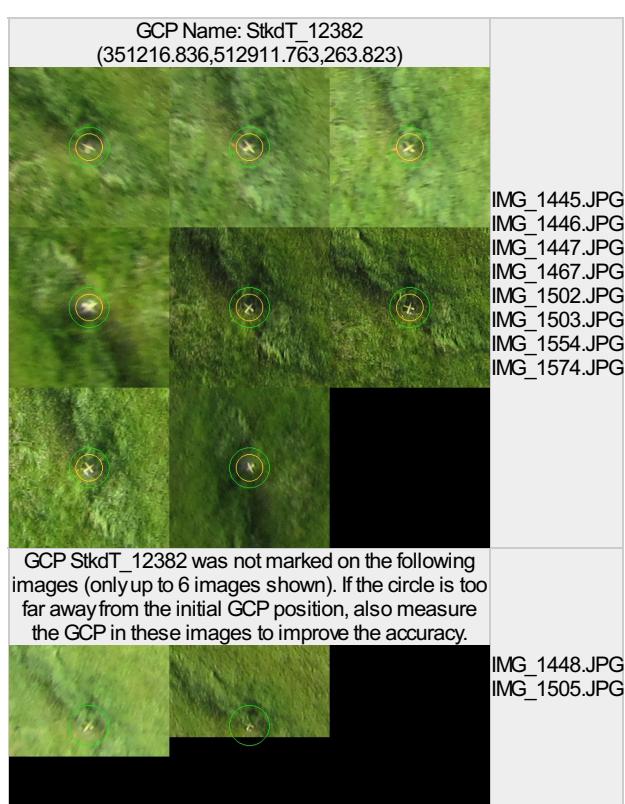
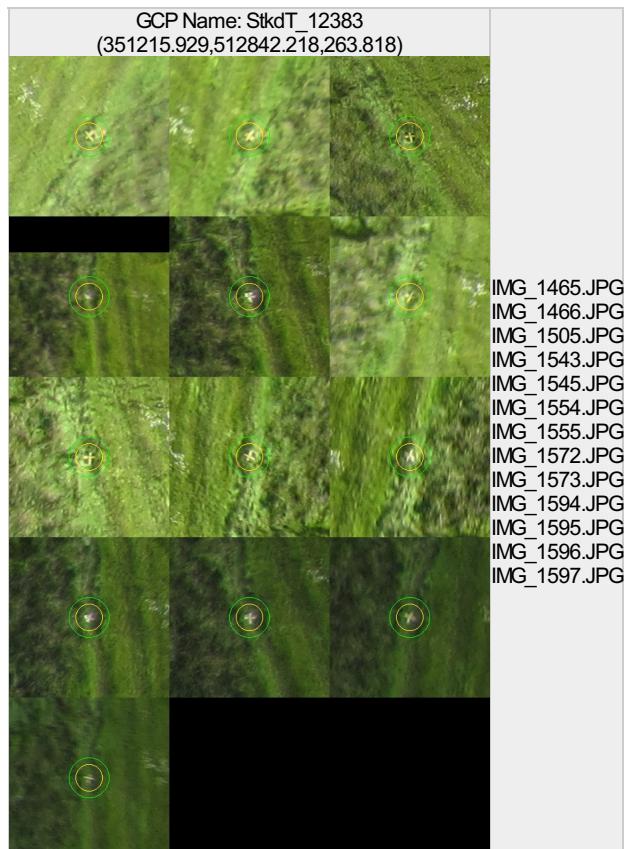
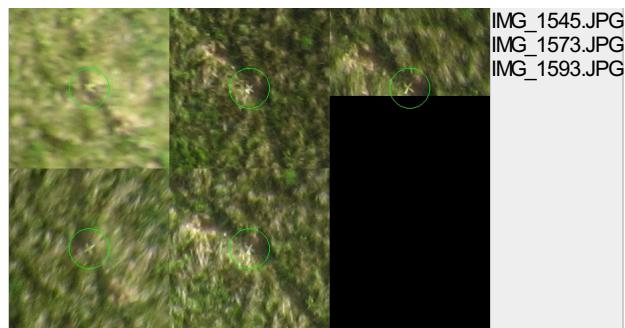
 Georeference Verification

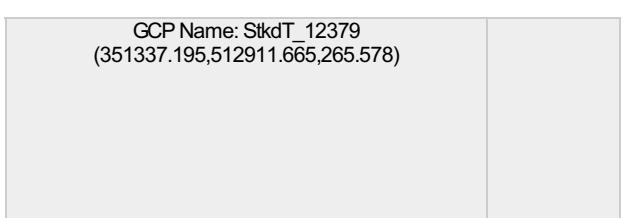
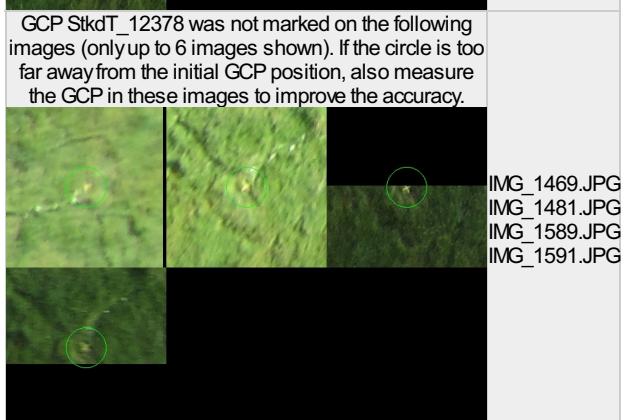
i

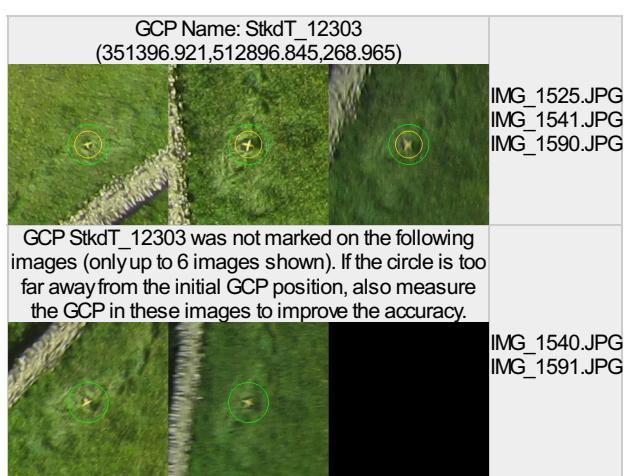
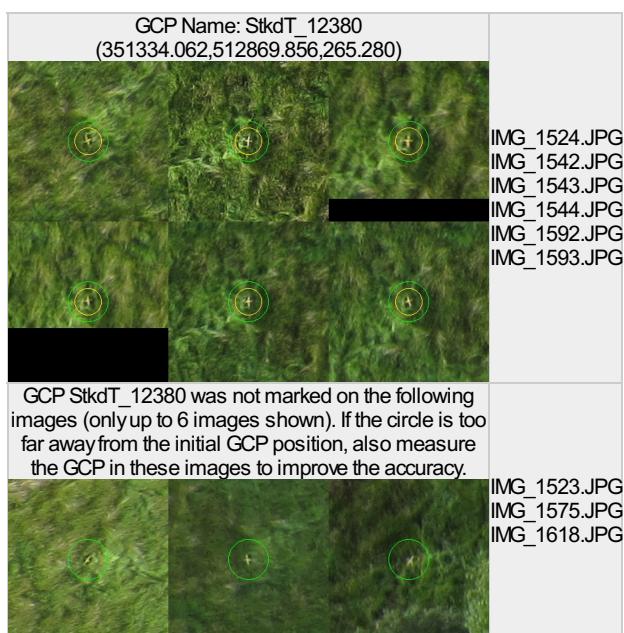
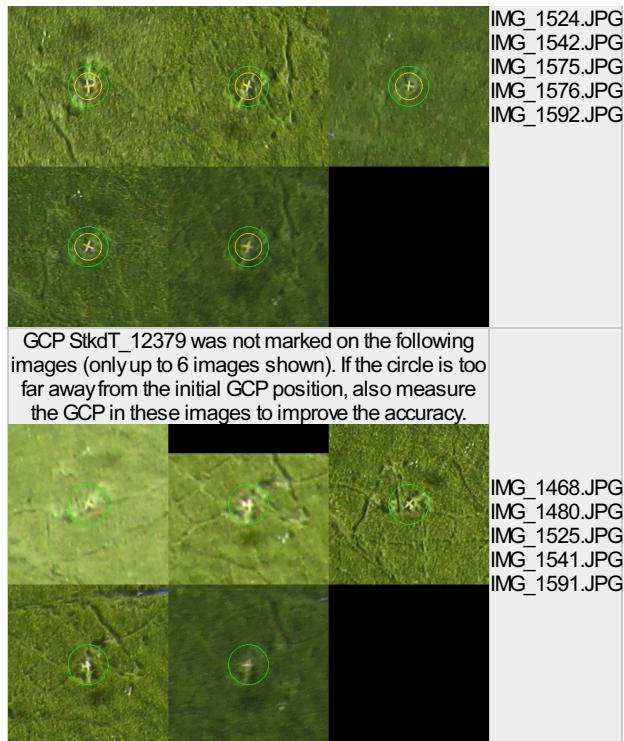


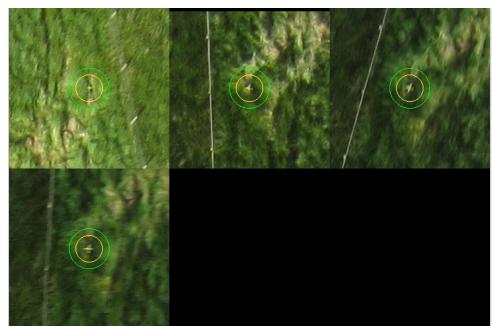
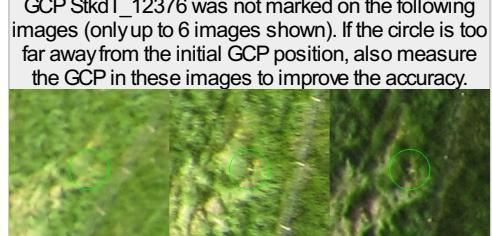
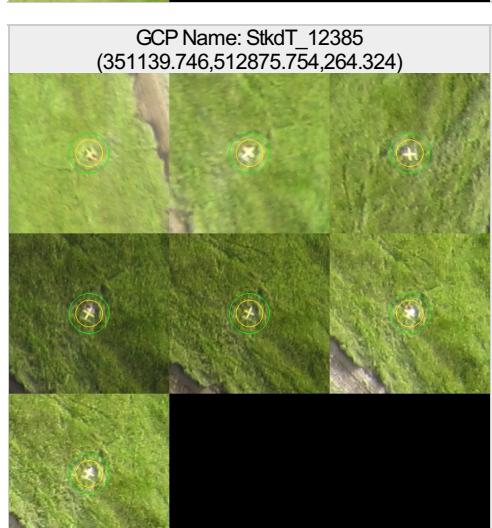
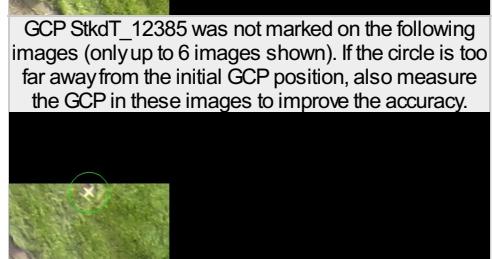
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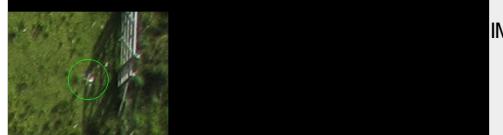
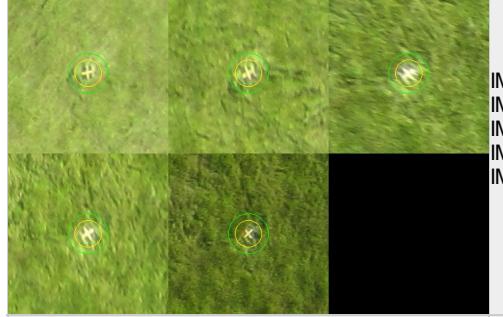


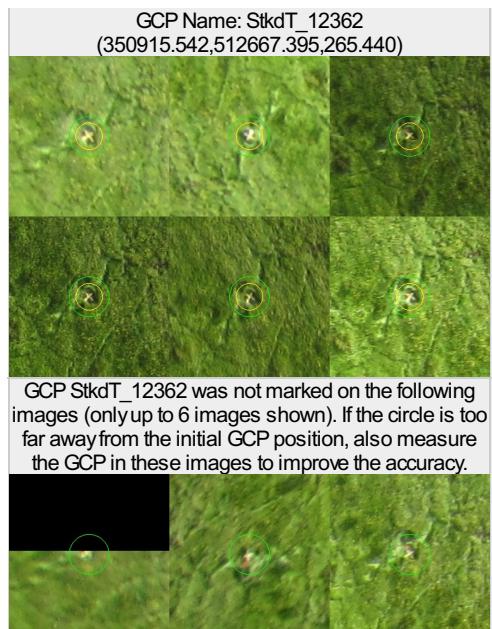
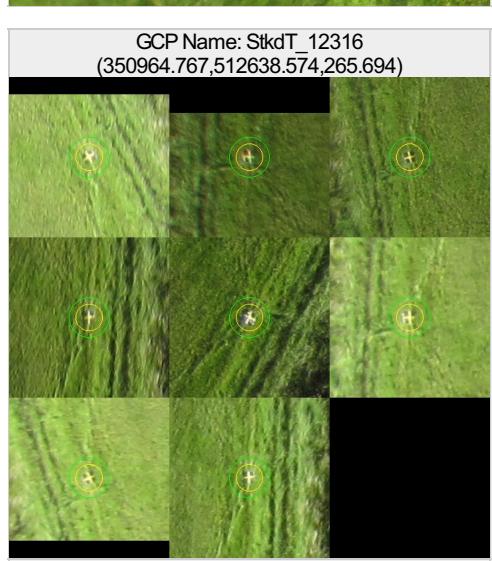
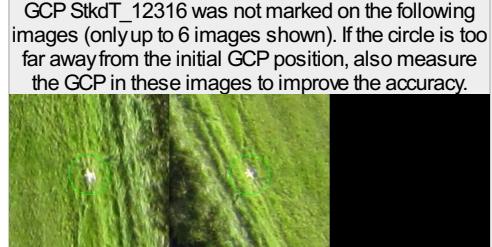
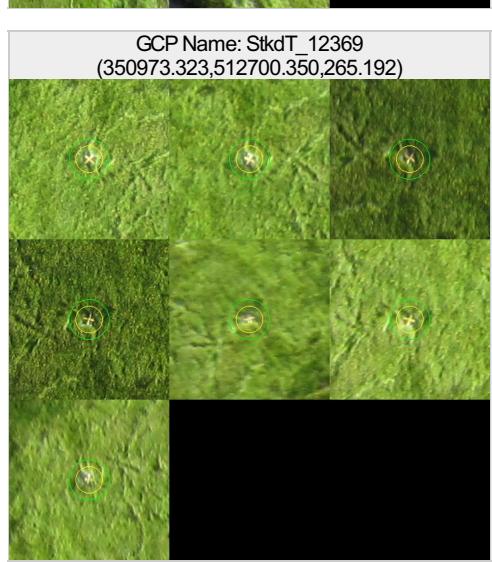
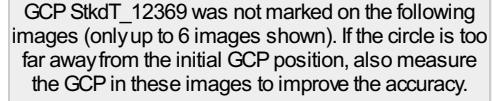


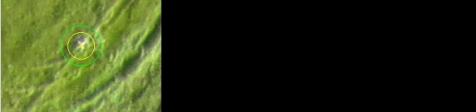
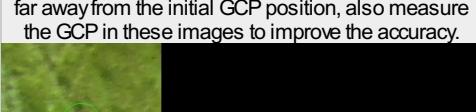
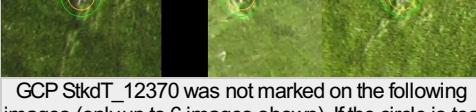
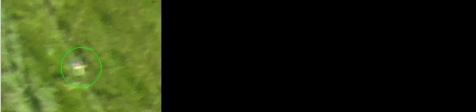
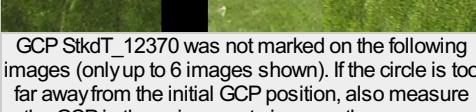
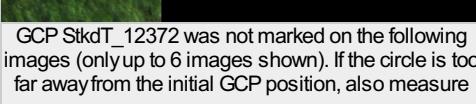
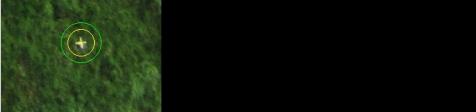


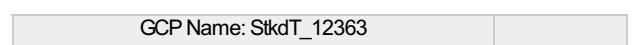
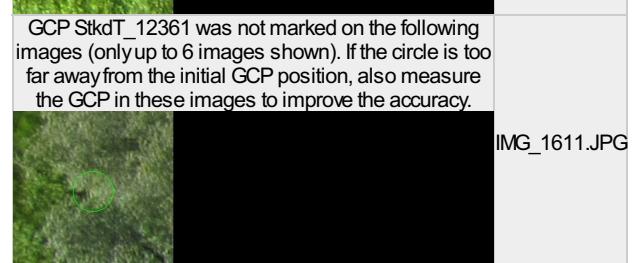
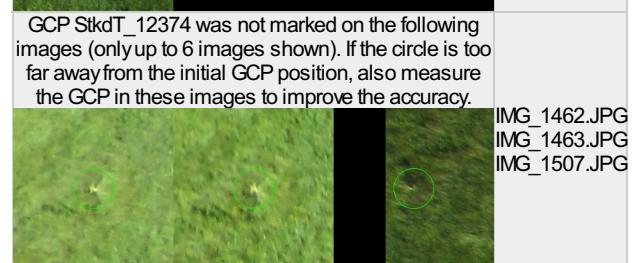
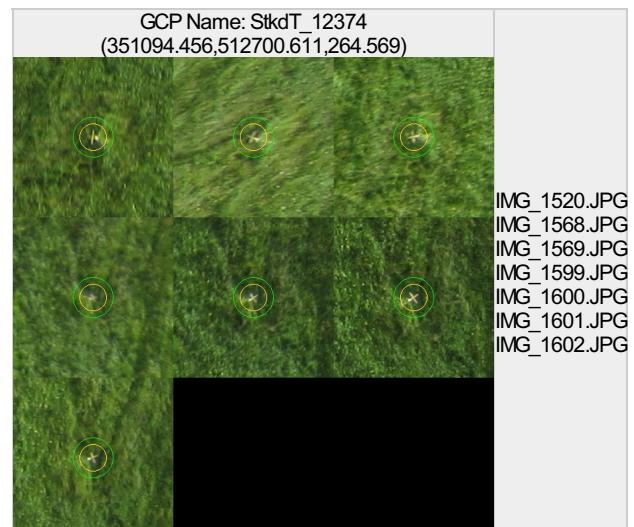


	IMG_1522.JPG IMG_1545.JPG IMG_1596.JPG IMG_1597.JPG
GCP StkdT_12376 was not marked on the following images (only up to 6 images shown). If the circle is too far away from the initial GCP position, also measure the GCP in these images to improve the accuracy. 	IMG_1466.JPG IMG_1572.JPG IMG_1616.JPG
GCP Name: StkdT_12386 (351098.693,512844.608,264.246) 	IMG_1449.JPG IMG_1450.JPG IMG_1451.JPG IMG_1557.JPG
GCP StkdT_12386 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. 	IMG_1428.JPG
GCP Name: StkdT_12385 (351139.746,512875.754,264.324) 	IMG_1429.JPG IMG_1449.JPG IMG_1465.JPG IMG_1505.JPG IMG_1506.JPG IMG_1555.JPG IMG_1556.JPG
GCP StkdT_12385 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. 	IMG_1448.JPG
GCP Name: StkdT_12384	

<p>(351151.301,512934.890,264.527)</p> 	<p>IMG_1429.JPG IMG_1430.JPG IMG_1447.JPG IMG_1448.JPG IMG_1504.JPG</p>	
<p>GCP StkdT_12384 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.</p> 	<p>IMG_1503.JPG</p>	
<p>GCP Name: StkdT_12371 (351034.591,512805.536,264.791)</p> 	<p>IMG_1427.JPG IMG_1428.JPG IMG_1452.JPG IMG_1453.JPG IMG_1508.JPG</p>	
<p>GCP StkdT_12371 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.</p> 	<p>IMG_1507.JPG IMG_1558.JPG IMG_1559.JPG IMG_1560.JPG</p>	
<p>GCP Name: StkdT_12317 (350974.566,512771.456,264.814)</p> 	<p>IMG_1427.JPG IMG_1454.JPG IMG_1455.JPG IMG_1510.JPG</p>	
<p>GCP StkdT_12317 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.</p> 	<p>IMG_1426.JPG IMG_1456.JPG IMG_1561.JPG</p>	

<p>GCP Name: StkdT_12362 (350915.542,512667.395,265.440)</p> 	<p>IMG_1458.JPG IMG_1459.JPG IMG_1512.JPG IMG_1513.JPG IMG_1514.JPG IMG_1563.JPG</p>
<p>GCP StkdT_12362 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.</p>	<p>IMG_1457.JPG IMG_1460.JPG IMG_1562.JPG</p>
<p>GCP Name: StkdT_12316 (350964.767,512638.574,265.694)</p> 	<p>IMG_1459.JPG IMG_1511.JPG IMG_1513.JPG IMG_1517.JPG IMG_1518.JPG IMG_1562.JPG IMG_1563.JPG IMG_1566.JPG</p>
<p>GCP StkdT_12316 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.</p> 	<p>IMG_1567.JPG IMG_1605.JPG</p>
<p>GCP Name: StkdT_12369 (350973.323,512700.350,265.192)</p> 	<p>IMG_1460.JPG IMG_1461.JPG IMG_1510.JPG IMG_1511.JPG IMG_1561.JPG IMG_1562.JPG IMG_1567.JPG</p>
<p>GCP StkdT_12369 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.</p> 	

	IMG_1456.JPG	
GCP Name: StkdT_12373 (351033.646,512737.711,265.105)		
		
	IMG_1462.JPG	
	IMG_1463.JPG	
	IMG_1507.JPG	
	IMG_1509.JPG	
	IMG_1510.JPG	
	IMG_1560.JPG	
	IMG_1568.JPG	
GCP StkdT_12373 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.		
	IMG_1559.JPG	
GCP Name: StkdT_12370 (351155.829,512805.282,264.406)		
	IMG_1522.JPG	
	IMG_1556.JPG	
	IMG_1571.JPG	
GCP StkdT_12370 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.		
	IMG_1464.JPG	
	IMG_1465.JPG	
	IMG_1555.JPG	
	IMG_1557.JPG	
	IMG_1570.JPG	
	IMG_1597.JPG	
GCP Name: StkdT_12372 (351153.923,512735.502,265.095)		
	IMG_1521.JPG	
	IMG_1570.JPG	
	IMG_1598.JPG	
	IMG_1599.JPG	
GCP StkdT_12372 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		



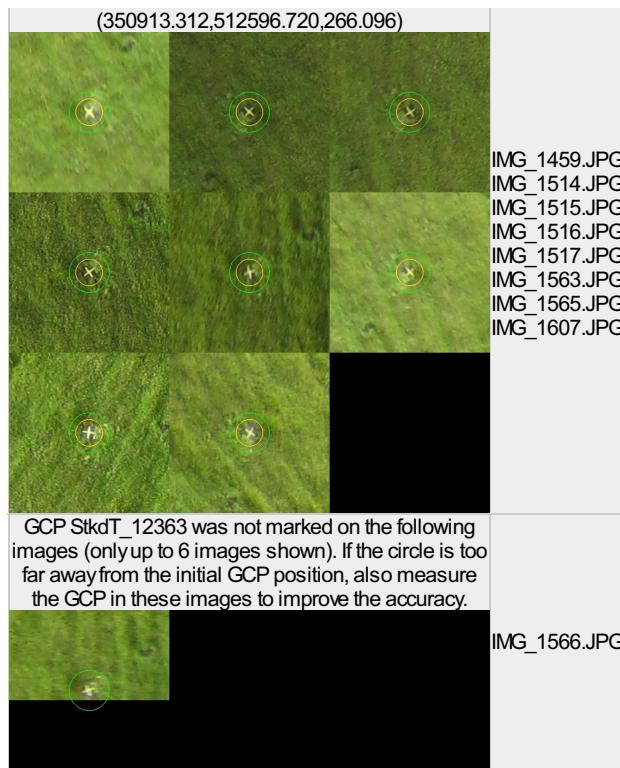


Figure 7: Images in which GCPs have been marked (yellow circle) and in which their computed 3D points have been projected (green circle). A green circle outside of the yellow circle indicates either an accuracy issue or a GCP issue.

Processing Options



Hardware	CPU: Intel(R) Xeon(R) CPU E5-2643 0 @ 3.30GHz RAM 62GB GPU: NVIDIA Quadro 4000 (Driver: 10.18.13.6277), RDPDD Chained DD (Driver: unknown), RDP Encoder Mirror Driver (Driver: unknown), RDP Reflector Display Driver (Driver: unknown)
Operating System	Windows 7 Professional, 64-bit
Camera Model Name	CanonIXUS220HS_4.3_4000x3000 (RGB)
Image Coordinate System	WGS84 (egm96)
Ground Control Point (GCP) Coordinate System	OSGB 1936 / British National Grid (egm96)
Output Coordinate System	OSGB 1936 / British National Grid (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	no
Advanced: Matching Window Size	7x7 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:29m:37s
Time for 3D Textured Mesh Generation	NA

Results



Number of Generated Tiles	4
Number of 3D Densified Points	75718460
Average Density (per m ³)	580.78

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	2.75 [cm/pixel]
DSM Filters	Noise Filtering: yes, Surface Smoothing: yes, Sharp
DSM Generation	yes, Method: Inverse Distance Weighting, Merge Tiles: yes
Grid DSM	yes, Spacing [cm]: 3
Contour Lines Generation	yes, Contour Base [m]: 0, Elevation Interval [m]: 10, Resolution [cm]: 100, Minimum Line Size [vertices]: 20
Time for DSM Generation	08h:36m:42s
Time for Orthomosaic Generation	01h:04m:20s
Time for Contour Lines Generation	01m:58s