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	djiled_cm
Processed	2019-08-02 16:29:44
Camera Model Name(s)	FC6310_8.8_5472x3078 (RGB)
Average Ground Sampling Distance (GSD)	4.90 cm / 1.93 in
Area Covered	0.202 km^2 / 20.2059 ha / 0.08 sq. mi. / 49.9557 acres
Time for Initial Processing (without report)	02m:58s

Quality Check

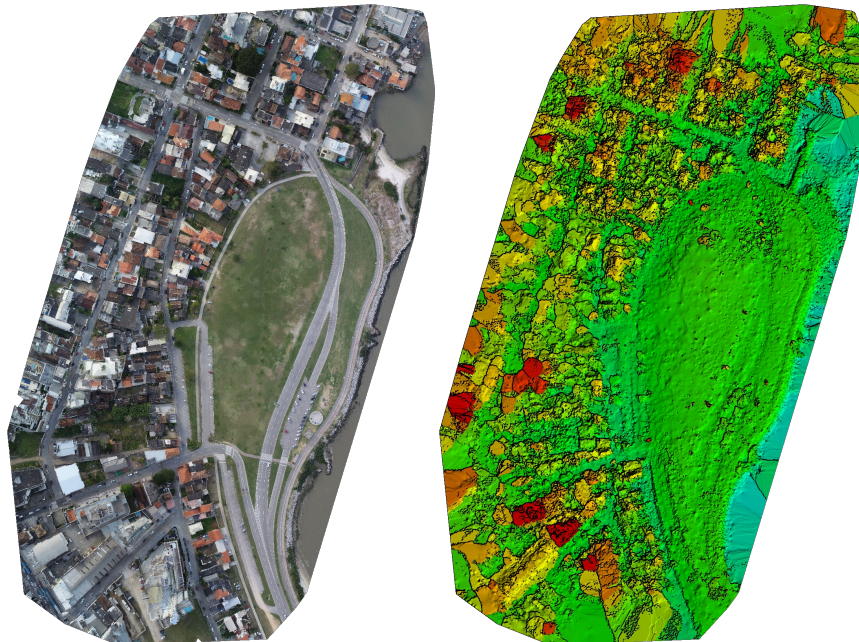|			
Images	median of 31809 keypoints per image		✓
Dataset	56 out of 233 images calibrated (24%), 2 images disabled		⚠
Camera Optimization	2.63% relative difference between initial and optimized internal camera parameters		✓
Matching	median of 14543.3 matches per calibrated image		✓
Georeferencing	yes, no 3D GCP		⚠

Preview

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

Calibration Details

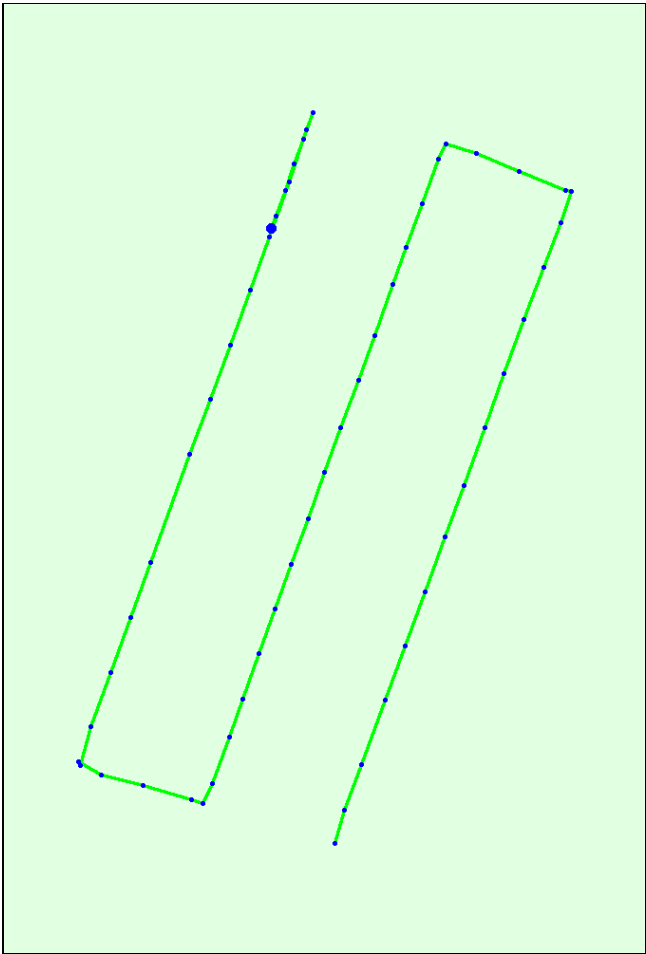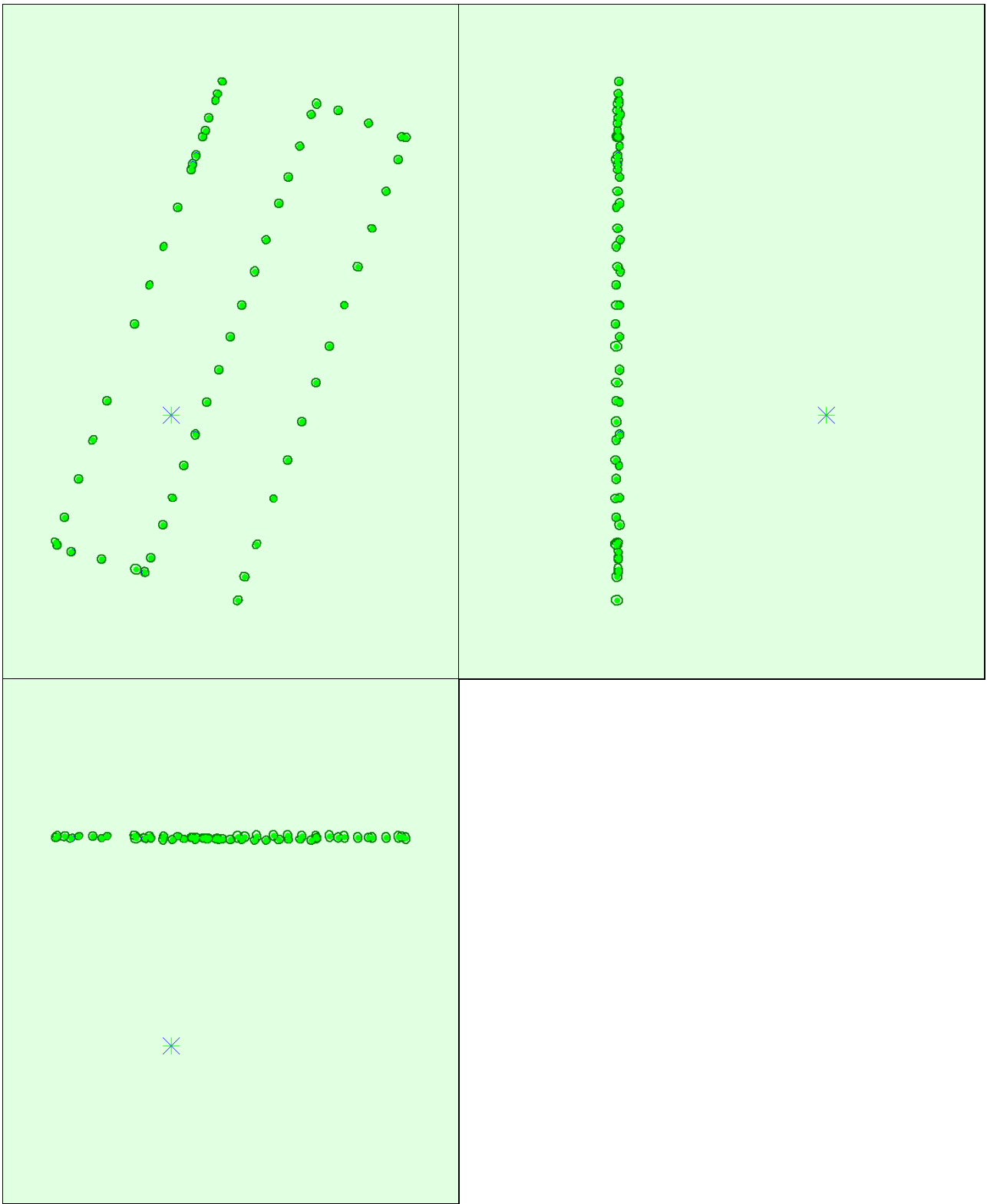| Number of Calibrated Images	56 out of 235
Number of Geolocated Images	56 out of 235

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 1000x 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

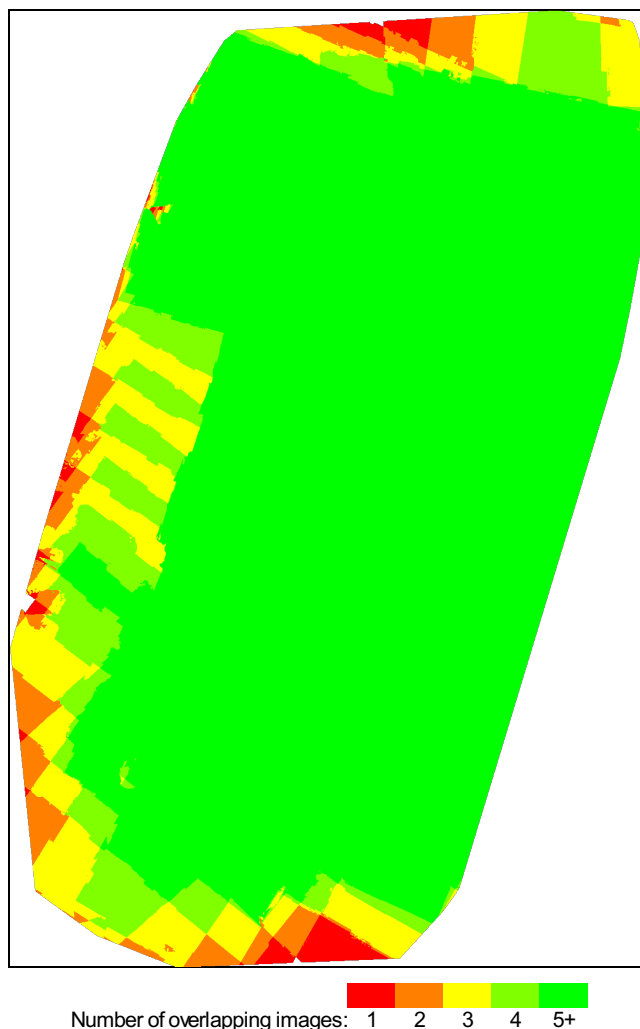|	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.004	0.004	0.004	0.003	0.004	0.003
Sigma	0.000	0.000	0.000	0.000	0.000	0.001

ⓘ 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	777894
Number of 3D Points for Bundle Block Adjustment	253704
Mean Reprojection Error [pixels]	0.388

Internal Camera Parameters

FC6310_8.8_5472x3078 (RGB). Sensor Dimensions: 12.833 [mm] x 7.219 [mm]

EXIF ID: FC6310_8.8_5472x3078

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3752.229 [pixel] 8.800 [mm]	2736.000 [pixel] 6.417 [mm]	1539.000 [pixel] 3.609 [mm]	0.000	0.000	0.000	0.000	0.000
Optimized Values	3653.177 [pixel] 8.568 [mm]	2734.209 [pixel] 6.412 [mm]	1510.058 [pixel] 3.541 [mm]	0.002	-0.021	0.023	-0.001	0.000
Uncertainties (Sigma)	0.253 [pixel] 0.001 [mm]	0.203 [pixel] 0.000 [mm]	0.143 [pixel] 0.000 [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	31809	14543
Min	20223	5264
Max	38542	22870
Mean	30967	13891

3D Points from 2D Keypoint Matches

|	Number of 3D Points Observed
In 2 Images	157544
In 3 Images	43325
In 4 Images	18472
In 5 Images	10373
In 6 Images	6494
In 7 Images	4673
In 8 Images	3684
In 9 Images	2608
In 10 Images	1849
In 11 Images	1273
In 12 Images	932
In 13 Images	693
In 14 Images	424
In 15 Images	330
In 16 Images	254
In 17 Images	205
In 18 Images	168
In 19 Images	115
In 20 Images	96
In 21 Images	82
In 22 Images	51
In 23 Images	51
In 24 Images	8
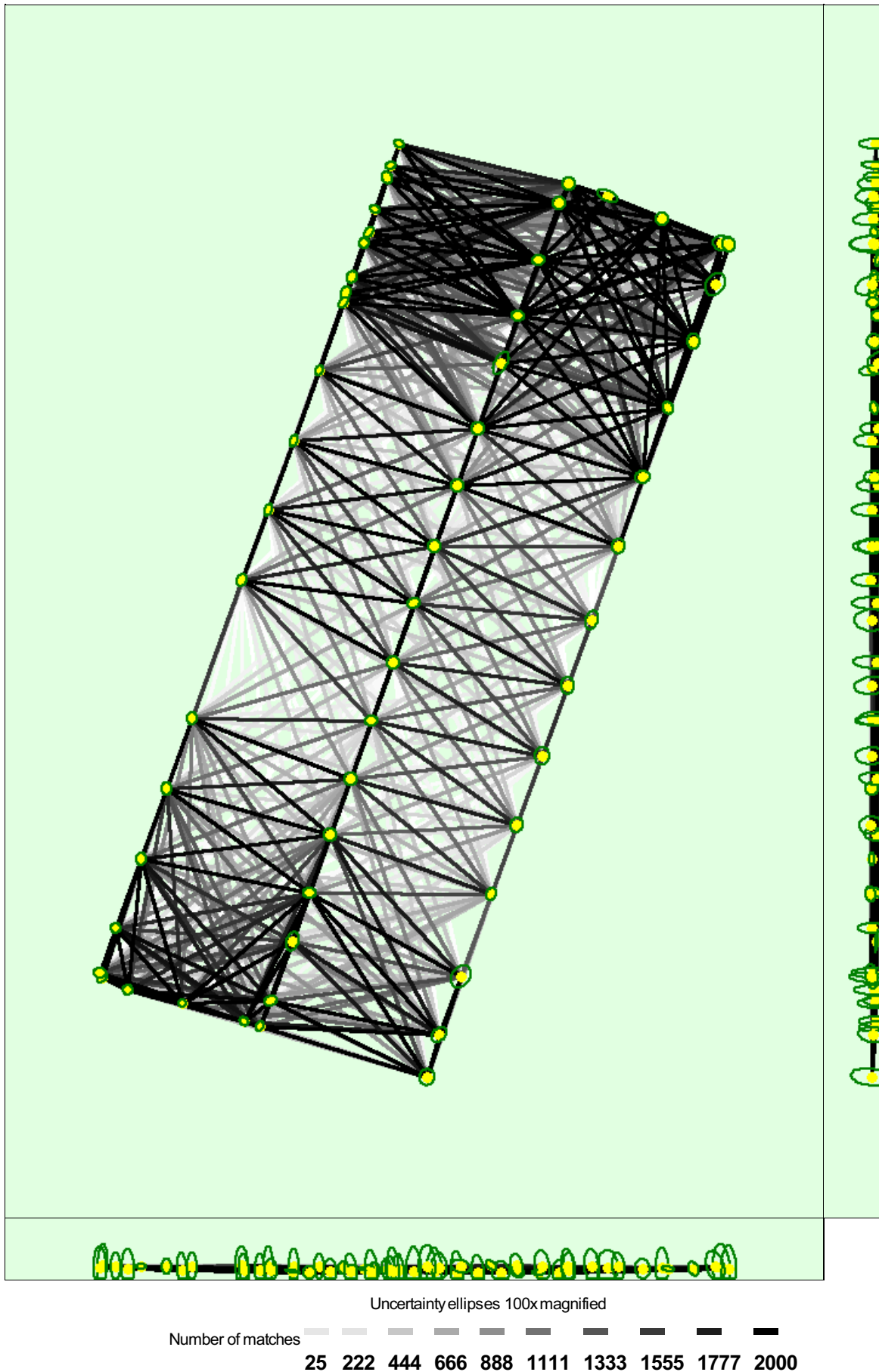
Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.030	0.031	0.064	0.055	0.043	0.004
Sigma	0.007	0.008	0.031	0.027	0.026	0.001

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
03 (3D)	0.005/ 0.010	-0.011	0.012	0.038	0.931	10 / 12

9 out of 19 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
02		-0.028	-0.032	0.111	0.620	8 / 8
04		0.050	0.002	-0.099	1.103	7 / 7
05		0.082	0.016	0.032	2.064	12 / 12
06		-0.011	0.019	0.060	0.530	9 / 9
07		0.015	0.006	0.053	0.863	9 / 9
08		0.001	-0.027	-0.059	0.764	7 / 7
10		-0.016	-0.055	-0.024	0.788	8 / 8
13		-0.033	-0.066	-0.076	1.233	18 / 18
14		-0.041	-0.055	-0.062	2.314	11 / 11
18		0.086	0.005	-0.060	0.954	6 / 6
Mean [m]		0.010390	-0.018504	-0.012165		
Sigma [m]		0.044481	0.030498	0.067283		
RMS Error [m]		0.045678	0.035673	0.068374		

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

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.03	1.79	5.36	12.50
-0.03	-0.02	1.79	3.57	7.14
-0.02	-0.02	7.14	3.57	5.36
-0.02	-0.01	5.36	5.36	10.71
-0.01	-0.01	7.14	25.00	7.14
-0.01	-0.00	17.86	16.07	7.14
-0.00	0.01	28.57	5.36	5.36
0.01	0.01	16.07	14.29	8.93
0.01	0.02	7.14	3.57	8.93
0.02	0.02	5.36	7.14	5.36
0.02	0.03	1.79	1.79	3.57
0.03	-	0.00	8.93	17.86
Mean [m]		0.000205	-0.000101	-0.000512
Sigma [m]		0.010632	0.018068	0.040363
RMS Error [m]		0.010634	0.018069	0.040366

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]	69.64	58.93	41.07
[-2.00, 2.00]	94.64	78.57	69.64
[-3.00, 3.00]	100.00	89.29	76.79
Mean of Geolocation Accuracy [m]	0.010436	0.010436	0.013943
Sigma of Geolocation Accuracy [m]	0.000474	0.000474	0.000617

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: AMD Ryzen 5 1600 Six-Core Processor RAM: 16GB GPU: NVIDIA GeForce GTX 1070 Ti (Driver: 25.21.14.1967)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	SIRGAS 2000 / UTM zone 22S (EGM96 Geoid)

Processing Options

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, 1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	yes
3D Textured Mesh Settings:	Resolution: Medium Resolution (default) Color Balancing: no
LOD	Generated: no
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	05m:01s

Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	03m:11s

Results ⓘ

Number of Generated Tiles	1
Number of 3D Densified Points	5828930
Average Density (per m^3)	20.23

DSM, Orthomosaic and Index Details ⓘ

Processing Options ⓘ

DSM and Orthomosaic Resolution	1 x GSD (4.9 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: yes
Time for DSM Generation	03m:35s
Time for Orthomosaic Generation	09m:06s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s