

Quality Report



Generated with Pix4Denterprise version 4.8.3
Preview

- !** **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	249162-Project-2023-11-09T16_31_06.729Z
Processed	2023-11-09 16:41:38
Camera Model Name(s)	L1D-20c_10.3_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	0.72 cm / 0.28 in
Area Covered	0.004 km ² / 0.4244 ha / 0.00 sq. mi. / 1.0494 acres
Time for Initial Processing (without report)	03m:22s

Quality Check



? Images	median of 4853 keypoints per image	✓
? Dataset	158 out of 158 images calibrated (100%), all images enabled	✓
? Camera Optimization	5.34% relative difference between initial and optimized internal camera parameters	⚠
? Matching	median of 1381.1 matches per calibrated image	✓
? Georeferencing	yes, no 3D GCP	⚠

? Preview

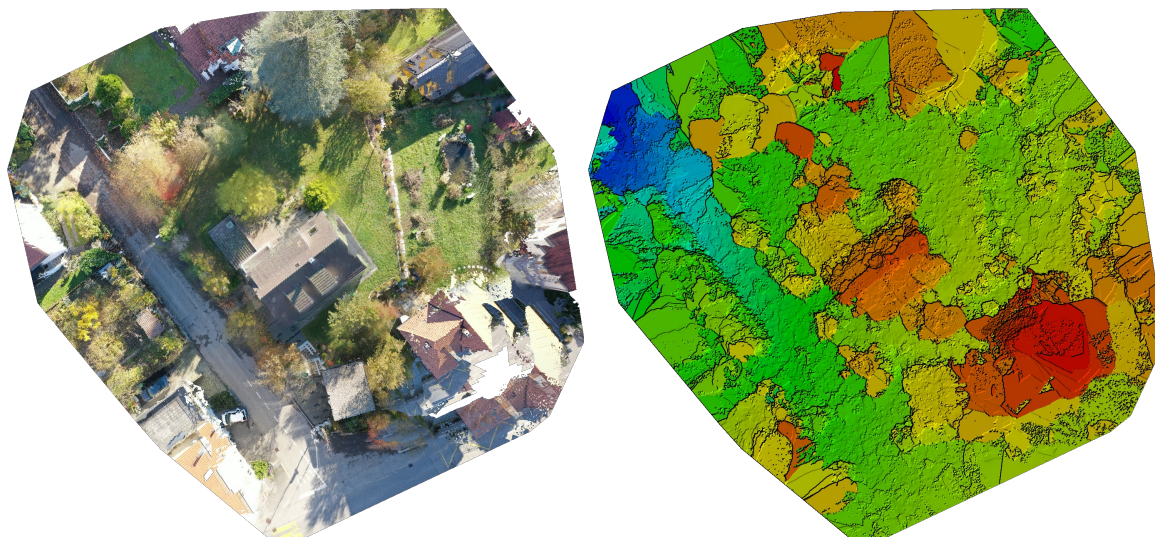


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	158 out of 158
Number of Geolocated Images	158 out of 158

Initial Image Positions

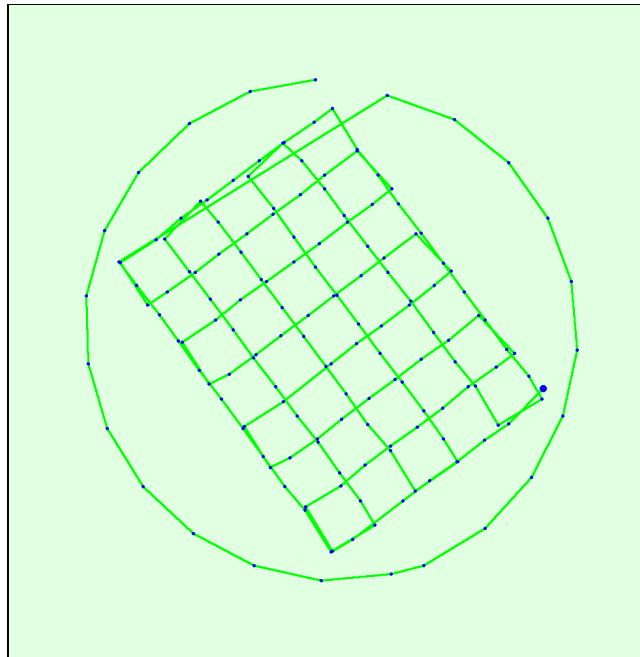
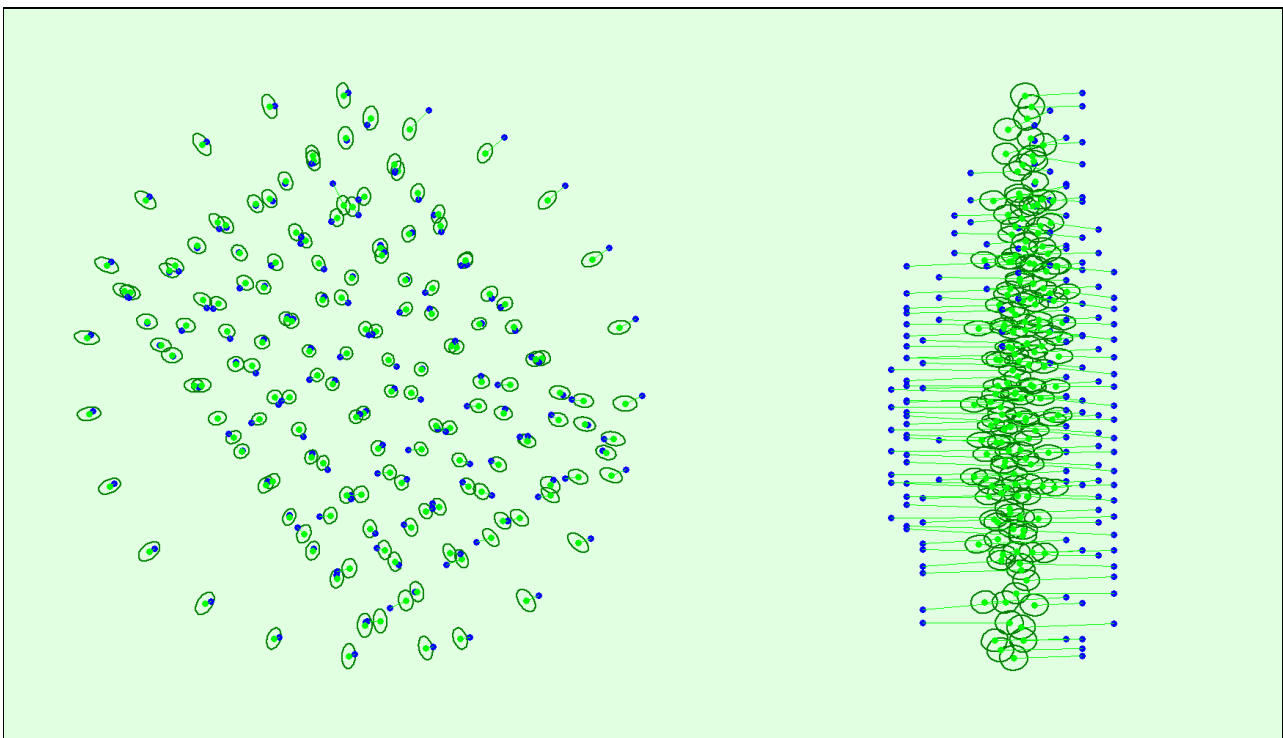
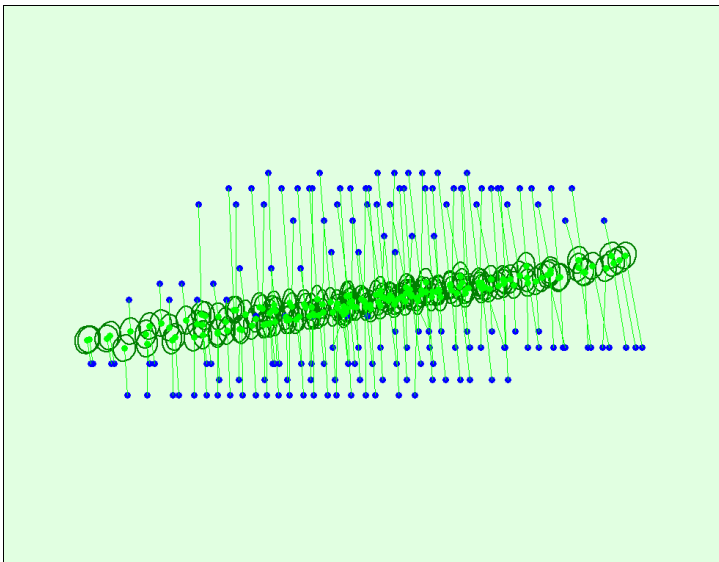


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 5x magnified

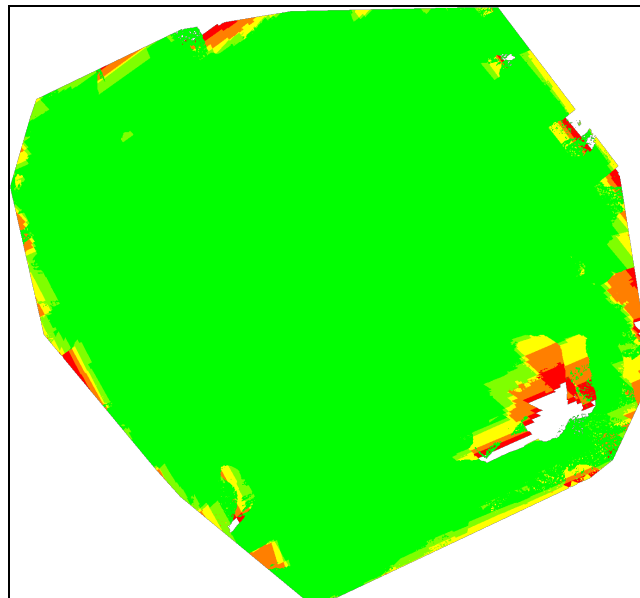
Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses 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]	Camera Displacement X [m]	Camera Displacement Y [m]	Camera Displacement Z [m]
Mean	0.102	0.103	0.170	0.070	0.062	0.082	0.003	0.003	0.006
Sigma	0.018	0.018	0.001	0.004	0.004	0.007	0.001	0.001	0.002

? 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	215500
Number of 3D Points for Bundle Block Adjustment	70818
Mean Reprojection Error [pixels]	0.117

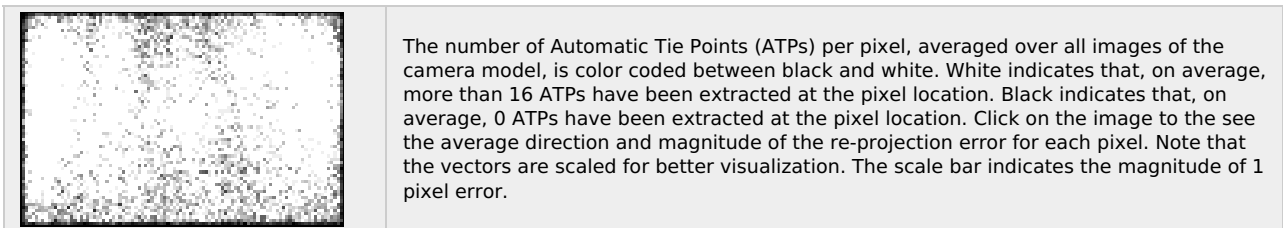
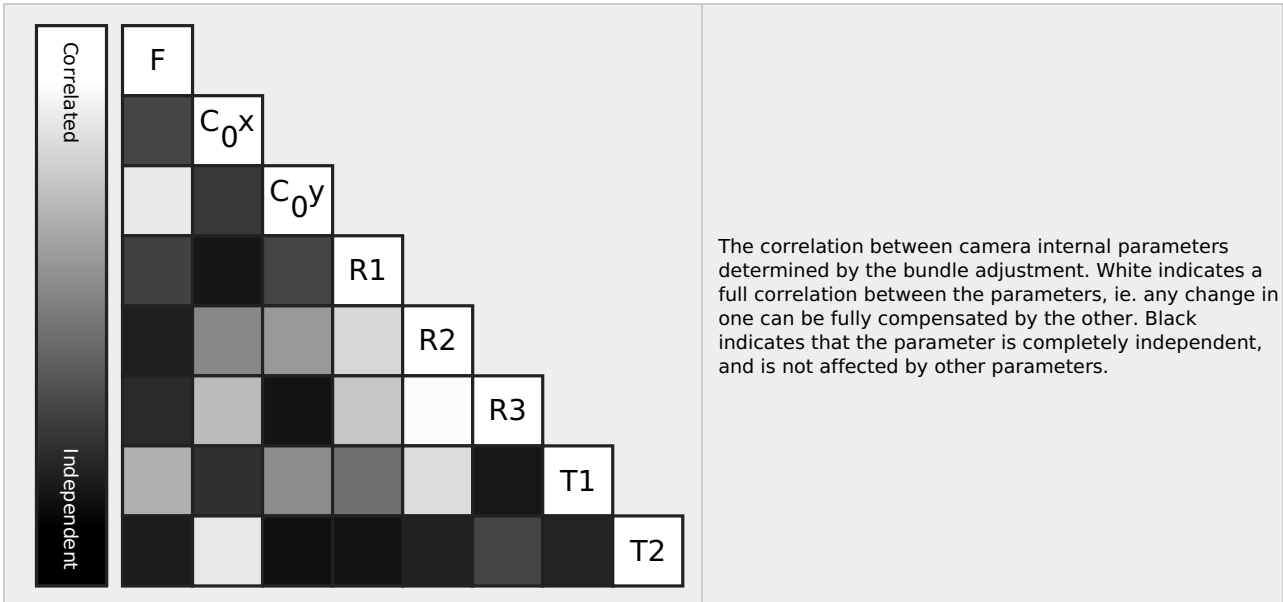
Internal Camera Parameters

L1D-20c_10.3_5472x3648 (RGB). Sensor Dimensions: 12.825 [mm] x 8.550 [mm]



EXIF ID: L1D-20c_10.3_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	4470.830 [pixel] 10.479 [mm]	2736.000 [pixel] 6.412 [mm]	1824.000 [pixel] 4.275 [mm]	0.009	0.040	-0.050	-0.003	0.002
Optimized Values	4231.772 [pixel] 9.918 [mm]	2720.938 [pixel] 6.377 [mm]	1793.083 [pixel] 4.203 [mm]	-0.014	0.031	-0.037	-0.003	-0.001
Uncertainties (Sigma)	3.662 [pixel] 0.009 [mm]	0.464 [pixel] 0.001 [mm]	2.474 [pixel] 0.006 [mm]	0.000	0.002	0.002	0.000	0.000



2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	4853	1381
Min	4234	269
Max	5738	2305
Mean	4886	1364

3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	46771

In 3 Images	11099
In 4 Images	4823
In 5 Images	2669
In 6 Images	1535
In 7 Images	971
In 8 Images	698
In 9 Images	434
In 10 Images	326
In 11 Images	234
In 12 Images	185
In 13 Images	160
In 14 Images	130
In 15 Images	102
In 16 Images	84
In 17 Images	71
In 18 Images	68
In 19 Images	41
In 20 Images	44
In 21 Images	31
In 22 Images	27
In 23 Images	29
In 24 Images	24
In 25 Images	23
In 26 Images	16
In 27 Images	25
In 28 Images	12
In 29 Images	20
In 30 Images	17
In 31 Images	15
In 32 Images	12
In 33 Images	15
In 34 Images	11
In 35 Images	11
In 36 Images	6
In 37 Images	4
In 38 Images	9
In 39 Images	3
In 40 Images	7
In 41 Images	2
In 42 Images	7
In 43 Images	2
In 44 Images	5
In 45 Images	1
In 46 Images	5
In 47 Images	1
In 48 Images	2
In 49 Images	1
In 50 Images	4
In 51 Images	1
In 52 Images	3
In 53 Images	3
In 55 Images	4
In 56 Images	2
In 57 Images	4
In 58 Images	2
In 59 Images	1
In 60 Images	1
In 61 Images	2
In 62 Images	1

In 63 Images	1
In 66 Images	1

2D Keypoint Matches

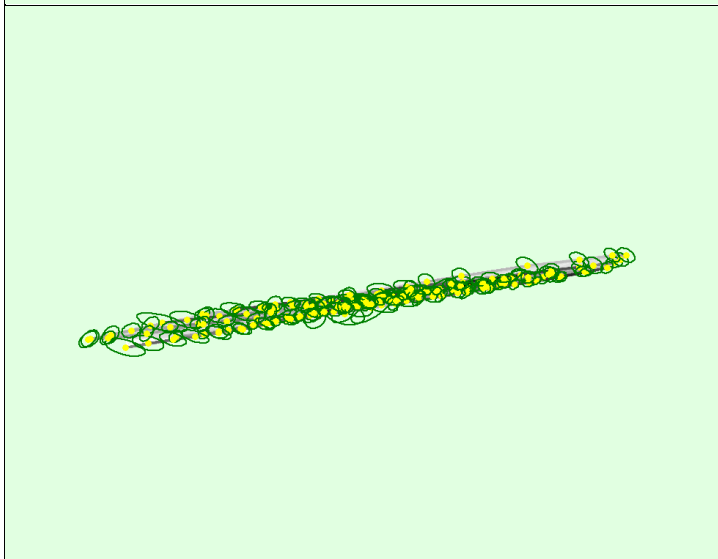
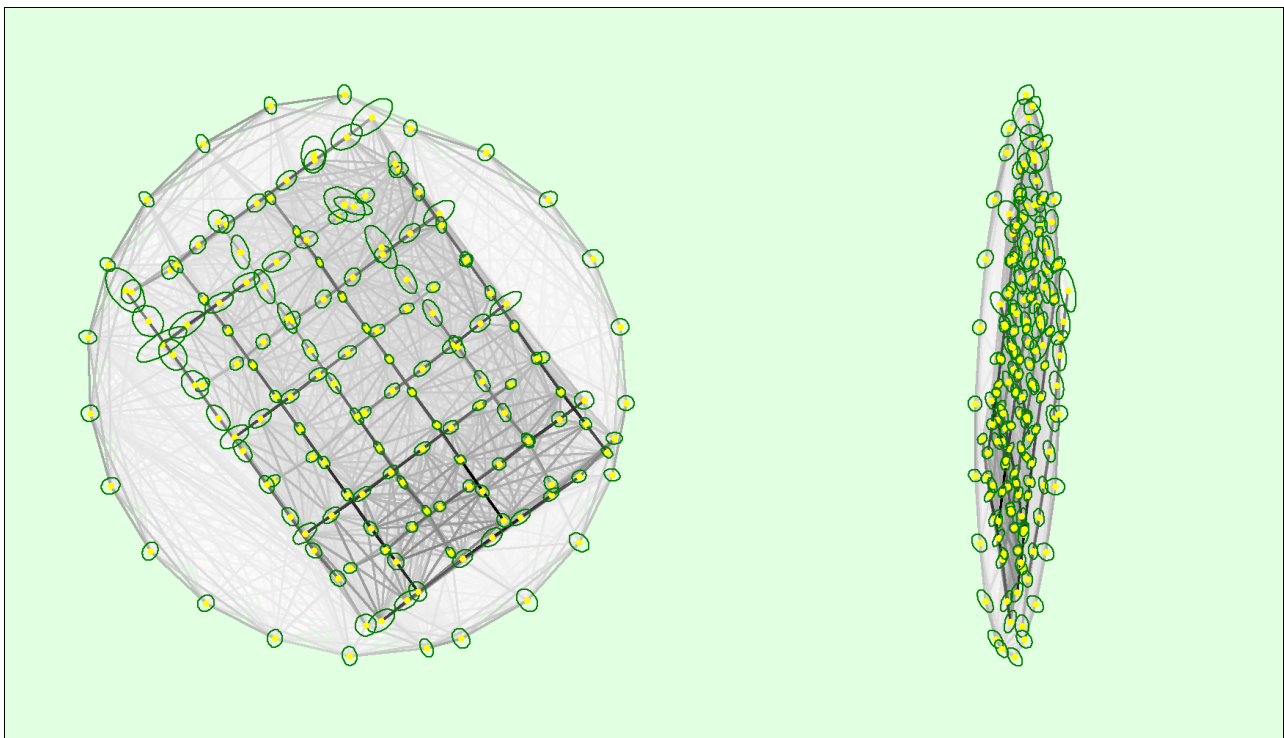


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties



	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]	Camera Displacement X [m]	Camera Displacement Y [m]	Camera Displacement Z [m]
Mean	0.006	0.006	0.004	0.020	0.018	0.010	0.003	0.003	0.005
Sigma	0.002	0.002	0.001	0.004	0.004	0.004	0.001	0.001	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	0.00	0.00
-9.00	-6.00	0.00	0.00	1.90
-6.00	-3.00	0.00	0.00	39.87
-3.00	0.00	41.14	50.00	15.82
0.00	3.00	58.86	50.00	9.49
3.00	6.00	0.00	0.00	13.29
6.00	9.00	0.00	0.00	19.62
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]		0.000000	-0.000000	-0.000000
Sigma [m]		0.451184	0.309723	4.785359
RMS Error [m]		0.451184	0.309723	4.785359

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]	100.00	100.00	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.

Geolocation Orientational Variance	RMS [degree]
Omega	2.381
Phi	7.674
Kappa	5.032

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

Rolling Shutter Statistics



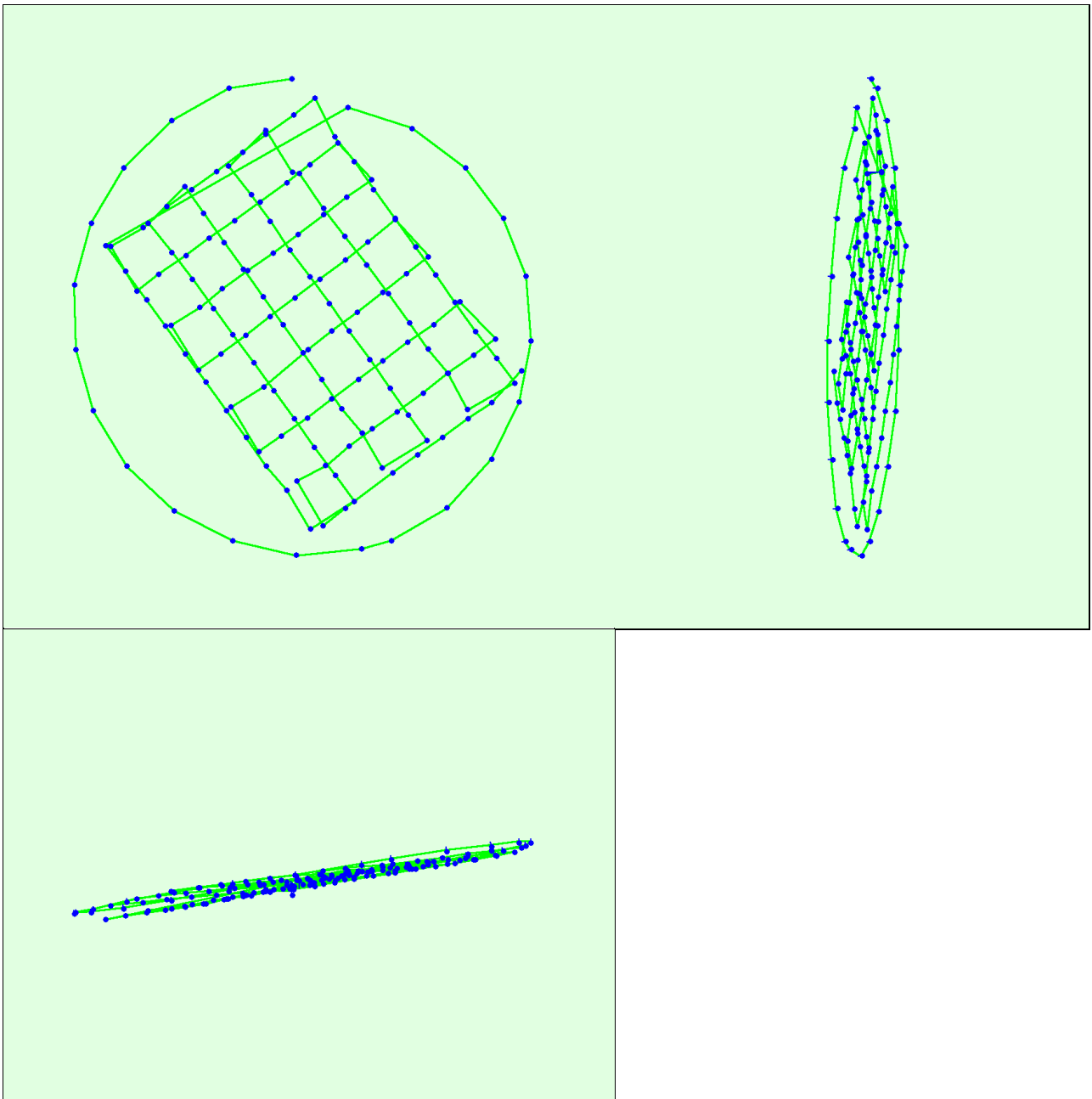


Figure 6: Camera movement estimated by the rolling shutter camera model. The green line follows the computed image positions. The blue dots represent the camera position at the start of the exposure. The blue lines represent the camera motion during the rolling shutter readout, re-scaled by a project dependant scaling factor for better visibility.

Median Camera Speed	1.1736 [m/s]
Median Camera Displacement During Sensor Readout)	0.1049 [m]
Median Rolling Shutter Readout Time	90.6208 [ms]

Initial Processing Details



System Information



Hardware	CPU: Intel(R) Xeon(R) Platinum 8124M CPU @ 3.00GHz RAM: 69GB GPU: no info (Driver: unknown)
Operating System	Linux 5.15.0-1049-aws x86_64

Coordinate Systems



Image Coordinate System	WGS 84 (EGM 96 Geoid)
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Processing Options



Detected Template	cloud-3d-maps-low-res-1*
Keypoints Image Scale	Rapid, Image Scale: 0.25
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, 1/4 (Quarter image size, Fast)
Point Density	Low (Fast)
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	02m:32s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	01m:26s

Results



Number of Generated Tiles	1
Number of 3D Densified Points	819579
Average Density (per m ³)	1225.21

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	4 x GSD (0.715 [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: no
Time for DSM Generation	02s
Time for Orthomosaic Generation	06m:21s
Time for DTM Generation	00s

Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s