

# Quality Report



Generated with Pix4Dmapper Pro version 4.2.27



**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	eldo_5k_1_x3
Processed	2018-08-24 15:27:41
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.29 cm / 2.08 in
Area Covered	0.611 km <sup>2</sup> / 61.0535 ha / 0.24 sq. mi. / 150.9446 acres
Time for Initial Processing (without report)	01h:22m:25s

## Quality Check



Images	median of 12357 keypoints per image	
Dataset	1920 out of 1927 images calibrated (99%), all images enabled	
Camera Optimization	0.29% relative difference between initial and optimized internal camera parameters	
Matching	median of 1006.6 matches per calibrated image	
Georeferencing	yes, no 3D GCP	

## Preview

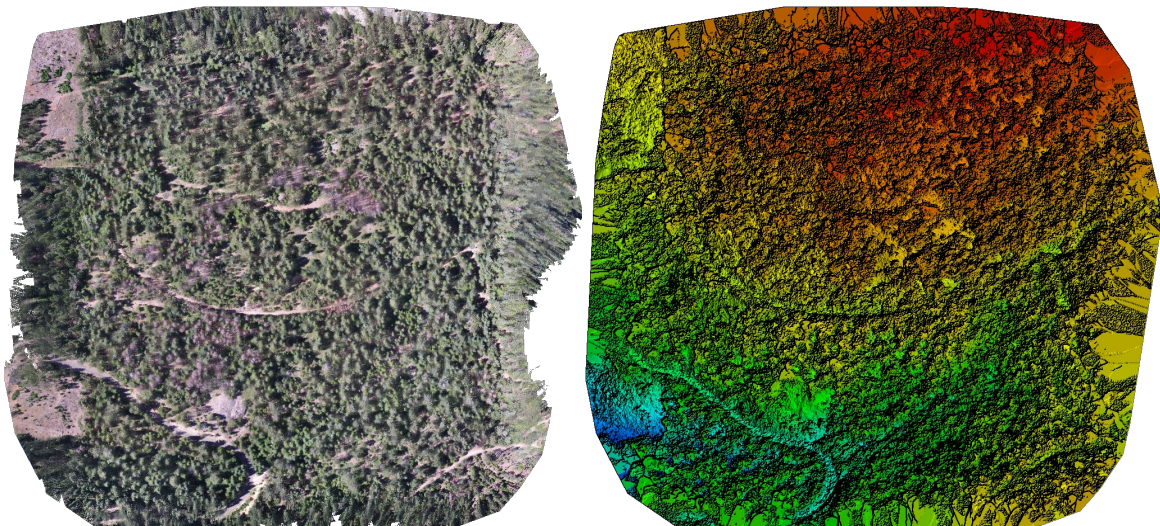


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

## Calibration Details



Number of Calibrated Images	1920 out of 1927
Number of Geolocated Images	1927 out of 1927

## ? Initial Image Positions

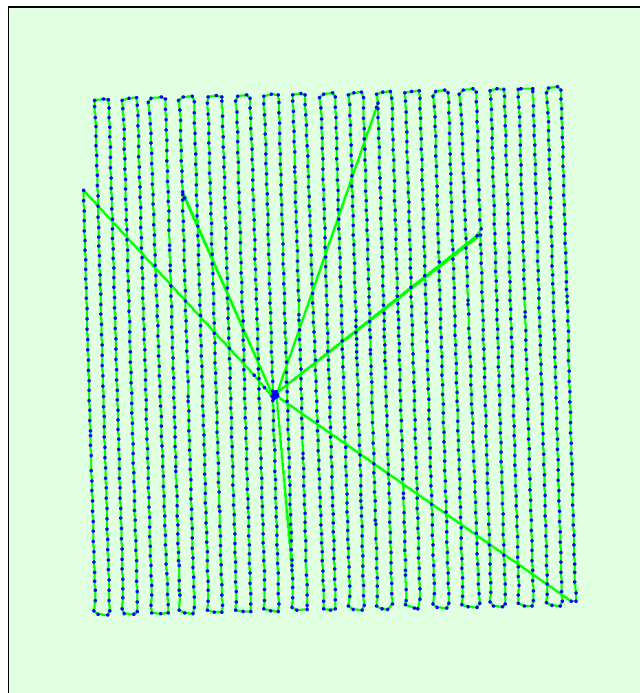
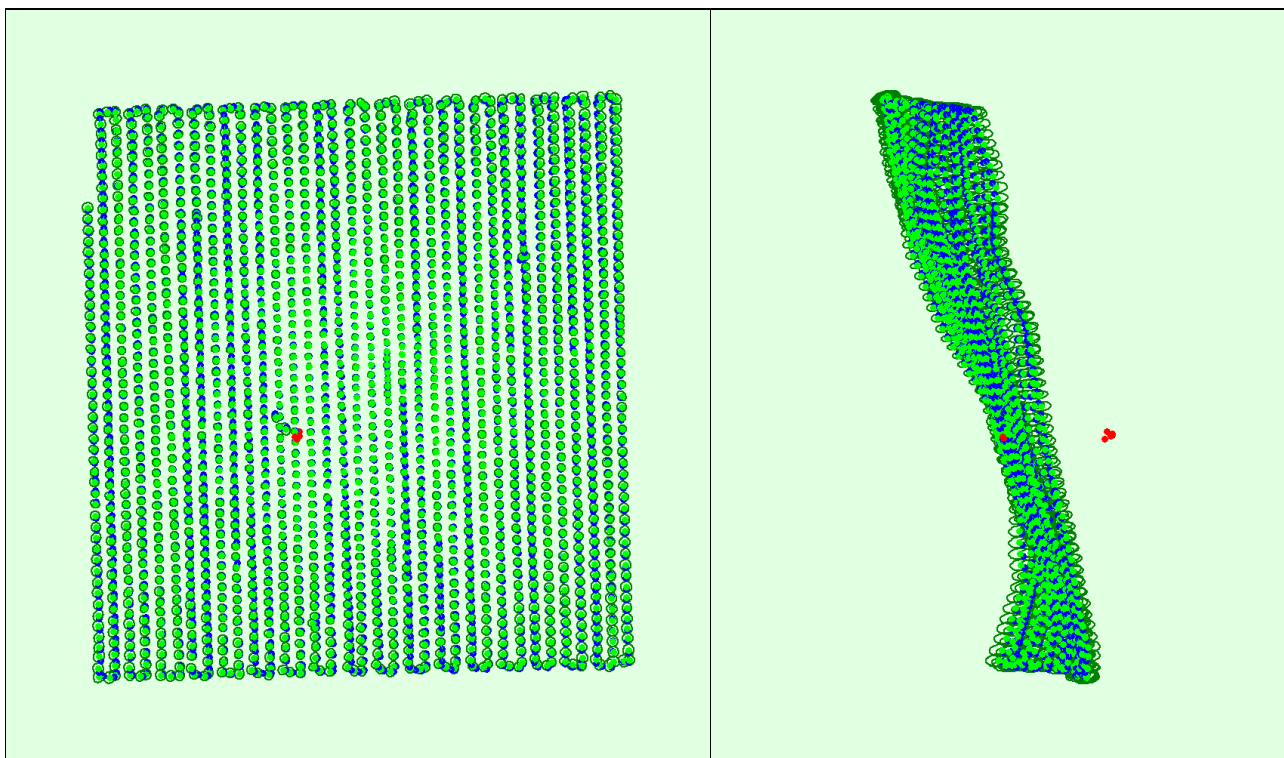
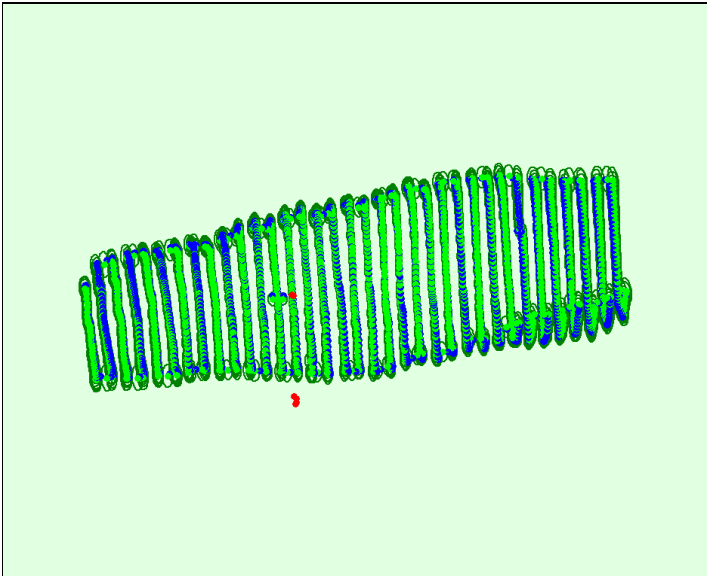


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

## ? Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 50x 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	0.089	0.091	0.186	0.036	0.037	0.017
Sigma	0.015	0.014	0.037	0.002	0.002	0.001

**Overlap**

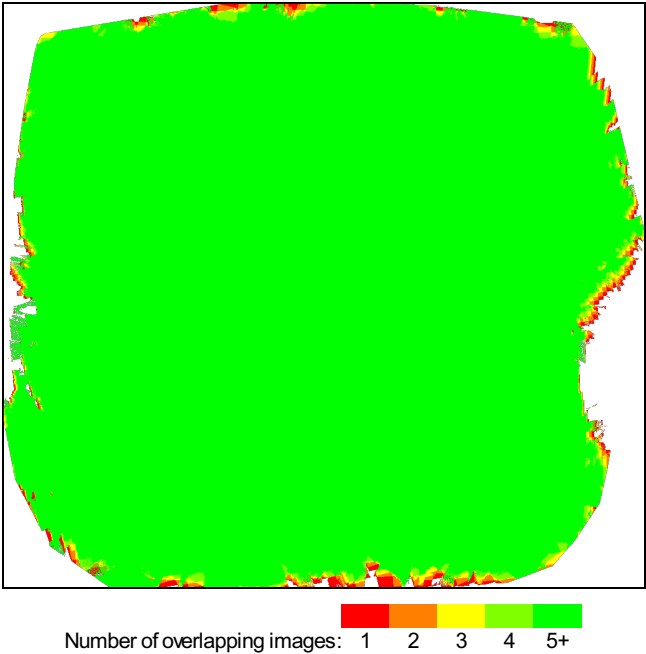


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	2028113
Number of 3D Points for Bundle Block Adjustment	728562
Mean Reprojection Error [pixels]	0.130

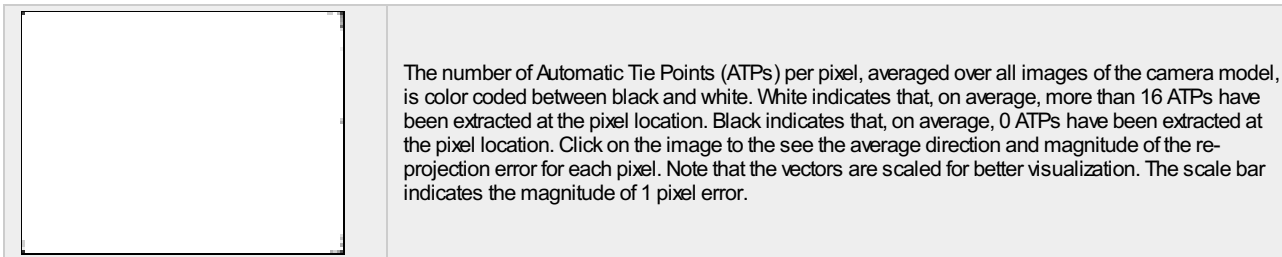
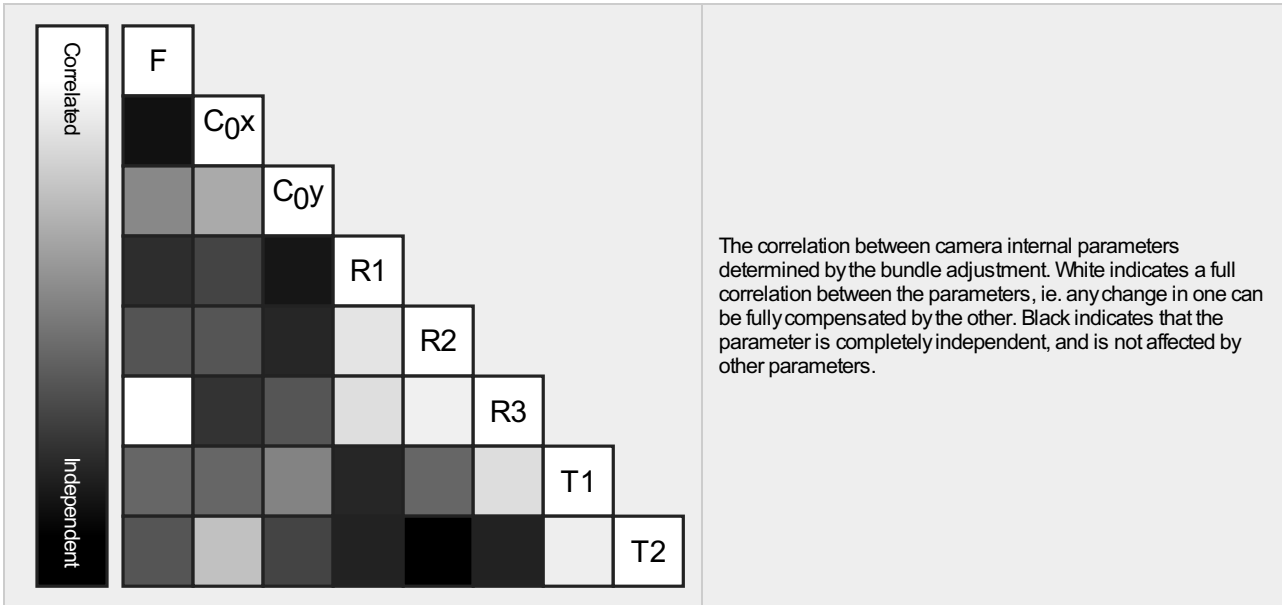
### ? Internal Camera Parameters

FC350\_3.6\_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]



EXIF ID: FC350\_3.6\_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2285.722 [pixel] 3.610 [mm]	2000.006 [pixel] 3.159 [mm]	1500.003 [pixel] 2.369 [mm]	-0.130	0.106	-0.016	-0.000	0.000
Optimized Values	2292.576 [pixel] 3.621 [mm]	1985.416 [pixel] 3.136 [mm]	1503.405 [pixel] 2.374 [mm]	-0.125	0.104	-0.012	0.001	0.000
Uncertainties (Sigma)	0.371 [pixel] 0.001 [mm]	0.044 [pixel] 0.000 [mm]	0.043 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



### ? 2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	12357	1007
Min	11512	269
Max	14145	2581
Mean	12418	1056

### ? 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	507162
In 3 Images	115471
In 4 Images	44254
In 5 Images	21631

In 6 Images	12138
In 7 Images	7591
In 8 Images	4963
In 9 Images	3366
In 10 Images	2406
In 11 Images	1847
In 12 Images	1380
In 13 Images	997
In 14 Images	811
In 15 Images	624
In 16 Images	551
In 17 Images	491
In 18 Images	370
In 19 Images	331
In 20 Images	270
In 21 Images	223
In 22 Images	195
In 23 Images	169
In 24 Images	156
In 25 Images	127
In 26 Images	105
In 27 Images	103
In 28 Images	111
In 29 Images	63
In 30 Images	73
In 31 Images	62
In 32 Images	46
In 33 Images	45
In 34 Images	36
In 35 Images	35
In 36 Images	35
In 37 Images	36
In 38 Images	26
In 39 Images	34
In 40 Images	19
In 41 Images	19
In 42 Images	17
In 43 Images	11
In 44 Images	15
In 45 Images	11
In 46 Images	10
In 47 Images	10
In 48 Images	8
In 49 Images	11
In 50 Images	6
In 51 Images	4
In 52 Images	10
In 53 Images	11
In 54 Images	7
In 55 Images	7
In 56 Images	5
In 57 Images	6
In 58 Images	4
In 59 Images	4
In 60 Images	2
In 61 Images	6
In 62 Images	3
In 63 Images	2
In 65 Images	4

In 66 Images	2
In 67 Images	1
In 68 Images	2
In 70 Images	2
In 71 Images	1
In 73 Images	1
In 74 Images	1
In 75 Images	1
In 81 Images	1
In 85 Images	1
In 86 Images	1
In 95 Images	1
In 102 Images	1

## ? 2D Keypoint Matches

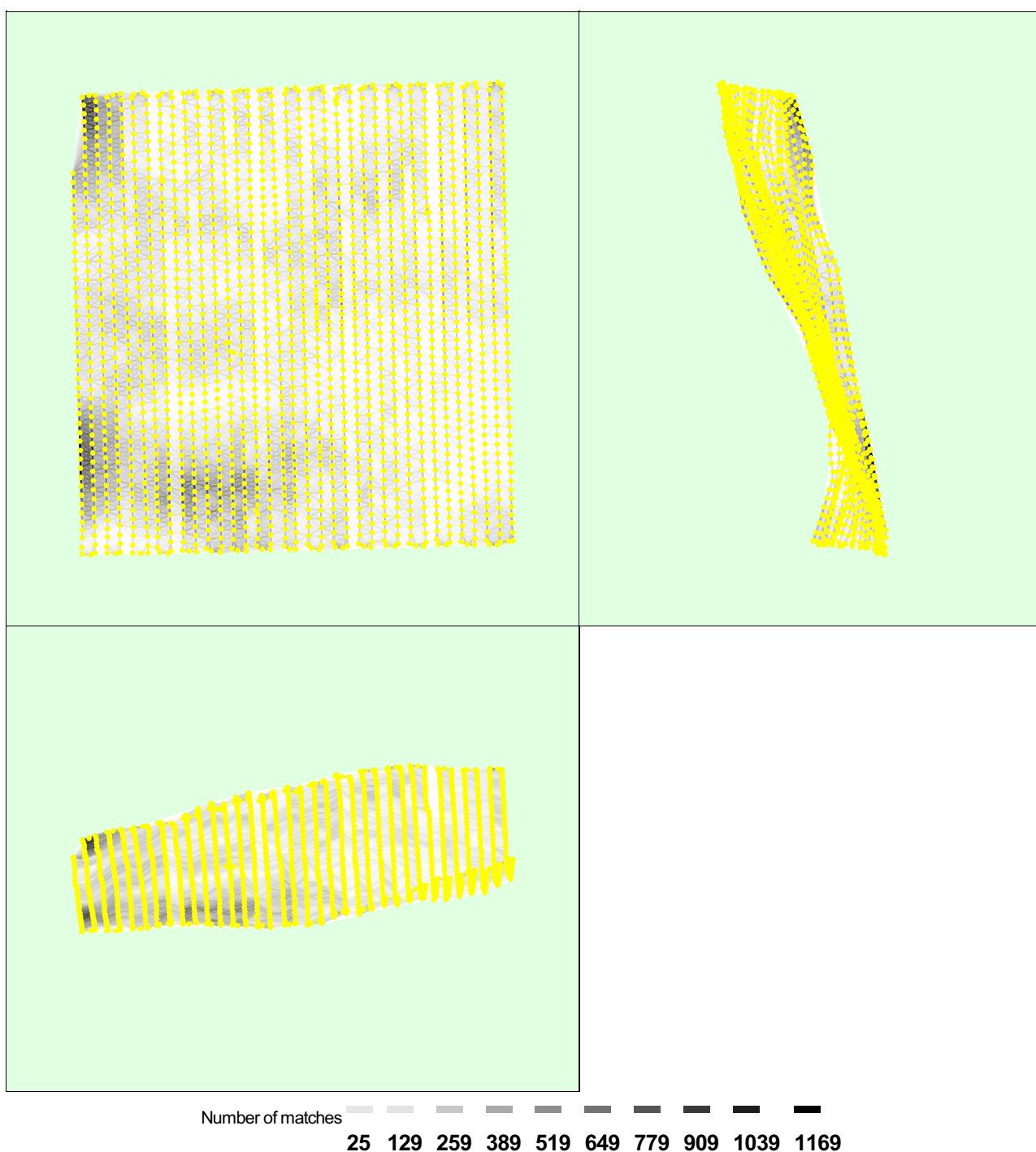


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.



# 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	0.57	0.00
-6.00	-3.00	2.19	14.37	3.49
-3.00	0.00	45.57	36.56	48.18
0.00	3.00	51.20	32.97	44.43
3.00	6.00	0.99	15.10	3.91
6.00	9.00	0.05	0.42	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]		0.000000	0.000000	0.000000
Sigma [m]		1.264064	2.663287	1.757944
RMS Error [m]		1.264064	2.663287	1.757944

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]	99.74	95.83	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	0.804
Phi	0.687
Kappa	4.840

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

# Initial Processing Details



## System Information



Hardware	CPU: Intel(R) Core(TM) i7-8700K CPU @ 3.70GHz RAM: 64GB GPU: NVIDIA GeForce GTX 1080 Ti (Driver: 24.21.13.9882), Intel(R) UHD Graphics 630 (Driver: 22.20.16.4758)
Operating System	Windows 10 Education, 64-bit

## Coordinate Systems



Image Coordinate System	WGS84 (egm96)
Output Coordinate System	WGS 84 / UTMzone 10N (egm96)

## Processing Options



Detected Template	No Template Available
Keypoints Image Scale	Custom, Image Scale: 0.5
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, no

## 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	06h:01m:58s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	38m:16s

## Results



Number of Generated Tiles	4
Number of 3D Densified Points	79537355
Average Density (per m <sup>3</sup> )	23.27

## DSM, Orthomosaic and Index Details



## Processing Options



DSM and Orthomosaic Resolution	1 x GSD (5.29 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Triangulation Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	09m:51s
Time for Orthomosaic Generation	15h:15m:31s
Time for DTM Generation	00s



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