

# Quality Report



Generated with Pix4Denterprise version 4.5.6



**Important:** Click on the different icons for:



Help to analyze the results in the Quality Report



Additional information about the sections



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## Summary



Project	GAINESTI_2
Processed	2022-11-06 18:33:17
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	3.30 cm / 1.30 in
Area Covered	3.307 km <sup>2</sup> / 330.7350 ha / 1.28 sq. mi. / 817.6870 acres
Time for Initial Processing (without report)	02h:57m:18s

## Quality Check



Images	median of 49146 keypoints per image	
Dataset	2719 out of 2818 images calibrated (96%), all images enabled, 4 blocks	
Camera Optimization	0.85% relative difference between initial and optimized internal camera parameters	
Matching	median of 12105.1 matches per calibrated image	
Georeferencing	yes, no 3D GCP	

## Preview

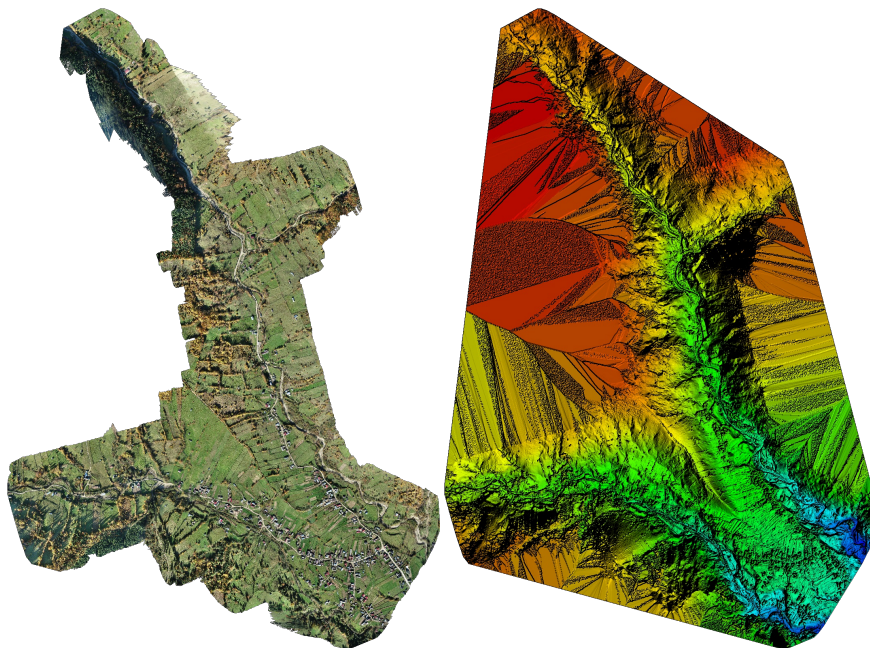


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

# Calibration Details



Number of Calibrated Images	2719 out of 2818
Number of Geolocated Images	2818 out of 2818

## Initial Image Positions

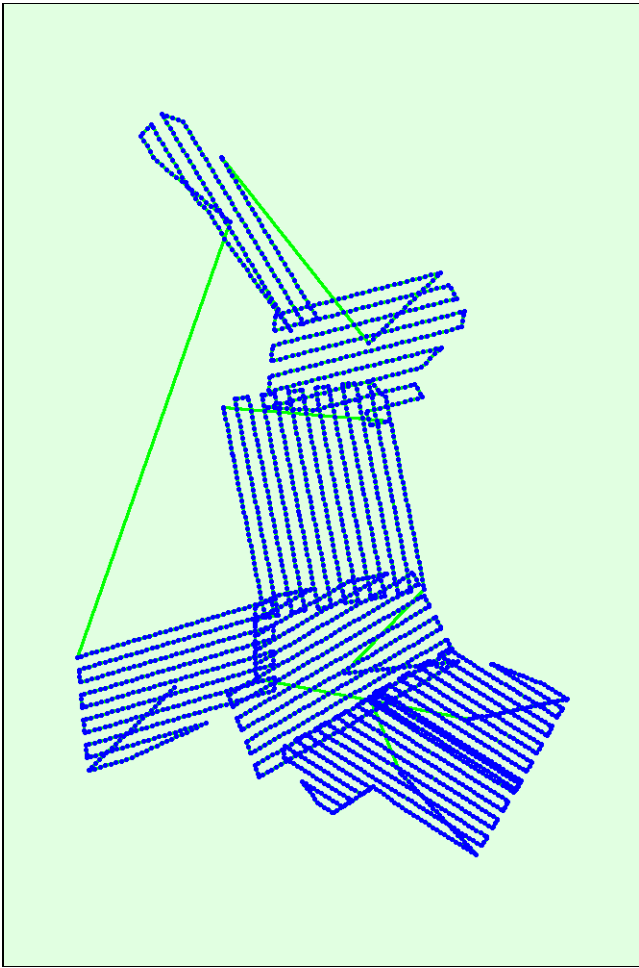
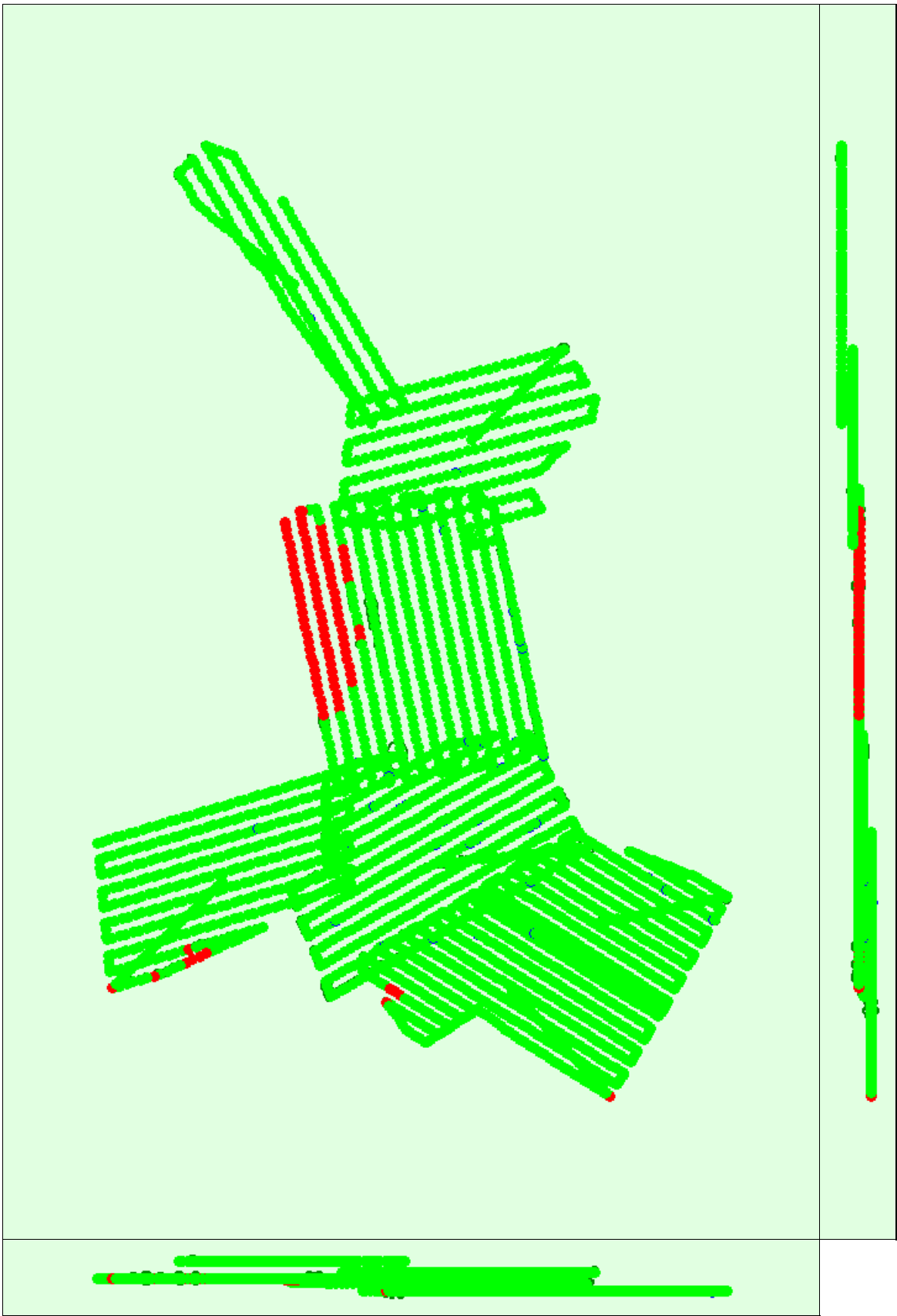


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

## 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	0.009	0.009	0.005	0.005	0.006	0.002

Sigma	0.002	0.002	0.002	0.009	0.022	0.002
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## ? 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	31781154
Number of 3D Points for Bundle Block Adjustment	10886589
Mean Reprojection Error [pixels]	0.103

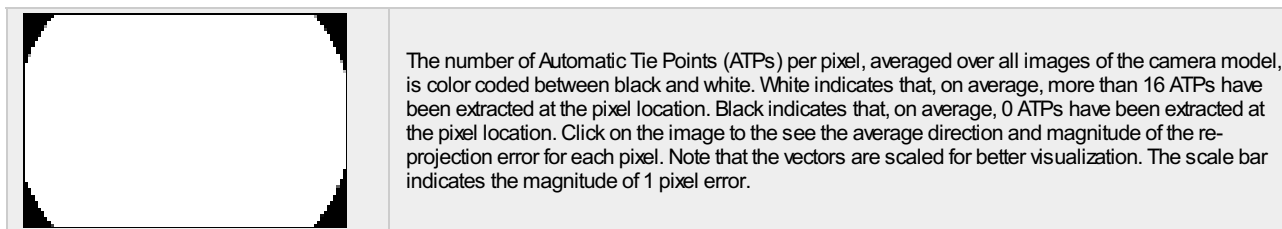
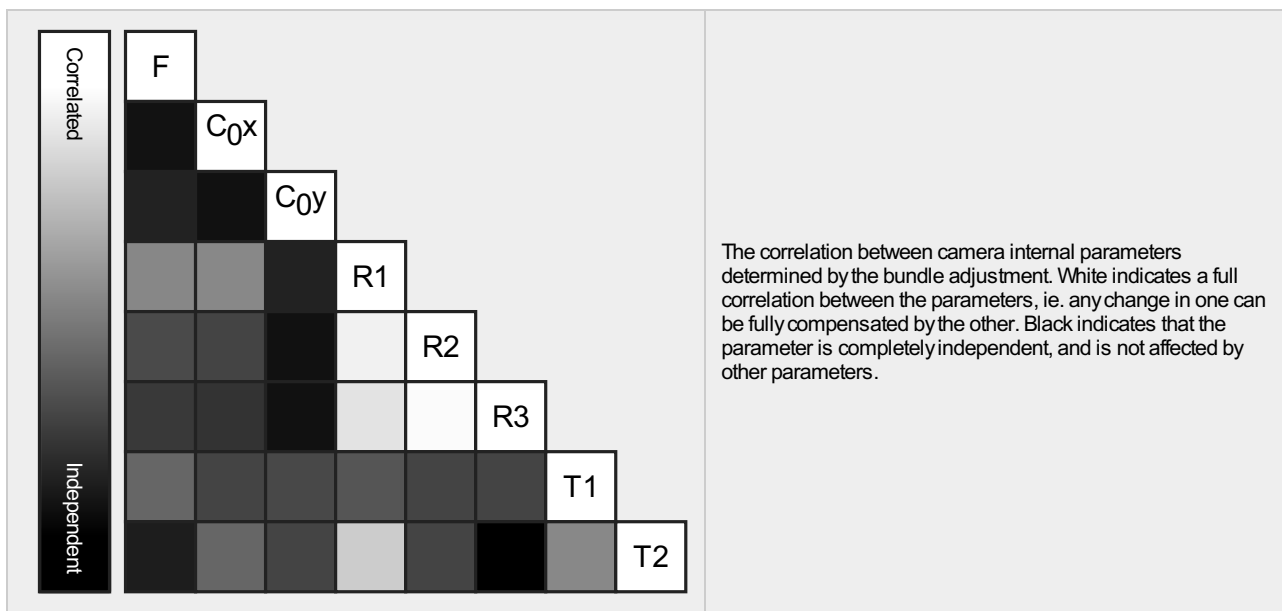
## ? Internal Camera Parameters

FC6310R\_8.8\_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]



EXIF ID: FC6310R\_8.8\_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3658.300 [pixel] 8.580 [mm]	2722.500 [pixel] 6.385 [mm]	1835.100 [pixel] 4.304 [mm]	-0.269	0.112	-0.033	0.000	-0.001
Optimized Values	3689.691 [pixel] 8.653 [mm]	2702.970 [pixel] 6.339 [mm]	1808.532 [pixel] 4.241 [mm]	-0.287	0.131	-0.039	0.000	-0.000
Uncertainties (Sigma)	0.069 [pixel] 0.000 [mm]	0.024 [pixel] 0.000 [mm]	0.019 [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	49146	12105
Min	25332	66
Max	79718	26994
Mean	49715	11689

## 3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	6590793
In 3 Images	2145945
In 4 Images	937642
In 5 Images	477070
In 6 Images	258065
In 7 Images	151558
In 8 Images	98704
In 9 Images	66964
In 10 Images	46465
In 11 Images	31855
In 12 Images	22215
In 13 Images	15572
In 14 Images	11414
In 15 Images	8454
In 16 Images	6015
In 17 Images	4496
In 18 Images	3230
In 19 Images	2442
In 20 Images	1898
In 21 Images	1458
In 22 Images	1119
In 23 Images	801

In 24 Images	617
In 25 Images	444
In 26 Images	329
In 27 Images	285
In 28 Images	210
In 29 Images	144
In 30 Images	109
In 31 Images	69
In 32 Images	63
In 33 Images	41
In 34 Images	35
In 35 Images	21
In 36 Images	15
In 37 Images	11
In 38 Images	9
In 39 Images	2
In 40 Images	2
In 41 Images	1
In 42 Images	2
In 43 Images	3
In 44 Images	2

## 2D Keypoint Matches



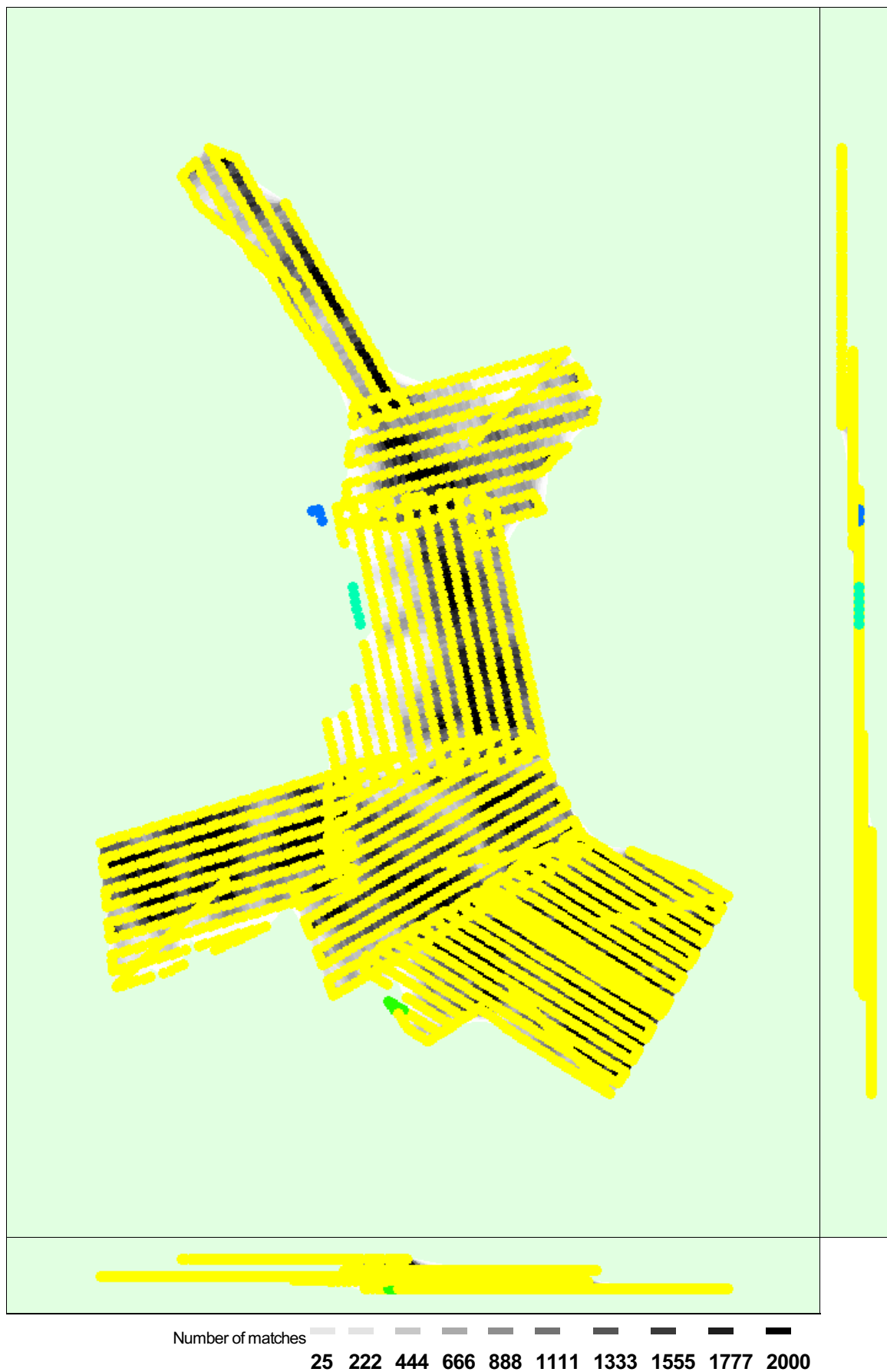


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

## ? Absolute Geolocation Variance



Mn Error [m]	Max Error [m]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
-	-4.54	0.00	0.00	0.00
-4.54	-3.63	0.00	0.00	0.00
-3.63	-2.72	0.00	0.00	0.00
-2.72	-1.81	0.00	0.00	0.00
-1.81	-0.91	0.00	0.00	0.00
-0.91	0.00	49.61	52.19	49.54
0.00	0.91	50.35	47.81	50.46
0.91	1.81	0.04	0.00	0.00
1.81	2.72	0.00	0.00	0.00
2.72	3.63	0.00	0.00	0.00
3.63	4.54	0.00	0.00	0.00
4.54	-	0.00	0.00	0.00
Mean [m]		-0.002414	-0.014808	-0.008340
Sigma [m]		0.063696	0.058693	0.089674
RMS Error [m]		0.063742	0.060532	0.090061

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]	99.19	98.01	98.09
[-2.00, 2.00]	99.96	99.93	100.00
[-3.00, 3.00]	100.00	99.96	100.00
Mean of Geolocation Accuracy [m]	0.129629	0.129629	0.196118
Sigma of Geolocation Accuracy [m]	0.202462	0.202462	0.311839

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

Geolocation Orientational Variance	RMS [degree]
Omega	1.036
Phi	0.886
Kappa	5.462

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) i9-9900 CPU @ 3.10GHz RAM: 80GB GPU: NVIDIA GeForce RTX 3060 Ti (Driver: 31.0.15.2230)
Operating System	Windows 10 Pro, 64-bit

### Coordinate Systems



Image Coordinate System	WGS 84
Output Coordinate System	WGS 84 / UTMzone 35N



Processing Options



Detected Template	3D Maps
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, 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	07h:59m:32s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	42m:28s

Results



Number of Processed Clusters	5
Number of Generated Tiles	11
Number of 3D Densified Points	320406165
Average Density (per m <sup>3</sup> )	80.25

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	1 x GSD (3.3 [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	02h:04m:45s
Time for Orthomosaic Generation	06h:01m:28s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s

Time for Index Map Generation

00s