

# 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	09-11-2023-PUG SLATINA_COMPLETARE_ORTO_4
Processed	2023-11-13 19:20:23
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	2.90 cm / 1.14 in
Area Covered	0.204 km <sup>2</sup> / 20.4105 ha / 0.08 sq. mi. / 50.4615 acres
Time for Initial Processing (without report)	01m:12s

## Quality Check



Images	median of 4833 keypoints per image	
Dataset	98 out of 98 images calibrated (100%), all images enabled	
Camera Optimization	0.87% relative difference between initial and optimized internal camera parameters	
Matching	median of 947.781 matches per calibrated image	
Georeferencing	yes, no 3D GCP	

## Preview

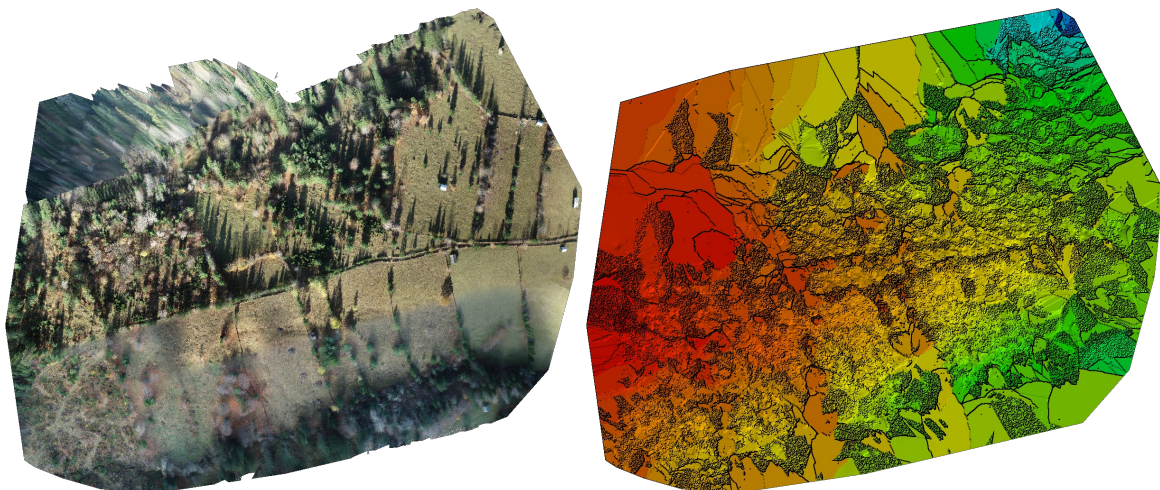


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

## Calibration Details



Number of Calibrated Images	98 out of 98
Number of Geolocated Images	98 out of 98

## ? Initial Image Positions

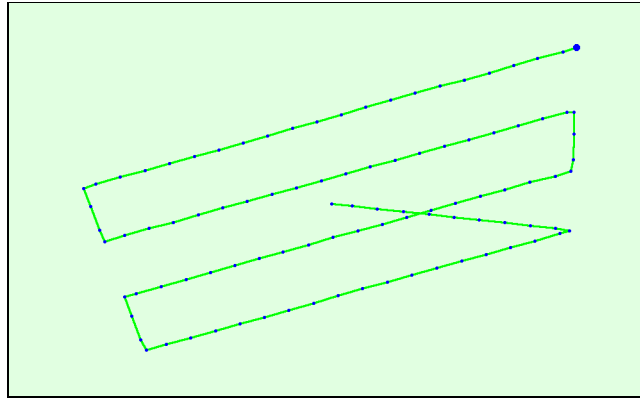


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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

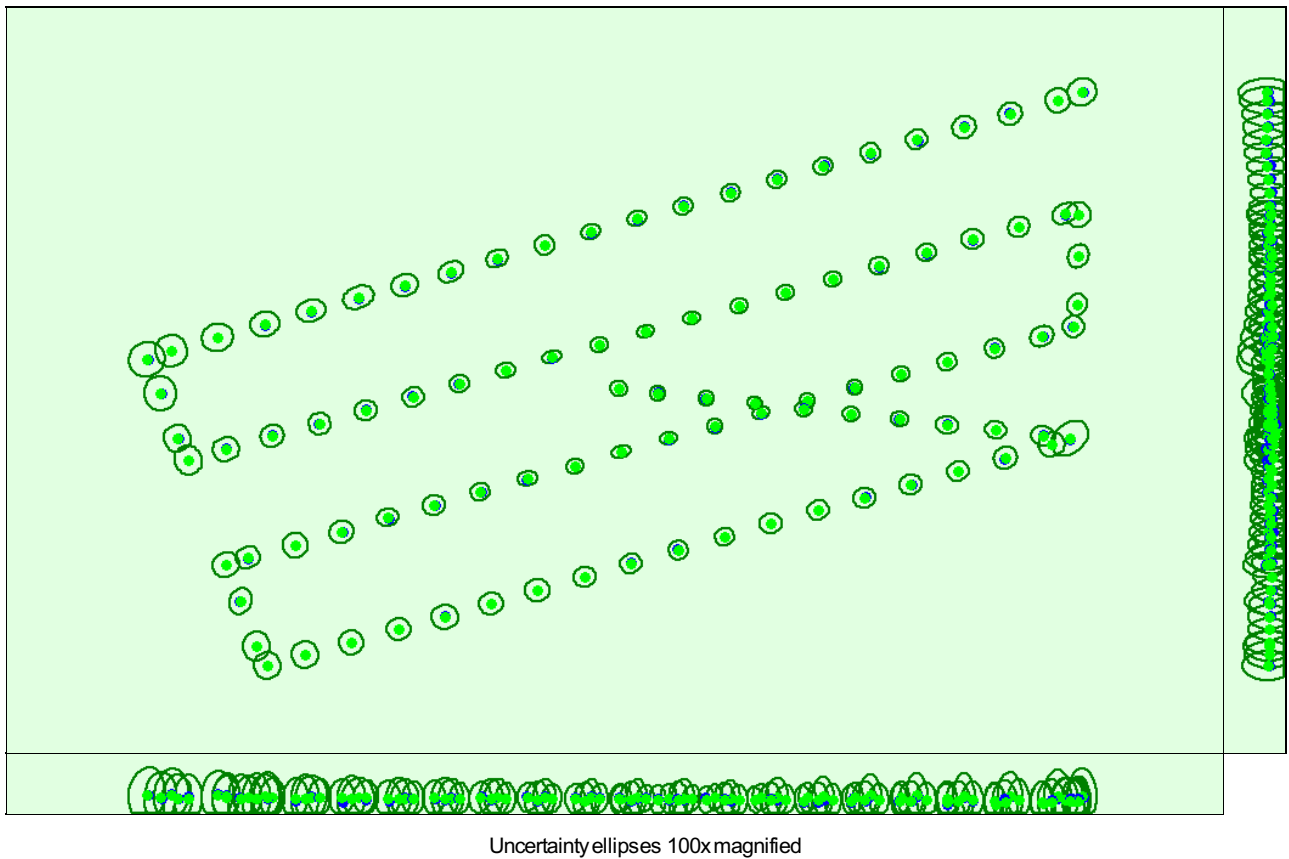


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses 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]
Mean	0.056	0.051	0.094	0.046	0.041	0.018
Sigma	0.011	0.012	0.019	0.005	0.009	0.008

## ? Overlap



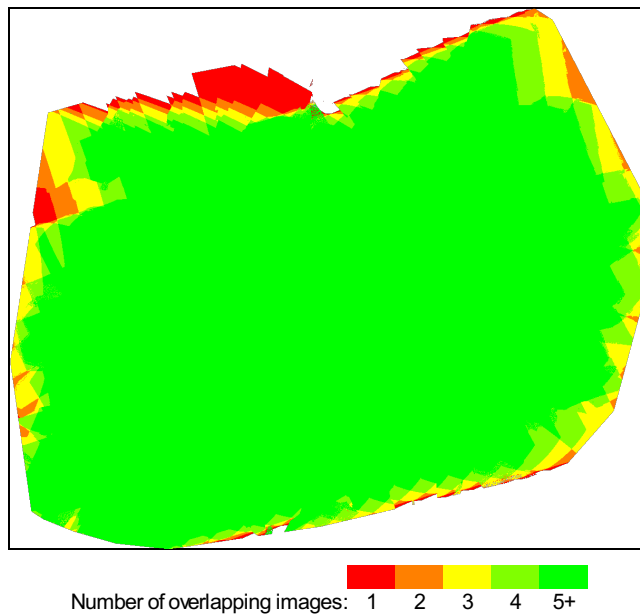


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	90817
Number of 3D Points for Bundle Block Adjustment	37747
Mean Reprojection Error [pixels]	0.093

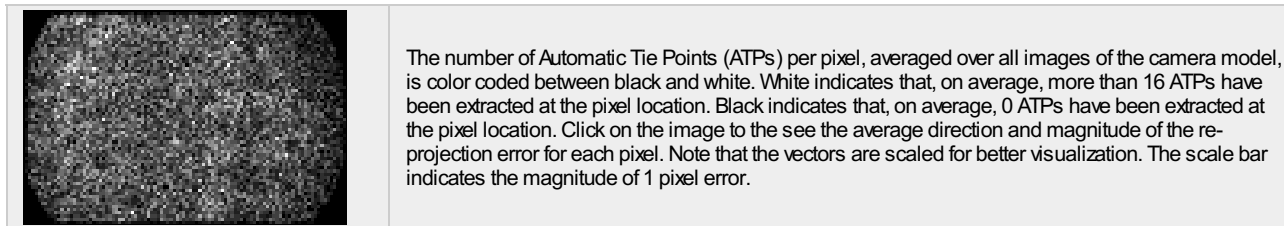
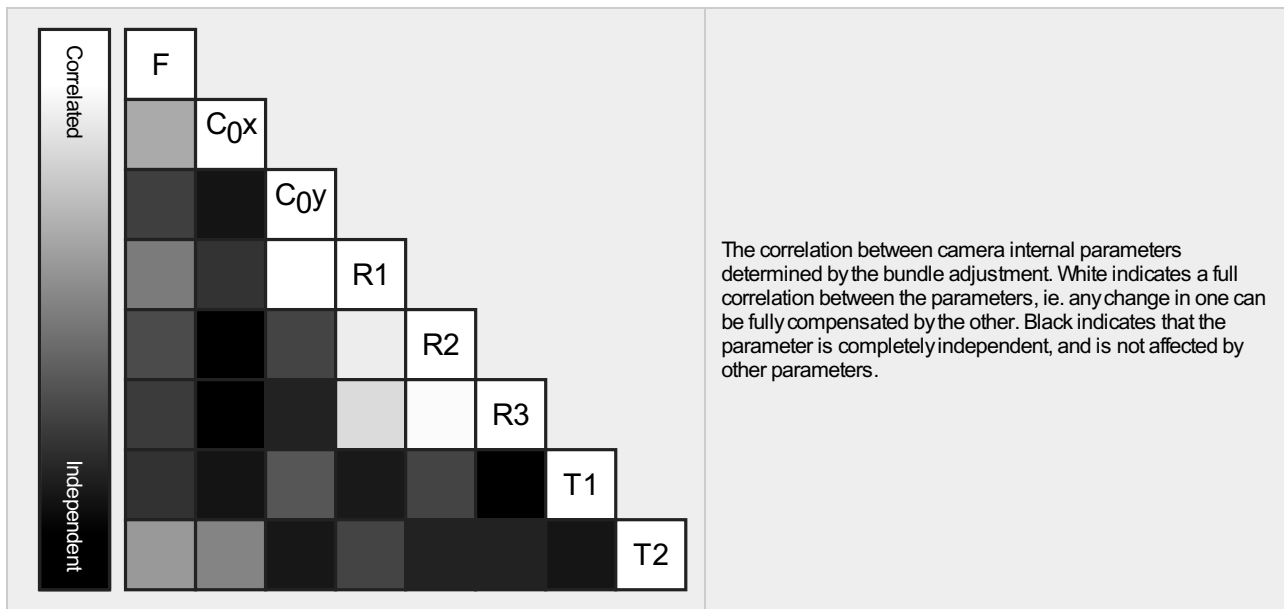
### ? Internal Camera Parameters

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	3690.197 [pixel] 8.655 [mm]	2702.375 [pixel] 6.338 [mm]	1809.390 [pixel] 4.244 [mm]	-0.287	0.130	-0.038	0.000	-0.000
Uncertainties (Sigma)	1.067 [pixel] 0.003 [mm]	0.572 [pixel] 0.001 [mm]	0.510 [pixel] 0.001 [mm]	0.000	0.001	0.001	0.000	0.000



## 2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	4833	948
Min	3533	224
Max	7159	1487
Mean	4732	927

## 3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	29629
In 3 Images	4919
In 4 Images	1645
In 5 Images	651
In 6 Images	329
In 7 Images	208
In 8 Images	152
In 9 Images	87
In 10 Images	37
In 11 Images	24
In 12 Images	27
In 13 Images	11
In 14 Images	8
In 15 Images	8
In 16 Images	5
In 17 Images	4
In 18 Images	1
In 19 Images	1
In 20 Images	1

## 2D Keypoint Matches

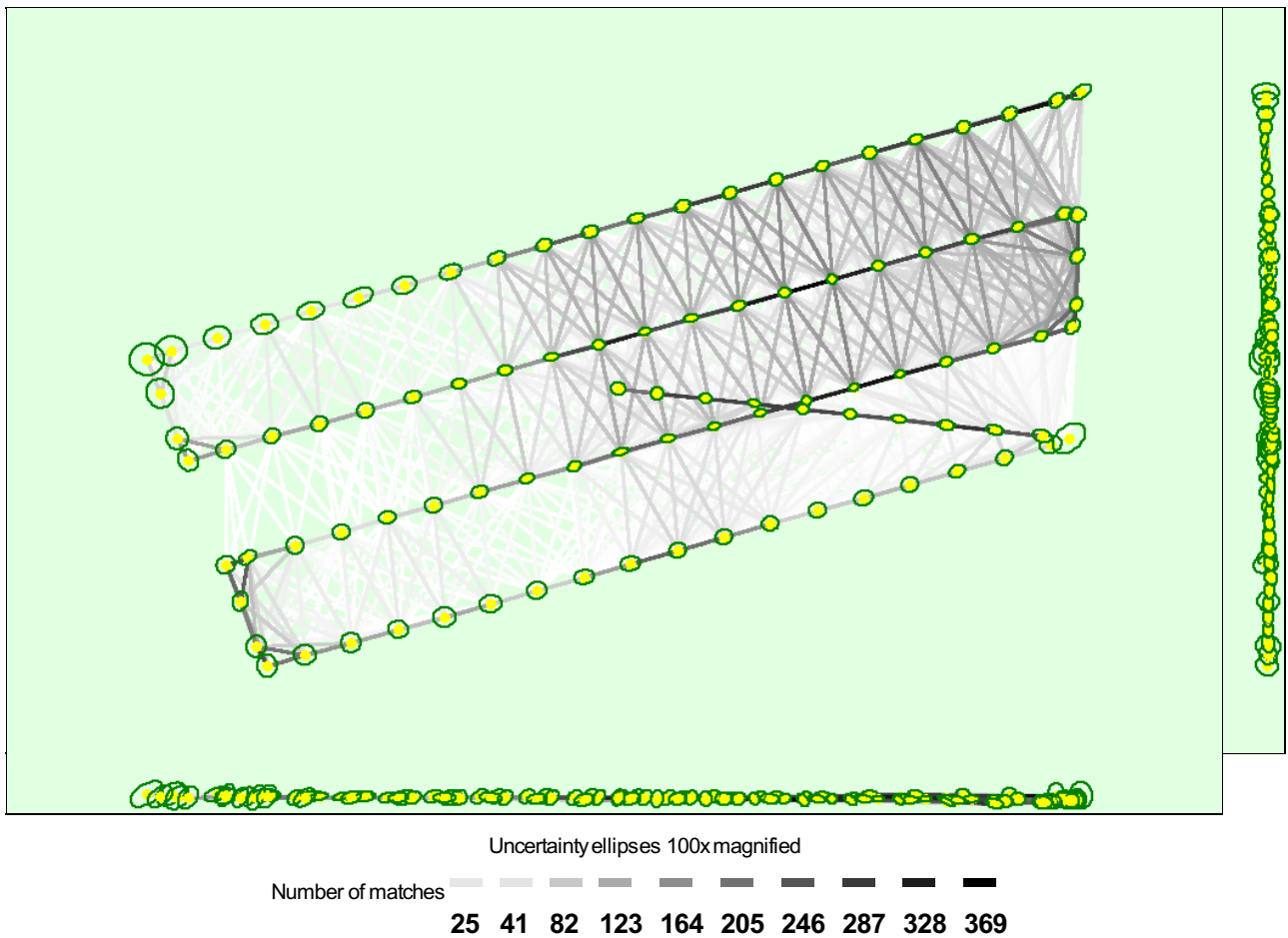


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty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

## Relative camera position and orientation uncertainties

	X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.043	0.036	0.034	0.026	0.032	0.014
Sigma	0.012	0.012	0.013	0.012	0.013	0.006

## Geolocation Details

### Absolute Geolocation Variance

Mn Error [m]	Max Error [m]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
-	-4.94	0.00	0.00	0.00
-4.94	-3.95	0.00	0.00	0.00
-3.95	-2.96	0.00	0.00	0.00
-2.96	-1.98	0.00	0.00	0.00
-1.98	-0.99	0.00	0.00	6.12
-0.99	0.00	56.12	56.12	44.90
0.00	0.99	43.88	43.88	40.82
0.99	1.98	0.00	0.00	8.16
1.98	2.96	0.00	0.00	0.00
2.96	3.95	0.00	0.00	0.00
3.95	4.94	0.00	0.00	0.00
4.94	-	0.00	0.00	0.00

Mean [m]	-0.000928	-0.004910	-0.007228
Sigma [m]	0.232236	0.283506	0.619536
RMS Error [m]	0.232238	0.283549	0.619578

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]	1.369854	1.369854	2.951334
Sigma of Geolocation Accuracy [m]	0.052789	0.052789	0.091372

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

Geolocation Orientational Variance	RMS [degree]
Omega	1.449
Phi	0.646
Kappa	5.064

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: 31.0.15.3758)
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	No Template Available
Keypoints Image Scale	Custom, 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	Optimal
Mnimum 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:52s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	02m:56s

Results



Number of Generated Tiles	1
Number of 3D Densified Points	3270291
Average Density (per m <sup>3</sup> )	29.07

DSM, Orthomosaic and Index Details



Processing Options



DSMand Orthomosaic Resolution	5 [cm/pixel]
DSMFilters	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 DSMGeneration	01m:12s
Time for Orthomosaic Generation	08m:37s
Time for DTMGeneration	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s