

# Quality Report



Generated with Pix4Dmapper 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	T1_PH4_RTK_AI_img_PL_accuracy
Processed	2020-04-02 01:27:27
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	2.60 cm / 1.02 in
Area Covered	0.337 km <sup>2</sup> / 33.6819 ha / 0.13 sq. mi. / 83.2729 acres
Time for Initial Processing (without report)	36m:38s

## Quality Check



Images	median of 68041 keypoints per image	
Dataset	794 out of 794 images calibrated (100%), 5 images disabled	
Camera Optimization	0.58% relative difference between initial and optimized internal camera parameters	
Matching	median of 17328.3 matches per calibrated image	
Georeferencing	yes, no 3D GCP	

## Preview

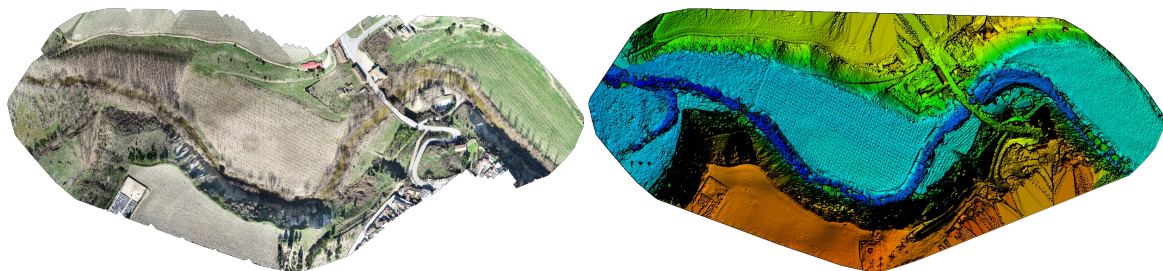


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

## Calibration Details



Number of Calibrated Images	794 out of 799
Number of Geolocated Images	799 out of 799

## Initial Image Positions



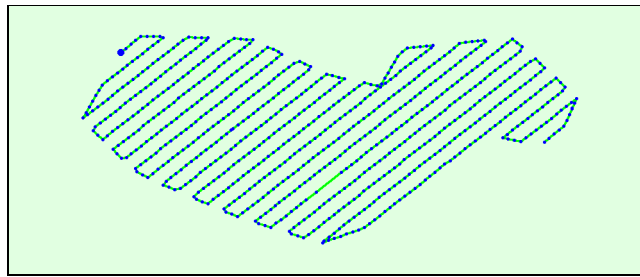


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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

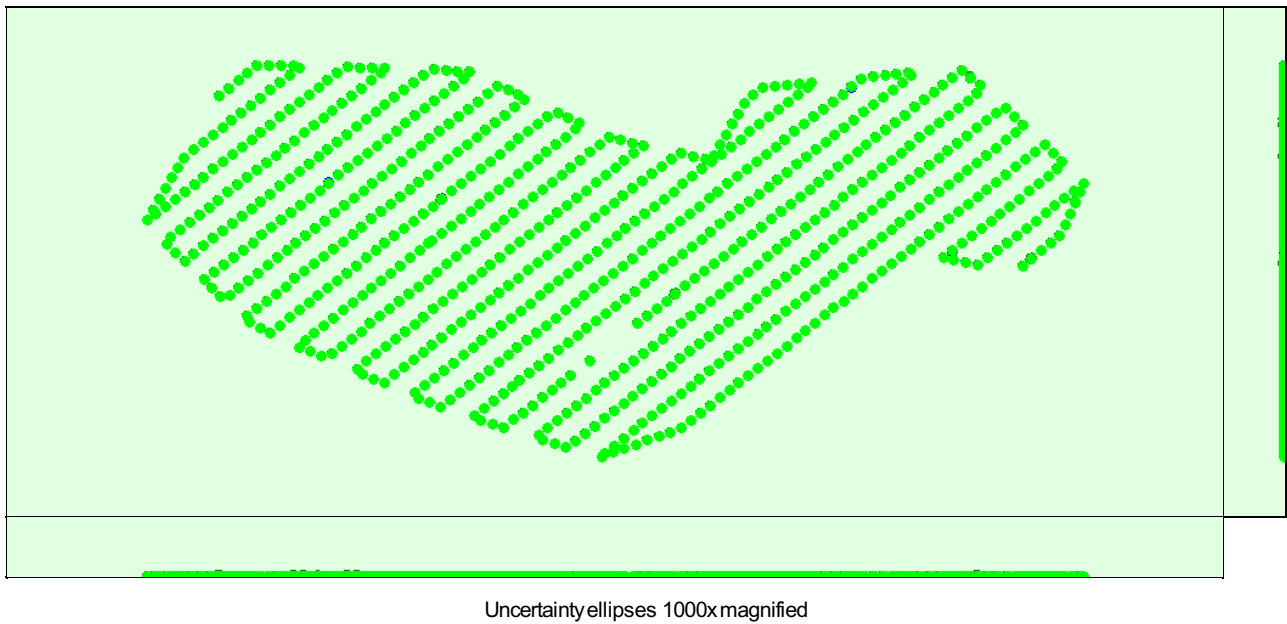


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled 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	0.003	0.003	0.003	0.003	0.003	0.002
Sigma	0.000	0.000	0.000	0.000	0.000	0.000

### Overlap

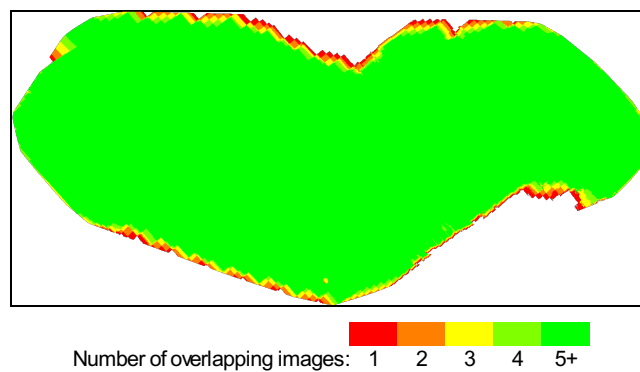


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	14086974
Number of 3D Points for Bundle Block Adjustment	4276338
Mean Reprojection Error [pixels]	0.129

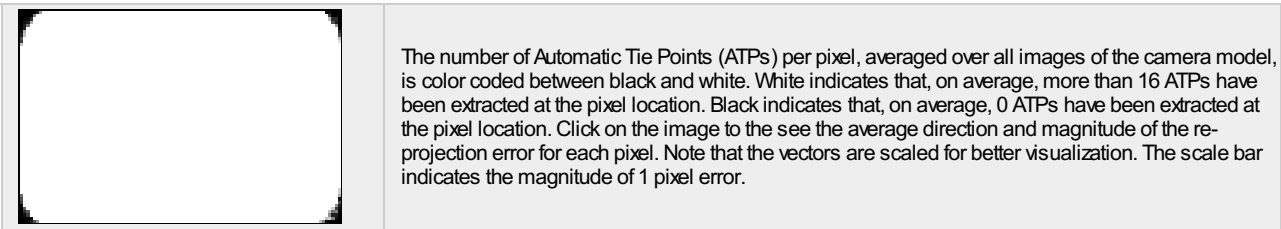
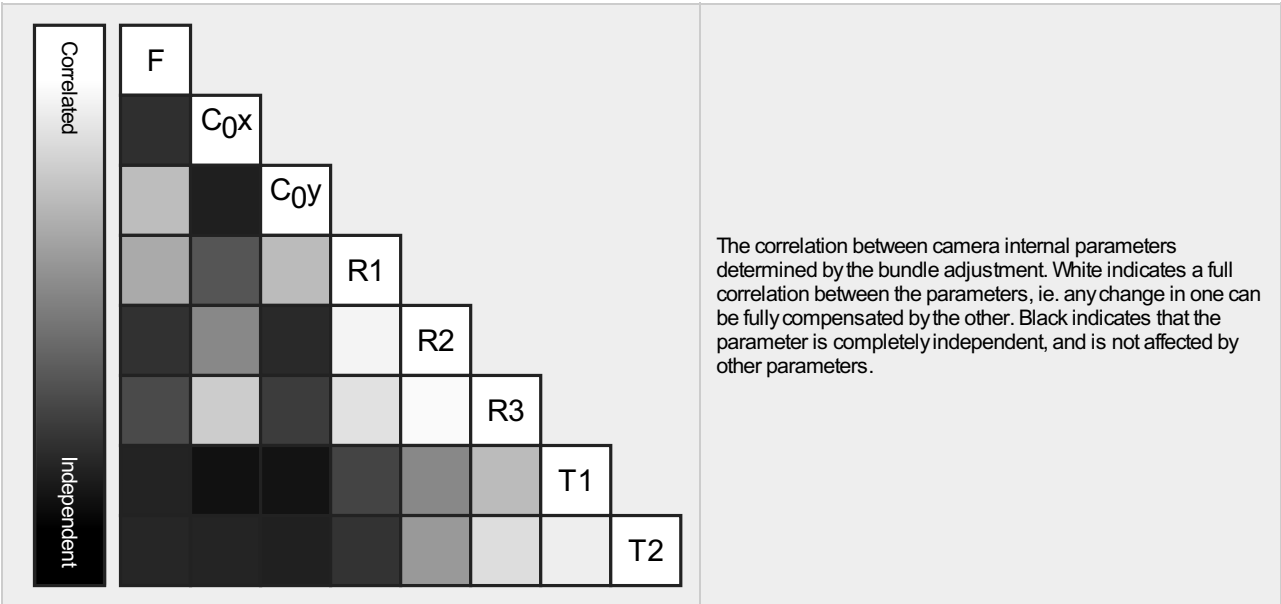
## Internal Camera Parameters

**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	3679.676 [pixel] 8.630 [mm]	2722.494 [pixel] 6.385 [mm]	1829.187 [pixel] 4.290 [mm]	0.002	-0.020	0.021	0.000	-0.001
Uncertainties (Sigma)	2.353 [pixel] 0.006 [mm]	0.296 [pixel] 0.001 [mm]	0.393 [pixel] 0.001 [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	68041	17328
Mn	38029	840
Max	79904	40619
Mean	67205	17742

## 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	2283164

In 3 Images	889645
In 4 Images	427634
In 5 Images	231639
In 6 Images	136371
In 7 Images	85339
In 8 Images	57098
In 9 Images	39320
In 10 Images	28479
In 11 Images	21158
In 12 Images	16158
In 13 Images	12639
In 14 Images	9636
In 15 Images	7336
In 16 Images	5569
In 17 Images	4450
In 18 Images	3490
In 19 Images	2785
In 20 Images	2338
In 21 Images	1995
In 22 Images	1673
In 23 Images	1376
In 24 Images	1272
In 25 Images	1038
In 26 Images	835
In 27 Images	728
In 28 Images	601
In 29 Images	505
In 30 Images	420
In 31 Images	345
In 32 Images	266
In 33 Images	230
In 34 Images	180
In 35 Images	148
In 36 Images	110
In 37 Images	92
In 38 Images	79
In 39 Images	66
In 40 Images	43
In 41 Images	27
In 42 Images	23
In 43 Images	11
In 44 Images	11
In 45 Images	5
In 46 Images	5
In 47 Images	4
In 48 Images	1
In 49 Images	1

 2D Keypoint Matches



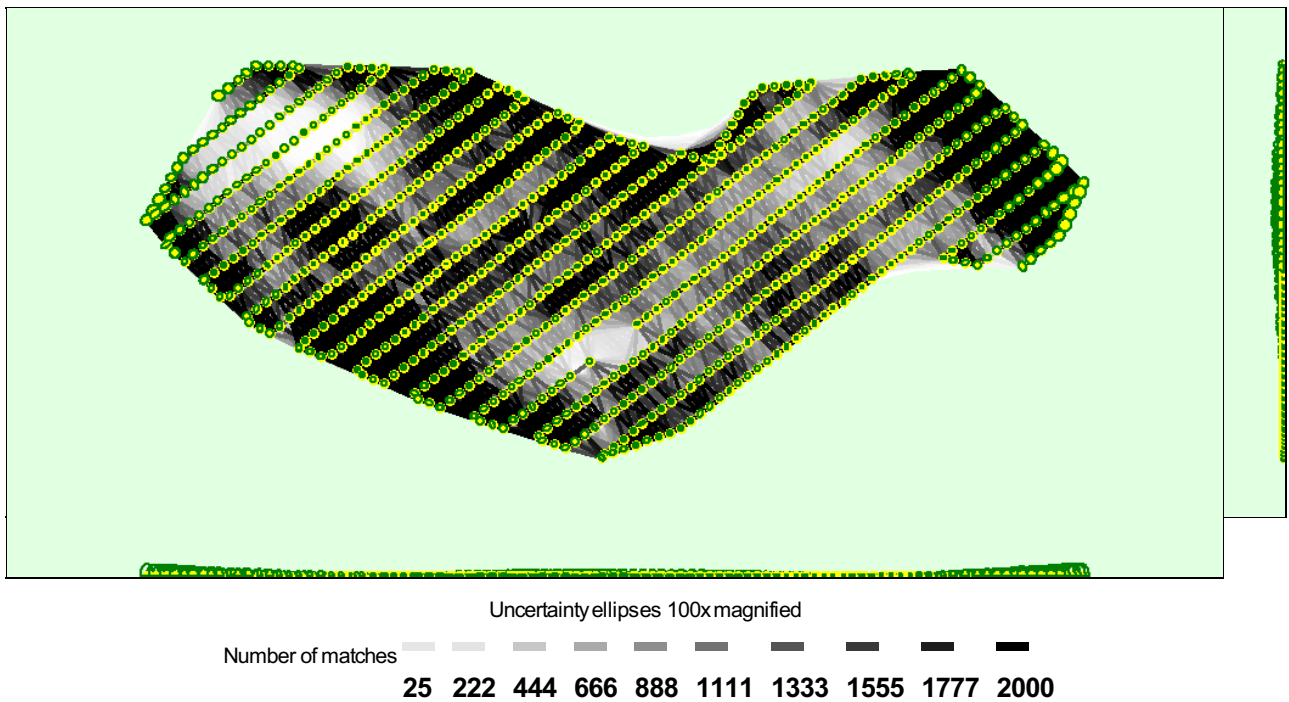


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.025	0.024	0.035	0.021	0.014	0.010
Sigma	0.010	0.010	0.024	0.010	0.006	0.004

## Geolocation Details

### Absolute Geolocation Variance

Mn Error [m]	Max Error [m]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
-	-0.08	0.00	0.00	0.13
-0.08	-0.06	0.00	0.00	0.50
-0.06	-0.05	0.00	0.00	1.64
-0.05	-0.03	0.00	0.00	5.79
-0.03	-0.02	0.13	0.13	11.96
-0.02	0.00	52.27	49.87	28.09
0.00	0.02	47.48	49.87	26.20
0.02	0.03	0.13	0.13	16.12
0.03	0.05	0.00	0.00	5.67
0.05	0.06	0.00	0.00	2.27
0.06	0.08	0.00	0.00	1.26
0.08	-	0.00	0.00	0.38
Mean [m]		-0.000010	-0.000007	0.001869
Sigma [m]		0.003420	0.002937	0.025195
RMS Error [m]		0.003420	0.002937	0.025264

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 Error	Images X[%]	Images Y[%]	Images Z[%]
[-1.00, 1.00]	98.61	99.50	89.92
[-2.00, 2.00]	100.00	100.00	99.87
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	0.012010	0.012010	0.038064
Sigma of Geolocation Accuracy [m]	0.000304	0.000304	0.009998

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

Geolocation Orientational Variance	RMS [degree]
Omega	0.528
Phi	0.229
Kappa	4.110

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) Xeon(R) CPU E5-1620 v3 @ 3.50GHz RAM: 32GB GPU: NVIDIA Quadro M2000 (Driver: 23.21.13.8816)
Operating System	Windows 10 Pro, 64-bit

### Coordinate Systems



Image Coordinate System	WGS 84
Output Coordinate System	ETRS89 / UTM zone 30N (+52.786m)

### 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: Geolocation Based Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, no