Quality Report

> **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 ℹ

Project	T1_PH4_RTK_All_Img_PL_All
Processed	2020-04-02 02:23:21
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^2 / 33.6647 ha / 0.13 sq. mi. / 83.2302 acres
Time for Initial Processing (without report)	35m:37s

Quality Check ℹ

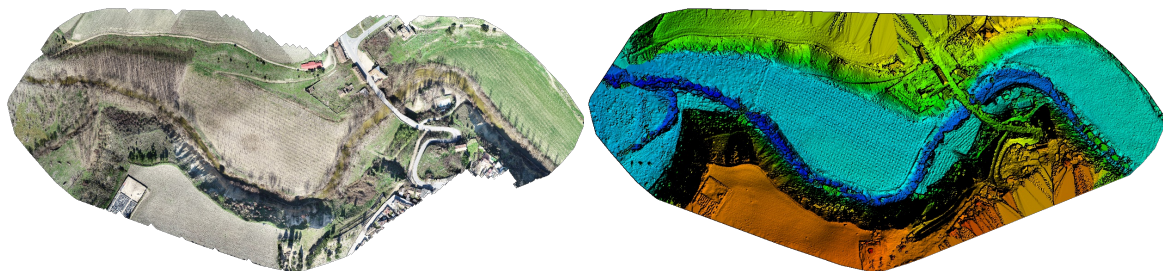|		
? **Images**	median of 68041 keypoints per image	✓
? **Dataset**	794 out of 794 images calibrated (100%), 5 images disabled	✓
? **Camera Optimization**	0% relative difference between initial and optimized internal camera parameters	✓
? **Matching**	median of 17344.6 matches per calibrated image	✓
? **Georeferencing**	yes, no 3D GCP	⚠

? Preview ℹ

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

Calibration Details ℹ

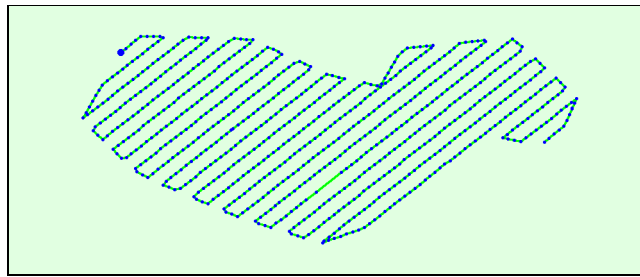|	
Number of Calibrated Images	794 out of 799
Number of Geolocated Images	799 out of 799

? Initial Image Positions ℹ

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   ⓘ
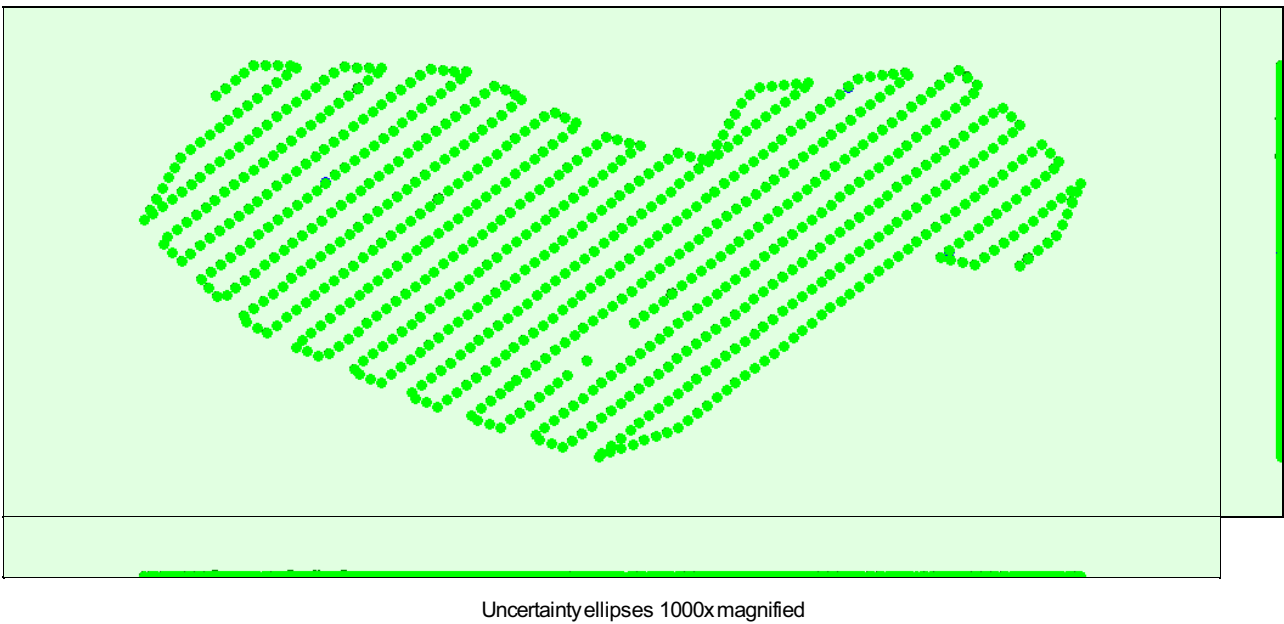

Uncertainty ellipses 1000x magnified

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	0.003	0.003	0.003	0.002	0.002	0.002
Sigma	0.000	0.000	0.000	0.000	0.000	0.000

❓ 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

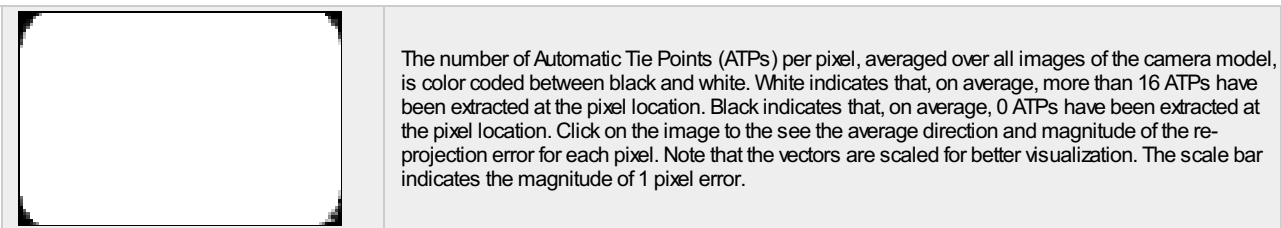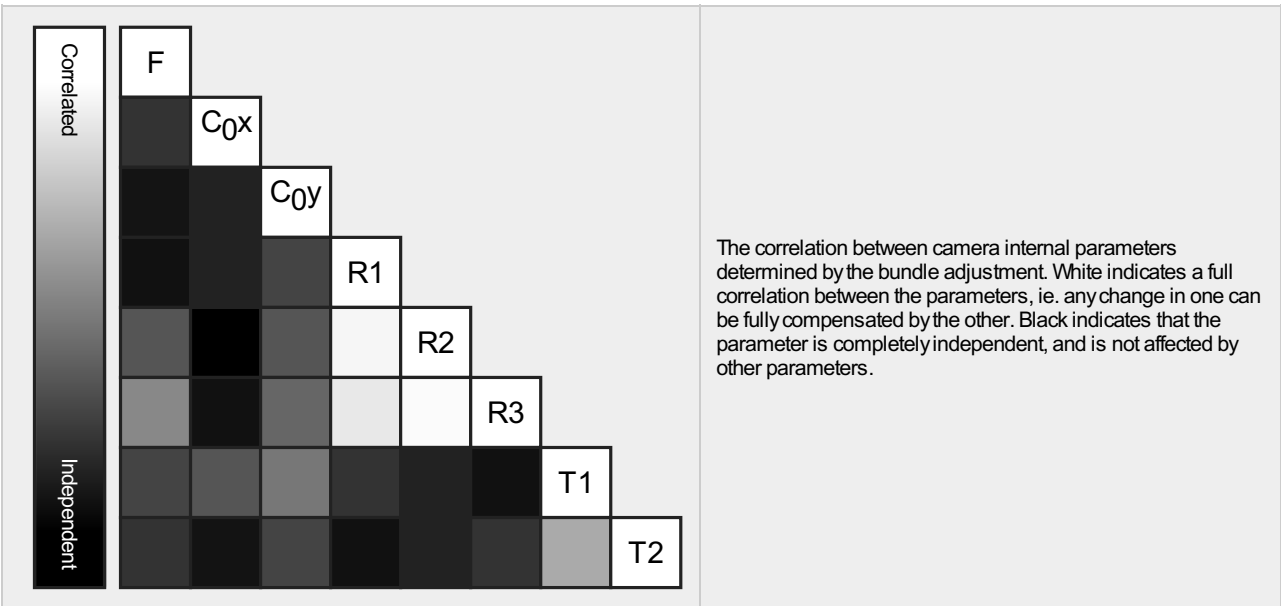|	
Number of 2D Keypoint Observations for Bundle Block Adjustment	14086674
Number of 3D Points for Bundle Block Adjustment	4276346
Mean Reprojection Error [pixels]	0.129

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	3658.340 [pixel] 8.580 [mm]	2722.673 [pixel] 6.385 [mm]	1833.630 [pixel] 4.300 [mm]	0.002	-0.019	0.020	0.000	-0.001
Uncertainties (Sigma)	0.245 [pixel] 0.001 [mm]	0.188 [pixel] 0.000 [mm]	0.180 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000

The correlation between camera internal parameters determined by the bundle adjustment. White indicates a full correlation between the parameters, ie. any change in one can be fully compensated by the other. Black indicates that the parameter is completely independent, and is not affected by other parameters.

The number of Automatic Tie Points (ATPs) per pixel, averaged over all images of the camera model, is color coded between black and white. White indicates that, on average, more than 16 ATPs have been extracted at the pixel location. Black indicates that, on average, 0 ATPs have been extracted at the pixel location. Click on the image to the see the average direction and magnitude of the re-projection error for each pixel. Note that the vectors are scaled for better visualization. The scale bar indicates the magnitude of 1 pixel error.

2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	68041	17345
Min	38029	840
Max	79904	40636
Mean	67205	17741

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	2283151

In 3 Images	889728
In 4 Images	427674
In 5 Images	231610
In 6 Images	136357
In 7 Images	85310
In 8 Images	57101
In 9 Images	39321
In 10 Images	28460
In 11 Images	21149
In 12 Images	16141
In 13 Images	12644
In 14 Images	9621
In 15 Images	7334
In 16 Images	5579
In 17 Images	4450
In 18 Images	3498
In 19 Images	2777
In 20 Images	2351
In 21 Images	2007
In 22 Images	1665
In 23 Images	1379
In 24 Images	1272
In 25 Images	1031
In 26 Images	832
In 27 Images	727
In 28 Images	606
In 29 Images	502
In 30 Images	421
In 31 Images	344
In 32 Images	271
In 33 Images	230
In 34 Images	180
In 35 Images	146
In 36 Images	109
In 37 Images	92
In 38 Images	78
In 39 Images	67
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

Uncertainty ellipses 100x magnified

Number of matches
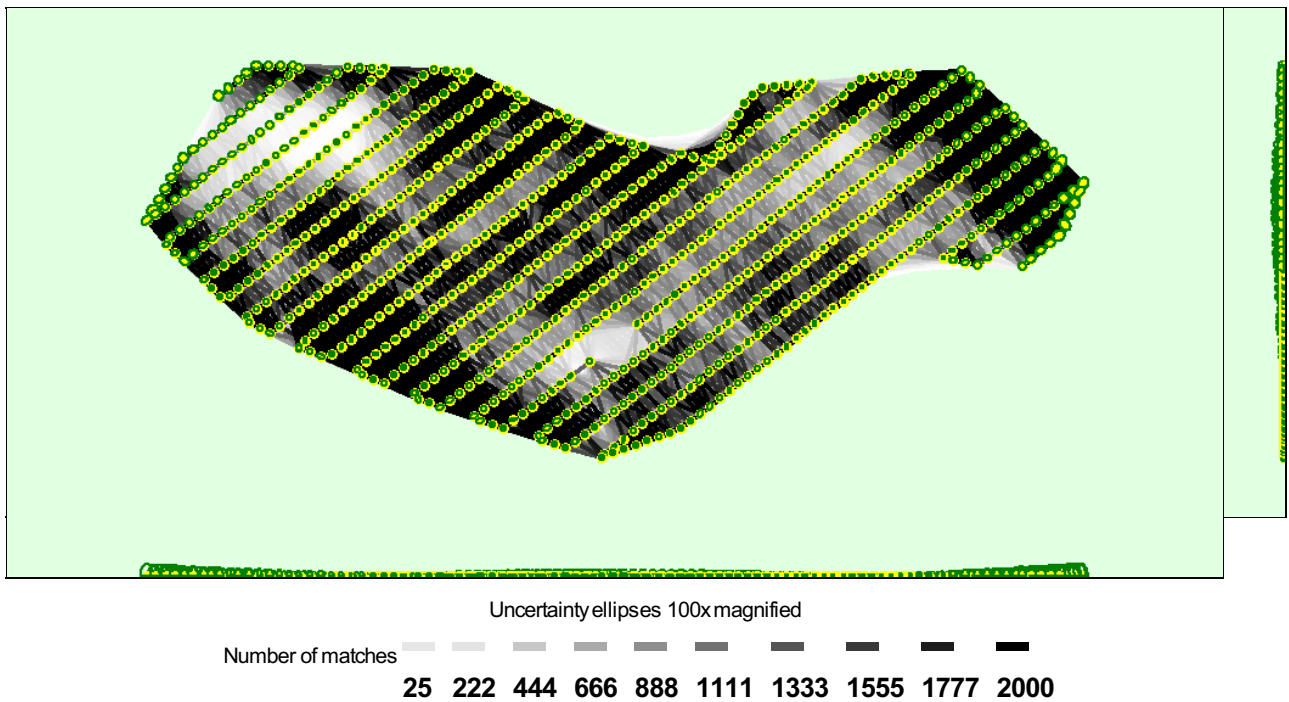
25 222 444 666 888 1111 1333 1555 1777 2000

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	0.023	0.023	0.035	0.020	0.013	0.009
Sigma	0.009	0.009	0.023	0.010	0.006	0.004

Geolocation Details

Absolute Geolocation Variance

Min 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	0.63
-0.06	-0.05	0.00	0.00	1.51
-0.05	-0.03	0.00	0.00	6.05
-0.03	-0.02	0.13	0.13	12.34
-0.02	0.00	51.76	48.99	28.34
0.00	0.02	47.98	50.76	25.06
0.02	0.03	0.13	0.13	16.25
0.03	0.05	0.00	0.00	5.92
0.05	0.06	0.00	0.00	2.14
0.06	0.08	0.00	0.00	1.26
0.08	-	0.00	0.00	0.38
Mean [m]		-0.000011	-0.000003	0.001647
Sigma [m]		0.003444	0.002968	0.025245
RMS Error [m]		0.003444	0.002968	0.025299

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]	98.87	99.50	89.80
[-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	0.542
Phi	0.238
Kappa	4.108

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: yes
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Geolocation Based Internal Parameters Optimization: All prior External Parameters Optimization: All Rematch: Auto, no