

# 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
- i** Additional information about the sections



Click [here](#) for additional tips to analyze the Quality Report

## Summary



Project	ML 3D 32 (doble grilla)
Processed	2020-06-05 01:33:48
Camera Model Name(s)	FC220_4.7_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	2.03 cm / 0.80 in
Time for Initial Processing (without report)	08h:45m:16s

## Quality Check



<b>?</b> Images	median of 36148 keypoints per image	
<b>?</b> Dataset	1500 out of 1500 images calibrated (100%), all images enabled	
<b>?</b> Camera Optimization	1.53% relative difference between initial and optimized internal camera parameters	
<b>?</b> Matching	median of 13551.4 matches per calibrated image	
<b>?</b> Georeferencing	yes, no 3D GCP	

## Calibration Details



Number of Calibrated Images	1500 out of 1500
Number of Geolocated Images	1500 out of 1500

### ?

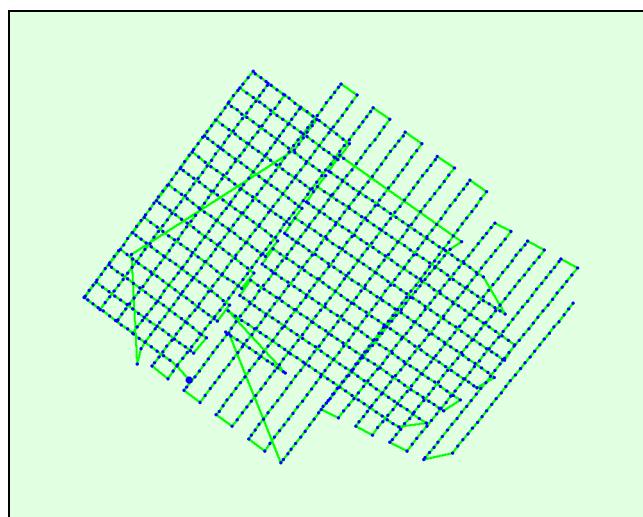
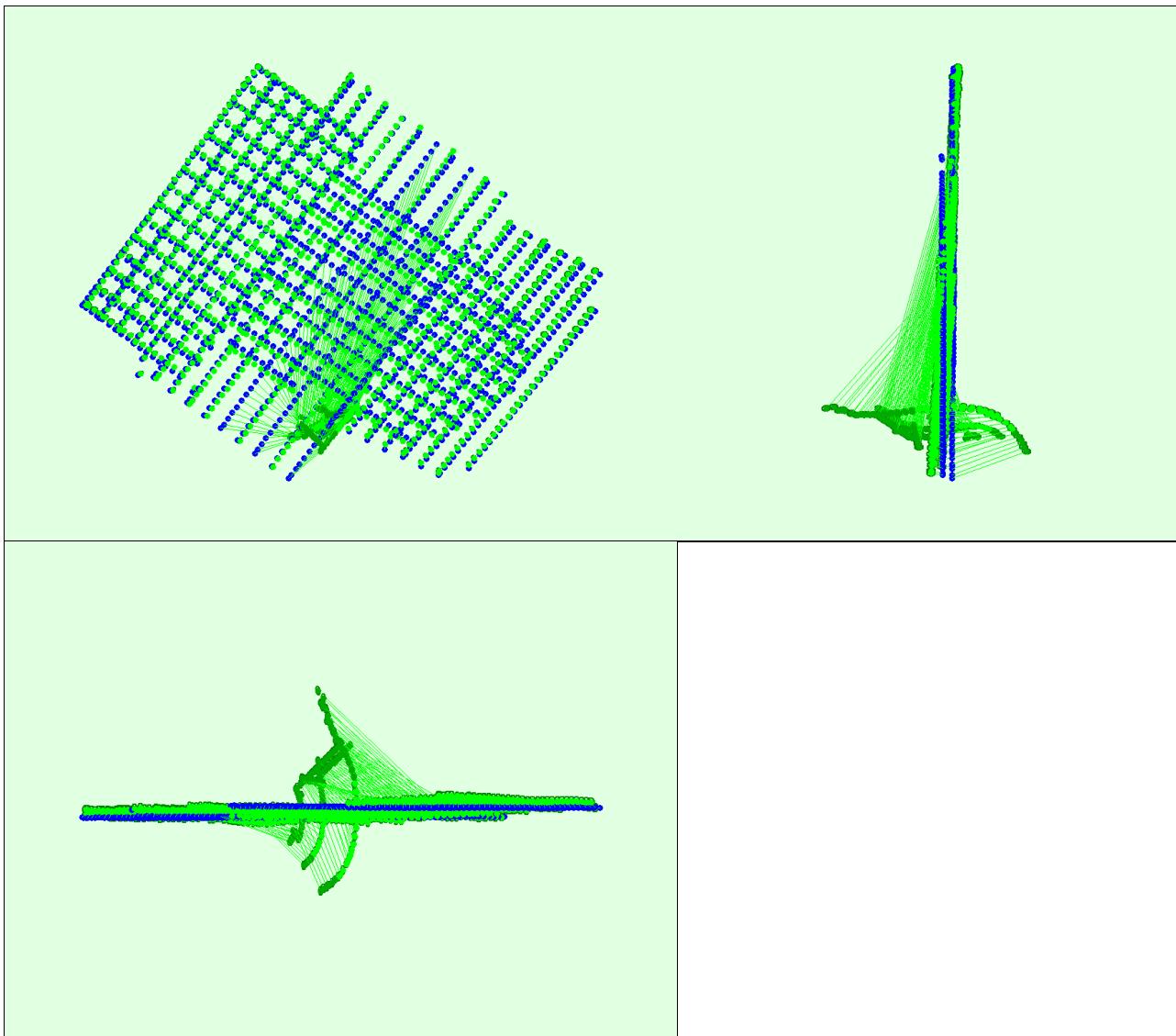
**Initial Image Positions**

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 10x 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). 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	0.084	0.083	0.139	0.067	0.043	0.055
Sigma	0.013	0.011	0.007	0.008	0.003	0.006

## Bundle Block Adjustment Details



Number of 2D Keypoint Observations for Bundle Block Adjustment	18990438
Number of 3D Points for Bundle Block Adjustment	5465251
Mean Reprojection Error [pixels]	0.191

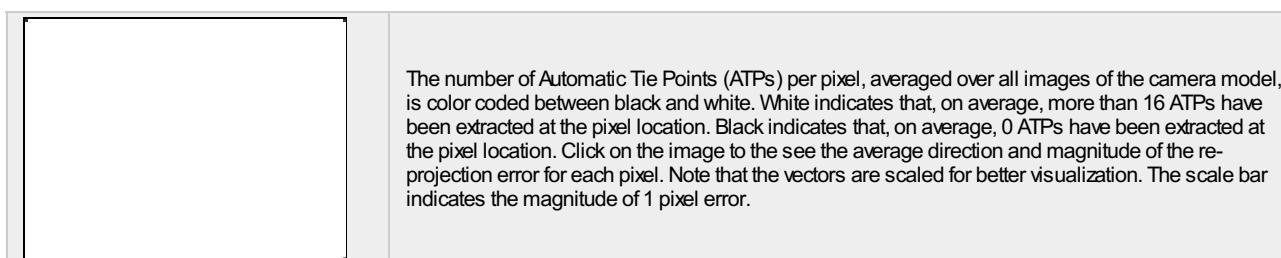
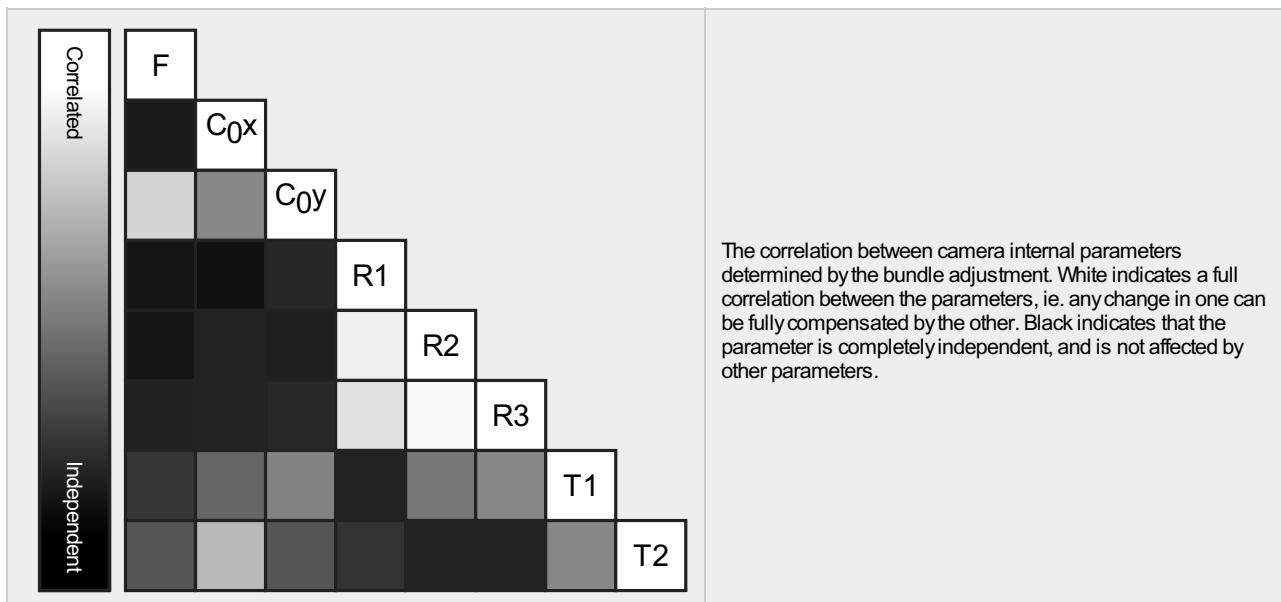
## Internal Camera Parameters

## FC220\_4.7\_4000x3000 (RGB). Sensor Dimensions: 6.327 [mm] x 4.745 [mm]



EXIF ID: FC220\_4.7\_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3073.410 [pixel] 4.861 [mm]	1917.790 [pixel] 3.033 [mm]	1485.800 [pixel] 2.350 [mm]	0.033	-0.086	0.078	0.000	-0.001
Optimized Values	3026.363 [pixel] 4.787 [mm]	1986.716 [pixel] 3.142 [mm]	1499.329 [pixel] 2.372 [mm]	0.060	-0.148	0.139	0.000	0.001
Uncertainties (Sigma)	0.341 [pixel] 0.001 [mm]	0.225 [pixel] 0.000 [mm]	0.384 [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	36148	13551
Mn	19175	215
Max	62910	29610
Mean	36094	12660

## 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	2778171
In 3 Images	1084978
In 4 Images	565727
In 5 Images	332462
In 6 Images	206716
In 7 Images	135517
In 8 Images	94464
In 9 Images	67148
In 10 Images	48769
In 11 Images	36370

In 12 Images	26646
In 13 Images	20021
In 14 Images	14992
In 15 Images	11552
In 16 Images	8773
In 17 Images	6635
In 18 Images	5348
In 19 Images	3978
In 20 Images	3136
In 21 Images	2469
In 22 Images	2126
In 23 Images	1578
In 24 Images	1302
In 25 Images	1106
In 26 Images	909
In 27 Images	667
In 28 Images	535
In 29 Images	446
In 30 Images	363
In 31 Images	303
In 32 Images	248
In 33 Images	244
In 34 Images	179
In 35 Images	152
In 36 Images	119
In 37 Images	118
In 38 Images	110
In 39 Images	87
In 40 Images	101
In 41 Images	85
In 42 Images	55
In 43 Images	44
In 44 Images	54
In 45 Images	35
In 46 Images	39
In 47 Images	40
In 48 Images	32
In 49 Images	28
In 50 Images	19
In 51 Images	24
In 52 Images	17
In 53 Images	15
In 54 Images	12
In 55 Images	13
In 56 Images	18
In 57 Images	9
In 58 Images	12
In 59 Images	16
In 60 Images	16
In 61 Images	7
In 62 Images	5
In 63 Images	7
In 64 Images	9
In 65 Images	7
In 66 Images	9
In 67 Images	6
In 68 Images	4
In 69 Images	2
In 70 Images	4

In 71 Images	5
In 73 Images	1
In 74 Images	4
In 75 Images	2
In 76 Images	3
In 77 Images	3
In 78 Images	2
In 79 Images	3
In 80 Images	2
In 81 Images	1
In 82 Images	2
In 85 Images	2
In 86 Images	3
In 89 Images	1
In 94 Images	3
In 95 Images	1
In 99 Images	2
In 101 Images	1
In 108 Images	1
In 109 Images	1

### 💡 2D Keypoint Matches

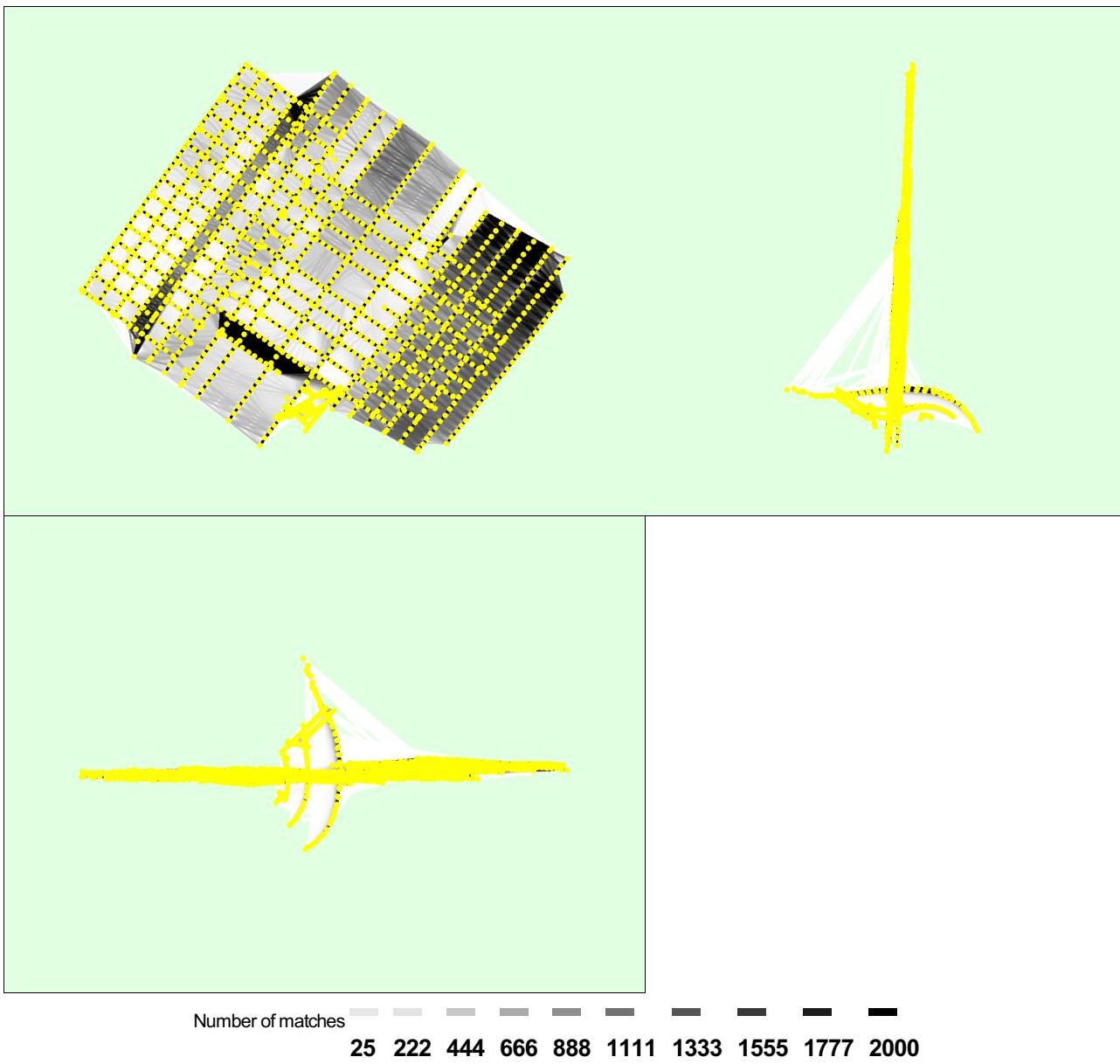


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

## Geolocation Details



### Absolute Geolocation Variance



Mn 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	0.22	0.00	0.00
-12.00	-9.00	0.22	0.00	0.15
-9.00	-6.00	0.51	0.07	0.07
-6.00	-3.00	0.58	0.15	6.06
-3.00	0.00	46.64	66.93	51.39
0.00	3.00	51.46	31.31	33.28
3.00	6.00	0.15	0.36	7.66
6.00	9.00	0.15	0.22	0.22
9.00	12.00	0.07	0.22	0.29
12.00	15.00	0.00	0.29	0.29
15.00	-	0.00	0.44	0.58
<b>Mean [m]</b>		0.084135	-0.134188	-0.046512
<b>Sigma [m]</b>		1.452063	2.038028	2.737710
<b>RMS Error [m]</b>		1.454499	2.042441	2.738105

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]	98.69	98.54	98.91
[-2.00, 2.00]	99.64	99.12	99.71
[-3.00, 3.00]	100.00	99.56	100.00
<b>Mean of Geolocation Accuracy [m]</b>	5.000000	5.000000	10.000000
<b>Sigma of Geolocation Accuracy [m]</b>	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	6.287
Phi	3.336
Kappa	5.469

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 E5-2630 v3 @ 2.40GHz RAM 16GB GPU: RDPUDD Chained DD (Driver: unknown)
Operating System	Windows Server 2012 R2 Standard, 64-bit

### Coordinate Systems



Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	WGS 84 / UTM zone 21S (EGM96 Geoid)

### Processing Options



Detected Template	No Template Available
Keypoints Image Scale	Full, Image Scale: 1
Advanced: Matching Image Pairs	Free Flight or Terrestrial
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	1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	no
LOD	Generated: no
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	04h:01m:34s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	NA

### Results



Number of Processed Clusters	58
Number of Generated Tiles	4
Number of 3D Densified Points	76380084
Average Density (per m <sup>3</sup> )	797.25