

Quality Report



Generated with Pix4Ddiscovery version 3.1.22



Important: Click on the different icons for:



Help to analyze the results in the Quality Report



Additional information about the sections



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

Summary



Project	pix4d p4p stoney mtn 6560 45m
Processed	2017-03-06 14:59:22
Camera Model Name(s)	FC6310_8.8_4864x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.3 cm / 0.51 in
Area Covered	0.0926 km ² / 9.2566 ha / 0.0358 sq. mi. / 22.8853 acres
Time for Initial Processing (without report)	09m:25s

Quality Check



Images	median of 3981 keypoints per image	
Dataset	281 out of 281 images calibrated (100%), all images enabled	
Camera Optimization	69.35% relative difference between initial and optimized internal camera parameters	
Matching	median of 1073.47 matches per calibrated image	
Georeferencing	yes, 15 GCPs (15 3D), mean RMS error = 0.047 ft	

Preview

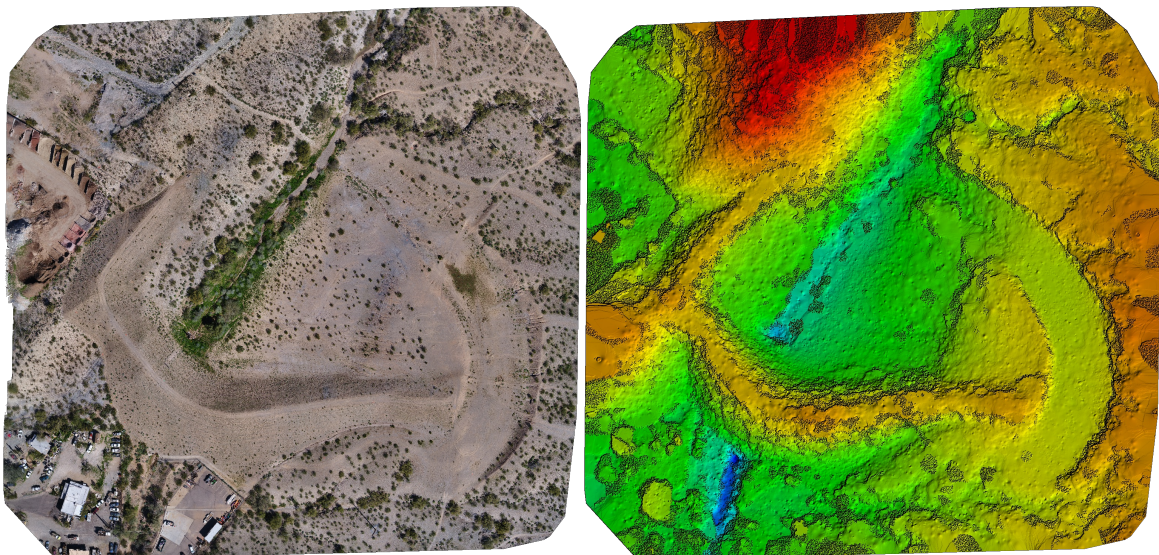


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	281 out of 281
Number of Geolocated Images	281 out of 281

? Initial Image Positions

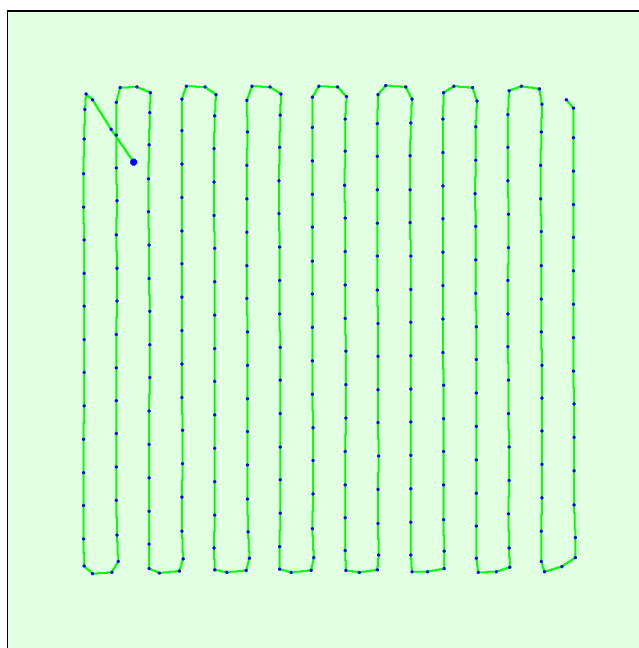
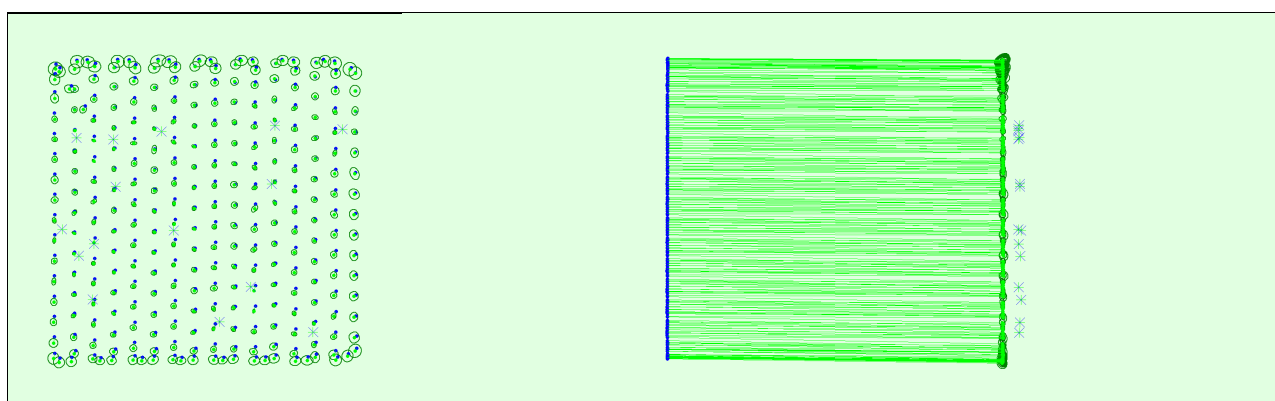
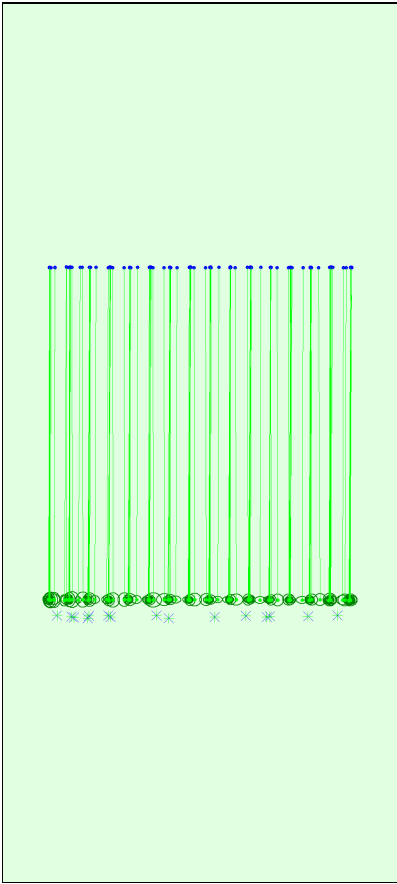


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

? Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 100x magnified

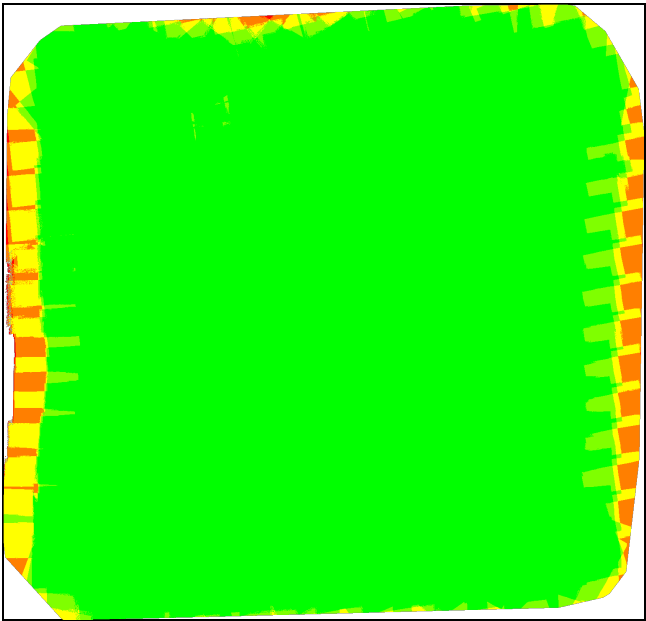
Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

? Absolute camera position and orientation uncertainties



	X [ft]	Y [ft]	Z [ft]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.100	0.099	0.078	0.056	0.046	0.044
Sigma	0.040	0.036	0.046	0.017	0.018	0.020

? 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

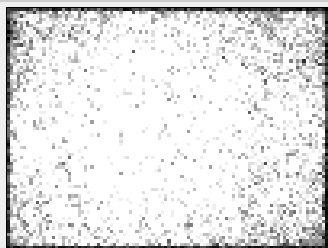
Number of 2D Keypoint Observations for Bundle Block Adjustment	318629
Number of 3D Points for Bundle Block Adjustment	124032
Mean Reprojection Error [pixels]	0.132

Internal Camera Parameters

FC6310_8.8_4864x3648 (RGB). Sensor Dimensions: 11.407 [mm] x 8.556 [mm]

EXIF ID: FC6310_8.8_4864x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3666.955 [pixel] 8.600 [mm]	2432.001 [pixel] 5.704 [mm]	1823.999 [pixel] 4.278 [mm]	0.004	-0.017	0.019	-0.000	0.000
Optimized Values	1123.818 [pixel] 2.636 [mm]	2475.382 [pixel] 5.805 [mm]	1802.049 [pixel] 4.226 [mm]	0.000	-0.000	0.000	0.000	0.001
Uncertainties (Sigma)	0.203 [pixel] 0.000 [mm]	0.059 [pixel] 0.000 [mm]	0.051 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



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 see the average direction and magnitude of the re-projection error for each pixel. Note that the vectors are scaled for better visualization.

2D Keypoints Table

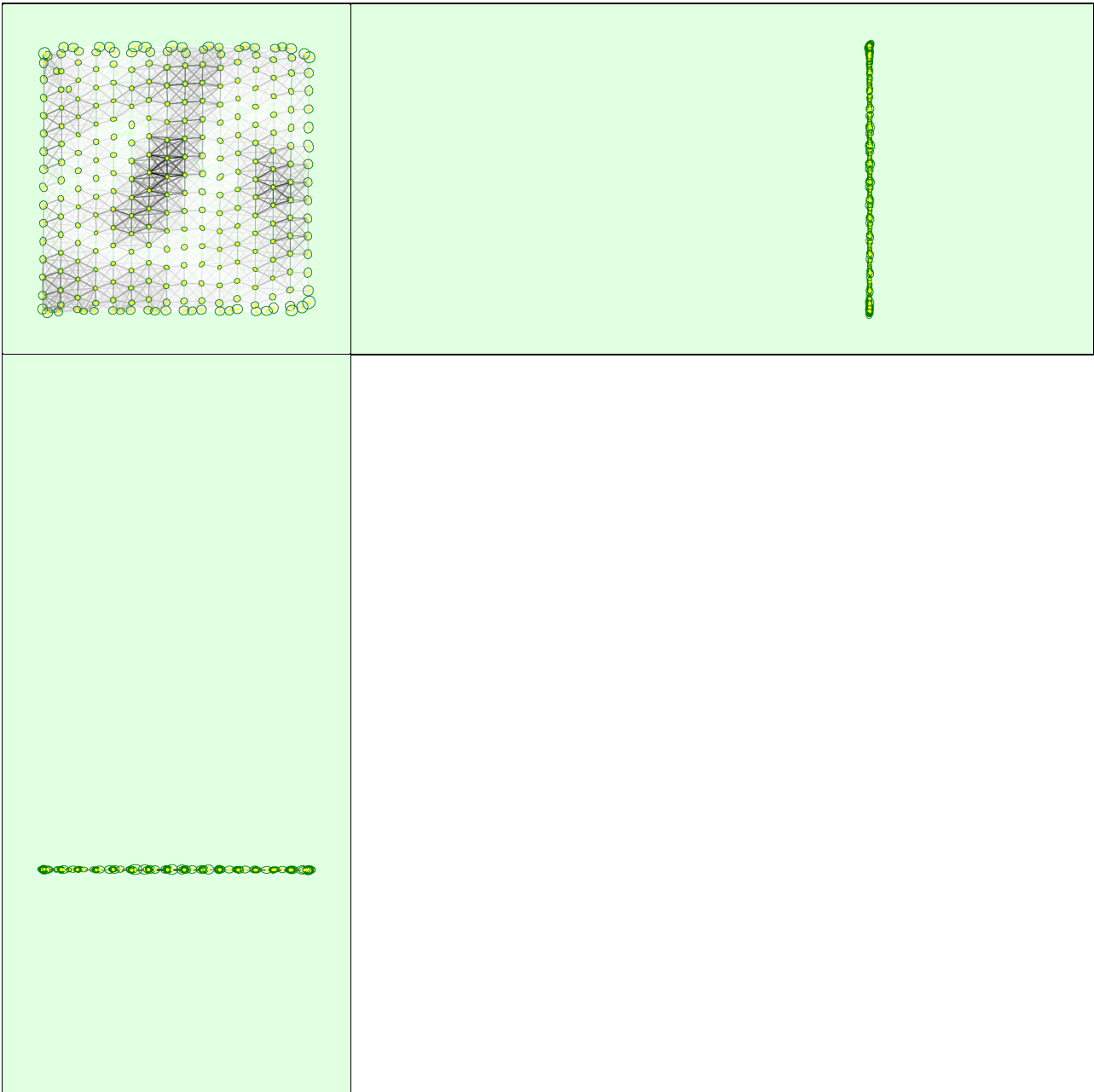
	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	3981	1073
Min	2735	447
Max	5501	1969
Mean	4015	1134

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	91812
In 3 Images	16947
In 4 Images	6479
In 5 Images	3288
In 6 Images	1908
In 7 Images	1347
In 8 Images	849
In 9 Images	593
In 10 Images	375
In 11 Images	261
In 12 Images	109
In 13 Images	33

In 14 Images	21
In 15 Images	10

? 2D Keypoint Matches



Uncertainty ellipses 100x magnified

Number of matches

25	81	163	244	326	407	489	570	652	734
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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 [ft]	Y [ft]	Z [ft]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.108	0.106	0.085	0.058	0.049	0.048
Sigma	0.033	0.030	0.025	0.014	0.016	0.020

Geolocation Details



Ground Control Points



GCP Name	Accuracy XY/Z [ft]	Error X [ft]	Error Y [ft]	Error Z [ft]	Projection Error [pixel]	Verified/Marked
AT01 (3D)	0.020/ 0.020	0.099	0.004	0.009	1.001	8 / 8
AT02 (3D)	0.020/ 0.020	0.060	0.039	0.012	0.917	10 / 10
AT03 (3D)	0.020/ 0.020	0.001	0.026	-0.019	1.294	7 / 7
AT04 (3D)	0.020/ 0.020	-0.013	-0.035	0.007	1.208	9 / 9
AT05 (3D)	0.020/ 0.020	0.026	-0.016	0.008	1.033	11 / 11
AT06 (3D)	0.020/ 0.020	0.022	-0.116	-0.016	0.586	9 / 9
AT07 (3D)	0.020/ 0.020	0.041	0.002	0.001	0.723	12 / 12
AT09 (3D)	0.020/ 0.020	-0.050	0.150	-0.029	0.782	9 / 9
AT10 (3D)	0.020/ 0.020	-0.054	0.109	-0.005	0.787	12 / 12
AT11 (3D)	0.020/ 0.020	-0.046	0.022	0.012	1.473	10 / 10
AT12 (3D)	0.020/ 0.020	-0.153	-0.046	0.003	1.426	5 / 5
AT13 (3D)	0.020/ 0.020	0.023	0.034	0.004	0.382	7 / 7
AT14 (3D)	0.020/ 0.020	0.037	-0.115	-0.022	0.661	8 / 8
AT16 (3D)	0.020/ 0.020	0.018	-0.052	-0.011	1.012	7 / 7
AT17 (3D)	0.020/ 0.020	-0.072	-0.037	-0.002	1.121	10 / 10
Mean [ft]		-0.004063	-0.002055	-0.003015		
Sigma [ft]		0.060259	0.069438	0.012716		
RMS Error [ft]		0.060396	0.069468	0.013069		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of calibrated images where the GCP has been automatically verified vs. manually marked.

Absolute Geolocation Variance



Min Error [ft]	Max Error [ft]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-15.00	0.00	0.00	0.00
-15.00	-12.00	0.00	0.00	0.00
-12.00	-9.00	0.00	3.20	0.00
-9.00	-6.00	0.36	13.88	0.00
-6.00	-3.00	8.19	19.93	0.00
-3.00	0.00	45.20	11.74	50.18
0.00	3.00	40.21	10.68	49.82
3.00	6.00	6.05	24.56	0.00
6.00	9.00	0.00	14.23	0.00
9.00	12.00	0.00	1.78	0.00
12.00	15.00	0.00	0.00	0.00
15.00	-	0.00	0.00	0.00
Mean [ft]		2.701688	8.269117	956.687775
Sigma [ft]		1.960507	5.500106	1.029832
RMS Error [ft]		3.338069	9.931236	956.688329

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.

Geolocation Bias	X	Y	Z
Translation [ft]	2.701688	8.269117	956.687775

Bias between image initial and computed geolocation given in output coordinate system.



Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	98.22	50.53	100.00
[-2.00, 2.00]	100.00	98.58	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [ft]	5.000000	5.000000	10.000000
Sigma of Geolocation Accuracy [ft]	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	0.385
Phi	0.302
Kappa	9.413

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) i5-6300U CPU @ 2.40GHz RAM: 8GB GPU: Intel(R) HD Graphics 520 (Driver: 20.19.15.4463)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems



Image Coordinate System	WGS84 (egm96)
Ground Control Point (GCP) Coordinate System	NAD_1983_StatePlane_Arizona_Central_FIPS_0202_Feet (egm96)
Output Coordinate System	NAD_1983_StatePlane_Arizona_Central_FIPS_0202_Feet (egm96)

Processing Options



Detected Template	CooperAerial*
Keypoints Image Scale	Rapid, 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 Bundle Adjustment: Classic