Quality Report



Generated with Pix4Dmapper Pro version 4.2.27



Important: Click on the different icons for:

- Plelp 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	stan_3k_3_x3
Processed	2018-06-10 21:28:05
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.56 cm / 2.19 in
Area Covered	0.709 km ² / 70.8768 ha / 0.27 sq. mi. / 175.2311 acres
Time for Initial Processing (without report)	02h:10m:28s

Quality Check



? Images	median of 12754 keypoints per image	②
② Dataset	1945 out of 1950 images calibrated (99%), all images enabled	O
? Camera Optimization	2.07% relative difference between initial and optimized internal camera parameters	②
Matching	median of 1317.87 matches per calibrated image	②
@ Georeferencing	yes, no 3D GCP	Δ





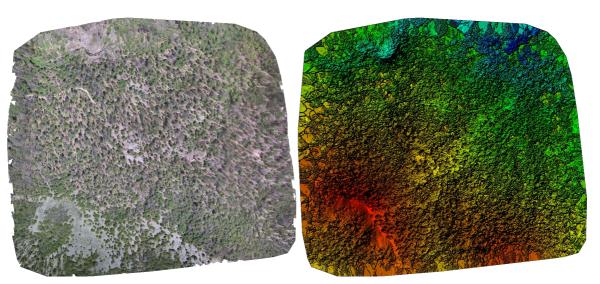


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



1

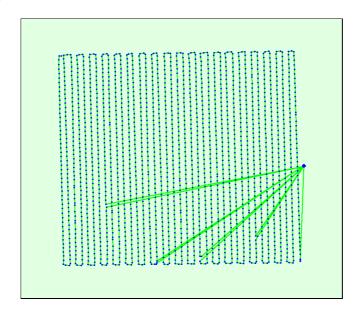


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

? Computed Image/GCPs/Manual Tie Points Positions

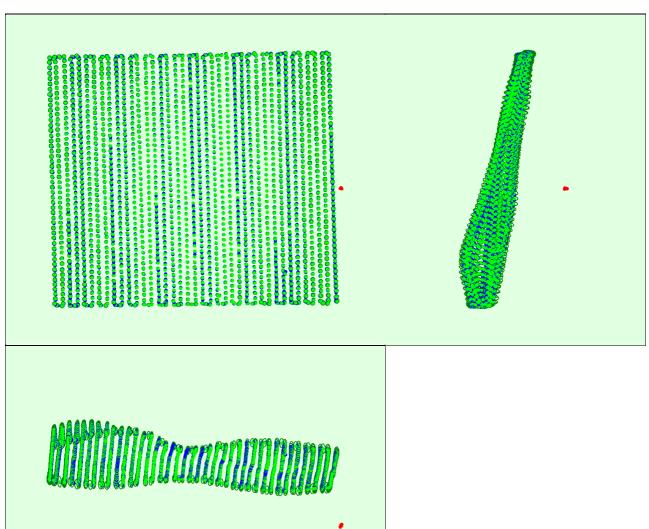


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled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

Absolute camera position and orientation uncertainties

1

	X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.073	0.074	0.158	0.034	0.032	0.012
Sigma	0.011	0.011	0.032	0.002	0.003	0.000





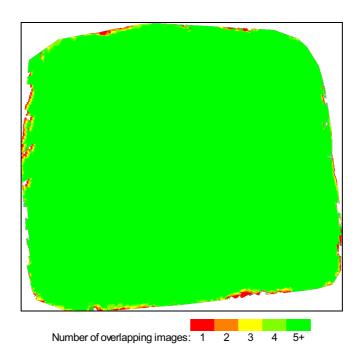


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.

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

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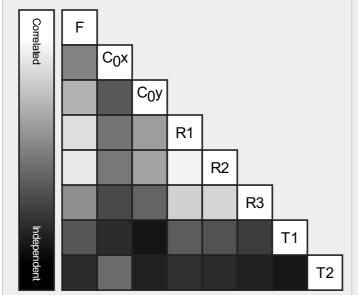
Number of 2D Keypoint Observations for Bundle Block Adjustment	2928513
Number of 3D Points for Bundle Block Adjustment	940829
Mean Reprojection Error [pixels]	0.136

Internal Camera Parameters

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EXIF ID: FC350_3.6_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2285.722 [pixel] 3.610 [mm]	2000.006 [pixel] 3.159 [mm]	1500.003 [pixel] 2.369 [mm]	-0.130	0.106	-0.016	-0.000	0.000
Optimized Values	2333.107 [pixel] 3.685 [mm]	1985.545 [pixel] 3.136 [mm]	1503.129 [pixel] 2.374 [mm]	-0.130	0.114	-0.015	0.001	0.000
Uncertainties (Sigma)	1.771 [pixel] 0.003 [mm]	0.041 [pixel] 0.000 [mm]	0.045 [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 reprojection 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

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	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	12754	1318
Min	11553	643
Max	13685	5349
Mean	12726	1506

3D Points from 2D Keypoint Matches

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	Number of 3D Points Observed
In 2 Images	612635
In 3 Images	154532
In 4 Images	64419
In 5 Images	33617
In 6 Images	20049
In 7 Images	12909
In 8 Images	9004
In 9 Images	6540
In 10 Images	4865
In 11 Images	3534
In 12 Images	2877
In 13 Images	2295
In 14 Images	1822
In 15 Images	1552
In 16 Images	1191
In 17 Images	1074
In 18 Images	850
In 19 Images	790
In 20 Images	627
In 21 Images	510
In 22 Images	456

In 23 Images	449
In 24 Images	369
In 25 Images	311
In 26 Images	299
In 27 Images	250
In 28 Images	222
	207
In 29 Images	
In 30 Images	211
In 31 Images	159
In 32 Images	167
In 33 Images	140
In 34 Images	132
In 35 Images	123
In 36 Images	111
In 37 Images	90
In 38 Images	92
In 39 Images	70
In 40 Images	68
In 41 Images	76
In 42 Images	73
In 43 Images	72
In 44 Images	46
In 45 Images	45
In 46 Images	46
In 47 Images	44
In 48 Images	37
In 49 Images	47
In 50 Images	41
In 51 Images	39
In 52 Images	33
In 53 Images	36
In 54 Images	27
In 55 Images	19
In 56 Images	24
In 57 Images	30
In 58 Images	30
In 59 Images	20
In 60 Images	18
In 61 Images	20
In 62 Images	22
In 63 Images	14
In 64 Images	16
In 65 Images	19
In 66 Images	19
In 67 Images	15
In 68 Images	19
In 69 Images	14
In 70 Images	13
In 71 Images	15
In 72 Images	13
In 73 Images	12
In 74 Images	11
In 75 Images	9
In 76 Images	8
	7
In 77 Images	
In 78 Images	5
In 79 Images	9
In 80 Images	10
In 81 Images	6

In 82 Images	9
In 83 Images	11
In 84 Images	10
In 85 Images	9
In 86 Images	8
In 87 Images	6
In 88 Images	4
In 89 Images	6
In 90 Images	1
In 91 Images	3
In 92 Images	1
In 93 Images	4
In 94 Images	3
In 95 Images	4
In 96 Images	2
In 97 Images	3
In 98 Images	1
In 99 Images	1
In 100 Images	1
In 101 Images	1
In 102 Images	3
In 103 Images	2
In 104 Images	2
In 106 Images	2
In 107 Images	1
In 108 Images	2
In 110 Images	3
In 112 Images	1
In 113 Images	2
In 114 Images	2
In 115 Images	1
In 116 Images	1
In 118 Images	2
In 119 Images	1
In 120 Images	3
In 121 Images	1
In 122 Images	2
In 123 Images	1
In 124 Images	1
In 125 Images	2
In 126 Images	2
In 130 Images	1
In 131 Images	1
In 134 Images	1
In 136 Images	2
In 141 Images	1
In 168 Images	1
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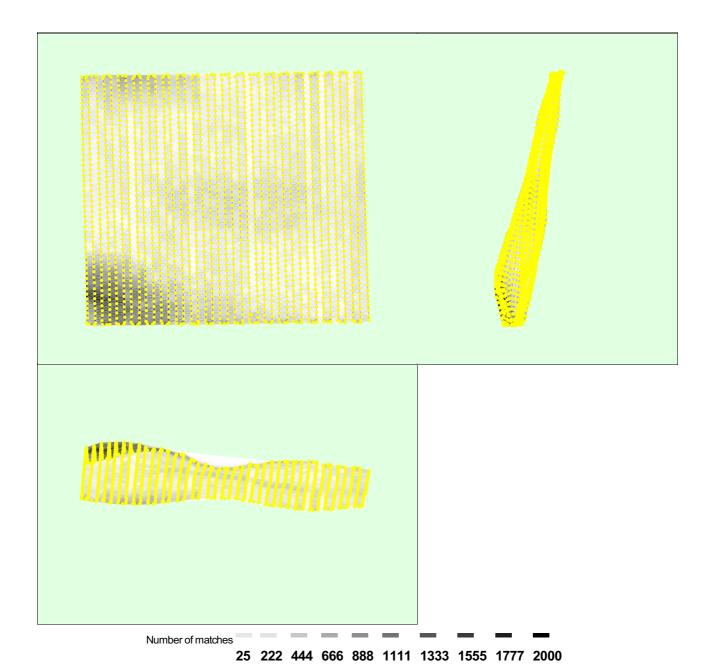


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details

Geolocation Error X[%]

0.00

Absolute Geolocation Variance

Max Error [m]

15.00

Min Error [m]

12.00

-15.00 0.00 0.00 0.00 -15.00 -12.00 0.00 0.00 0.00 -12.00 -9.00 0.00 0.00 0.00 -9.00 -6.00 0.00 0.00 0.00 0.00 -6.00 -3.00 14.45 0.10 -3.00 0.00 56.30 32.24 53.01 0.00 3.00 43.19 41.18 46.74 0.51 3.00 6.00 12.13 0.15 6.00 9.00 0.00 0.00 0.00 9.00 12.00 0.00 0.00 0.00

0.00

Geolocation Error Y [%]

Geolocation Error Z [%]

0.00

15.00	-	0.00	0.00	0.00
Mean [m]		-0.000000	-0.000000	0.000000
Sigma [m]		0.631540	2.380021	0.926700
RMS Error [m]		0.631540	2.380021	0.926700

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	98.56	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]	5.000000	5.000000	10.000000
Sigma of Geolocation Accuracy [m]	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	0.596
Phi	0.682
Карра	4.652

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

Initial Processing Details



System Information

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Hardware	CPU: Intel(R) Core(TM) i7-8700K CPU @ 3.70GHz RAW 64GB GPU: NVIDIA GeForce GTX 1080 Ti (Driver: 23.21.13.8795), Intel(R) UHD Graphics 630 (Driver: 22.20.16.4758)
Operating System	Windows 10 Education, 64-bit

Coordinate Systems



Image Coordinate System	WGS84 (egm96)
Output Coordinate System	WGS 84 / UTMzone 10N (egm96)

Processing Options



Detected Template	
Keypoints Image Scale	Custom, Image Scale: 0.5
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, no

Point Cloud Densification details



Processing Options

Image Scale	multiscale, 1/2 (Half image size, Default)
Point Density	Optimal
Minimum 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	07h:51m:51s
Time for Point Cloud Classification	NA

Results

Time for 3D Textured Mesh Generation

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Number of Generated Tiles	4
Number of 3D Densified Points	74376876
Average Density (per m ³)	22.16

34m:46s

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	1 x GSD (5.56 [cm/pixel])
DSMFilters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Triangulation Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	05m:13s
Time for Orthomosaic Generation	09h:49m:32s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s