Quality Report

Generated with Pix4Dmapper Pro version 4.2.26

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	stan_3k_1_x3
Processed	2018-05-23 18:21:18
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	4.91 cm / 1.93 in
Area Covered	0.660 km^2 / 65.9684 ha / 0.25 sq. mi. / 163.0959 acres
Time for Initial Processing (without report)	05h:23m:54s

Quality Check

Images	median of 12340 keypoints per image	✓
Dataset	2056 out of 2070 images calibrated (99%), all images enabled	✓
Camera Optimization	4.76% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1471.79 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

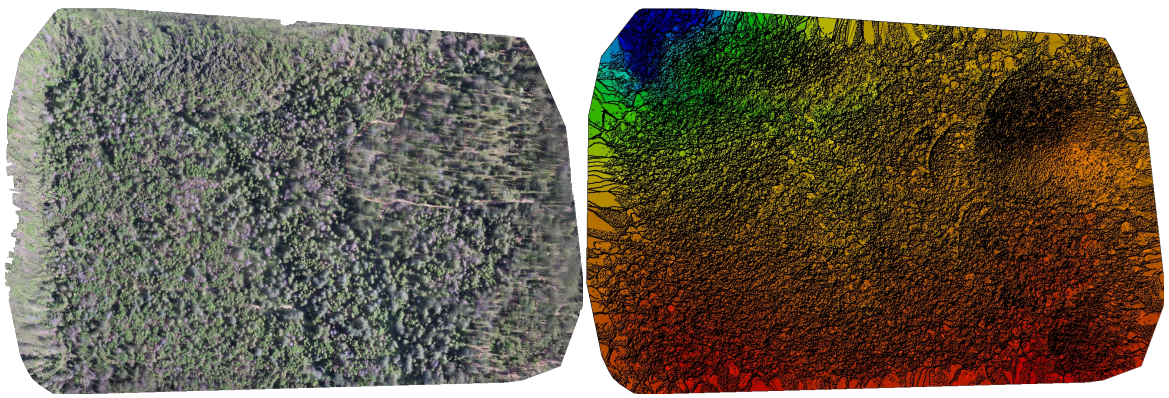


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	2056 out of 2070
Number of Geolocated Images	2070 out of 2070

Initial Image Positions

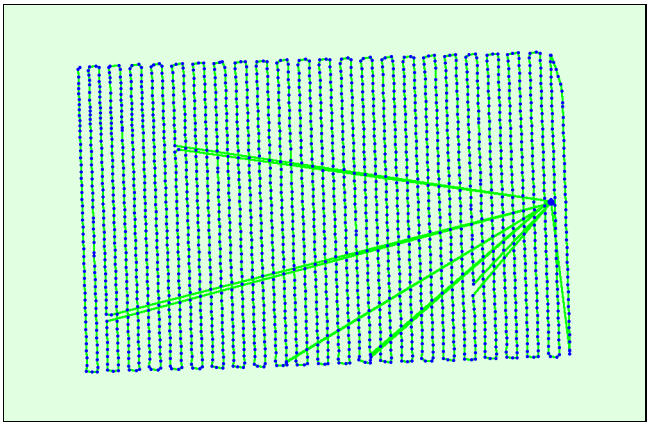
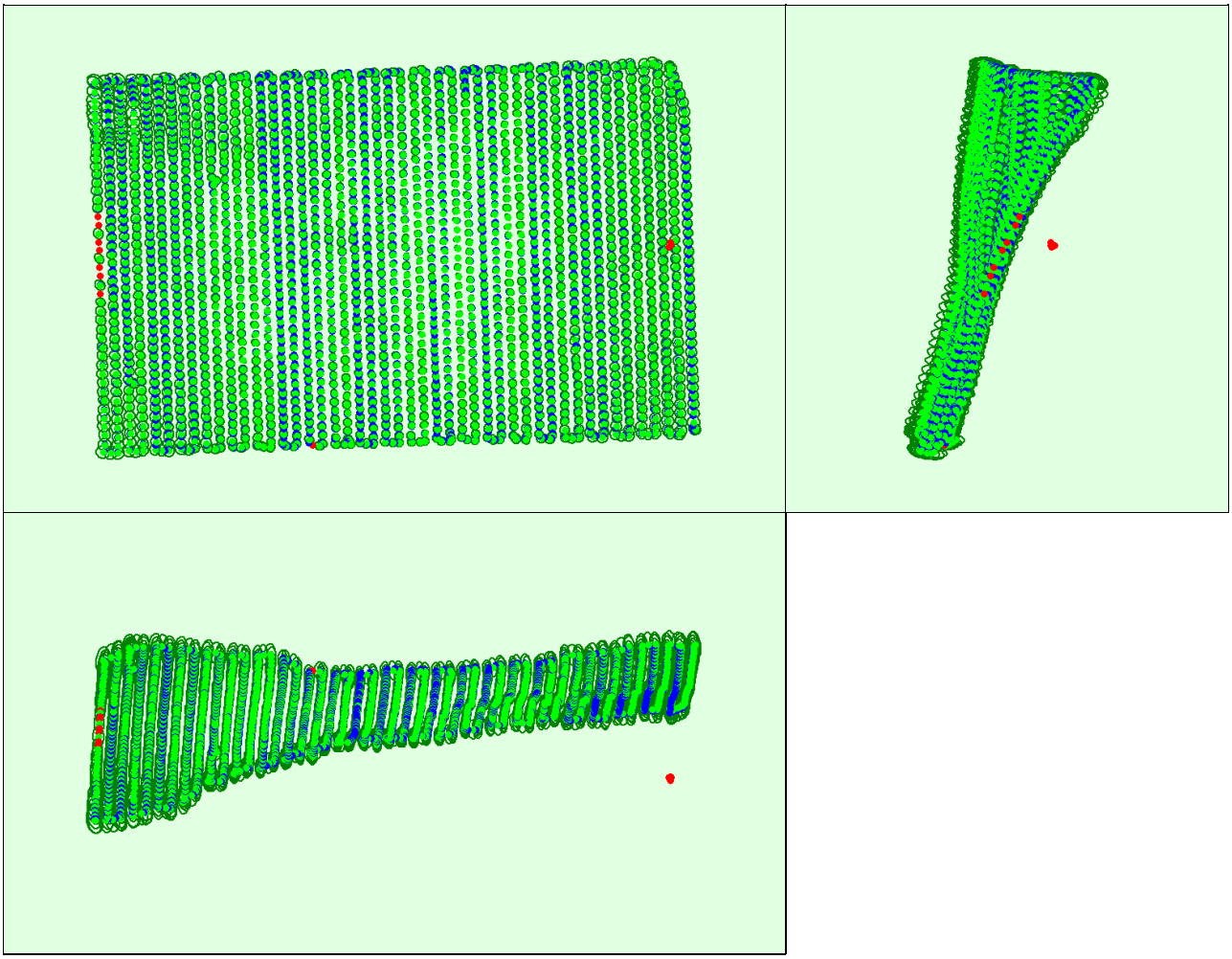


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 50x 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	0.113	0.116	0.229	0.057	0.049	0.019
Sigma	0.021	0.020	0.046	0.005	0.008	0.002

Overlap

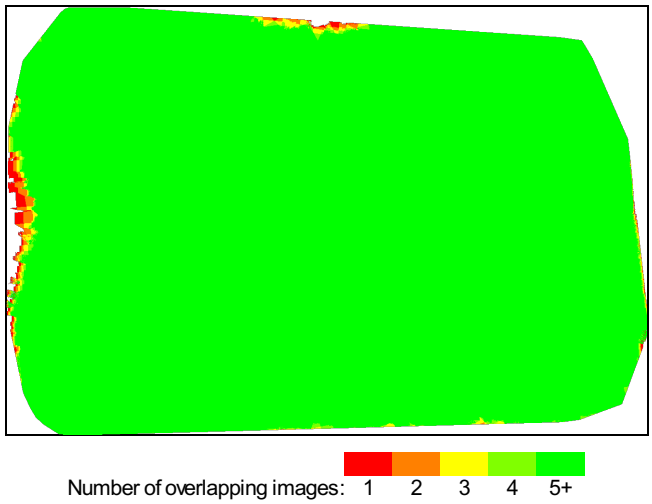


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).**

Bundle Block Adjustment Details

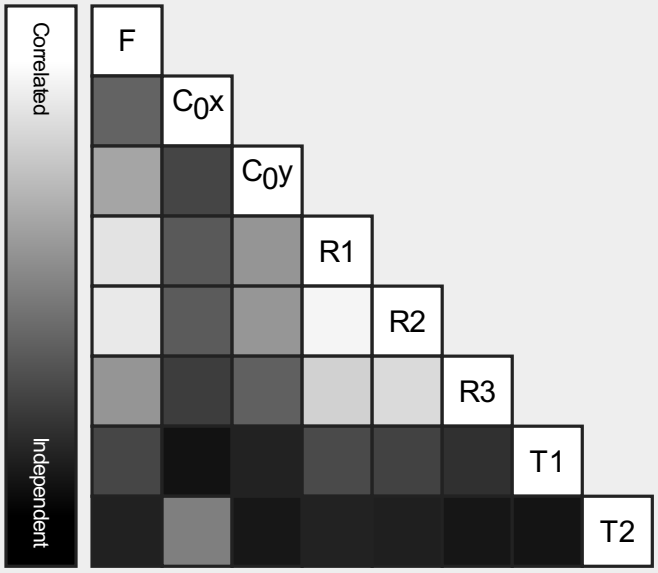
Number of 2D Keypoint Observations for Bundle Block Adjustment	3034768
Number of 3D Points for Bundle Block Adjustment	1149269
Mean Reprojection Error [pixels]	0.166

Internal Camera Parameters

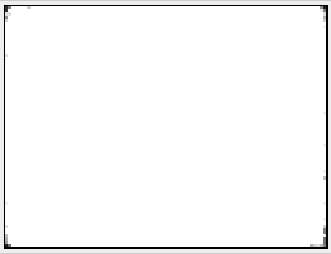
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2394.626 [pixel] 3.782 [mm]	1985.001 [pixel] 3.135 [mm]	1501.787 [pixel] 2.372 [mm]	-0.137	0.128	-0.019	0.001	0.000
Uncertainties (Sigma)	3.282 [pixel] 0.005 [mm]	0.073 [pixel] 0.000 [mm]	0.084 [pixel] 0.000 [mm]	0.000	0.001	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

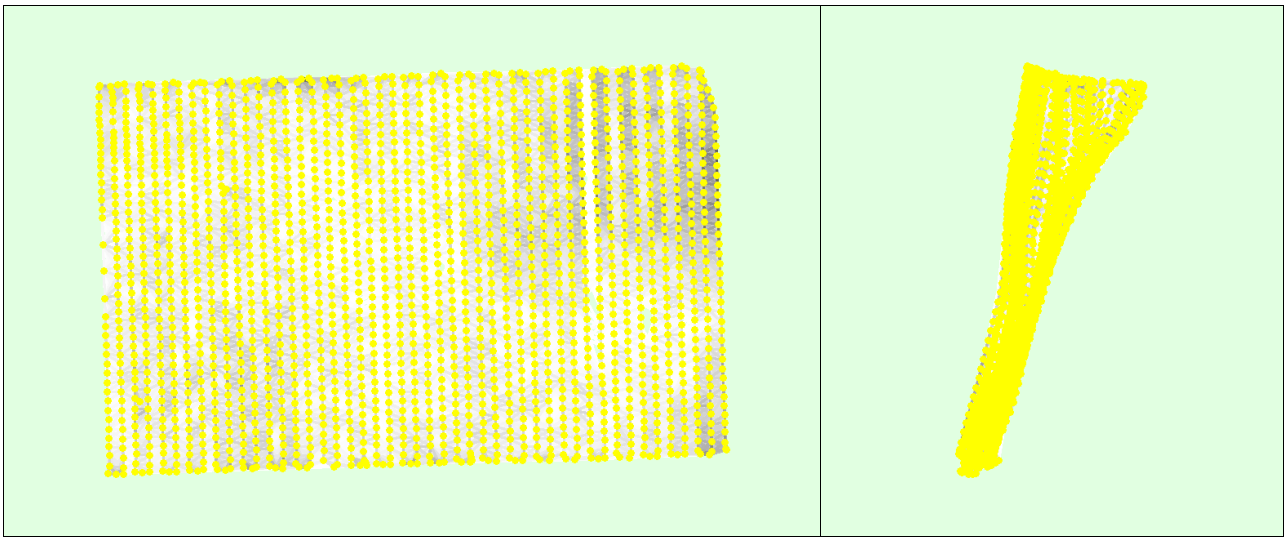
	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	12340	1472
Min	11434	462
Max	15019	3515
Mean	12366	1476

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	827882
In 3 Images	175917
In 4 Images	64337
In 5 Images	30761
In 6 Images	16609
In 7 Images	10072
In 8 Images	6472
In 9 Images	4314
In 10 Images	3139
In 11 Images	2237
In 12 Images	1585
In 13 Images	1197
In 14 Images	949
In 15 Images	744
In 16 Images	552
In 17 Images	409
In 18 Images	353
In 19 Images	297
In 20 Images	239
In 21 Images	189
In 22 Images	170

In 23 Images	121
In 24 Images	114
In 25 Images	93
In 26 Images	82
In 27 Images	64
In 28 Images	56
In 29 Images	48
In 30 Images	49
In 31 Images	40
In 32 Images	29
In 33 Images	19
In 34 Images	17
In 35 Images	18
In 36 Images	17
In 37 Images	16
In 38 Images	8
In 39 Images	6
In 40 Images	7
In 41 Images	9
In 42 Images	3
In 43 Images	4
In 44 Images	4
In 45 Images	3
In 46 Images	3
In 47 Images	1
In 48 Images	2
In 49 Images	4
In 50 Images	1
In 51 Images	3
In 54 Images	1
In 57 Images	1
In 58 Images	1
In 59 Images	1

2D Keypoint Matches



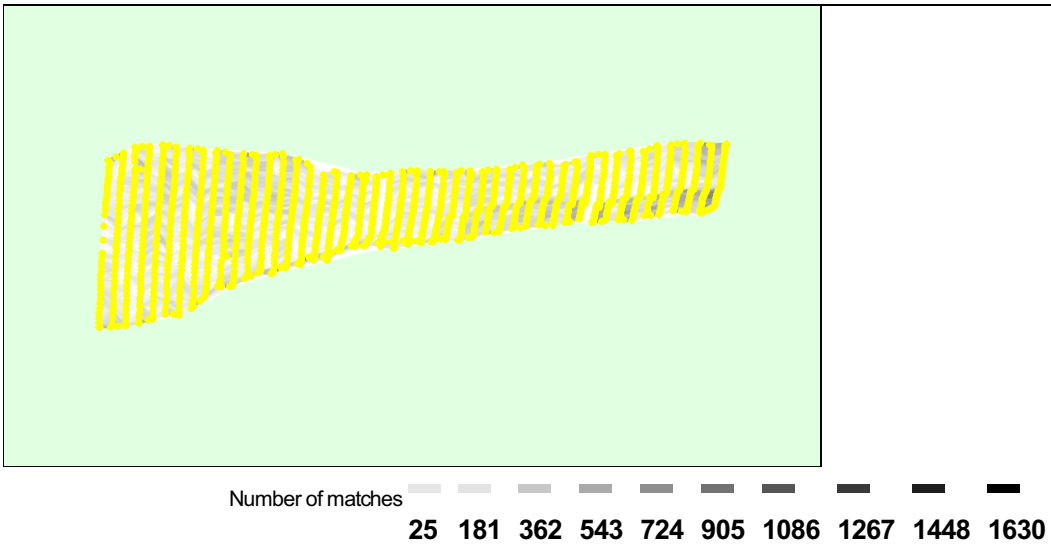


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details

Absolute Geolocation Variance

Min 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	0.00	0.00	0.00
-12.00	-9.00	0.00	0.00	0.00
-9.00	-6.00	0.00	0.00	0.00
-6.00	-3.00	0.00	14.98	1.36
-3.00	0.00	51.99	36.77	45.04
0.00	3.00	47.18	35.21	52.24
3.00	6.00	0.83	12.94	1.36
6.00	9.00	0.00	0.10	0.00
9.00	12.00	0.00	0.00	0.00
12.00	15.00	0.00	0.00	0.00
15.00	-	0.00	0.00	0.00
Mean [m]		-0.000055	0.000065	-0.001237
Sigma [m]		0.658919	2.377377	1.331679
RMS Error [m]		0.658919	2.377377	1.331679

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]	99.95	99.22	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	0.654
Phi	0.743
Kappa	4.546

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) i7-4770 CPU @ 3.40GHz RAM: 32GB GPU: NVIDIA GeForce GTX 645 (Driver: 9.18.13.3182), RDPDD Chained DD (Driver: unknown), RDP Encoder Mirror Driver (Driver: unknown), RDP Reflector Display Driver (Driver: unknown)
Operating System	Windows 7 Enterprise, 64-bit

Coordinate Systems

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

Processing Options

Detected Template	Local structure outbreak intensity RGB*
Keypoints Image Scale	Custom, Image Scale: 0.5
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: Alternative Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, no

Point Cloud Densification details

Processing Options

Image Scale	multiscale, 1/4 (Quarter image size, Fast)
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	09h:40m:24s
Time for Point Cloud Classification	12m:49s
Time for 3D Textured Mesh Generation	03h:27m:58s

Results

Number of Generated Tiles	1
Number of 3D Densified Points	22821096
Average Density (per m^3)	9.7

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (4.91 [cm/pixel])
DSM Filters	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
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	5 x GSD (4.91 [cm/pixel])
Time for DSM Generation	01h:19m:56s
Time for Orthomosaic Generation	4d:14h:48m:08s
Time for DTM Generation	47m:30s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s