Quality Report



Generated with Pix4Dmapper Pro version 4.2.26



Important: Click on the different icons for:

- Pelp 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	sierra_4000_1_rgb
Processed	2018-04-18 23:43:33
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.34 cm / 2.10 in
Area Covered	0.700 km ² / 69.9576 ha / 0.27 sq. mi. / 172.9586 acres
Time for Initial Processing (without report)	01h:40m:46s

Quality Check



? Images	median of 11581 keypoints per image	②
② Dataset	1311 out of 1317 images calibrated (99%), all images enabled	O
? Camera Optimization	2.27% relative difference between initial and optimized internal camera parameters	②
Matching	median of 1657.66 matches per calibrated image	②
@ Georeferencing	yes, no 3D GCP	<u> </u>





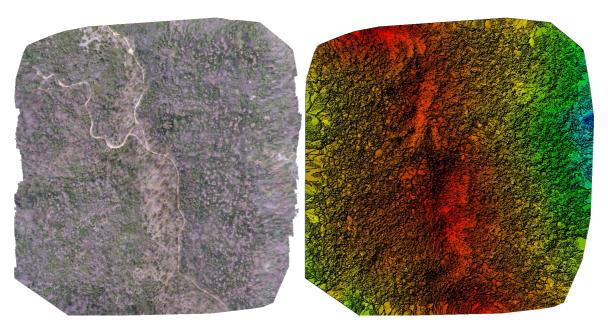


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1311 out of 1317
Number of Geolocated Images	1317 out of 1317

Initial Image Positions



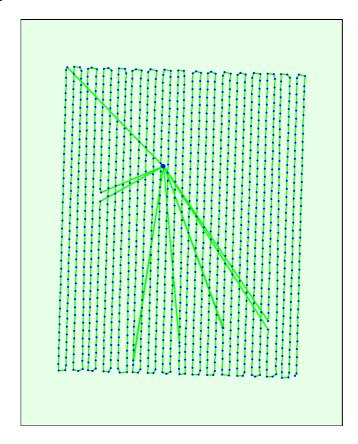
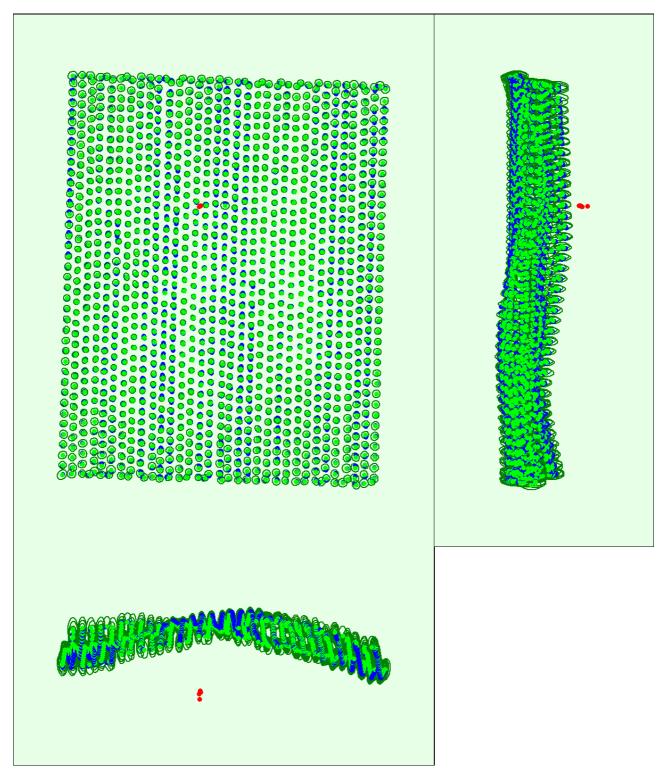


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions

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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	0.112	0.114	0.245	0.049	0.054	0.018
Sigma	0.016	0.016	0.050	0.005	0.003	0.001

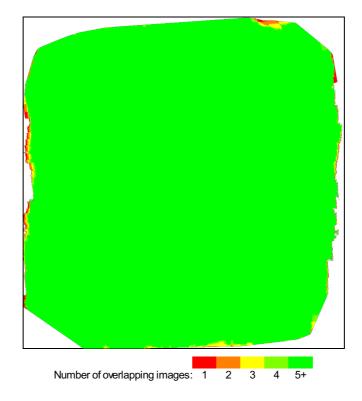


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.

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			
Number of 3D Points for Bundle Block Adjustment	812374		
Mean Reprojection Error [pixels]	0.160		

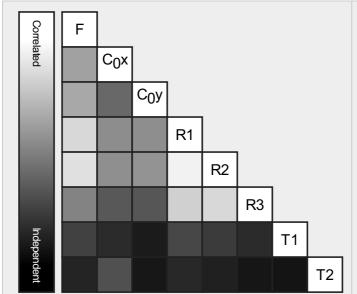
Internal Camera Parameters

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

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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	2337.762 [pixel] 3.692 [mm]	1984.972 [pixel] 3.135 [mm]	1502.609 [pixel] 2.373 [mm]	-0.131	0.117	-0.016	0.001	0.000
Uncertainties (Sigma)	2.382 [pixel] 0.004 [mm]	0.075 [pixel] 0.000 [mm]	0.075 [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 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	11581	1658
Min	10641	260
Max	14524	3388
Mean	11637	1721

3D Points from 2D Keypoint Matches

1

	Number of 3D Points Observed
In 2 Images	556802
In 3 Images	132315
In 4 Images	52321
In 5 Images	25784
In 6 Images	14448
In 7 Images	8825
In 8 Images	5679
In 9 Images	3960
In 10 Images	2732
In 11 Images	1937
In 12 Images	1540
In 13 Images	1147
In 14 Images	898
In 15 Images	680
In 16 Images	538
In 17 Images	478
In 18 Images	347
In 19 Images	275
In 20 Images	225
In 21 Images	208
In 22 Images	172

In 23 Images	133
In 24 Images	135
In 25 Images	101
In 26 Images	89
In 27 Images	77
In 28 Images	60
In 29 Images	74
In 30 Images	44
In 31 Images	57
In 32 Images	34
In 33 Images	31
In 34 Images	32
In 35 Images	22
In 36 Images	20
In 37 Images	11
In 38 Images	12
In 39 Images	14
In 40 Images	8
In 41 Images	16
In 42 Images	11
In 43 Images	10
In 44 Images	9
In 45 Images	5
In 46 Images	10
In 47 Images	6
In 48 Images	6
In 49 Images	4
In 50 Images	5
In 51 Images	5
In 52 Images	2
In 53 Images	2
In 54 Images	4
In 55 Images	1
In 59 Images	3
In 60 Images	3
In 61 Images	2
In 65 Images	1
In 66 Images	1
In 74 Images	1
In 75 Images	1
In 78 Images	1
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2D Keypoint Matches

1

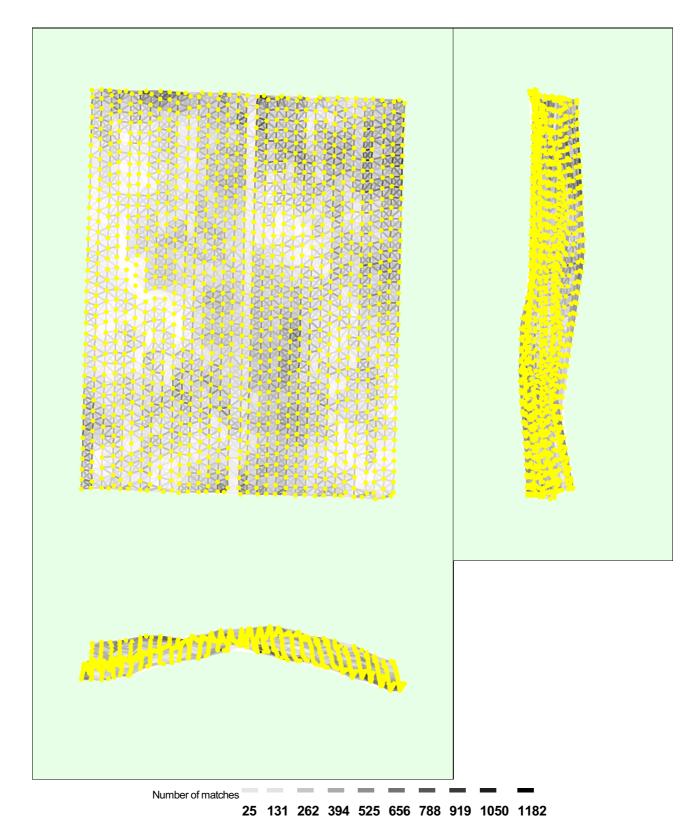


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details 3 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	0.31
-6.00	-3.00	0.53	13.65	12.05
-3.00	0.00	46.68	38.44	32.95
0.00	3.00	52.78	33.87	45.69
3.00	6.00	0.00	14.04	9.00
6.00	9.00	0.00	0.00	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]		-0.002427	-0.001219	0.006143
Sigma [m]		0.550856	2.475733	2.351046
RMS Error [m]		0.550862	2.475733	2.351054

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	97.10	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	0.503
Phi	0.948
Карра	5.162

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: RDPDD Chained DD (Driver: unknown), 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 / UTMzone 11N (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: 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

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Processing Options

(1)

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	01h:50m:33s
Time for Point Cloud Classification	04m:43s
Time for 3D Textured Mesh Generation	18m:18s

Results

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Number of Generated Tiles	1
Number of 3D Densified Points	15268841
Average Density (per m ³)	7.56

DSM, Orthomosaic and Index Details

①

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.34 [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
Raster DTM	Generated: yes Merge Tiles: yes
DTMResolution	5 x GSD (5.34 [cm/pixel])
Time for DSM Generation	03m:46s
Time for Orthomosaic Generation	04h:24m:01s
Time for DTM Generation	07m:43s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s