Quality Report

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	sequoia_4000_2_rgb
Processed	2018-04-23 09:11:57
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.39 cm / 2.12 in
Area Covered	0.682 km^2 / 68.1818 ha / 0.26 sq. mi. / 168.5681 acres
Time for Initial Processing (without report)	50m:10s

Quality Check

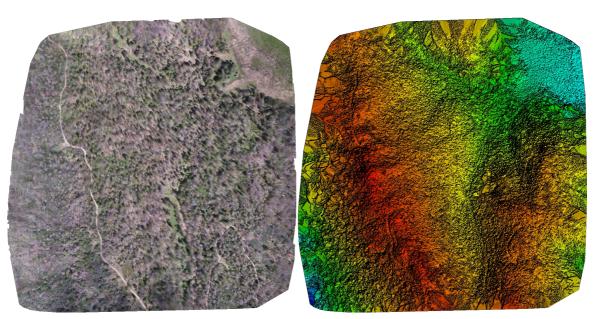|			
Images	median of 11281 keypoints per image		✓
Dataset	1298 out of 1311 images calibrated (99%), all images enabled		✓
Camera Optimization	0.85% relative difference between initial and optimized internal camera parameters		✓
Matching	median of 1396.49 matches per calibrated image		✓
Georeferencing	yes, no 3D GCP		⚠

Preview

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

Calibration Details

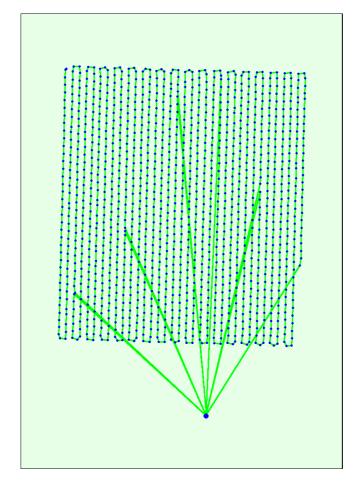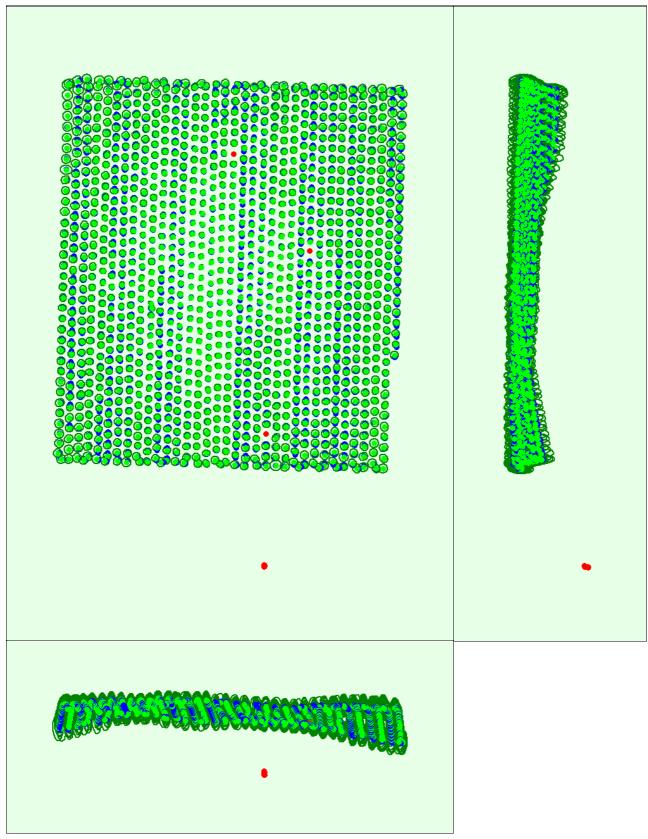| Number of Calibrated Images	1298 out of 1311
Number of Geolocated Images	1311 out of 1311

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	0.120	0.121	0.272	0.060	0.063	0.019
Sigma	0.019	0.019	0.056	0.009	0.008	0.001

? Overlap

Number of overlapping images: 1 2 3 4 5+
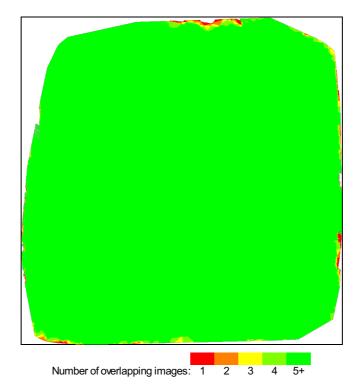
Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good
quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).

Bundle Block Adjustment Details
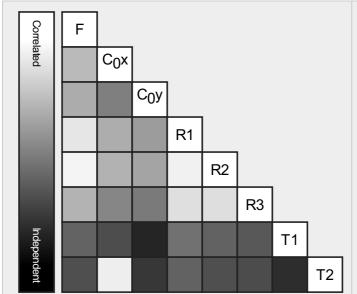
Number of 2D Keypoint Observations for Bundle Block Adjustment	1955105
Number of 3D Points for Bundle Block Adjustment	600830
Mean Reprojection Error [pixels]	0.184

? 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	2305.206 [pixel] 3.641 [mm]	1985.908 [pixel] 3.136 [mm]	1502.008 [pixel] 2.372 [mm]	-0.127	0.110	-0.015	0.001	0.000
Uncertainties (Sigma)	4.004 [pixel] 0.006 [mm]	0.110 [pixel] 0.000 [mm]	0.104 [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 ℹ

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	11281	1396
Min	9944	579
Max	13526	6753
Mean	11297	1506

❓ 3D Points from 2D Keypoint Matches ℹ
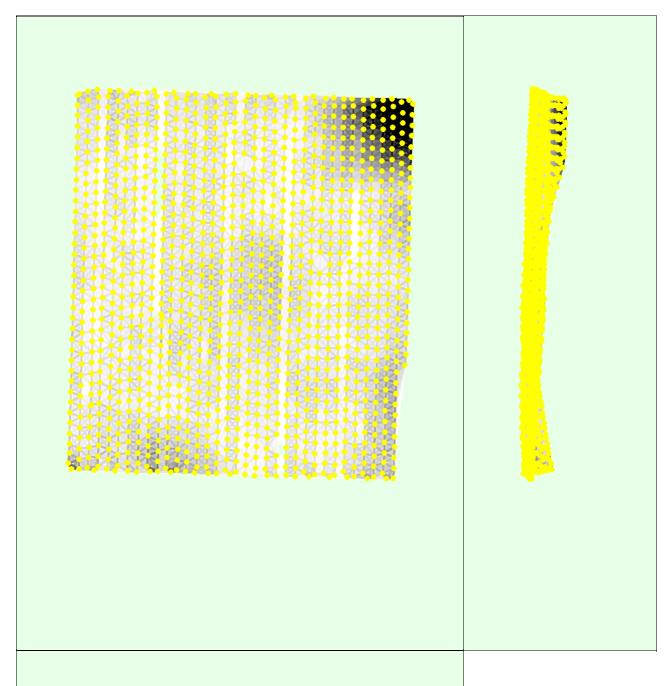
	Number of 3D Points Observed
In 2 Images	375446
In 3 Images	98001
In 4 Images	44307
In 5 Images	24602
In 6 Images	15260
In 7 Images	9986
In 8 Images	6976
In 9 Images	5131
In 10 Images	3680
In 11 Images	2964
In 12 Images	2324
In 13 Images	1808
In 14 Images	1458
In 15 Images	1227
In 16 Images	962
In 17 Images	818
In 18 Images	749
In 19 Images	587
In 20 Images	548
In 21 Images	485
In 22 Images	370
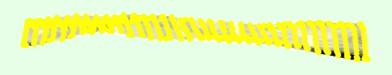
In 23 Images	344
In 24 Images	294
In 25 Images	253
In 26 Images	208
In 27 Images	186
In 28 Images	172
In 29 Images	173
In 30 Images	125
In 31 Images	116
In 32 Images	138
In 33 Images	107
In 34 Images	73
In 35 Images	74
In 36 Images	61
In 37 Images	81
In 38 Images	54
In 39 Images	50
In 40 Images	43
In 41 Images	40
In 42 Images	59
In 43 Images	39
In 44 Images	27
In 45 Images	39
In 46 Images	36
In 47 Images	25
In 48 Images	19
In 49 Images	28
In 50 Images	24
In 51 Images	15
In 52 Images	22
In 53 Images	19
In 54 Images	18
In 55 Images	13
In 56 Images	14
In 57 Images	15
In 58 Images	10
In 59 Images	9
In 60 Images	7
In 61 Images	4
In 62 Images	9
In 63 Images	6
In 64 Images	5
In 65 Images	5
In 66 Images	3
In 67 Images	7
In 68 Images	5
In 69 Images	5
In 70 Images	6
In 71 Images	2
In 72 Images	2
In 73 Images	6
In 74 Images	7
In 75 Images	8
In 76 Images	1
In 77 Images	2
In 78 Images	2
In 79 Images	4
In 80 Images	1
In 81 Images	3

In 82 Images	2
In 83 Images	4
In 84 Images	1
In 85 Images	1
In 86 Images	1
In 88 Images	3
In 90 Images	1
In 91 Images	3
In 94 Images	2

2D Keypoint Matches

Number of matches

25	222	444	666	888	1111	1333	1555	1777	2000

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	13.87	0.46
-3.00	0.00	53.24	38.60	48.15
0.00	3.00	46.07	30.66	51.08
3.00	6.00	0.69	16.72	0.31
6.00	9.00	0.00	0.15	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]		-0.000274	0.000024	-0.000838
Sigma [m]		0.617048	2.648917	0.955437
RMS Error [m]		0.617048	2.648917	0.955437

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]	99.85	97.00	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	0.614
Phi	1.135
Kappa	6.386

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 / UTM zone 11N (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	01h:37m:52s
Time for Point Cloud Classification	04m:33s
Time for 3D Textured Mesh Generation	17m:13s

Results ⓘ

Number of Generated Tiles	1
Number of 3D Densified Points	14263819
Average Density (per m^3)	7.35

DSM, Orthomosaic and Index Details ⓘ

Processing Options ⓘ

DSM and Orthomosaic Resolution	1 x GSD (5.39 [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 (5.39 [cm/pixel])
Time for DSM Generation	03m:23s
Time for Orthomosaic Generation	08h:47m:38s
Time for DTM Generation	06m:52s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s