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	stan_4k_2_x3
Processed	2018-10-02 10:55:31
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.39 cm / 2.12 in
Area Covered	0.668 km^2 / 66.7598 ha / 0.26 sq. mi. / 165.0525 acres
Time for Initial Processing (without report)	36m:24s

Quality Check

Images	median of 12357 keypoints per image	✓
Dataset	1992 out of 1996 images calibrated (99%), all images enabled	✓
Camera Optimization	0.63% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 948.928 matches per calibrated image	⚠
Georeferencing	yes, no 3D GCP	⚠

Preview

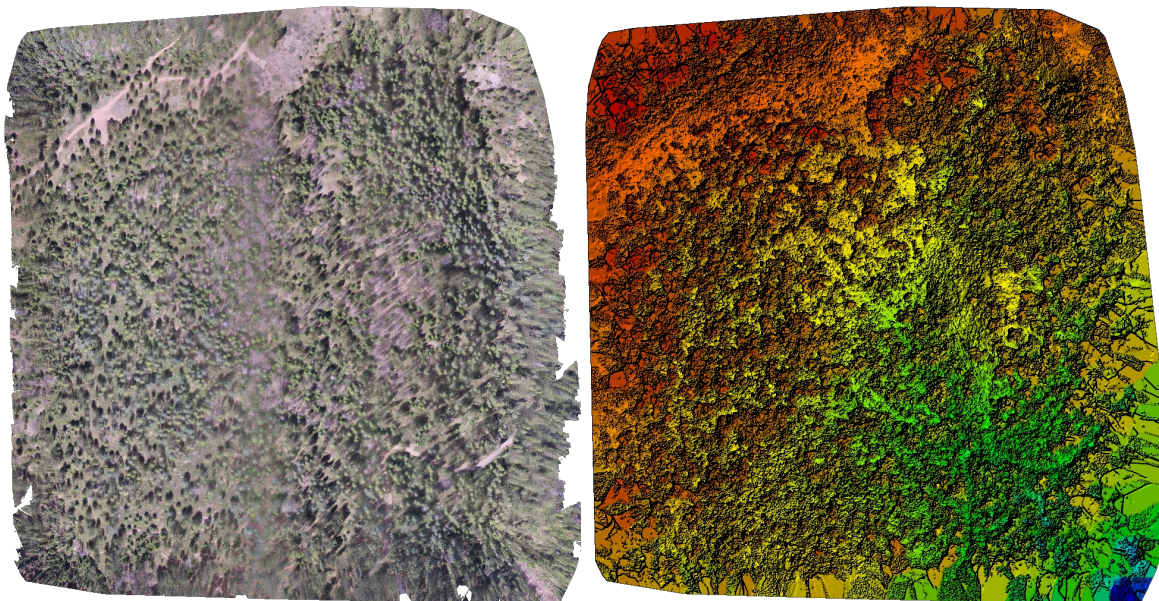**Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.**

Calibration Details

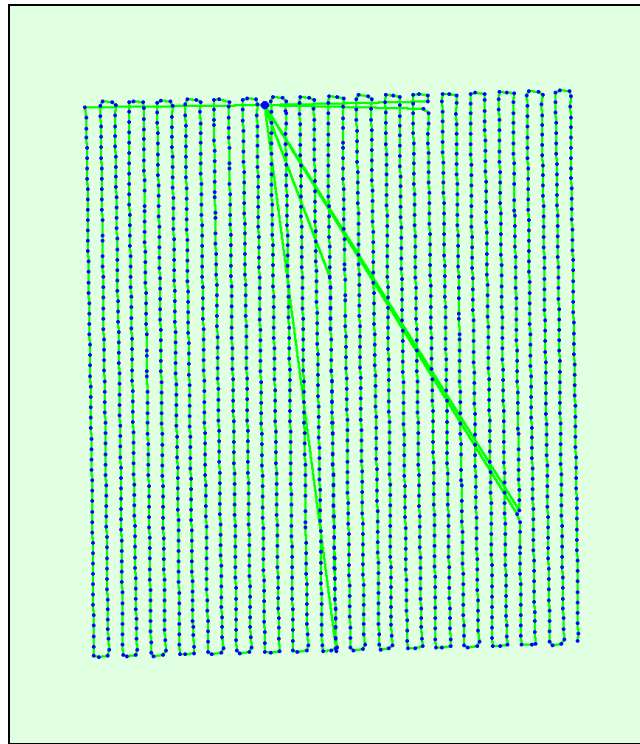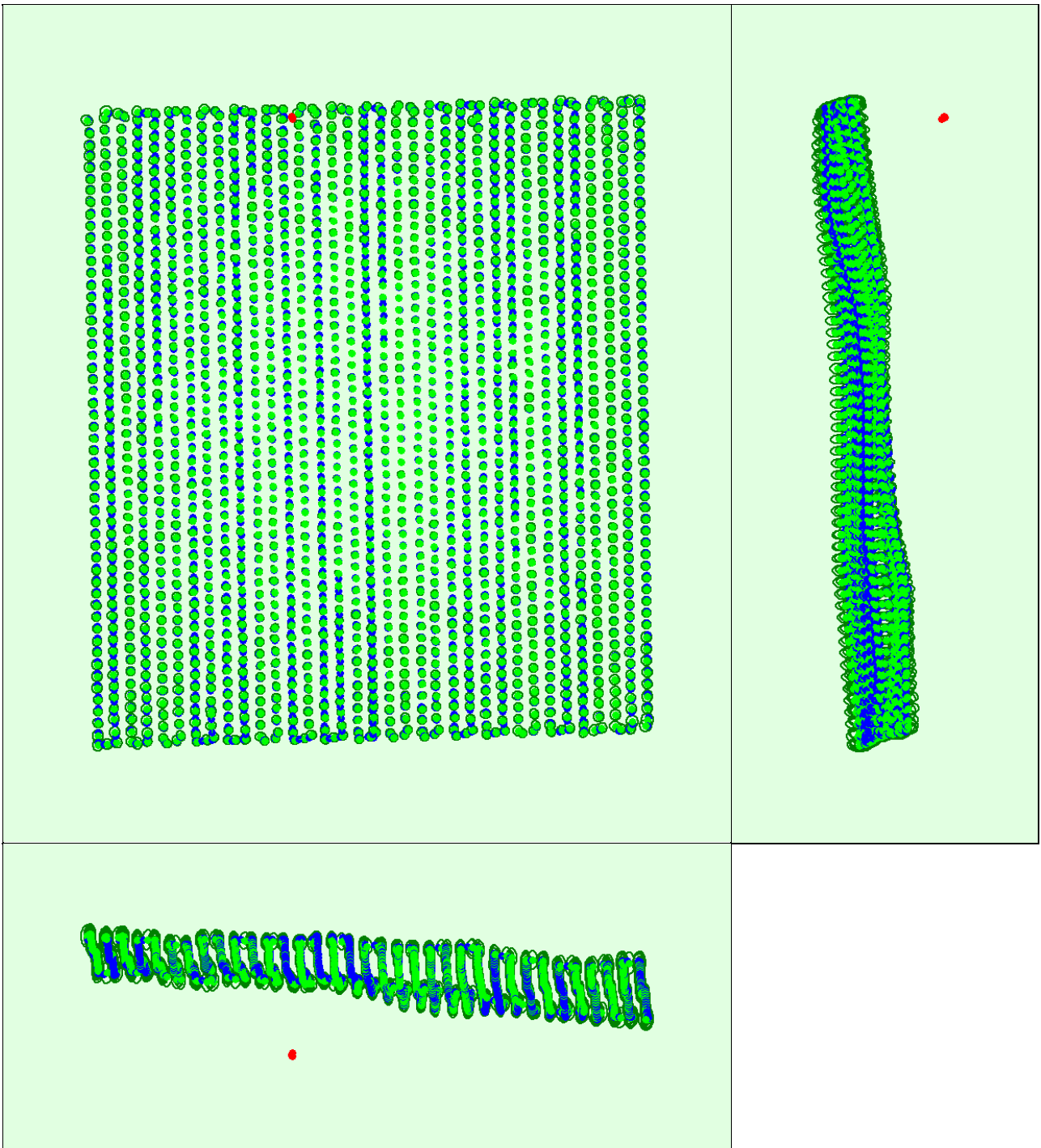|	
Number of Calibrated Images	1992 out of 1996
Number of Geolocated Images	1996 out of 1996

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.

⑦ Absolute camera position and orientation uncertainties ⓘ

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.084	0.085	0.156	0.031	0.031	0.014
Sigma	0.012	0.012	0.025	0.003	0.003	0.001

⑦ Overlap ⓘ
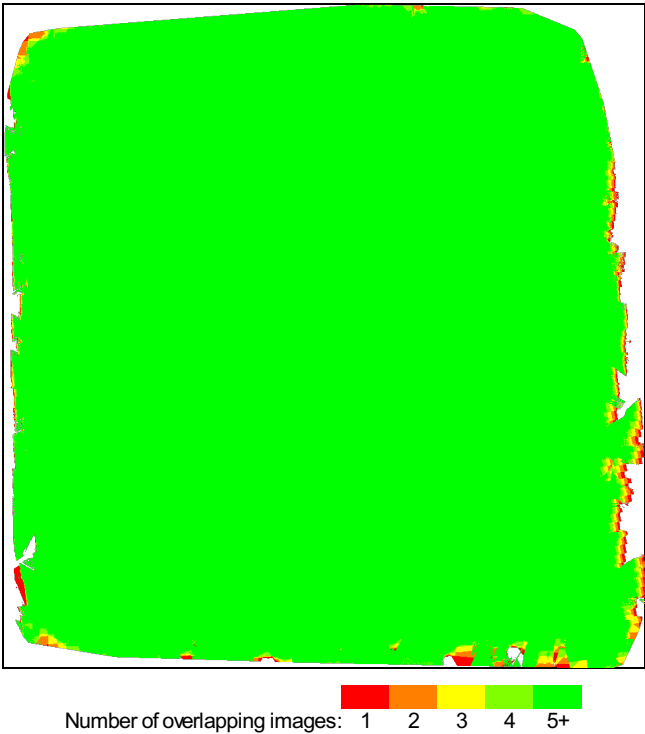
Number of overlapping images: 1 2 3 4 5+

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).
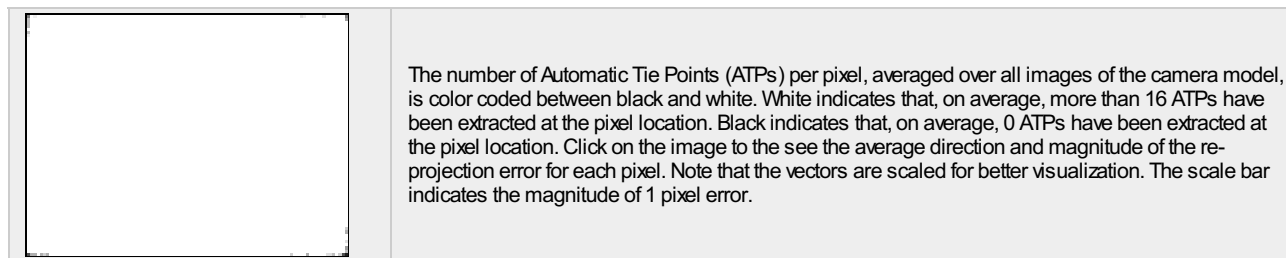
Bundle Block Adjustment Details

Number of 2D Keypoint Observations for Bundle Block Adjustment	2065401
Number of 3D Points for Bundle Block Adjustment	736194
Mean Reprojection Error [pixels]	0.133

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	2300.137 [pixel] 3.633 [mm]	1986.320 [pixel] 3.137 [mm]	1503.787 [pixel] 2.375 [mm]	-0.126	0.108	-0.014	0.001	0.000
Uncertainties (Sigma)	0.516 [pixel] 0.001 [mm]	0.044 [pixel] 0.000 [mm]	0.041 [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 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	12357	949
Min	10530	424
Max	15473	2629
Mean	12408	1037

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	511582
In 3 Images	115814
In 4 Images	44845
In 5 Images	22210
In 6 Images	12700
In 7 Images	7744
In 8 Images	5202
In 9 Images	3564
In 10 Images	2582
In 11 Images	1834
In 12 Images	1438
In 13 Images	1123
In 14 Images	825
In 15 Images	694
In 16 Images	550
In 17 Images	443
In 18 Images	383
In 19 Images	310
In 20 Images	253
In 21 Images	214
In 22 Images	200

In 23 Images	179
In 24 Images	150
In 25 Images	120
In 26 Images	119
In 27 Images	107
In 28 Images	85
In 29 Images	66
In 30 Images	72
In 31 Images	61
In 32 Images	50
In 33 Images	46
In 34 Images	38
In 35 Images	53
In 36 Images	44
In 37 Images	42
In 38 Images	34
In 39 Images	33
In 40 Images	24
In 41 Images	26
In 42 Images	22
In 43 Images	24
In 44 Images	17
In 45 Images	19
In 46 Images	17
In 47 Images	21
In 48 Images	14
In 49 Images	18
In 50 Images	13
In 51 Images	14
In 52 Images	18
In 53 Images	6
In 54 Images	14
In 55 Images	7
In 56 Images	4
In 57 Images	8
In 58 Images	5
In 59 Images	5
In 60 Images	7
In 61 Images	5
In 62 Images	6
In 63 Images	4
In 64 Images	1
In 65 Images	3
In 66 Images	3
In 67 Images	3
In 68 Images	4
In 69 Images	6
In 70 Images	1
In 71 Images	5
In 72 Images	2
In 73 Images	5
In 74 Images	5
In 75 Images	1
In 76 Images	3
In 77 Images	2
In 78 Images	2
In 79 Images	1
In 80 Images	5
In 81 Images	2

In 83 Images	3
In 84 Images	1
In 85 Images	1
In 87 Images	1
In 89 Images	1
In 94 Images	1
In 95 Images	1
In 96 Images	2
In 98 Images	1
In 104 Images	1

2D Keypoint Matches

Number of matches

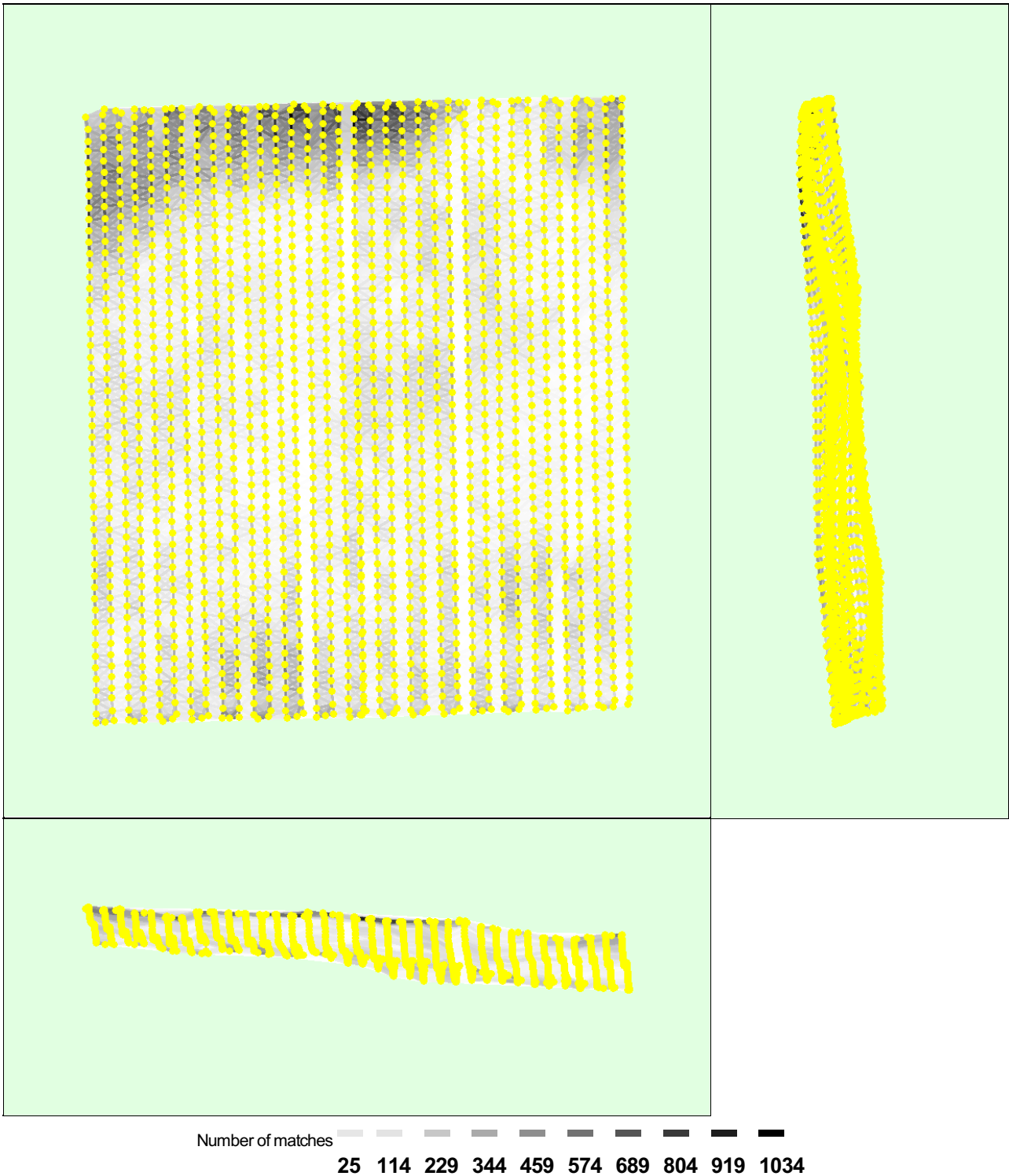**25 114 229 344 459 574 689 804 919 1034**

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	0.05	0.05	0.00
-6.00	-3.00	0.65	14.66	4.42
-3.00	0.00	42.52	34.64	48.44
0.00	3.00	56.78	37.35	39.16
3.00	6.00	0.00	13.30	7.98
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]		-0.000000	-0.000000	0.000000
Sigma [m]		0.585316	2.529231	1.906963
RMS Error [m]		0.585316	2.529231	1.906963

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	98.54	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	0.488
Phi	0.764
Kappa	5.736

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) i7-8700K CPU @ 3.70GHz RAM: 64GB GPU: NVIDIA GeForce GTX 1080 Ti (Driver: 24.21.13.9882), Intel(R) UHD Graphics 630 (Driver: 22.20.16.4758)
Operating System	Windows 10 Education, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	WGS 84 / UTM zone 10N (EGM96 Geoid)

Processing Options　ⓘ

Detected Template	⚇ RGB Local structure bark beetle severity*
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:32m:06s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	42m:12s

Results　ⓘ

Number of Generated Tiles	4
Number of 3D Densified Points	83843779
Average Density (per m^3)	22.35

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
Time for DSM Generation	06m:43s
Time for Orthomosaic Generation	21h:13m:42s
Time for DTM Generation	00s

Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s