Quality Report

Generated with Pix4Dmapper Pro version 4.2.27

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_5k_1_x3
Processed	2018-09-29 13:52:17
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.01 cm / 1.97 in
Area Covered	0.687 km^2 / 68.6571 ha / 0.27 sq. mi. / 169.7432 acres
Time for Initial Processing (without report)	02h:37m:38s

Quality Check

Images	median of 11826 keypoints per image	✓
Dataset	1965 out of 1970 images calibrated (99%), all images enabled	✓
Camera Optimization	2.85% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1637.13 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

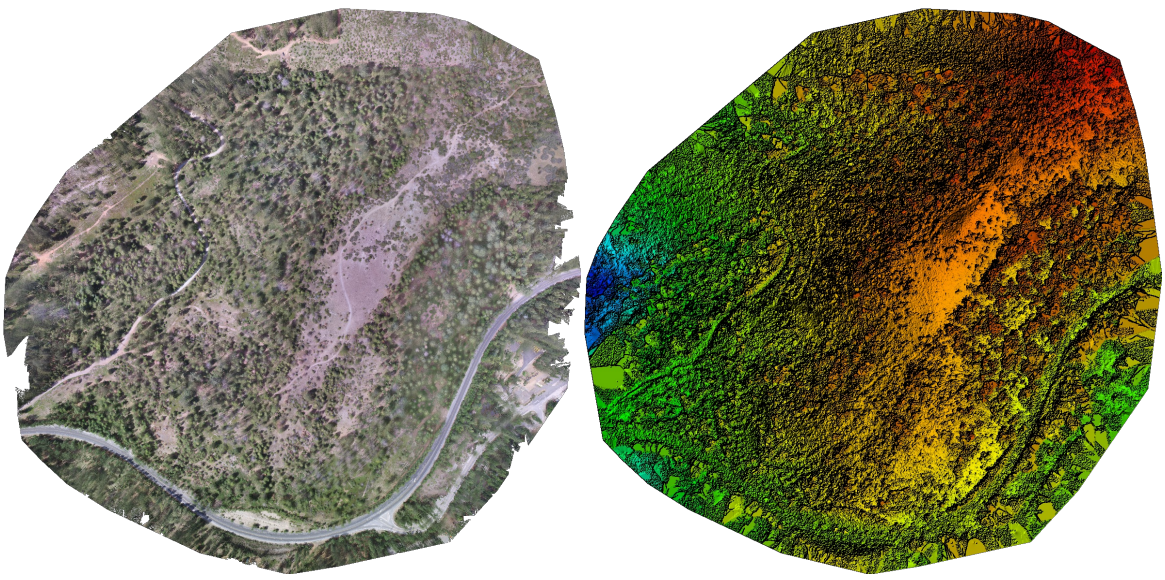


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1965 out of 1970
Number of Geolocated Images	1970 out of 1970

Initial Image Positions

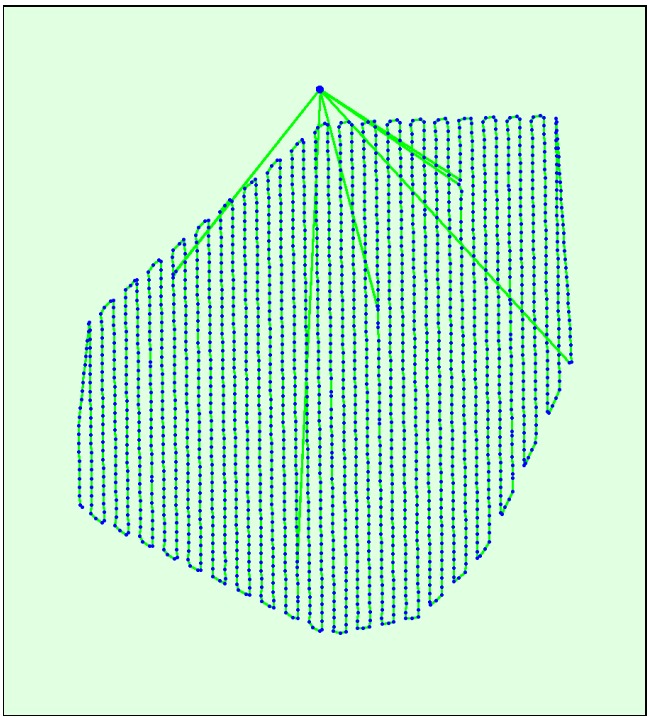
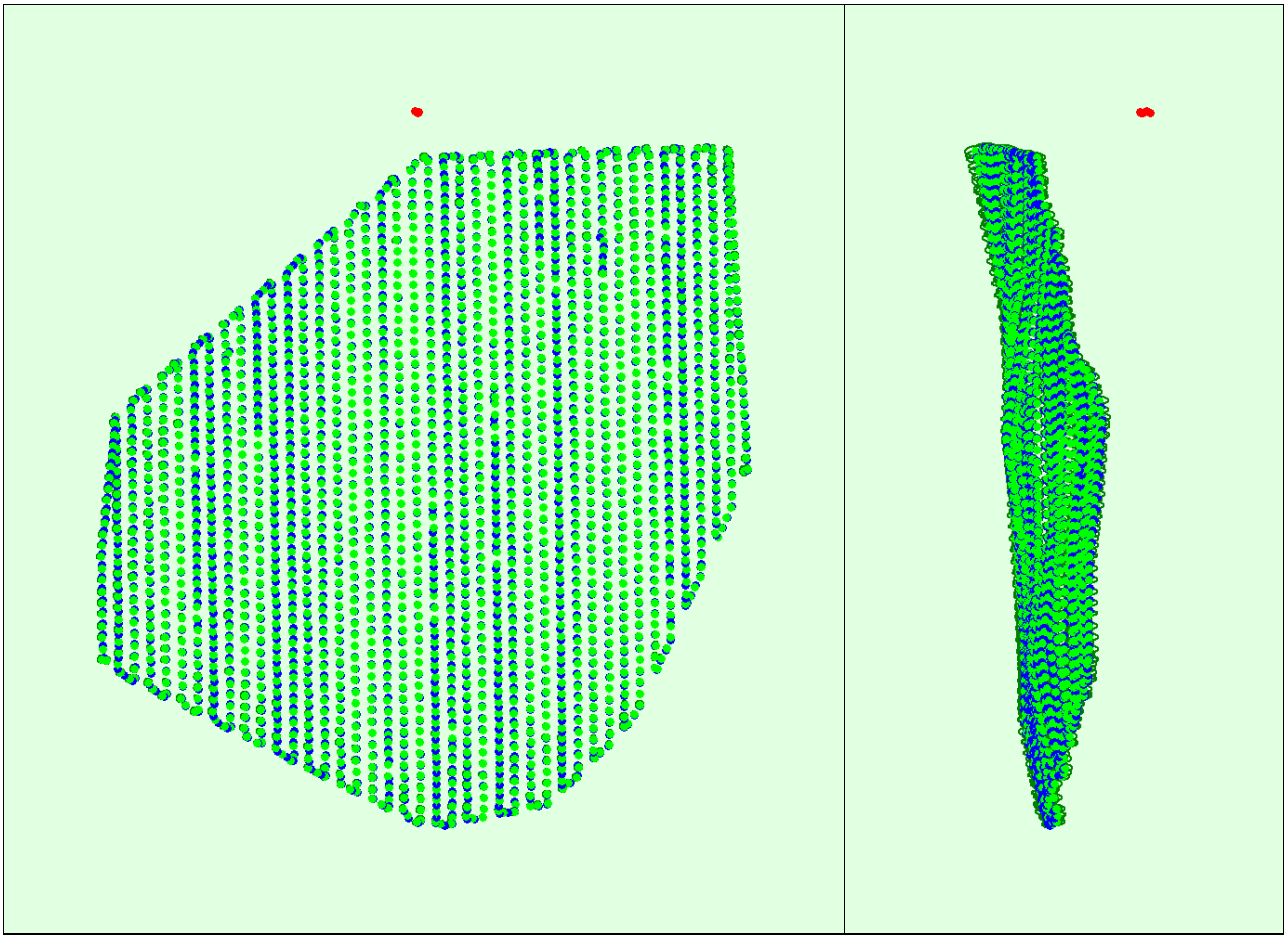
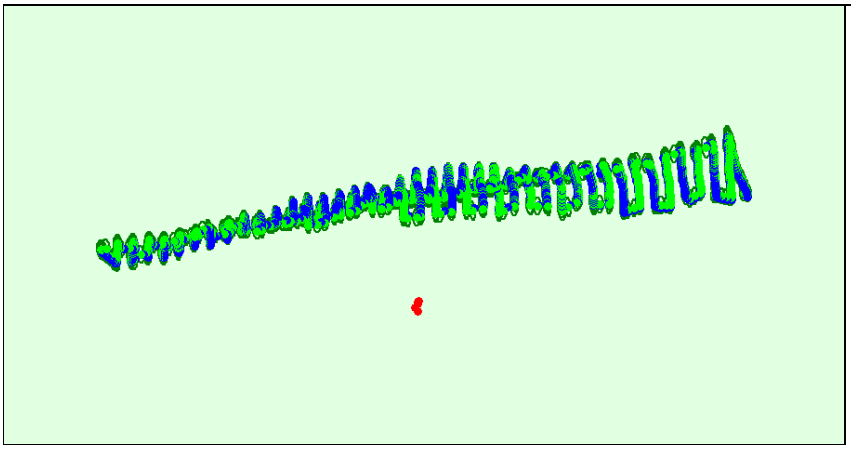


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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	0.062	0.062	0.139	0.030	0.029	0.010
Sigma	0.010	0.009	0.028	0.003	0.003	0.000

Overlap

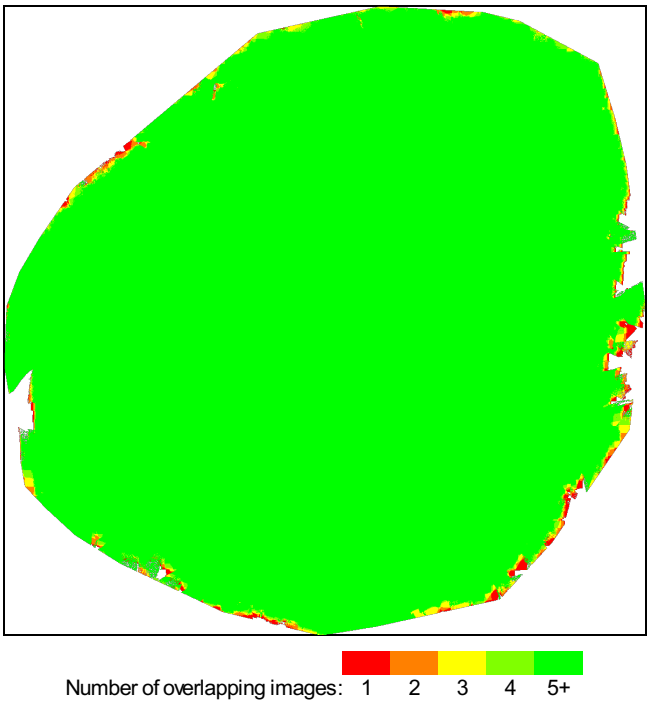


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

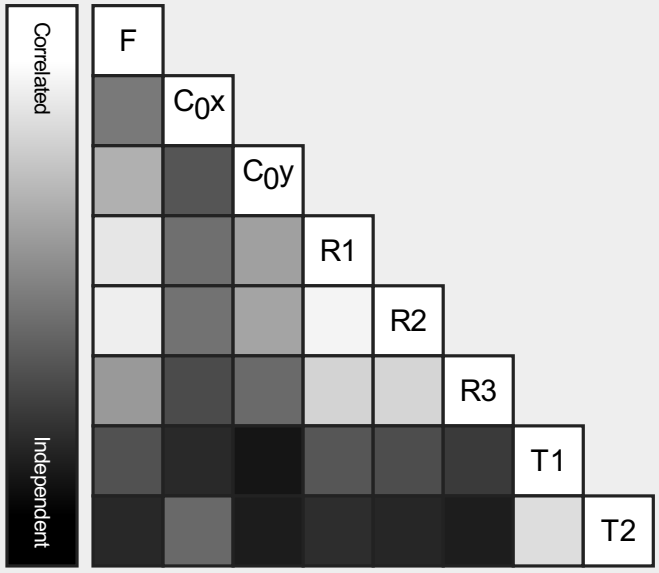
Number of 2D Keypoint Observations for Bundle Block Adjustment	3421517
Number of 3D Points for Bundle Block Adjustment	985630
Mean Reprojection Error [pixels]	0.132

Internal Camera Parameters

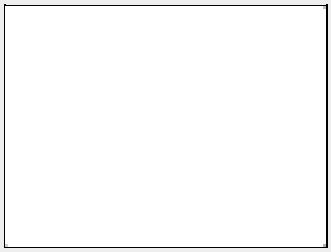
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

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	2350.977 [pixel] 3.713 [mm]	1985.067 [pixel] 3.135 [mm]	1502.674 [pixel] 2.373 [mm]	-0.131	0.116	-0.015	0.001	0.000
Uncertainties (Sigma)	1.640 [pixel] 0.003 [mm]	0.034 [pixel] 0.000 [mm]	0.038 [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	11826	1637
Min	10555	633
Max	14211	5154
Mean	11935	1741

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	604582
In 3 Images	166638
In 4 Images	73336
In 5 Images	39662
In 6 Images	24466
In 7 Images	16192
In 8 Images	11234

In 9 Images	8346
In 10 Images	6462
In 11 Images	4973
In 12 Images	3940
In 13 Images	3252
In 14 Images	2680
In 15 Images	2165
In 16 Images	1799
In 17 Images	1531
In 18 Images	1353
In 19 Images	1174
In 20 Images	1049
In 21 Images	947
In 22 Images	803
In 23 Images	714
In 24 Images	632
In 25 Images	563
In 26 Images	515
In 27 Images	432
In 28 Images	429
In 29 Images	405
In 30 Images	361
In 31 Images	303
In 32 Images	283
In 33 Images	270
In 34 Images	229
In 35 Images	229
In 36 Images	200
In 37 Images	215
In 38 Images	173
In 39 Images	165
In 40 Images	150
In 41 Images	141
In 42 Images	135
In 43 Images	121
In 44 Images	113
In 45 Images	93
In 46 Images	93
In 47 Images	84
In 48 Images	82
In 49 Images	95
In 50 Images	87
In 51 Images	76
In 52 Images	66
In 53 Images	67
In 54 Images	78
In 55 Images	66
In 56 Images	59
In 57 Images	44
In 58 Images	43
In 59 Images	47
In 60 Images	39
In 61 Images	41
In 62 Images	44
In 63 Images	47
In 64 Images	33
In 65 Images	41
In 66 Images	40
In 67 Images	44

In 68 Images	29
In 69 Images	23
In 70 Images	34
In 71 Images	23
In 72 Images	21
In 73 Images	27
In 74 Images	28
In 75 Images	24
In 76 Images	26
In 77 Images	25
In 78 Images	28
In 79 Images	21
In 80 Images	18
In 81 Images	14
In 82 Images	17
In 83 Images	12
In 84 Images	21
In 85 Images	18
In 86 Images	16
In 87 Images	22
In 88 Images	10
In 89 Images	21
In 90 Images	21
In 91 Images	16
In 92 Images	9
In 93 Images	17
In 94 Images	17
In 95 Images	16
In 96 Images	15
In 97 Images	8
In 98 Images	7
In 99 Images	12
In 100 Images	18
In 101 Images	11
In 102 Images	16
In 103 Images	9
In 104 Images	17
In 105 Images	17
In 106 Images	15
In 107 Images	15
In 108 Images	7
In 109 Images	12
In 110 Images	9
In 111 Images	10
In 112 Images	15
In 113 Images	6
In 114 Images	13
In 115 Images	12
In 116 Images	2
In 117 Images	6
In 118 Images	7
In 119 Images	6
In 121 Images	3
In 122 Images	3
In 123 Images	4
In 124 Images	2
In 125 Images	2
In 126 Images	1
In 128 Images	2

In 129 Images	2
In 132 Images	1

2D Keypoint Matches

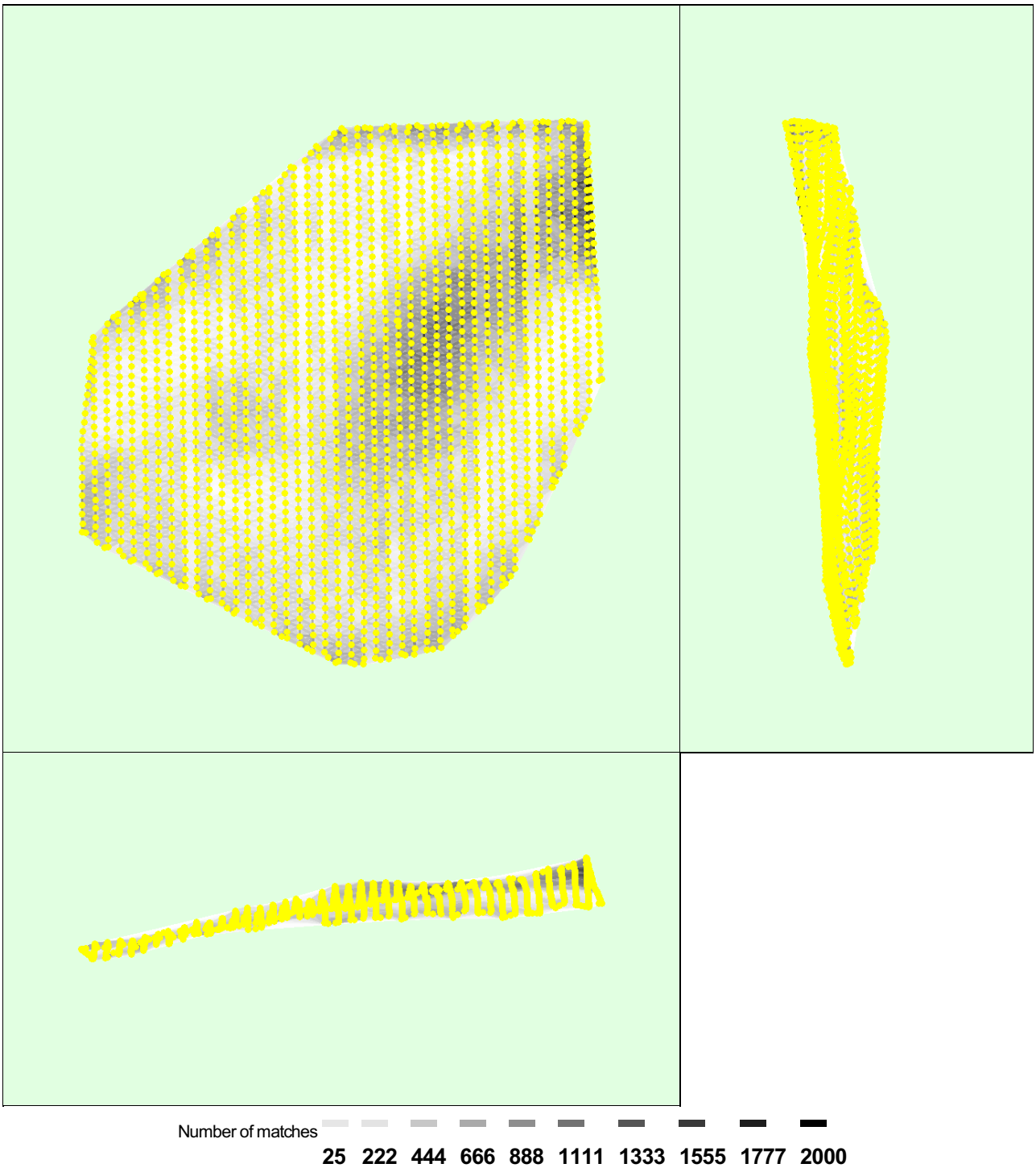


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	0.15	0.00
-6.00	-3.00	0.05	13.84	0.87
-3.00	0.00	56.18	38.27	44.07
0.00	3.00	43.00	34.86	54.30
3.00	6.00	0.76	12.72	0.76
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]		-0.000000	-0.000000	-0.000000
Sigma [m]		0.746337	2.530891	1.445155
RMS Error [m]		0.746337	2.530891	1.445155

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	97.35	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	0.603
Phi	0.705
Kappa	4.431

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

Processing Options

Detected Template	No Template Available
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	06h:43m:28s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	40m:15s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	85365973
Average Density (per m^3)	31.68

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.01 [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	09m:27s
Time for Orthomosaic Generation	13h:09m:33s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s