

Quality Report



Generated with PIX4Dmapper version 4.9.0



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Additional information about the sections



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Summary



Project	20240521
Processed	2024-06-10 23:17:13
Camera Model Name(s)	ILCE-5100_E16mmF2.8_16.0_6000x4000 (RGB)
Average Ground Sampling Distance (GSD)	3.73 cm / 1.47 in
Area Covered	1.507 km ² / 150.6618 ha / 0.58 sq. mi. / 372.4861 acres

Quality Check



Images	median of 83912 keypoints per image	
Dataset	2368 out of 2396 images calibrated (98%), 551 images disabled, 5 blocks	
Camera Optimization	1.73% relative difference between initial and optimized internal camera parameters	
Matching	median of 12512.1 matches per calibrated image	
Georeferencing	yes, 5 GCPs (5 3D), mean RMS error = 0.04 US survey foot	

Preview

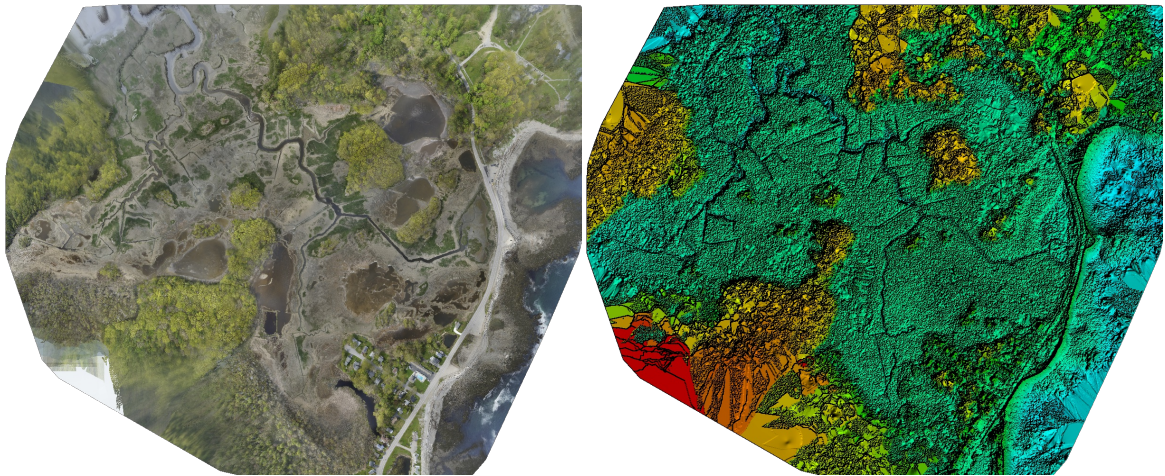


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	2368 out of 2947
Number of Geolocated Images	2947 out of 2947

? Initial Image Positions

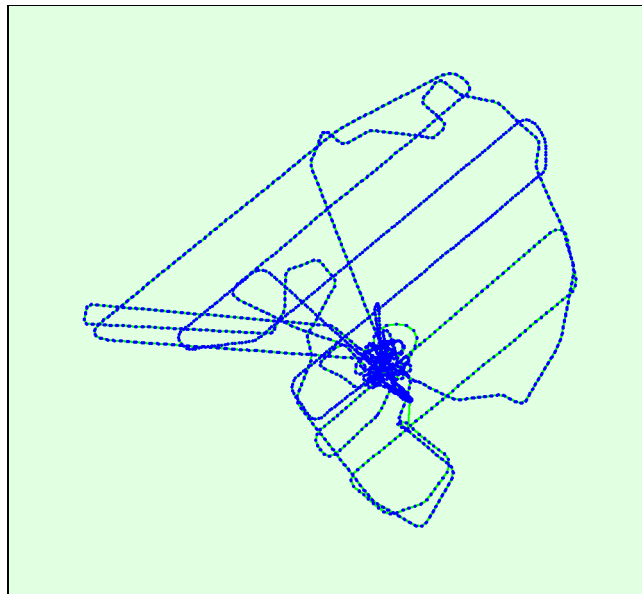


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

? Computed Image/GCPs/Manual Tie Points Positions

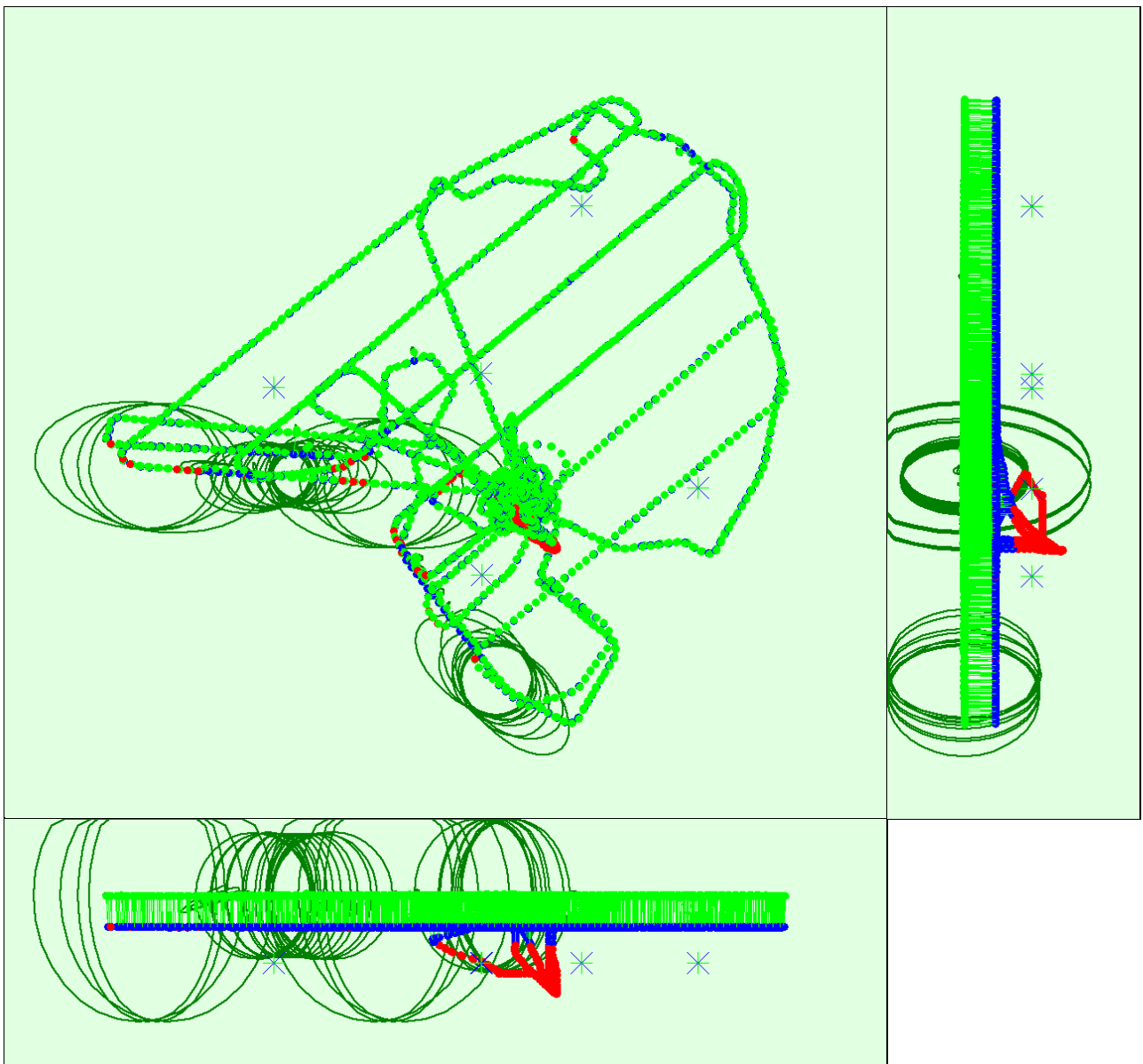


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled or uncalibrated images. Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

? Absolute camera position and orientation uncertainties

	X[US survey foot]	Y[US survey foot]	Z [US survey foot]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.095	0.085	0.113	0.012	0.013	0.012
Sigma	0.388	0.303	0.567	0.032	0.041	0.044

? Overlap

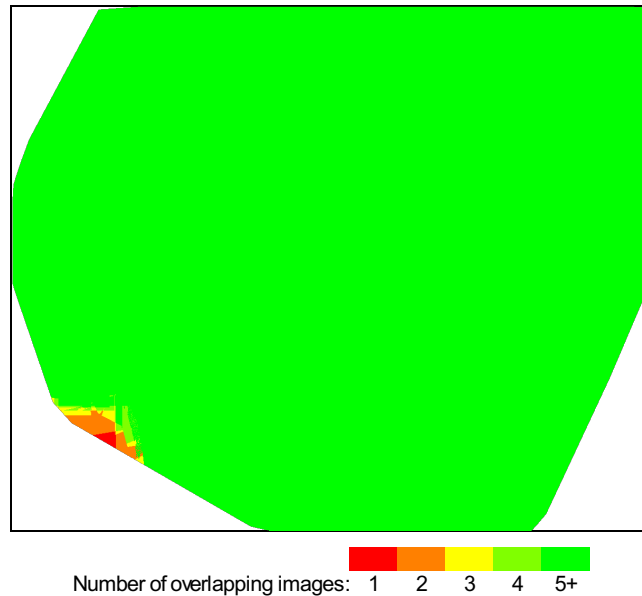


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

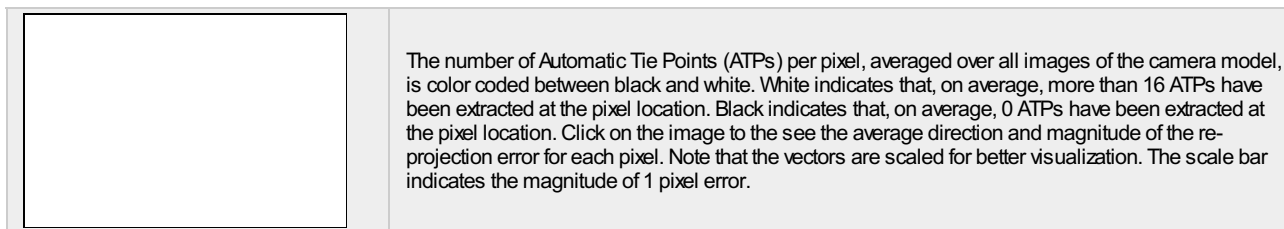
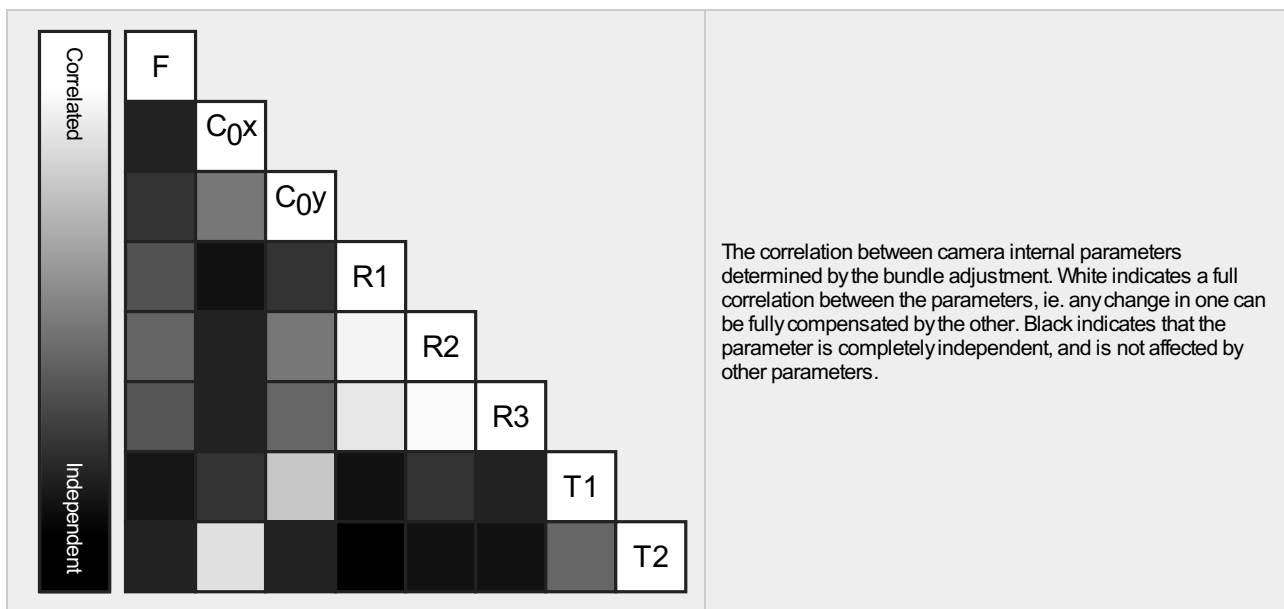
Number of 2D Keypoint Observations for Bundle Block Adjustment	31530380
Number of 3D Points for Bundle Block Adjustment	10886795
Mean Reprojection Error [pixels]	0.129

? Internal Camera Parameters

📷 ILCE-5100_E16mmF2.8_16.0_6000x4000 (RGB). Sensor Dimensions: 23.333 [mm] x 15.556 [mm]

EXIF ID: ILCE-5100_E16mmF2.8_16.0_6000x4000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	4114.286 [pixel] 16.000 [mm]	3000.000 [pixel] 11.667 [mm]	2000.000 [pixel] 7.778 [mm]	0.000	0.000	0.000	0.000	0.000
Optimized Values	4042.805 [pixel] 15.722 [mm]	2983.649 [pixel] 11.603 [mm]	1948.066 [pixel] 7.576 [mm]	-0.065	0.091	0.003	0.001	-0.000
Uncertainties (Sigma)	0.046 [pixel] 0.000 [mm]	0.045 [pixel] 0.000 [mm]	0.038 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



? 2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	83912	12512
Min	35082	55
Max	95214	35356
Mean	78851	13315

? 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	6733295
In 3 Images	2082588
In 4 Images	891712
In 5 Images	455564
In 6 Images	261153
In 7 Images	158652
In 8 Images	96860
In 9 Images	61566
In 10 Images	40641
In 11 Images	27495
In 12 Images	18904
In 13 Images	13363
In 14 Images	9449
In 15 Images	7002
In 16 Images	5280
In 17 Images	4108
In 18 Images	3197
In 19 Images	2506
In 20 Images	2053
In 21 Images	1704
In 22 Images	1321
In 23 Images	1085

In 24 Images	909
In 25 Images	815
In 26 Images	710
In 27 Images	600
In 28 Images	541
In 29 Images	441
In 30 Images	396
In 31 Images	359
In 32 Images	285
In 33 Images	290
In 34 Images	224
In 35 Images	230
In 36 Images	170
In 37 Images	155
In 38 Images	149
In 39 Images	128
In 40 Images	100
In 41 Images	90
In 42 Images	73
In 43 Images	71
In 44 Images	60
In 45 Images	57
In 46 Images	49
In 47 Images	41
In 48 Images	41
In 49 Images	38
In 50 Images	28
In 51 Images	29
In 52 Images	25
In 53 Images	19
In 54 Images	17
In 55 Images	26
In 56 Images	17
In 57 Images	11
In 58 Images	13
In 59 Images	10
In 60 Images	5
In 61 Images	8
In 62 Images	7
In 63 Images	6
In 64 Images	3
In 65 Images	3
In 66 Images	4
In 67 Images	4
In 68 Images	2
In 69 Images	3
In 70 Images	5
In 71 Images	3
In 72 Images	1
In 73 Images	2
In 74 Images	3
In 75 Images	2
In 76 Images	3
In 77 Images	1
In 78 Images	1
In 79 Images	1
In 81 Images	1
In 83 Images	1
In 84 Images	1

In 86 Images	1
In 87 Images	2
In 89 Images	1
In 91 Images	1
In 95 Images	1
In 96 Images	1
In 98 Images	1
In 109 Images	1
In 120 Images	1

? 2D Keypoint Matches

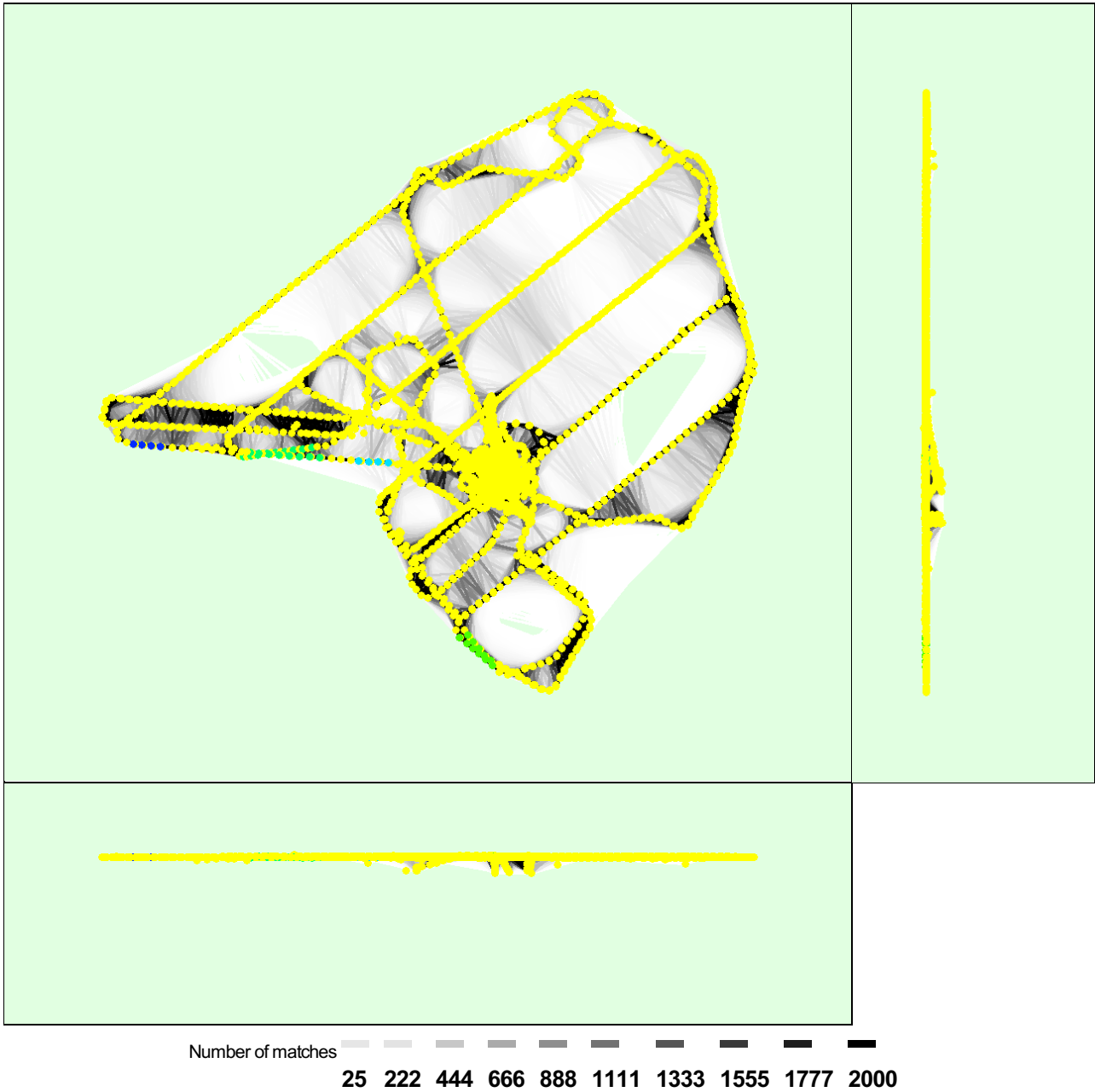


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details



? Ground Control Points



GCP Name	Accuracy XY/Z [US survey foot]	Error X [US survey foot]	Error Y [US survey foot]	Error Z [US survey foot]	Projection Error [pixel]	Verified/Marked
1 (3D)	0.020/ 0.020	-0.013	-0.005	0.017	0.377	16 / 16
2 (3D)	0.020/ 0.020	0.017	-0.031	-0.198	0.266	10 / 10
3 (3D)	0.020/ 0.020	0.007	0.014	0.022	0.302	11 / 11
9 (3D)	0.020/ 0.020	-0.003	0.019	0.052	0.176	10 / 10
10 (3D)	0.020/ 0.020	0.002	0.028	0.012	0.291	10 / 10
Mean [US survey foot]		0.001939	0.004982	-0.019028		
Sigma [US survey foot]		0.010205	0.020850	0.090594		
RMS Error [US survey foot]		0.010388	0.021437	0.092571		

0 out of 5 check points have been labeled as inaccurate.

Check Point Name	Accuracy XY/Z [US survey foot]	Error X [US survey foot]	Error Y [US survey foot]	Error Z [US survey foot]	Projection Error [pixel]	Verified/Marked
4		0.2098	-0.1851	-0.3131	0.1307	10 / 10
5		-0.0723	-0.0108	-0.3890	0.3477	10 / 10
6		-0.2252	-0.0448	-0.4994	0.1128	10 / 10
7		0.0211	0.3190	-0.1267	0.5539	10 / 10
8		-0.0517	0.2197	0.7560	0.4010	10 / 10
Mean [US survey foot]		-0.023647	0.059599	-0.114435		
Sigma [US survey foot]		0.141622	0.183637	0.451845		
RMS Error [US survey foot]		0.143582	0.193066	0.466111		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of calibrated images where the GCP has been automatically verified v.s. manually marked.

? Absolute Geolocation Variance



Mn Error [US survey foot]	Max Error [US survey foot]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-49.21	0.17	0.08	0.00
-49.21	-39.37	0.08	0.13	0.00
-39.37	-29.53	0.17	0.08	0.00
-29.53	-19.68	0.13	0.13	0.00
-19.68	-9.84	0.42	0.76	0.04
-9.84	0.00	44.55	47.34	64.95
0.00	9.84	53.93	51.22	34.38
9.84	19.69	0.30	0.13	0.42
19.69	29.53	0.04	0.00	0.08
29.53	39.37	0.13	0.00	0.08
39.37	49.21	0.00	0.00	0.04
49.21	-	0.08	0.13	0.00
Mean [US survey foot]		-0.097601	-0.882152	-173.493010
Sigma [US survey foot]		4.522603	5.446453	2.097374
RMS Error [US survey foot]		4.523656	5.517431	173.505687

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.

Geolocation Bias	X	Y	Z
Translation [US survey foot]	-0.097001	-0.881033	-173.493686

Bias between image initial and computed geolocation given in output coordinate system.



Relative Geolocation Error	Images X[%]	Images Y[%]	Images Z[%]
[-1.00, 1.00]	98.99	99.07	99.87
[-2.00, 2.00]	99.54	99.58	100.00
[-3.00, 3.00]	99.75	99.79	100.00
Mean of Geolocation Accuracy [US survey foot]	16.404167	16.404167	32.808333
Sigma of Geolocation Accuracy [US survey foot]	0.000004	0.000004	0.000007

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	120.697
Phi	95.865
Kappa	120.602

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: AMD Ryzen 7 1800X Eight-Core Processor RAM: 64GB GPU: NVIDIA GeForce GTX 1080 (Driver: 31.0.15.5134)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems



Image Coordinate System	WGS 84 (EGM96 Geoid)
Ground Control Point (GCP) Coordinate System	NAD83(2011) / New Hampshire (ftUS) (2D)
Output Coordinate System	NAD83(2011) / New Hampshire (ftUS) (2D)

Processing Options



Detected Template	No Template Available
Keypoints Image Scale	Full, Image Scale: 1
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	10h:08m:25s
Time for Point Cloud Classification	42m:36s
Time for 3D Textured Mesh Generation	38m:06s

Results



Number of Processed Clusters	8
Number of Generated Tiles	8
Number of 3D Densified Points	207284857
Average Density (per US survey foot ³)	0.67

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	1 x GSD (3.73 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	00s
Time for Orthomosaic Generation	07h:38m:42s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s