Quality Report

Generated with PIX4Dmapper version 4.10.0

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	Lubberland_18Apr2025
Processed	2025-06-12 18:05:04
Camera Model Name(s)	ILCE-5100_E16mmF2.8_16.0_6000x4000 (RGB)
Average Ground Sampling Distance (GSD)	1.94 cm / 0.77 in
Area Covered	0.645 km^2 / 64.4525 ha / 0.25 sq. mi. / 159.3481 acres

Quality Check

Images	median of 90611 keypoints per image	✓
Dataset	1262 out of 1294 images calibrated (97%), all images enabled	✓
Camera Optimization	0.67% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 17716.2 matches per calibrated image	✓
Georeferencing	yes, 9 GCPs (9 3D), mean RMS error = 0.012 US survey foot	✓

Preview

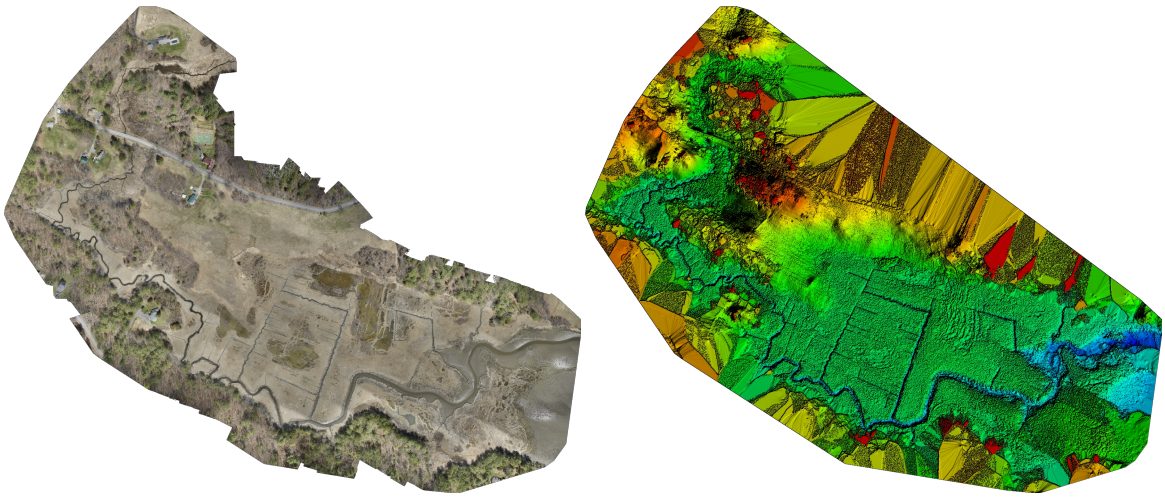


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	1262 out of 1294
Number of Geolocated Images	1294 out of 1294

Initial Image Positions

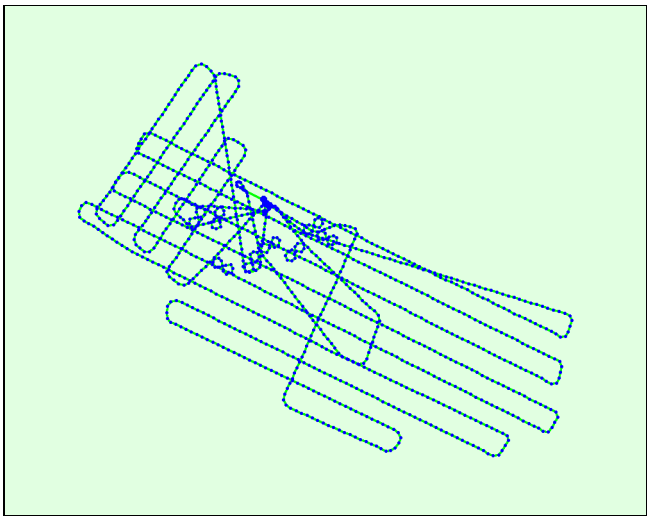


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions

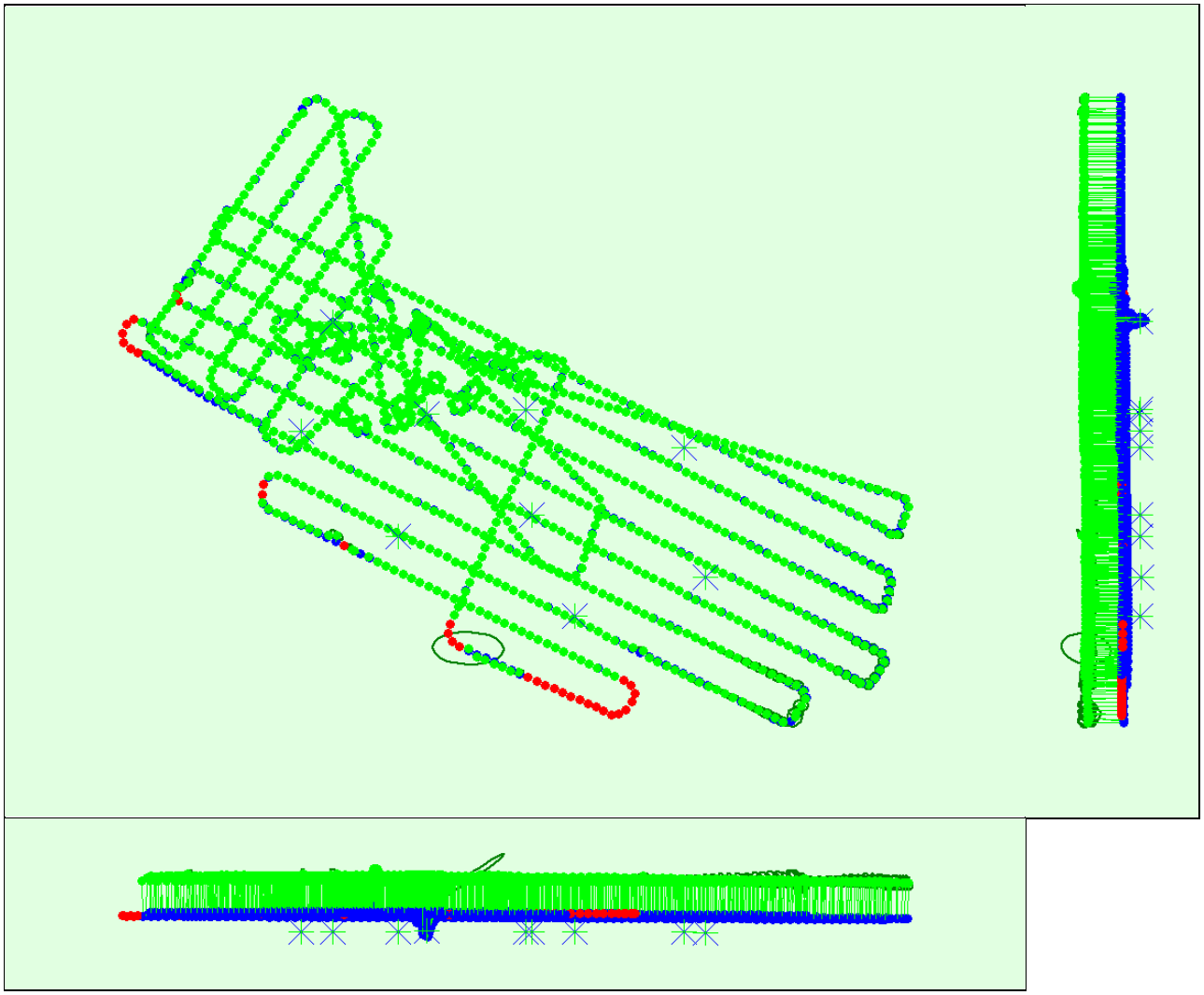


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled 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	0.068	0.062	0.065	0.011	0.013	0.005
Sigma	0.075	0.052	0.082	0.009	0.017	0.010

Overlap

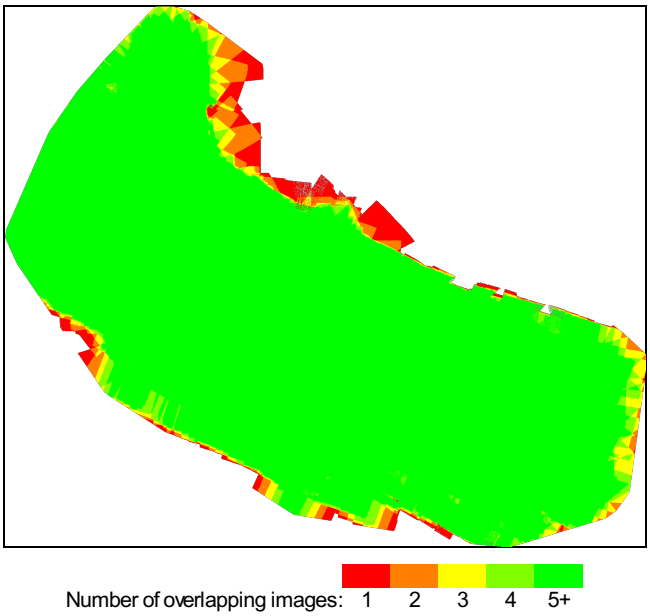


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

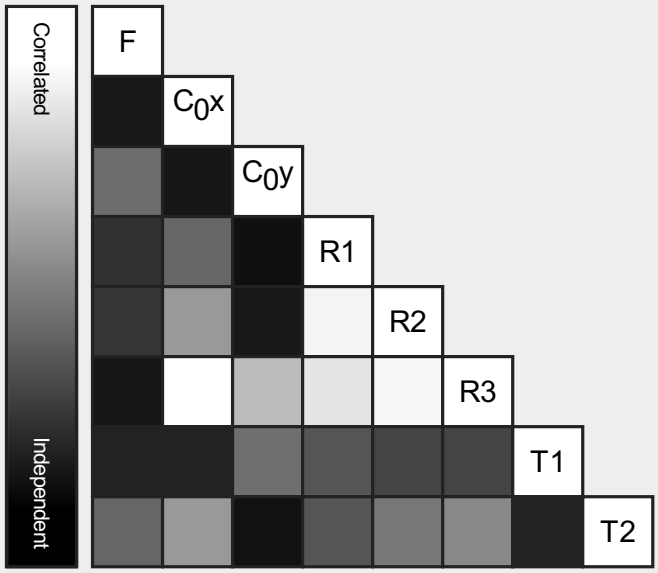
Number of 2D Keypoint Observations for Bundle Block Adjustment	22560033
Number of 3D Points for Bundle Block Adjustment	7723294
Mean Reprojection Error [pixels]	0.146

Internal Camera Parameters

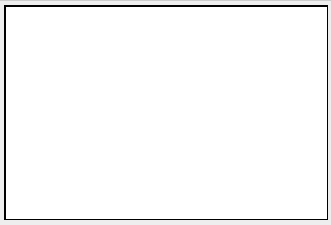
ILCE-5100_E16mmF2.8_16.0_6000x4000 (RGB). Sensor Dimensions: 23.333 [mm] x 15.556 [mm]

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	4086.410 [pixel] 15.892 [mm]	2945.090 [pixel] 11.453 [mm]	1970.486 [pixel] 7.663 [mm]	-0.066	0.094	0.004	-0.000	-0.003
Uncertainties (Sigma)	0.252 [pixel] 0.001 [mm]	0.072 [pixel] 0.000 [mm]	0.072 [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	90611	17716
Min	31648	39
Max	97023	45068
Mean	87344	17876

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	4709856
In 3 Images	1505461
In 4 Images	667853
In 5 Images	341183
In 6 Images	178518
In 7 Images	99726
In 8 Images	63787
In 9 Images	42438
In 10 Images	29079
In 11 Images	20222
In 12 Images	14604
In 13 Images	10631
In 14 Images	8145
In 15 Images	6217
In 16 Images	4881
In 17 Images	3649
In 18 Images	2940
In 19 Images	2281
In 20 Images	1885
In 21 Images	1529
In 22 Images	1275
In 23 Images	974

In 24 Images	864
In 25 Images	673
In 26 Images	629
In 27 Images	523
In 28 Images	425
In 29 Images	369
In 30 Images	359
In 31 Images	258
In 32 Images	260
In 33 Images	194
In 34 Images	170
In 35 Images	148
In 36 Images	146
In 37 Images	119
In 38 Images	104
In 39 Images	88
In 40 Images	59
In 41 Images	59
In 42 Images	67
In 43 Images	51
In 44 Images	43
In 45 Images	43
In 46 Images	33
In 47 Images	32
In 48 Images	30
In 49 Images	24
In 50 Images	26
In 51 Images	37
In 52 Images	25
In 53 Images	22
In 54 Images	21
In 55 Images	13
In 56 Images	23
In 57 Images	22
In 58 Images	14
In 59 Images	18
In 60 Images	17
In 61 Images	19
In 62 Images	13
In 63 Images	10
In 64 Images	13
In 65 Images	10
In 66 Images	12
In 67 Images	12
In 68 Images	16
In 69 Images	6
In 70 Images	6
In 71 Images	3
In 72 Images	5
In 73 Images	1
In 74 Images	4
In 75 Images	5
In 76 Images	4
In 77 Images	3
In 78 Images	4
In 79 Images	3
In 81 Images	1
In 84 Images	1
In 86 Images	1

2D Keypoint Matches

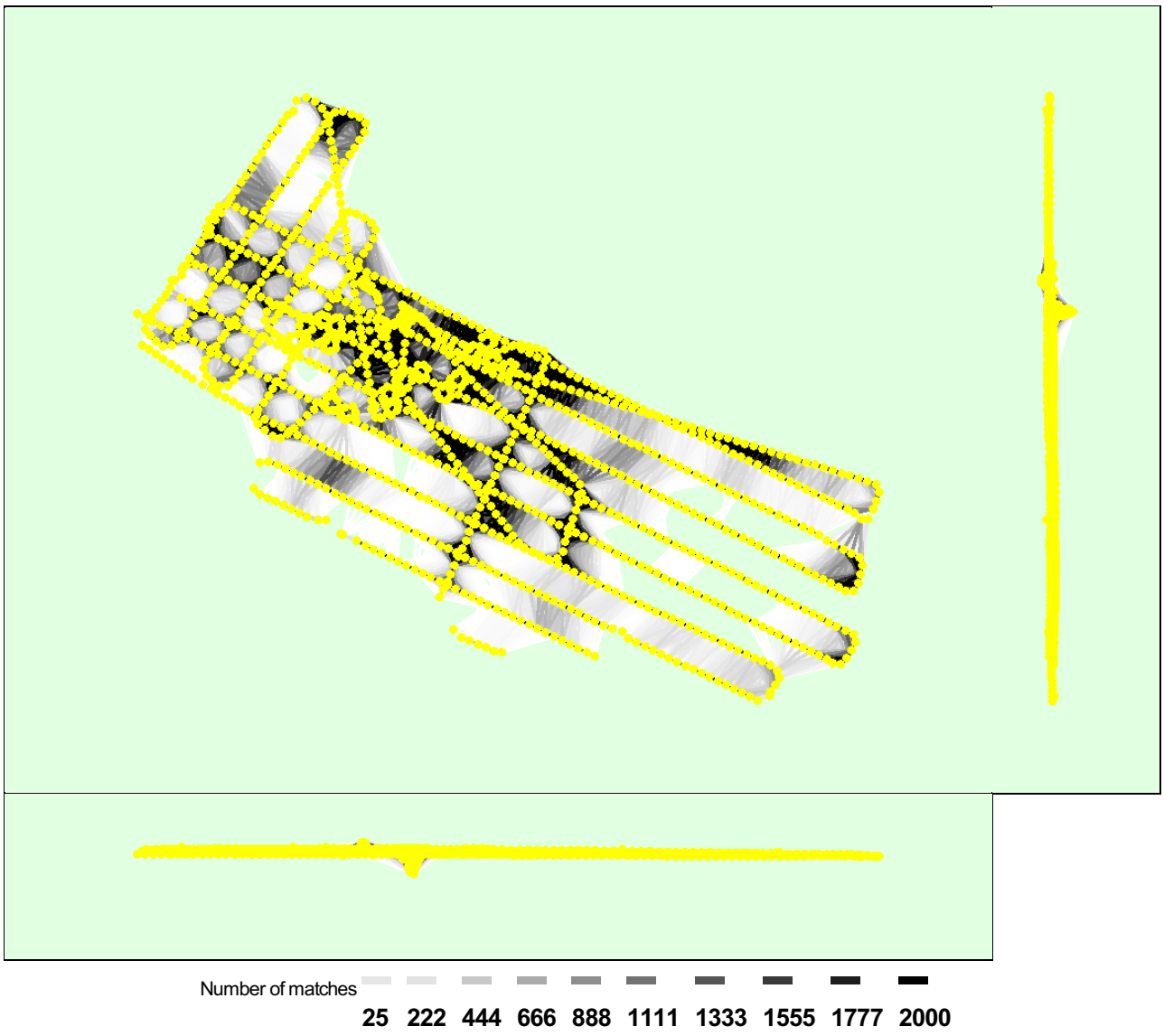


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	-0.002	0.002	0.002	0.113	6 / 6
3 (3D)	0.020/ 0.020	0.028	0.002	-0.003	0.349	10 / 10
4 (3D)	0.020/ 0.020	-0.000	0.001	-0.002	0.132	10 / 10
5 (3D)	0.020/ 0.020	0.010	0.006	-0.023	0.361	10 / 10
6 (3D)	0.020/ 0.020	-0.001	0.011	0.009	0.226	6 / 6
7 (3D)	0.020/ 0.020	-0.014	-0.009	0.009	0.186	9 / 9
8 (3D)	0.020/ 0.020	-0.013	0.001	0.007	0.188	8 / 8
9 (3D)	0.020/ 0.020	-0.008	0.006	-0.008	0.354	9 / 9
10 (3D)	0.020/ 0.020	-0.007	-0.020	0.039	0.289	10 / 10
Mean [US survey foot]		-0.000864	-0.000058	0.003436		

Sigma [US survey foot]		0.012303	0.008736	0.015695		
RMS Error [US survey foot]		0.012334	0.008736	0.016067		

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 vs. manually marked.

Absolute Geolocation Variance

Min Error [US survey foot]	Max Error [US survey foot]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-49.21	0.00	0.00	0.00
-49.21	-39.37	0.00	0.00	0.00
-39.37	-29.53	0.00	0.08	0.00
-29.53	-19.68	0.08	0.00	0.00
-19.68	-9.84	0.32	0.95	0.32
-9.84	0.00	44.61	47.46	52.14
0.00	9.84	54.75	51.35	47.39
9.84	19.69	0.16	0.08	0.16
19.69	29.53	0.00	0.08	0.00
29.53	39.37	0.08	0.00	0.00
39.37	49.21	0.00	0.00	0.00
49.21	-	0.00	0.00	0.00
Mean [US survey foot]		0.074286	0.148221	-178.247621
Sigma [US survey foot]		1.835861	2.309473	1.780509
RMS Error [US survey foot]		1.837363	2.314224	178.256513

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]	0.074294	0.148283	-178.247616

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

Relative Geolocation Variance

Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	99.76	99.76	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 [US survey foot]	16.404167	16.404167	32.808333
Sigma of Geolocation Accuracy [US survey foot]	0.000003	0.000003	0.000006

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

Geolocation Orientational Variance	RMS [degree]
Omega	1.670
Phi	0.826
Kappa	0.561

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: 32.0.15.7216)
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	3d map no las or mesh*
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	no
LOD	Generated: no
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	02h:25m:37s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	NA

Results

Number of Generated Tiles	6
Number of 3D Densified Points	148045249
Average Density (per US survey foot^3)	12.84

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (1.94 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp

Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	47m:56s
Time for Orthomosaic Generation	01h:54m:02s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s