

Quality Report



Generated with PIX4Dmapper version 4.8.4



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	StLawBoroTop
Processed	2024-03-10 14:14:38
Camera Model Name(s)	M3E_12.3_5280x3956 (RGB)
Average Ground Sampling Distance (GSD)	2.18 cm / 0.86 in
Area Covered	1.207 km ² / 120.6992 ha / 0.47 sq. mi. / 298.4085 acres

Quality Check



Images	median of 74098 keypoints per image	
Dataset	2463 out of 2926 images calibrated (84%), all images enabled, 9 blocks	
Camera Optimization	0.5% relative difference between initial and optimized internal camera parameters	
Matching	median of 1025.18 matches per calibrated image	
Georeferencing	yes, 3 GCPs (3 3D), mean RMS error = 0.277 US survey foot	

Preview

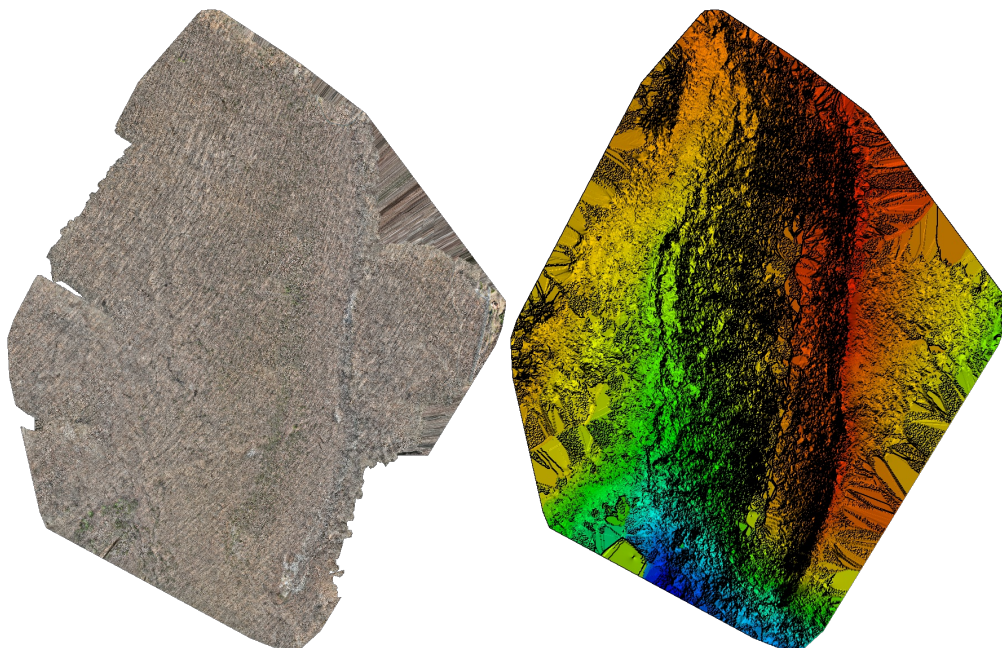


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	2463 out of 2926
Number of Geolocated Images	2926 out of 2926

Initial Image Positions

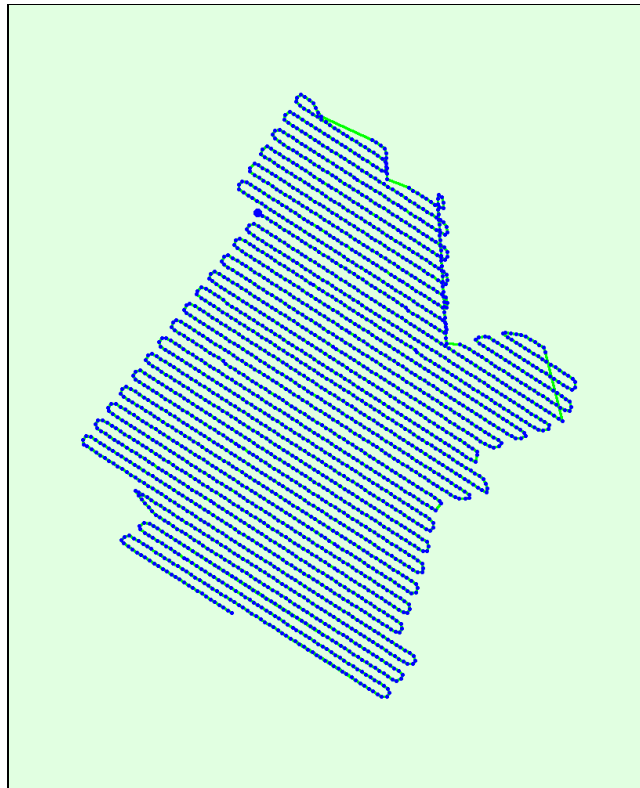
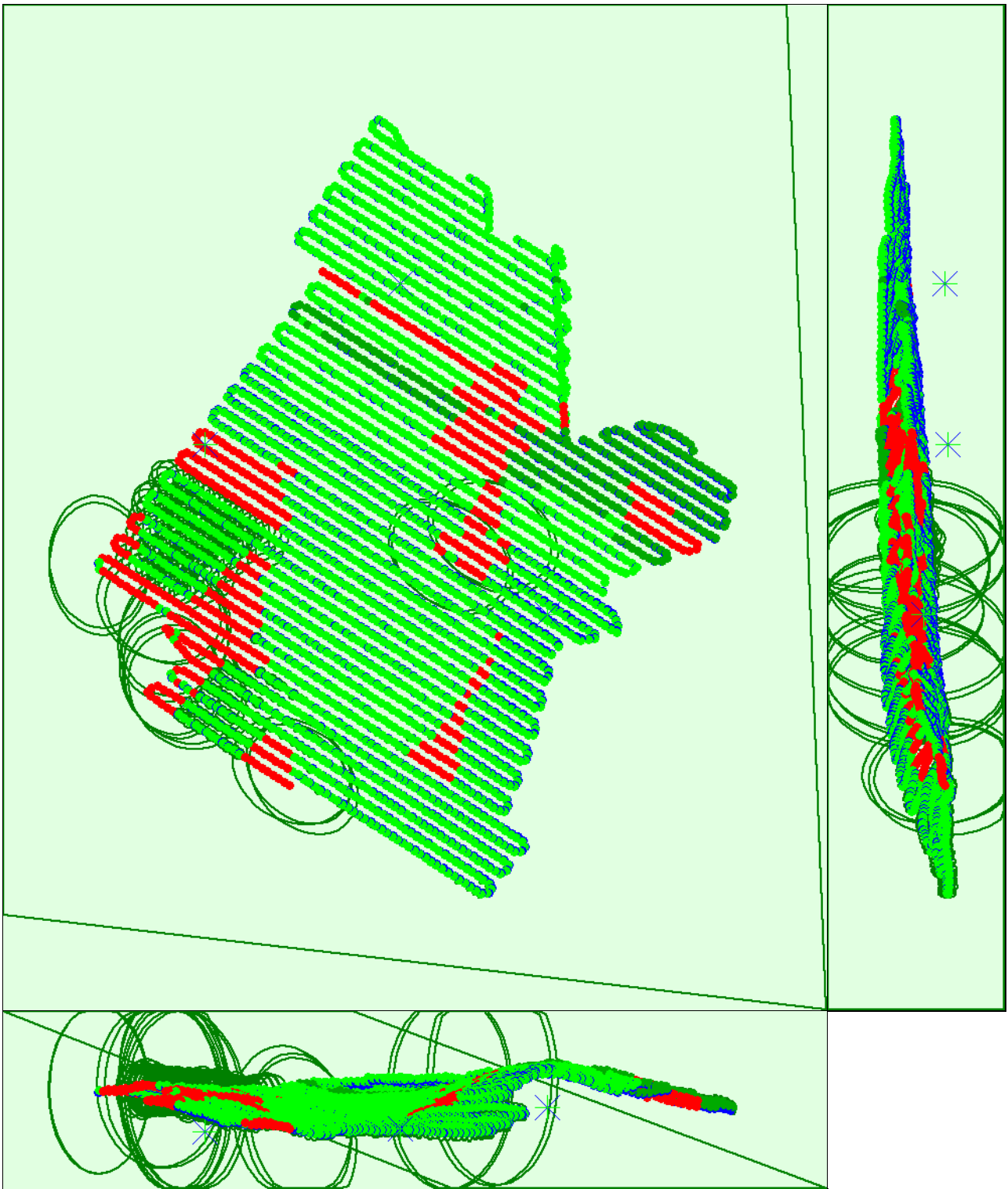


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 100x 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[US survey foot]	Y[US survey foot]	Z [US survey foot]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	3747.299	2961.141	106.121	0.050	0.082	0.050
Sigma	185889.564	146889.581	5251.293	0.269	0.973	0.486

🔍 Overlap



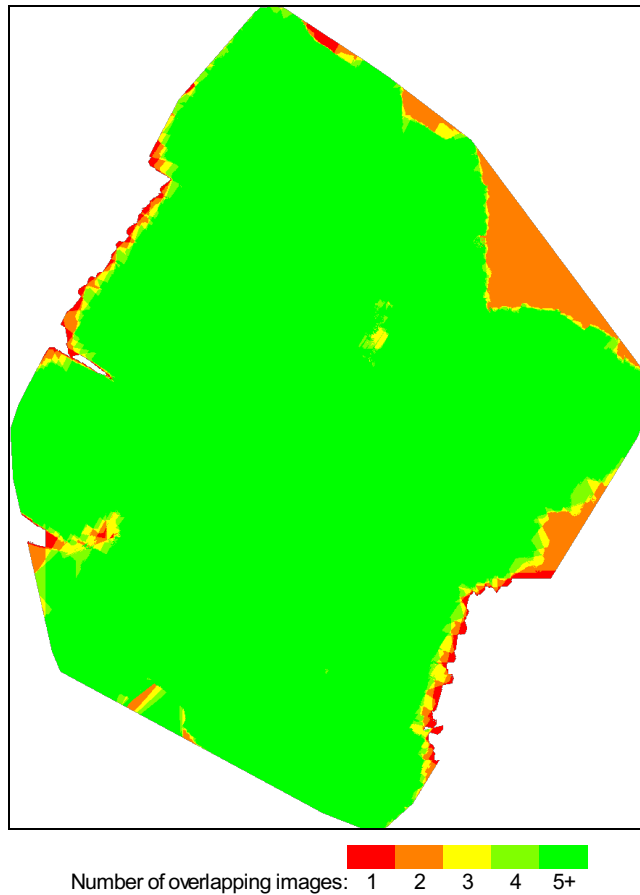


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

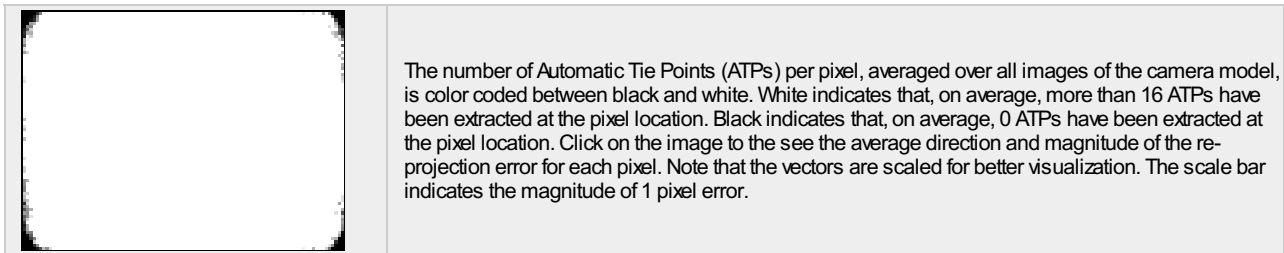
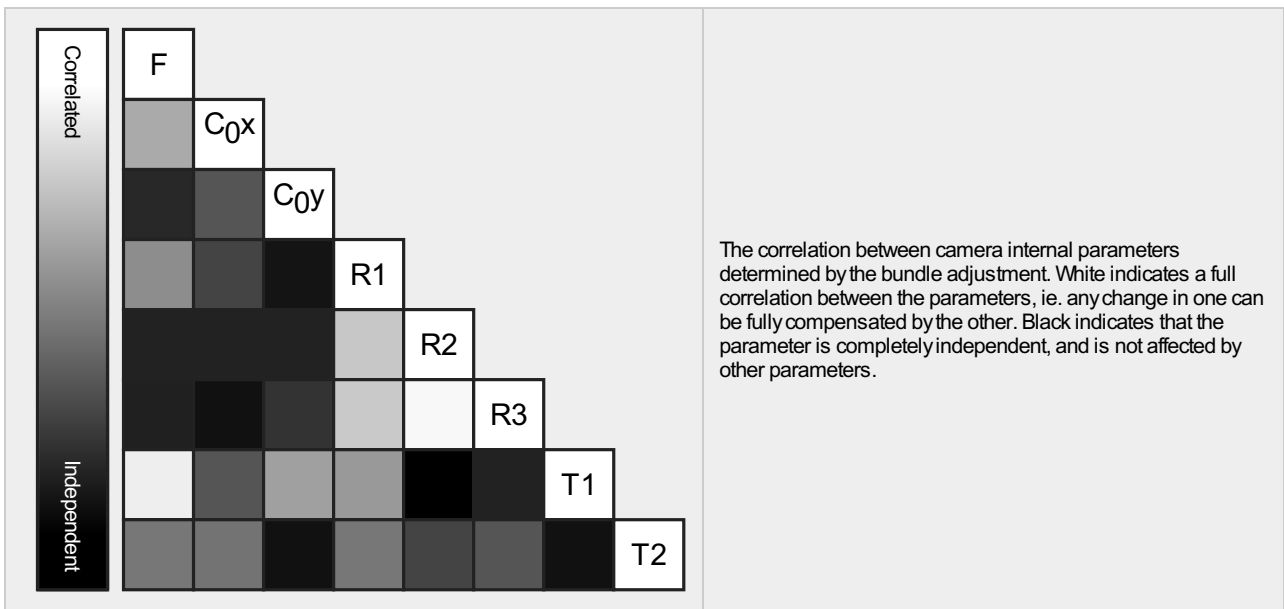
Number of 2D Keypoint Observations for Bundle Block Adjustment	3106815
Number of 3D Points for Bundle Block Adjustment	1360750
Mean Reprojection Error [pixels]	0.123

Internal Camera Parameters

M3E_12.3_5280x3956 (RGB). Sensor Dimensions: 17.424 [mm] x 13.055 [mm]

EXIF ID: M3E_12.3_5280x3956

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3720.980 [pixel] 12.279 [mm]	2644.890 [pixel] 8.728 [mm]	1967.940 [pixel] 6.494 [mm]	-0.111	0.012	-0.027	-0.000	-0.000
Optimized Values	3702.311 [pixel] 12.218 [mm]	2653.575 [pixel] 8.757 [mm]	1976.929 [pixel] 6.524 [mm]	-0.103	-0.007	-0.012	0.000	-0.000
Uncertainties (Sigma)	0.825 [pixel] 0.003 [mm]	0.063 [pixel] 0.000 [mm]	0.060 [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	74098	1025
Mn	69120	21
Max	81702	10011
Mean	73939	1261

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	1103501
In 3 Images	183218
In 4 Images	46424
In 5 Images	15442
In 6 Images	6028
In 7 Images	2751
In 8 Images	1412
In 9 Images	820
In 10 Images	511
In 11 Images	256
In 12 Images	155
In 13 Images	82
In 14 Images	64
In 15 Images	39
In 16 Images	20
In 17 Images	11
In 18 Images	6
In 19 Images	6
In 21 Images	2
In 22 Images	1
In 26 Images	1

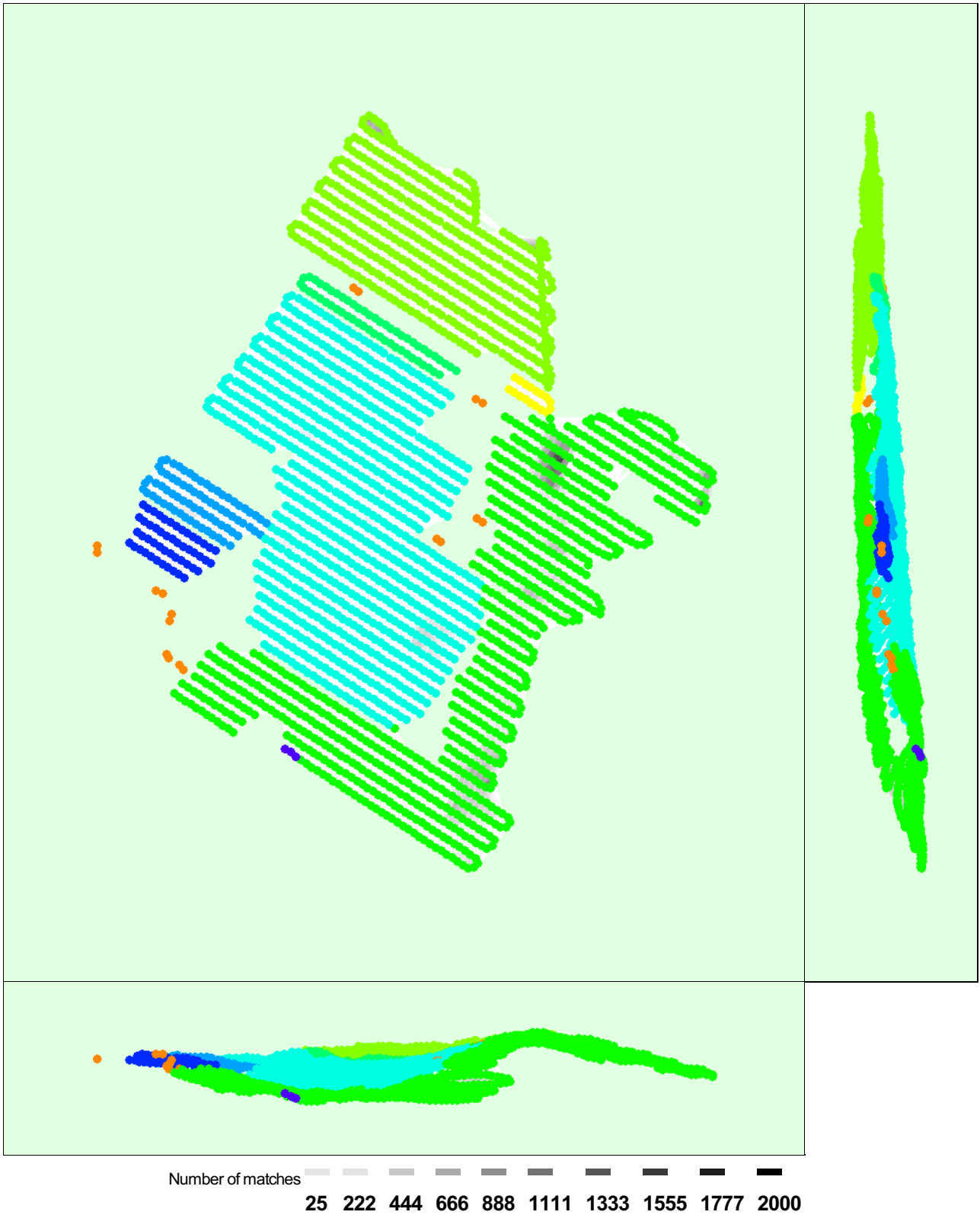


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

Geolocation Details

GCP Name	Accuracy XYZ [US survey foot]	Error X [US survey foot]	Error Y [US survey foot]	Error Z [US survey foot]	Projection Error [pixel]	Verified/Marked
gcp2 (3D)	0.020/ 0.020	-0.337	-0.480	-0.903	0.493	2 / 2
gcp4 (3D)	0.020/ 0.020	-0.051	-0.043	-0.094	0.522	23 / 23
gcp3 (3D)	0.020/ 0.020	0.045	0.039	0.127	0.619	18 / 18
Mean [US survey foot]		-0.114167	-0.161176	-0.289976		
Sigma [US survey foot]		0.162139	0.227624	0.442788		
RMS Error [US survey foot]		0.198301	0.278910	0.529289		

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



Mn Error [US survey foot]	Max Error [US survey foot]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-17.78	0.00	0.00	0.00
-17.78	-14.23	0.00	0.00	0.00
-14.23	-10.67	0.00	0.00	0.05
-10.67	-7.11	0.09	0.00	0.00
-7.11	-3.56	0.46	0.14	0.36
-3.56	0.00	29.50	24.17	27.72
0.00	3.56	50.21	34.02	43.82
3.56	7.11	14.23	32.10	10.90
7.11	10.67	5.52	8.98	10.26
10.67	14.23	0.00	0.59	6.89
14.23	17.78	0.00	0.00	0.00
17.78	-	0.00	0.00	0.00
Mean [US survey foot]		0.021306	2.608805	-7.120662
Sigma [US survey foot]		2.589935	3.062195	3.996527
RMS Error [US survey foot]		2.590023	4.022798	8.165541

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]	-1.532666	-0.251990	-9.806050

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]	73.37	65.62	73.05
[-2.00, 2.00]	93.39	93.11	93.48
[-3.00, 3.00]	96.17	96.49	95.03
Mean of Geolocation Accuracy [US survey foot]	3.327645	3.327645	6.353505
Sigma of Geolocation Accuracy [US survey foot]	2.564650	2.564650	4.887852

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

Geolocation Orientational Variance	RMS [degree]
Omega	5.465
Phi	3.265

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) i9-9900K CPU @ 3.60GHz RAM: 64GB GPU: NVIDIA GeForce RTX 2070 (Driver: 31.0.15.4592), CyberLink Mirror Driver (Driver: unknown)
Operating System	Windows 10 Home, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84
Ground Control Point (GCP) Coordinate System	NAD83(2011) / Pennsylvania South (ftUS) (-114.193ft)
Output Coordinate System	NAD83(2011) / Pennsylvania South (ftUS) (-114.193ft)

Processing Options

Detected Template	 3D Maps
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	02h:57m:32s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	36m:59s

Results

Number of Processed Clusters	7
Number of Generated Tiles	10
Number of 3D Densified Points	238372963
Average Density (per US survey foot ³)	8.07

