



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	HAC 3D Smart Oblique 11-19-2024
Processed	2025-02-05 13:19:39
Camera Model Name(s)	M3M_12.3_5280x3956 (RGB)
Average Ground Sampling Distance (GSD)	1.08 cm / 0.43 in
Area Covered	0.025 km ² / 2.5140 ha / 0.01 sq. mi. / 6.2155 acres
Time for Initial Processing (without report)	02h:16m:05s

Quality Check



Images	median of 71278 keypoints per image	
Dataset	500 out of 500 images calibrated (100%), all images enabled	
Camera Optimization	0.97% relative difference between initial and optimized internal camera parameters	
Matching	median of 31265.9 matches per calibrated image	
Georeferencing	yes, no 3D GCP	



Preview

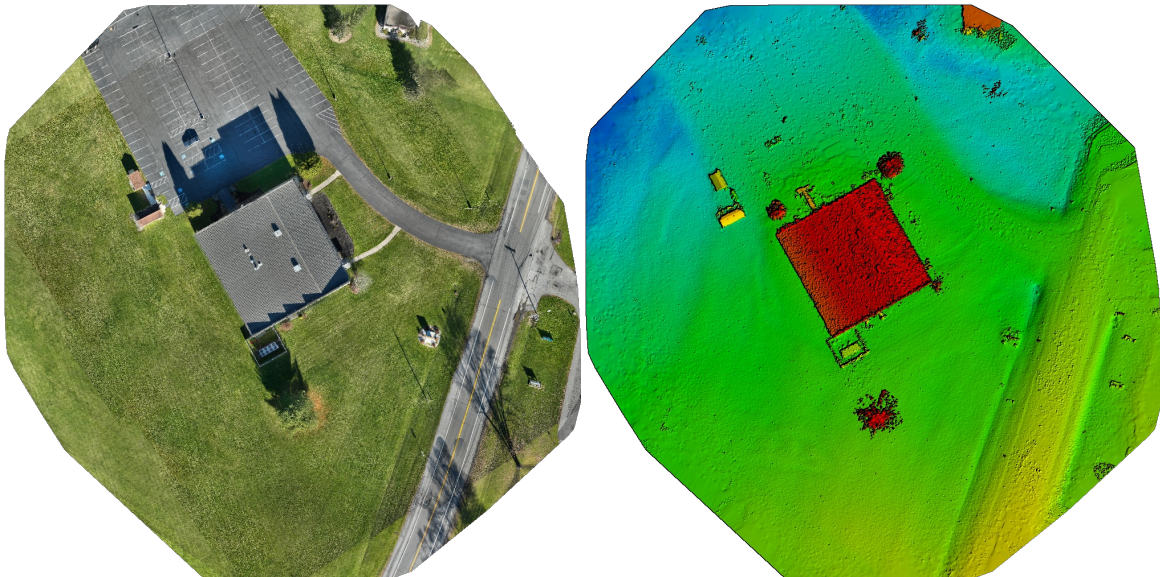


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	500 out of 500
Number of Geolocated Images	500 out of 500

? Initial Image Positions

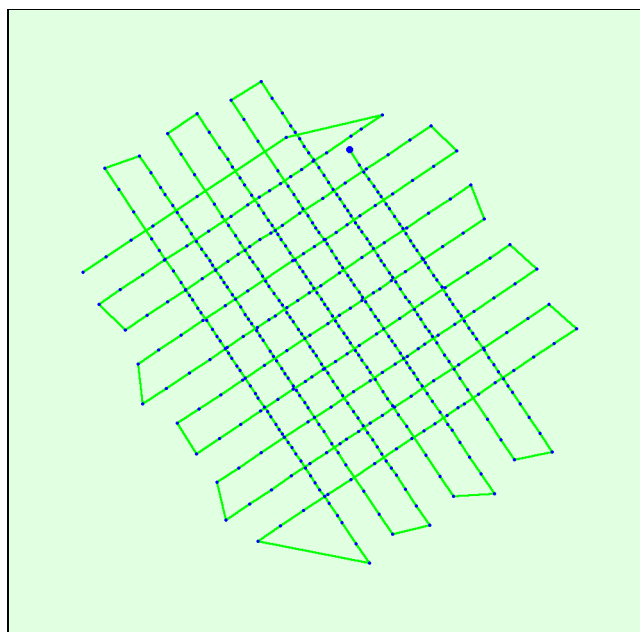
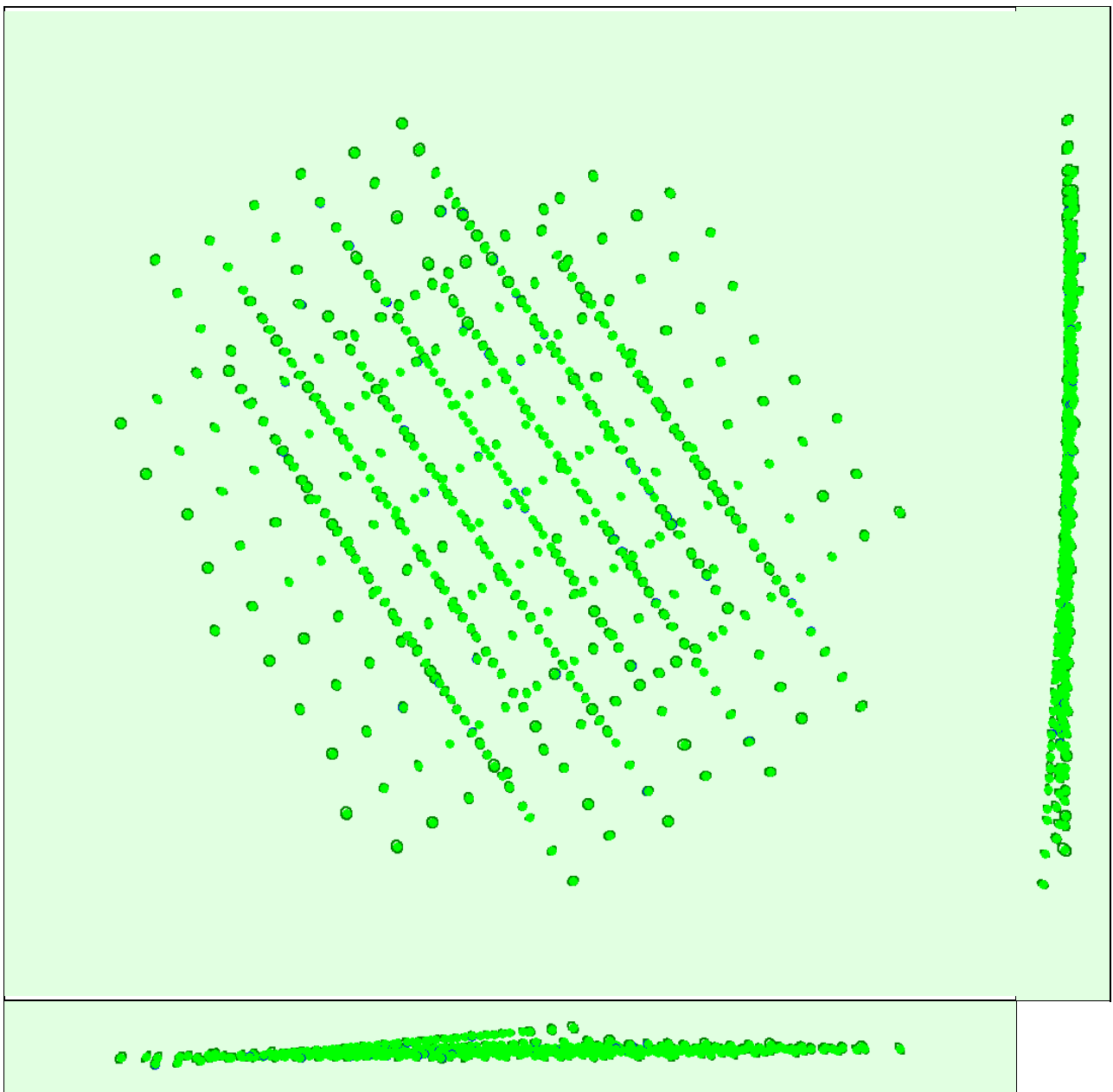


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

? Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 500x 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). 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	0.002	0.002	0.002	0.003	0.003	0.002
Sigma	0.000	0.000	0.000	0.000	0.000	0.000

? Overlap



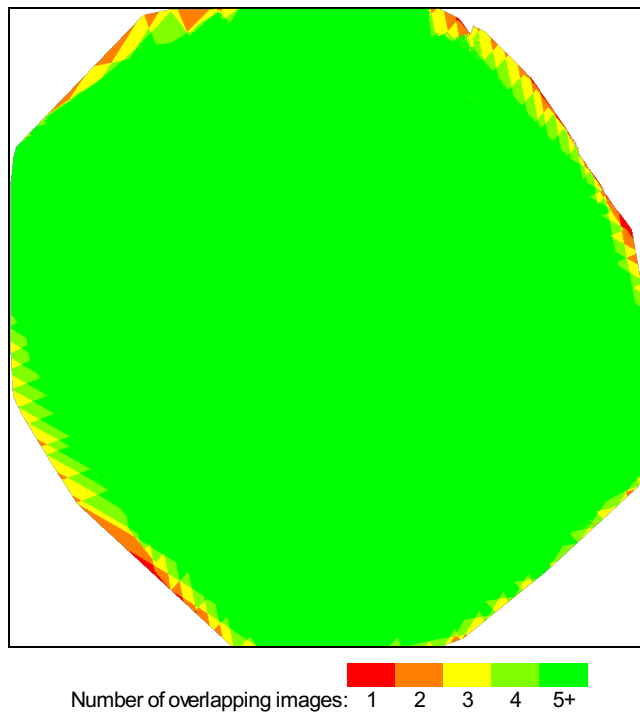


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details ?

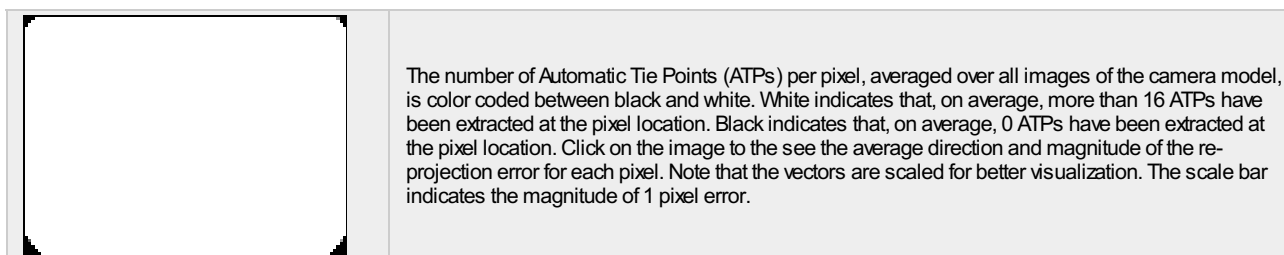
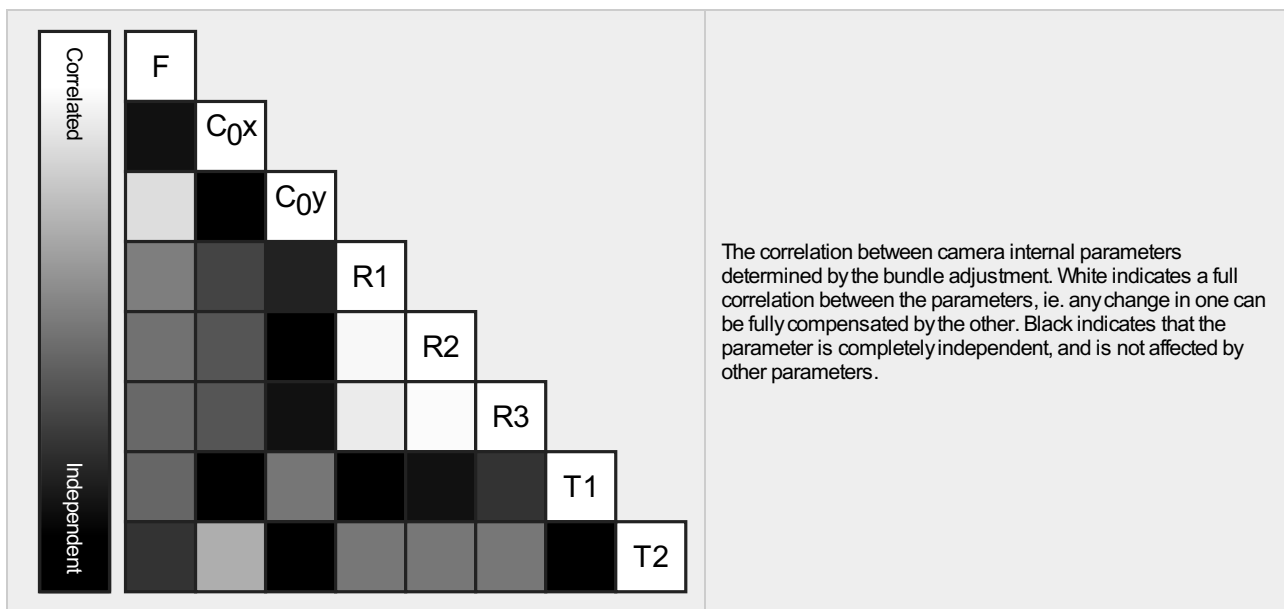
Number of 2D Keypoint Observations for Bundle Block Adjustment	15288606
Number of 3D Points for Bundle Block Adjustment	4705986
Mean Reprojection Error [pixels]	0.211

? Internal Camera Parameters

📷 **M3M_12.3_5280x3956 (RGB). Sensor Dimensions: 17.424 [mm] x 13.055 [mm]** ?

EXIF ID: M3M_12.3_5280x3956

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3675.640 [pixel] 12.130 [mm]	2644.240 [pixel] 8.726 [mm]	1970.210 [pixel] 6.502 [mm]	-0.098	-0.021	0.001	-0.000	-0.000
Optimized Values	3711.524 [pixel] 12.248 [mm]	2646.003 [pixel] 8.732 [mm]	1906.862 [pixel] 6.293 [mm]	-0.106	0.003	-0.020	-0.000	-0.000
Uncertainties (Sigma)	0.038 [pixel] 0.000 [mm]	0.034 [pixel] 0.000 [mm]	0.030 [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	71278	31266
Mn	27249	13283
Max	89967	46248
Mean	68082	30577

? 3D Points from 2D Keypoint Matches



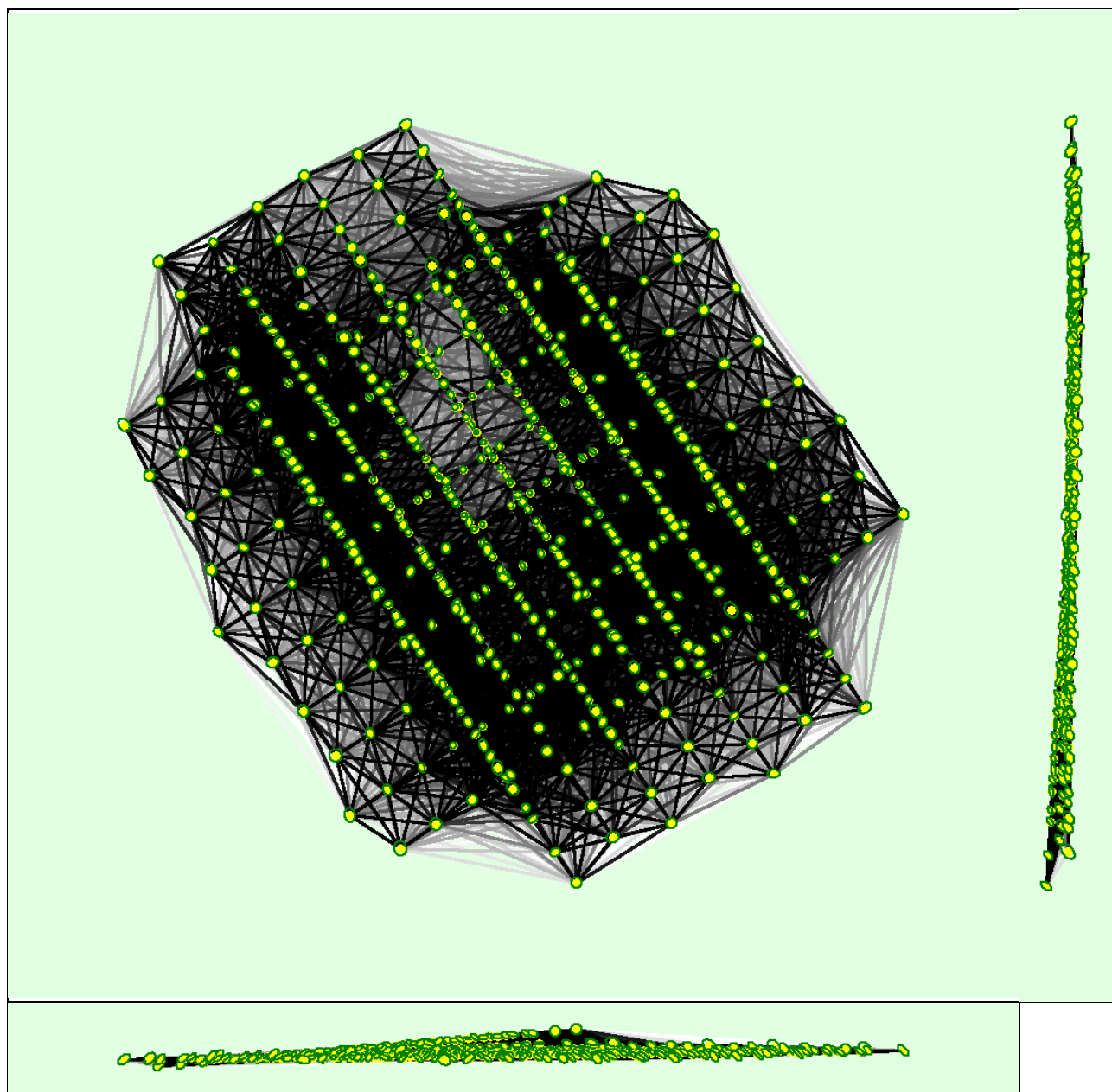
	Number of 3D Points Observed
In 2 Images	2893202
In 3 Images	778027
In 4 Images	361658
In 5 Images	202097
In 6 Images	125704
In 7 Images	83158
In 8 Images	58102
In 9 Images	41469
In 10 Images	31343
In 11 Images	23502
In 12 Images	18251
In 13 Images	14611
In 14 Images	11624
In 15 Images	9281
In 16 Images	7806
In 17 Images	6295
In 18 Images	5446
In 19 Images	4499
In 20 Images	3793
In 21 Images	3282
In 22 Images	2800

In 23 Images	2480
In 24 Images	2053
In 25 Images	1820
In 26 Images	1491
In 27 Images	1337
In 28 Images	1167
In 29 Images	1060
In 30 Images	909
In 31 Images	757
In 32 Images	746
In 33 Images	624
In 34 Images	546
In 35 Images	486
In 36 Images	445
In 37 Images	378
In 38 Images	342
In 39 Images	292
In 40 Images	287
In 41 Images	271
In 42 Images	217
In 43 Images	216
In 44 Images	192
In 45 Images	140
In 46 Images	152
In 47 Images	135
In 48 Images	136
In 49 Images	109
In 50 Images	116
In 51 Images	111
In 52 Images	93
In 53 Images	73
In 54 Images	72
In 55 Images	78
In 56 Images	45
In 57 Images	62
In 58 Images	54
In 59 Images	44
In 60 Images	41
In 61 Images	33
In 62 Images	39
In 63 Images	38
In 64 Images	17
In 65 Images	23
In 66 Images	30
In 67 Images	15
In 68 Images	24
In 69 Images	13
In 70 Images	20
In 71 Images	23
In 72 Images	9
In 73 Images	16
In 74 Images	16
In 75 Images	19
In 76 Images	13
In 77 Images	8
In 78 Images	8
In 79 Images	10
In 80 Images	7
In 81 Images	2

In 82 Images	11
In 83 Images	3
In 84 Images	7
In 85 Images	6
In 86 Images	3
In 87 Images	5
In 88 Images	1
In 89 Images	3
In 90 Images	1
In 91 Images	4
In 92 Images	4
In 93 Images	5
In 96 Images	2
In 97 Images	3
In 98 Images	2
In 100 Images	1
In 102 Images	1
In 104 Images	1
In 105 Images	2
In 106 Images	1
In 108 Images	1
In 109 Images	1
In 110 Images	1
In 111 Images	1
In 115 Images	1
In 116 Images	1
In 120 Images	1
In 124 Images	1
In 132 Images	1
In 136 Images	1

2D Keypoint Matches





Uncertainty ellipses 500x magnified

Number of matches

25 222 444 666 888 1111 1333 1555 1777 2000

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. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties

	X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.002	0.002	0.001	0.003	0.003	0.002
Sigma	0.000	0.000	0.000	0.001	0.001	0.001

Geolocation Details

Absolute Geolocation Variance

Mn Error [m]	Max Error [m]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
--------------	---------------	------------------------	------------------------	------------------------

-	-0.03	0.20	0.00	0.00
-0.03	-0.03	1.00	2.40	0.60
-0.03	-0.02	6.00	7.00	2.80
-0.02	-0.01	11.40	6.40	11.80
-0.01	-0.01	11.40	14.00	24.60
-0.01	0.00	23.60	23.20	20.80
0.00	0.01	19.60	19.40	6.40
0.01	0.01	7.60	8.80	6.60
0.01	0.02	8.20	6.20	15.40
0.02	0.03	8.80	8.80	8.60
0.03	0.03	2.00	3.60	2.40
0.03	-	0.20	0.20	0.00
Mean [m]		-0.000067	0.000046	0.000157
Sigma [m]		0.013242	0.013820	0.013596
RMS Error [m]		0.013242	0.013821	0.013597

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]	58.00	60.60	89.00
[-2.00, 2.00]	90.60	83.40	100.00
[-3.00, 3.00]	99.80	100.00	100.00
Mean of Geolocation Accuracy [m]	0.011089	0.011089	0.020473
Sigma of Geolocation Accuracy [m]	0.000205	0.000205	0.000273

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

Geolocation Orientational Variance	RMS [degree]
Omega	0.646
Phi	0.695
Kappa	0.775

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) Xeon(R) CPU E5-2630 v3 @ 2.40GHz RAM: 64GB GPU: NMDIA Quadro P5000 (Driver: 32.0.15.5612)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems



Image Coordinate System	WGS 84
Output Coordinate System	WGS 84 / UTMzone 18N

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, yes

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: High Resolution 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:13m:21s
Time for Point Cloud Classification	54s
Time for 3D Textured Mesh Generation	50m:21s

Results



Number of Generated Tiles	4
Number of 3D Densified Points	40750837
Average Density (per m ³)	4453.68

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	4 x GSD (1.08 [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
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	5 x GSD (1.08 [cm/pixel])
Contour Lines Generation	Generated: yes Contour Base [m]: 0 Elevation Interval [m]: 0.5 Resolution [cm]: 200 Minimum Line Size [vertices]: 20
Time for DSM Generation	01m:37s
Time for Orthomosaic Generation	29m:03s
Time for DTM Generation	03m:53s
Time for Contour Lines Generation	02s

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