Quality Report

Generated with Pix4Dmapper version 4.6.4

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	Mangroves
Processed	2021-04-15 02:01:40
Camera Model Name(s)	FC6310_8.8_4864x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.28 cm / 0.51 in
Area Covered	0.372 km^2 / 37.1556 ha / 0.14 sq. mi. / 91.8611 acres
Time for Initial Processing (without report)	08m:39s

Quality Check

Images	median of 73104 keypoints per image	✓
Dataset	169 out of 172 images calibrated (98%), all images enabled, 2 blocks	⚠
Camera Optimization	0.21% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 4080.1 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

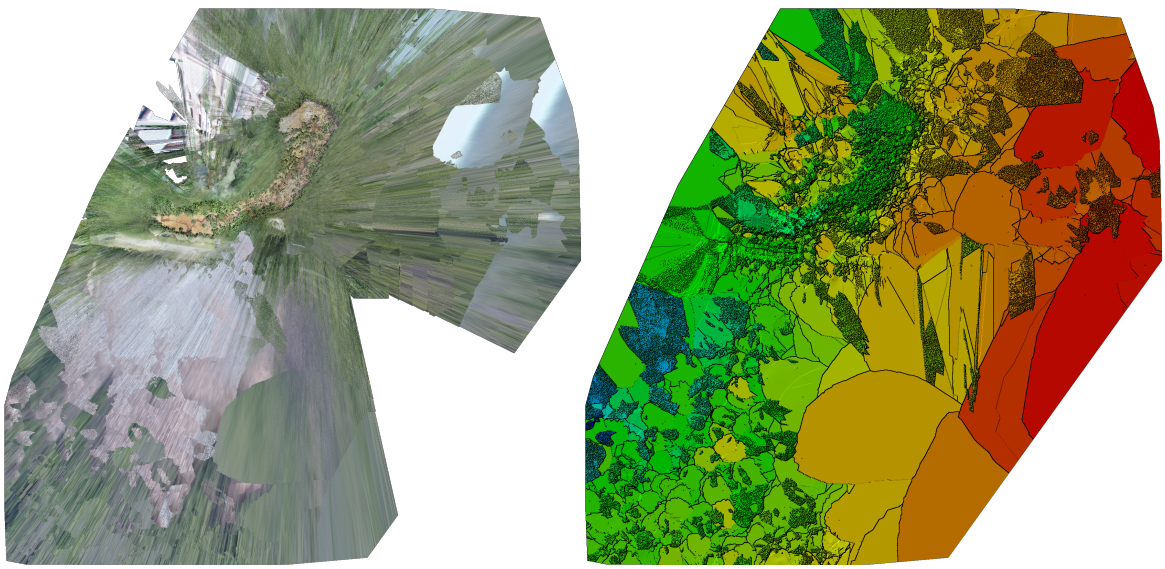


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	169 out of 172
Number of Geolocated Images	172 out of 172

Initial Image Positions

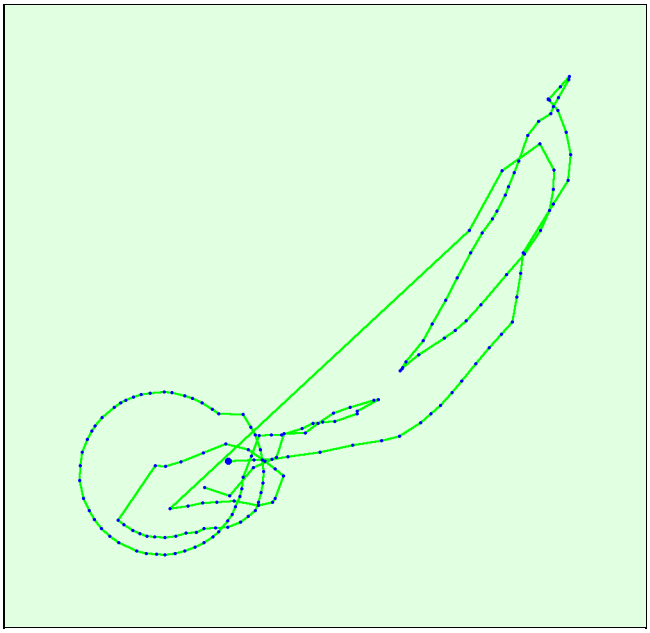
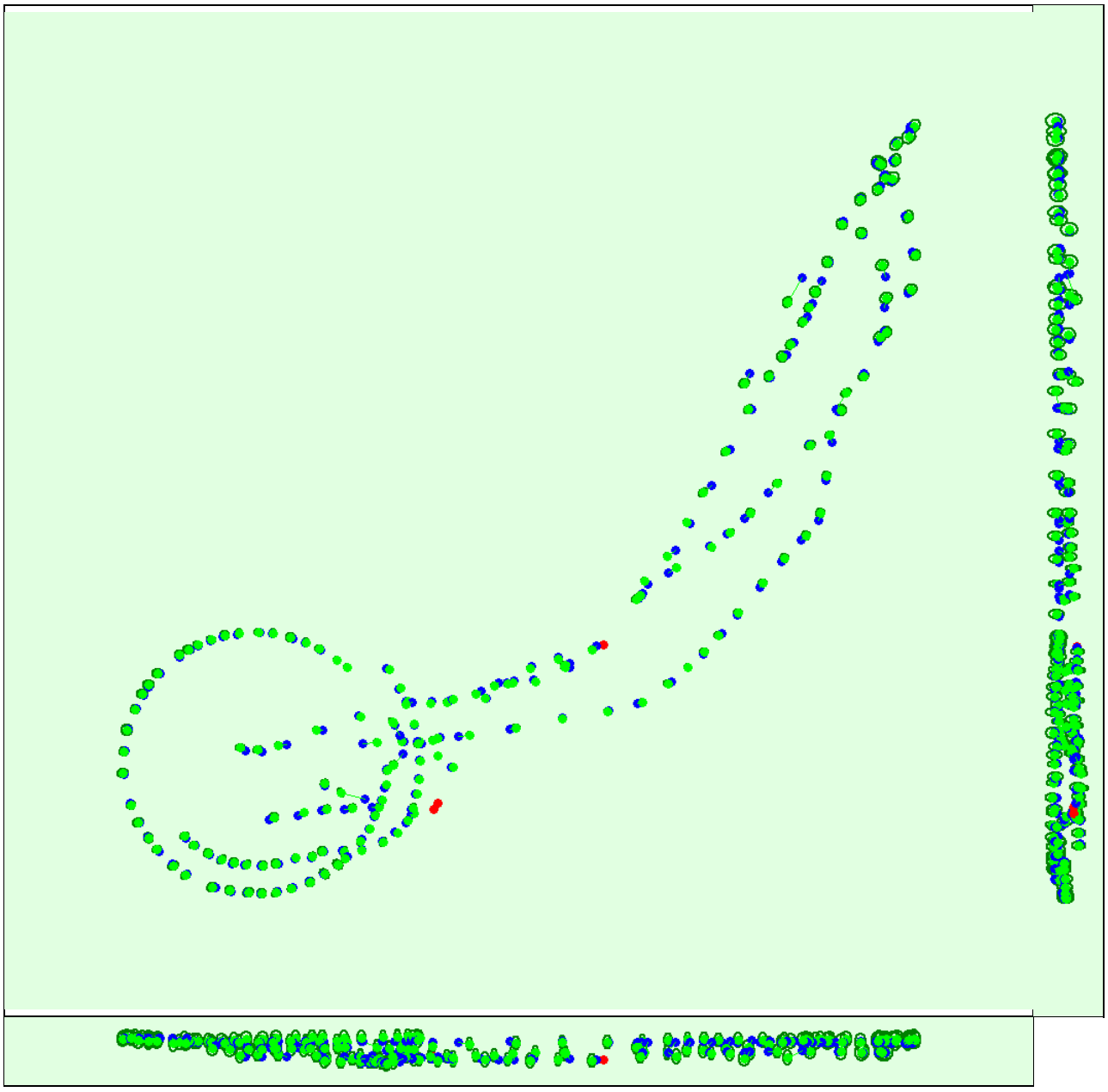


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 5x 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 [ft]	Y [ft]	Z [ft]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.620	0.610	1.040	0.137	0.103	0.143
Sigma	0.125	0.127	0.097	0.027	0.013	0.055

Overlap

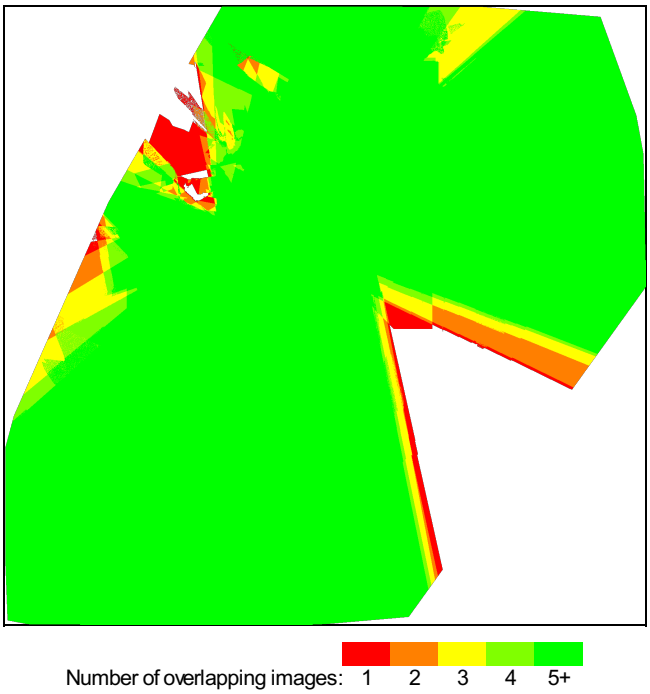


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

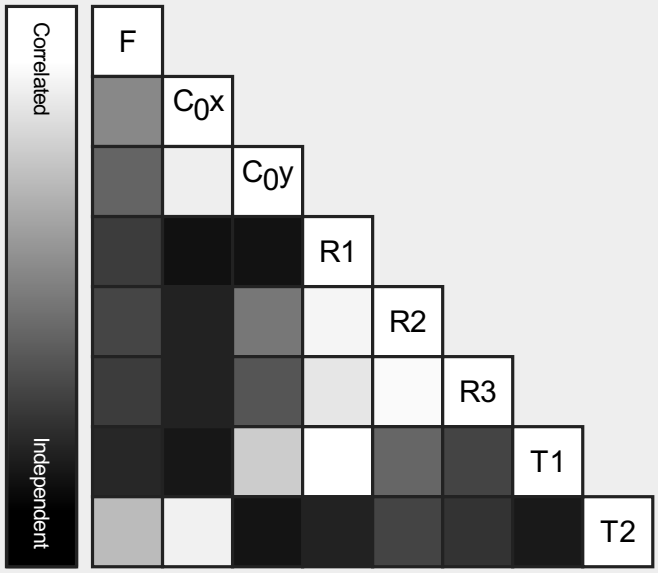
Number of 2D Keypoint Observations for Bundle Block Adjustment	934413
Number of 3D Points for Bundle Block Adjustment	388864
Mean Reprojection Error [pixels]	0.163

Internal Camera Parameters

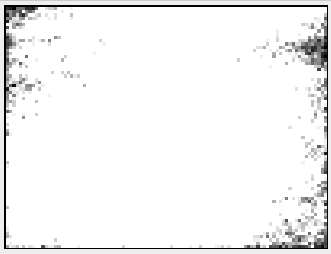
FC6310_8.8_4864x3648 (RGB). Sensor Dimensions: 11.407 [mm] x 8.556 [mm]

EXIF ID: FC6310_8.8_4864x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3666.955 [pixel] 8.600 [mm]	2432.001 [pixel] 5.704 [mm]	1823.999 [pixel] 4.278 [mm]	0.004	-0.017	0.019	-0.000	0.000
Optimized Values	3658.997 [pixel] 8.581 [mm]	2425.944 [pixel] 5.689 [mm]	1832.420 [pixel] 4.298 [mm]	0.007	-0.026	0.025	0.000	-0.000
Uncertainties (Sigma)	0.177 [pixel] 0.000 [mm]	0.283 [pixel] 0.001 [mm]	0.286 [pixel] 0.001 [mm]	0.000	0.001	0.001	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	73104	4080
Min	49062	294
Max	85463	18344
Mean	72028	5529

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	304922
In 3 Images	51718
In 4 Images	16377
In 5 Images	6844
In 6 Images	3619
In 7 Images	1987
In 8 Images	1147
In 9 Images	727
In 10 Images	512
In 11 Images	307
In 12 Images	222
In 13 Images	154
In 14 Images	92
In 15 Images	84
In 16 Images	60
In 17 Images	39
In 18 Images	25
In 19 Images	16
In 20 Images	4
In 21 Images	5
In 23 Images	2

In 26 Images	1

2D Keypoint Matches

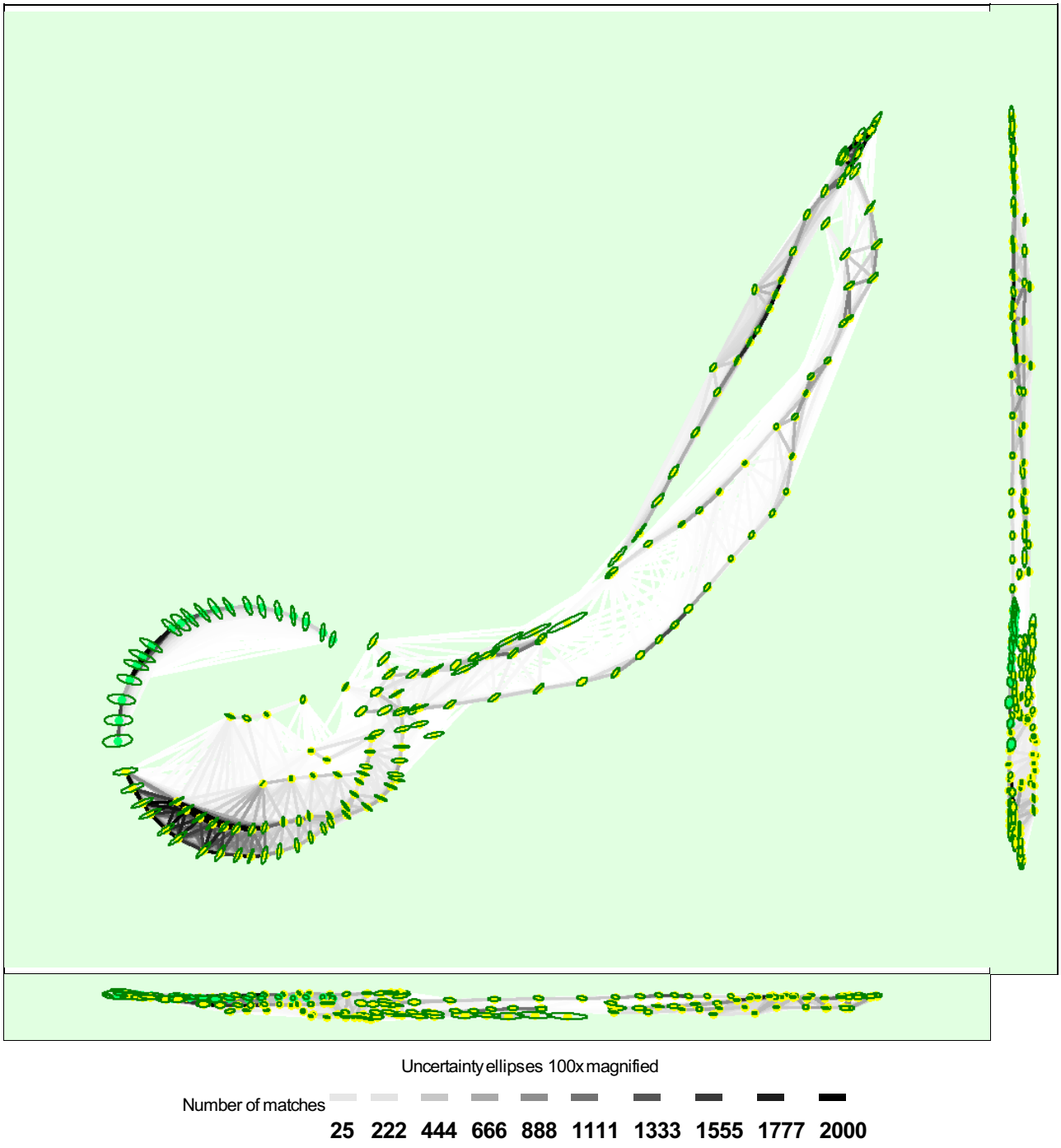


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties

	X [ft]	Y [ft]	Z [ft]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.043	0.041	0.014	0.011	0.008	0.012
Sigma	0.025	0.017	0.004	0.002	0.003	0.005

Geolocation Details

Absolute Geolocation Variance

Min Error [ft]	Max Error [ft]	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	0.00	0.00
-29.53	-19.69	0.00	0.00	0.00
-19.69	-9.84	0.59	1.18	0.00
-9.84	0.00	50.30	50.30	53.25
0.00	9.84	47.93	47.93	46.75
9.84	19.69	1.18	0.59	0.00
19.69	29.53	0.00	0.00	0.00
29.53	39.37	0.00	0.00	0.00
39.37	49.21	0.00	0.00	0.00
49.21	-	0.00	0.00	0.00
Mean [ft]		0.006276	0.013739	-0.015407
Sigma [ft]		2.991891	2.796684	2.169144
RMS Error [ft]		2.991898	2.796718	2.169199

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]	99.41	99.41	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 [ft]	16.404199	16.404199	32.808399
Sigma of Geolocation Accuracy [ft]	0.000001	0.000001	0.000003

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

Geolocation Orientational Variance	RMS [degree]
Omega	3.571
Phi	3.800
Kappa	5.768

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 5 2600 Six-Core Processor RAM: 16GB GPU: NVIDIA GeForce GTX 1060 6GB (Driver: 27.21.14.5751)
Operating System	Windows 10 Home, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	WGS 84 / UTM zone 17N (ft) (EGM96 Geoid)

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, 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: 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	15m:02s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	03m:33s

Results

Number of Generated Tiles	1
Number of 3D Densified Points	10211771
Average Density (per ft^3)	20.18

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (1.28 [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	29m:27s
Time for Orthomosaic Generation	01h:01m:56s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s