Quality Report

Generated with Pix4Denterprise version 4.4.12

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	tw_miaoli_zhunan_hsinggang-river_20190411
Processed	2019-12-15 01:37:21
Camera Model Name(s)	FC6310R_8.8_4864x3648 (RGB)
Average Ground Sampling Distance (GSD)	3.63 cm / 1.43 in
Area Covered	0.286 km^2 / 28.5752 ha / 0.11 sq. mi. / 70.6475 acres
Time for Initial Processing (without report)	29m:36s

Quality Check

Images	median of 40830 keypoints per image	✓
Dataset	299 out of 299 images calibrated (100%), all images enabled	✓
Camera Optimization	0.49% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 14570.2 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

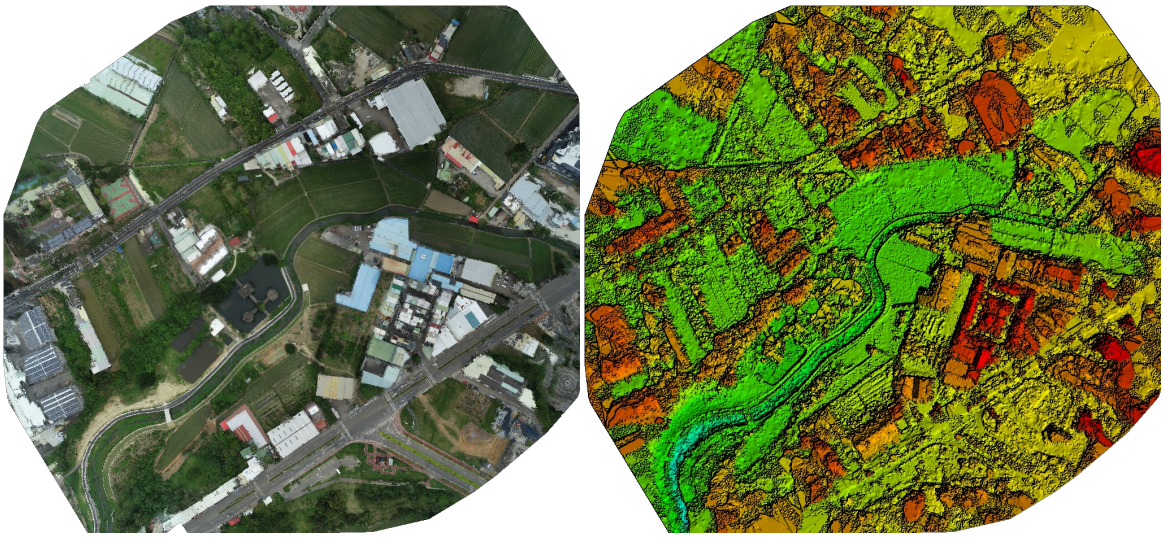


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	299 out of 299
Number of Geolocated Images	299 out of 299

Initial Image Positions

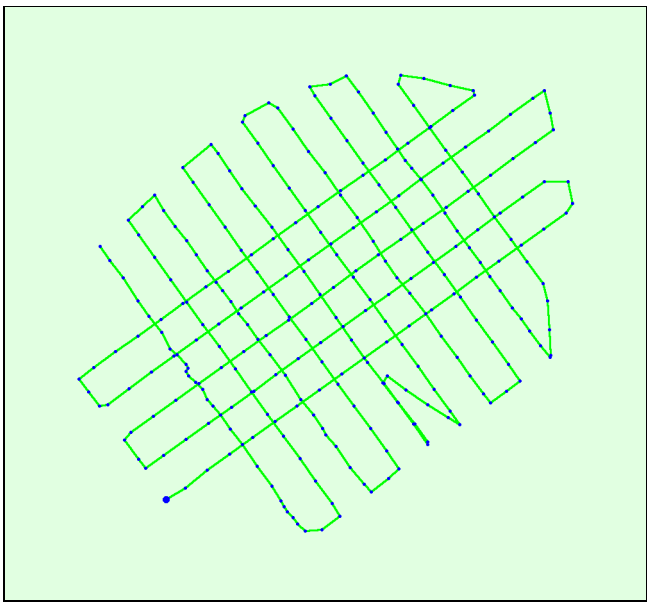
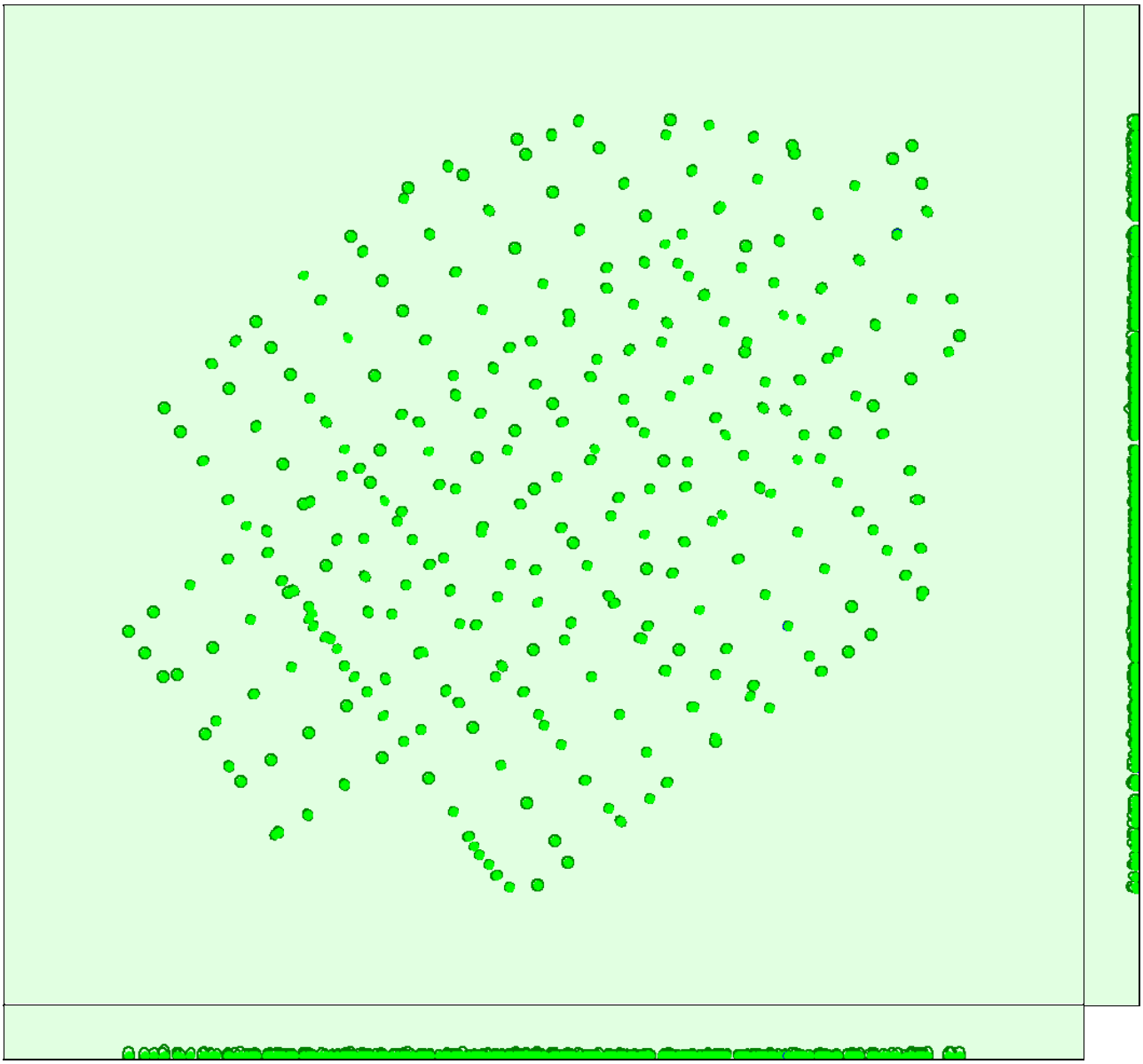


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 1000x 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	0.003	0.002	0.001	0.001
Sigma	0.000	0.000	0.000	0.000	0.000	0.000

Overlap

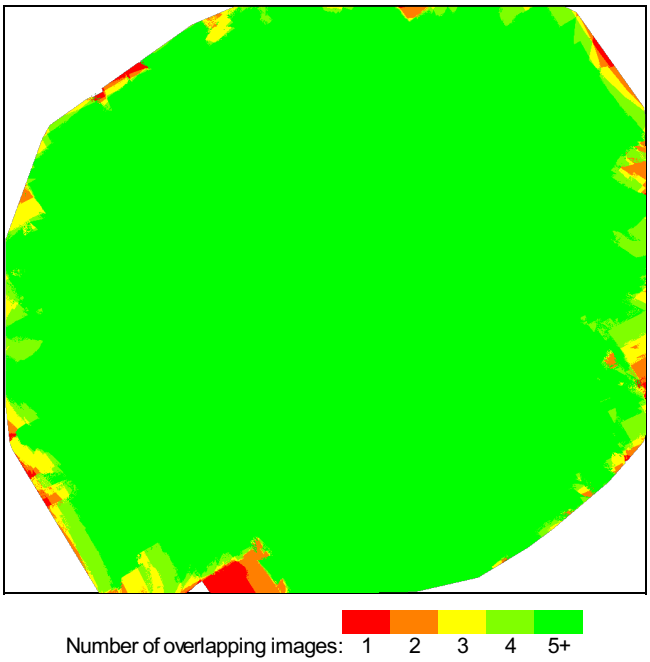


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

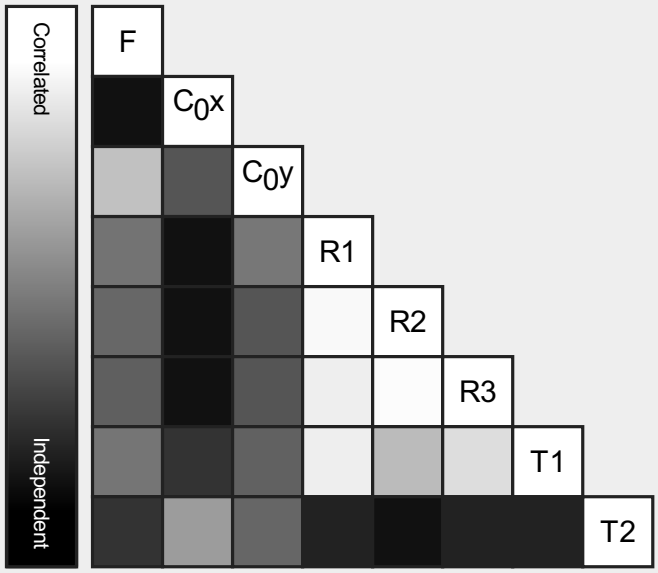
Number of 2D Keypoint Observations for Bundle Block Adjustment	4458236
Number of 3D Points for Bundle Block Adjustment	1532545
Mean Reprojection Error [pixels]	0.189

Internal Camera Parameters

FC6310R_8.8_4864x3648 (RGB). Sensor Dimensions: 11.407 [mm] x 8.556 [mm]

EXIF ID: FC6310R_8.8_4864x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3666.840 [pixel] 8.600 [mm]	2420.300 [pixel] 5.676 [mm]	1835.990 [pixel] 4.306 [mm]	-0.270	0.112	-0.032	0.000	-0.001
Optimized Values	3648.742 [pixel] 8.557 [mm]	2421.342 [pixel] 5.679 [mm]	1848.072 [pixel] 4.334 [mm]	-0.269	0.117	-0.037	0.001	0.000
Uncertainties (Sigma)	0.051 [pixel] 0.000 [mm]	0.050 [pixel] 0.000 [mm]	0.065 [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	40830	14570
Min	21419	2850
Max	63143	25374
Mean	39442	14910

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	1014912
In 3 Images	250532
In 4 Images	103674
In 5 Images	54345
In 6 Images	32517
In 7 Images	21059
In 8 Images	13924
In 9 Images	9833
In 10 Images	7158
In 11 Images	5284
In 12 Images	4068
In 13 Images	3005
In 14 Images	2333
In 15 Images	1798
In 16 Images	1468
In 17 Images	1170
In 18 Images	944
In 19 Images	778
In 20 Images	595
In 21 Images	487
In 22 Images	431

In 23 Images	362
In 24 Images	287
In 25 Images	229
In 26 Images	187
In 27 Images	174
In 28 Images	139
In 29 Images	131
In 30 Images	100
In 31 Images	101
In 32 Images	78
In 33 Images	83
In 34 Images	52
In 35 Images	48
In 36 Images	44
In 37 Images	31
In 38 Images	18
In 39 Images	23
In 40 Images	11
In 41 Images	20
In 42 Images	15
In 43 Images	17
In 44 Images	9
In 45 Images	6
In 46 Images	11
In 47 Images	5
In 48 Images	8
In 49 Images	4
In 50 Images	3
In 51 Images	6
In 52 Images	2
In 53 Images	4
In 54 Images	2
In 55 Images	2
In 56 Images	3
In 57 Images	1
In 58 Images	1
In 59 Images	3
In 60 Images	2
In 61 Images	1
In 62 Images	1
In 64 Images	3
In 65 Images	1
In 68 Images	1
In 71 Images	1

2D Keypoint Matches

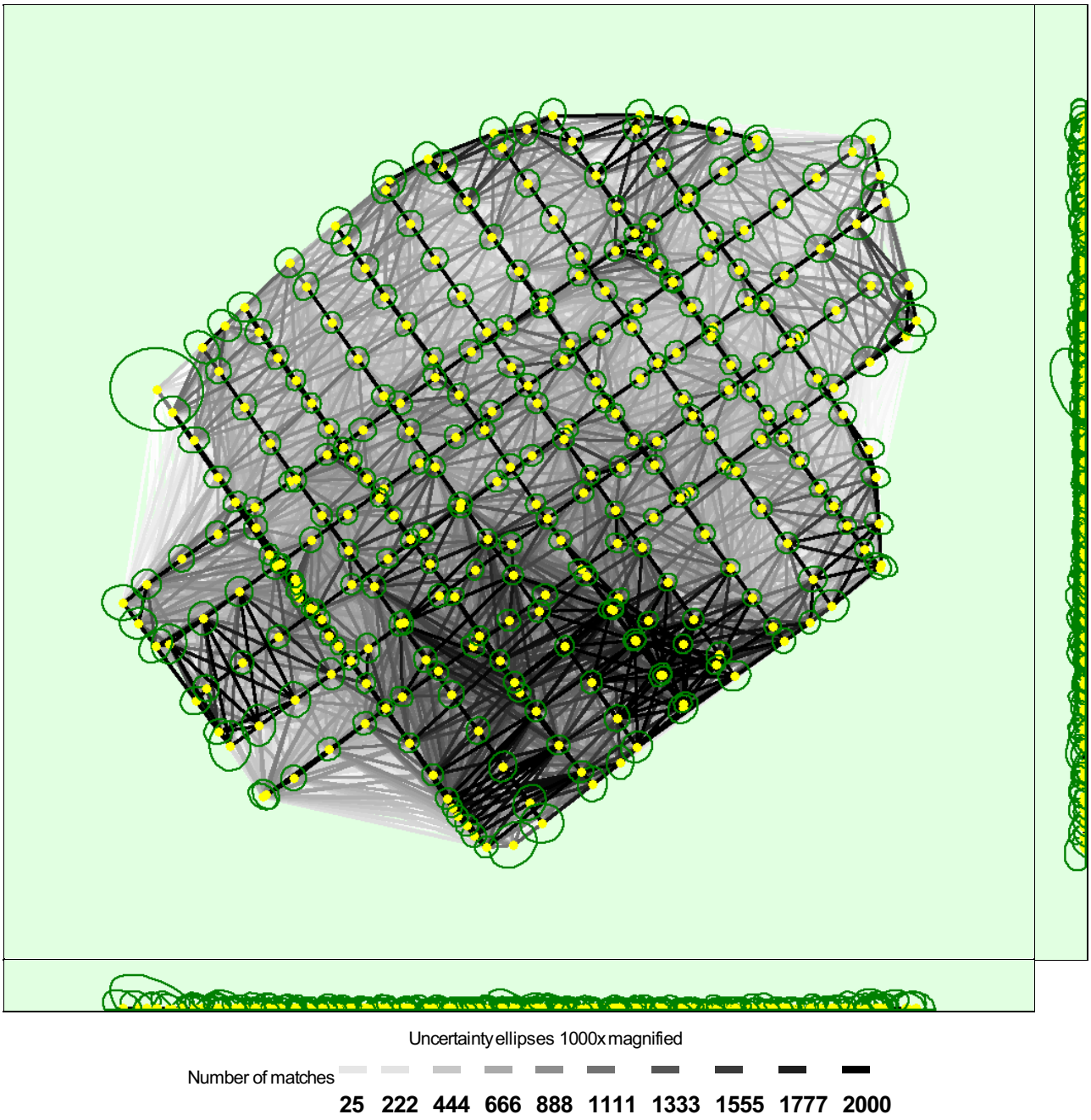


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty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

Relative camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.005	0.005	0.005	0.004	0.003	0.002
Sigma	0.001	0.001	0.001	0.001	0.001	0.001

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.03	0.00	0.00	0.00
-0.03	-0.03	0.00	0.00	0.00

-0.03	-0.02	0.00	0.00	0.00
-0.02	-0.01	0.00	0.00	1.00
-0.01	-0.01	0.00	0.00	13.71
-0.01	0.00	48.83	51.17	35.12
0.00	0.01	51.17	48.49	38.80
0.01	0.01	0.00	0.33	10.03
0.01	0.02	0.00	0.00	0.67
0.02	0.03	0.00	0.00	0.67
0.03	0.03	0.00	0.00	0.00
0.03	-	0.00	0.00	0.00
Mean [m]		0.000013	0.000001	-0.000050
Sigma [m]		0.001812	0.001888	0.005971
RMS Error [m]		0.001812	0.001888	0.005971

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]	100.00	100.00	99.67
[-2.00, 2.00]	100.00	100.00	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	0.009591	0.009591	0.020625
Sigma of Geolocation Accuracy [m]	0.000308	0.000308	0.000707

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

Geolocation Orientational Variance	RMS [degree]
Omega	0.795
Phi	0.889
Kappa	2.288

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) Platinum 8124M CPU @ 3.00GHz RAM: 69GB GPU: no info (Driver: unknown)
Operating System	Linux 4.15.0-1054-aws x86_64

Coordinate Systems

Image Coordinate System	WGS 84
Output Coordinate System	TWD97 / TM2 zone 121

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: yes
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Geolocation Based 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: yes
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	29m:13s
Time for Point Cloud Classification	01m:41s
Time for 3D Textured Mesh Generation	16m:55s

Results

Number of Generated Tiles	1
Number of 3D Densified Points	25992006
Average Density (per m^3)	76.9

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (3.63 [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: yes
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	10 x GSD (3.63 [cm/pixel])
Time for DSM Generation	00s
Time for Orthomosaic Generation	02h:19m:58s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s