

Quality Report



Generated with Pix4Denterprise version 3.2.23



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_sanyi_yutenping
Processed	2017-07-25 15:56:25
Camera Model Name(s)	FC330_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.09 cm / 2 in
Area Covered	0.362 km ² / 36.1987 ha / 0.1398 sq. mi. / 89.4953 acres
Time for Initial Processing (without report)	02h:17m:20s

Quality Check



Images	median of 50382 keypoints per image	
Dataset	403 out of 403 images calibrated (100%), all images enabled, 2 blocks	
Camera Optimization	3.47% relative difference between initial and optimized internal camera parameters	
Matching	median of 10692.3 matches per calibrated image	
Georeferencing	yes, no 3D GCP	

Preview

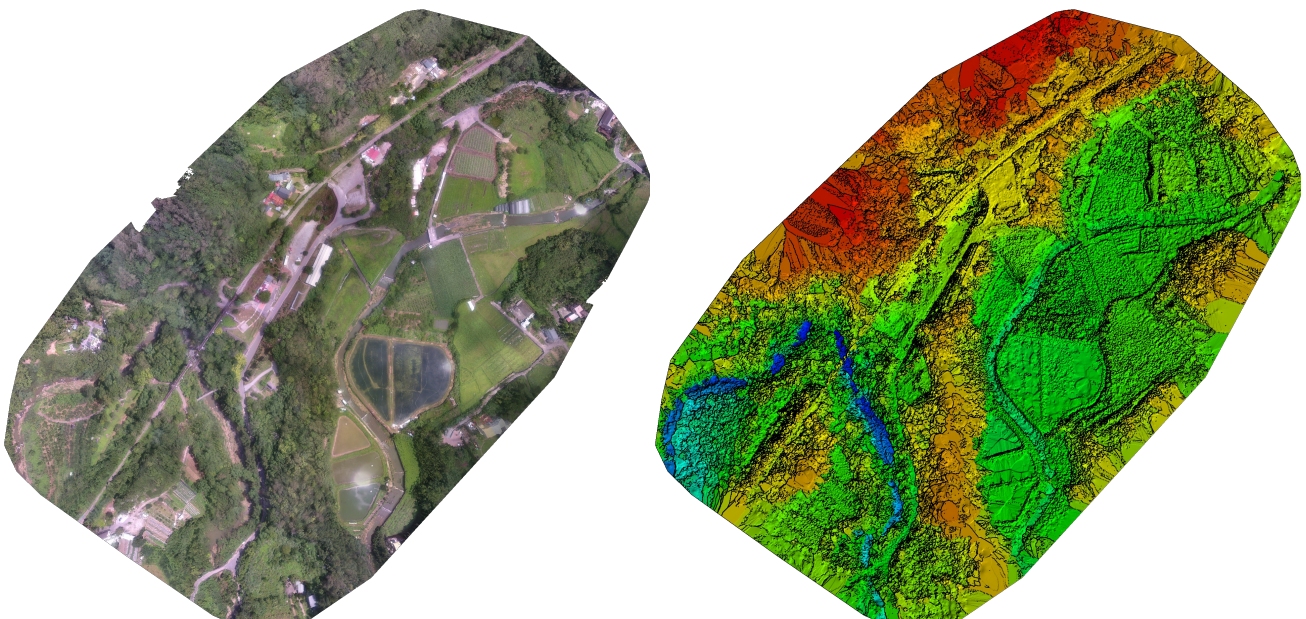


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	403 out of 403
Number of Geolocated Images	403 out of 403

Initial Image Positions

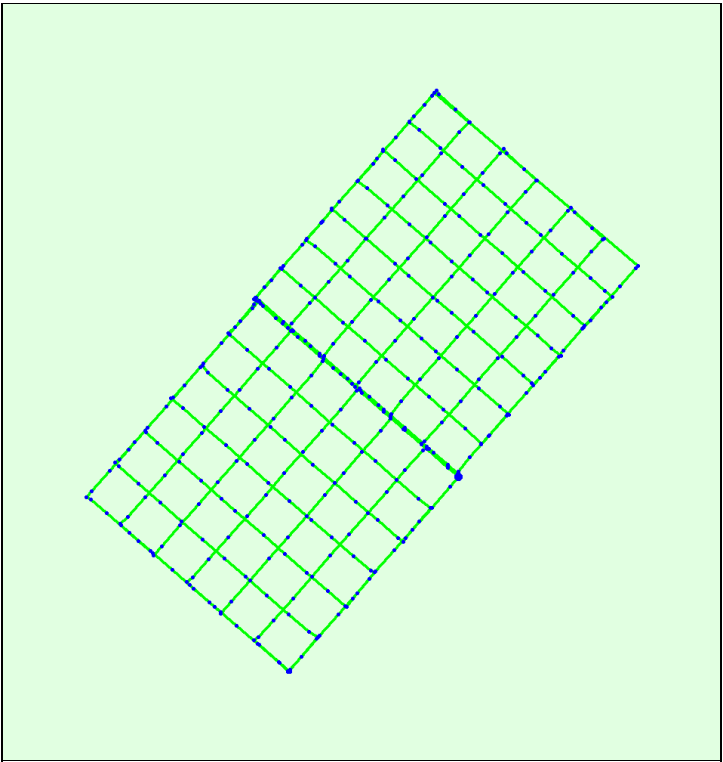
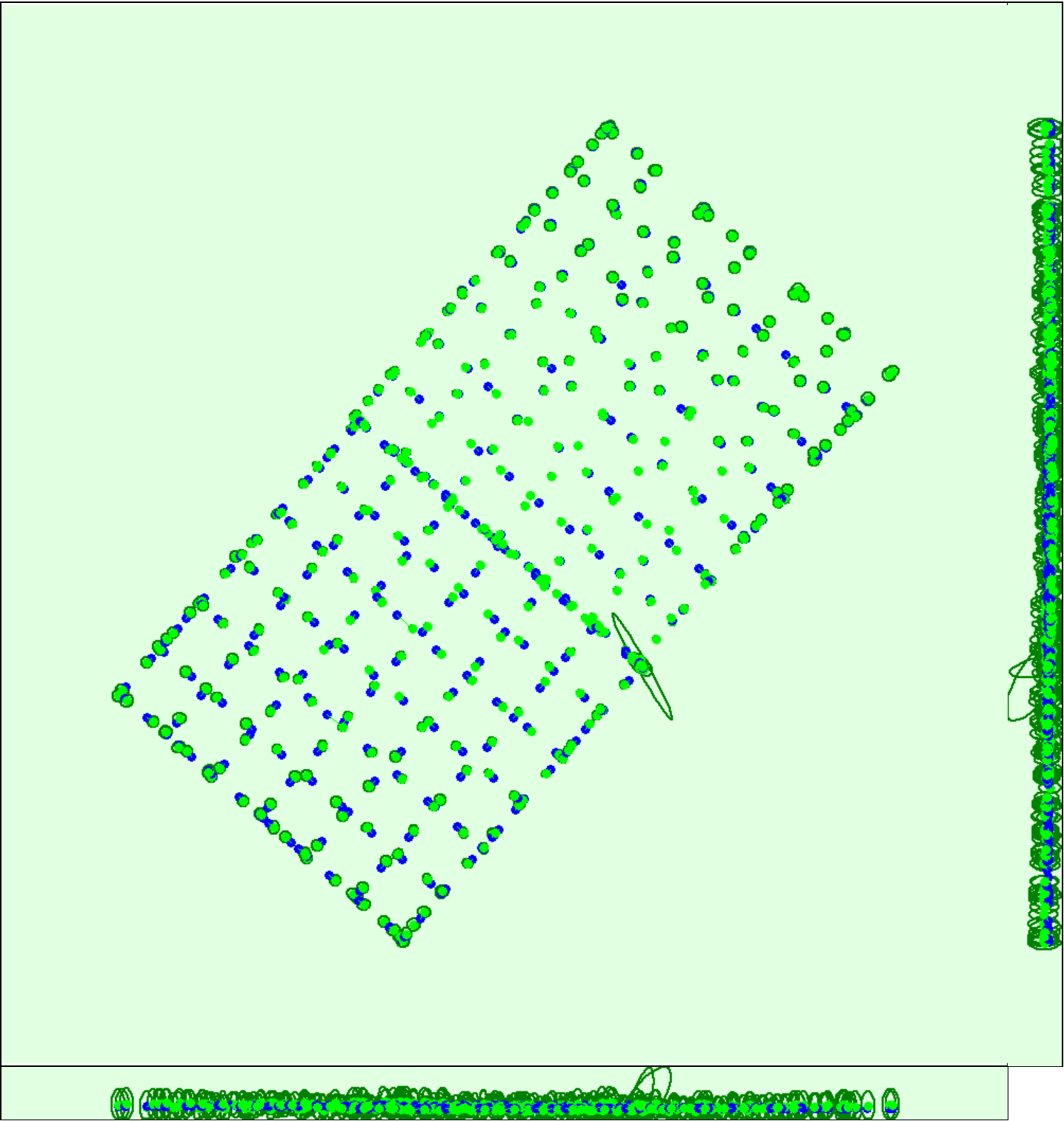


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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). 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	0.694	0.703	1.671	0.636	0.513	0.348
Sigma	0.236	0.388	0.470	2.388	0.855	1.692

🔍 Overlap



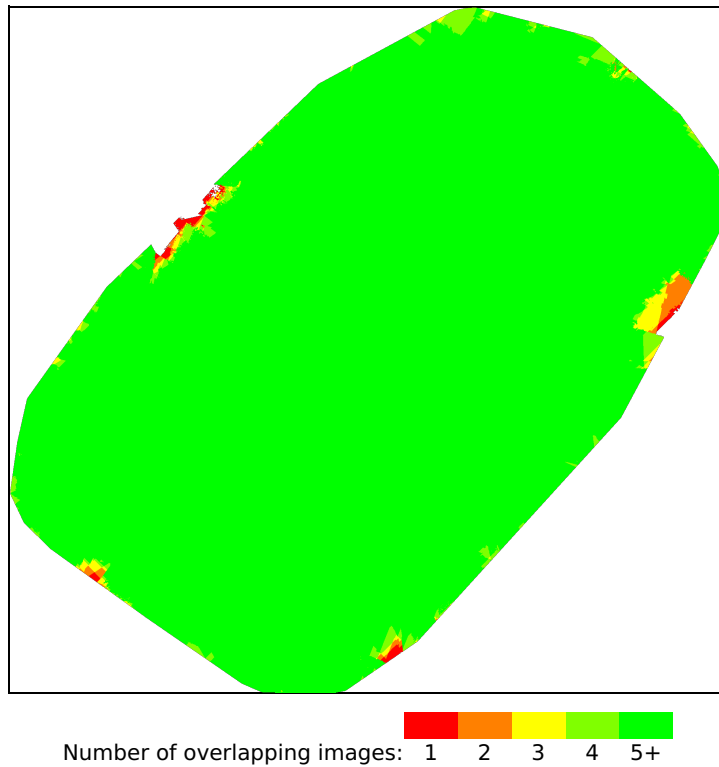


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

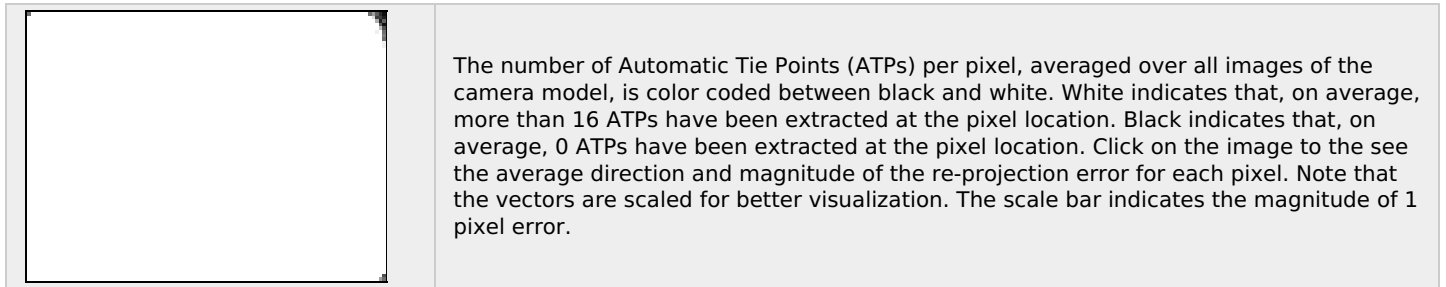
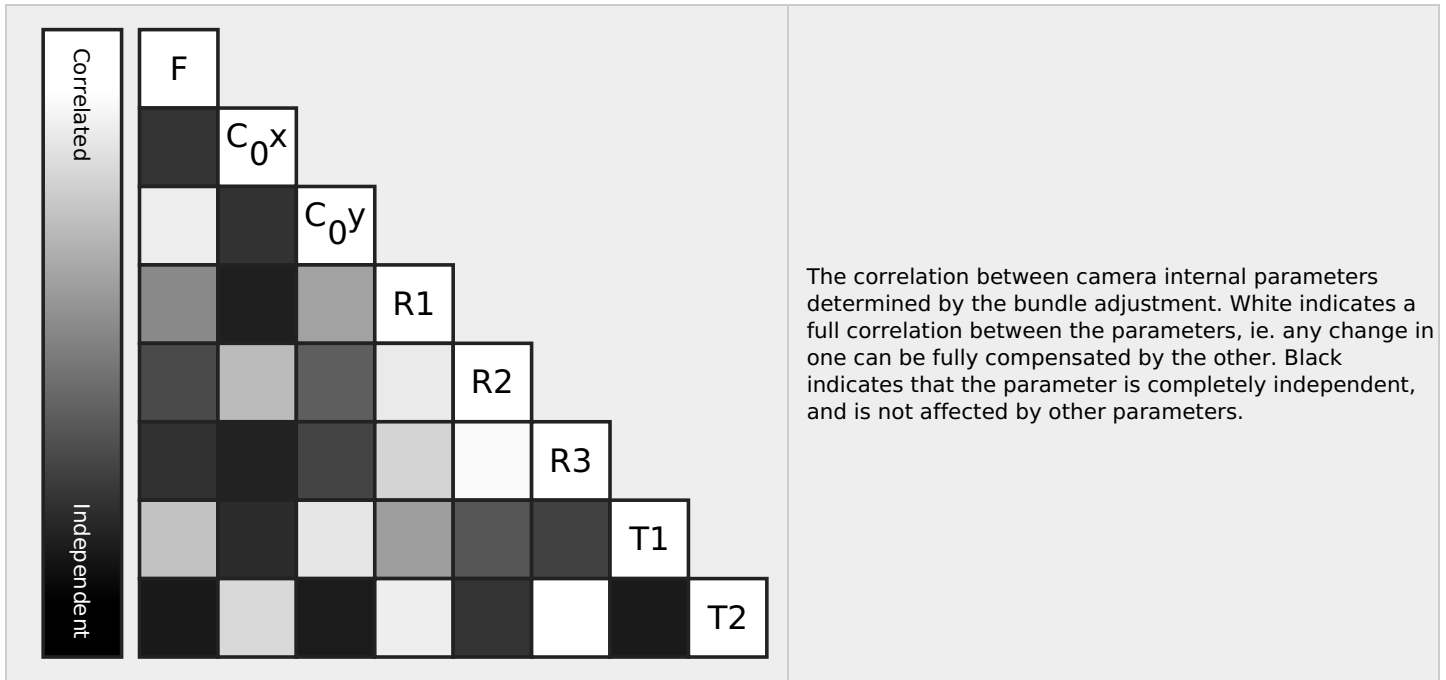
Number of 2D Keypoint Observations for Bundle Block Adjustment	4471087
Number of 3D Points for Bundle Block Adjustment	1803357
Mean Reprojection Error [pixels]	0.291

Internal Camera Parameters

FC330_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

EXIF ID: FC330_3.6_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2285.722 [pixel] 3.610 [mm]	2000.006 [pixel] 3.159 [mm]	1500.003 [pixel] 2.369 [mm]	-0.001	-0.002	0.000	-0.001	-0.001
Optimized Values	2365.099 [pixel] 3.735 [mm]	2060.338 [pixel] 3.254 [mm]	1457.063 [pixel] 2.301 [mm]	0.119	-0.138	0.040	0.001	-0.000
Uncertainties (Sigma)	1.175 [pixel] 0.002 [mm]	0.246 [pixel] 0.000 [mm]	0.778 [pixel] 0.001 [mm]	0.001	0.001	0.001	0.000	0.000



? 2D Keypoints Table i

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	50382	10692
Min	20087	23
Max	67073	25110
Mean	49735	11095

? 3D Points from 2D Keypoint Matches i

	Number of 3D Points Observed
In 2 Images	1404757
In 3 Images	230707
In 4 Images	75674
In 5 Images	34969
In 6 Images	19272
In 7 Images	11507
In 8 Images	7441
In 9 Images	5063
In 10 Images	3487
In 11 Images	2434
In 12 Images	1766
In 13 Images	1405
In 14 Images	976
In 15 Images	809
In 16 Images	611

In 17 Images	440
In 18 Images	360
In 19 Images	313
In 20 Images	233
In 21 Images	196
In 22 Images	143
In 23 Images	131
In 24 Images	112
In 25 Images	101
In 26 Images	96
In 27 Images	54
In 28 Images	44
In 29 Images	28
In 30 Images	38
In 31 Images	32
In 32 Images	28
In 33 Images	27
In 34 Images	15
In 35 Images	16
In 36 Images	13
In 37 Images	8
In 38 Images	7
In 39 Images	9
In 40 Images	6
In 41 Images	4
In 42 Images	5
In 43 Images	7
In 44 Images	3
In 45 Images	1
In 46 Images	1
In 48 Images	3
In 49 Images	1
In 50 Images	1
In 51 Images	2
In 53 Images	1

2D Keypoint Matches



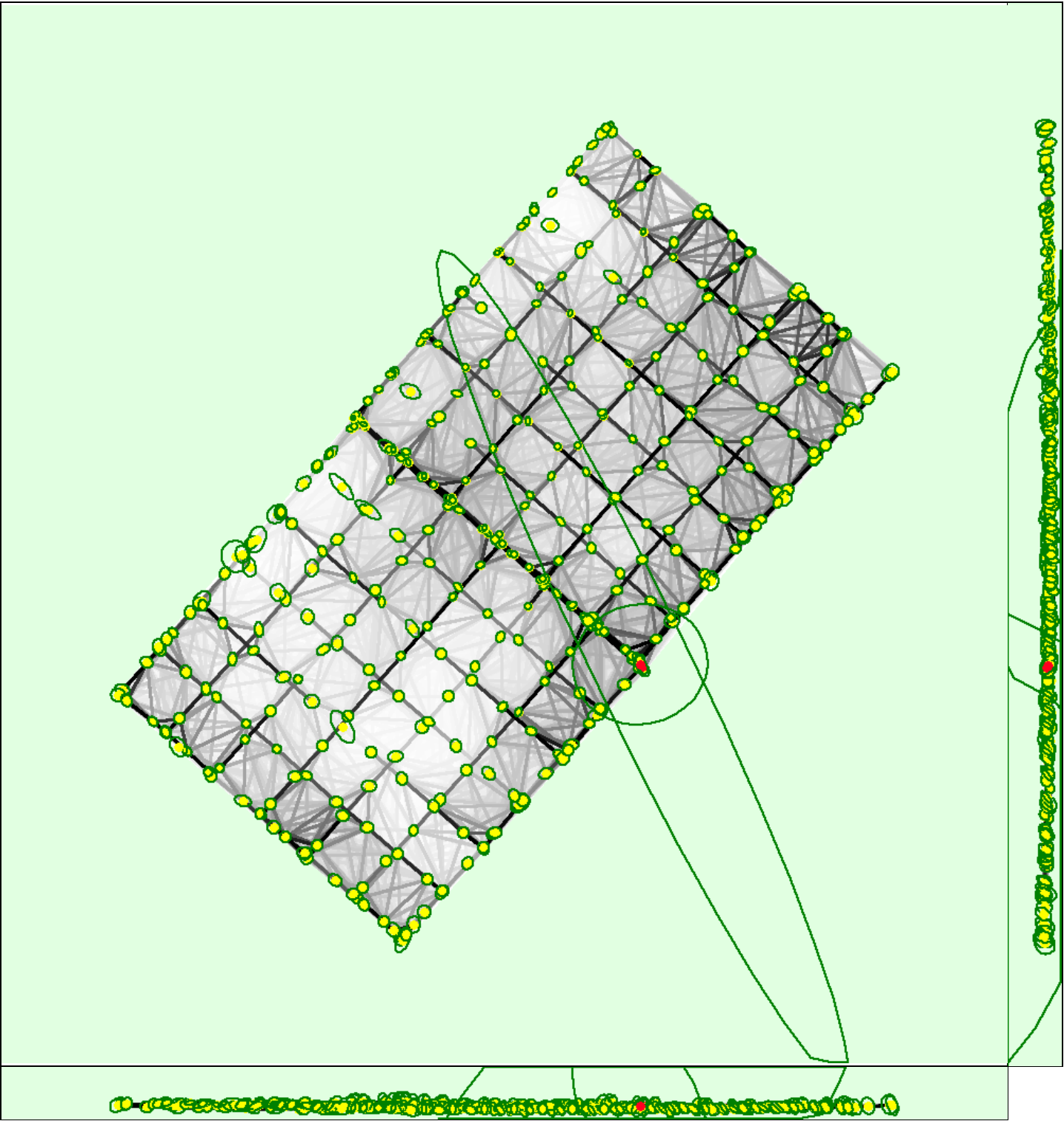


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty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

2 Relative camera position and orientation uncertainties



	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.089	0.096	0.088	0.220	0.106	0.144
Sigma	0.159	0.311	0.134	2.486	0.905	1.751

Geolocation Details

? Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-15.00	0.00	0.00	0.00
-15.00	-12.00	0.25	0.00	0.00
-12.00	-9.00	0.25	0.00	0.00
-9.00	-6.00	0.00	0.00	0.00
-6.00	-3.00	18.11	17.37	2.48
-3.00	0.00	24.81	31.51	45.41
0.00	3.00	37.97	31.27	50.87
3.00	6.00	16.13	19.35	1.24
6.00	9.00	2.48	0.00	0.00
9.00	12.00	0.00	0.50	0.00
12.00	15.00	0.00	0.00	0.00
15.00	-	0.00	0.00	0.00
Mean [m]		0.000000	-0.000000	-0.000001
Sigma [m]		2.830120	2.707146	1.433811
RMS Error [m]		2.830120	2.707146	1.433811

Min Error and Max Error represent geolocation error intervalsbetween -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 intial 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]	93.55	93.55	100.00
[-2.00, 2.00]	99.50	99.75	100.00
[-3.00, 3.00]	100.00	100.00	100.00
Mean of Geolocation Accuracy [m]	5.000000	5.000000	10.000000
Sigma of Geolocation Accuracy [m]	0.000000	0.000000	0.000000

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

Geolocation Orientational Variance	RMS [degree]
Omega	3.333
Phi	1.876
Kappa	3.615

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 E5-2666 v3 @ 2.90GHz RAM: 59GB GPU: Cirrus Logic GD 5446 (Driver: unknown)
Operating System	Linux 3.13.0-91-generic x86_64

Coordinate Systems



Image Coordinate System	WGS84 (egm96)
Output Coordinate System	TWD97 / TM2 zone 121 (egm96)

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: Geolocation Based Internal Parameters Optimization: All External Parameters Optimization: All Lever-Arm Parameters Optimization: None Rematch: Auto, yes Bundle Adjustment: Classic

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
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Matching Window Size	7x7 pixels
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Advanced: Limit Camera Depth Automatically	yes
Time for Point Cloud Densification	18m:26s
Time for 3D Textured Mesh Generation	16m:08s

Results



Number of Generated Tiles	1
Number of 3D Densified Points	23985176
Average Density (per m ³)	28.1

DSM, Orthomosaic and Index Details

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Processing Options

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DSM and Orthomosaic Resolution	1 x GSD (5.1 [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: yes
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	10 x GSD (5.1 [cm/pixel])
Time for DSM Generation	08m:12s
Time for Orthomosaic Generation	15m:15s
Time for DTM Generation	01m:07s