Quality Report

Generated with Pix4Denterprise version 4.2.27

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	stan_5k_3_x3
Processed	2018-10-01 12:08:06
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	5.06 cm / 1.99 in
Area Covered	0.642 km^2 / 64.2201 ha / 0.25 sq. mi. / 158.7736 acres
Time for Initial Processing (without report)	03h:36m:24s

Quality Check

Images	median of 12303 keypoints per image	✓
Dataset	2025 out of 2031 images calibrated (99%), all images enabled	✓
Camera Optimization	1.25% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 1317.3 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

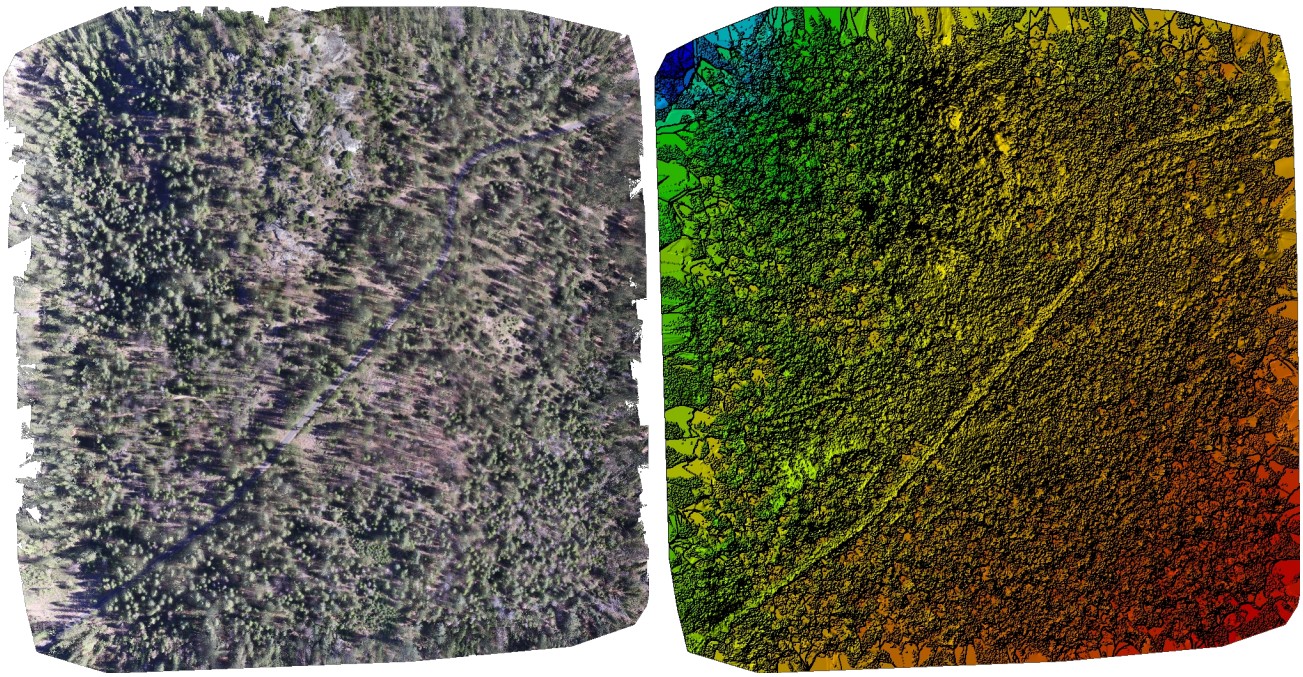


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	2025 out of 2031
Number of Geolocated Images	2031 out of 2031

Initial Image Positions

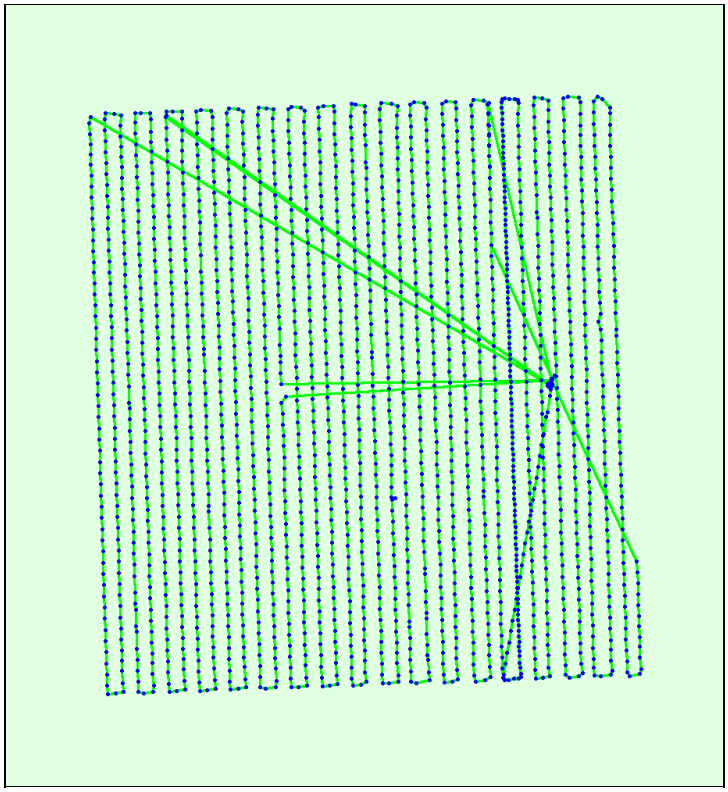
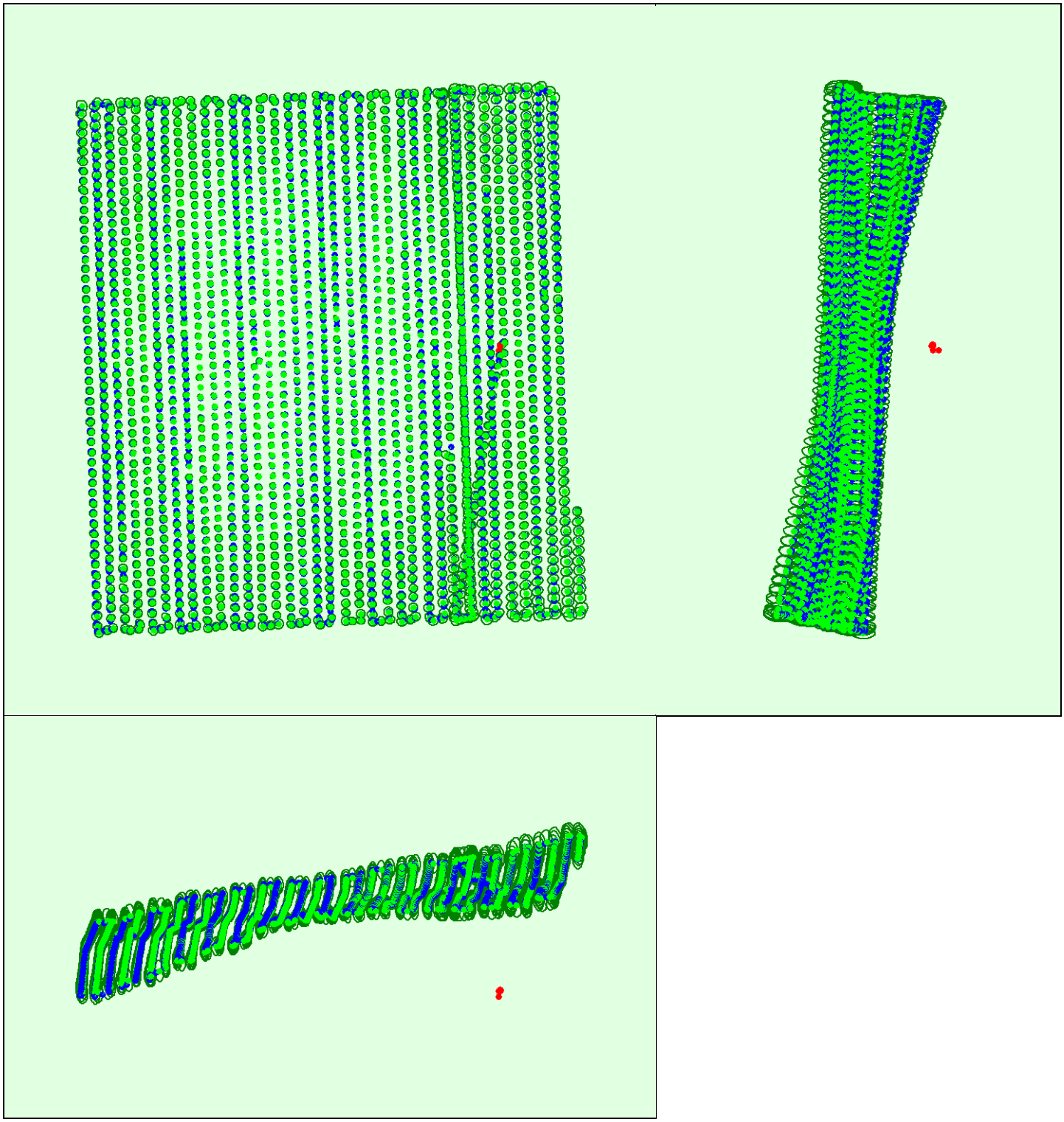


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions



Uncertainty ellipses 50x 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 [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.094	0.092	0.192	0.043	0.046	0.016
Sigma	0.020	0.017	0.044	0.006	0.009	0.003

Overlap

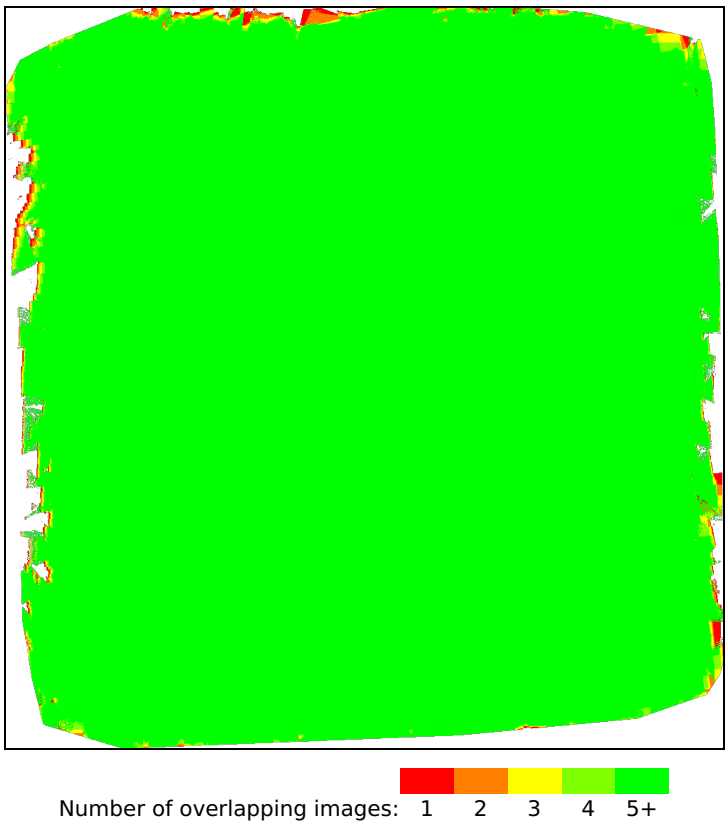


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

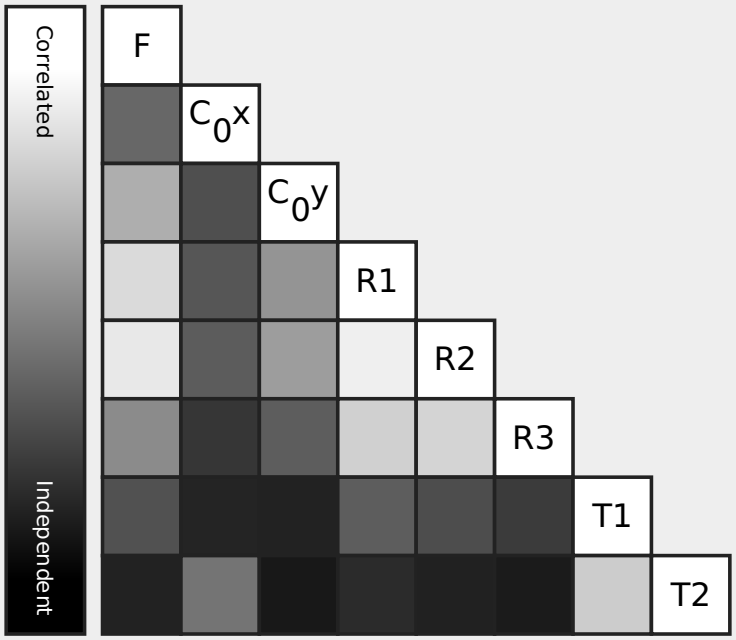
Number of 2D Keypoint Observations for Bundle Block Adjustment	2935550
Number of 3D Points for Bundle Block Adjustment	962687
Mean Reprojection Error [pixels]	0.137

Internal Camera Parameters

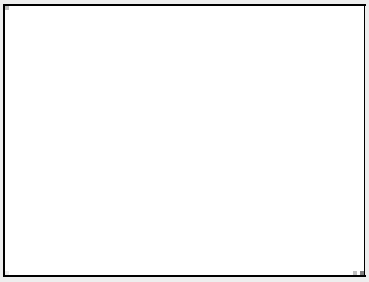
FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm]

EXIF ID: FC350_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]	-0.130	0.106	-0.016	-0.000	0.000
Optimized Values	2314.311 [pixel] 3.655 [mm]	1986.833 [pixel] 3.138 [mm]	1503.184 [pixel] 2.374 [mm]	-0.128	0.111	-0.014	0.001	0.000
Uncertainties (Sigma)	1.957 [pixel] 0.003 [mm]	0.049 [pixel] 0.000 [mm]	0.055 [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	12303	1317
Min	11482	116
Max	15361	4264
Mean	12321	1450

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	609942
In 3 Images	165593
In 4 Images	72181
In 5 Images	37866
In 6 Images	22528
In 7 Images	14328
In 8 Images	9688
In 9 Images	6894
In 10 Images	5051
In 11 Images	3732
In 12 Images	2715
In 13 Images	2087
In 14 Images	1683
In 15 Images	1278
In 16 Images	1071

In 17 Images	848
In 18 Images	725
In 19 Images	576
In 20 Images	491
In 21 Images	425
In 22 Images	322
In 23 Images	304
In 24 Images	239
In 25 Images	212
In 26 Images	193
In 27 Images	157
In 28 Images	145
In 29 Images	123
In 30 Images	120
In 31 Images	109
In 32 Images	91
In 33 Images	65
In 34 Images	73
In 35 Images	53
In 36 Images	59
In 37 Images	67
In 38 Images	51
In 39 Images	35
In 40 Images	35
In 41 Images	37
In 42 Images	38
In 43 Images	33
In 44 Images	29
In 45 Images	25
In 46 Images	28
In 47 Images	16
In 48 Images	15
In 49 Images	12
In 50 Images	13
In 51 Images	25
In 52 Images	13
In 53 Images	22
In 54 Images	12
In 55 Images	10
In 56 Images	8
In 57 Images	11
In 58 Images	10
In 59 Images	10
In 60 Images	10
In 61 Images	9
In 62 Images	17
In 63 Images	5
In 64 Images	5
In 65 Images	6
In 66 Images	5
In 67 Images	5
In 68 Images	7
In 69 Images	3

In 70 Images	6
In 71 Images	4
In 72 Images	4
In 73 Images	5
In 74 Images	4
In 75 Images	3
In 76 Images	5
In 77 Images	5
In 78 Images	5
In 79 Images	1
In 80 Images	2
In 81 Images	2
In 82 Images	1
In 83 Images	5
In 84 Images	2
In 85 Images	4
In 86 Images	5
In 87 Images	3
In 88 Images	3
In 89 Images	1
In 91 Images	1
In 92 Images	2
In 93 Images	2
In 94 Images	1
In 95 Images	2
In 96 Images	1
In 97 Images	1
In 98 Images	1
In 100 Images	2
In 103 Images	1
In 104 Images	2
In 105 Images	1
In 106 Images	3
In 108 Images	1
In 110 Images	2

2D Keypoint Matches

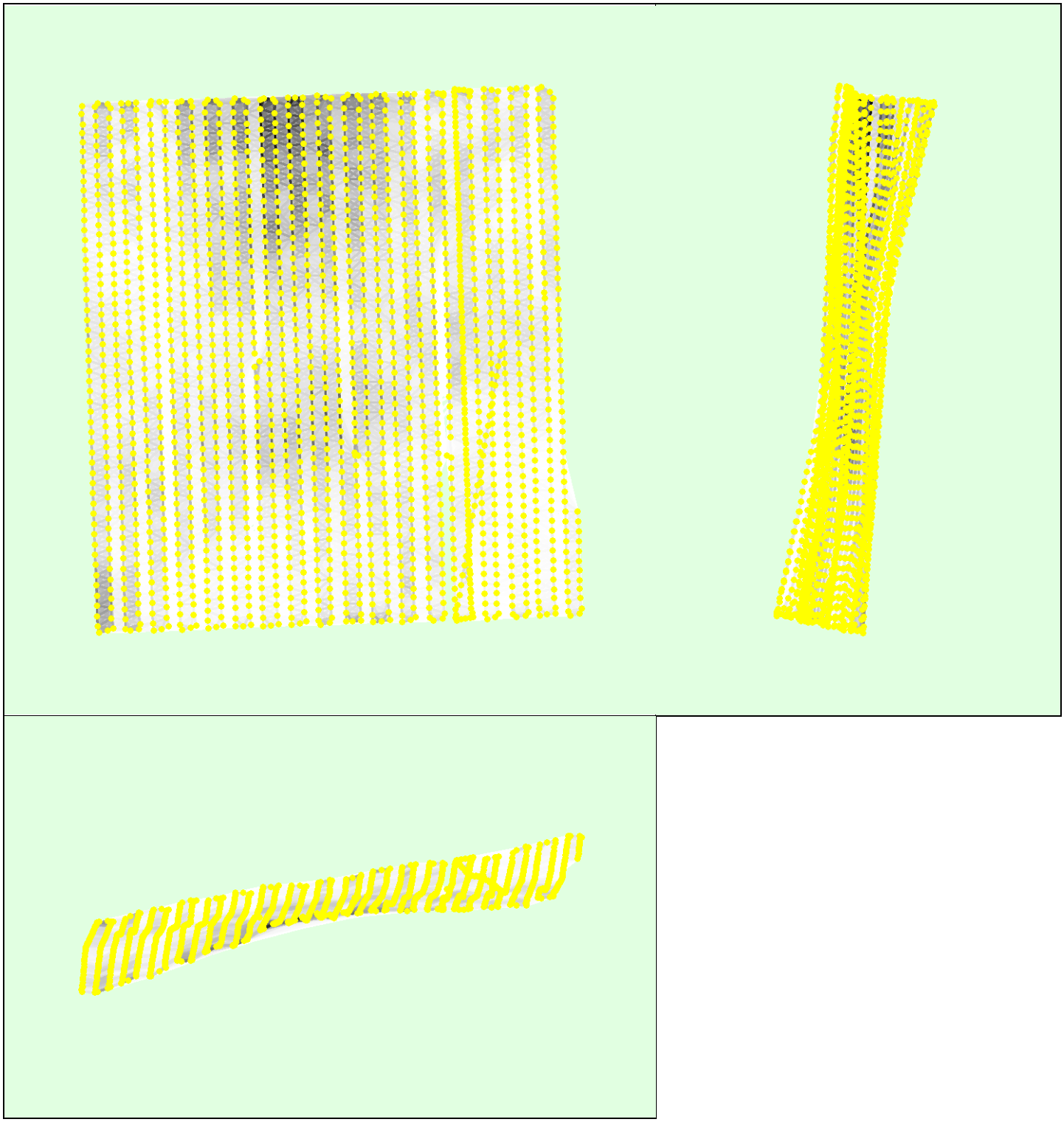


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

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	0.00	0.00	0.00
-12.00	-9.00	0.00	0.00	0.00
-9.00	-6.00	0.00	0.00	0.64
-6.00	-3.00	0.69	15.60	14.57
-3.00	0.00	34.02	34.22	31.70
0.00	3.00	65.23	35.65	47.31
3.00	6.00	0.05	14.37	5.78
6.00	9.00	0.00	0.10	0.00
9.00	12.00	0.00	0.05	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	0.000000
Sigma [m]		0.659577	2.548920	2.375621
RMS Error [m]		0.659577	2.548920	2.375621

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]	99.90	98.47	100.00
[-2.00, 2.00]	100.00	99.95	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	0.810
Phi	1.402
Kappa	5.356

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 4.15.0-1021-aws x86_64

Coordinate Systems

Image Coordinate System	WGS84 (egm96)
Output Coordinate System	WGS 84 / UTM zone 10N (egm96)

Processing Options

Detected Template	No Template Available
Keypoints Image Scale	Custom, Image Scale: 0.5
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:22m:19s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	52m:44s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	86027218
Average Density (per m^3)	27.06

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (5.06 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp

Raster DSM	Generated: yes Method: Triangulation Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	07m:48s
Time for Orthomosaic Generation	08h:06m:03s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s