Quality Report

Generated with Pix4Dmapper Pro version 4.0.25

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	2017_11_03_rtk_venoge_const
Processed	2017-11-27 18:13:39
Camera Model Name(s)	S.O.D.A._10.6_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	3.11 cm / 1.22 in
Area Covered	1.4088 km^2 / 140.877 ha / 0.5442 sq. mi. / 348.295 acres
Time for Initial Processing (without report)	45m:51s

Quality Check

Images	median of 63621 keypoints per image	✓
Dataset	596 out of 616 images calibrated (96%), all images enabled	✓
Camera Optimization	0.55% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 8412.41 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

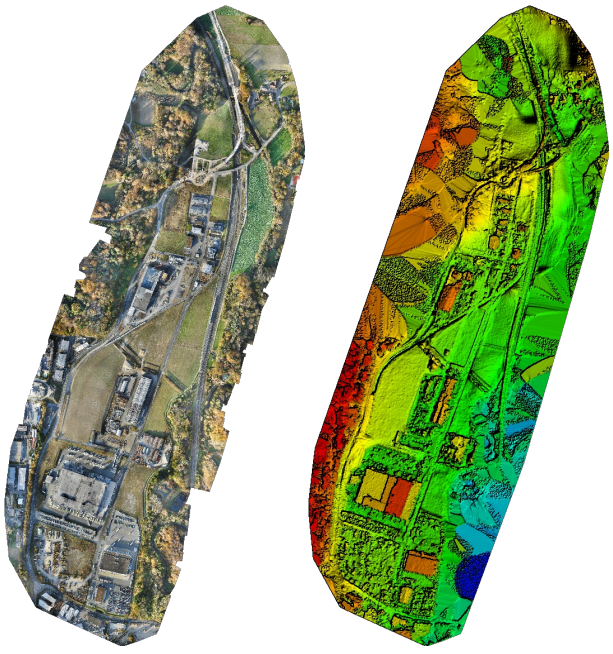


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	596 out of 616
Number of Geolocated Images	616 out of 616

Initial Image Positions

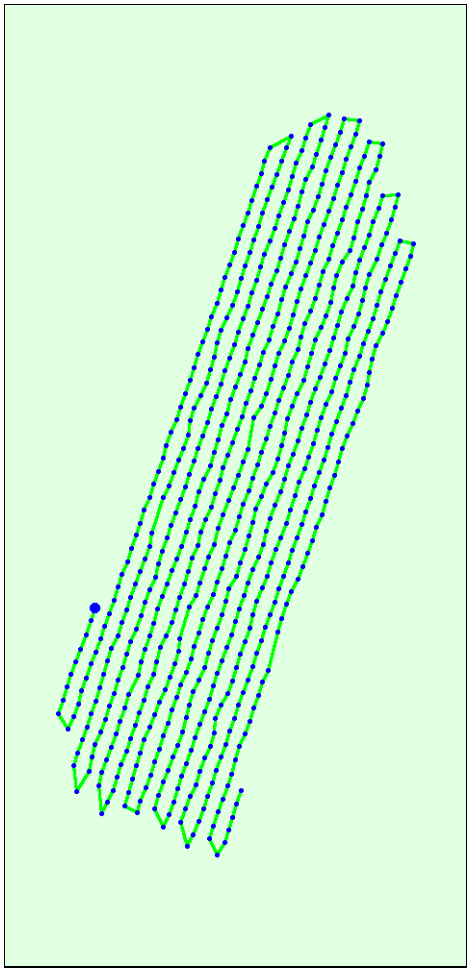


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions

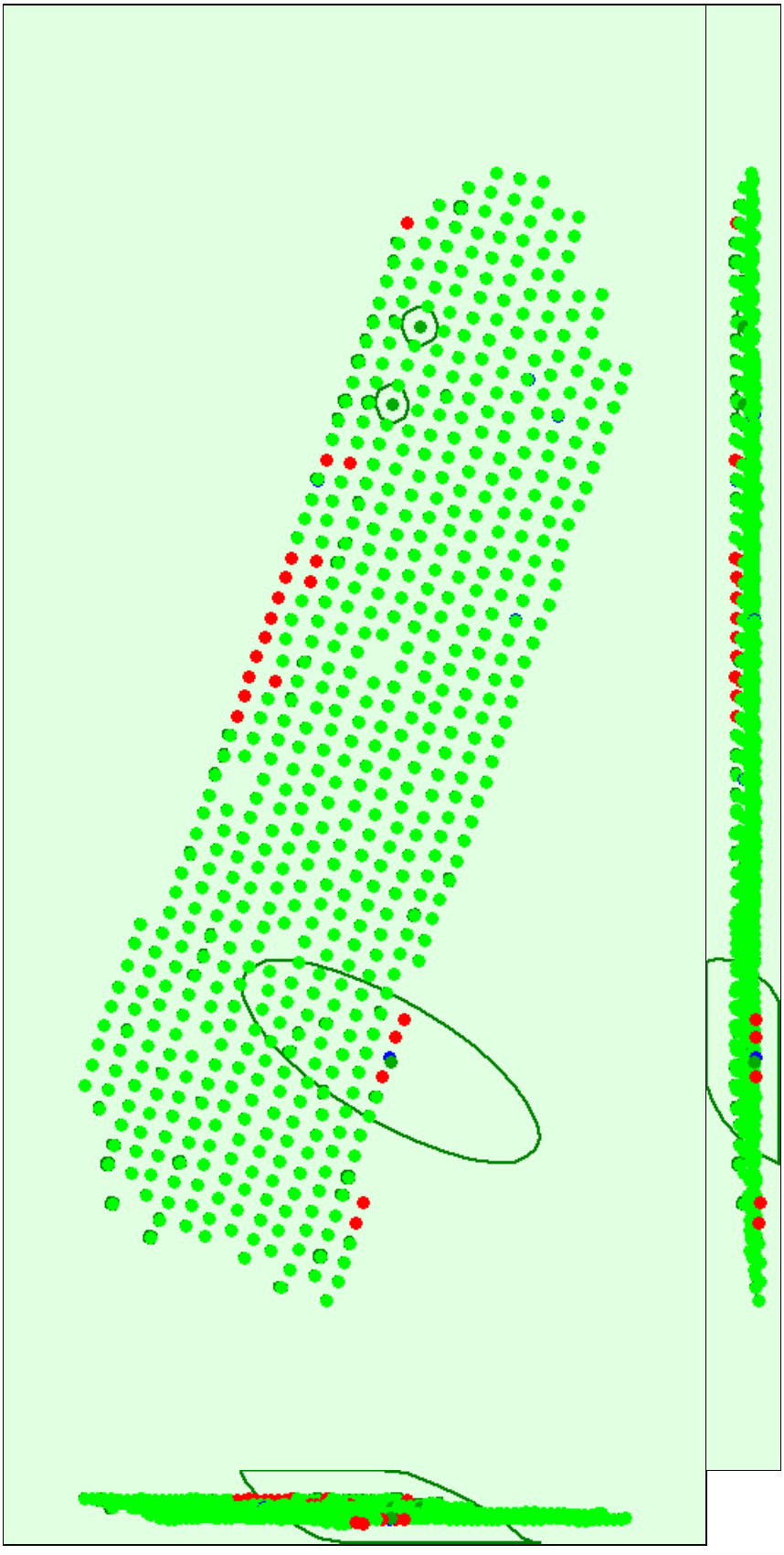


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Red dots indicate disabled 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	0.009	0.009	0.007	0.005	0.005	0.004
Sigma	0.012	0.008	0.006	0.004	0.006	0.005

Overlap

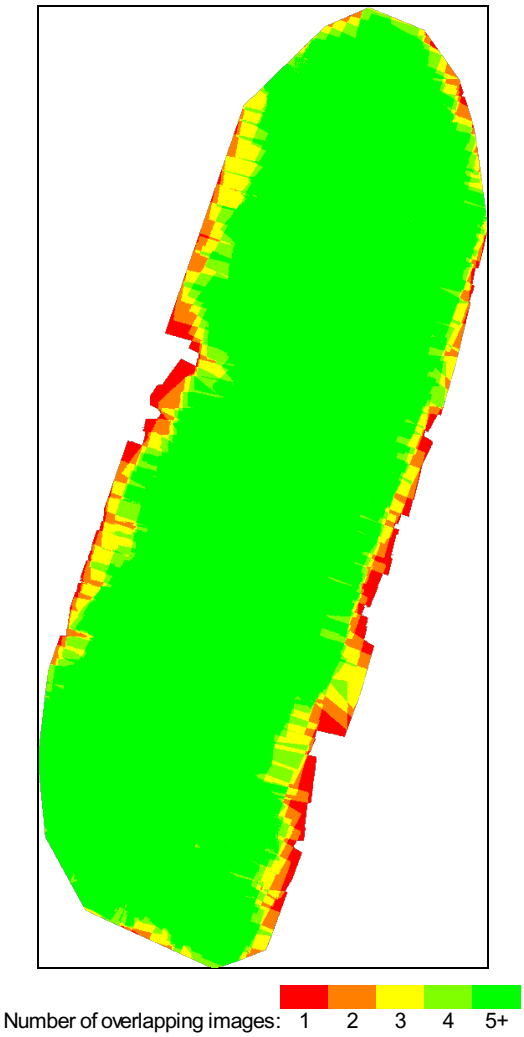


**Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

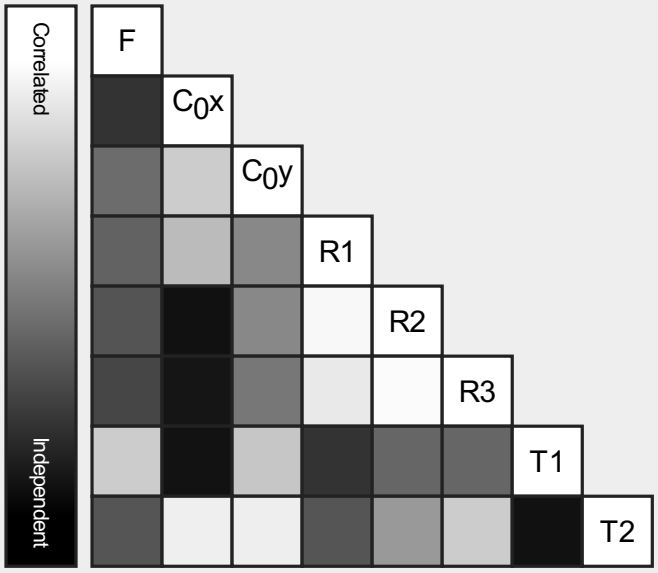
Number of 2D Keypoint Observations for Bundle Block Adjustment	5071905
Number of 3D Points for Bundle Block Adjustment	1907822
Mean Reprojection Error [pixels]	0.153

Internal Camera Parameters

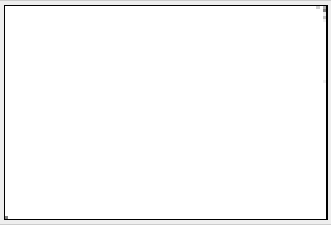
S.O.D.A._10.6_5472x3648 (RGB). Sensor Dimensions: 13.133 [mm] x 8.755 [mm]

EXIF ID: S.O.D.A._10.6_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	4430.420 [pixel] 10.633 [mm]	2725.000 [pixel] 6.540 [mm]	1811.670 [pixel] 4.348 [mm]	0.033	-0.209	0.315	0.000	0.000
Optimized Values	4405.769 [pixel] 10.574 [mm]	2651.616 [pixel] 6.364 [mm]	1774.099 [pixel] 4.258 [mm]	0.029	-0.181	0.266	-0.004	-0.005
Uncertainties (Sigma)	0.128 [pixel] 0.000 [mm]	0.105 [pixel] 0.000 [mm]	0.087 [pixel] 0.000 [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	63621	8412
Min	23984	37
Max	85769	24135
Mean	60678	8510

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	1274724
In 3 Images	350505
In 4 Images	129567
In 5 Images	66651
In 6 Images	37324
In 7 Images	21938
In 8 Images	13189
In 9 Images	7281
In 10 Images	3760
In 11 Images	1794
In 12 Images	767
In 13 Images	224
In 14 Images	64
In 15 Images	22
In 16 Images	12

2D Keypoint Matches

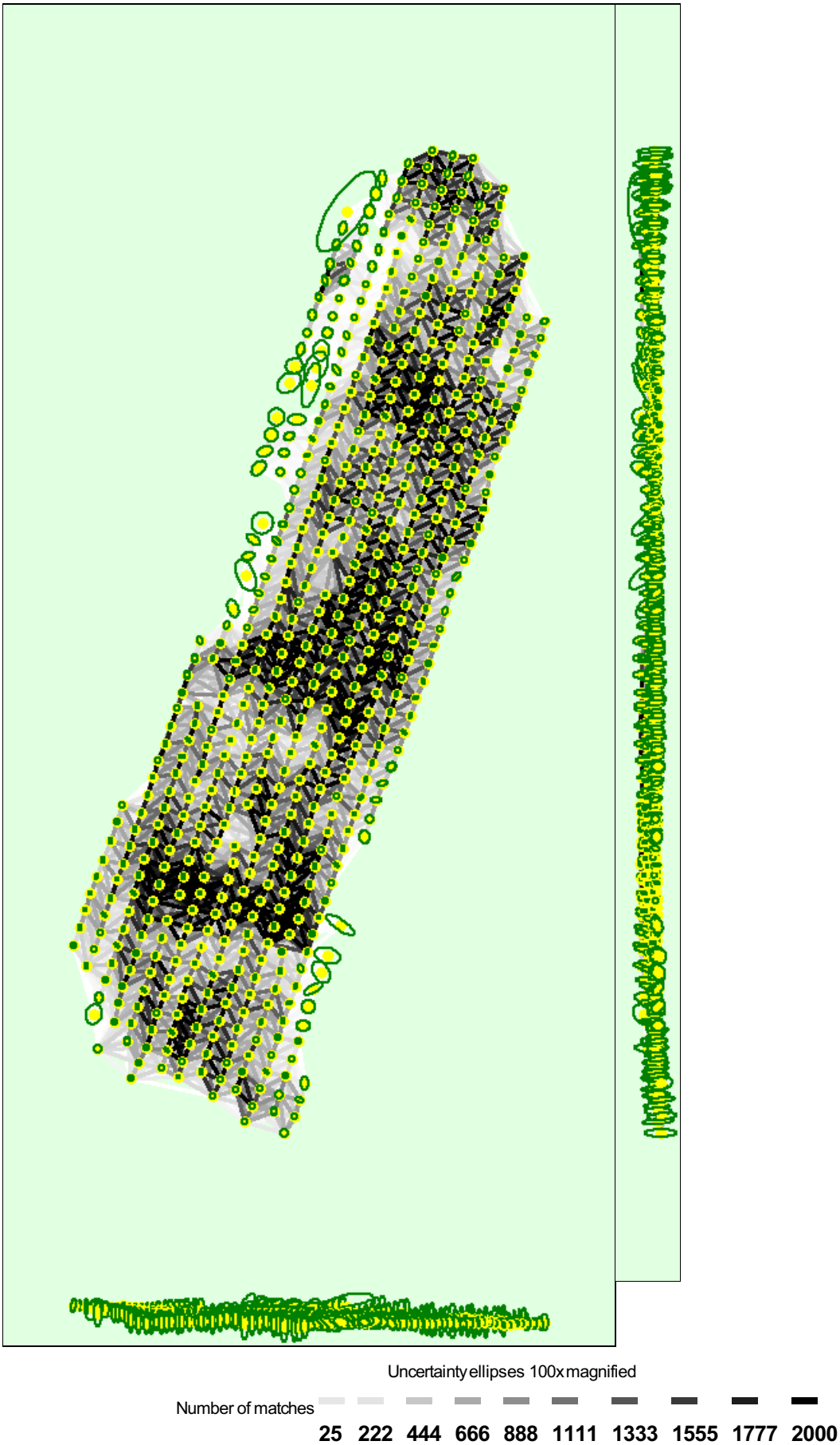


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.054	0.061	0.137	0.034	0.023	0.010
Sigma	0.044	0.053	0.069	0.022	0.016	0.009

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.04	0.17	0.17	0.17
-0.04	-0.03	0.51	0.34	0.67
-0.03	-0.03	1.01	0.67	2.87
-0.03	-0.02	1.85	1.35	6.58
-0.02	-0.01	9.95	11.80	16.69
-0.01	0.00	36.93	38.11	22.60
0.00	0.01	36.26	32.72	25.46
0.01	0.02	10.12	10.12	14.50
0.02	0.03	1.52	2.87	7.42
0.03	0.03	0.84	1.01	2.19
0.03	0.04	0.34	0.34	0.84
0.04	-	0.51	0.51	0.00
Mean [m]		-0.000060	0.000135	-0.000186
Sigma [m]		0.014608	0.010225	0.013859
RMS Error [m]		0.014609	0.010226	0.013861

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]	94.44	94.10	83.98
[-2.00, 2.00]	98.99	98.99	99.16
[-3.00, 3.00]	99.66	99.66	100.00
Mean of Geolocation Accuracy [m]	0.018305	0.018305	0.019041
Sigma of Geolocation Accuracy [m]	0.001132	0.001132	0.001367

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

Geolocation Orientational Variance	RMS [degree]
Omega	5.636
Phi	5.636
Kappa	7.970

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) Core(TM) i7-4860HQ CPU @ 2.40GHz RAM: 32GB GPU: Intel(R) Iris(TM) Pro Graphics 5200 (Driver: 20.19.15.4549)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems

Image Coordinate System	WGS84
Output Coordinate System	WGS84 / UTM zone 32N

Processing Options

Detected Template	3cm and classify*
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, 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:18m:32s
Time for Point Cloud Classification	39m:51s
Time for 3D Textured Mesh Generation	19m:21s

Results

Number of Generated Tiles	2
Number of 3D Densified Points	72958890
Average Density (per m^3)	100.31

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	3 [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	01h:04m:39s
Time for Orthomosaic Generation	01h:49m:39s