

# Quality Report



Generated with Pix4Denterprise version 4.5.6



**Important:** Click on the different icons for:



Help to analyze the results in the Quality Report



Additional information about the sections



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## Summary



Project	INTRAMLAN_HERLEA
Processed	2022-10-26 06:55:22
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	3.39 cm / 1.33 in
Area Covered	5.716 km <sup>2</sup> / 571.5559 ha / 2.21 sq. mi. / 1413.0765 acres
Time for Initial Processing (without report)	09h:25m:49s

## Quality Check



Images	median of 54432 keypoints per image	
Dataset	5742 out of 5743 images calibrated (99%), all images enabled, 5 blocks	
Camera Optimization	0.82% relative difference between initial and optimized internal camera parameters	
Matching	median of 13212.5 matches per calibrated image	
Georeferencing	yes, no 3D GCP	

## Preview

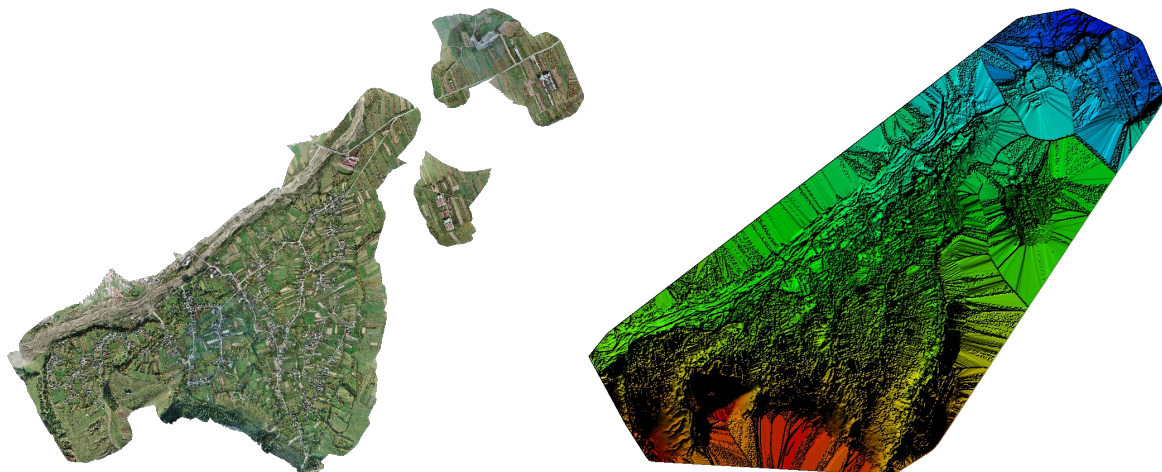


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

## Calibration Details



Number of Calibrated Images	5742 out of 5743
Number of Geolocated Images	5743 out of 5743



## ? Initial Image Positions

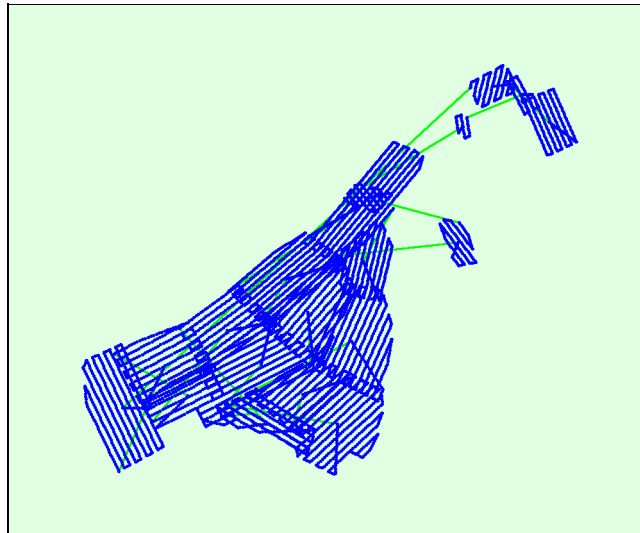
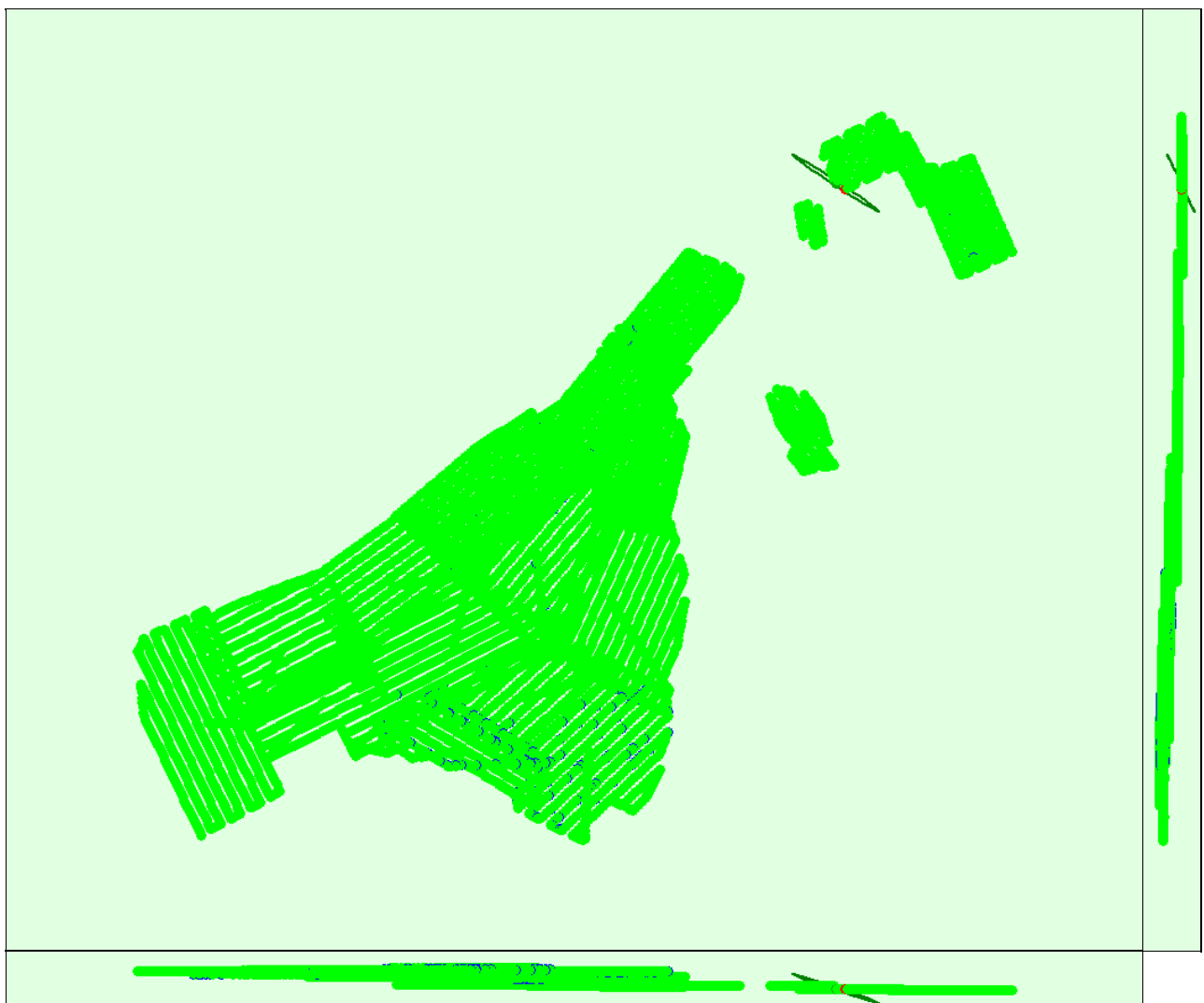


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

## ? 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). 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	0.006	0.007	0.003	0.003	0.003	0.001
Sigma	0.003	0.002	0.001	0.001	0.001	0.001

? Overlap

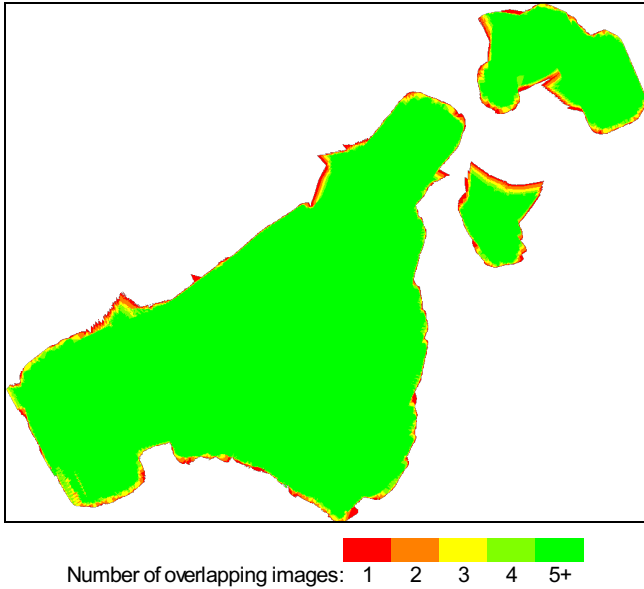


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint 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	78908388
Number of 3D Points for Bundle Block Adjustment	26202398
Mean Reprojection Error [pixels]	0.098

? Internal Camera Parameters

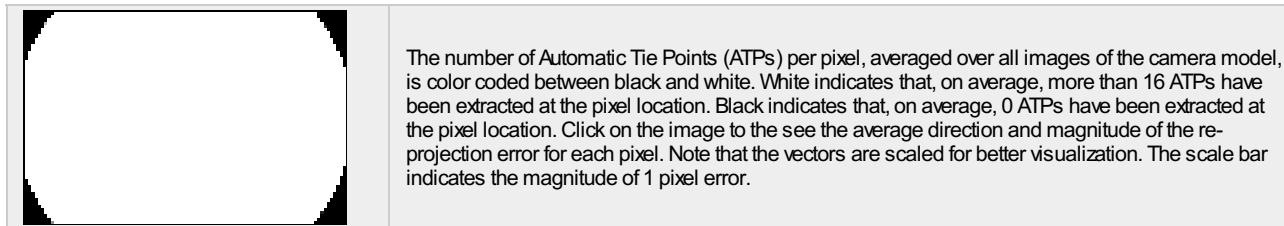
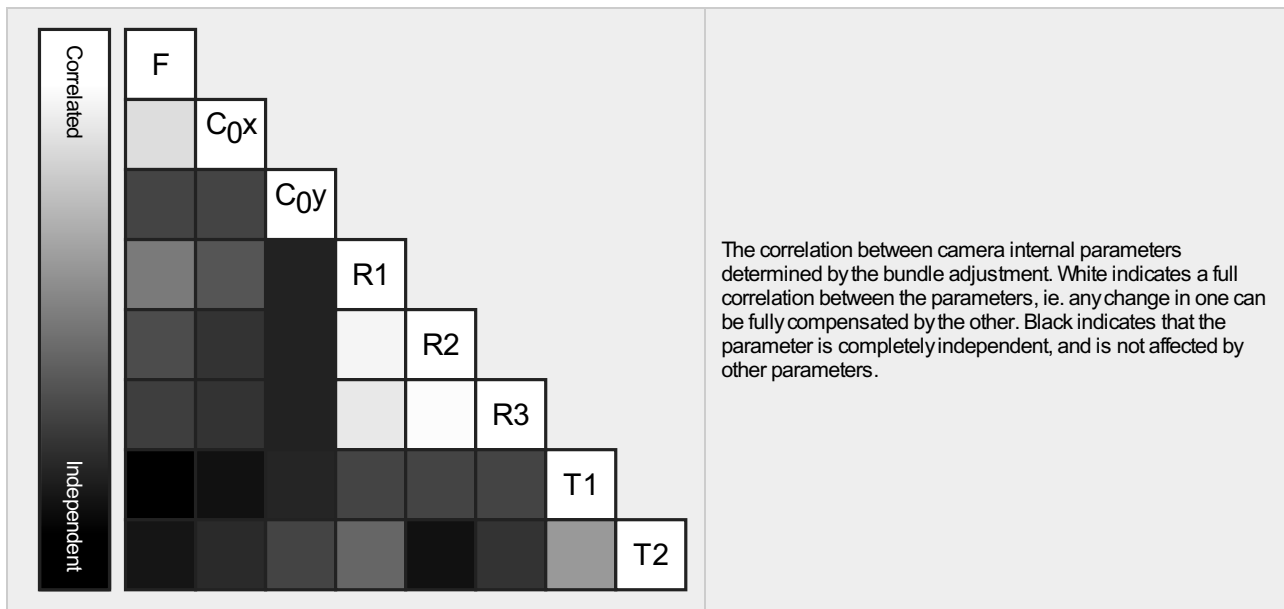
FC6310R\_8.8\_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]



EXIF ID: FC6310R\_8.8\_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3658.300 [pixel] 8.580 [mm]	2722.500 [pixel] 6.385 [mm]	1835.100 [pixel] 4.304 [mm]	-0.269	0.112	-0.033	0.000	-0.001
Optimized Values	3688.584 [pixel] 8.651 [mm]	2702.414 [pixel] 6.338 [mm]	1808.098 [pixel] 4.240 [mm]	-0.287	0.130	-0.039	0.000	-0.000
Uncertainties (Sigma)	0.026 [pixel] 0.000 [mm]	0.012 [pixel] 0.000 [mm]	0.009 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000





## 2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	54432	13213
Mn	21738	97
Max	79971	35776
Mean	55210	13742

## 3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	15771406
In 3 Images	5003474
In 4 Images	2214642
In 5 Images	1163826
In 6 Images	662510
In 7 Images	401339
In 8 Images	269178
In 9 Images	188094
In 10 Images	134584
In 11 Images	96780
In 12 Images	69873
In 13 Images	50888
In 14 Images	38329
In 15 Images	29714
In 16 Images	23047
In 17 Images	17711
In 18 Images	14010
In 19 Images	10829
In 20 Images	8239
In 21 Images	6671
In 22 Images	5307
In 23 Images	4321



In 24 Images	3331
In 25 Images	2681
In 26 Images	2111
In 27 Images	1623
In 28 Images	1378
In 29 Images	1121
In 30 Images	872
In 31 Images	796
In 32 Images	632
In 33 Images	525
In 34 Images	434
In 35 Images	359
In 36 Images	273
In 37 Images	241
In 38 Images	193
In 39 Images	158
In 40 Images	144
In 41 Images	138
In 42 Images	98
In 43 Images	78
In 44 Images	53
In 45 Images	72
In 46 Images	48
In 47 Images	41
In 48 Images	30
In 49 Images	29
In 50 Images	31
In 51 Images	28
In 52 Images	18
In 53 Images	17
In 54 Images	17
In 55 Images	14
In 56 Images	8
In 57 Images	8
In 58 Images	5
In 59 Images	1
In 60 Images	5
In 61 Images	1
In 62 Images	2
In 63 Images	1
In 64 Images	3
In 66 Images	3
In 67 Images	1
In 68 Images	1
In 70 Images	1
In 72 Images	1
In 76 Images	1

 **2D Keypoint Matches**





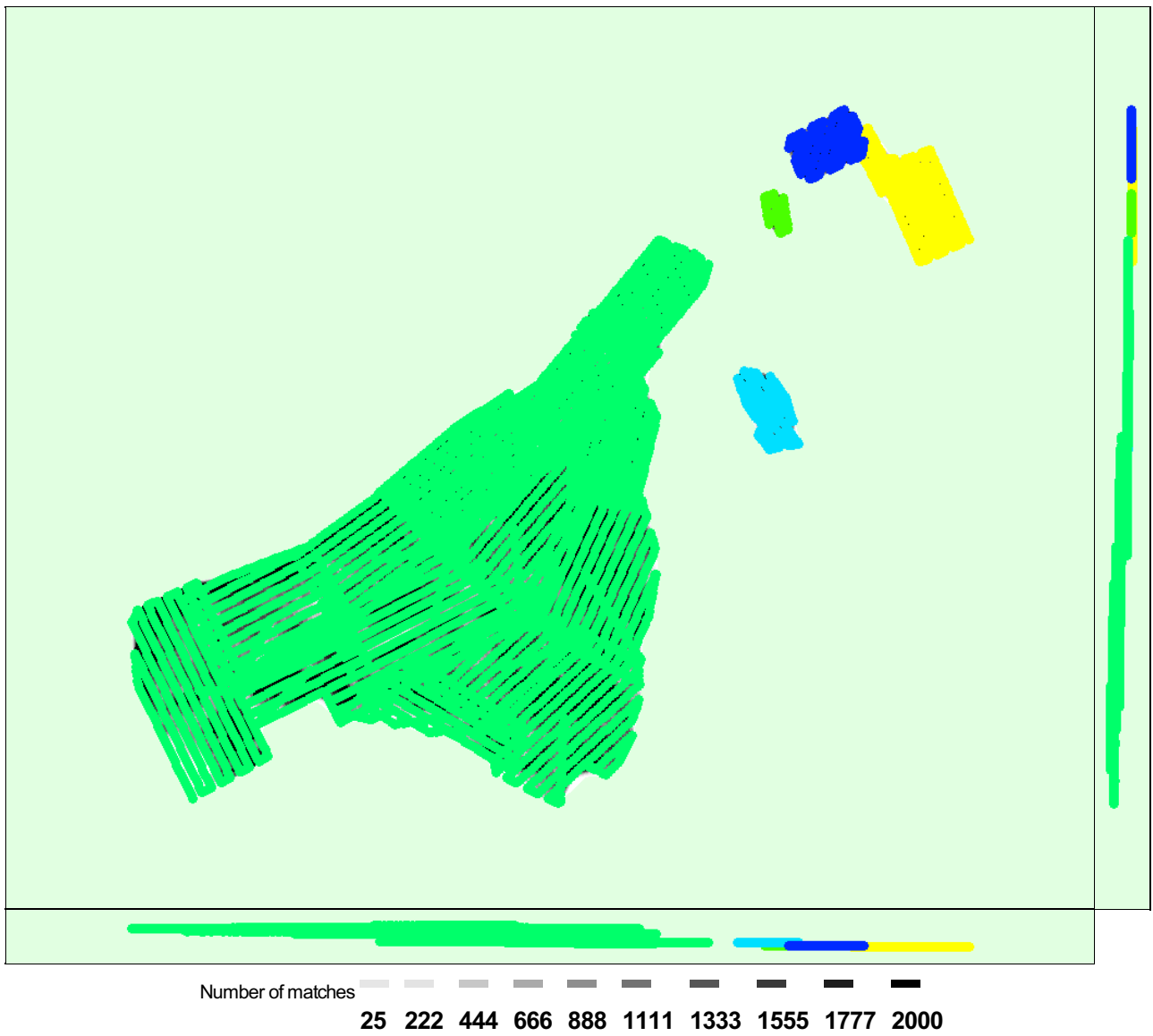


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

## Geolocation Details

### Absolute Geolocation Variance

Mn Error [m]	Max Error [m]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
-	-5.15	0.00	0.00	0.00
-5.15	-4.12	0.00	0.00	0.00
-4.12	-3.09	0.00	0.00	0.00
-3.09	-2.06	0.00	0.00	0.10
-2.06	-1.03	0.00	0.05	0.31
-1.03	0.00	46.44	46.52	49.68
0.00	1.03	51.91	52.22	47.83
1.03	2.06	1.65	1.17	1.48
2.06	3.09	0.00	0.03	0.49
3.09	4.12	0.00	0.00	0.10
4.12	5.15	0.00	0.00	0.00
5.15	-	0.00	0.00	0.00
Mean [m]		0.056431	0.043527	0.039035
Sigma [m]		0.219831	0.208046	0.321636



RMS Error [m]	0.226959	0.212551	0.323996
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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]	99.22	99.51	99.51
[-2.00, 2.00]	99.97	99.98	100.00
[-3.00, 3.00]	99.97	100.00	100.00
Mean of Geolocation Accuracy [m]	0.133403	0.133403	0.292815
Sigma of Geolocation Accuracy [m]	0.341388	0.341388	0.810968

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

Geolocation Orientational Variance	RMS [degree]
Omega	0.984
Phi	0.845
Kappa	5.819

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) i9-9900 CPU @ 3.10GHz RAM: 40GB GPU: unknown graphics card (Driver: unknown)
Operating System	Windows 10 Pro, 64-bit


### Coordinate Systems



Image Coordinate System	WGS 84
Output Coordinate System	WGS 84 / UTMzone 35N

### 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, no

## Point Cloud Densification details



### Processing Options



Image Scale	multiscale, 1/2 (Half image size, Default)
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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	10h:09m:08s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	01h:19m:09s

## Results



Number of Processed Clusters	158
Number of Generated Tiles	15
Number of 3D Densified Points	608240679
Average Density (per m <sup>3</sup> )	90.3

## DSM, Orthomosaic and Index Details



### Processing Options



DSM and Orthomosaic Resolution	1 x GSD (3.39 [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	04h:28m:00s
Time for Orthomosaic Generation	13h:18m:42s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s