

Processing Report



Generated with Drone2Map for ArcGIS

Summary

Project	LOOP3_st303_st308_20190709
Processed	2019-10-03 13:53:15
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.97 cm / 0.77 in
Area Covered	0.215 km ² / 21.5444 ha / 0.08 sq. mi. / 53.2650 acres
Time for Initial Processing (without report)	10m:49s

Quality Check

Images	median of 7461 keypoints per image	⚠
Dataset	315 out of 316 images calibrated (99%), all images enabled, 2 blocks	⚠
Camera Optimization	22.45% relative difference between initial and optimized internal camera parameters	⚠
Matching	median of 1489.06 matches per calibrated image	✅
Georeferencing	yes, no 3D GCP	⚠

Preview

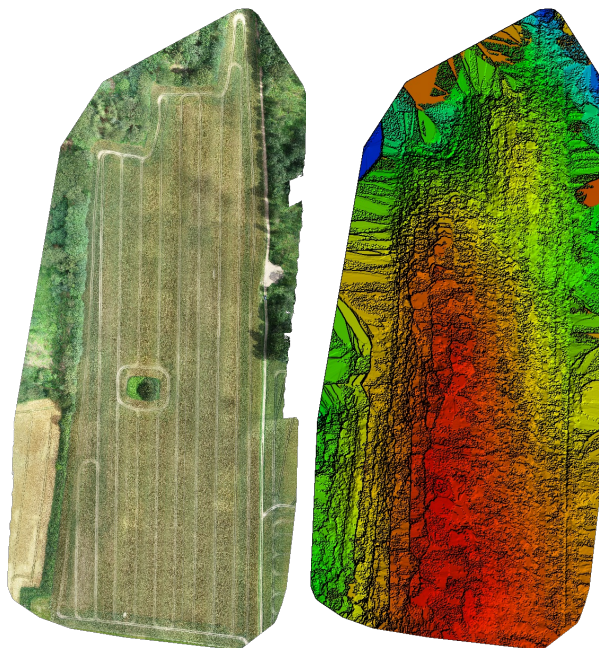


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	315 out of 316
Number of Geolocated Images	316 out of 316

Initial Image Positions

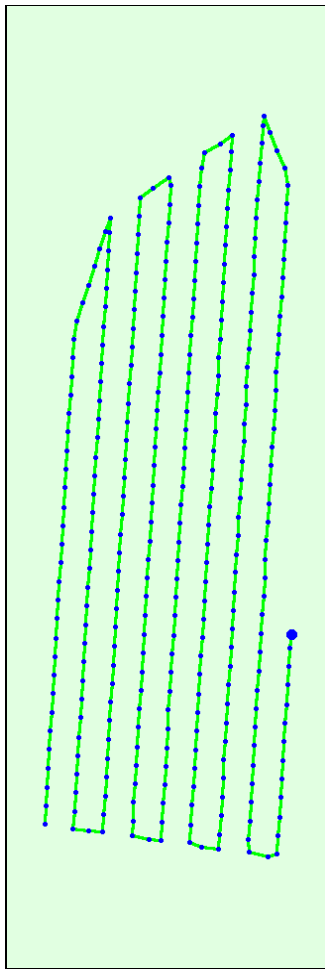
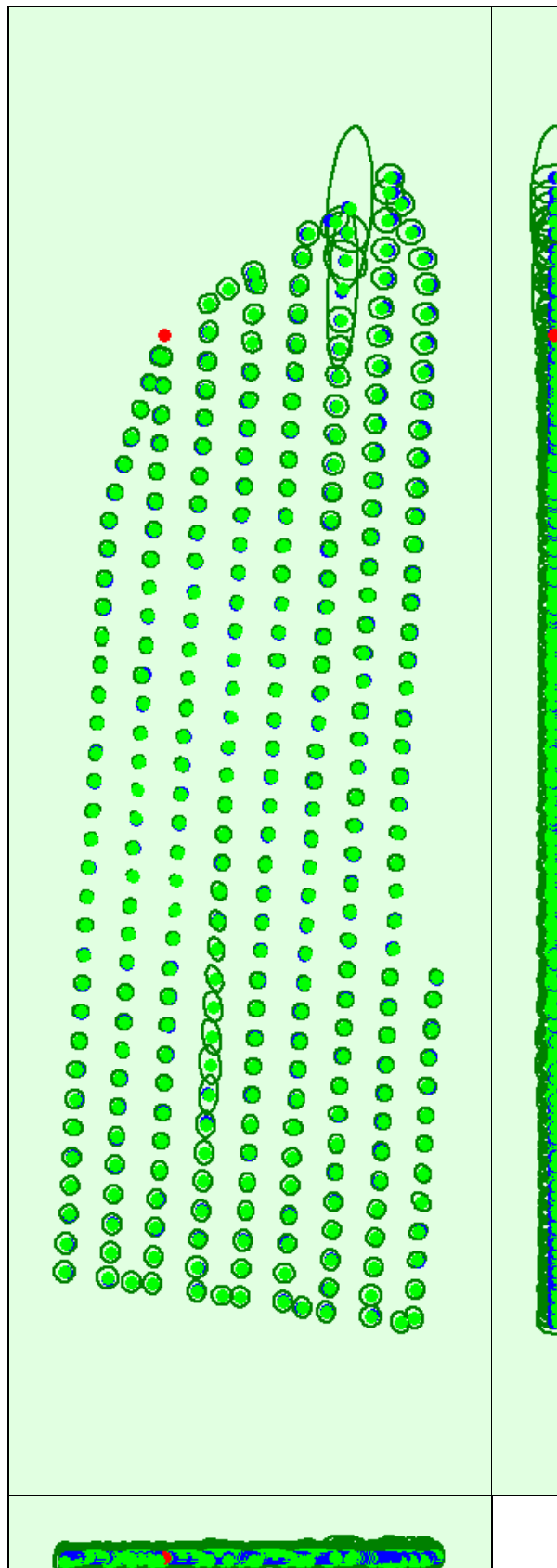


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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). 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	1.043	1.104	1.851	0.518	0.516	0.220
Sigma	0.277	0.768	0.321	0.159	0.138	0.053

Overlap

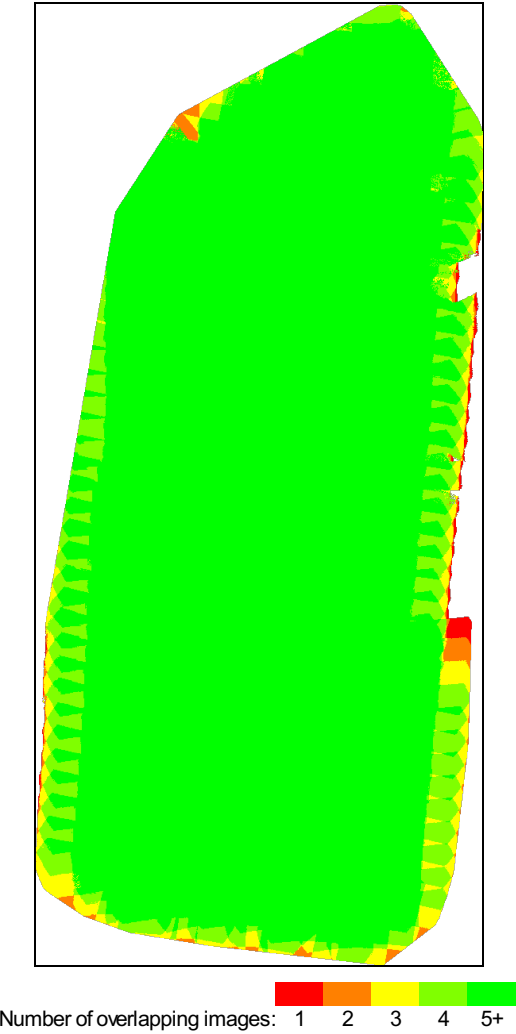


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

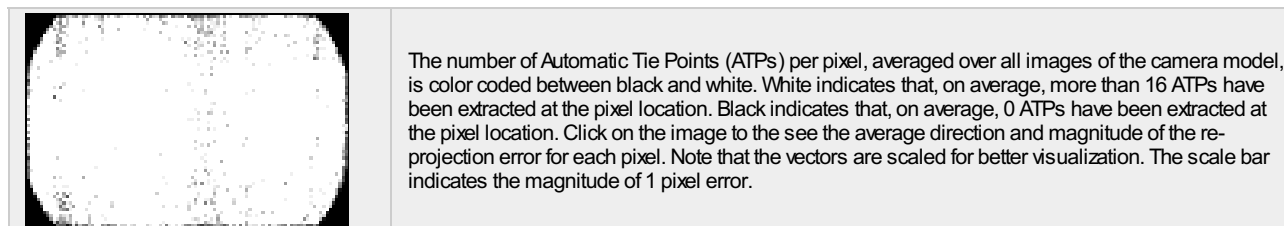
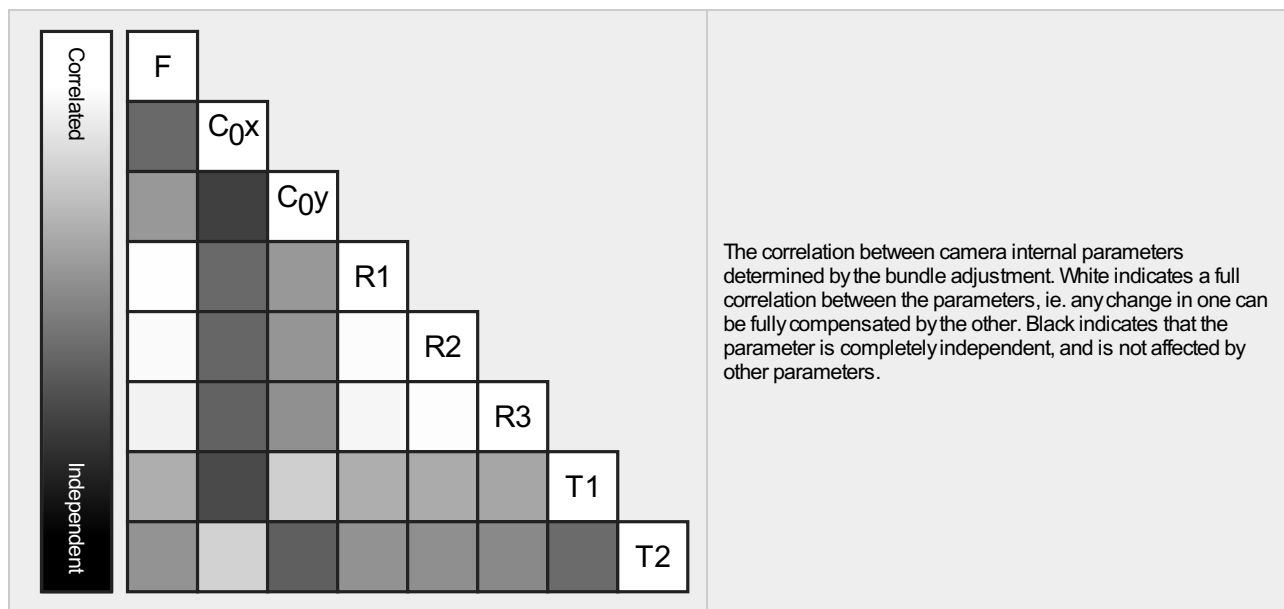
Number of 2D Keypoint Observations for Bundle Block Adjustment	480619
Number of 3D Points for Bundle Block Adjustment	205070
Mean Reprojection Error [pixels]	0.115

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	4479.740 [pixel] 10.506 [mm]	2725.225 [pixel] 6.391 [mm]	1862.714 [pixel] 4.369 [mm]	-0.394	0.241	-0.105	-0.000	-0.001
Uncertainties (Sigma)	132.885 [pixel] 0.312 [mm]	2.864 [pixel] 0.007 [mm]	2.750 [pixel] 0.006 [mm]	0.023	0.029	0.020	0.000	0.000



2D Keypoints Table

	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	7461	1489
Mn	5791	255
Max	23399	2880
Mean	8456	1526

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	161501
In 3 Images	28605
In 4 Images	9115
In 5 Images	2886
In 6 Images	1390
In 7 Images	818
In 8 Images	429
In 9 Images	143
In 10 Images	73
In 11 Images	38
In 12 Images	32
In 13 Images	12
In 14 Images	9
In 15 Images	8
In 16 Images	5
In 17 Images	1
In 19 Images	4
In 20 Images	1

2D Keypoint Matches

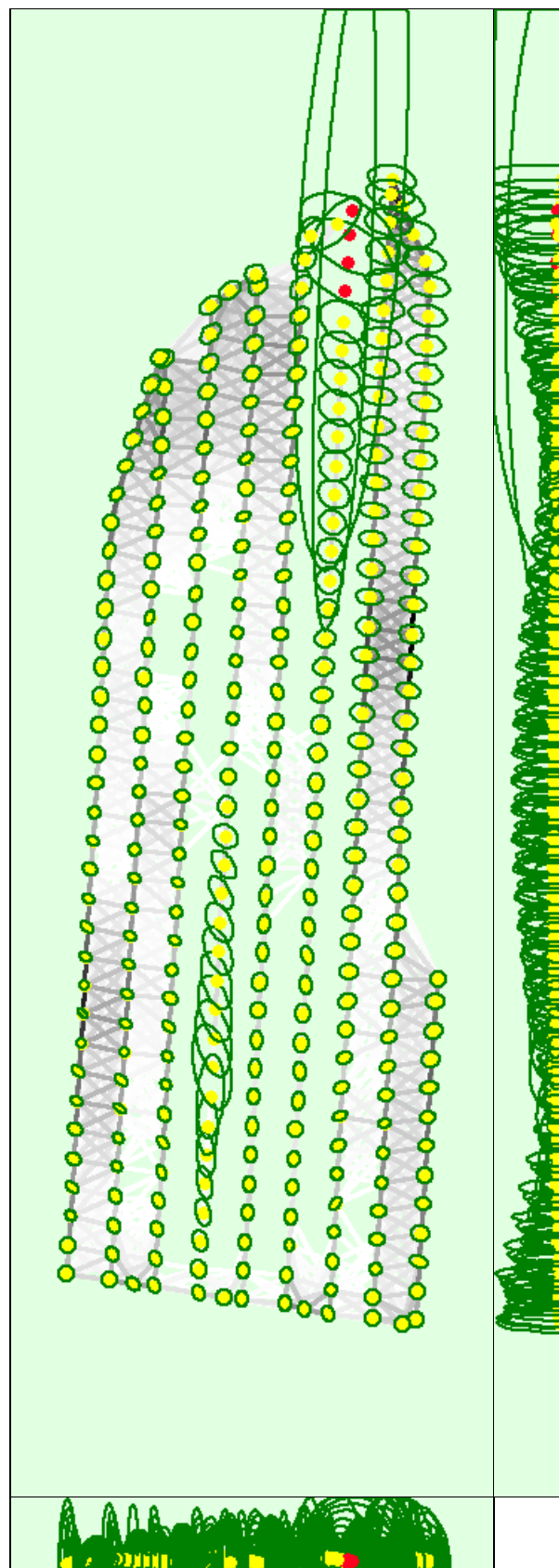


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty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

Relative camera position and orientation uncertainties

X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
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Mean	0.123	0.142	0.351	0.219	0.142	0.030
Sigma	0.076	0.348	0.186	0.112	0.064	0.016

Geolocation Details

Absolute Geolocation Variance

Mn 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	0.00
-6.00	-3.00	0.32	0.00	0.00
-3.00	0.00	54.60	51.75	54.29
0.00	3.00	45.08	48.25	45.08
3.00	6.00	0.00	0.00	0.63
6.00	9.00	0.00	0.00	0.00
9.00	12.00	0.00	0.00	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]		0.712439	0.473966	1.236778
RMS Error [m]		0.712439	0.473966	1.236778

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	100.00
[-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]	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	1.012
Phi	0.811
Kappa	133.795

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) i5-6300U CPU @ 2.40GHz RAM: 16GB GPU: Intel(R) HD Graphics 520 (Driver: 22.20.16.4836)
Operating System	Windows 10 Enterprise 2016 LTSB, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84
Output Coordinate System	WGS_1984_UTM_Zone_32N (EGM96 Geoid)

Processing Options

Detected Template	2D Rapid
Keypoints Image Scale	Rapid, Image Scale: 0.5
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: Alternative Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, yes

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	4 x GSD (1.97 [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
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	5 x GSD (1.97 [cm/pixel])
Time for DSM Generation	01m:04s
Time for Orthomosaic Generation	21m:30s
Time for DTM Generation	25m:26s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s