

Quality Report



Generated with PIX4Dmapper version 4.8.4



Important: Click on the different icons for:



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Additional information about the sections



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Summary



Project	Clear Creek Flight 2
Processed	2024-01-09 10:34:00
Camera Model Name(s)	DSC-RX1RM2_35.0_7952x5304 (RGB)
Average Ground Sampling Distance (GSD)	1.49 cm / 0.59 in
Area Covered	0.328 km ² / 32.8421 ha / 0.13 sq. mi. / 81.1967 acres
Time for Initial Processing (without report)	42m:27s

Quality Check



Images	median of 9947 keypoints per image	
Dataset	590 out of 637 images calibrated (92%), all images enabled, 7 blocks	
Camera Optimization	0.05% relative difference between initial and optimized internal camera parameters	
Matching	median of 229.467 matches per calibrated image	
Georeferencing	yes, 5 GCPs (5 3D), mean RMS error = 0.022 US survey foot	

Preview

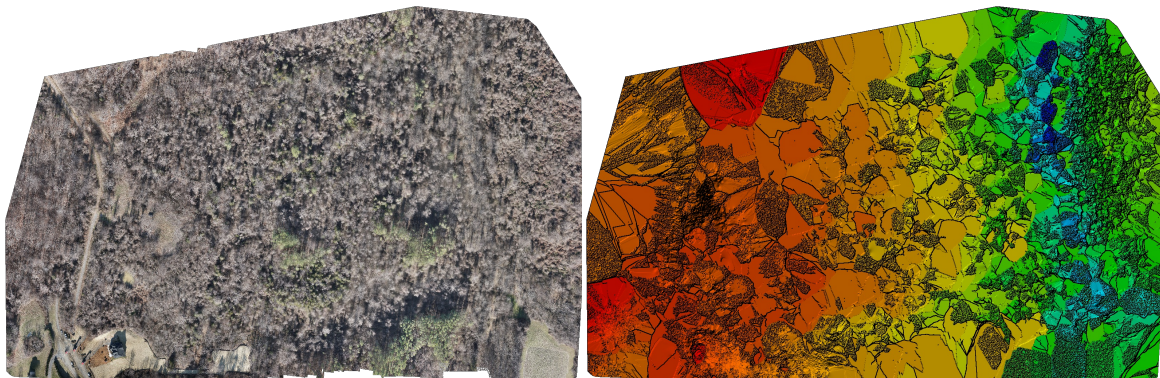


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	590 out of 637
Number of Geolocated Images	637 out of 637

Initial Image Positions



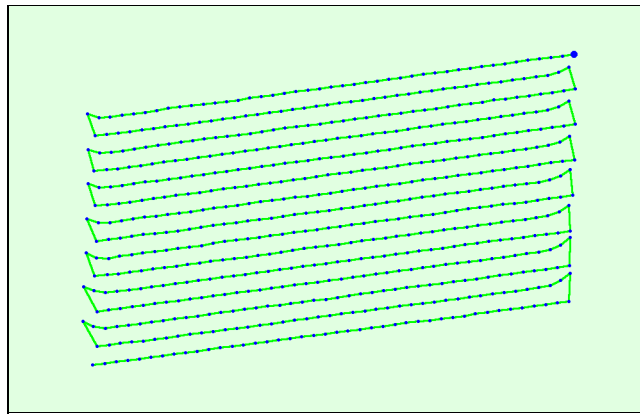
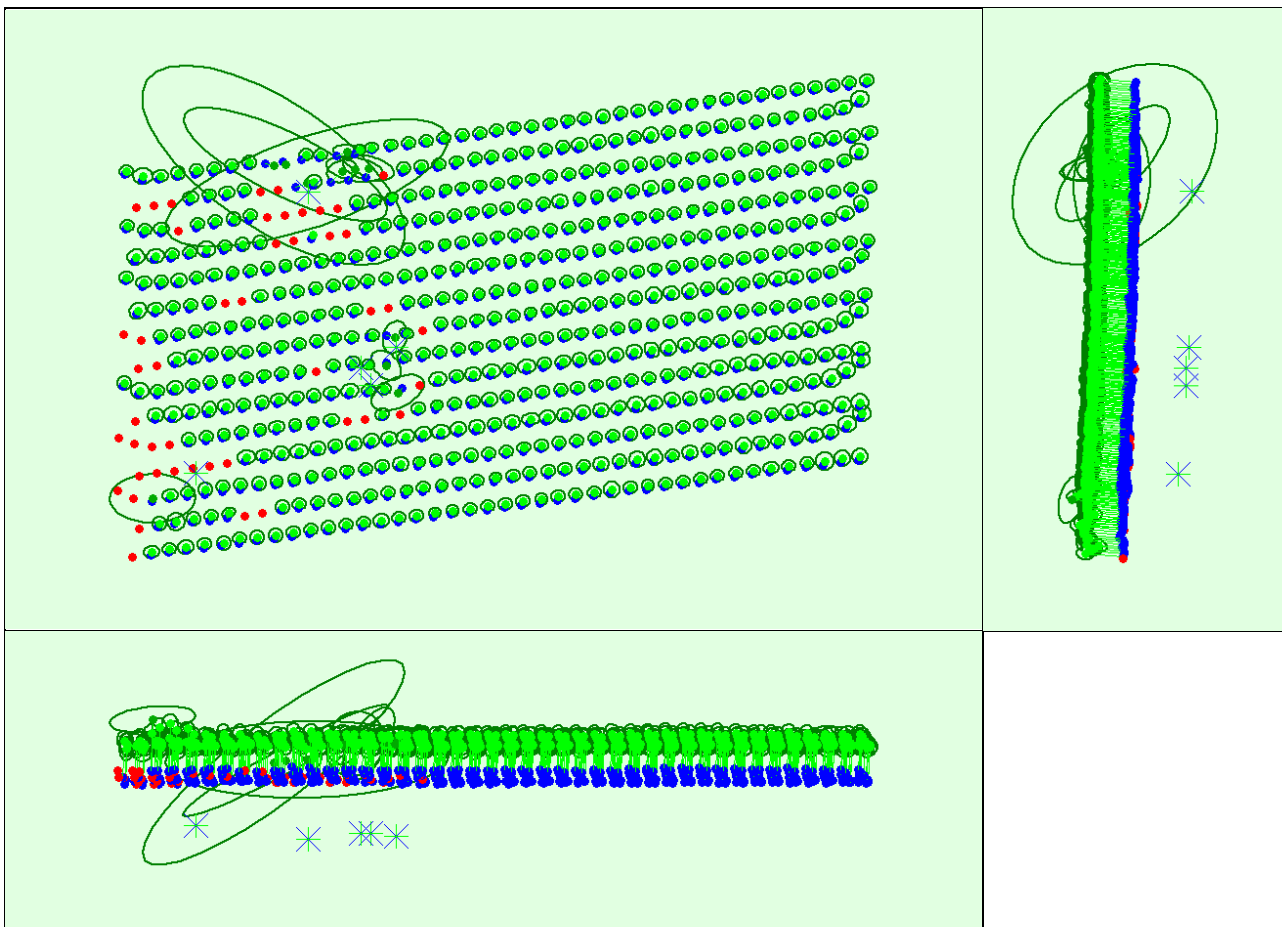


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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 [US survey foot]	Y [US survey foot]	Z [US survey foot]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.480	0.403	0.561	0.074	0.085	0.123
Sigma	0.526	0.312	0.291	0.080	0.155	0.199

Overlap

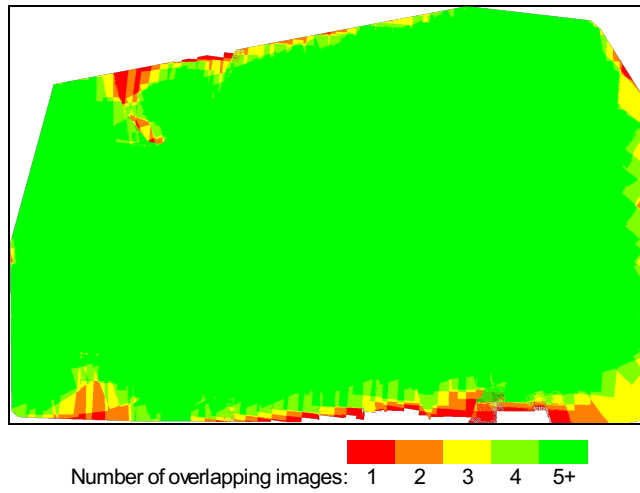


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

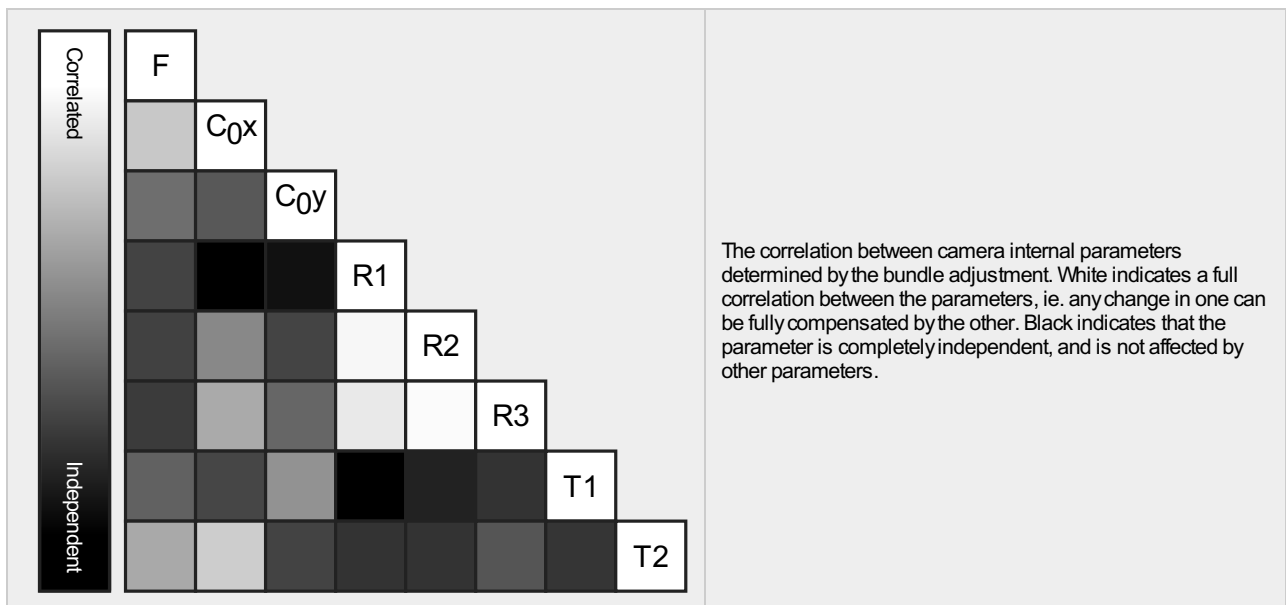
Number of 2D Keypoint Observations for Bundle Block Adjustment	198166
Number of 3D Points for Bundle Block Adjustment	77278
Mean Reprojection Error [pixels]	0.111

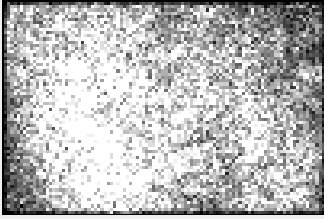
Internal Camera Parameters

DSC-RX1RM2_35.0_7952x5304 (RGB). Sensor Dimensions: 35.000 [mm] x 23.345 [mm]

EXIF ID: DSC-RX1RM2_35.0_7952x5304

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	7451.230 [pixel] 32.796 [mm]	3949.280 [pixel] 17.382 [mm]	2642.930 [pixel] 11.633 [mm]	-0.011	0.043	-0.069	0.001	-0.000
Optimized Values	7455.257 [pixel] 32.814 [mm]	3980.078 [pixel] 17.518 [mm]	2651.847 [pixel] 11.672 [mm]	-0.020	0.090	-0.150	0.001	0.000
Uncertainties (Sigma)	7.959 [pixel] 0.035 [mm]	3.103 [pixel] 0.014 [mm]	2.031 [pixel] 0.009 [mm]	0.006	0.035	0.061	0.000	0.000





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 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	9947	229
Mn	7967	0
Max	11308	2063
Mean	9900	336

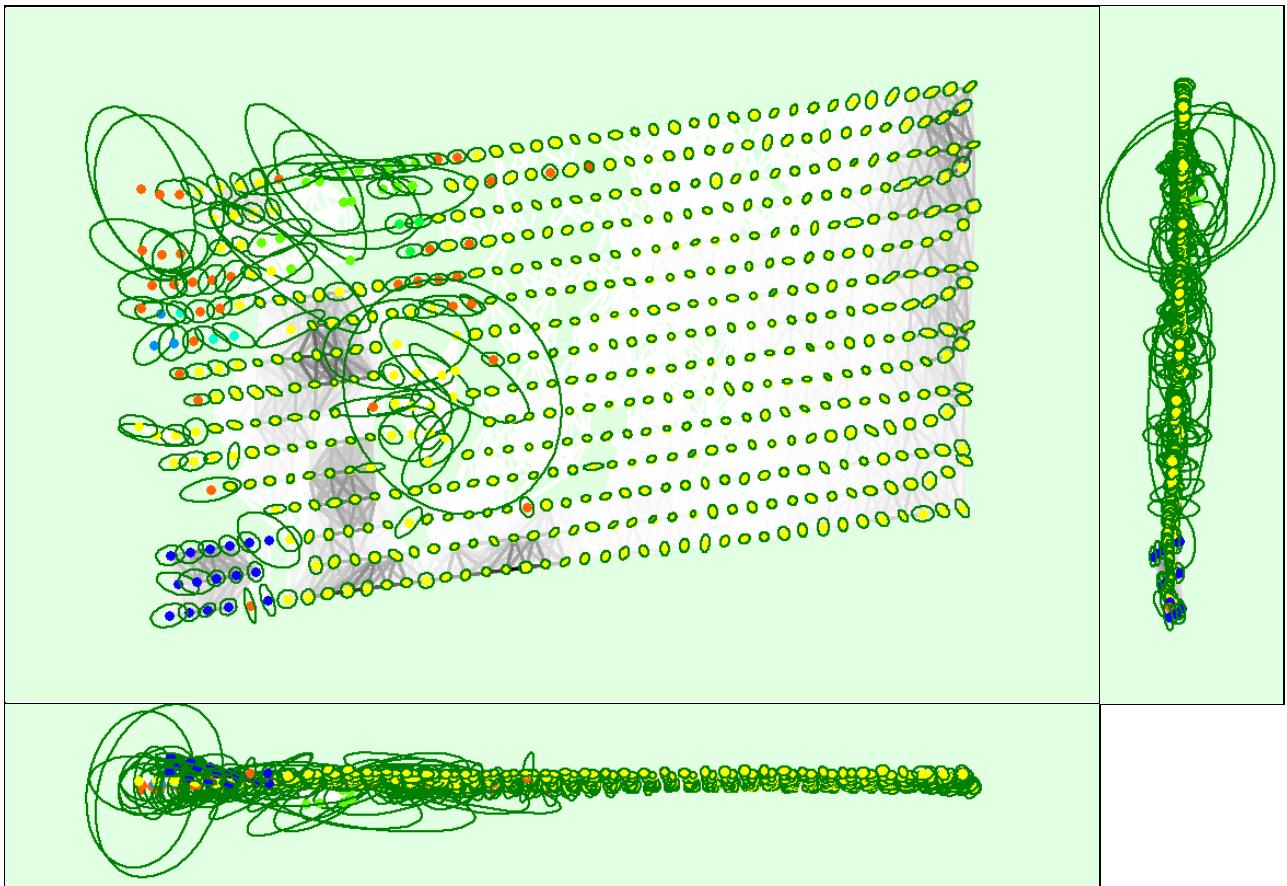
? 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	57085
In 3 Images	10768
In 4 Images	4279
In 5 Images	2014
In 6 Images	1179
In 7 Images	676
In 8 Images	417
In 9 Images	287
In 10 Images	202
In 11 Images	128
In 12 Images	108
In 13 Images	54
In 14 Images	29
In 15 Images	12
In 16 Images	9
In 17 Images	9
In 18 Images	3
In 19 Images	4
In 20 Images	4
In 22 Images	3
In 23 Images	3
In 24 Images	4
In 31 Images	1

? 2D Keypoint Matches





Uncertainty ellipses 100x magnified

Number of matches

25 83 167 251 334 418 502 585 669 753

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[US survey foot]	Y[US survey foot]	Z[US survey foot]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.237	0.195	0.202	0.040	0.046	0.060
Sigma	0.310	0.249	0.193	0.197	0.222	0.599

Geolocation Details



Ground Control Points



GCP Name	Accuracy XYZ [US survey foot]	Error X [US survey foot]	Error Y [US survey foot]	Error Z [US survey foot]	Projection Error [pixel]	Verified/Marked
5011 (3D)	0.020/0.020	-0.002	0.002	-0.001	0.072	8 / 8
5012 (3D)	0.020/0.020	0.002	0.002	-0.002	0.169	8 / 8
5013 (3D)	0.020/0.020	0.015	0.010	0.025	0.438	7 / 7
5014 (3D)	0.020/0.020	-0.044	0.013	-0.045	0.456	10 / 10
5001 (3D)	0.020/0.020	0.031	-0.031	0.032	0.347	8 / 10
Mean [US survey foot]		0.000445	-0.000736	0.001800		
Sigma [US survey foot]		0.024800	0.015793	0.027193		
RMS Error [US survey foot]		0.024804	0.015810	0.027252		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of calibrated images where the GCP has been automatically verified vs. manually marked.

🔍 Absolute Geolocation Variance



Min Error [US survey foot]	Max Error [US survey foot]	Geolocation Error X[%]	Geolocation Error Y[%]	Geolocation Error Z[%]
-	-0.30	34.89	40.76	45.08
-0.30	-0.24	2.25	1.55	4.66
-0.24	-0.18	2.59	2.42	3.28
-0.18	-0.12	3.11	4.15	4.49
-0.12	-0.06	2.25	2.94	3.45
-0.06	0.00	1.73	2.42	3.11
0.00	0.06	2.59	2.25	3.97
0.06	0.12	3.63	3.11	2.42
0.12	0.18	2.25	2.59	2.42
0.18	0.24	2.25	2.07	2.76
0.24	0.30	5.18	2.76	2.94
0.30	-	37.31	32.99	21.42
Mean [US survey foot]		-5.182205	-10.434481	-106.746008
Sigma [US survey foot]		1.184190	1.257700	3.444819
RMS Error [US survey foot]		5.315784	10.510005	106.801578

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.

Geolocation Bias	X	Y	Z
Translation [US survey foot]	-5.198320	-10.430159	-106.715151

Bias between image initial and computed geolocation given in output coordinate system.

🔍 Relative Geolocation Variance



Relative Geolocation Error	Images X[%]	Images Y[%]	Images Z[%]
[-1.00, 1.00]	5.18	6.22	12.26
[-2.00, 2.00]	12.26	13.99	25.73
[-3.00, 3.00]	20.21	20.73	38.00
Mean of Geolocation Accuracy [US survey foot]	0.074003	0.074003	0.115821
Sigma of Geolocation Accuracy [US survey foot]	0.014440	0.014440	0.017473

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

Geolocation Orientational Variance	RMS [degree]
Omega	2.521
Phi	2.979
Kappa	2.301

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: 13th Gen Intel(R) Core(TM) i9-13900K RAM: 64GB GPU: NVIDIA GeForce RTX4060 Ti (Driver: 31.0.15.3667)
Operating System	Windows 11, 64-bit

Coordinate Systems



Image Coordinate System	NAD83(2011)
Ground Control Point (GCP) Coordinate System	NAD83(2011) / Virginia North (ftUS)
Output Coordinate System	NAD83(2011) / Virginia North (ftUS)

Processing Options



Detected Template	No Template Available
Keypoints Image Scale	Custom, Image Scale: 0.25
Advanced: Matching Image Pairs	Custom Use Capture Time: yes, Number of Neighboring Images: 1 Use Triangulation of Image Geolocation: yes Use Distance: no Use Image Similarity: yes, Maximum Number of Pairs for Each Image Based on Similarity: 1 Use MTPs: yes, Maximum Number of Image Pairs per MTP: 5 Use Time for Multiple Cameras: yes
Advanced: Matching Strategy	Use Geometrically Verified Matching: yes
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Geolocation Based Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, no

Point Cloud Densification details



Processing Options



Image Scale	multiscale, 1/4 (Quarter image size, Fast)
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	08m:26s
Time for Point Cloud Classification	01m:59s
Time for 3D Textured Mesh Generation	14m:52s

Results



Number of Generated Tiles	1
Number of 3D Densified Points	18701747
Average Density (per US survey foot ³)	4.74