Quality Report

Generated with PIX4Dmapper version 4.9.0

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	DianBaoRiver
Processed	2024-02-19 14:14:19
Camera Model Name(s)	MAVIC2-ENTERPRISE-ADVANCED_4.5_8000x6000 (RGB)
Average Ground Sampling Distance (GSD)	0.76 cm / 0.30 in
Area Covered	0.039 km^2 / 3.8529 ha / 0.01 sq. mi. / 9.5257 acres

Quality Check

Images	median of 48199 keypoints per image	✓
Dataset	90 out of 183 images calibrated (49%), all images enabled, 2 blocks	⚠
Camera Optimization	2.83% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 11241.9 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

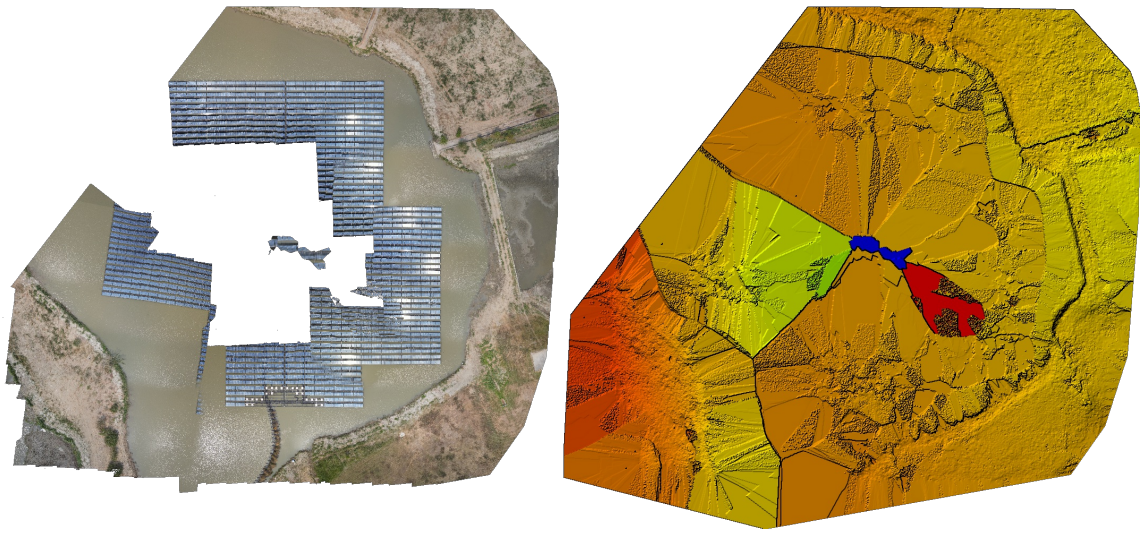


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	90 out of 183
Number of Geolocated Images	183 out of 183

Initial Image Positions

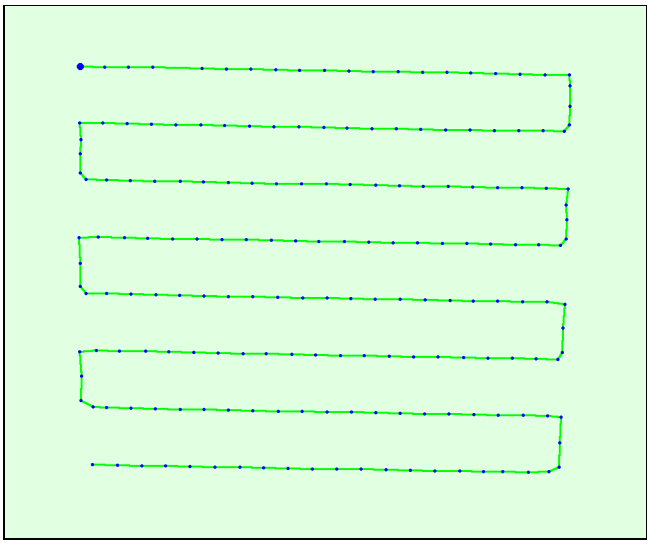


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions

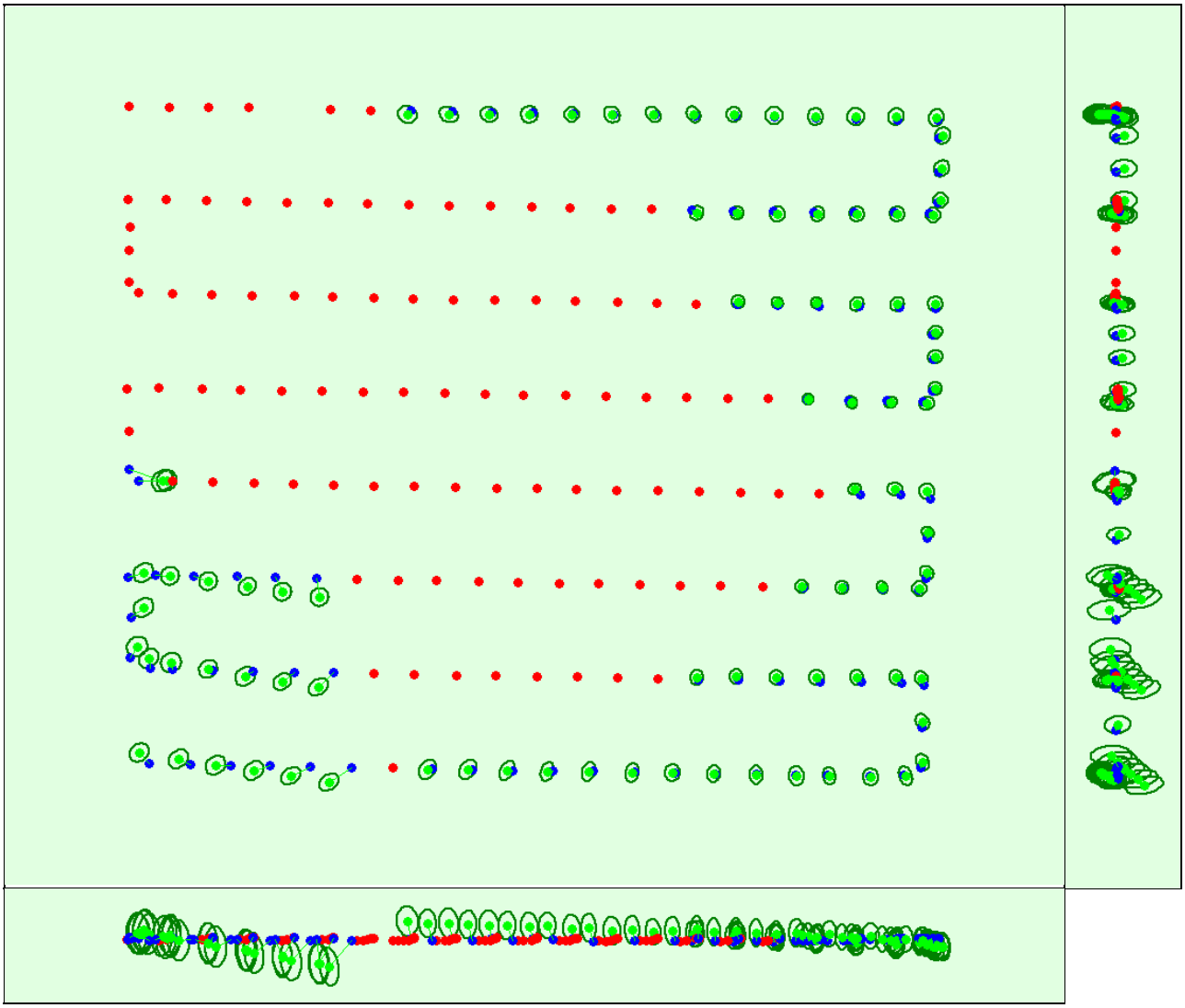


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and

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	0.187	0.194	0.337	0.083	0.093	0.086
Sigma	0.031	0.028	0.069	0.008	0.012	0.017

Overlap

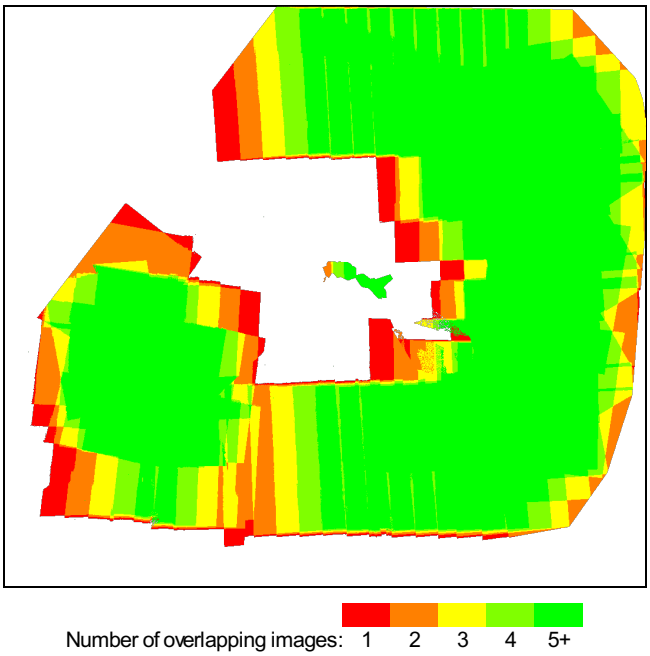


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

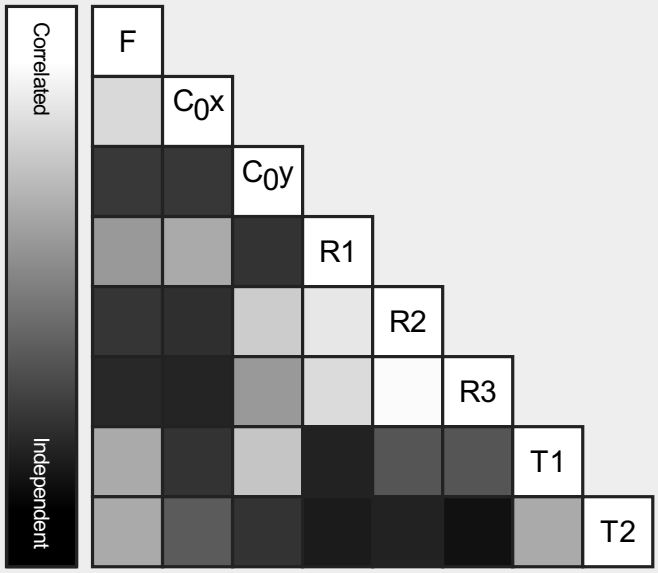
Number of 2D Keypoint Observations for Bundle Block Adjustment	1100556
Number of 3D Points for Bundle Block Adjustment	419531
Mean Reprojection Error [pixels]	0.208

Internal Camera Parameters

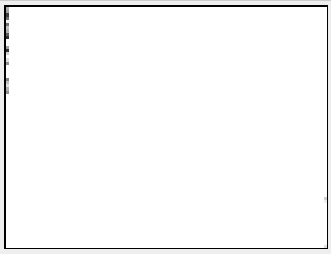
MAVIC2-ENTERPRISE-ADVANCED_4.5_8000x6000 (RGB). Sensor Dimensions: 6.563 [mm] x 4.922 [mm]

EXIF ID: MAVIC2-ENTERPRISE-ADVANCED_4.5_8000x6000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	6538.690 [pixel] 5.364 [mm]	3905.580 [pixel] 3.204 [mm]	2967.060 [pixel] 2.434 [mm]	-0.007	-0.006	-0.023	-0.000	-0.001
Optimized Values	6723.849 [pixel] 5.516 [mm]	3916.141 [pixel] 3.212 [mm]	2967.243 [pixel] 2.434 [mm]	-0.000	-0.038	0.021	-0.000	-0.001
Uncertainties (Sigma)	8.827 [pixel] 0.007 [mm]	0.611 [pixel] 0.001 [mm]	0.305 [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	48199	11242
Min	22645	1227
Max	88057	24895
Mean	50258	12228

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	307460
In 3 Images	54671
In 4 Images	24029
In 5 Images	13736
In 6 Images	6553
In 7 Images	4257
In 8 Images	2825
In 9 Images	1978
In 10 Images	1457
In 11 Images	911
In 12 Images	597
In 13 Images	379
In 14 Images	223
In 15 Images	133
In 16 Images	102
In 17 Images	92
In 18 Images	119
In 19 Images	9

2D Keypoint Matches

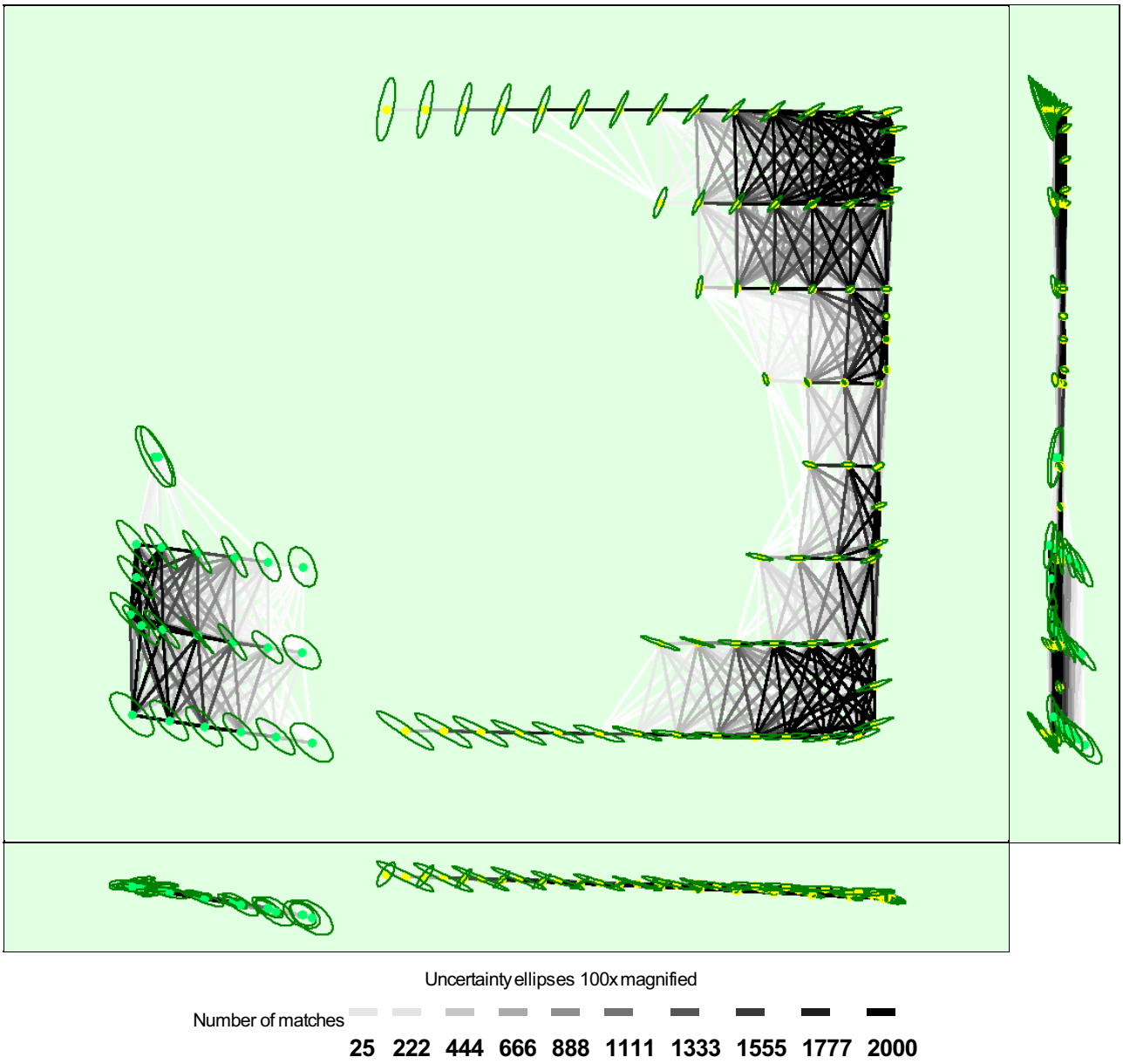


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty 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	0.033	0.028	0.013	0.016	0.031	0.034
Sigma	0.017	0.020	0.009	0.009	0.017	0.004

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	2.22	0.00	0.00

-6.00	-3.00	3.33	0.00	7.78
-3.00	0.00	37.78	51.11	43.33
0.00	3.00	51.11	44.44	41.11
3.00	6.00	5.56	4.44	6.67
6.00	9.00	0.00	0.00	1.11
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]		-0.000070	-0.000059	-0.000198
Sigma [m]		1.811737	1.228579	2.097377
RMS Error [m]		1.811737	1.228579	2.097377

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]	96.67	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	1.956
Phi	5.312
Kappa	5.082

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) i7-10875H CPU @ 2.30GHz RAM: 32GB GPU: Intel(R) UHD Graphics (Driver: 27.20.100.8476), NVIDIA GeForce RTX 3080 Laptop GPU (Driver: 27.21.14.6589)
Operating System	Windows 11, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	WGS 84 / UTM zone 51N (EGM96 Geoid)

Processing Options

Detected Template	3D Maps
Keypoints Image Scale	Full, 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, yes

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

Results

Number of Generated Tiles	1
Number of 3D Densified Points	23636837
Average Density (per m^3)	4575.79

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (0.758 [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