Quality Report

Generated with Pix4Denterprise version 4.4.12

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	tw_taichung_longjing_shanjiao-channel_20191223
Processed	2020-01-11 06:35:25
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	3.76 cm / 1.48 in
Area Covered	0.440 km^2 / 44.0221 ha / 0.17 sq. mi. / 108.8372 acres
Time for Initial Processing (without report)	01h:26m:42s

Quality Check

Images	median of 51698 keypoints per image	✓
Dataset	492 out of 492 images calibrated (100%), all images enabled	✓
Camera Optimization	0.24% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 22080.8 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Preview

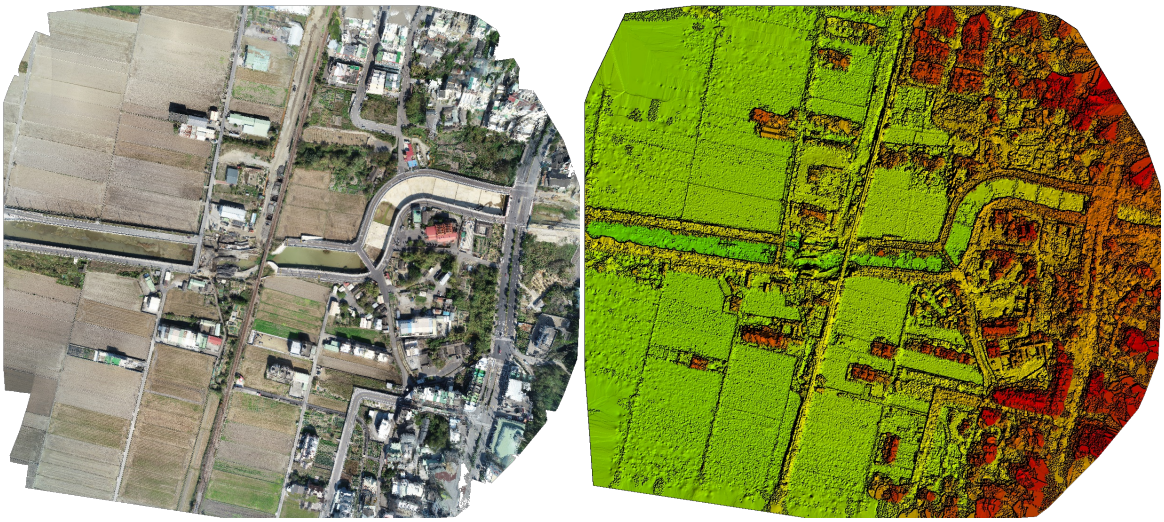


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details

Number of Calibrated Images	492 out of 492

Number of Geolocated Images	492 out of 492

Initial Image Positions

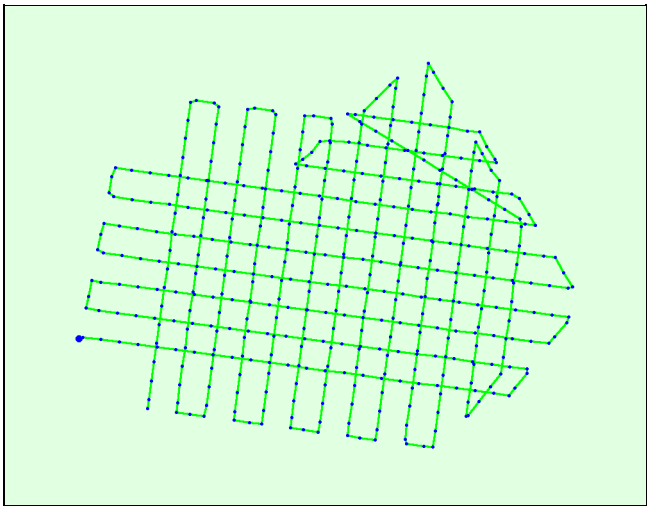
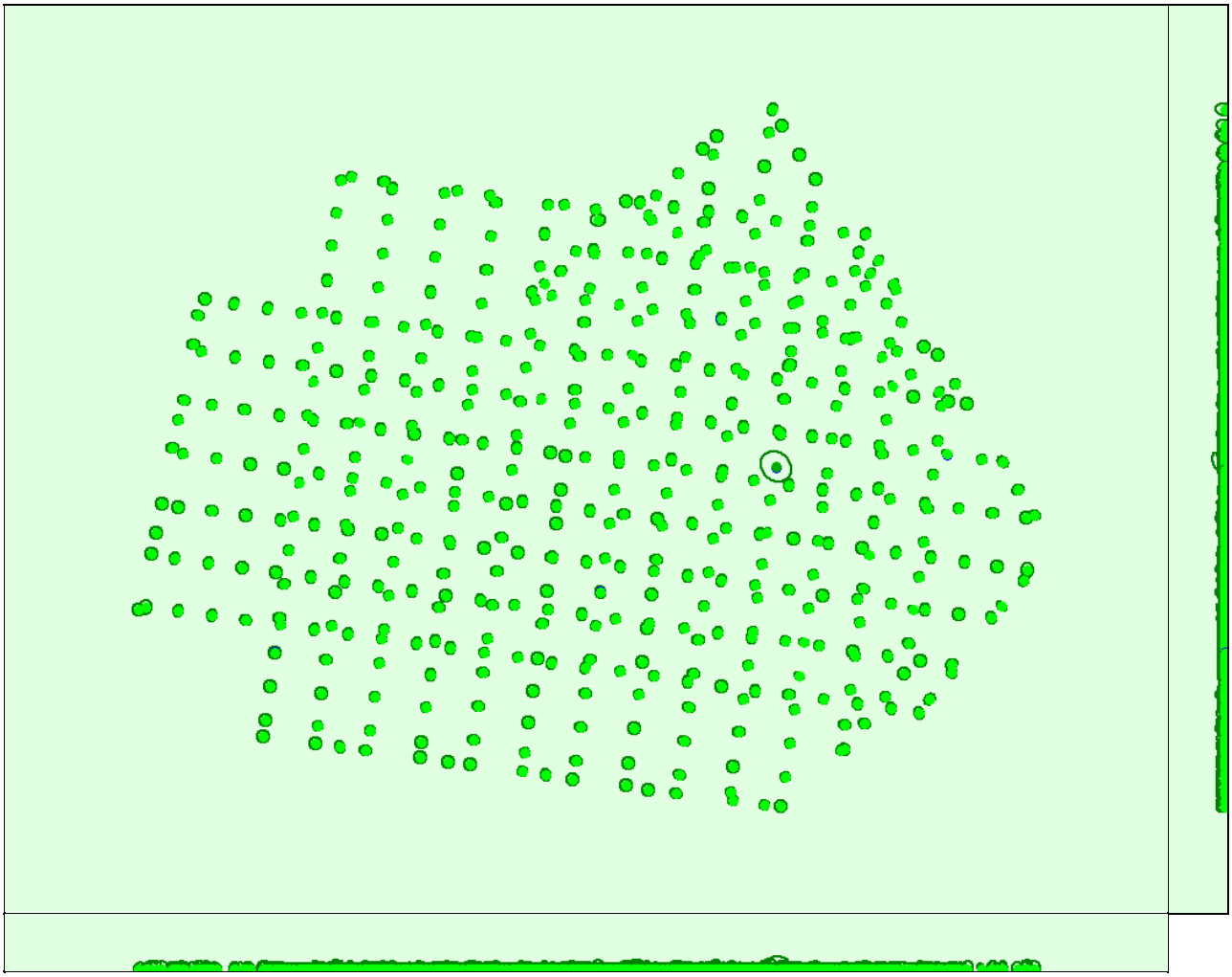


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

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). 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	0.003	0.003	0.004	0.002	0.002	0.002
Sigma	0.000	0.000	0.000	0.000	0.000	0.000

Overlap

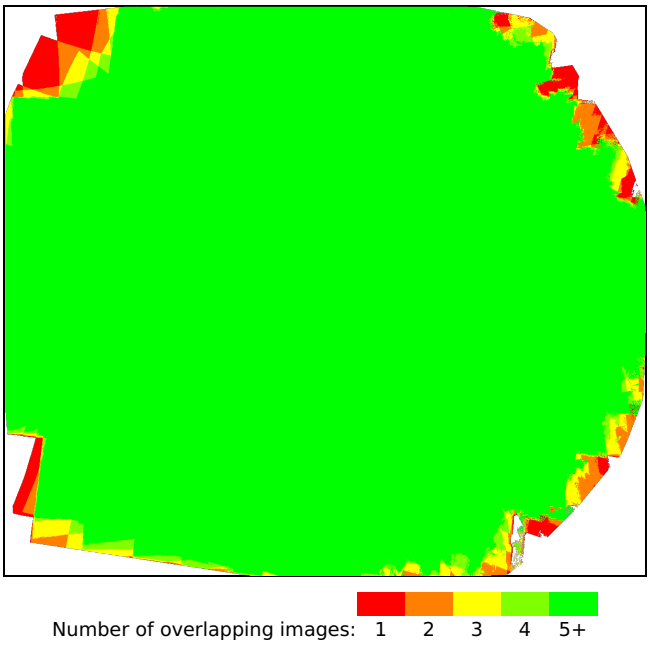


Figure 4: Number of overlapping images computed for each pixel of the orthomosaic.
Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint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

Bundle Block Adjustment Details

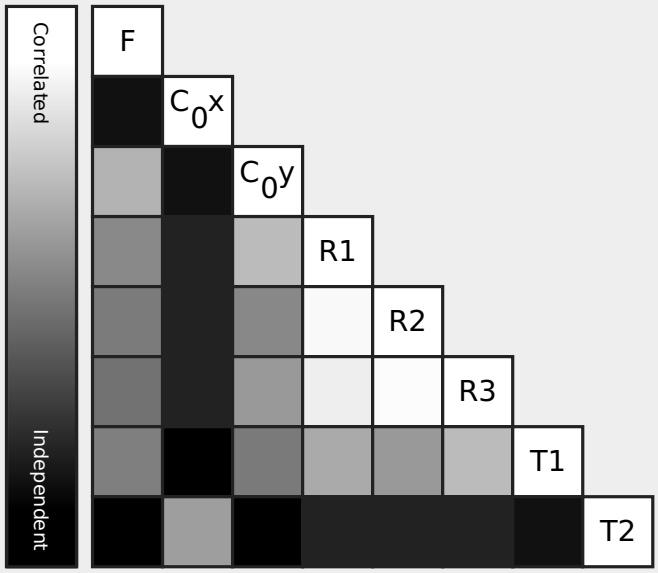
Number of 2D Keypoint Observations for Bundle Block Adjustment	10933399
Number of 3D Points for Bundle Block Adjustment	3539070
Mean Reprojection Error [pixels]	0.182

Internal Camera Parameters

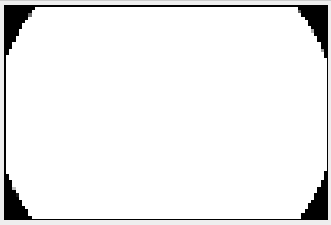
FC6310R_8.8_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]

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	3649.203 [pixel] 8.558 [mm]	2726.137 [pixel] 6.394 [mm]	1847.904 [pixel] 4.334 [mm]	-0.268	0.112	-0.033	0.001	0.000
Uncertainties (Sigma)	0.041 [pixel] 0.000 [mm]	0.046 [pixel] 0.000 [mm]	0.050 [pixel] 0.000 [mm]	0.000	0.000	0.000	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	51698	22081
Min	28835	7370
Max	67878	33904
Mean	51067	22222

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	2125126
In 3 Images	639012
In 4 Images	295406
In 5 Images	163087
In 6 Images	98136
In 7 Images	63032
In 8 Images	41894
In 9 Images	29028
In 10 Images	20667
In 11 Images	14886
In 12 Images	10903
In 13 Images	8252
In 14 Images	6340
In 15 Images	4921
In 16 Images	3713
In 17 Images	2884
In 18 Images	2314
In 19 Images	1851
In 20 Images	1450
In 21 Images	1210
In 22 Images	935
In 23 Images	809

In 24 Images	521
In 25 Images	482
In 26 Images	394
In 27 Images	319
In 28 Images	258
In 29 Images	196
In 30 Images	187
In 31 Images	164
In 32 Images	121
In 33 Images	102
In 34 Images	79
In 35 Images	57
In 36 Images	56
In 37 Images	41
In 38 Images	44
In 39 Images	36
In 40 Images	24
In 41 Images	15
In 42 Images	20
In 43 Images	14
In 44 Images	17
In 45 Images	7
In 46 Images	11
In 47 Images	5
In 48 Images	5
In 49 Images	8
In 50 Images	9
In 51 Images	6
In 52 Images	3
In 53 Images	2
In 54 Images	4
In 56 Images	1
In 57 Images	1
In 58 Images	1
In 61 Images	1
In 66 Images	1
In 67 Images	1
In 68 Images	1

2D Keypoint Matches

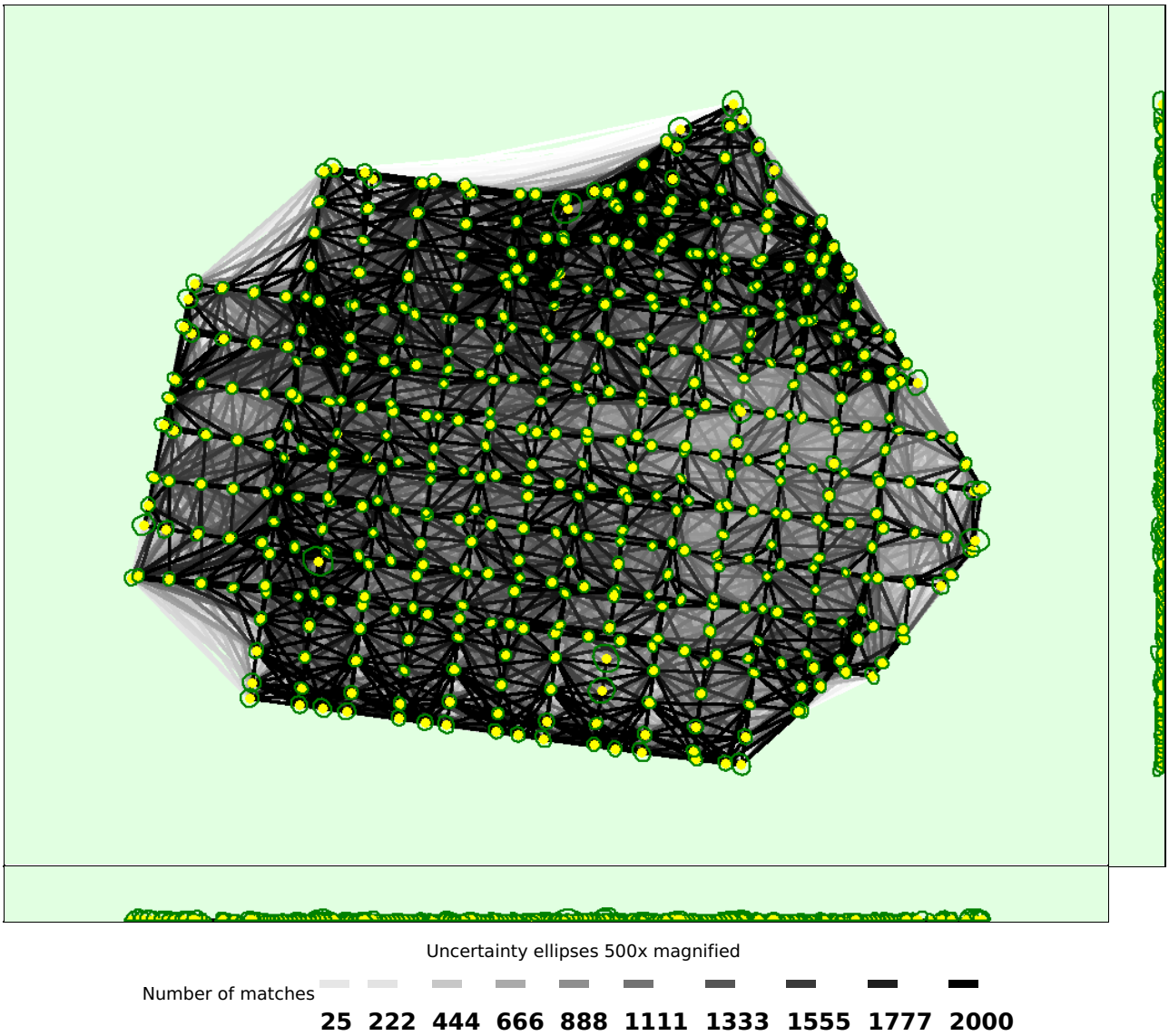


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty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

Relative camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.007	0.007	0.006	0.004	0.004	0.003
Sigma	0.002	0.002	0.001	0.001	0.001	0.001

Geolocation Details

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.04	0.00	0.00	0.61
-0.04	-0.03	0.00	0.00	1.43
-0.03	-0.02	0.00	0.20	2.24
-0.02	-0.01	0.00	0.41	8.96
-0.01	-0.01	2.44	3.05	16.09
-0.01	0.00	47.25	46.23	23.83
0.00	0.01	48.47	48.27	21.59

0.01	0.01	1.83	1.83	13.44
0.01	0.02	0.00	0.00	8.35
0.02	0.03	0.00	0.00	2.04
0.03	0.04	0.00	0.00	0.41
0.04	-	0.00	0.00	1.02
Mean [m]		0.000010	-0.000057	-0.000096
Sigma [m]		0.003379	0.003873	0.015573
RMS Error [m]		0.003379	0.003873	0.015574

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]	99.39	98.98	86.76
[-2.00, 2.00]	100.00	99.59	98.37
[-3.00, 3.00]	100.00	100.00	98.98
Mean of Geolocation Accuracy [m]	0.009643	0.009643	0.018027
Sigma of Geolocation Accuracy [m]	0.000427	0.000427	0.000532

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

Geolocation Orientational Variance	RMS [degree]
Omega	1.231
Phi	1.072
Kappa	2.746

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) Xeon(R) Platinum 8124M CPU @ 3.00GHz RAM: 69GB GPU: no info (Driver: unknown)
Operating System	Linux 4.15.0-1054-aws x86_64

Coordinate Systems

Image Coordinate System	WGS 84
Output Coordinate System	TWD97 / TM2 zone 121

Processing Options

Detected Template	No Template Available
Keypoints Image Scale	Full, Image Scale: 1
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: Geolocation Based 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: yes
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	47m:00s
Time for Point Cloud Classification	02m:55s
Time for 3D Textured Mesh Generation	25m:03s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	41739892
Average Density (per m^3)	65.32

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (3.76 [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
Raster DTM	Generated: yes Merge Tiles: yes
DTM Resolution	10 x GSD (3.76 [cm/pixel])
Time for DSM Generation	11m:41s
Time for Orthomosaic Generation	21m:09s
Time for DTM Generation	52s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s