Quality Report

> ⚠️ **Important**: Click on the different icons for:
>
> ❓ Help to analyze the results in the Quality Report
>
> ℹ️ Additional information about the sections

> 💡 Click here for additional tips to analyze the Quality Report

Summary

Project	stan_3k_1_x3
Processed	2018-10-02 22:14:20
Camera Model Name(s)	FC350_3.6_4000x3000 (RGB)
Average Ground Sampling Distance (GSD)	4.95 cm / 1.95 in
Area Covered	0.680 km^2 / 68.0279 ha / 0.26 sq. mi. / 168.1875 acres
Time for Initial Processing (without report)	38m:14s

Quality Check

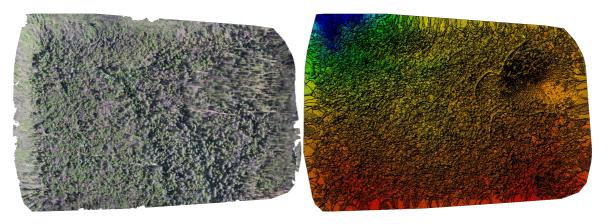|		
❓ **Images**	median of 12341 keypoints per image	✅
❓ **Dataset**	2064 out of 2070 images calibrated (99%), all images enabled	✅
❓ **Camera Optimization**	3.04% relative difference between initial and optimized internal camera parameters	✅
❓ **Matching**	median of 1159.77 matches per calibrated image	✅
❓ **Georeferencing**	yes, no 3D GCP	⚠️

❓ **Preview** ℹ️

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

Calibration Details ℹ️

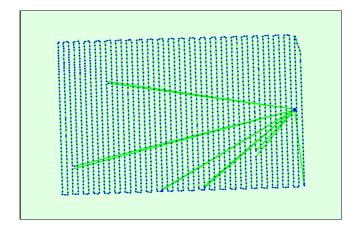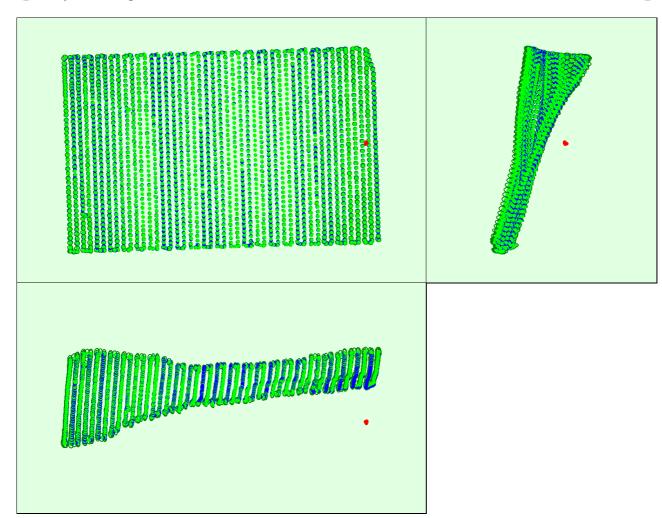|	
Number of Calibrated Images	2064 out of 2070
Number of Geolocated Images	2070 out of 2070

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.

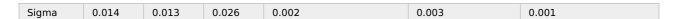## Computed Image/GCPs/Manual Tie Points Positions

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 [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.085	0.085	0.156	0.031	0.029	0.014

Sigma	0.014	0.013	0.026	0.002	0.003	0.001

? Overlap ⓘ

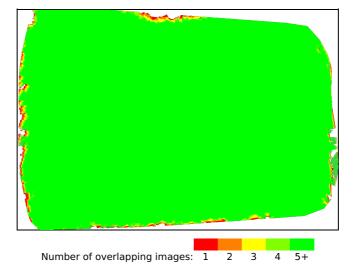Number of overlapping images: 1 2 3 4 5+

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 ⓘ

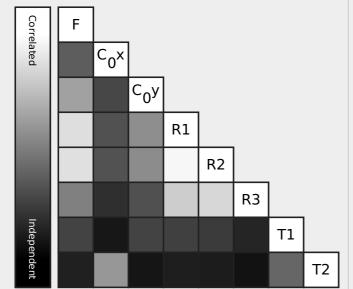|	
Number of 2D Keypoint Observations for Bundle Block Adjustment	2478429
Number of 3D Points for Bundle Block Adjustment	925315
Mean Reprojection Error [pixels]	0.129

? Internal Camera Parameters

⊖ FC350_3.6_4000x3000 (RGB). Sensor Dimensions: 6.317 [mm] x 4.738 [mm] ⓘ

EXIF ID: FC350_3.6_4000x3000

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	2285.722 [pixel] 3.610 [mm]	2000.006 [pixel] 3.159 [mm]	1500.003 [pixel] 2.369 [mm]	-0.130	0.106	-0.016	-0.000	0.000
Optimized Values	2355.333 [pixel] 3.720 [mm]	1984.997 [pixel] 3.135 [mm]	1503.000 [pixel] 2.374 [mm]	-0.133	0.117	-0.016	0.001	0.000
Uncertainties (Sigma)	1.995 [pixel] 0.003 [mm]	0.048 [pixel] 0.000 [mm]	0.051 [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	12341	1160
Min	11434	499
Max	15019	3135
Mean	12368	1201
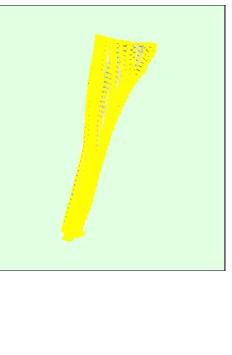
? 3D Points from 2D Keypoint Matches
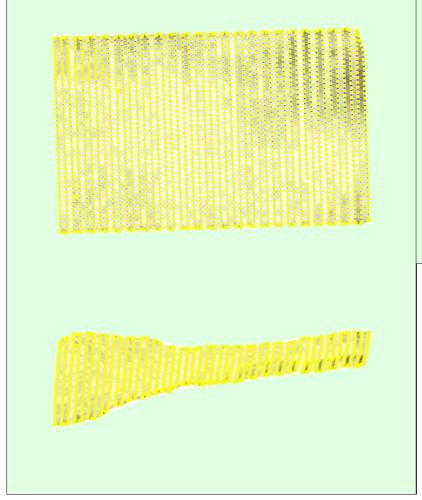
	Number of 3D Points Observed
In 2 Images	648231
In 3 Images	149141
In 4 Images	57175
In 5 Images	27304
In 6 Images	14981
In 7 Images	8837
In 8 Images	5611
In 9 Images	3818
In 10 Images	2723
In 11 Images	1839
In 12 Images	1263
In 13 Images	948
In 14 Images	736
In 15 Images	541
In 16 Images	422
In 17 Images	328
In 18 Images	239
In 19 Images	207
In 20 Images	168
In 21 Images	139
In 22 Images	119

In 23 Images	96
In 24 Images	72
In 25 Images	55
In 26 Images	38
In 27 Images	34
In 28 Images	34
In 29 Images	33
In 30 Images	25
In 31 Images	22
In 32 Images	20
In 33 Images	17
In 34 Images	19
In 35 Images	11
In 36 Images	18
In 37 Images	9
In 38 Images	10
In 39 Images	5
In 40 Images	7
In 41 Images	2
In 42 Images	4
In 43 Images	3
In 44 Images	1
In 45 Images	3
In 46 Images	3
In 47 Images	3
In 48 Images	1

2D Keypoint Matches

Number of 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

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	0.00	0.00	0.00
-6.00	-3.00	0.00	14.68	6.49
-3.00	0.00	56.20	36.29	36.48
0.00	3.00	42.93	35.76	55.62
3.00	6.00	0.87	13.23	1.41
6.00	9.00	0.00	0.05	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]		0.609598	2.379097	1.673310
RMS Error [m]		0.609598	2.379097	1.673310

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]	99.90	99.66	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	0.555
Phi	0.745
Kappa	4.550

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 4.15.0-1021-aws x86_64

Coordinate Systems

Image Coordinate System	WGS 84 (EGM 96 Geoid)
Output Coordinate System	WGS 84 / UTM zone 10N (EGM 96 Geoid)

Processing Options

Detected Template	No Template Available
Keypoints Image Scale	Custom, 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, no

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
Time for Point Cloud Densification	02h:43m:48s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	57m:32s

Results

Number of Generated Tiles	4
Number of 3D Densified Points	89085836
Average Density (per m^3)	24.55

DSM, Orthomosaic and Index Details

Processing Options

DSM and Orthomosaic Resolution	1 x GSD (4.95 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp

Raster DSM	Generated: yes Method: Triangulation Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	06m:37s
Time for Orthomosaic Generation	07h:07m:58s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s