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Processing Report
27 September 2021



Survey Data

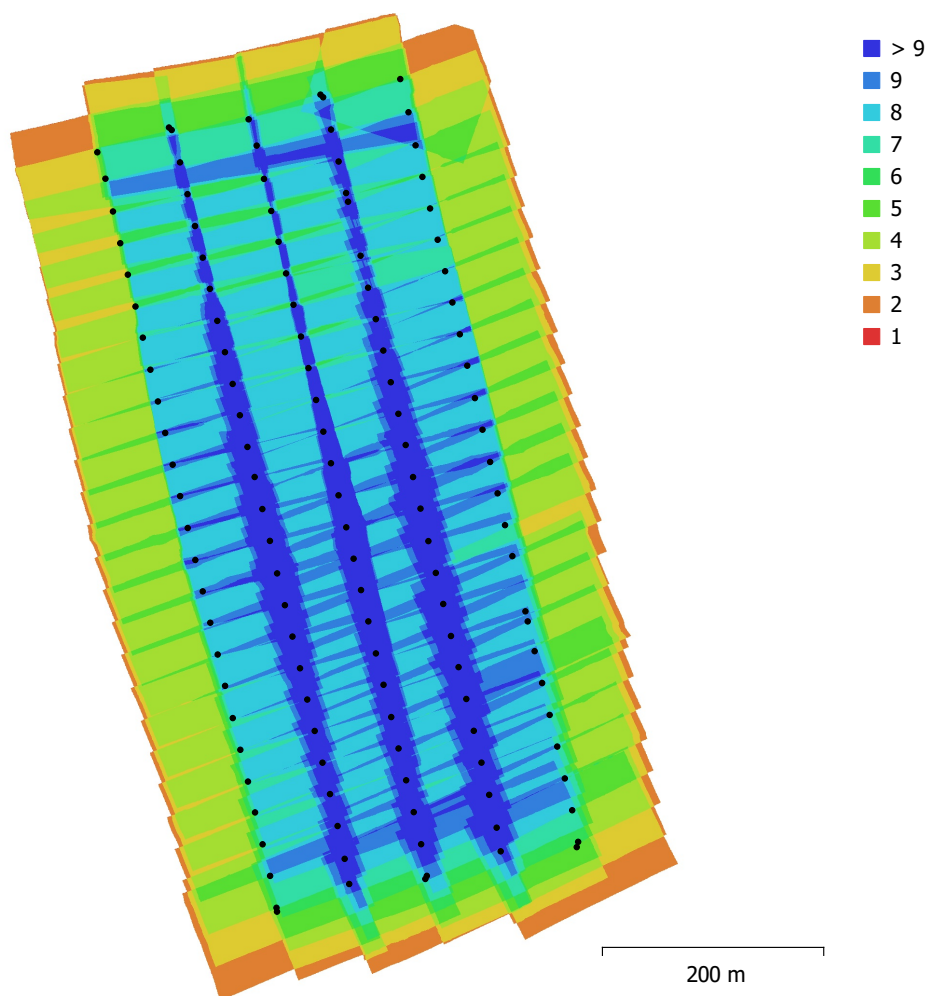


Fig. 1. Camera locations and image overlap.

Number of images:	130	Camera stations:	130
Flying altitude:	129 m	Tie points:	163,005
Ground resolution:	3.21 cm/pix	Projections:	505,456
Coverage area:	0.359 km ²	Reprojection error:	0.657 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC6310 (8.8mm)	4864 x 3648	8.8 mm	2.61 x 2.61 μm	No

Table 1. Cameras.

Camera Calibration

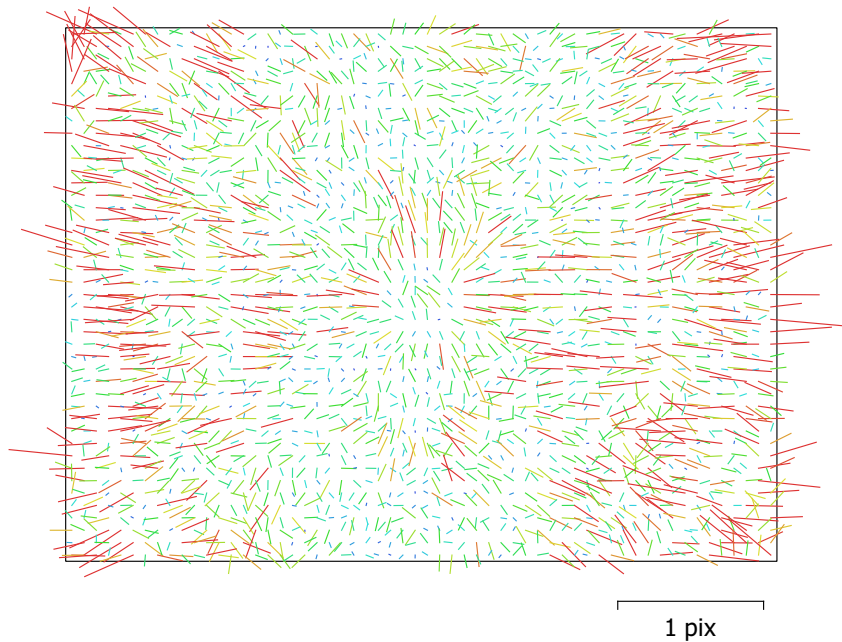


Fig. 2. Image residuals for FC6310 (8.8mm).

FC6310 (8.8mm)

130 images

Type **Frame** Resolution **4864 x 3648** Focal Length **8.8 mm** Pixel Size **2.61 x 2.61 μm**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
F	3650.37	1.8	1.00	0.25	0.13	-0.03	0.02	0.22	-0.36	0.44	-0.49	-0.03	-0.05
Cx	-8.71581	0.14		1.00	0.07	-0.10	-0.04	0.06	-0.10	0.12	-0.13	0.17	-0.03
Cy	15.3912	0.11			1.00	0.04	-0.06	0.03	-0.05	0.06	-0.06	-0.07	0.34
B1	1.08816	0.026				1.00	0.02	0.01	-0.01	-0.00	0.01	-0.00	0.03
B2	0.179706	0.026					1.00	-0.00	-0.00	0.00	-0.00	-0.04	0.01
K1	0.0169503	9.2e-05						1.00	-0.96	0.91	-0.85	0.01	-0.01
K2	-0.0974422	0.00054							1.00	-0.98	0.95	-0.00	0.02
K3	0.189177	0.0013								1.00	-0.99	0.00	-0.03
K4	-0.124069	0.001									1.00	-0.00	0.03
P1	-0.000231353	2.9e-06										1.00	-0.11
P2	-0.00049493	3.8e-06											1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations



Fig. 3. Camera locations and error estimates.

Z error is represented by ellipse color. X,Y errors are represented by ellipse shape. Estimated camera locations are marked with a black dot.

X error (m)	Y error (m)	Z error (m)	XY error (m)	Total error (m)
1.66835	5.58083	5.68299	5.82486	8.1379

Table 3. Average camera location error.
X - Easting, Y - Northing, Z - Altitude.

Ground Control Points



Fig. 4. GCP locations and error estimates.

Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.

Estimated GCP locations are marked with a dot or crossing.

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
7	2.29669	3.06365	0.16276	3.82893	3.83239

Table 4. Control points RMSE.

X - Easting, Y - Northing, Z - Altitude.

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
1	-1.73462	1.95739	0.253763	2.62768	2.272 (4)
2	-0.329188	-0.34169	0.0187484	0.474835	0.644 (3)
3	-0.649468	1.88291	-0.0826271	1.99348	1.503 (7)
4	0.858301	2.59453	-0.0135758	2.73285	1.618 (8)
5	-3.40374	1.47836	0.112909	3.71265	1.816 (8)
6	0.729724	-0.576175	0.010633	0.929832	1.183 (4)
7	4.53098	-6.99708	-0.317513	8.34204	3.879 (8)
Total	2.29669	3.06365	0.16276	3.83239	2.241

Table 5. Control points.
X - Easting, Y - Northing, Z - Altitude.

Digital Elevation Model

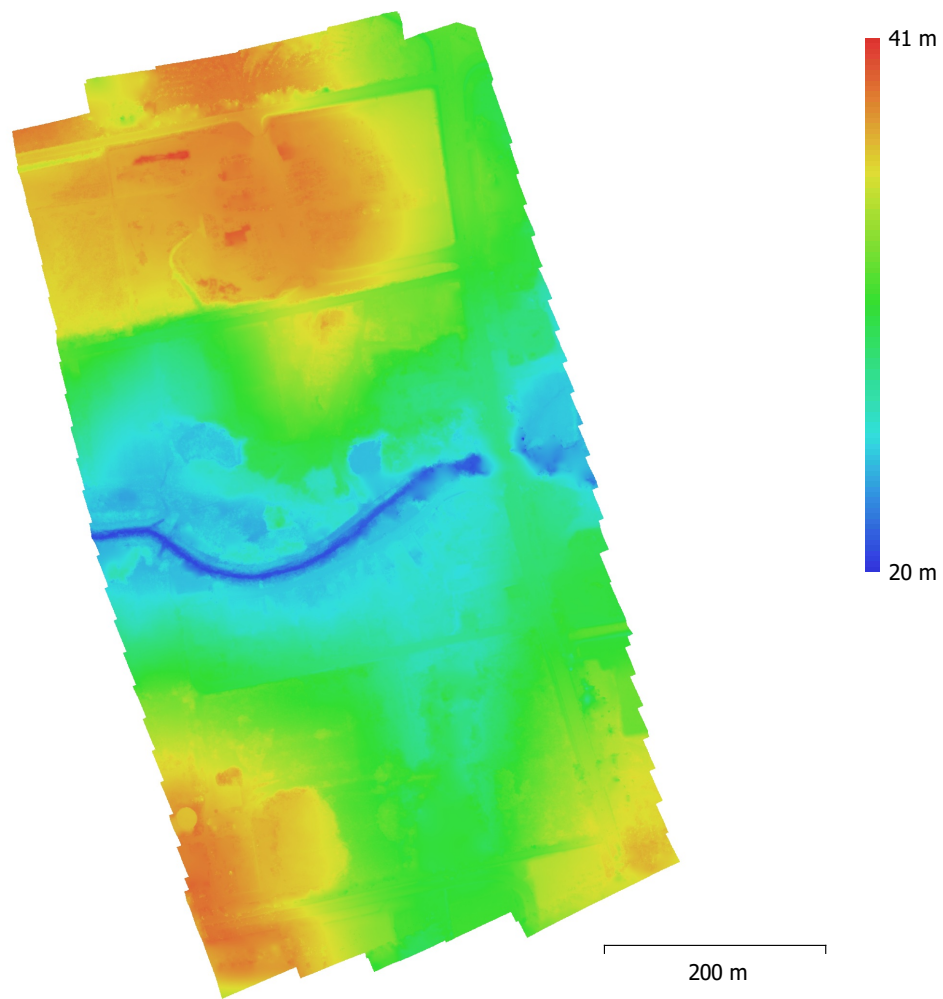


Fig. 5. Reconstructed digital elevation model.

Resolution: 6.41 cm/pix
Point density: 243 points/m²

Processing Parameters

General

Cameras	130
Aligned cameras	130
Markers	7
Coordinate system	WGS 84 / UTM zone 21S EGM08
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	163,005 of 170,993
RMS reprojection error	0.141385 (0.656554 pix)
Max reprojection error	1.8038 (33.0565 pix)
Mean key point size	4.21752 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.17517

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	Source
Key point limit	40,000
Tie point limit	4,000
Guided image matching	No
Adaptive camera model fitting	Yes
Matching time	5 minutes 7 seconds
Matching memory usage	1.17 GB
Alignment time	32 seconds
Alignment memory usage	127.99 MB

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1, p2
Adaptive camera model fitting	No
Optimization time	2 seconds
Software version	1.6.4.10928
File size	12.52 MB

Dense Point Cloud

Points	120,511,709
Point colors	3 bands, uint8

Depth maps generation parameters

Quality	High
Filtering mode	Aggressive
Processing time	9 minutes 6 seconds
Memory usage	1.49 GB

Dense cloud generation parameters

Processing time	12 minutes 3 seconds
Memory usage	4.37 GB

Ground points classification parameters

Max angle (°)	15
Max distance (m)	0.2
Cell size (m)	50
Classification time	7 minutes 35 seconds
Classification memory usage	4.78 GB
Software version	1.6.4.10928

File size	1.53 GB
DEM	
Size	13,900 x 19,227
Coordinate system	WGS 84 / UTM zone 21S EGM08
Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	2 minutes 38 seconds
Memory usage	299.55 MB
Software version	1.6.4.10928
File size	375.81 MB
Orthomosaic	
Size	18,811 x 27,807
Coordinate system	WGS 84 / UTM zone 21S EGM08
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	4 minutes 10 seconds
Memory usage	2.52 GB
Software version	1.6.4.10928
File size	2.34 GB
System	
Software name	Agisoft Metashape Professional
Software version	1.7.2 build 12070
OS	Windows 64 bit
RAM	63.93 GB
CPU	Intel(R) Core(TM) i7-9700F CPU @ 3.00GHz
GPU(s)	Radeon(TM) RX 460 Graphics (Baffin)