

Ozaukee_SouthBeach_05232019_Photoscan

Processing Report

30 October 2019



Survey Data

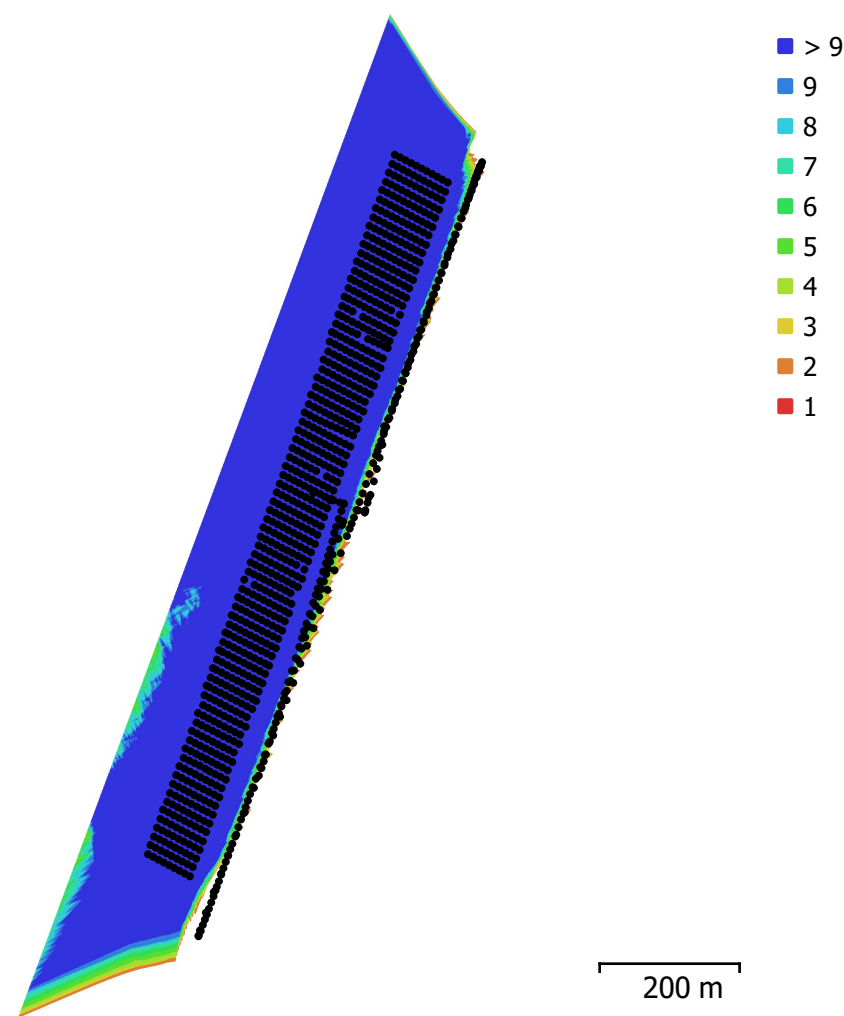


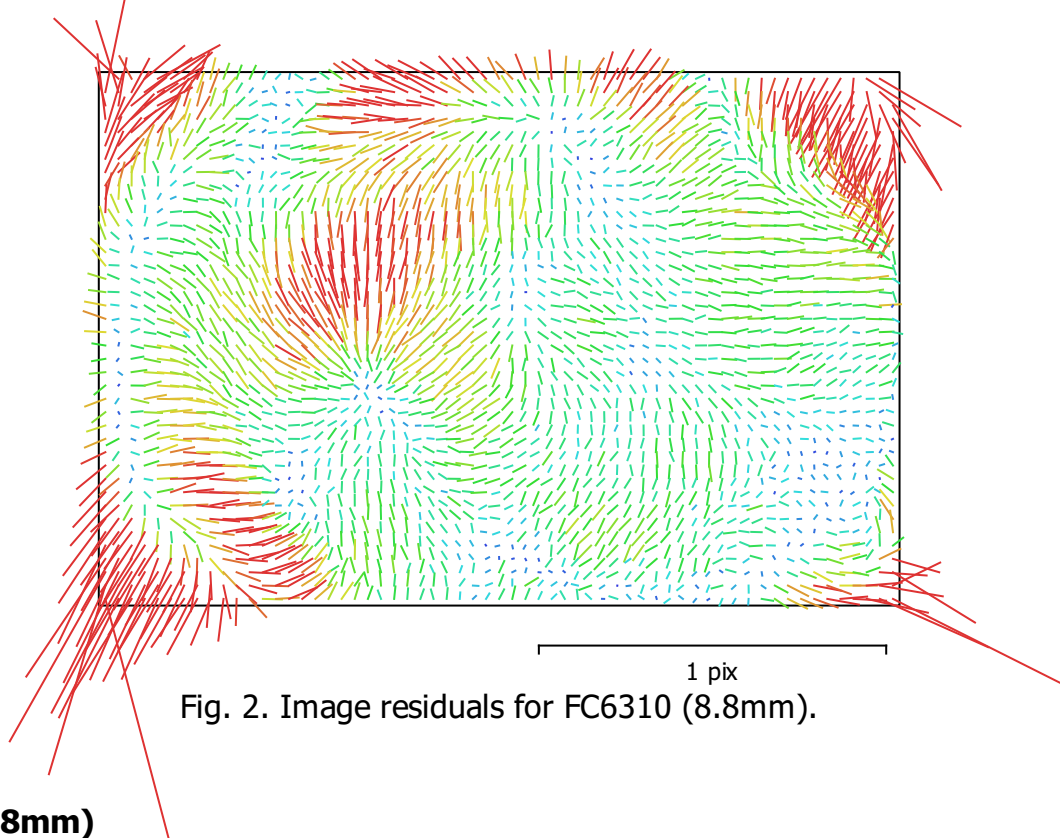
Fig. 1. Camera locations and image overlap.

Number of images:	1,020	Camera stations:	1,020
Flying altitude:	59.8 m	Tie points:	1,731,838
Ground resolution:	1.47 cm/pix	Projections:	6,891,164
Coverage area:	0.274 km ²	Reprojection error:	0.665 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC6310 (8.8mm)	5464 x 3640	8.8 mm	2.42 x 2.42 μm	No
FC6310 (8.8mm)	5464 x 3640	8.8 mm	2.42 x 2.42 μm	No

Table 1. Cameras.

Camera Calibration



FC6310 (8.8mm)

797 images

Type
Frame

Resolution
5464 x 3640

Focal Length
8.8 mm

Pixel Size
2.42 x 2.42 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2	P3	P4
F	3649.71	0.077	1.00	0.09	-0.06	-0.61	0.28	-0.80	0.37	-0.23	0.17	-0.09	0.02	0.00	0.02
Cx	-8.9995	0.0059		1.00	-0.01	-0.09	0.03	-0.06	0.02	-0.01	0.00	0.20	0.18	-0.13	0.07
Cy	39.9783	0.0042			1.00	0.03	-0.10	0.04	-0.02	0.01	-0.01	0.31	0.23	-0.31	0.26
B1	0.495651	0.013				1.00	-0.20	0.42	-0.22	0.14	-0.10	0.10	0.01	-0.01	-0.00
B2	-1.41754	0.0095					1.00	-0.21	0.11	-0.08	0.06	-0.01	0.06	-0.02	0.03
K1	-0.269905	1.4e-05						1.00	-0.84	0.72	-0.65	0.06	-0.02	0.02	-0.04
K2	0.127843	3.1e-05							1.00	-0.98	0.94	-0.02	0.02	-0.03	0.05
K3	-0.0602324	4e-05								1.00	-0.99	0.00	-0.02	0.03	-0.05
K4	0.0145503	1.8e-05									1.00	0.00	0.02	-0.03	0.05
P1	0.000242375	4.6e-07										1.00	0.89	-0.88	0.75
P2	0.000311516	5.6e-07											1.00	-0.90	0.78
P3	-0.221077	0.0045												1.00	-0.96
P4	0.264149	0.0032													1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Calibration

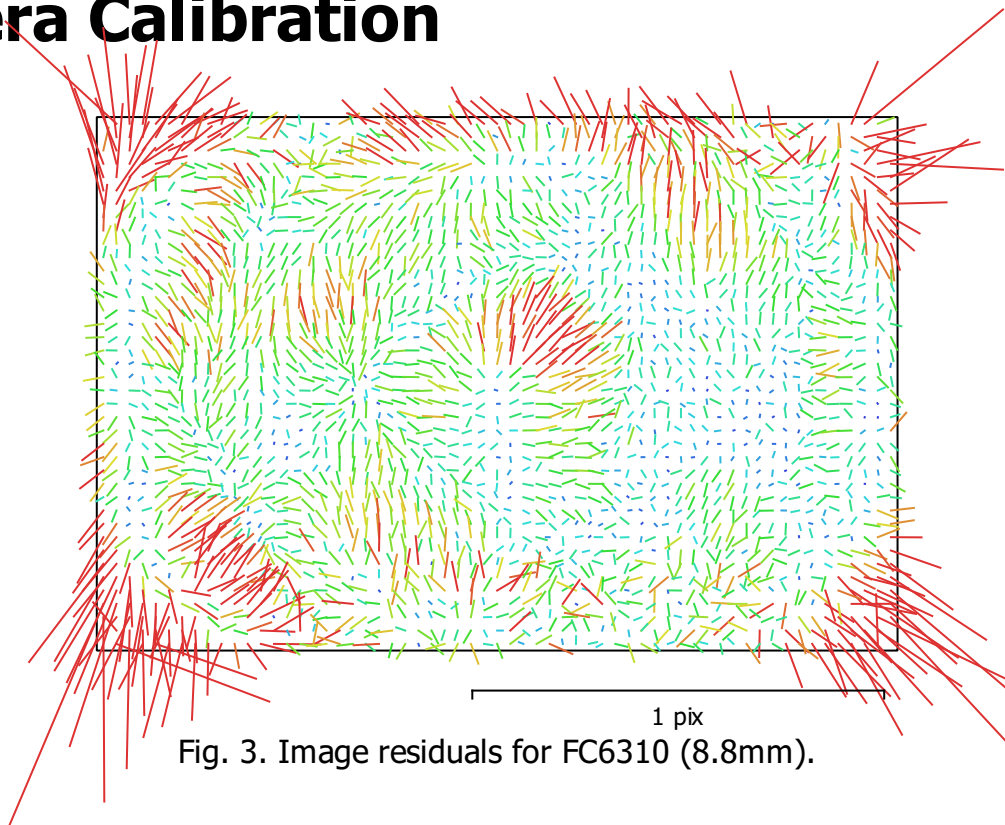


Fig. 3. Image residuals for FC6310 (8.8mm).

FC6310 (8.8mm)

223 images

Type
Frame

Resolution
5464 x 3640

Focal Length
8.8 mm

Pixel Size
2.42 x 2.42 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2	P3	P4
F	3657.79	0.034	1.00	-0.01	-0.18	-0.53	-0.06	-0.36	0.21	-0.18	0.17	0.09	0.20	-0.05	-0.06
Cx	-13.0812	0.03		1.00	0.14	-0.14	0.56	0.03	-0.00	-0.00	0.00	-0.33	-0.22	0.14	0.22
Cy	44.0751	0.021			1.00	-0.37	0.18	0.20	-0.11	0.10	-0.11	-0.32	-0.74	0.20	0.20
B1	-2.77691	0.02				1.00	-0.08	-0.04	0.02	-0.02	0.02	0.19	0.31	-0.12	-0.09
B2	-1.53483	0.014					1.00	0.02	-0.00	-0.00	0.00	-0.43	-0.34	0.24	0.24
K1	-0.27059	1.6e-05						1.00	-0.96	0.91	-0.86	-0.05	-0.16	0.03	0.04
K2	0.128817	5.4e-05							1.00	-0.99	0.96	0.01	0.08	-0.00	-0.02
K3	-0.061789	7.6e-05								1.00	-0.99	-0.01	-0.07	0.00	0.01
K4	0.0154866	3.6e-05									1.00	0.01	0.09	-0.01	0.00
P1	0.000121376	1.8e-06										1.00	0.81	-0.88	0.02
P2	4.32674e-05	8.4e-07											1.00	-0.71	-0.03
P3	0.574404	0.03												1.00	-0.48
P4	0.65878	0.013													1.00

Table 3. Calibration coefficients and correlation matrix.

Ground Control Points

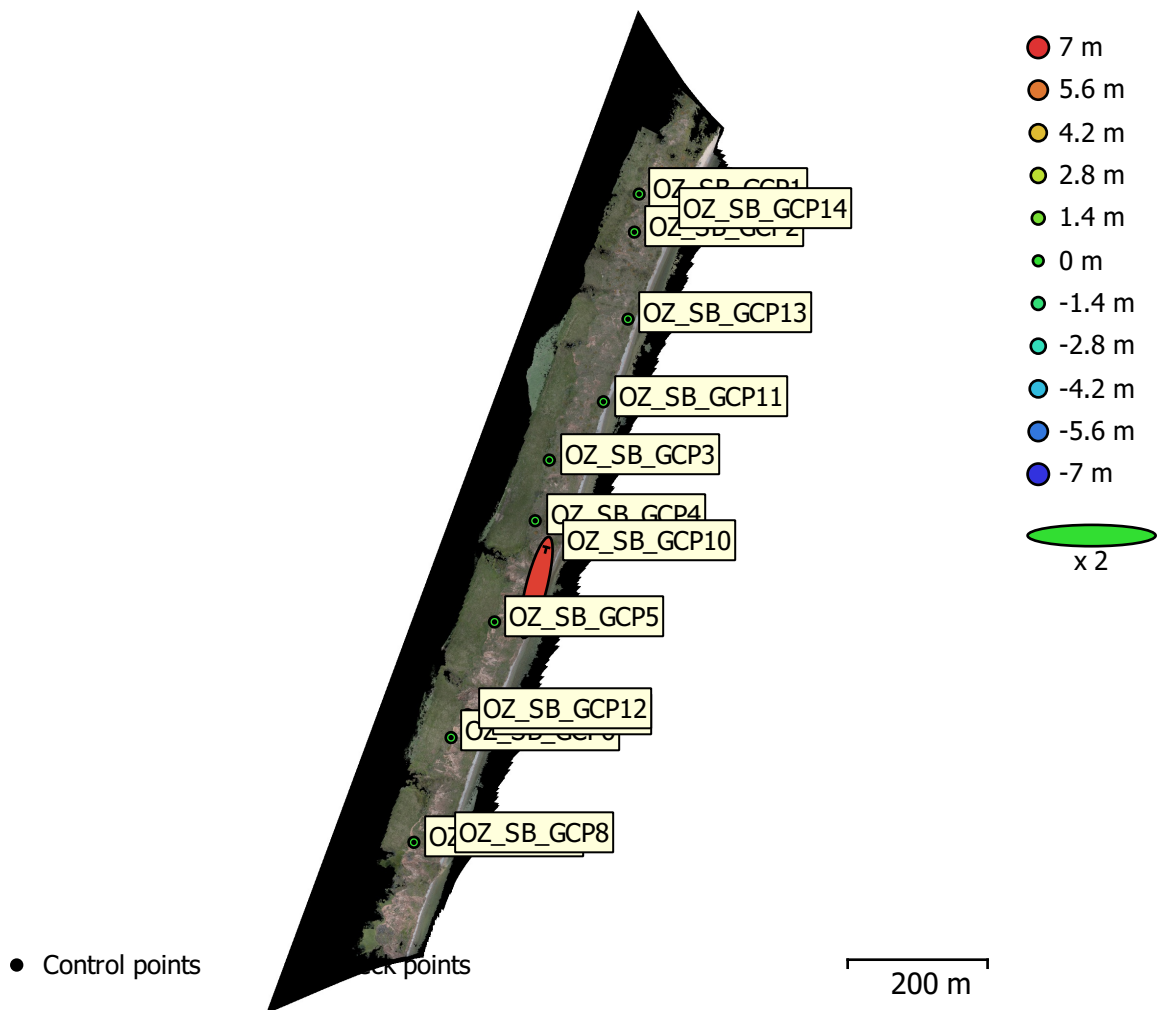


Fig. 4. GCP locations and error estimates.

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 (m)	Y error (m)	Z error (m)	XY error (m)	Total (m)
13	0.022767	0.0351378	0.0212768	0.0418688	0.0469649

Table 4. Control points RMSE.

X - Longitude, Y - Latitude, Z - Altitude.

Count	X error (m)	Y error (m)	Z error (m)	XY error (m)	Total (m)
1	14.6449	57.5789	6.74044	59.4121	59.7932

Table 5. Check points RMSE.

X - Longitude, Y - Latitude, Z - Altitude.

Label	X error (m)	Y error (m)	Z error (m)	Total (m)	Image (pix)
OZ_SB_GCP1	0.00899633	0.00490413	-0.00079019	0.0102766	0.343 (73)
OZ_SB_GCP2	-0.0426274	-0.0575344	0.00530585	0.0718015	0.285 (59)
OZ_SB_GCP3	-0.000199671	-0.0183685	-0.00126386	0.018413	0.204 (68)
OZ_SB_GCP4	0.0181308	-0.0114001	-0.0087571	0.0231382	0.174 (63)
OZ_SB_GCP5	-0.0103318	0.00659088	0.0175632	0.0214161	0.201 (58)
OZ_SB_GCP6	-0.00485289	0.0346786	-0.0220871	0.0414004	0.212 (55)
OZ_SB_GCP7	0.00909194	-0.018737	0.00213737	0.0209357	0.213 (43)
OZ_SB_GCP8	-0.0150852	0.0227654	-0.00906636	0.0287754	0.207 (56)
OZ_SB_GCP9	0.0206137	-0.0705954	0.00871882	0.0740584	0.195 (73)
OZ_SB_GCP11	-0.000369883	0.0301778	-0.01343	0.0330333	0.224 (75)
OZ_SB_GCP12	0.0599872	0.0644584	0.0676287	0.111027	0.344 (54)
OZ_SB_GCP13	-0.00558216	-0.00664721	0.00342156	0.00933022	0.198 (82)
OZ_SB_GCP14	0.00404261	0.00633691	0.0072968	0.0104758	0.284 (74)
Total	0.022767	0.0351378	0.0212768	0.0469649	0.243

Table 6. Control points.
X - Longitude, Y - Latitude, Z - Altitude.

Label	X error (m)	Y error (m)	Z error (m)	Total (m)	Image (pix)
OZ_SB_GCP10	14.6449	57.5789	6.74044	59.7932	0.214 (74)
Total	14.6449	57.5789	6.74044	59.7932	0.214

Table 7. Check points.
X - Longitude, Y - Latitude, Z - Altitude.

Digital Elevation Model

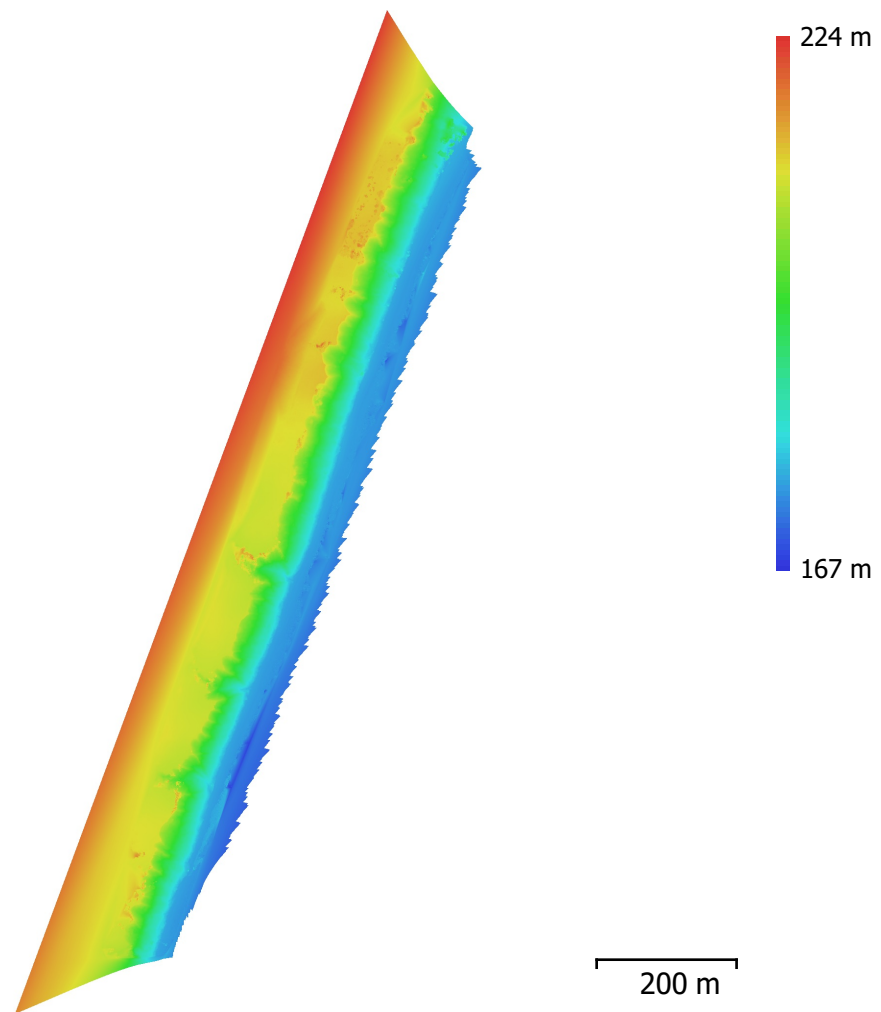


Fig. 5. Reconstructed digital elevation model.

Resolution: 2.95 cm/pix
Point density: 11.5 points/cm²

Processing Parameters

General

Cameras	1020
Aligned cameras	1020
Markers	14
Coordinate system	WGS 84 (EPSG::4326)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	1,731,838 of 1,896,269
RMS reprojection error	0.132606 (0.665305 pix)
Max reprojection error	1.07537 (44.5737 pix)
Mean key point size	3.82408 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	4.7308

Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	Yes
Key point limit	40,000
Tie point limit	10,000
Adaptive camera model fitting	No
Matching time	1 hours 23 minutes
Alignment time	21 minutes 8 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1-p4
Adaptive camera model fitting	No
Optimization time	43 seconds

Depth Maps

Count	1020
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	1 days 5 hours

Dense Point Cloud

Points	205,590,938
Point colors	3 bands, uint16

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	1 days 5 hours
Dense cloud generation time	1 days 10 hours

Model

Faces	48,570,117
Vertices	24,297,920
Vertex colors	3 bands, uint16

Reconstruction parameters

Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	48,845,229
Processing time	19 minutes 34 seconds

Software

Version	1.4.3 build 6529
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