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Processing Report
27 September 2021



Survey Data

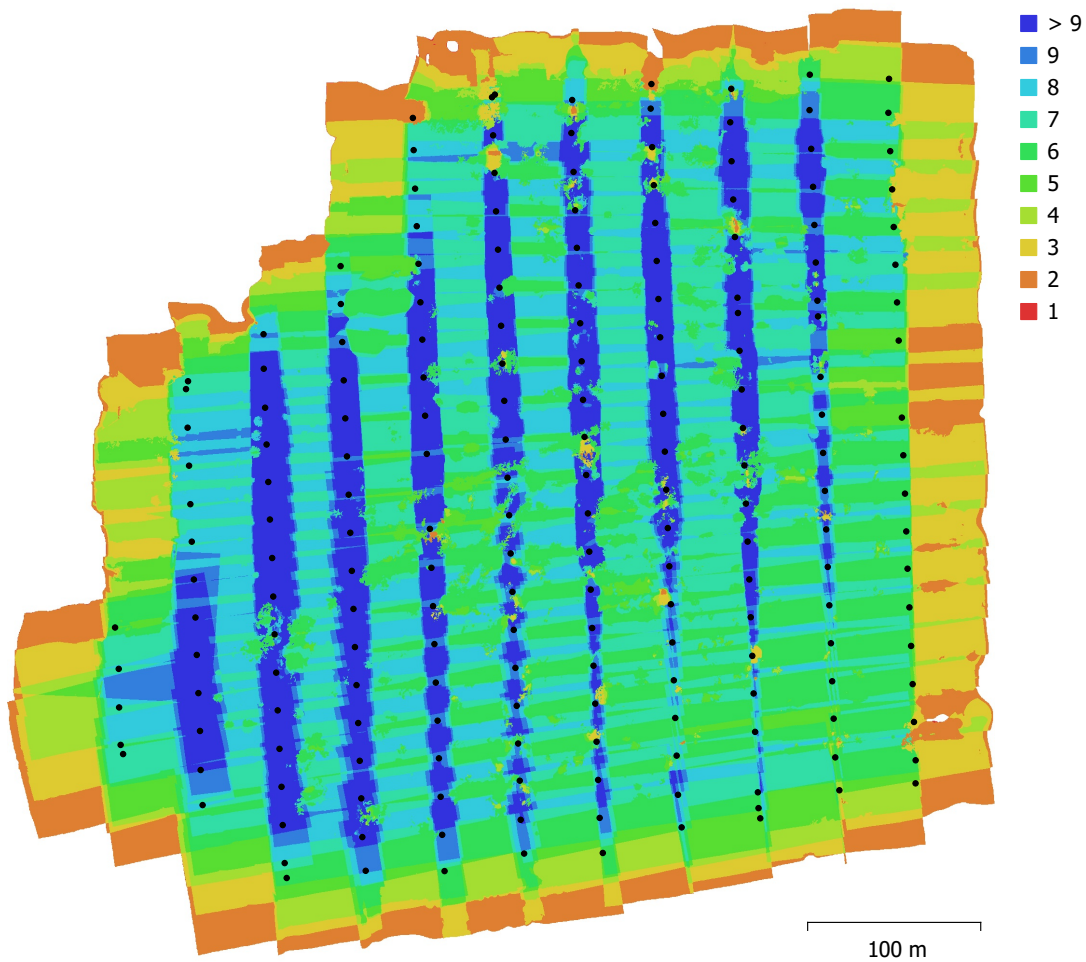


Fig. 1. Camera locations and image overlap.

Number of images:	195	Camera stations:	195
Flying altitude:	84.5 m	Tie points:	210,208
Ground resolution:	2.14 cm/pix	Projections:	696,304
Coverage area:	0.239 km ²	Reprojection error:	0.686 pix

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

Table 1. Cameras.

Camera Calibration

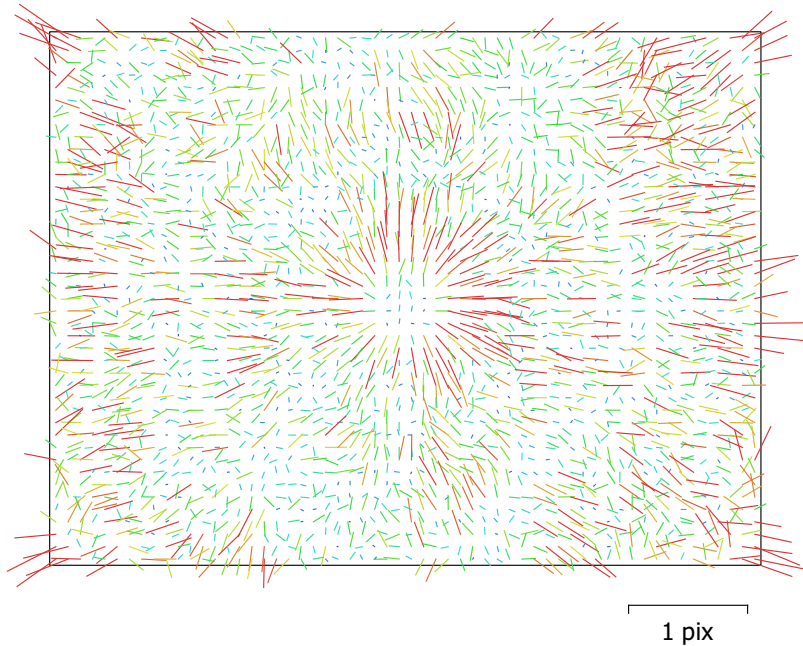


Fig. 2. Image residuals for FC6310 (8.8mm).

FC6310 (8.8mm)

195 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	B2	K1	K2	K3	P1	P2
F	3619.7	2.2	1.00	0.12	0.49	0.27	0.25	-0.45	0.60	-0.03	-0.09
Cx	-7.09441	0.12		1.00	-0.05	-0.05	0.03	-0.06	0.08	0.22	-0.04
Cy	14.5066	0.094			1.00	0.12	0.12	-0.22	0.29	-0.06	0.27
B2	-0.819084	0.019				1.00	0.07	-0.12	0.16	-0.01	-0.00
K1	0.0059558	4.1e-05					1.00	-0.94	0.85	-0.01	-0.02
K2	-0.027187	0.00015						1.00	-0.97	0.02	0.04
K3	0.0268556	0.00017							1.00	-0.03	-0.05
P1	-0.000199274	2.7e-06								1.00	-0.04
P2	-0.000412706	3.2e-06									1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

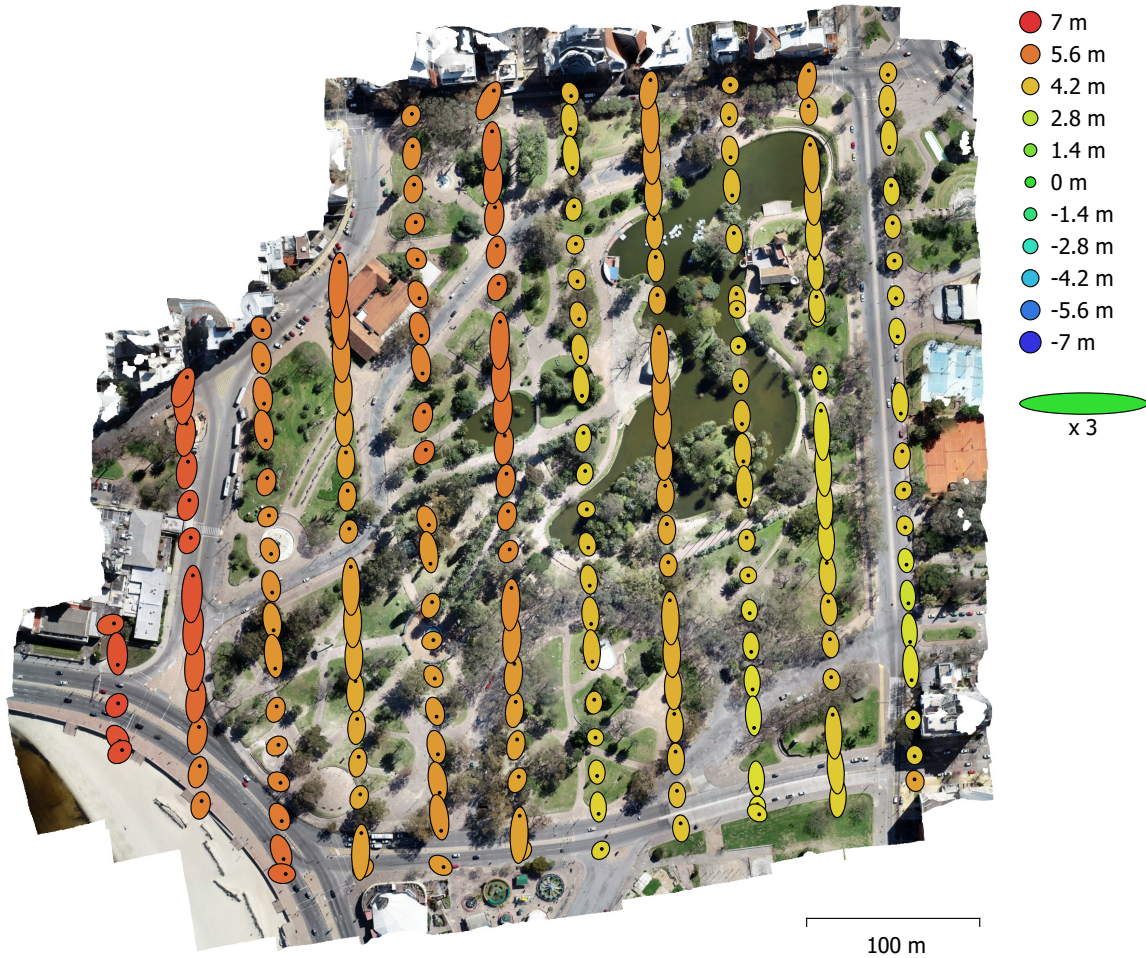


Fig. 3. Camera locations and error estimates.

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)
0.441439	3.72665	4.7603	3.7527	6.06162

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

Ground Control Points

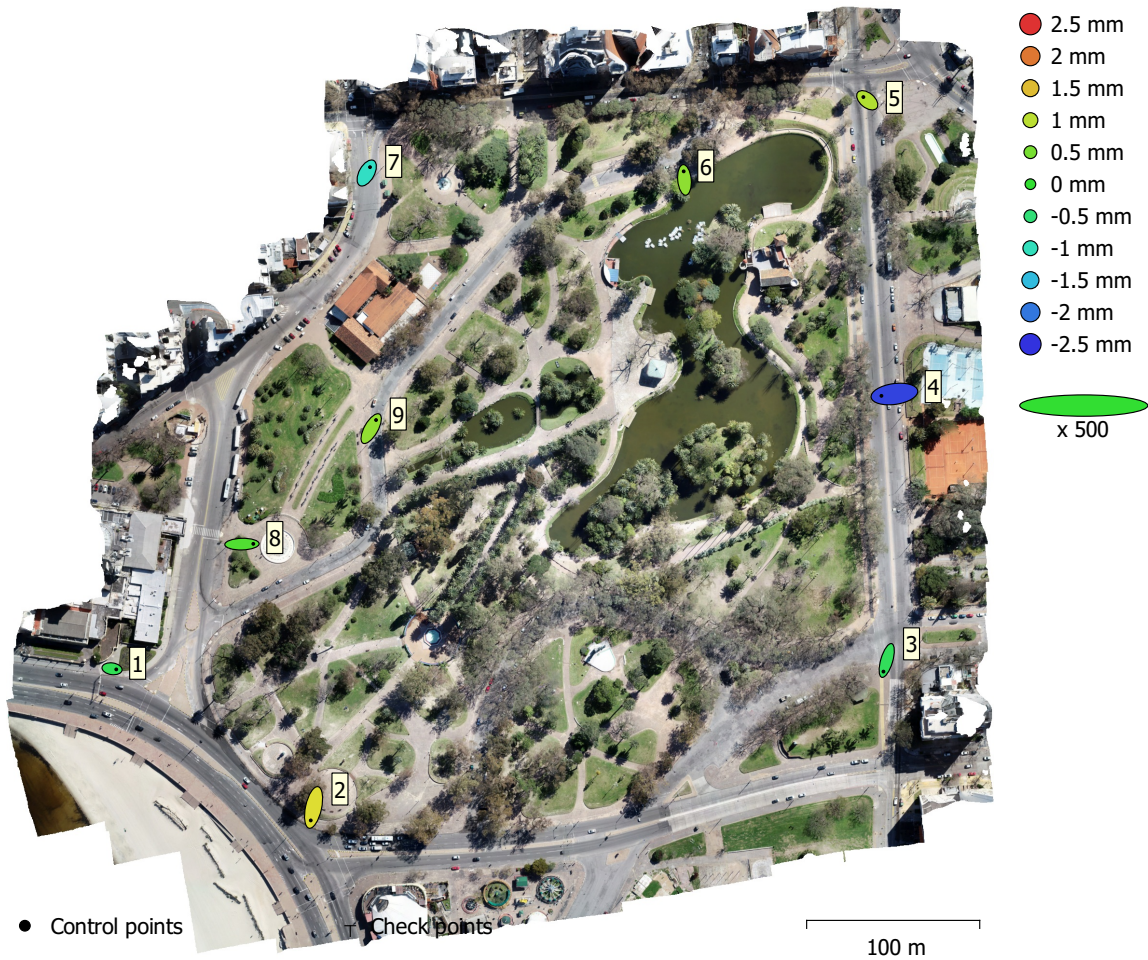


Fig. 4. GCP locations and error estimates.

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)
9	1.50885	1.69807	0.107412	2.27158	2.27412

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	0.969564	-0.138261	-0.0250818	0.979693	0.622 (7)
2	-0.646662	-2.98973	0.12568	3.06145	0.924 (8)
3	-0.756785	-2.56866	-0.02997	2.67799	1.343 (6)
4	-3.00055	-0.424224	-0.238103	3.03973	1.600 (4)
5	-0.897323	0.739256	0.0926664	1.16631	0.675 (6)
6	-0.177603	1.97662	0.0666121	1.9857	0.885 (7)
7	0.754642	1.34848	-0.106605	1.54895	0.971 (4)
8	2.62217	0.0666291	0.0226156	2.62311	0.799 (12)
9	1.12848	1.9847	0.0701387	2.28417	1.055 (6)
Total	1.50885	1.69807	0.107412	2.27412	0.974

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

Digital Elevation Model

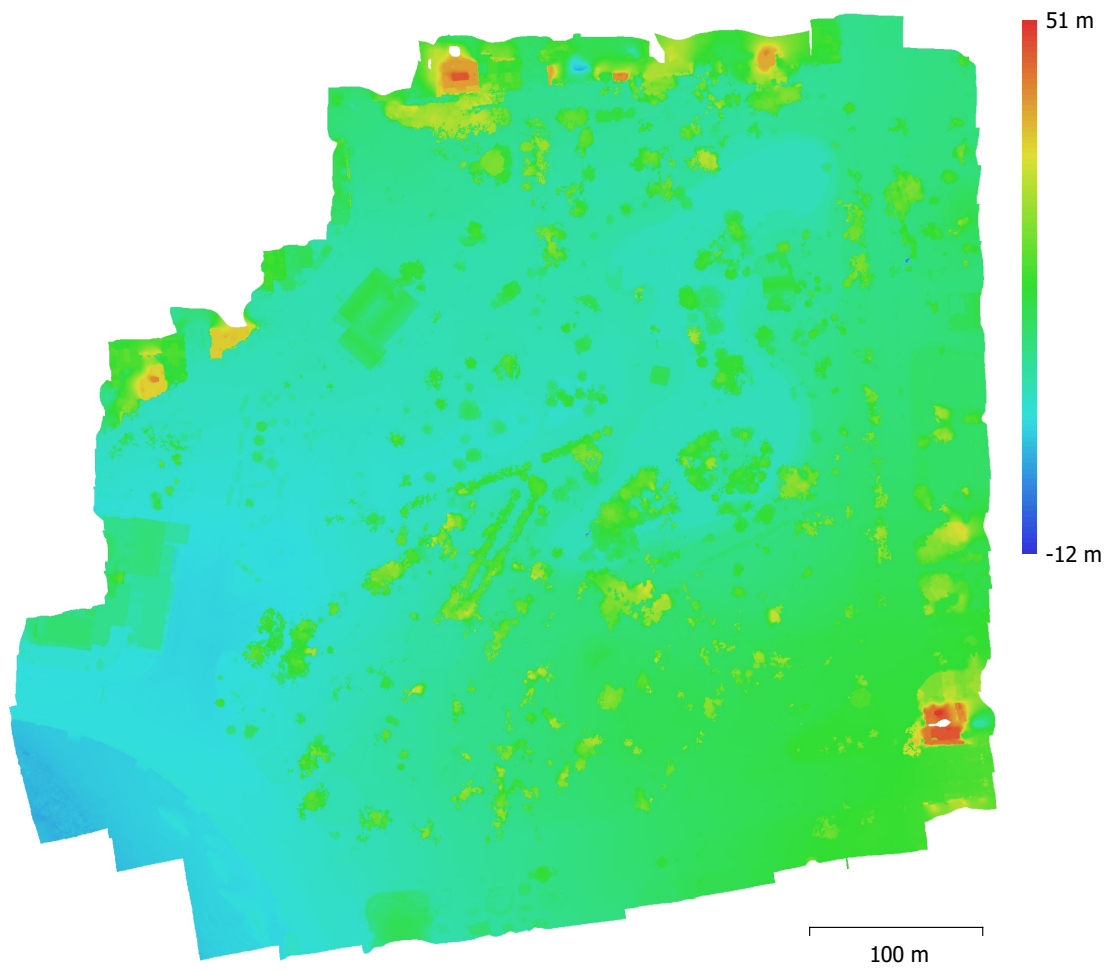


Fig. 5. Reconstructed digital elevation model.

Resolution: 4.27 cm/pix
Point density: 547 points/m²

Processing Parameters

General

Cameras	195
Aligned cameras	195
Markers	9
Coordinate system	WGS 84 / UTM zone 21S EGM08
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	210,208 of 227,604
RMS reprojection error	0.16401 (0.685788 pix)
Max reprojection error	0.626628 (30.4403 pix)
Mean key point size	4.10931 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.43509

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	9 minutes 6 seconds
Matching memory usage	1.24 GB
Alignment time	37 seconds
Alignment memory usage	123.84 MB

Optimization parameters

Parameters	f, b2, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	1 seconds
Software version	1.6.1.10009
File size	17.42 MB

Depth Maps

Count	195
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	21 minutes 0 seconds
Memory usage	2.22 GB
Software version	1.6.1.10009
File size	815.16 MB

Dense Point Cloud

Points	154,134,361
Point colors	3 bands, uint8

Depth maps generation parameters

Quality	High
Filtering mode	Mild
Processing time	21 minutes 0 seconds
Memory usage	2.22 GB

Dense cloud generation parameters

Processing time	11 minutes 15 seconds
Memory usage	4.22 GB
Software version	1.6.1.10009
File size	2.17 GB
DEM	
Size	22,345 x 22,209
Coordinate system	WGS 84 / UTM zone 21S EGM08
Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	2 minutes 32 seconds
Memory usage	316.84 MB
Software version	1.6.1.10009
File size	598.64 MB
Orthomosaic	
Size	26,683 x 25,573
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	6 minutes 1 seconds
Memory usage	1.60 GB
Software version	1.6.1.10009
File size	2.91 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)