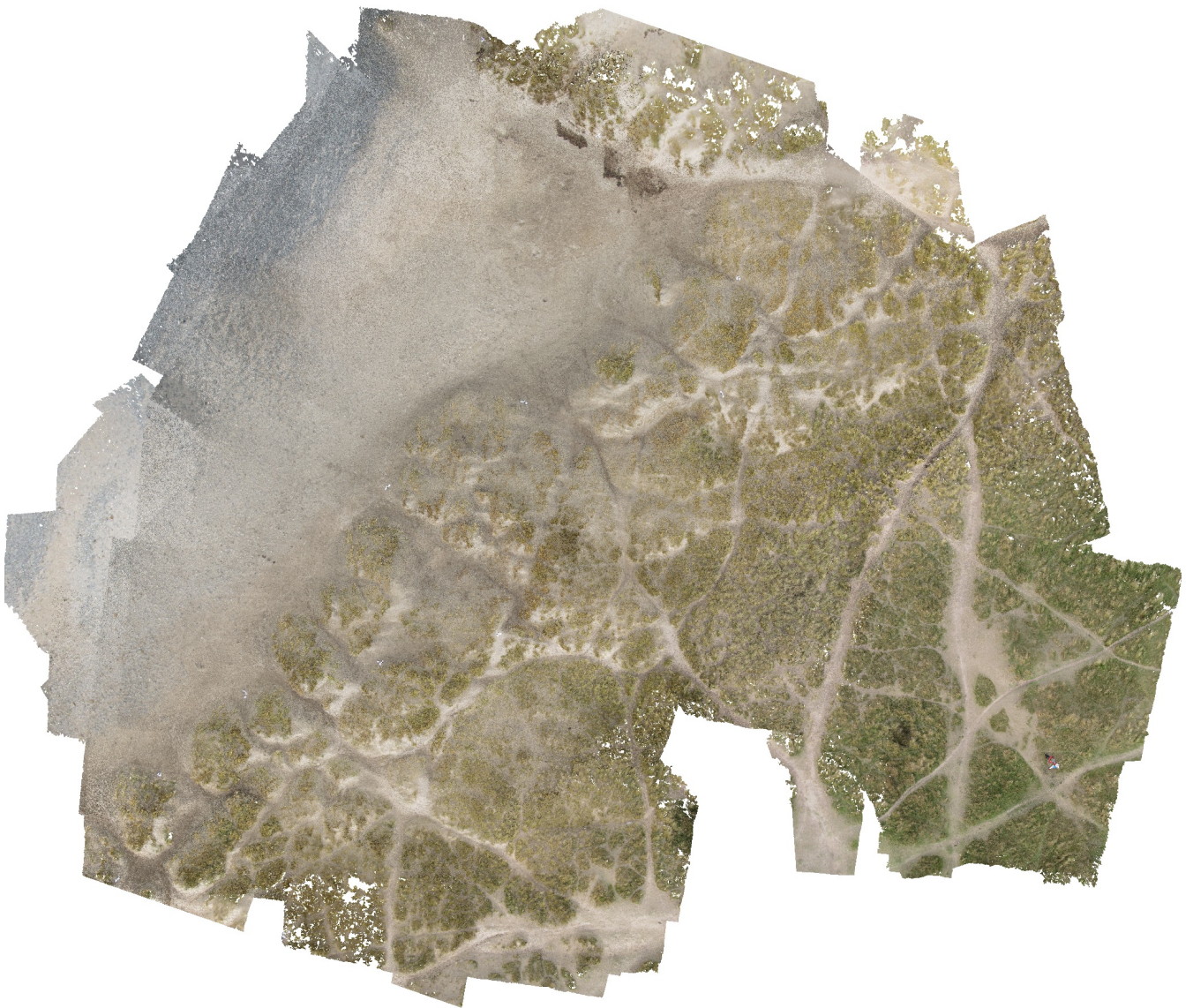


day11_drone

Processing Report

14 June 2018



Survey Data

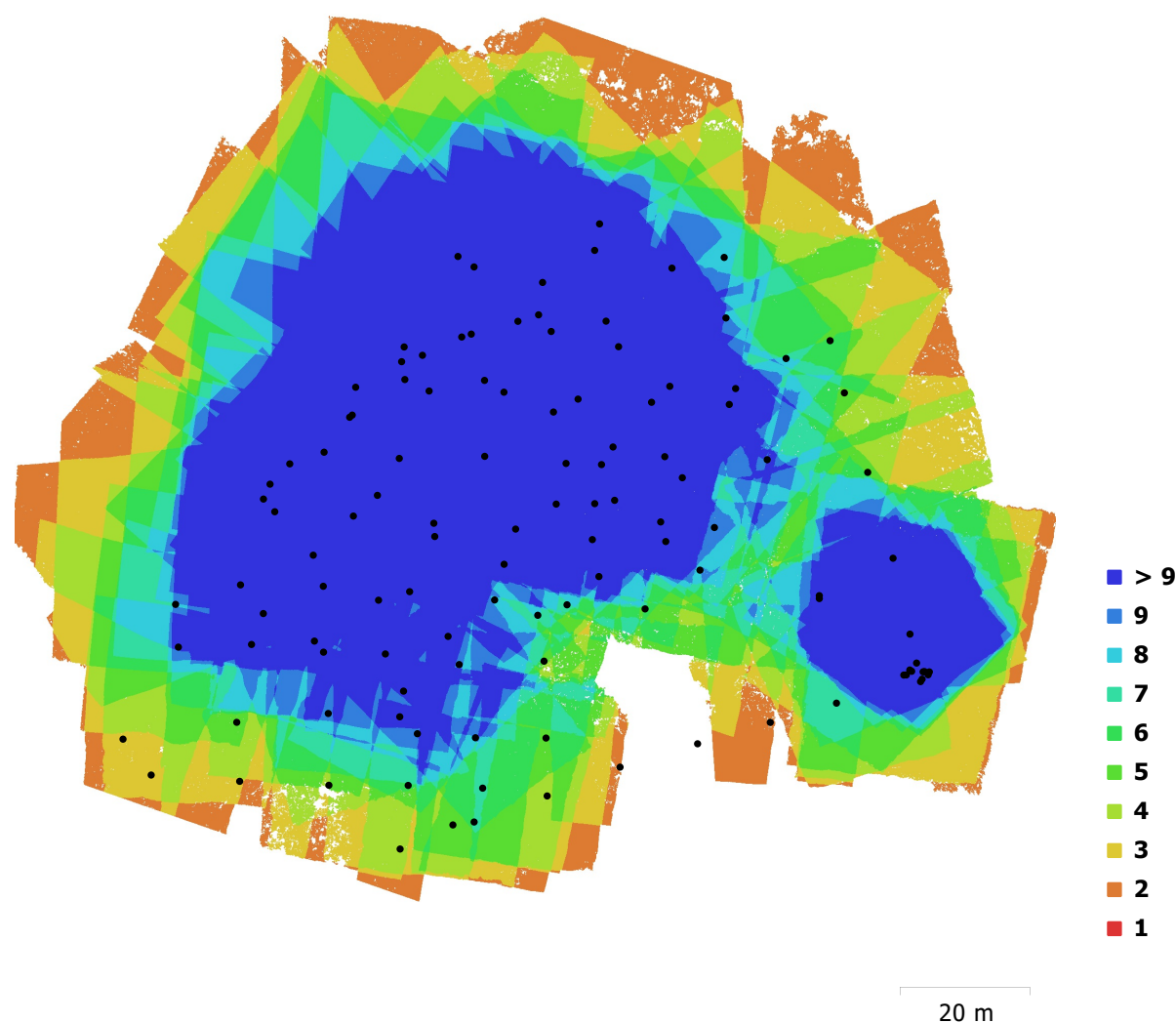


Fig. 1. Camera locations and image overlap.

Number of images:	118	Camera stations:	118
Flying altitude:	32.8 m	Tie points:	370,378
Ground resolution:	9.43 mm/pix	Projections:	1,088,322
Coverage area:	0.0149 km ²	Reprojection error:	1.14 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
Canon PowerShot D30 (5 mm)	4000 x 3000	5 mm	1.55 x 1.55 μm	No

Table 1. Cameras.

Camera Calibration

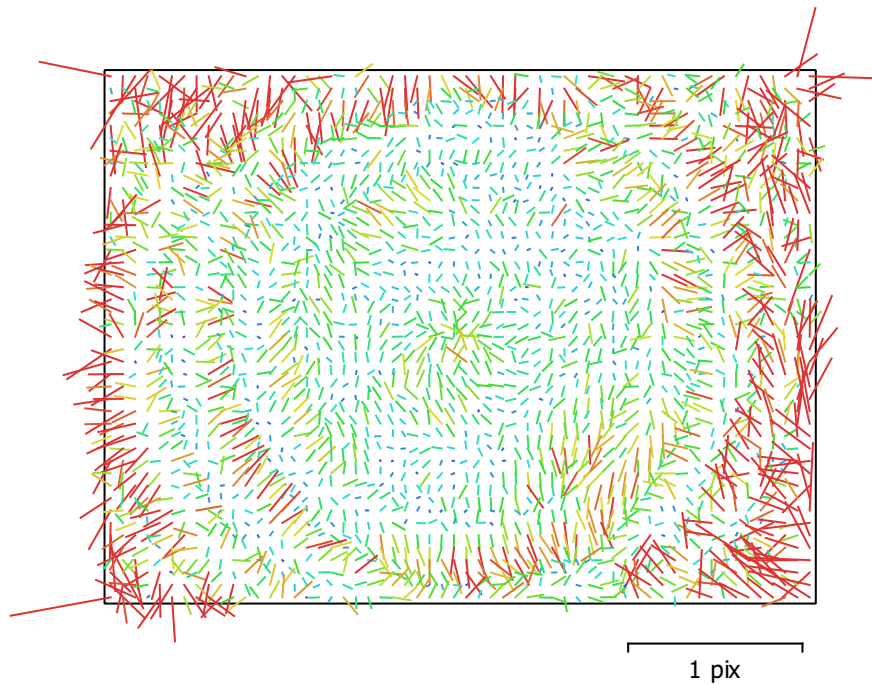


Fig. 2. Image residuals for Canon PowerShot D30 (5 mm).

Canon PowerShot D30 (5 mm)

118 images

Type
Frame

Resolution
4000 x 3000

Focal Length
5 mm

Pixel Size
1.55 x 1.55 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	P1	P2
F	3281.51	0.18	1.00	0.12	-0.05	-0.03	0.13	0.07	0.05	-0.04	0.14	-0.13
Cx	-13.9734	0.07		1.00	-0.02	0.15	-0.18	0.04	-0.02	0.02	0.79	-0.04
Cy	-5.16352	0.069			1.00	0.26	0.18	-0.00	-0.01	0.01	-0.01	0.73
B1	-0.966119	0.014				1.00	-0.03	0.02	-0.03	0.03	0.09	0.10
B2	1.08468	0.015					1.00	0.01	0.00	-0.00	-0.05	0.08
K1	0.00494249	9.5e-05						1.00	-0.94	0.89	0.04	-0.01
K2	-0.0355456	0.00043							1.00	-0.98	-0.01	-0.01
K3	0.0323457	0.00059								1.00	0.01	0.01
P1	-0.00116071	6.3e-06									1.00	-0.03
P2	0.000453444	5.8e-06										1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

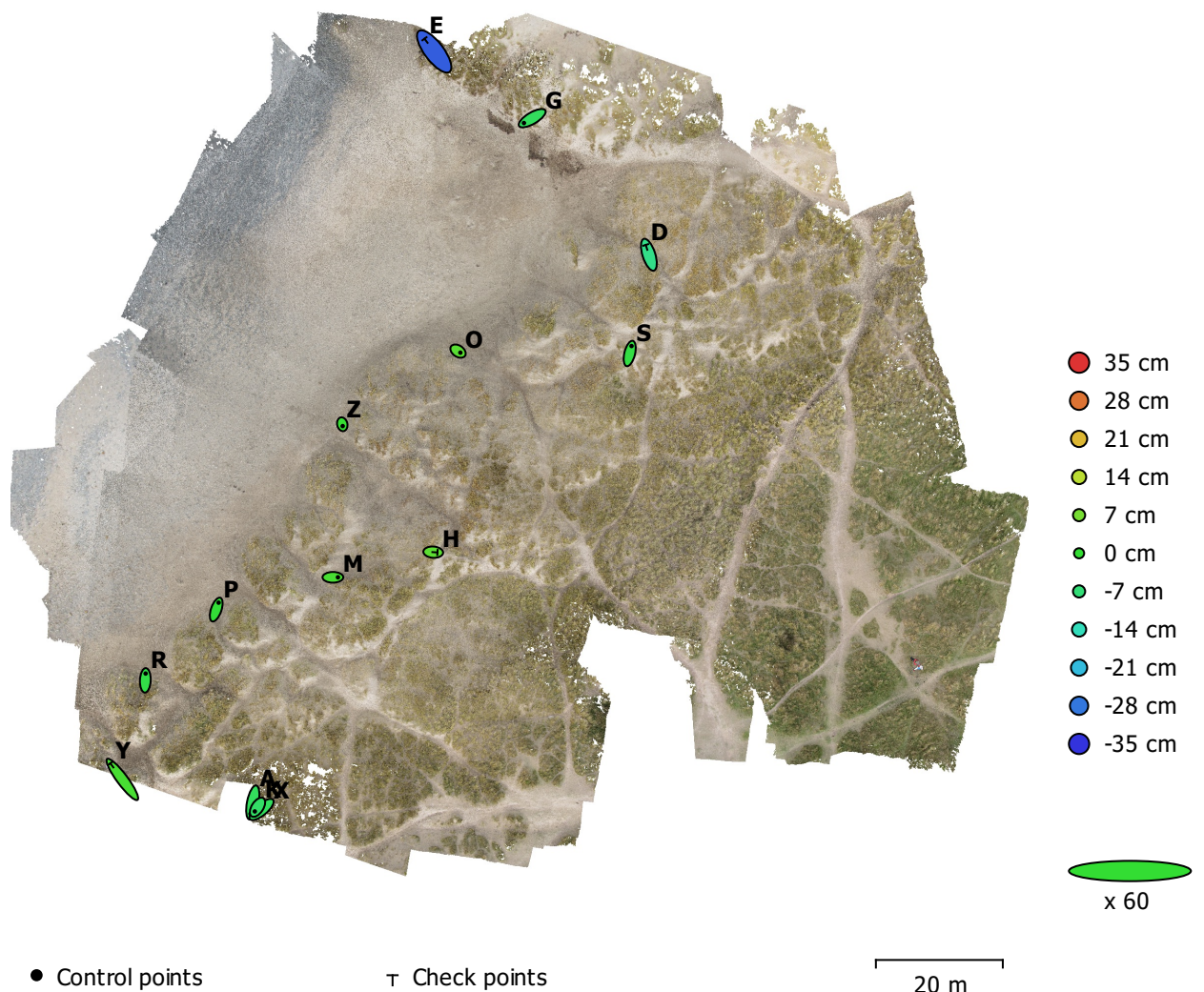


Fig. 3. GCP locations and error estimates.

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)
10	2.17594	3.15434	3.47633	3.83204	5.17392

Table 3. Control points RMSE.

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

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
4	4.27913	5.98025	16.1209	7.35352	17.7189

Table 4. Check points RMSE.

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

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
S	0.966257	3.92157	-1.83595	4.43656	1.212 (15)
Z	0.218434	-0.961926	0.389668	1.06059	1.403 (18)
G	-4.32196	-2.54333	-4.53279	6.75974	1.184 (5)
O	1.22915	-0.820305	3.83885	4.11345	1.178 (20)
M	2.64928	0.0100555	1.85231	3.23262	1.081 (14)
P	1.25889	3.62272	-0.843933	3.92698	1.838 (13)
R	0.149885	3.58828	-2.18832	4.20558	1.759 (4)
A	-1.20168	-5.95171	-4.79524	7.73701	1.533 (2)
X	-3.7543	-3.13988	-4.67913	6.77111	1.169 (2)
K	-1.41809	-2.18429	-5.31248	5.91647	0.995 (2)
Total	2.17594	3.15434	3.47633	5.17392	1.354

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

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
D	-1.65312	5.14976	-8.85262	10.3741	0.976 (10)
H	2.22492	-0.153786	3.96201	4.54658	1.280 (12)
Y	-6.30383	8.47052	2.1798	10.7814	1.513 (3)
E	-5.08157	6.6903	-30.6712	31.801	0.195 (2)
Total	4.27913	5.98025	16.1209	17.7189	1.157

Table 6. Check points.
X - Easting, Y - Northing, Z - Altitude.

Digital Elevation Model

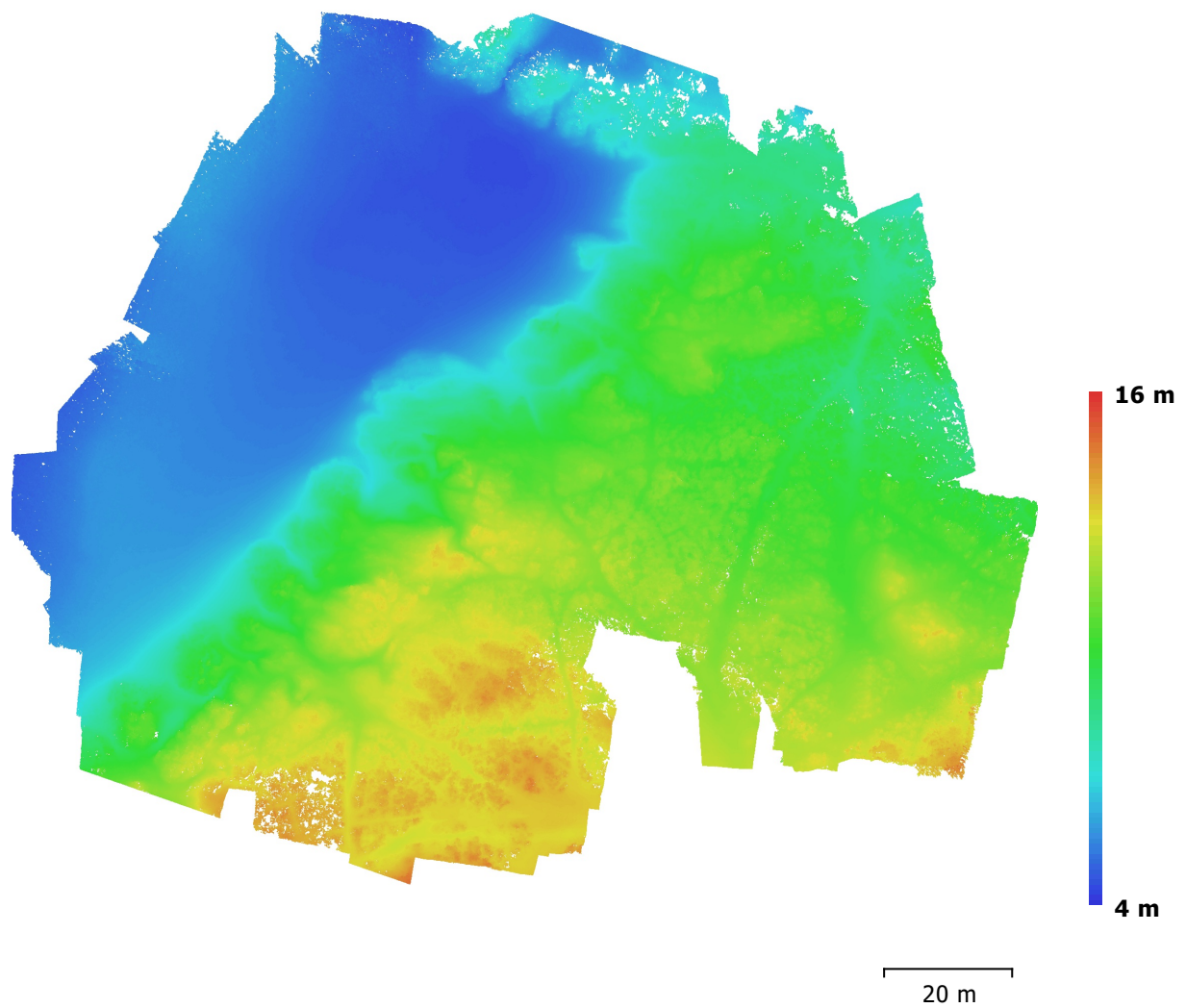


Fig. 4. Reconstructed digital elevation model.

Resolution: unknown

Point density: unknown

Processing Parameters

General

Cameras	118
Aligned cameras	118
Markers	14
Coordinate system	OSGB 1936 / British National Grid (EPSG::27700)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	370,378 of 388,631
RMS reprojection error	0.225874 (1.13716 pix)
Max reprojection error	1.22988 (46.0722 pix)
Mean key point size	5.0279 pix
Effective overlap	3.05623

Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	Yes
Key point limit	100,000
Tie point limit	0
Adaptive camera model fitting	Yes
Matching time	37 minutes 7 seconds
Alignment time	6 minutes 5 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k3, p1, p2
Fit rolling shutter	No
Optimization time	19 seconds

Dense Point Cloud

Points	48,277,528
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Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	1 hours 57 minutes
Dense cloud generation time	37 minutes 40 seconds

Software

Version	1.3.2 build 4205
Platform	Windows 64