

Day 9 (Survey 4)

Processing Report

13 February 2018



Survey Data

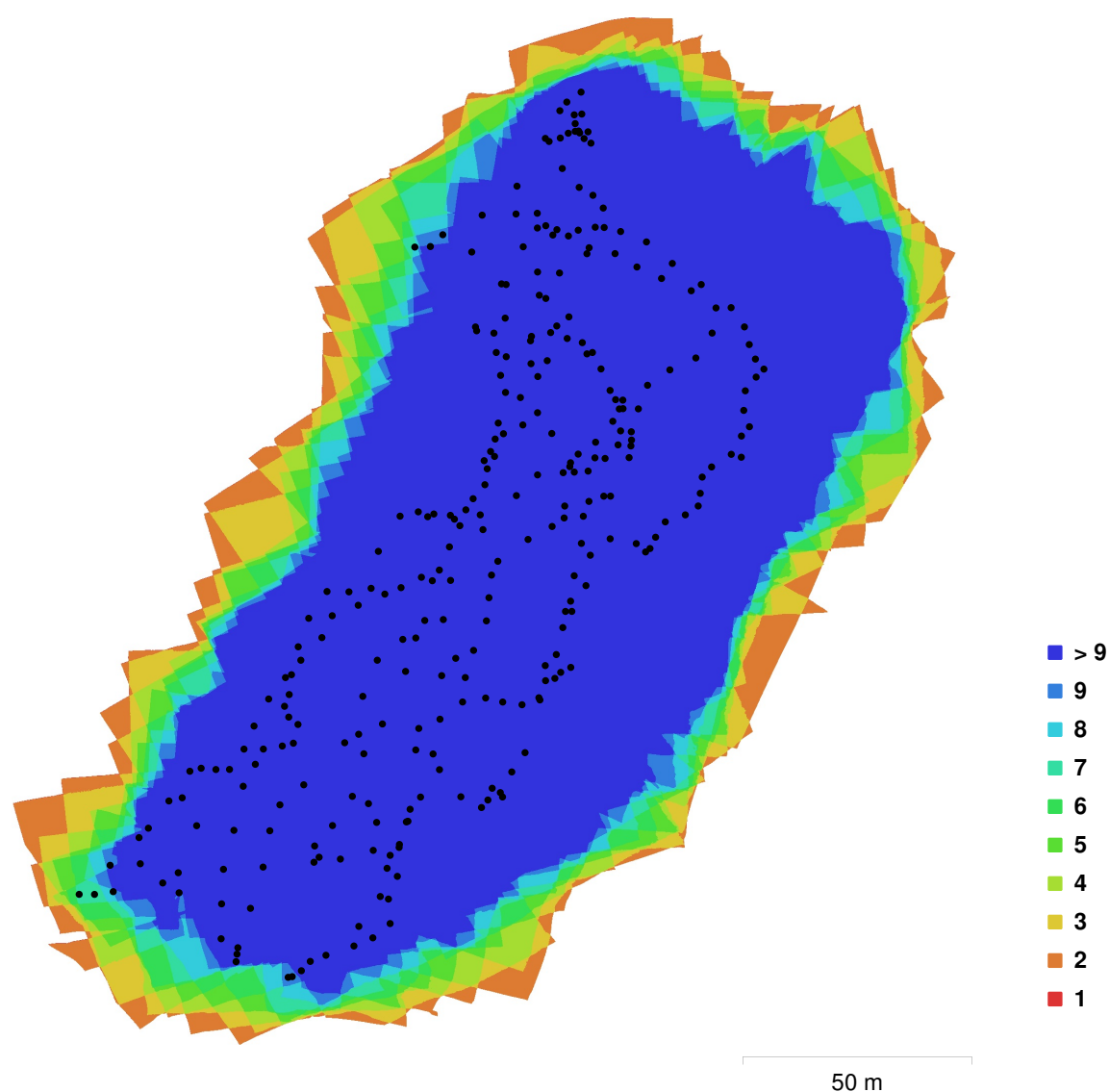


Fig. 1. Camera locations and image overlap.

Number of images:	298	Camera stations:	298
Flying altitude:	40.1 m	Tie points:	1,232,351
Ground resolution:	1.16 cm/pix	Projections:	4,215,961
Coverage area:	0.0264 km ²	Reprojection error:	1.21 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

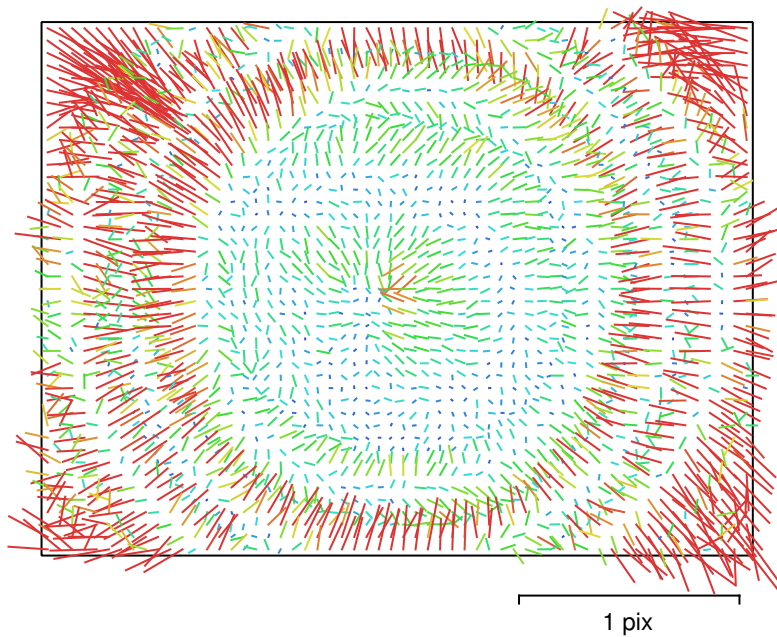


Fig. 2. Image residuals for Canon PowerShot D30 (5 mm).

Canon PowerShot D30 (5 mm)

298 images

Type	Resolution	Focal Length	Pixel Size
Frame	4000 x 3000	5 mm	1.55 x 1.55 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	P1	P2
F	3293.36	0.09	1.00	0.09	-0.26	0.04	0.21	0.24	-0.01	-0.09	-0.00
Cx	-30.3648	0.064		1.00	-0.02	-0.31	0.36	0.02	-0.02	0.89	-0.02
Cy	2.23319	0.075			1.00	-0.39	-0.40	-0.10	0.02	0.05	0.88
B1	-1.68816	0.0082				1.00	0.03	-0.01	-0.00	-0.30	-0.21
B2	0.430692	0.0083					1.00	0.05	-0.01	0.15	-0.31
K1	0.00222779	1.8e-05						1.00	-0.82	0.01	-0.11
K2	-0.00883801	3.2e-05							1.00	-0.01	0.01
P1	-0.00354208	4.6e-06								1.00	-0.01
P2	-0.00108885	5.1e-06									1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

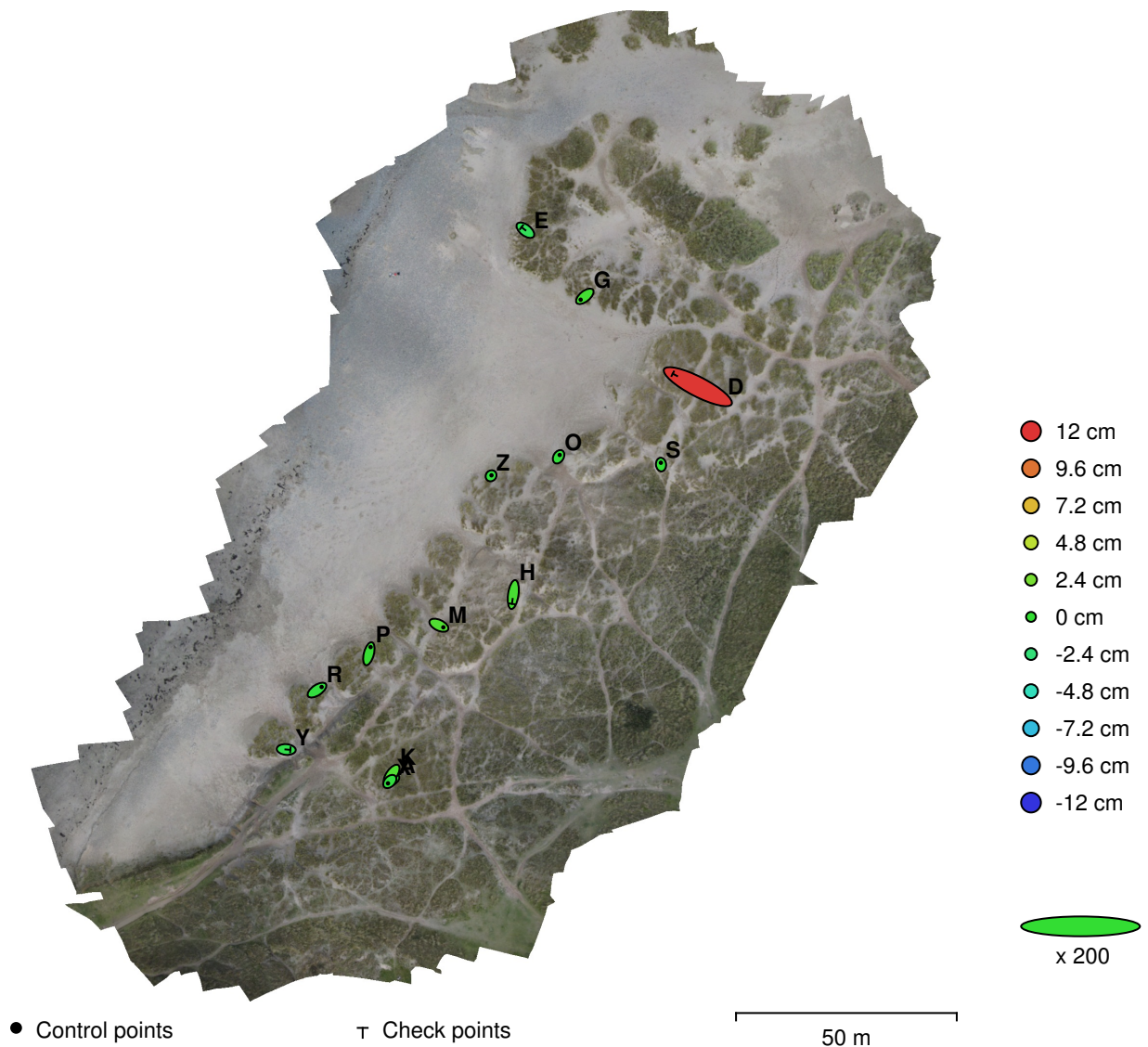


Fig. 3. GCP locations and error estimates.

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	0.660104	0.746251	0.577163	0.996307	1.15141

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	2.9182	1.83849	5.93999	3.44905	6.86873

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)
A	-0.563179	-0.357057	-0.0585325	0.669393	0.871 (28)
G	-0.94114	-0.760243	0.540041	1.3249	0.694 (41)
K	-0.807629	-1.1674	0.957036	1.71202	0.761 (29)
M	1.00121	-0.475247	0.934028	1.44937	0.845 (28)
O	0.251217	0.413633	-0.370993	0.609786	0.728 (63)
P	0.393816	1.50042	0.0944458	1.55412	0.610 (33)
R	1.0483	0.709096	-0.587199	1.39519	0.798 (26)
S	-0.0387573	0.404595	-0.290728	0.499722	0.701 (42)
X	-0.415086	-0.417487	-0.592608	0.83533	0.822 (27)
Z	0.094058	0.107665	-0.566313	0.584079	0.705 (43)
Total	0.660104	0.746251	0.577163	1.15141	0.746

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	-5.68546	2.93355	11.7433	13.3729	4.193 (57)
E	-0.878407	0.683758	-1.35404	1.75287	0.661 (27)
H	-0.300451	-2.10748	0.626811	2.21915	0.432 (32)
Y	0.93658	-0.0742056	-1.00147	1.37318	0.594 (26)
Total	2.9182	1.83849	5.93999	6.86873	2.692

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

Digital Elevation Model

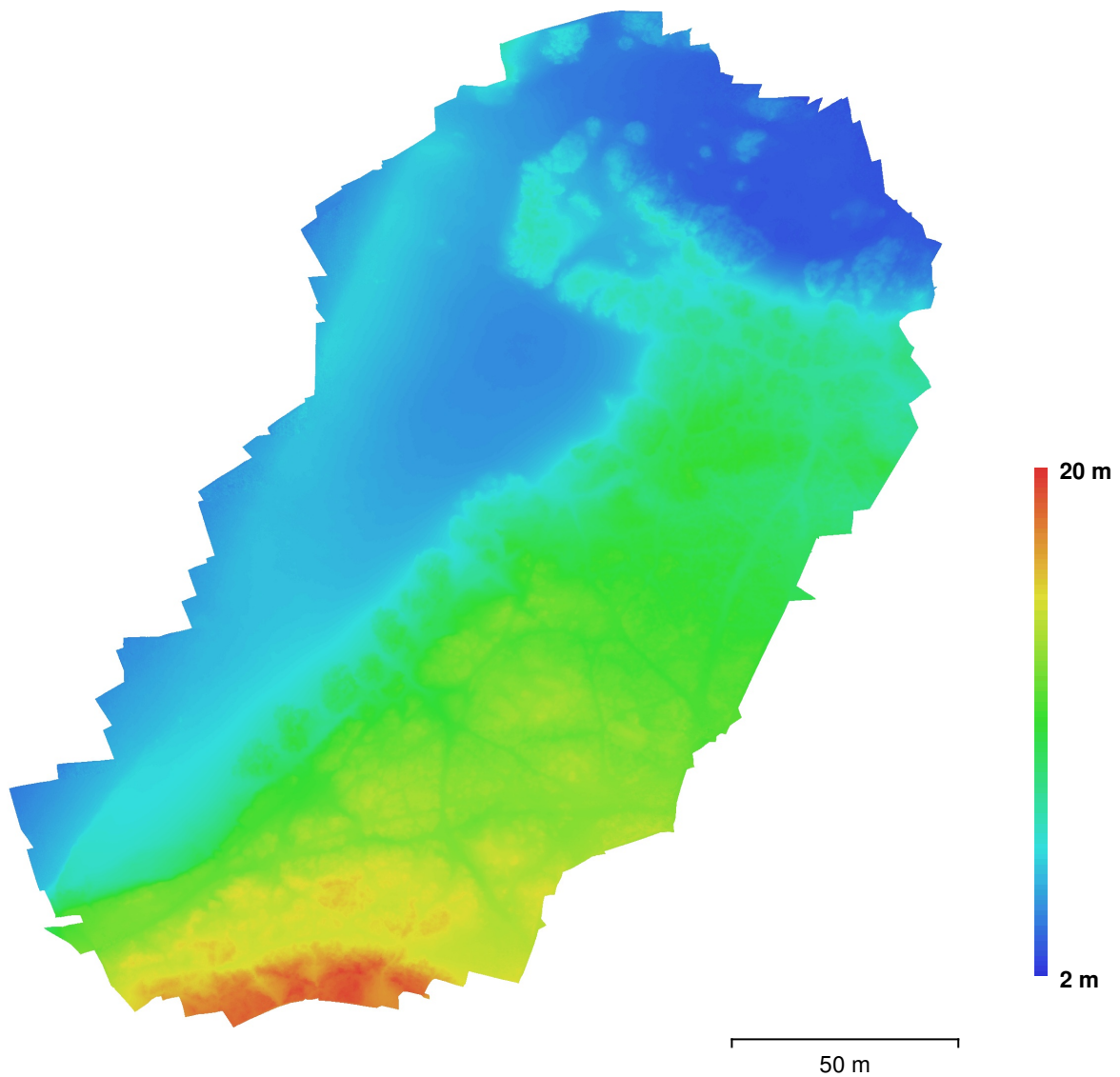


Fig. 4. Reconstructed digital elevation model.

Resolution: 2.32 cm/pix
Point density: 18.5 points/cm²

Processing Parameters

General

Cameras	298
Aligned cameras	298
Markers	14
Coordinate system	OSGB 1936 / British National Grid (EPSG::27700)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	1,232,351 of 1,310,465
RMS reprojection error	0.197978 (1.21227 pix)
Max reprojection error	0.715523 (47.0986 pix)
Mean key point size	5.49004 pix
Effective overlap	3.84492

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	1 hours 35 minutes
Alignment time	10 minutes 57 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1, k2, p1, p2
Fit rolling shutter	No
Optimization time	29 seconds

Depth Maps

Count	298
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	1 days 0 hours

Dense Point Cloud

Points	58,411,074
Reconstruction parameters	
Quality	High
Depth filtering	Aggressive
Depth maps generation time	1 days 0 hours
Dense cloud generation time	4 hours 0 minutes

Model

Faces	11,581,895
Vertices	5,797,224
Reconstruction parameters	
Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	11,682,211
Processing time	4 minutes 14 seconds

Orthomosaic

Size	17,737 x 19,316
Coordinate system	OSGB 1936 / British National Grid (EPSG::27700)
Channels	3, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh

Enable color correction

Enable hole filling

Processing time

No

Yes

43 minutes 38 seconds

Software

Version

Platform

1.3.2 build 4205

Linux 64