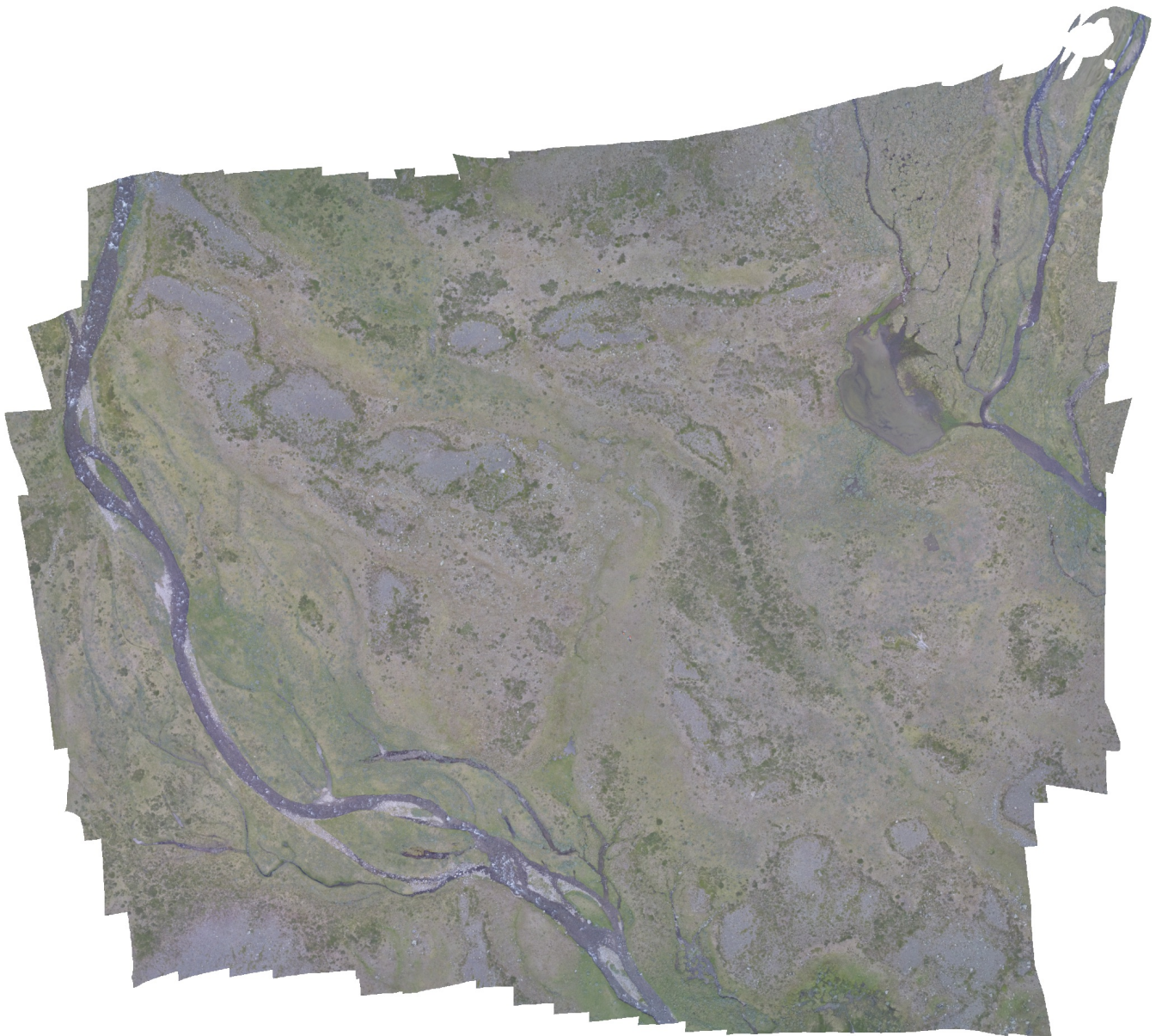


Agisoft Metashape

Processing Report

04 March 2021



Survey Data

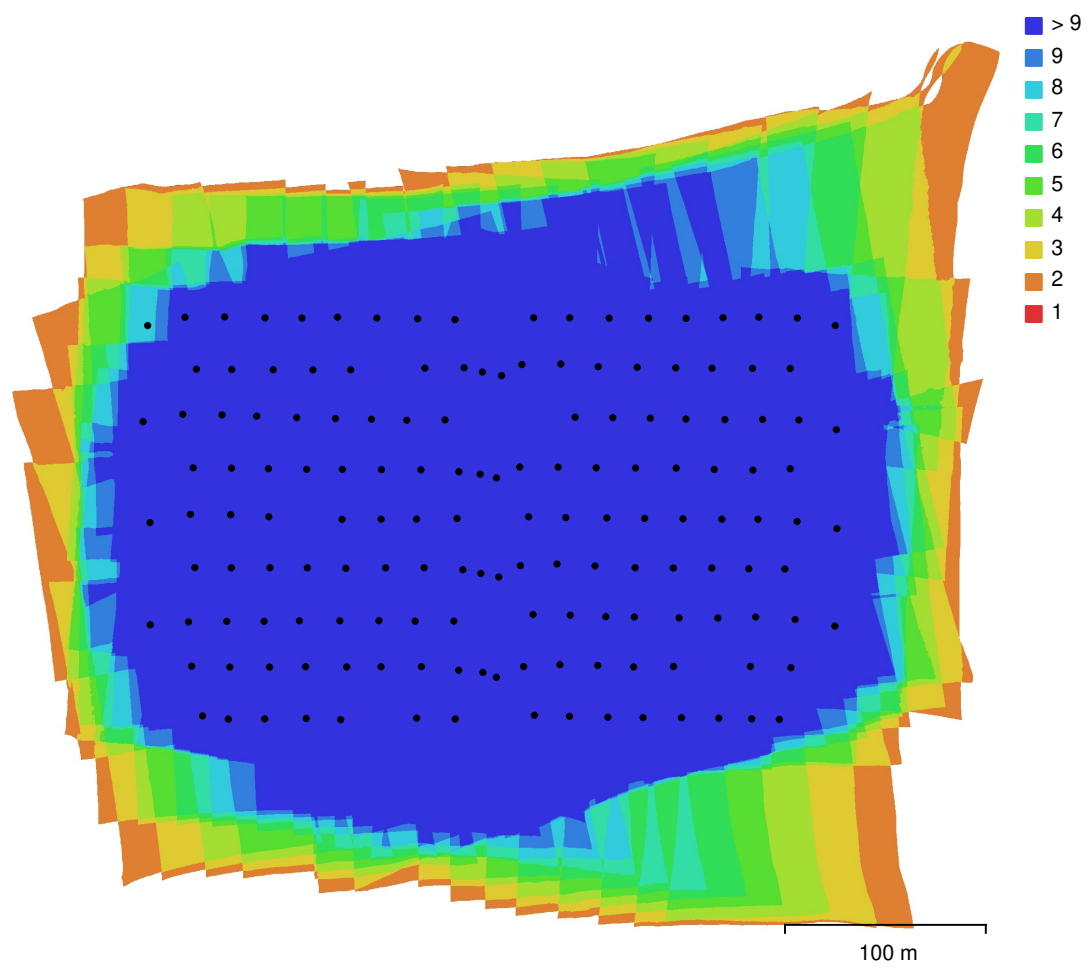


Fig. 1. Camera locations and image overlap.

Number of images:	155	Camera stations:	155
Flying altitude:	94.4 m	Tie points:	40,484
Ground resolution:	3.72 cm/pix	Projections:	296,871
Coverage area:	0.165 km²	Reprojection error:	0.754 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
HERO4 Black (3mm)	4000 x 3000	3 mm	1.73 x 1.73 μm	No

Table 1. Cameras.

Camera Calibration

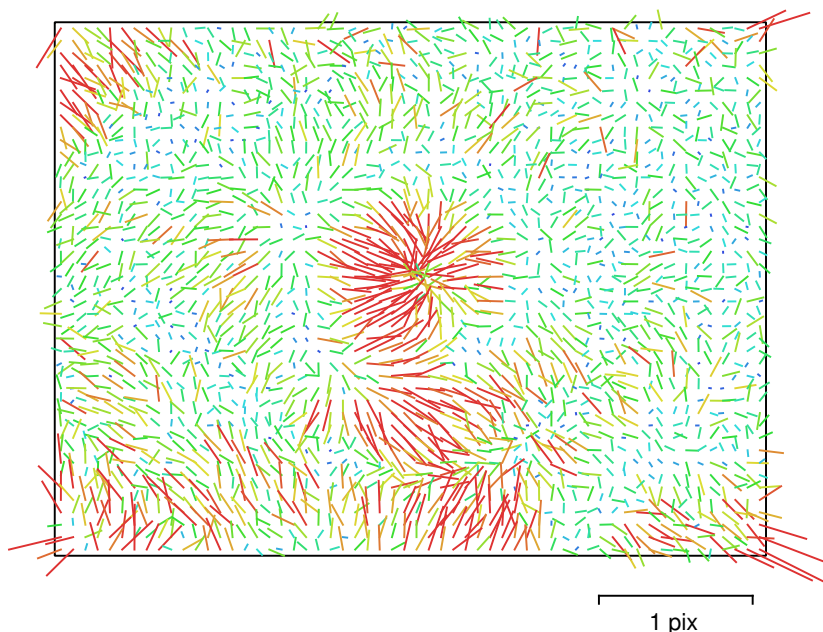


Fig. 2. Image residuals for HERO4 Black (3mm).

HERO4 Black (3mm)

155 images

Type
Frame

Resolution
4000 x 3000

Focal Length
3 mm

Pixel Size
1.73 x 1.73 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2184.87	0.29	1.00	-0.44	-0.28	0.50	-0.60	0.44	0.15	0.06
Cx	28.2845	0.043		1.00	0.14	-0.24	0.27	-0.19	-0.02	-0.02
Cy	-74.8616	0.04			1.00	-0.14	0.18	-0.14	-0.02	0.09
K1	0.0705363	3.6e-05				1.00	-0.95	0.90	0.04	0.00
K2	-0.081442	6.9e-05					1.00	-0.97	-0.10	-0.04
K3	0.0194345	3.3e-05						1.00	0.09	0.03
P1	0.000496426	2.3e-06							1.00	0.04
P2	0.000332309	1.8e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

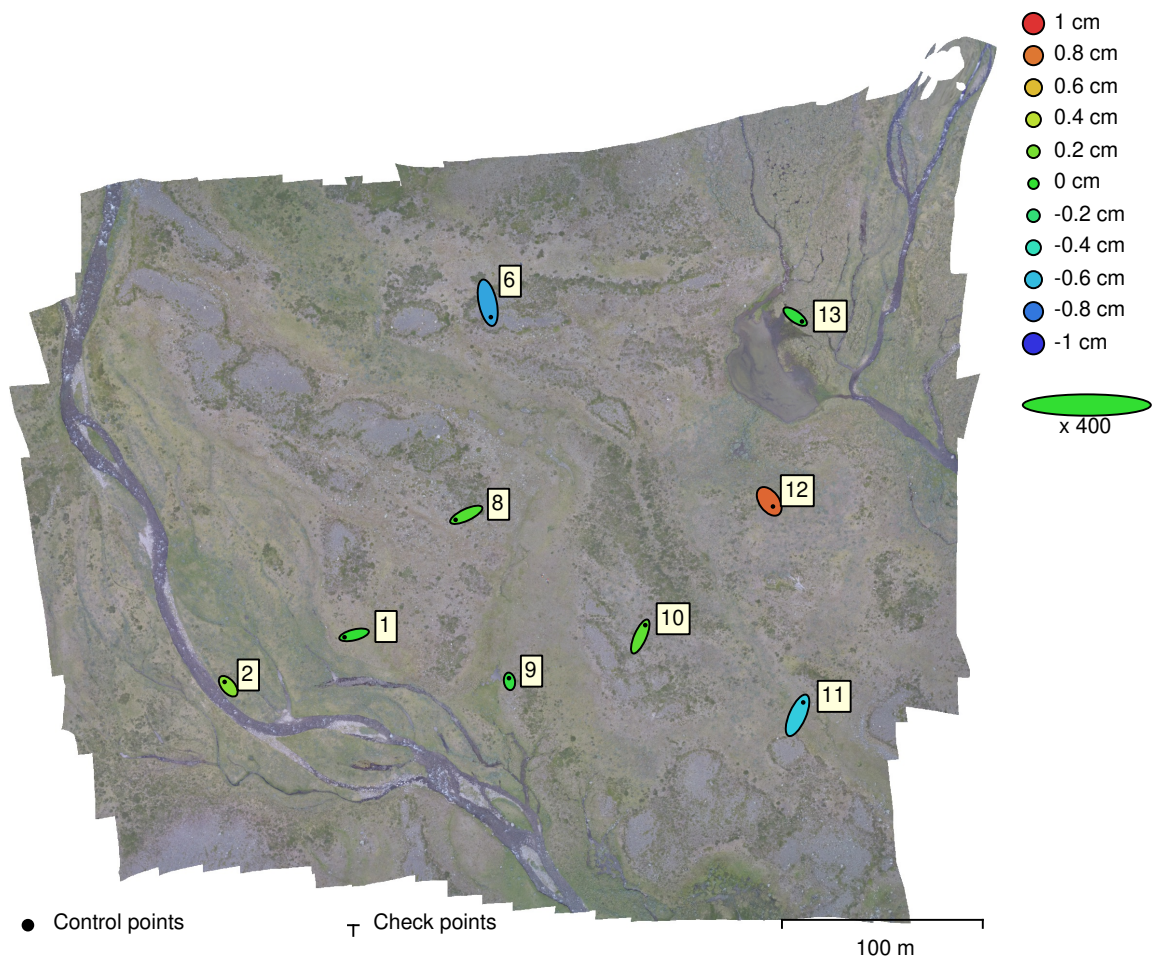


Fig. 3. GCP locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated GCP locations are marked with a dot or crossing.

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
9	1.54417	2.05493	0.416798	2.57045	2.60402

Table 3. Control points RMSE.
X - Easting, Y - Northing, Z - Altitude.

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
1	-2.37597	-0.586675	-0.00370447	2.44733	1.414 (13)
2	-0.905703	1.07327	0.245591	1.42566	0.500 (13)
6	0.775358	-3.5935	-0.669757	3.73671	1.296 (16)
8	-2.66204	-1.24795	0.092049	2.94148	1.546 (18)
9	-0.120273	0.798766	-0.045237	0.809036	0.900 (5)
10	1.24433	2.82521	0.128611	3.08978	0.747 (18)
11	1.41734	3.21296	-0.554291	3.55517	1.653 (9)
12	0.931741	-1.27947	0.847942	1.7956	0.805 (16)
13	1.69328	-1.20745	-0.035686	2.08	1.359 (9)
Total	1.54417	2.05493	0.416798	2.60402	1.187

Table 4. Control points.
X - Easting, Y - Northing, Z - Altitude.

Digital Elevation Model

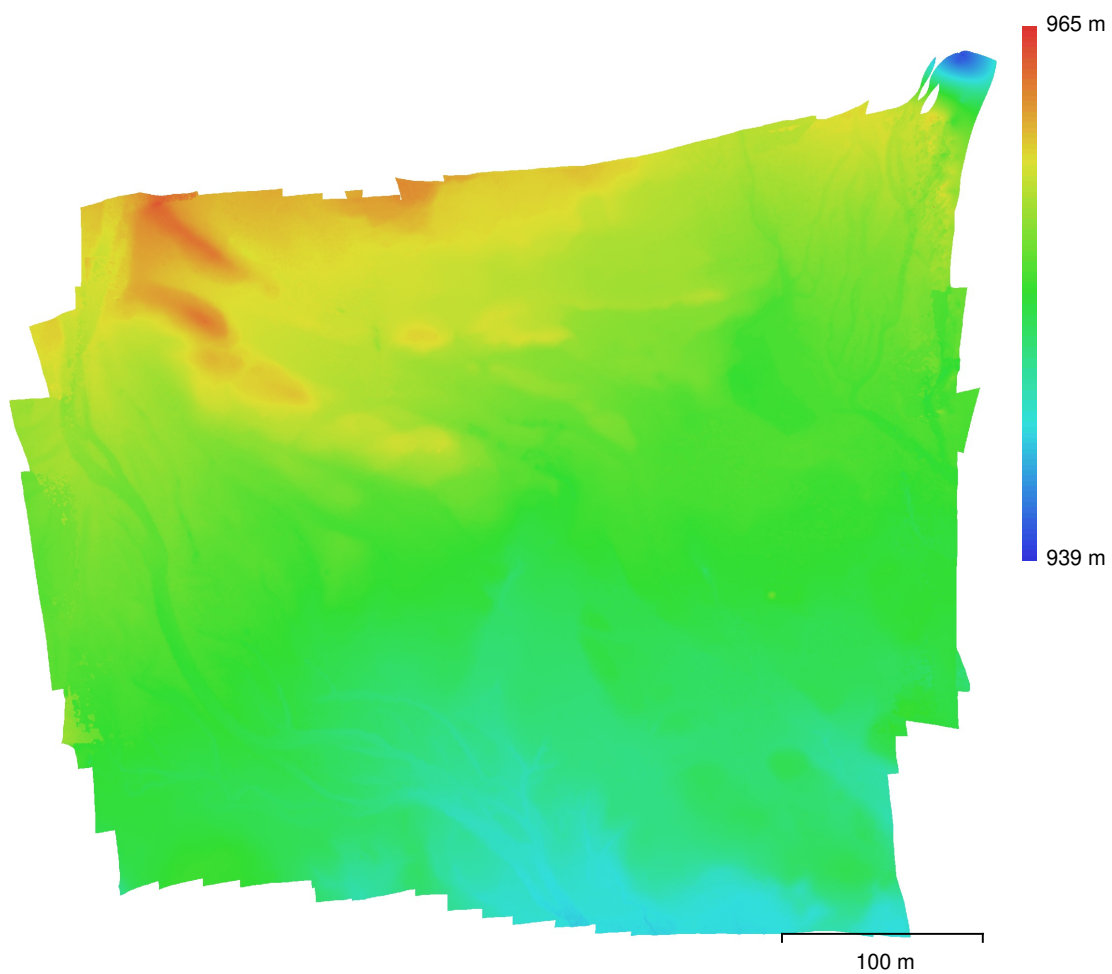


Fig. 4. Reconstructed digital elevation model.

Resolution: 7.45 cm/pix
Point density: 180 points/m²

Processing Parameters

General

Cameras	155
Aligned cameras	155
Markers	9
Coordinate system	SWEREF99 TM (EPSG::3006)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	40,484 of 70,994
RMS reprojection error	0.19223 (0.754245 pix)
Max reprojection error	1.7033 (13.4516 pix)
Mean key point size	3.61666 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	9.74025

Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	No
Key point limit	40,000
Tie point limit	4,000
Guided image matching	No
Adaptive camera model fitting	No
Matching time	1 minutes 44 seconds
Matching memory usage	793.85 MB
Alignment time	2 minutes 38 seconds
Alignment memory usage	314.25 MB

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	5 seconds
Software version	1.6.2.10247

Depth Maps

Count	155
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	17 minutes 27 seconds
Software version	1.6.2.10247

Dense Point Cloud

Points	30,141,523
Point colors	3 bands, uint8
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	17 minutes 27 seconds
Dense cloud generation parameters	
Processing time	10 minutes 49 seconds
Software version	1.6.2.10247

DEM

Size	9,855 x 8,962
Coordinate system	SWEREF99 TM (EPSG::3006)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	49 seconds
Software version	1.6.2.10247
Orthomosaic	
Size	13,200 x 11,852
Coordinate system	SWEREF99 TM (EPSG::3006)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	2 minutes 14 seconds
Software version	1.6.2.10247
System	
Software name	Agisoft Metashape Professional
Software version	1.6.2 build 10247
OS	Linux 64 bit
RAM	62.65 GB
CPU	Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz
GPU(s)	Tesla K80
	Tesla K80
	Tesla K80
	Tesla K80