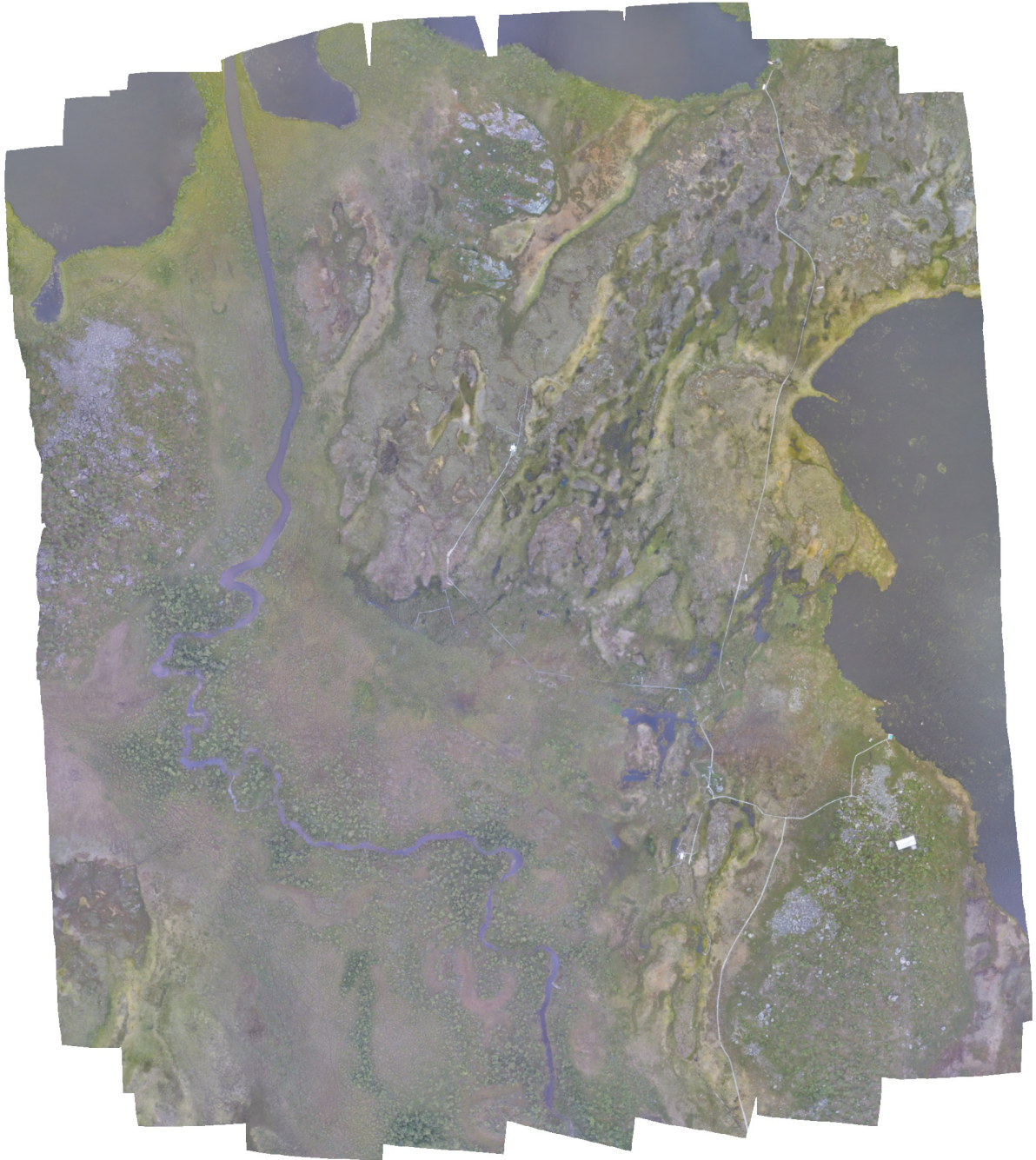


Agisoft Metashape

Processing Report

15 October 2020



Survey Data

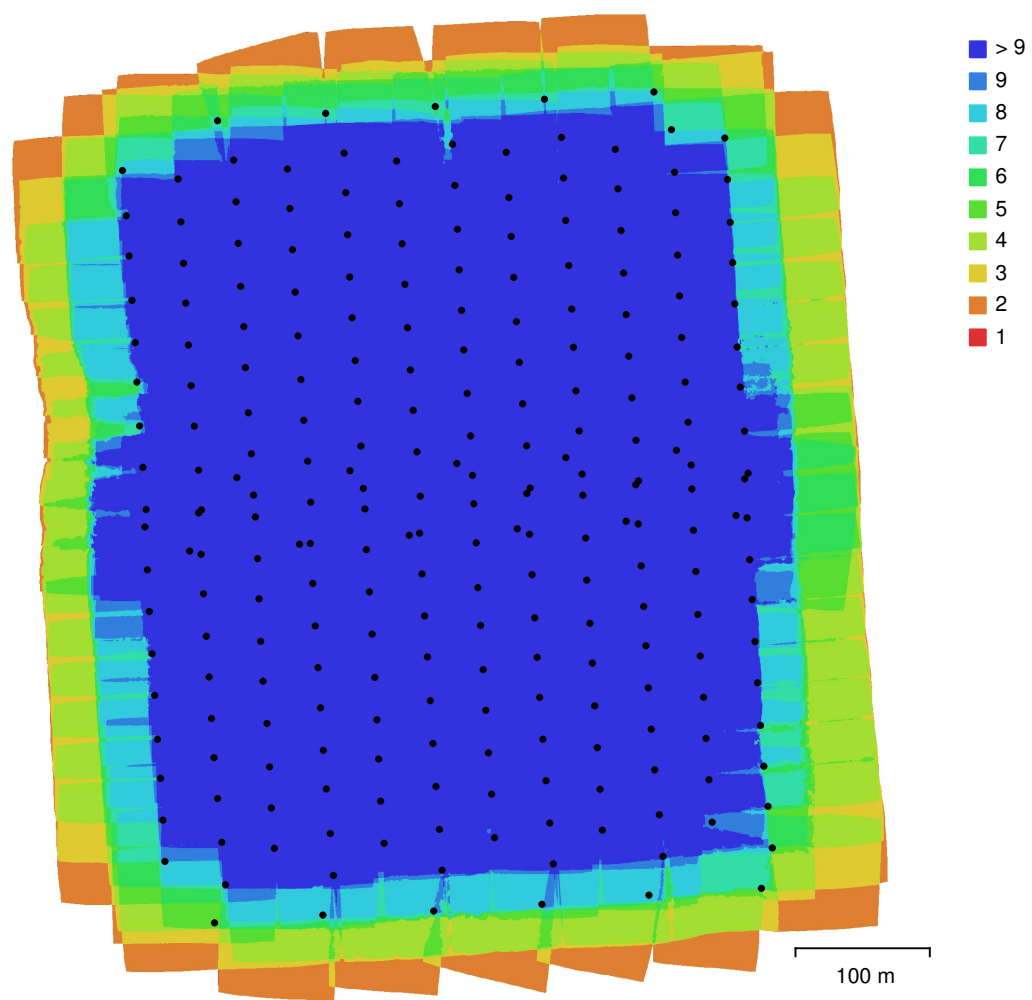


Fig. 1. Camera locations and image overlap.

Number of images:	245	Camera stations:	242
Flying altitude:	110 m	Tie points:	416,829
Ground resolution:	3.94 cm/pix	Projections:	1,616,753
Coverage area:	0.416 km ²	Reprojection error:	0.959 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

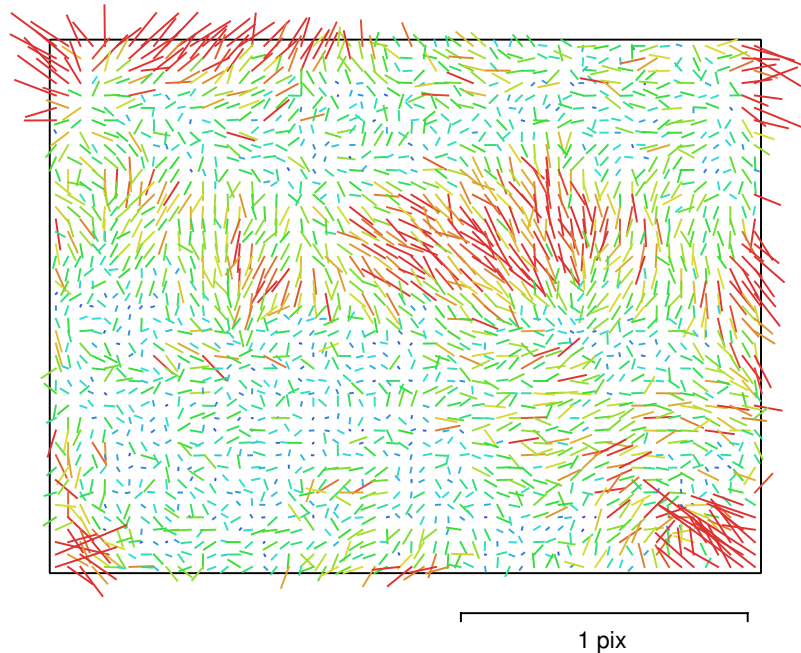


Fig. 2. Image residuals for HERO4 Black (3mm).

HERO4 Black (3mm)

245 images

Type	Resolution	Focal Length	Pixel Size
Frame	4000 x 3000	3 mm	1.73 x 1.73 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
F	2405.32	2.3	1.00	0.08	0.07	-0.47	0.03	-0.99	0.95	-0.79	0.90	0.08	-0.03
Cx	-30.5778	0.025		1.00	0.01	-0.05	0.01	-0.09	0.09	-0.11	0.11	-0.11	-0.02
Cy	-12.9153	0.026			1.00	-0.05	-0.02	-0.06	0.06	-0.04	0.05	-0.00	-0.30
B1	-5.89134	0.011				1.00	-0.01	0.47	-0.45	0.38	-0.43	-0.03	0.02
B2	0.460154	0.0095					1.00	-0.03	0.03	-0.02	0.03	-0.03	-0.00
K1	-0.124942	0.00024						1.00	-0.99	0.87	-0.95	-0.08	0.03
K2	0.121552	0.00049							1.00	-0.94	0.99	0.08	-0.03
K3	-0.0473691	0.00035								1.00	-0.97	-0.07	0.02
K4	0.0285034	0.00024									1.00	0.08	-0.02
P1	0.000124442	1.5e-06										1.00	-0.03
P2	-5.29887e-06	1.2e-06											1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

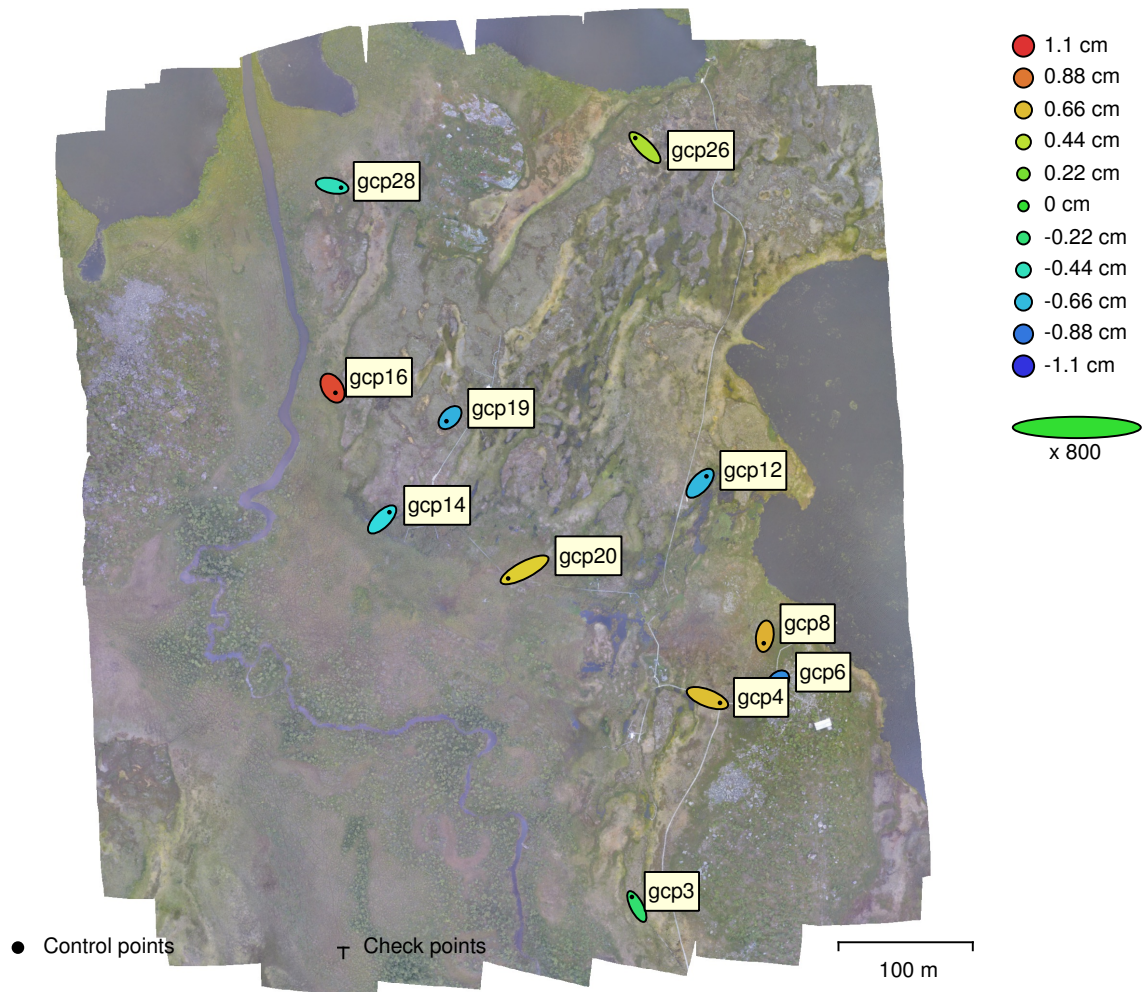


Fig. 3. GCP locations and error estimates.

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)
11	1.5333	1.2232	0.64696	1.96144	2.06538

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)
gcp3	-0.917445	1.77697	-0.195096	2.00933	0.284 (5)
gcp4	2.33576	-0.890754	0.648261	2.58253	0.374 (12)
gcp6	-0.475543	-0.501997	-0.812072	1.06658	0.260 (10)
gcp8	-0.194916	-1.31122	0.697656	1.49801	0.371 (12)
gcp12	1.18522	1.29386	-0.670159	1.87828	0.416 (14)
gcp14	1.35852	1.34508	-0.558224	1.99159	0.518 (15)
gcp16	0.54314	-0.872099	1.02508	1.45133	0.313 (14)
gcp19	-0.668341	-0.670257	-0.694717	1.17412	0.392 (20)
gcp20	-3.04599	-1.59883	0.600066	3.49205	0.605 (16)
gcp26	-1.79547	1.77891	0.394675	2.55812	0.509 (11)
gcp28	1.67506	-0.349656	-0.435472	1.76571	0.654 (11)
Total	1.5333	1.2232	0.64696	2.06538	0.453

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

Digital Elevation Model

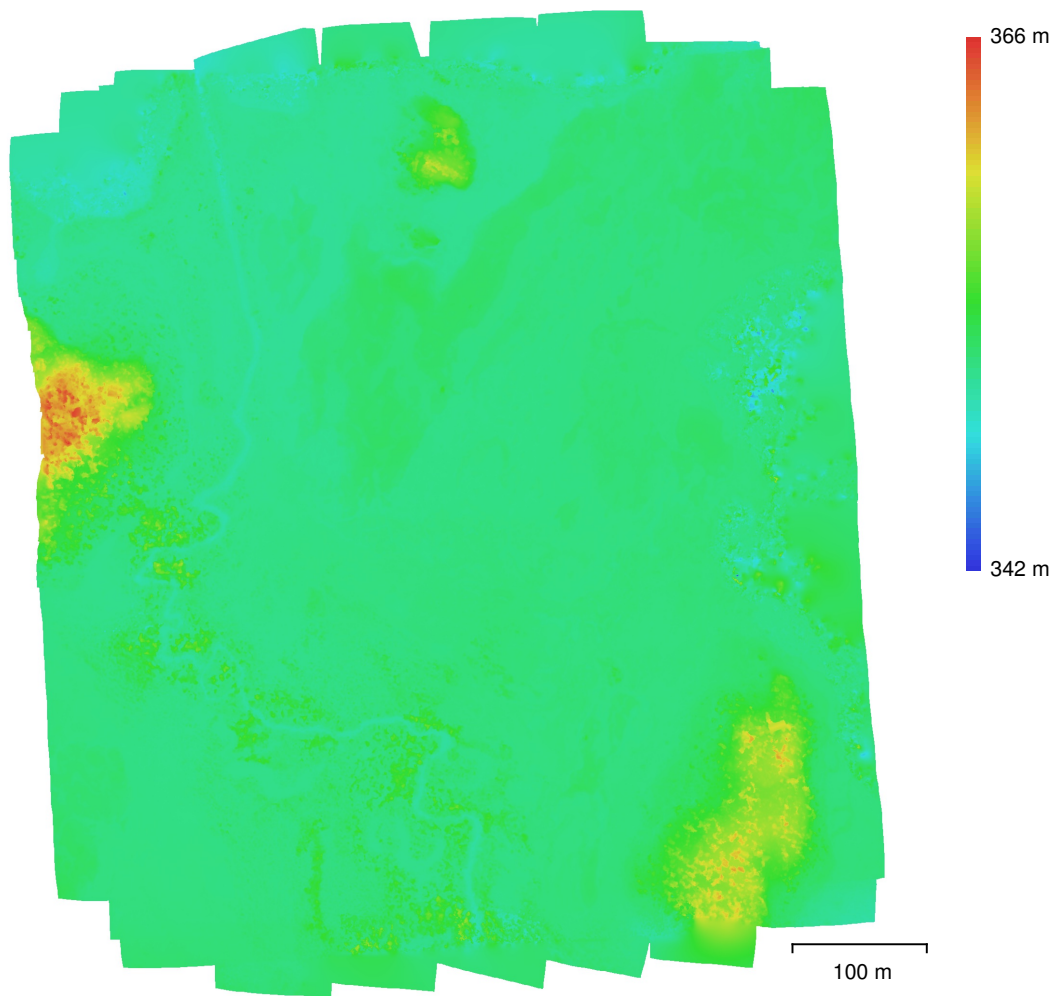


Fig. 4. Reconstructed digital elevation model.

Resolution: 7.88 cm/pix
Point density: 161 points/m²

Processing Parameters

General

Cameras	245
Aligned cameras	242
Markers	29
Coordinate system	SWEREF99 TM (EPSG::3006)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	416,829 of 487,548
RMS reprojection error	0.188792 (0.958616 pix)
Max reprojection error	1.90245 (30.8082 pix)
Mean key point size	4.60876 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	4.48984

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	100,000
Tie point limit	10,000
Adaptive camera model fitting	Yes
Matching time	18 minutes 26 seconds
Alignment time	1 hours 7 minutes

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1, p2
Adaptive camera model fitting	No
Optimization time	23 seconds

Depth Maps

Count	242
-------	-----

Depth maps generation parameters

Quality	High
Filtering mode	Aggressive
Processing time	15 minutes 27 seconds
Software version	1.6.2.10247

Dense Point Cloud

Points	74,044,359
Point colors	3 bands, uint8

Depth maps generation parameters

Quality	High
Filtering mode	Aggressive
Processing time	15 minutes 27 seconds

Dense cloud generation parameters

Processing time	9 minutes 12 seconds
Software version	1.6.2.10247

DEM

Size	10,314 x 11,242
Coordinate system	SWEREF99 TM (EPSG::3006)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	1 minutes 8 seconds

Software version	1.6.2.10247
Orthomosaic	
Size	16,523 x 18,647
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 47 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	1007.58 GB
CPU	Intel(R) Xeon(R) CPU E5-2690 v4 @ 2.60GHz
GPU(s)	Tesla P100-PCIE-16GB