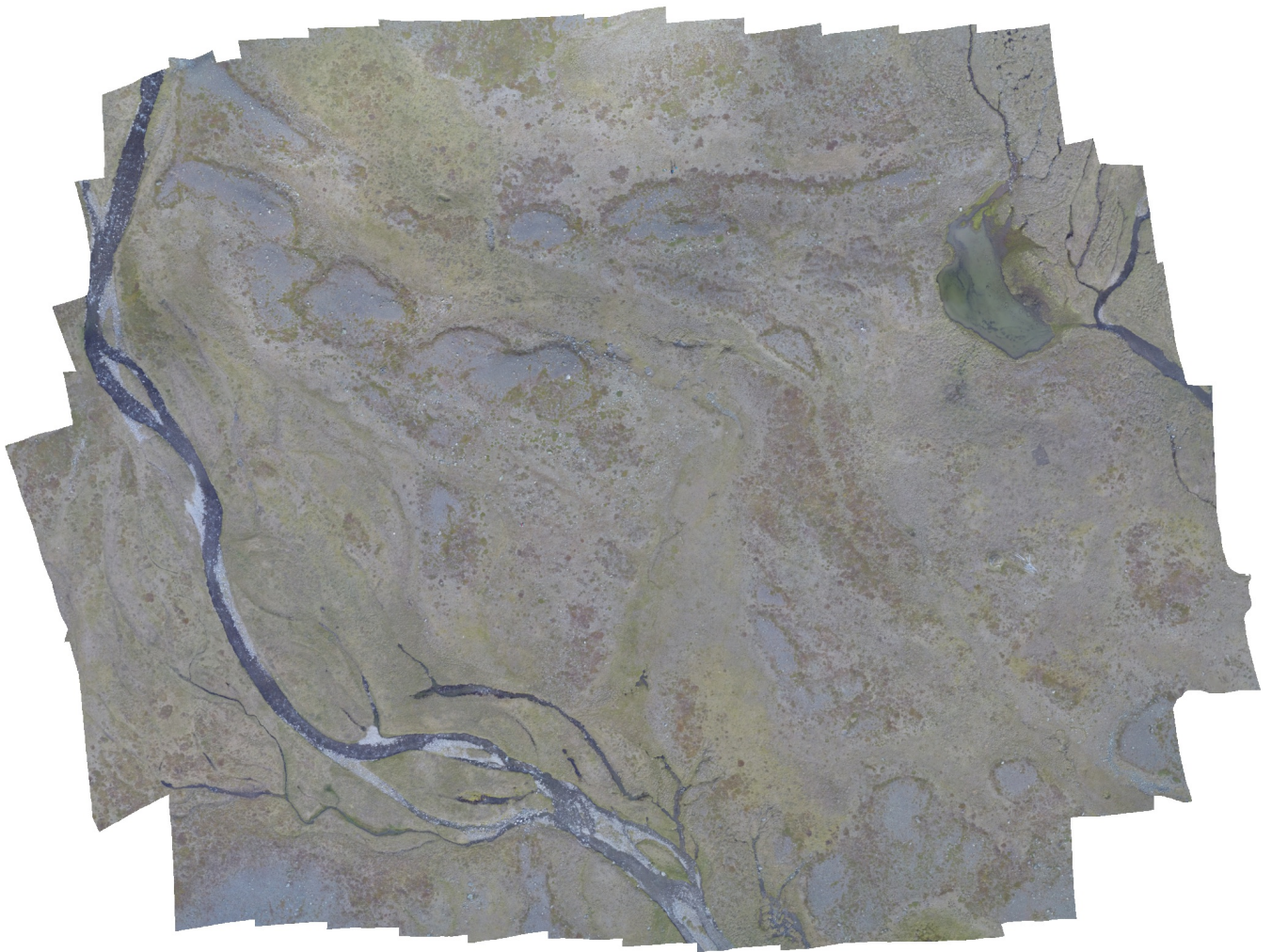


Agisoft Metashape

Processing Report

04 March 2021



Survey Data

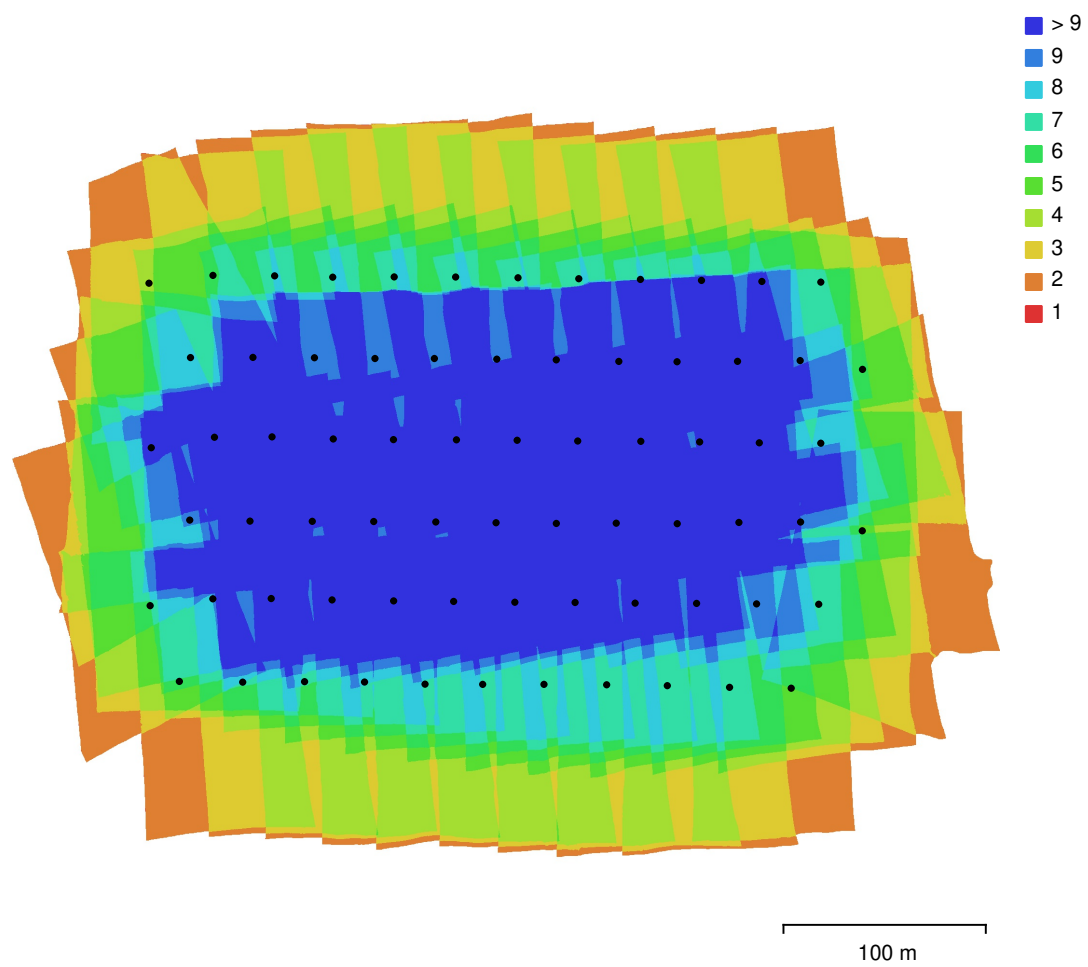


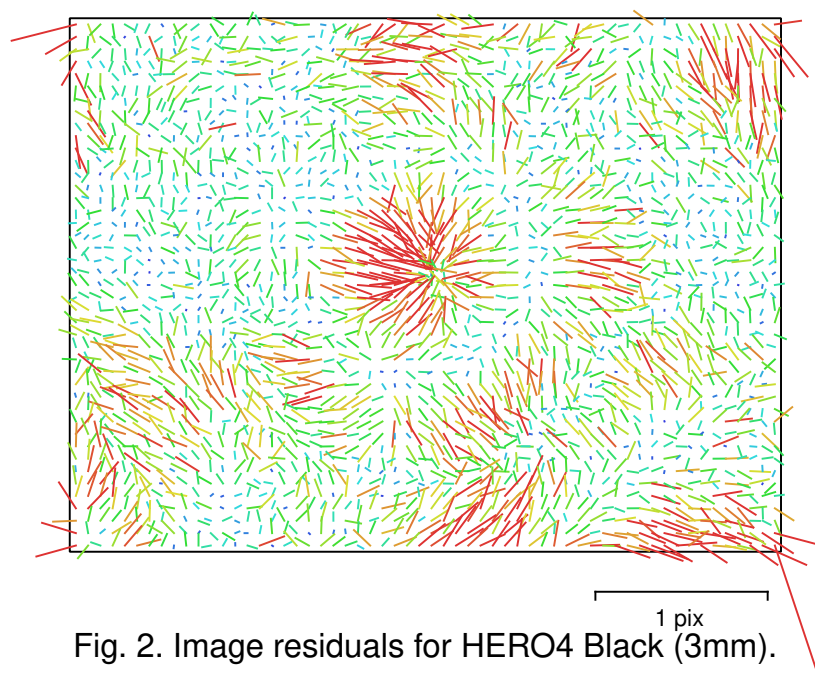
Fig. 1. Camera locations and image overlap.

Number of images:	71	Camera stations:	71
Flying altitude:	91.2 m	Tie points:	60,663
Ground resolution:	3.62 cm/pix	Projections:	260,349
Coverage area:	0.147 km²	Reprojection error:	0.587 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



HERO4 Black (3mm)

71 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	2180.01	0.81	1.00	-0.20	0.22	0.84	-0.89	0.78	0.15	-0.02
Cx	26.8422	0.068		1.00	0.07	-0.15	0.16	-0.13	-0.20	-0.00
Cy	-77.361	0.062			1.00	0.20	-0.20	0.17	0.06	0.04
K1	0.0699778	6.1e-05				1.00	-0.98	0.96	0.12	-0.03
K2	-0.0800803	0.00013					1.00	-0.97	-0.14	0.03
K3	0.0188595	5.2e-05						1.00	0.13	-0.03
P1	0.000661554	2.6e-06							1.00	-0.02
P2	1.08626e-05	2.3e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

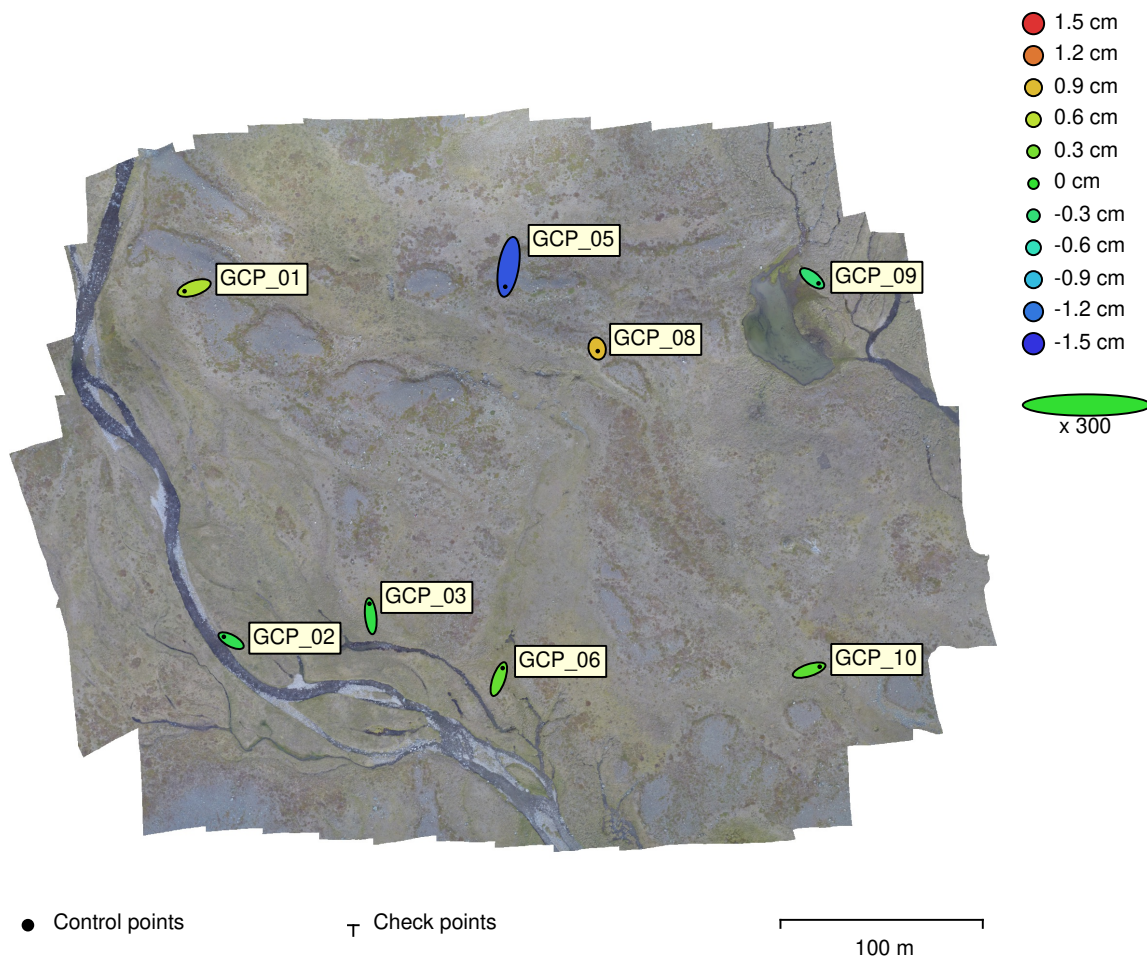


Fig. 3. GCP locations and error estimates.
 Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
 Estimated GCP locations are marked with a dot or crossing.

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
8	2.09736	3.16702	0.625072	3.79855	3.84963

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)
GCP_01	-3.15432	-1.0546	0.543275	3.37003	2.302 (5)
GCP_02	-2.37987	1.27853	-0.136916	2.70503	1.408 (7)
GCP_03	-0.421651	4.08725	-0.0917964	4.10996	1.278 (12)
GCP_05	-1.09853	-6.55292	-1.34812	6.77974	2.583 (9)
GCP_06	1.2785	3.62329	0.225779	3.84887	3.611 (4)
GCP_08	0.194707	-0.84987	0.906296	1.2576	0.538 (13)
GCP_09	2.11071	-1.6556	-0.282231	2.69736	1.461 (7)
GCP_10	3.47357	1.12057	0.184305	3.6545	3.103 (5)
Total	2.09736	3.16702	0.625072	3.84963	1.963

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

Digital Elevation Model

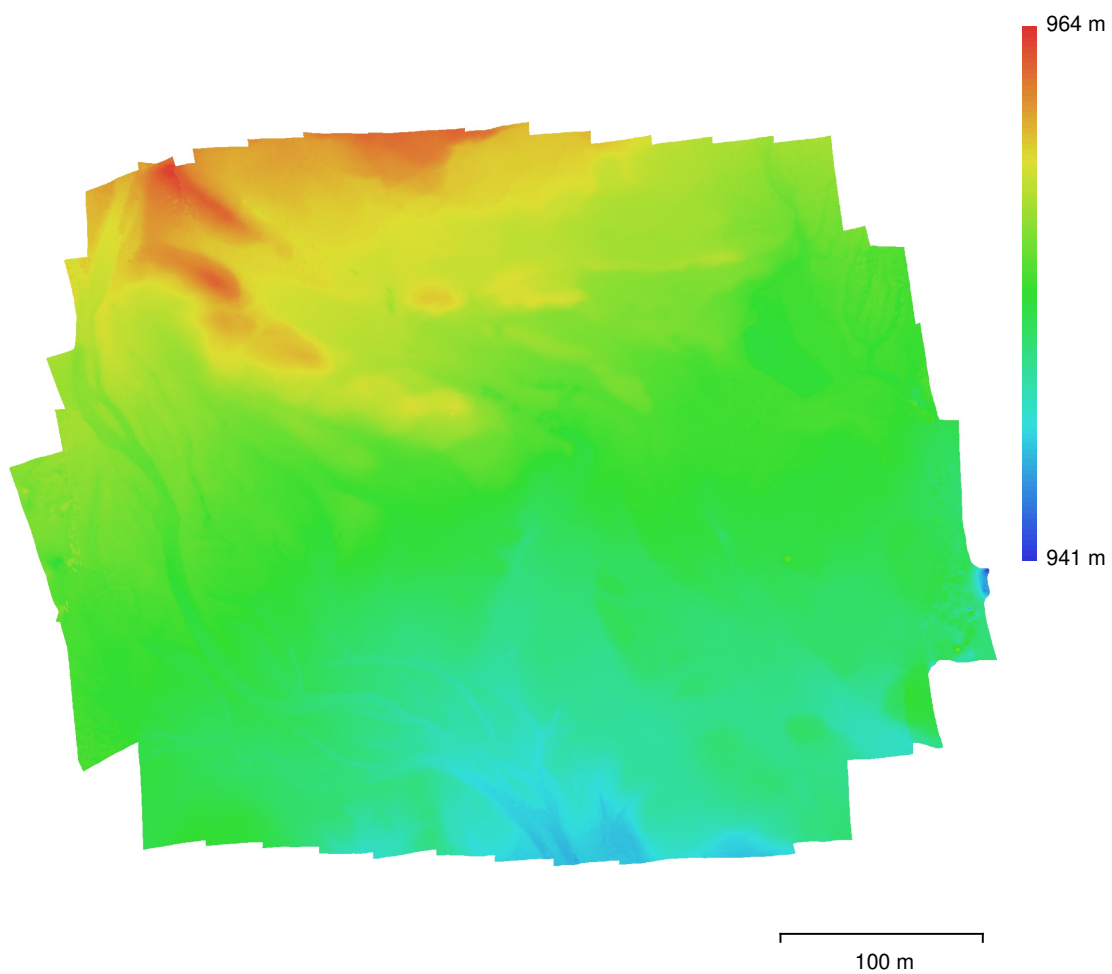


Fig. 4. Reconstructed digital elevation model.

Resolution: 7.23 cm/pix
Point density: 191 points/m²

Processing Parameters

General

Cameras	71
Aligned cameras	71
Markers	8
Coordinate system	SWEREF99 TM (EPSG::3006)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	60,663 of 71,500
RMS reprojection error	0.166224 (0.586649 pix)
Max reprojection error	0.8 (18.3605 pix)
Mean key point size	3.19086 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	4.27825

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	38 seconds
Matching memory usage	768.69 MB
Alignment time	1 minutes 22 seconds
Alignment memory usage	98.57 MB

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	4 seconds
Software version	1.6.2.10247

Depth Maps

Count	71
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	3 minutes 54 seconds
Software version	1.6.2.10247

Dense Point Cloud

Points	28,298,167
Point colors	3 bands, uint8
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	3 minutes 54 seconds
Dense cloud generation parameters	
Processing time	3 minutes 6 seconds
Software version	1.6.2.10247

DEM

Size	7,987 x 6,824
Coordinate system	SWEREF99 TM (EPSG::3006)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	42 seconds
Software version	1.6.2.10247
Orthomosaic	
Size	13,487 x 10,155
Coordinate system	SWEREF99 TM (EPSG::3006)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	1 minutes 22 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