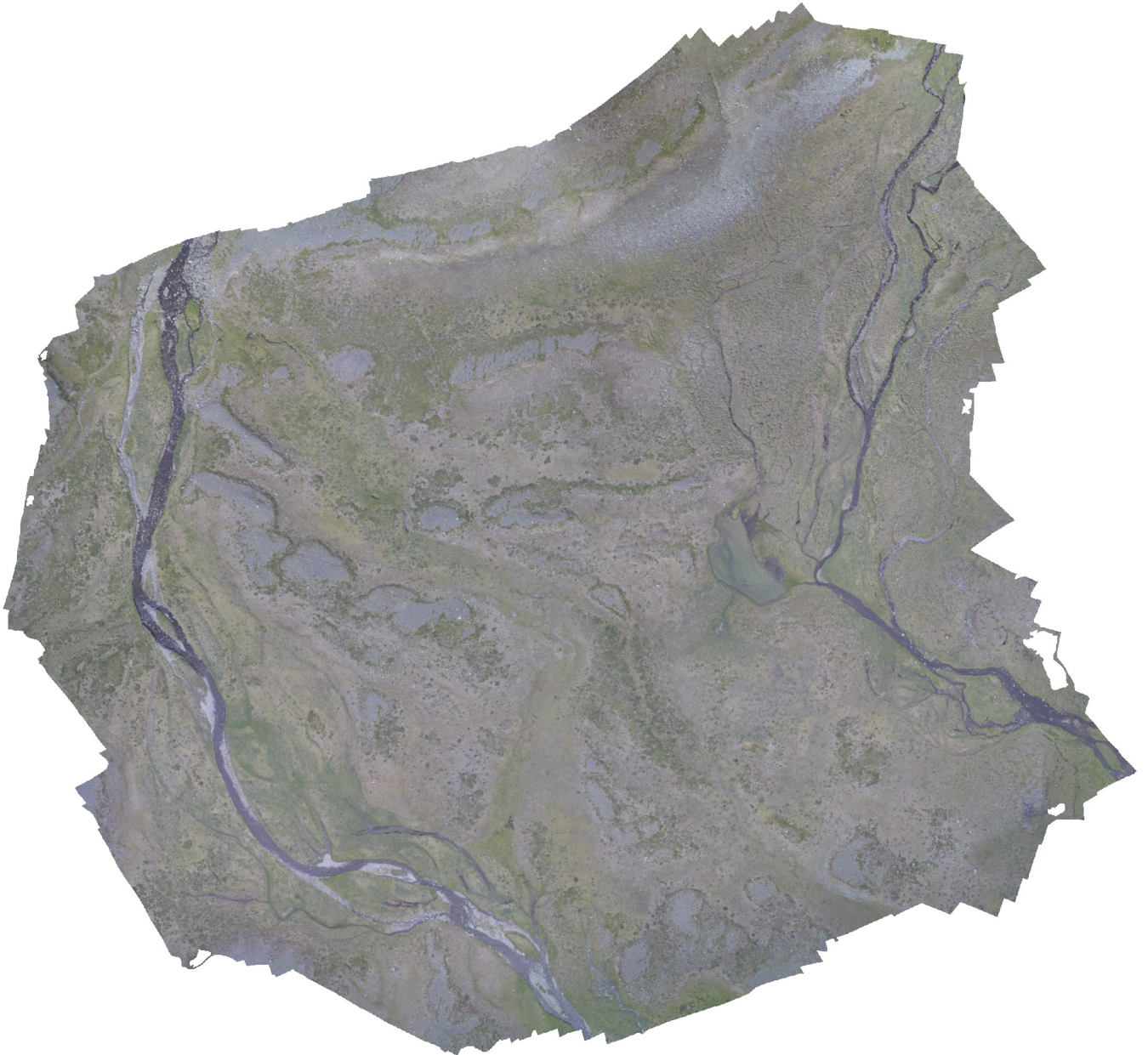


Agisoft Metashape

Processing Report
24 August 2021



Survey Data

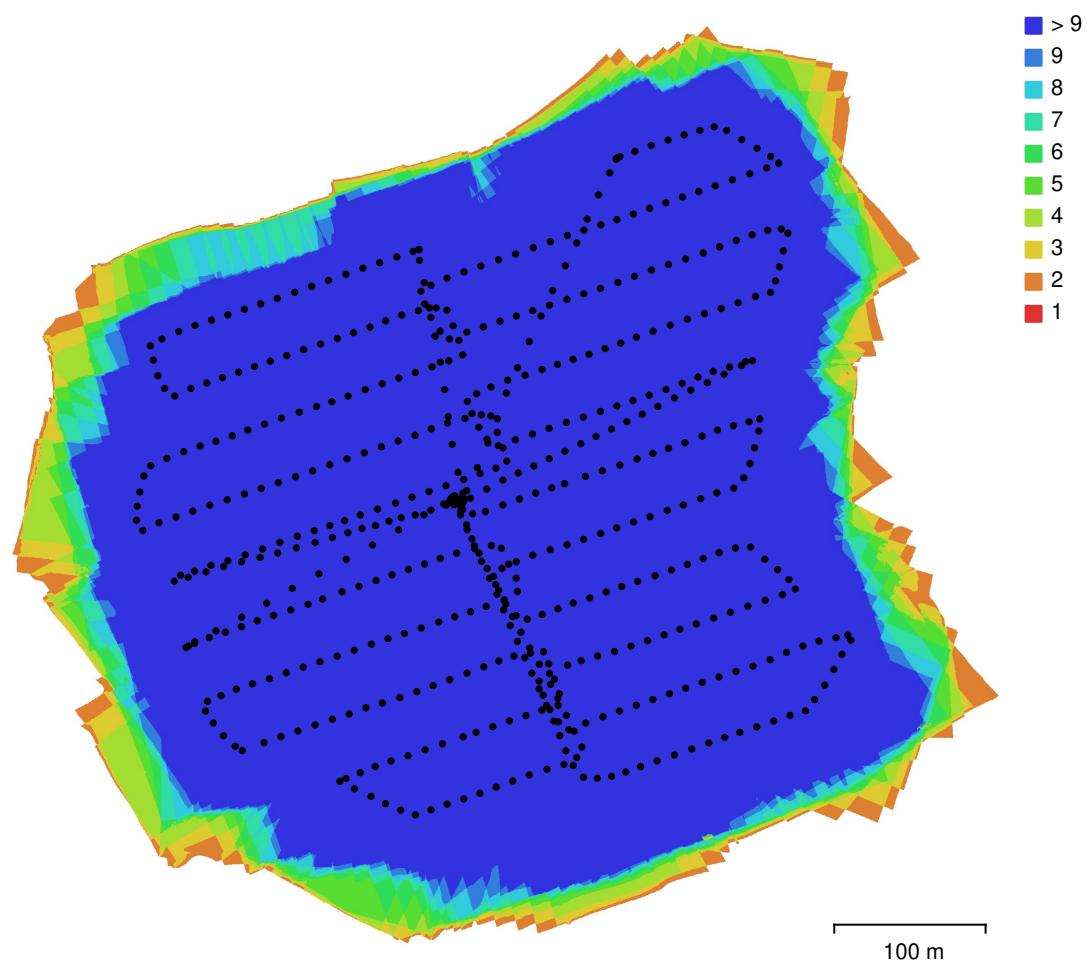


Fig. 1. Camera locations and image overlap.

Number of images:	713	Camera stations:	713
Flying altitude:	82.4 m	Tie points:	249,195
Ground resolution:	3.18 cm/pix	Projections:	2,079,362
Coverage area:	0.268 km ²	Reprojection error:	0.907 pix

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

Table 1. Cameras.

Camera Calibration

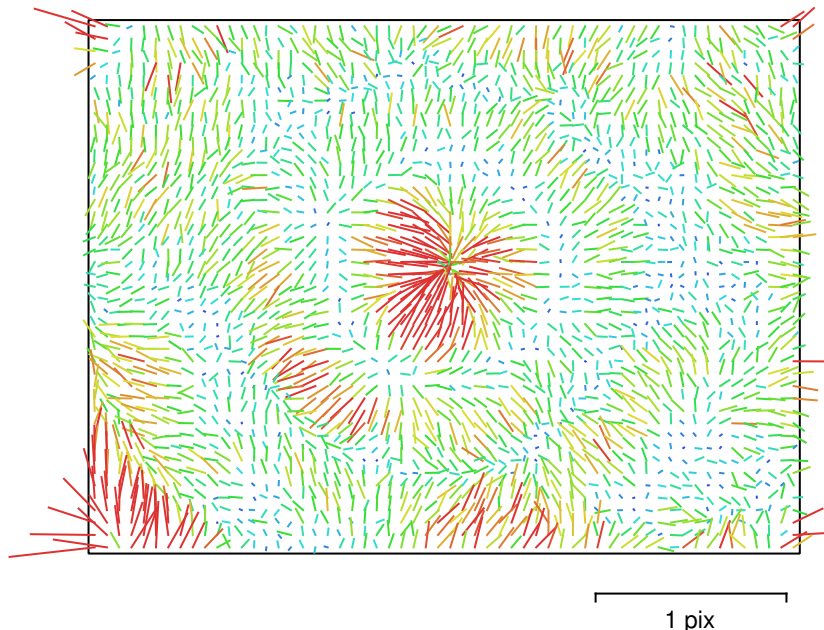


Fig. 2. Image residuals for HERO4 Black (3mm).

HERO4 Black (3mm)

713 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	2177.24	0.19	1.00	-0.35	-0.04	0.61	-0.72	0.57	0.15	-0.04
Cx	26.4282	0.021		1.00	0.05	-0.24	0.27	-0.21	-0.02	0.03
Cy	-77.3689	0.02			1.00	-0.04	0.05	-0.05	-0.03	0.13
K1	0.0698937	1.9e-05				1.00	-0.96	0.92	0.09	-0.04
K2	-0.0799586	3.7e-05					1.00	-0.97	-0.13	0.05
K3	0.0188554	1.6e-05						1.00	0.12	-0.05
P1	2.28632e-05	1.1e-06							1.00	-0.00
P2	-0.000389202	9e-07								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

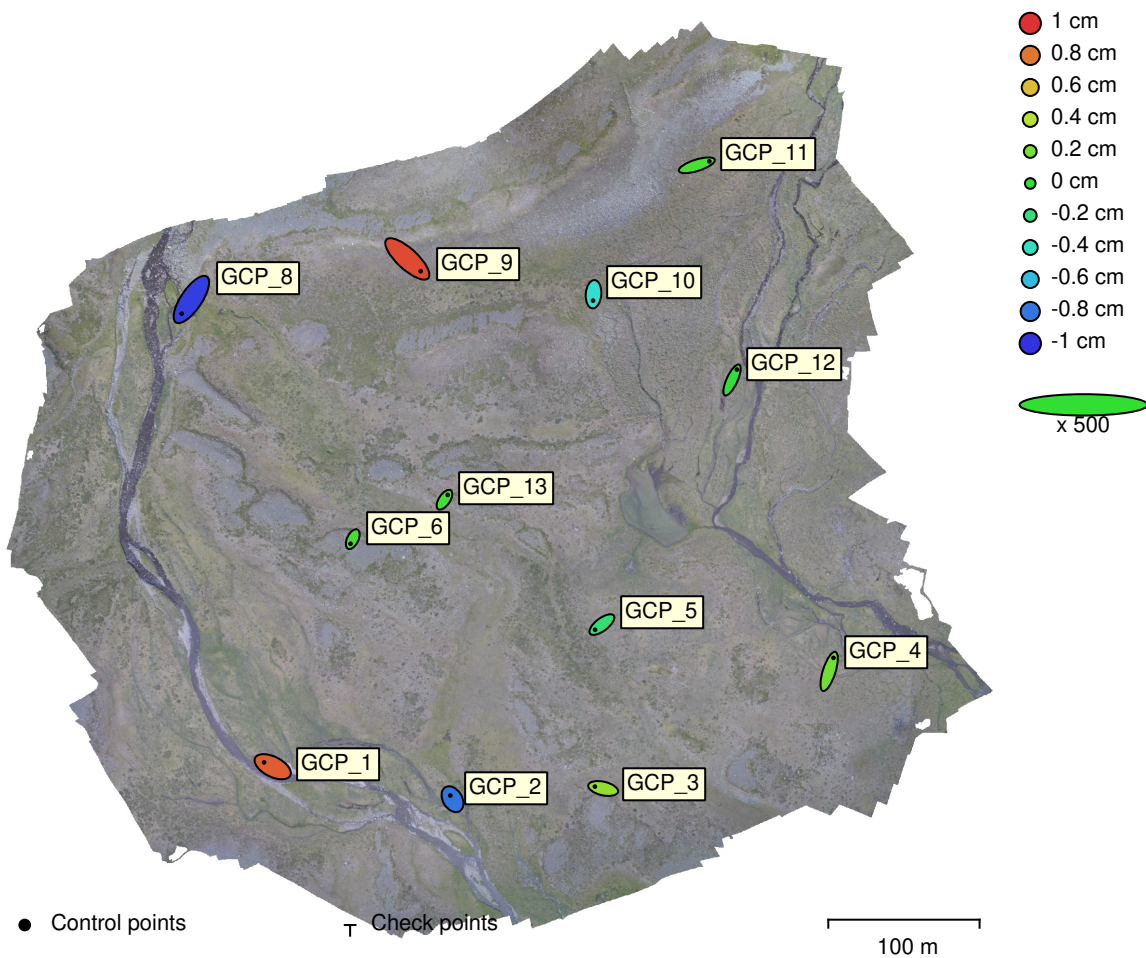


Fig. 3. GCP locations and error estimates.

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)
12	1.98968	2.16955	0.54624	2.94377	2.99402

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_1	-2.28443	1.14745	0.876598	2.70254	1.973 (7)
GCP_2	-0.589425	0.970588	-0.805619	1.39229	0.704 (11)
GCP_3	-2.17992	0.499891	0.275186	2.25337	0.929 (13)
GCP_4	1.14815	3.58029	0.18047	3.76421	1.973 (15)
GCP_5	-1.80635	-1.36521	-0.191864	2.27233	1.729 (14)
GCP_6	-0.590104	-1.20418	0.0581808	1.34226	0.907 (12)
GCP_13	0.860486	1.27019	0.0450321	1.53488	0.380 (12)
GCP_8	-2.54113	-3.75865	-0.964101	4.63835	1.668 (11)
GCP_9	3.53333	-3.25018	0.931423	4.89037	1.685 (14)
GCP_10	-0.132794	-1.68775	-0.458176	1.75387	0.657 (11)
GCP_11	3.30278	1.04152	0.0722065	3.46386	1.097 (12)
GCP_12	1.28461	2.7577	-0.0196924	3.04228	3.897 (13)
Total	1.98968	2.16955	0.54624	2.99402	1.748

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

Digital Elevation Model

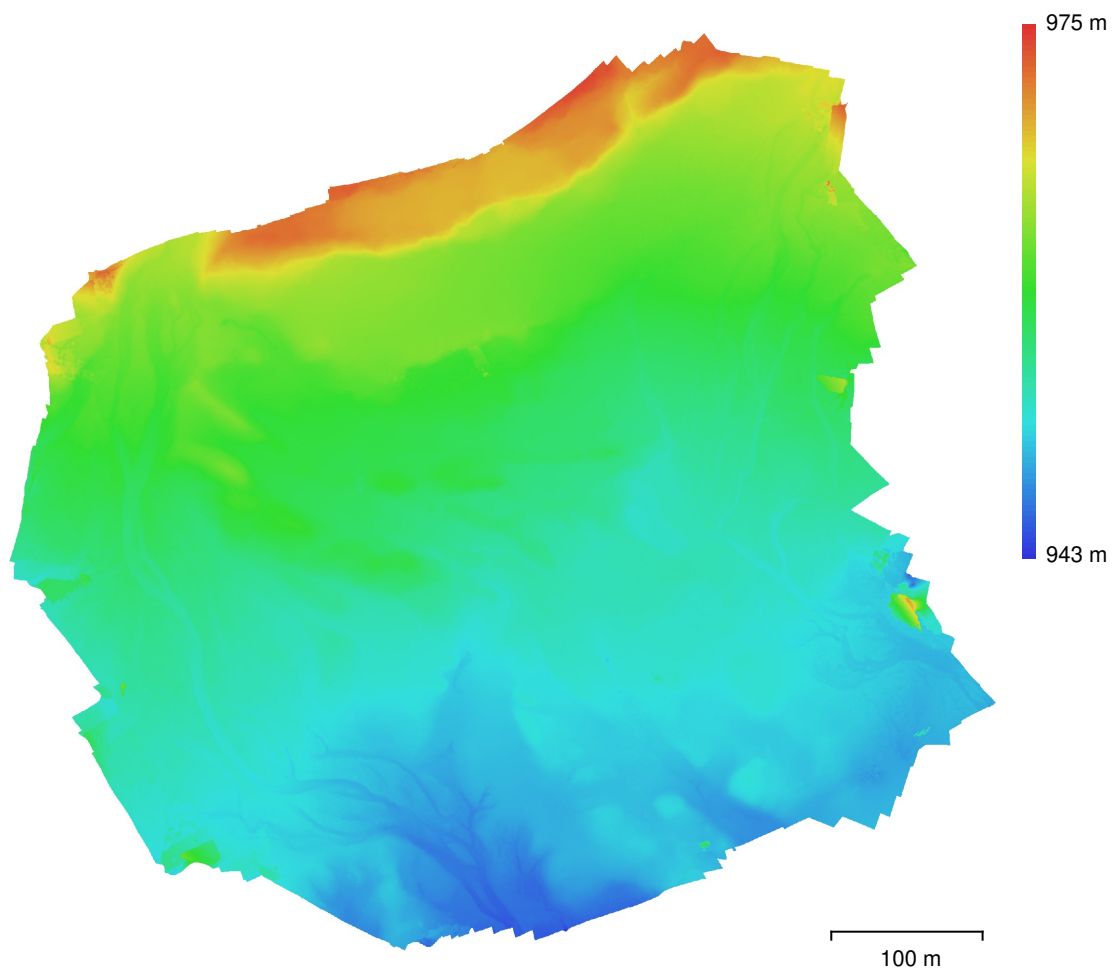


Fig. 4. Reconstructed digital elevation model.

Resolution: 6.36 cm/pix
Point density: 248 points/m²

Processing Parameters

General

Cameras	713
Aligned cameras	713
Markers	12
Coordinate system	SWEREF99 TM (EPSG::3006)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	249,195 of 484,186
RMS reprojection error	0.248187 (0.906509 pix)
Max reprojection error	3.4969 (40.0835 pix)
Mean key point size	3.43744 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	16.8062

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	No
Key point limit	40,000
Tie point limit	10,000
Guided image matching	No
Adaptive camera model fitting	No
Matching time	4 hours 45 minutes
Matching memory usage	7.62 GB
Alignment time	30 minutes 45 seconds
Alignment memory usage	1.86 GB

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	50 seconds
Software version	1.6.2.10247

Depth Maps

Count	711
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Depth maps generation parameters

Quality	High
Filtering mode	Mild
Processing time	3 hours 2 minutes
Software version	1.6.5.11249

Dense Point Cloud

Points	70,412,468
Point colors	3 bands, uint8

Depth maps generation parameters

Quality	High
Filtering mode	Mild
Processing time	3 hours 2 minutes

Dense cloud generation parameters

Processing time	3 hours 1 minutes
Software version	1.6.5.11249

DEM

Size	17,477 x 17,493
Coordinate system	SWEREF99 TM (EPSG::3006)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	2 minutes 25 seconds
Software version	1.6.5.11249
Orthomosaic	
Size	20,527 x 19,073
Coordinate system	SWEREF99 TM (EPSG::3006)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	11 minutes 23 seconds
Software version	1.6.5.11249
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