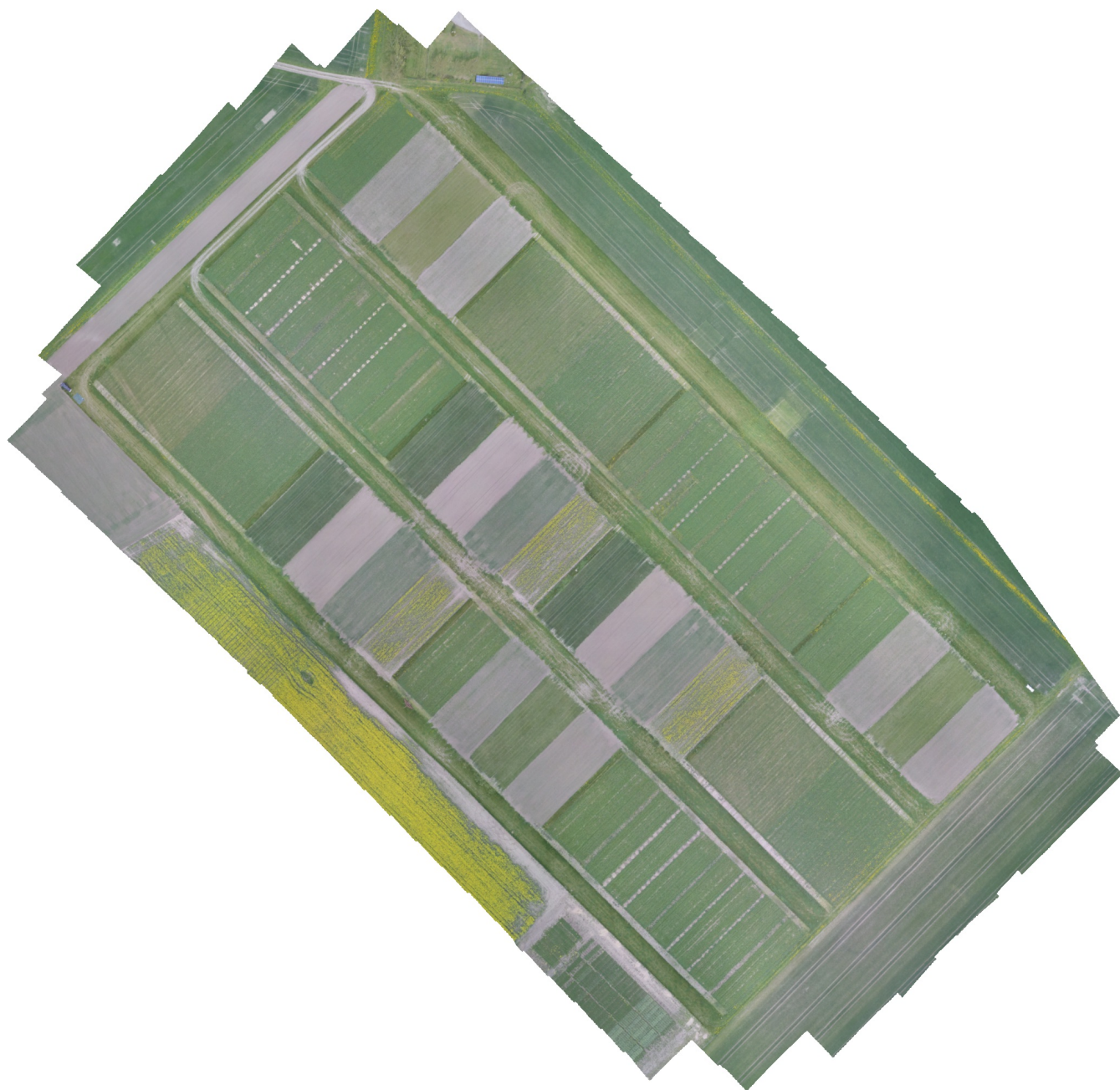


Agisoft Metashape

Processing Report

04 March 2021



Survey Data

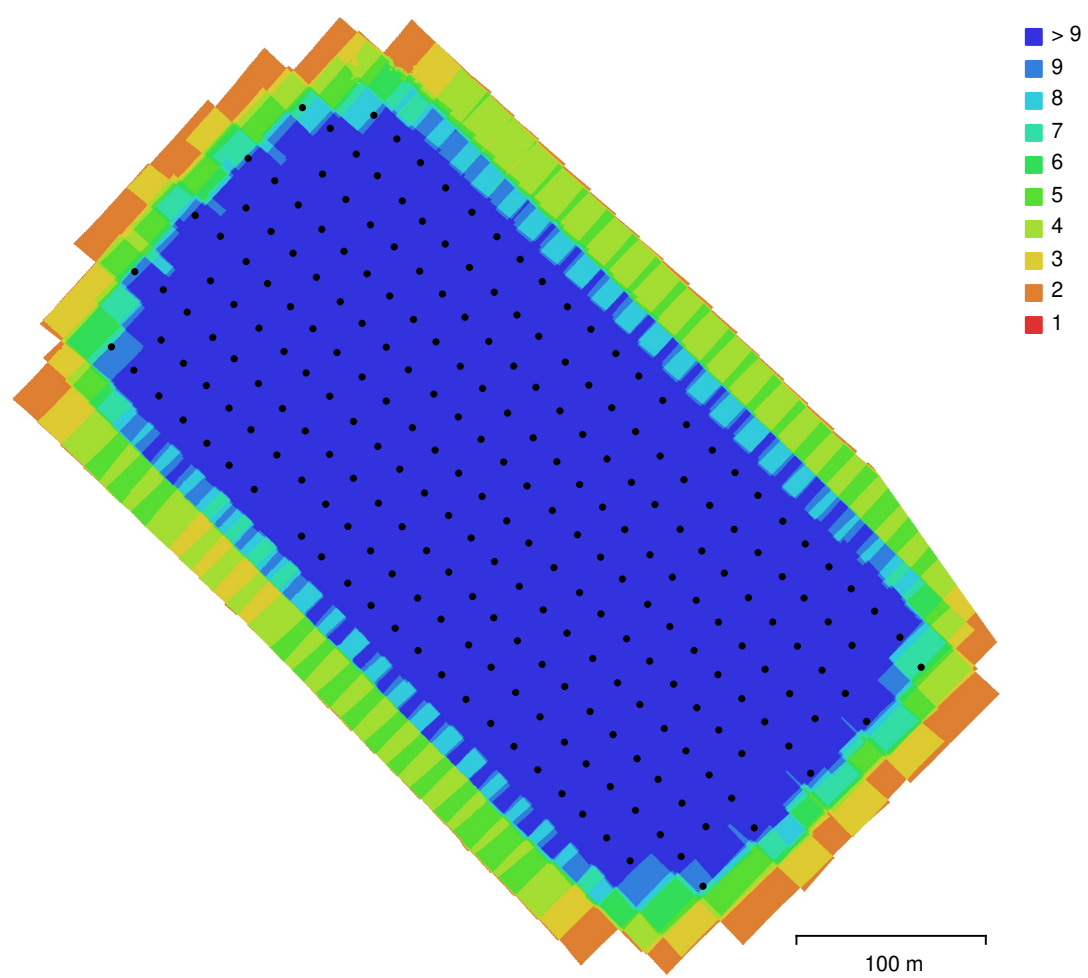


Fig. 1. Camera locations and image overlap.

Number of images:	241	Camera stations:	241
Flying altitude:	68.5 m	Tie points:	222,870
Ground resolution:	2.61 cm/pix	Projections:	928,016
Coverage area:	0.142 km²	Reprojection error:	0.738 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

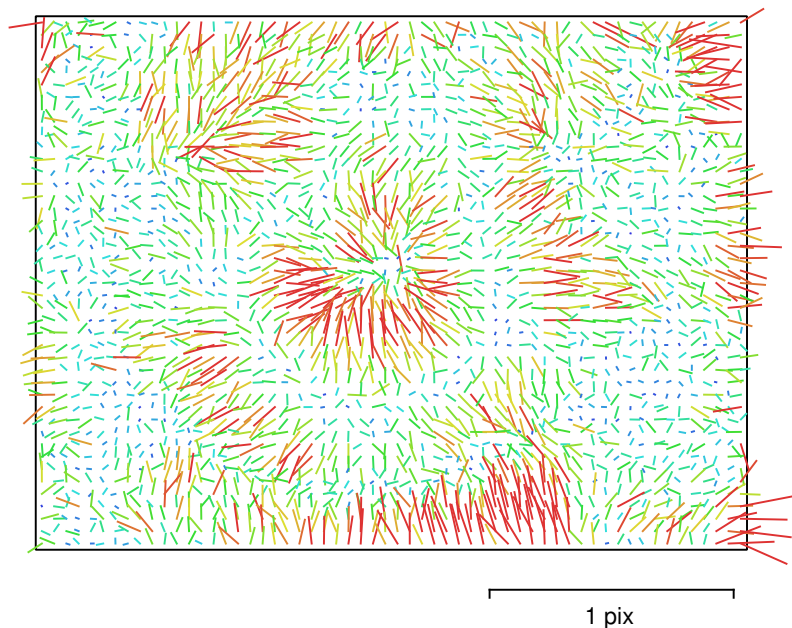


Fig. 2. Image residuals for HERO4 Black (3mm).

HERO4 Black (3mm)

241 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	2273.29	3.7	1.00	-0.19	0.00	1.00	-1.00	0.99	-0.16	-0.47
Cx	-107.533	0.056		1.00	0.01	-0.20	0.20	-0.21	-0.26	0.10
Cy	12.6455	0.05			1.00	0.00	-0.00	0.00	0.00	-0.13
K1	0.0763384	0.00025				1.00	-1.00	1.00	-0.16	-0.47
K2	-0.0938086	0.00061					1.00	-1.00	0.16	0.47
K3	0.0234905	0.00023						1.00	-0.16	-0.46
P1	-0.000244731	1.8e-06							1.00	0.07
P2	-0.000472798	1.6e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

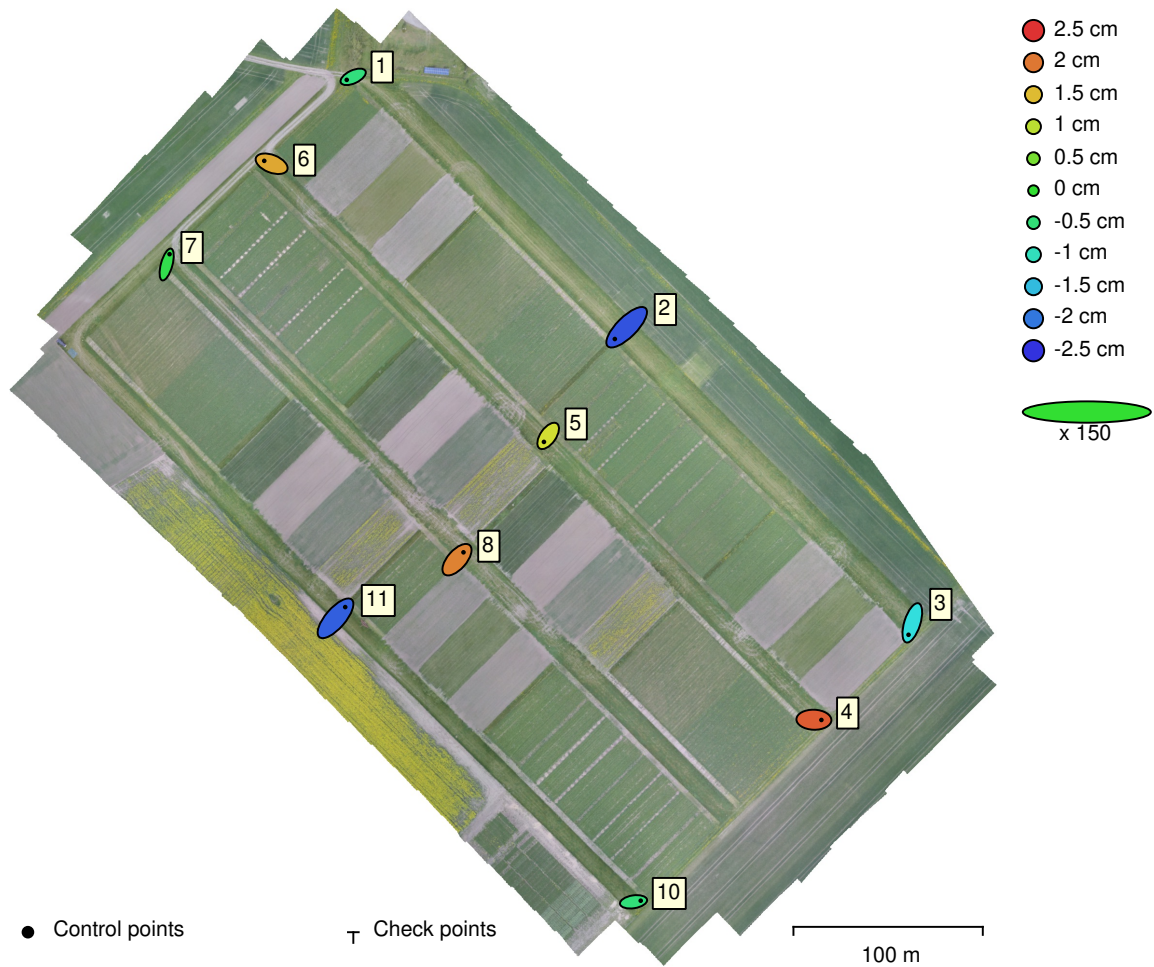


Fig. 3. GCP locations and error estimates.
 Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
 Estimated GCP locations are marked with a dot or crossing.

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
10	5.07948	5.55304	1.56758	7.52578	7.6873

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	-4.54041	-2.11836	-0.547548	5.0401	2.866 (5)
2	-8.3326	-8.28442	-2.25905	11.9652	3.020 (11)
3	-2.67098	-8.39068	-1.24828	8.89358	4.090 (6)
4	5.25679	-0.168228	2.19602	5.69953	1.481 (11)
5	-2.97783	-4.22175	1.16661	5.29638	1.059 (15)
6	-5.21161	2.04424	1.64867	5.83592	1.627 (10)
7	2.02761	7.27426	-0.193664	7.55404	2.490 (8)
8	4.564	5.19057	1.92188	7.17396	1.486 (14)
10	5.05258	0.780164	-0.514789	5.13831	3.509 (5)
11	6.83355	7.8958	-2.17119	10.6656	4.213 (7)
Total	5.07948	5.55304	1.56758	7.6873	2.501

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

Digital Elevation Model

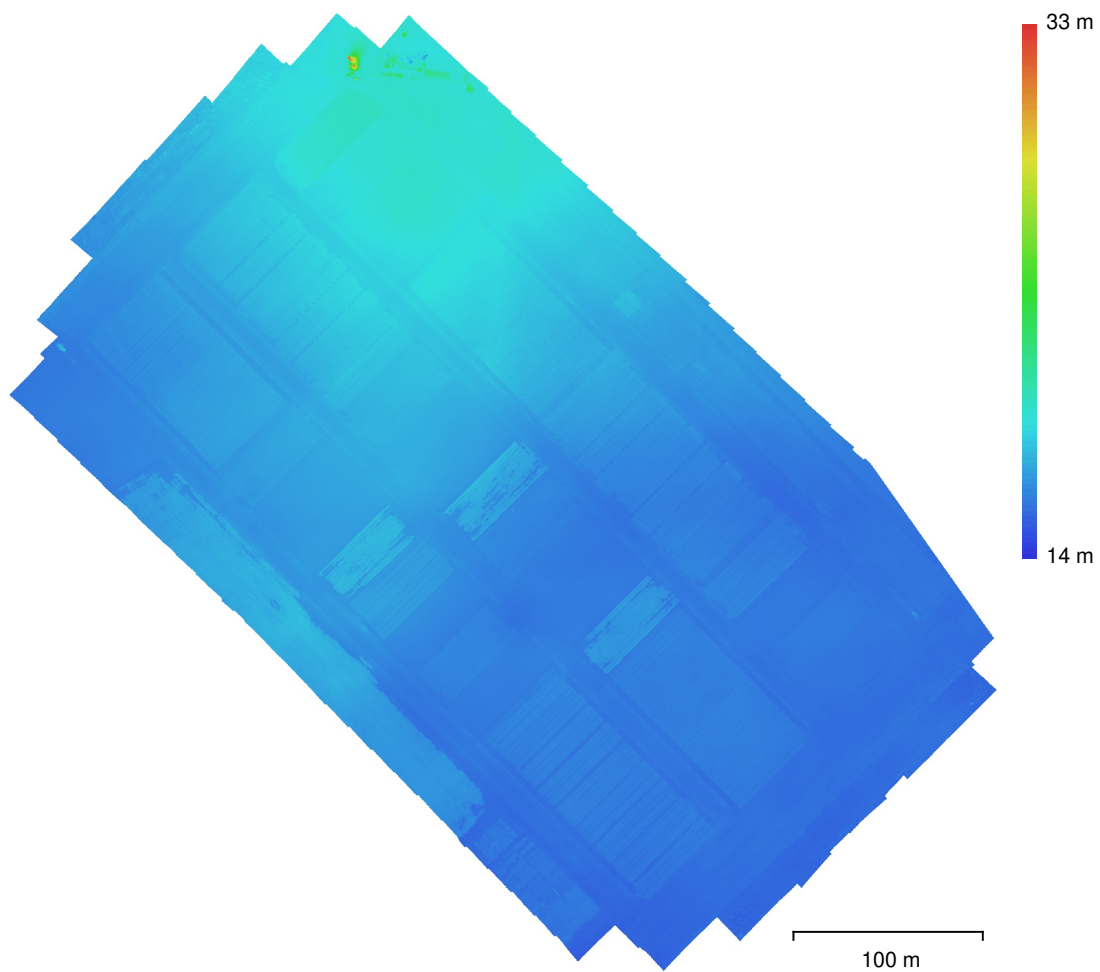


Fig. 4. Reconstructed digital elevation model.

Resolution: 5.22 cm/pix
Point density: 367 points/m²

Processing Parameters

General

Cameras	241
Aligned cameras	241
Markers	10
Coordinate system	SWEREF99 TM (EPSG::3006)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	222,870 of 233,057
RMS reprojection error	0.176023 (0.737961 pix)
Max reprojection error	0.703429 (17.4096 pix)
Mean key point size	4.03104 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	4.37768

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	4 minutes 11 seconds
Matching memory usage	830.36 MB
Alignment time	17 minutes 32 seconds
Alignment memory usage	355.71 MB

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	19 seconds
Software version	1.6.2.10247

Depth Maps

Count	241
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	43 minutes 5 seconds
Software version	1.6.2.10247

Dense Point Cloud

Points	54,081,336
Point colors	3 bands, uint8
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	43 minutes 5 seconds
Dense cloud generation parameters	
Processing time	30 minutes 24 seconds
Software version	1.6.2.10247

DEM

Size	12,262 x 13,374
Coordinate system	SWEREF99 TM (EPSG::3006)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	2 minutes 5 seconds
Software version	1.6.2.10247
Orthomosaic	
Size	19,976 x 19,380
Coordinate system	SWEREF99 TM (EPSG::3006)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	7 minutes 6 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