

# Sander\_2022-10-20\_Mavic2EA\_Wide

Processing Report  
28 June 2024



# Survey Data

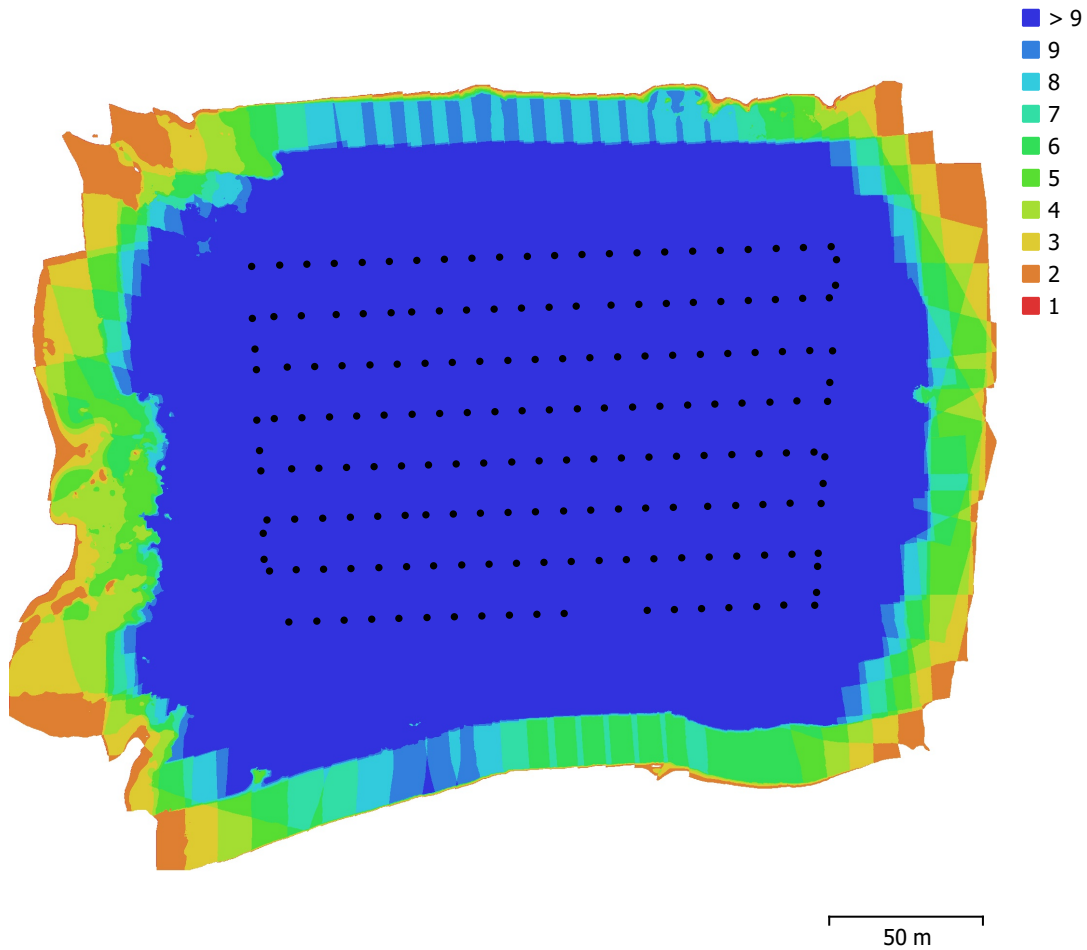


Fig. 1. Camera locations and image overlap.

Number of images:	180	Camera stations:	180
Flying altitude:	83.3 m	Tie points:	77,235
Ground resolution:	1.31 cm/pix	Projections:	589,903
Coverage area:	0.0673 km <sup>2</sup>	Reprojection error:	1.69 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
MAVIC2-ENTERPRISE-...	8000 x 6000	4.5 mm	0.811 x 0.811 $\mu$ m	No

Table 1. Cameras.

# Camera Calibration

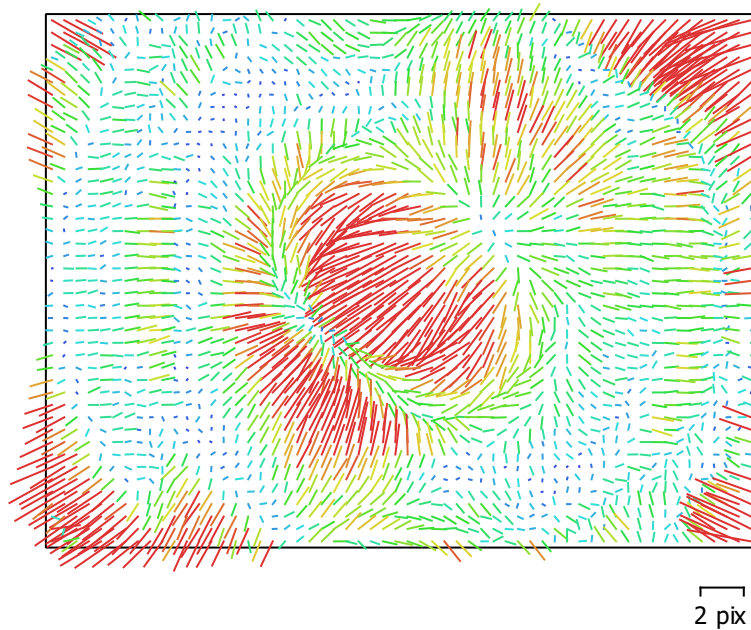


Fig. 2. Image residuals for MAVIC2-ENTERPRISE-ADVANCED (4.5mm).

## MAVIC2-ENTERPRISE-ADVANCED (4.5mm)

180 images

Type	Resolution	Focal Length	Pixel Size
<b>Frame</b>	<b>8000 x 6000</b>	<b>4.5 mm</b>	<b>0.811 x 0.811 <math>\mu\text{m}</math></b>

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	P1	P2
<b>F</b>	<b>6370.71</b>	5.3	1.00	0.74	0.82	-0.27	-0.11	0.11	0.22	-0.71	0.09	-0.10
<b>Cx</b>	<b>70.7584</b>	0.11		1.00	0.67	-0.27	-0.08	0.08	0.13	-0.50	0.43	-0.05
<b>Cy</b>	<b>-55.4793</b>	0.12			1.00	-0.24	-0.15	0.07	0.18	-0.59	0.11	0.14
<b>B1</b>	<b>-5.07167</b>	0.024				1.00	0.04	-0.01	-0.08	0.21	-0.01	0.04
<b>B2</b>	<b>1.74553</b>	0.022					1.00	0.01	-0.02	0.08	-0.06	0.03
<b>K1</b>	<b>-0.00411284</b>	0.00013						1.00	-0.30	0.09	0.27	0.37
<b>K2</b>	<b>0.0132402</b>	0.00021							1.00	-0.83	-0.02	0.02
<b>K3</b>	<b>-0.0478295</b>	0.00034								1.00	-0.04	0.02
<b>P1</b>	<b>0.000397184</b>	3.1e-06									1.00	0.15
<b>P2</b>	<b>-0.000382585</b>	2.7e-06										1.00

Table 2. Calibration coefficients and correlation matrix.

# Ground Control Points

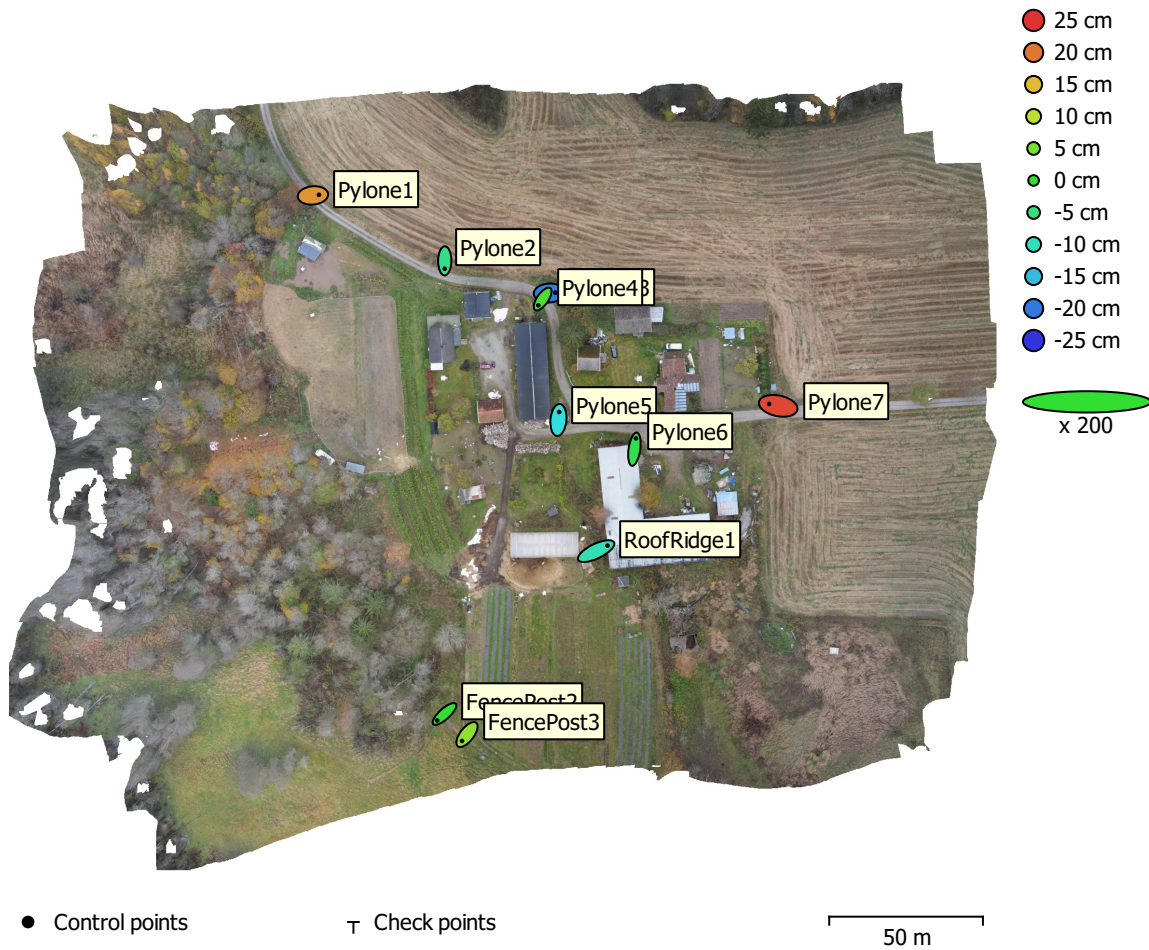


Fig. 3. GCP locations and error estimates.

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	2.01777	2.06172	12.5735	2.8848	12.9002

Table 3. Control points RMSE.

X - Easting, Y - Northing, Z - Altitude.

<b>Label</b>	<b>X error (cm)</b>	<b>Y error (cm)</b>	<b>Z error (cm)</b>	<b>Total (cm)</b>	<b>Image (pix)</b>
Pylone1	1.96284	0.187625	17.8965	18.0048	1.306 (10)
Pylone2	-0.0181819	-2.57615	-6.16345	6.6802	1.248 (9)
Pylone3	1.97593	0.105337	-19.3411	19.442	1.019 (10)
Pylone4	-1.42484	-2.03315	1.56772	2.93626	1.800 (10)
Pylone5	0.234696	2.60279	-12.5488	12.8181	2.940 (10)
Pylone6	0.513484	3.52929	-2.26696	4.22595	1.238 (10)
Pylone7	-2.95262	0.608262	23.4381	23.6311	2.407 (14)
FencePost2	-2.36659	-2.12788	-0.129087	3.18517	0.526 (6)
FencePost3	-1.62088	-2.08691	6.87086	7.36146	1.424 (5)
RoofRidge1	3.69617	1.79081	-9.32364	10.1882	3.019 (10)
<b>Total</b>	<b>2.01777</b>	<b>2.06172</b>	<b>12.5735</b>	<b>12.9002</b>	<b>1.956</b>

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

# Digital Elevation Model

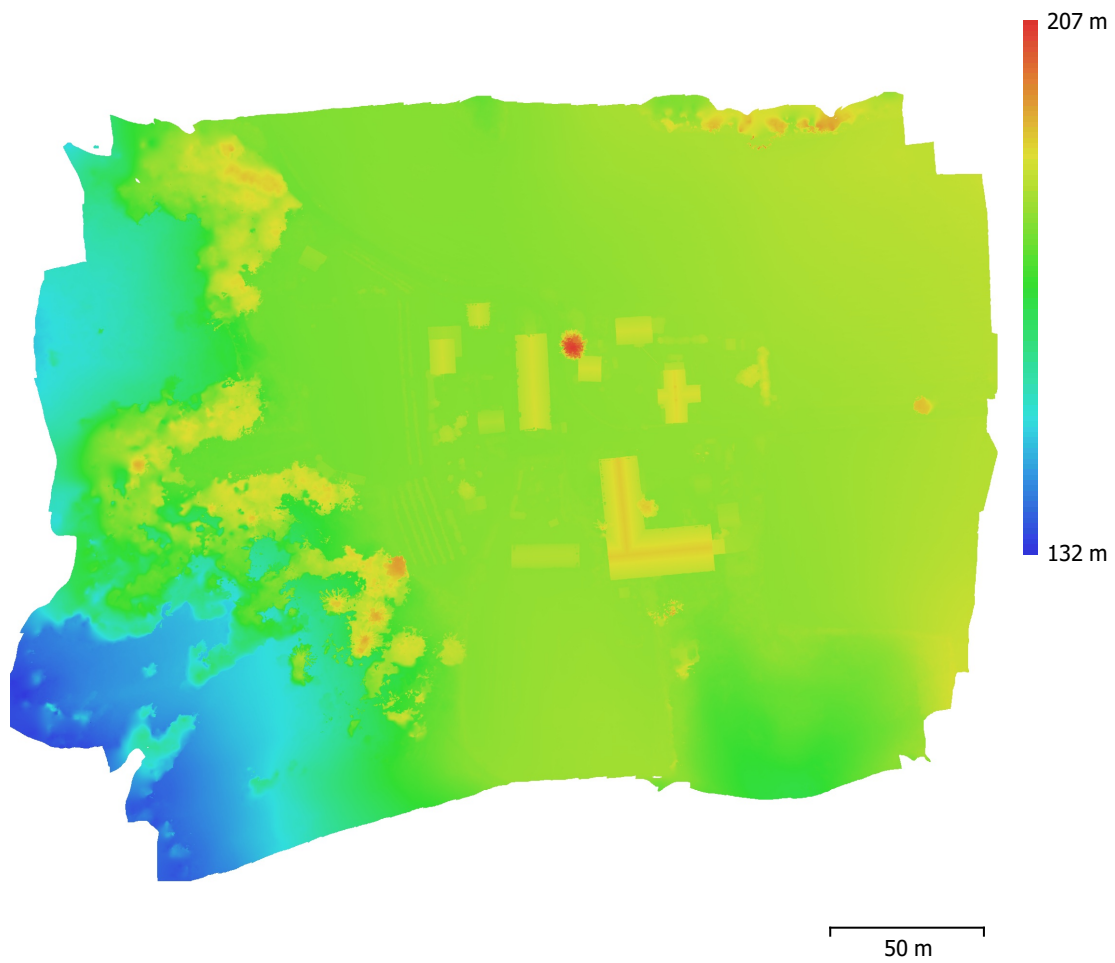


Fig. 4. Reconstructed digital elevation model.

Resolution: 5 cm/pix  
Point density: 400 points/m<sup>2</sup>

# Processing Parameters

## General

Cameras	180
Aligned cameras	180
Markers	10
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Rotation angles	Yaw, Pitch, Roll

## Tie Points

Points	77,235 of 90,256
RMS reprojection error	0.381407 (1.68865 pix)
Max reprojection error	1.60453 (69.6112 pix)
Mean key point size	4.94418 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	8.93172

## Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	Source
Key point limit	40,000
Key point limit per Mpx	1,000
Tie point limit	4,000
Exclude stationary tie points	Yes
Guided image matching	No
Adaptive camera model fitting	Yes
Matching time	1 minutes 7 seconds
Matching memory usage	553.80 MB
Alignment time	43 seconds
Alignment memory usage	671.57 MB

## Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	Yes
Optimization time	6 seconds
Date created	2024:06:28 12:31:19
Software version	2.1.0.17532
File size	38.93 MB

## Depth Maps

Count	180
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## Depth maps generation parameters

Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	15 minutes 26 seconds
Memory usage	11.95 GB
Date created	2024:06:28 13:39:04
Software version	2.1.0.17532
File size	2.90 GB

## DEM

Size	6,426 x 5,127
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)

## Depth maps generation parameters

Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	15 minutes 26 seconds
Memory usage	11.95 GB
<b>Reconstruction parameters</b>	
Source data	Depth maps
Interpolation	Enabled
Processing time	4 minutes 8 seconds
Memory usage	19.31 GB
Date created	2024:06:28 13:43:13
Software version	2.1.0.17532
File size	113.01 MB
<b>Orthomosaic</b>	
Size	12,840 x 10,240
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Colors	3 bands, uint8
<b>Reconstruction parameters</b>	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	1 minutes 37 seconds
Memory usage	1.53 GB
Date created	2024:06:28 13:52:15
Software version	2.1.0.17532
File size	1.89 GB
<b>System</b>	
Software name	Agisoft Metashape Professional
Software version	2.1.0 build 17532
OS	Windows 64 bit
RAM	127.15 GB
CPU	AMD Ryzen 9 7950X 16-Core Processor
GPU(s)	NVIDIA GeForce RTX 4080 SUPER