

# Sander\_2021-05-25\_MavicPro

Processing Report

27 June 2024



# Survey Data

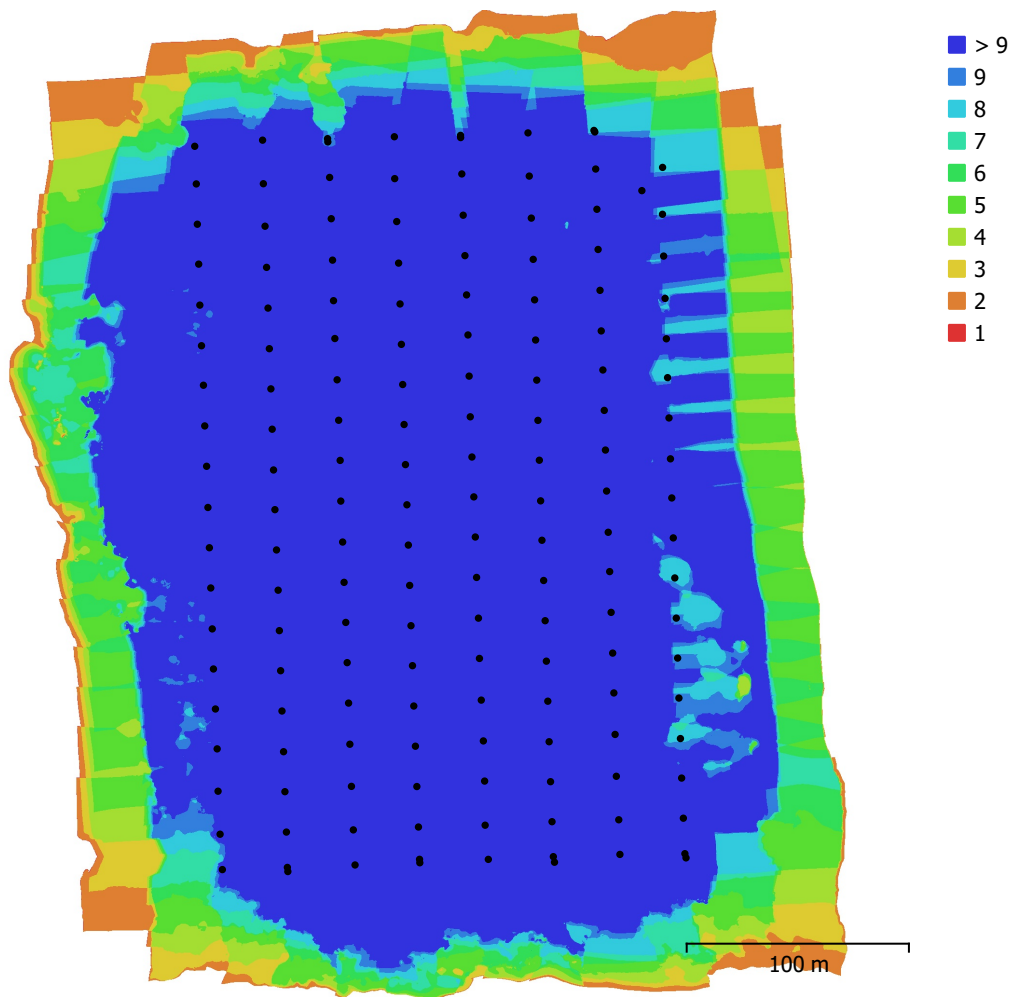


Fig. 1. Camera locations and image overlap.

Number of images:	159	Camera stations:	159
Flying altitude:	97.6 m	Tie points:	112,903
Ground resolution:	3.24 cm/pix	Projections:	549,029
Coverage area:	0.143 km <sup>2</sup>	Reprojection error:	1.08 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC220 (4.73mm)	4000 x 3000	4.73 mm	1.57 x 1.57 $\mu$ m	No

Table 1. Cameras.

# Camera Calibration

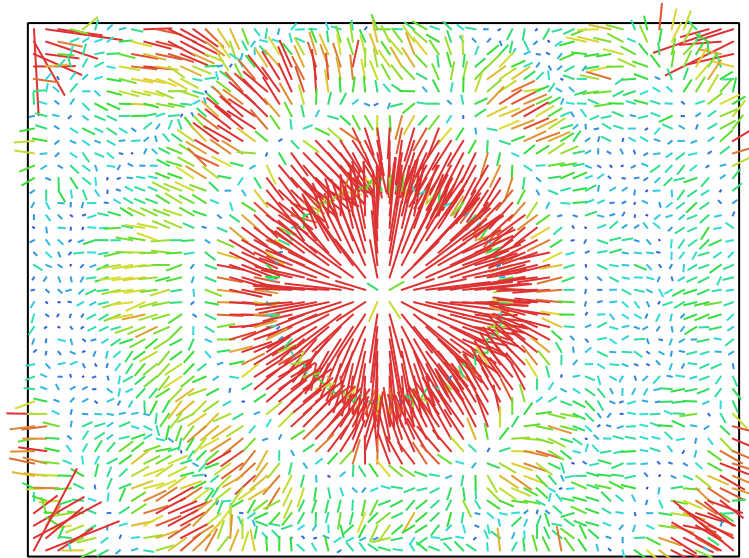


Fig. 2. Image residuals for FC220 (4.73mm). 1 pix

## FC220 (4.73mm)

159 images

Type	Resolution	Focal Length	Pixel Size
<b>Frame</b>	<b>4000 x 3000</b>	<b>4.73 mm</b>	<b>1.57 x 1.57 <math>\mu</math>m</b>

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
<b>F</b>	<b>3010.78</b>	0.87	1.00	0.31	-0.87	-0.04	0.03	0.32	-0.52	0.66	-0.74	-0.04	-0.09
<b>Cx</b>	<b>7.34834</b>	0.049		1.00	-0.27	0.10	0.20	0.09	-0.15	0.20	-0.22	0.65	-0.03
<b>Cy</b>	<b>7.99495</b>	0.08			1.00	-0.07	0.02	-0.31	0.48	-0.59	0.66	0.04	0.40
<b>B1</b>	<b>-9.59317</b>	0.043				1.00	-0.02	-0.00	0.01	-0.01	0.01	0.04	0.01
<b>B2</b>	<b>4.11561</b>	0.043					1.00	-0.00	-0.01	0.02	-0.02	-0.00	-0.00
<b>K1</b>	<b>0.111199</b>	0.00018						1.00	-0.95	0.88	-0.81	-0.02	-0.05
<b>K2</b>	<b>-0.56519</b>	0.0012							1.00	-0.98	0.94	0.03	0.05
<b>K3</b>	<b>1.23828</b>	0.0032								1.00	-0.99	-0.04	-0.07
<b>K4</b>	<b>-0.932579</b>	0.0029									1.00	0.04	0.07
<b>P1</b>	<b>0.00022404</b>	4.8e-06										1.00	-0.01
<b>P2</b>	<b>-8.78251e-05</b>	4.1e-06											1.00

Table 2. Calibration coefficients and correlation matrix.

# Ground Control Points

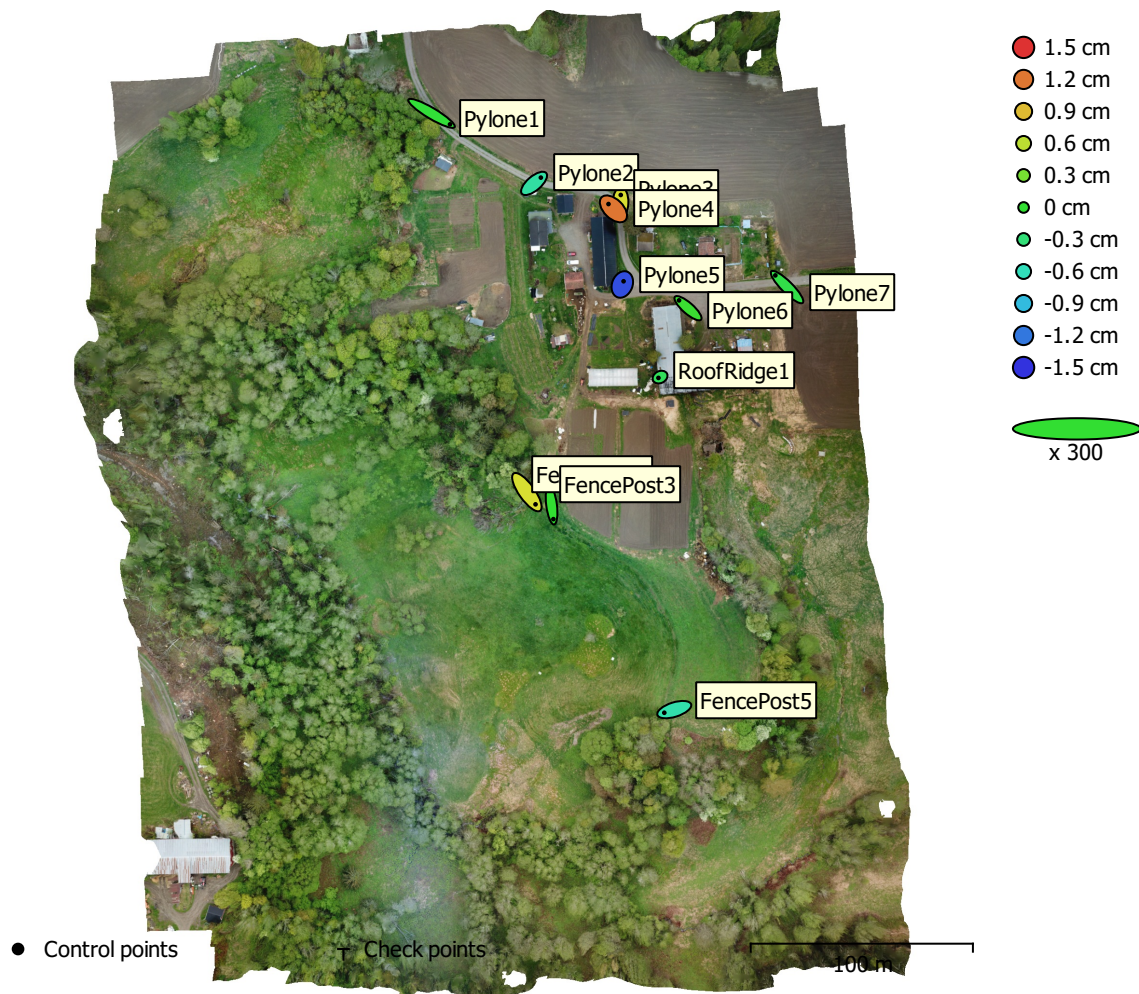


Fig. 3. GCP locations and error estimates.

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	2.57488	2.56534	0.671929	3.63469	3.69628

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	5.5268	-3.28751	-0.0258769	6.4307	2.611 (8)
Pylone2	2.03639	1.73441	-0.486985	2.71887	1.346 (8)
Pylone3	0.095107	2.3553	0.726011	2.46649	1.671 (8)
Pylone4	-1.48524	1.45127	1.20597	2.40135	2.487 (9)
Pylone5	0.377348	0.958503	-1.37904	1.7213	1.485 (8)
Pylone6	-2.68839	2.3513	0.0355643	3.57174	1.538 (8)
Pylone7	-3.51965	3.50724	-0.100282	4.96978	2.283 (8)
FencePost2	2.59879	-3.65571	0.724899	4.5435	1.866 (8)
FencePost3	0.545532	-4.22642	0.000112207	4.26149	2.158 (7)
FencePost5	-2.99542	-0.940681	-0.528078	3.18375	1.557 (7)
RoofRidge1	-0.491258	-0.247713	-0.172295	0.576525	0.988 (8)
<b>Total</b>	<b>2.57488</b>	<b>2.56534</b>	<b>0.671929</b>	<b>3.69628</b>	<b>1.889</b>

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

# Digital Elevation Model

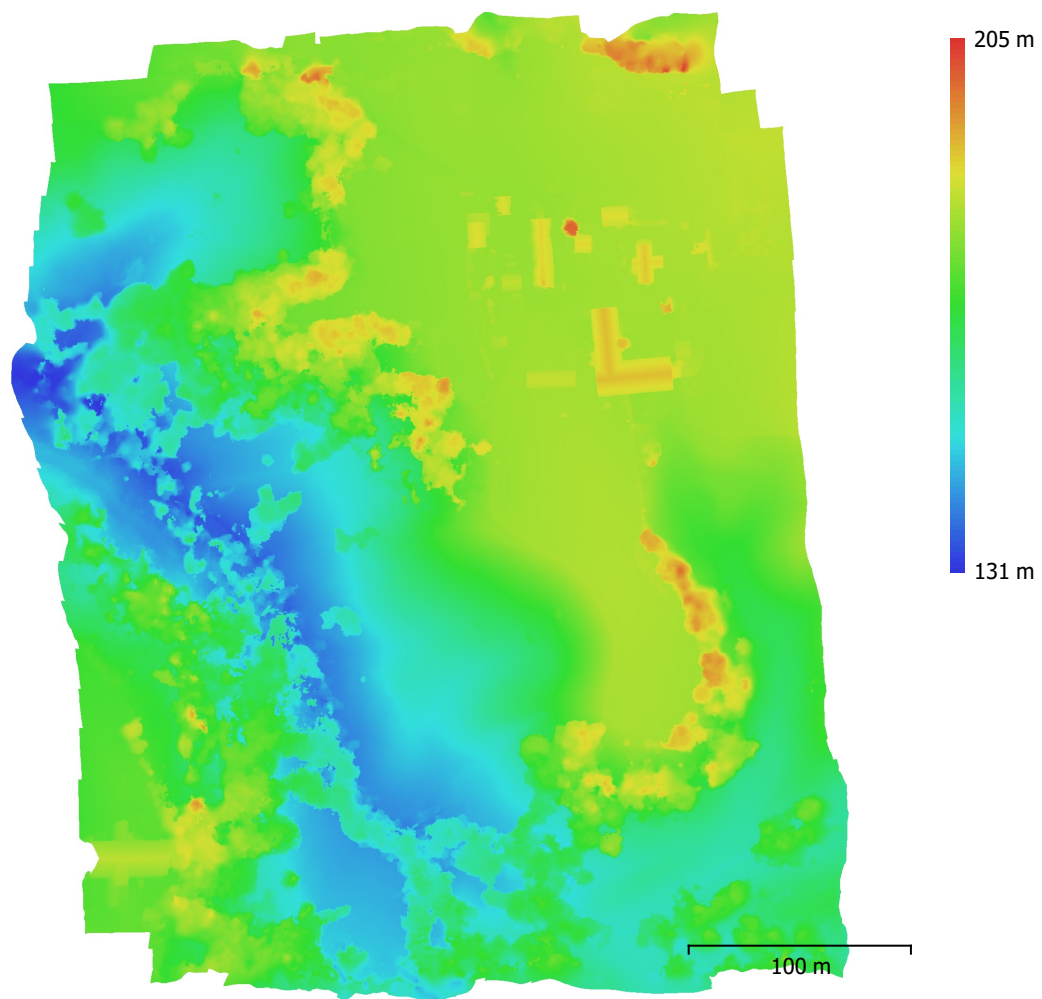


Fig. 4. Reconstructed digital elevation model.

Resolution: 10 cm/pix  
Point density: 100 points/m<sup>2</sup>

# Processing Parameters

## General

Cameras	159
Aligned cameras	159
Markers	13
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Rotation angles	Yaw, Pitch, Roll

## Tie Points

Points	112,903 of 131,509
RMS reprojection error	0.315046 (1.07636 pix)
Max reprojection error	2.74013 (41.8393 pix)
Mean key point size	3.59283 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	5.07685

## 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	53 seconds
Matching memory usage	527.68 MB
Alignment time	31 seconds
Alignment memory usage	159.36 MB

## Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	Yes
Optimization time	2 seconds
Date created	2024:06:27 14:55:53
Software version	2.1.0.17532
File size	33.52 MB

## Depth Maps

Count	159
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## Depth maps generation parameters

Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	5 minutes 20 seconds
Memory usage	2.72 GB
Date created	2024:06:27 15:17:11
Software version	2.1.0.17532
File size	594.40 MB

## DEM

Size	3,771 x 4,455
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)

## Depth maps generation parameters

Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	5 minutes 20 seconds
Memory usage	2.72 GB
<b>Reconstruction parameters</b>	
Source data	Depth maps
Interpolation	Enabled
Processing time	2 minutes 56 seconds
Memory usage	5.68 GB
Date created	2024:06:27 15:20:08
Software version	2.1.0.17532
File size	65.46 MB
<b>Orthomosaic</b>	
Size	7,520 x 8,880
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	53 seconds
Memory usage	709.09 MB
Date created	2024:06:27 15:21:49
Software version	2.1.0.17532
File size	1011.34 MB
<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