

# 2025-10-23 Sander SO 75m

M4E Smart Oblique 2cm GSD

Flown by Luc Girod

Georeferencing through Kartverket CORS with 0 GCPs.

Processing by Luc Girod - 2025-10-23

23 October 2025



# Survey Data

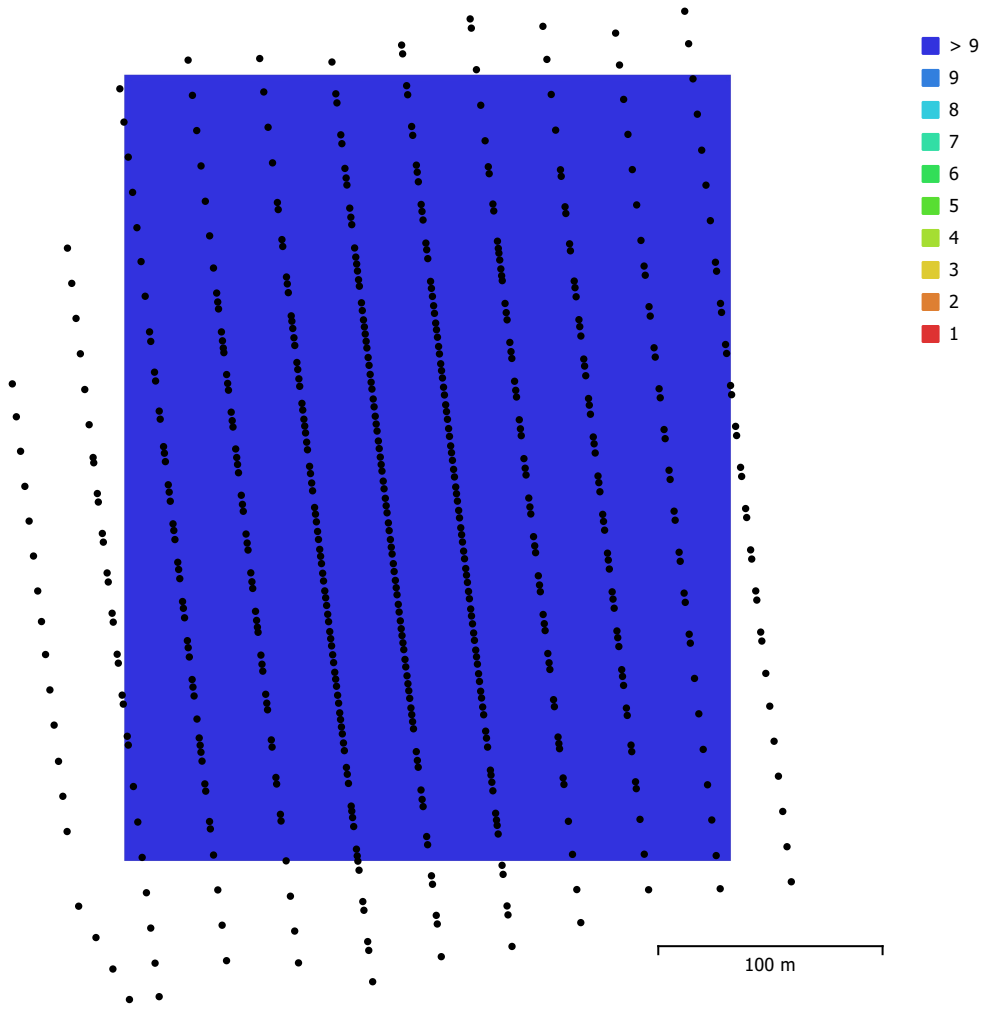


Fig. 1. Camera locations and image overlap.

Number of images:	571	Camera stations:	571
Flying altitude:	89.7 m	Tie points:	446,863
Ground resolution:	2.41 cm/pix	Projections:	1,908,952
Coverage area:	0.0946 km <sup>2</sup>	Reprojection error:	1.02 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
M4E (12.29mm)	5280 x 3956	12.29 mm	3.36 x 3.36 $\mu$ m	Yes

Table 1. Cameras.

# Camera Calibration

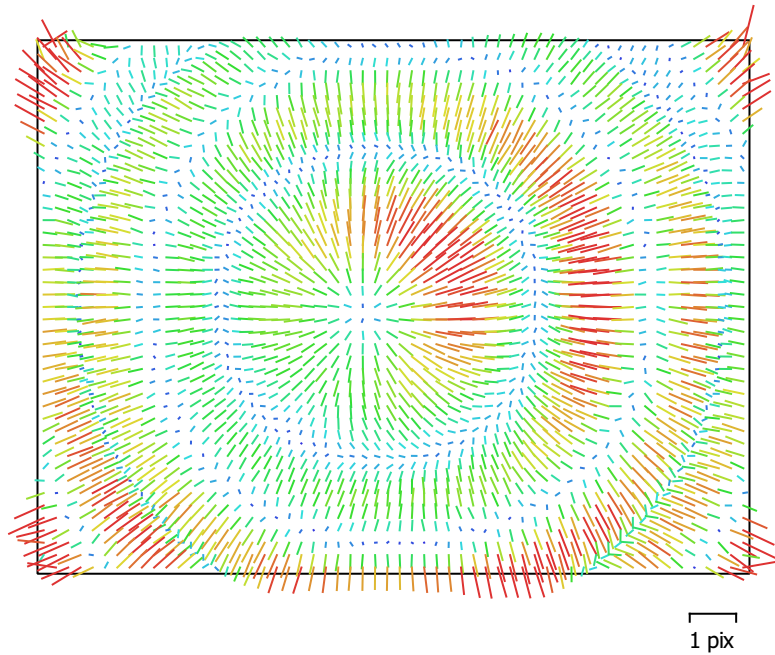


Fig. 2. Image residuals for M4E (12.29mm).

## M4E (12.29mm)

571 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
<b>Frame</b>	<b>5280 x 3956</b>	<b>12.29 mm</b>	<b>3.36 x 3.36 <math>\mu\text{m}</math></b>

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
<b>F</b>	<b>3717.5</b>	0.018	1.00	-0.00	-0.09	-0.35	0.29	-0.26	-0.00	0.02
<b>Cx</b>	<b>18.3539</b>	0.016		1.00	-0.00	-0.01	0.01	-0.01	0.68	-0.02
<b>Cy</b>	<b>-18.0447</b>	0.013			1.00	0.00	0.01	-0.01	0.00	0.46
<b>K1</b>	<b>-0.101026</b>	1.9e-05				1.00	-0.97	0.91	-0.01	-0.04
<b>K2</b>	<b>-0.0164766</b>	5.2e-05					1.00	-0.98	0.02	0.04
<b>K3</b>	<b>-0.00475162</b>	4.3e-05						1.00	-0.02	-0.06
<b>P1</b>	<b>-0.000288238</b>	7.5e-07							1.00	-0.02
<b>P2</b>	<b>-0.000318766</b>	7.5e-07								1.00

Table 2. Calibration coefficients and correlation matrix.

# Camera Locations

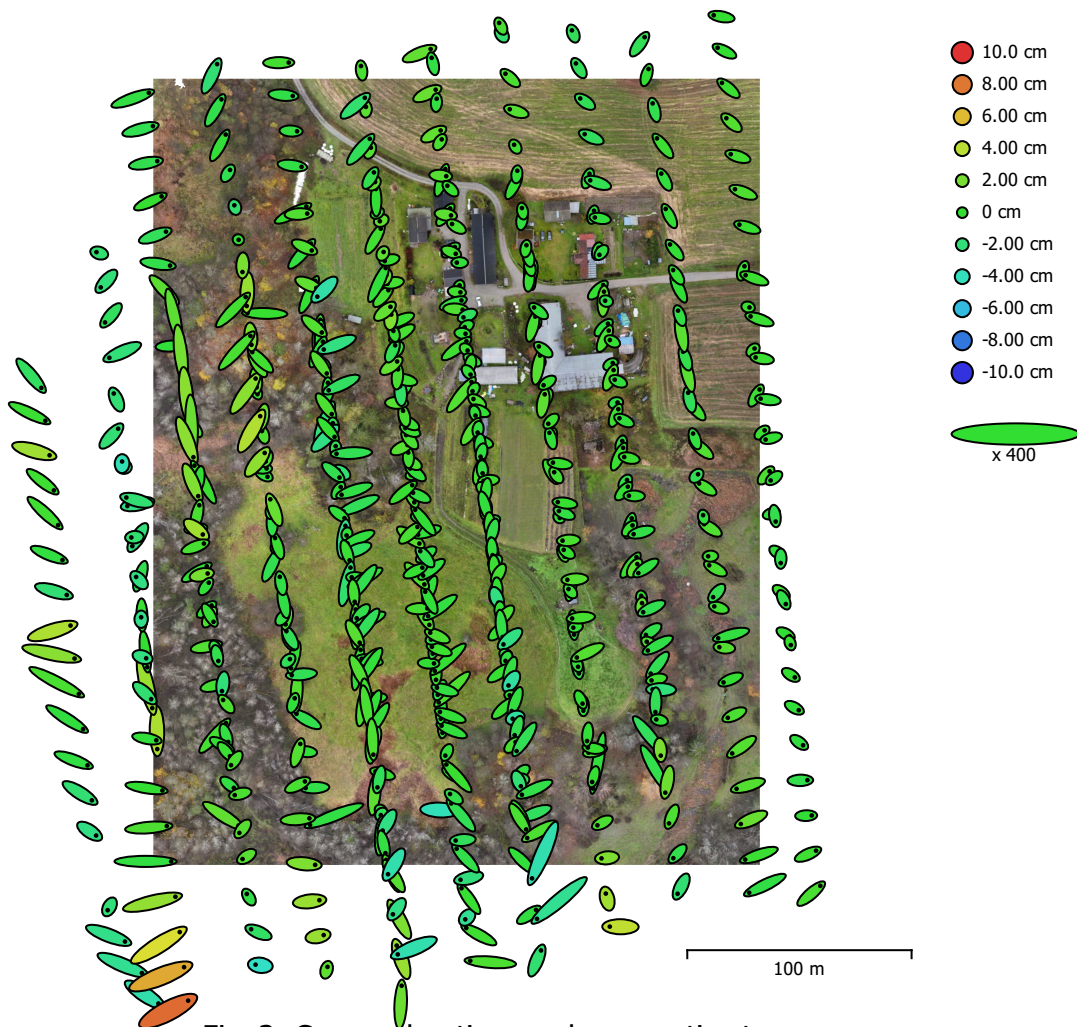


Fig. 3. Camera locations and error estimates.

Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.  
 Estimated camera locations are marked with a black dot.

X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total error (cm)
1.54231	1.56881	1.256	2.19997	2.53326

Table 3. Average camera location error.  
 X - Easting, Y - Northing, Z - Altitude.

# Digital Elevation Model

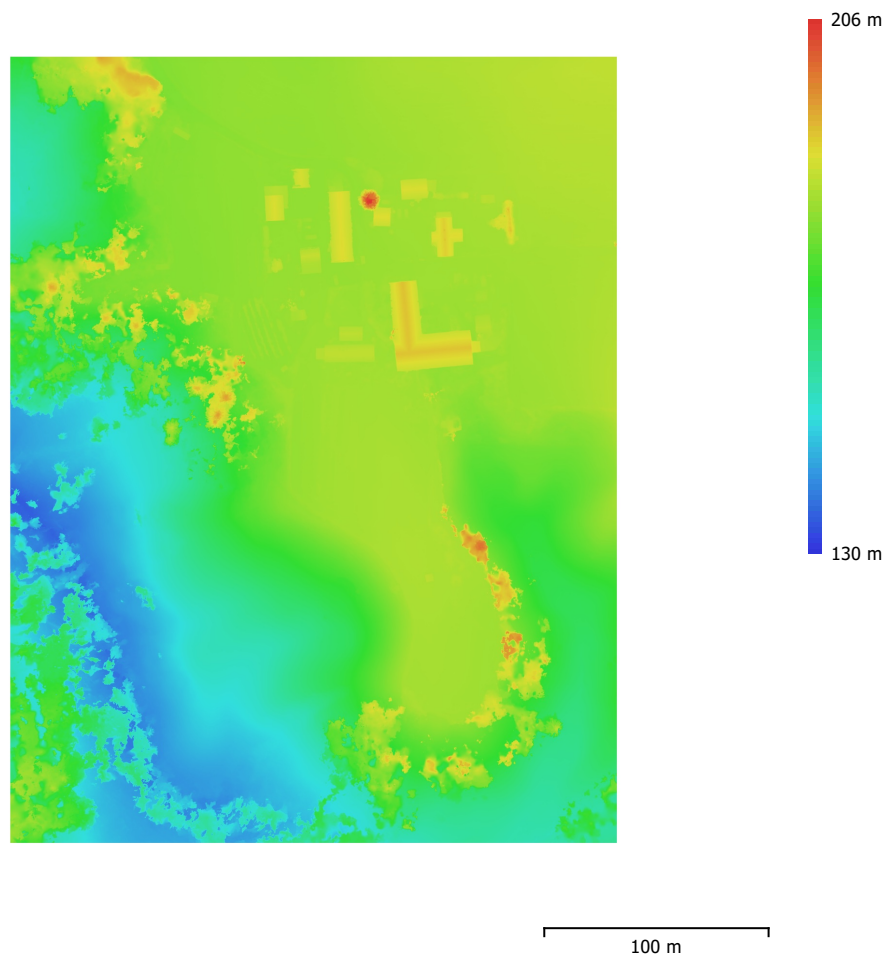


Fig. 4. Reconstructed digital elevation model.

Resolution: 5.00 cm/pix  
Point density: 400 points/m<sup>2</sup>

# Processing Parameters

## General

Images	571
Aligned images	571
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Rotation angles	Yaw, Pitch, Roll

## Tie Points

Points	446,863 of 485,416
RMS reprojection error	0.251398 (1.01688 pix)
Max reprojection error	0.758605 (64.5743 pix)
Mean key point size	3.39525 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	4.89092

## 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	2 minutes 22 seconds
Matching memory usage	581.36 MB
Alignment time	1 minutes 57 seconds
Alignment memory usage	700.60 MB
Date created	2025:10:23 14:14:45
Software version	2.2.1.20641
File size	138.41 MB

## Depth Maps

Count	571
<b>Depth maps generation parameters</b>	
Quality	High
Filtering mode	Moderate
Max neighbors	16
Processing time	17 minutes 47 seconds
Memory usage	6.75 GB
Date created	2025:10:23 14:34:42
Software version	2.2.1.20641
File size	3.45 GB

## DEM

Size	5,401 x 7,001
Resolution	5.00 cm/pix
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
<b>Depth maps generation parameters</b>	
Quality	High
Filtering mode	Moderate
Max neighbors	16
Processing time	17 minutes 47 seconds
Memory usage	6.75 GB
<b>Reconstruction parameters</b>	
Source data	Depth maps
Interpolation	Enabled

Processing time	4 minutes 12 seconds
Memory usage	27.63 GB
Date created	2025:10:23 15:06:27
Software version	2.2.1.20641
File size	161.45 MB
<b>Orthomosaic</b>	
Size	10,802 x 14,002
Resolution	2.50 cm/pix
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Colors	3 bands, uint8
Orthophotos	6.20 GB
<b>Reconstruction parameters</b>	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	9 minutes 38 seconds
Memory usage	2.23 GB
Date created	2025:10:23 15:13:11
Software version	2.2.1.20641
File size	6.42 GB
<b>System</b>	
Software name	Agisoft Metashape Professional
Software version	2.2.1 build 20641
OS	Windows 64 bit
RAM	127.15 GB
CPU	AMD Ryzen 9 7950X 16-Core Processor
GPU(s)	NVIDIA GeForce RTX 4080 SUPER