

# Sander\_2022-07-12\_1216\_P1

Processing Report  
27 June 2024



# Survey Data

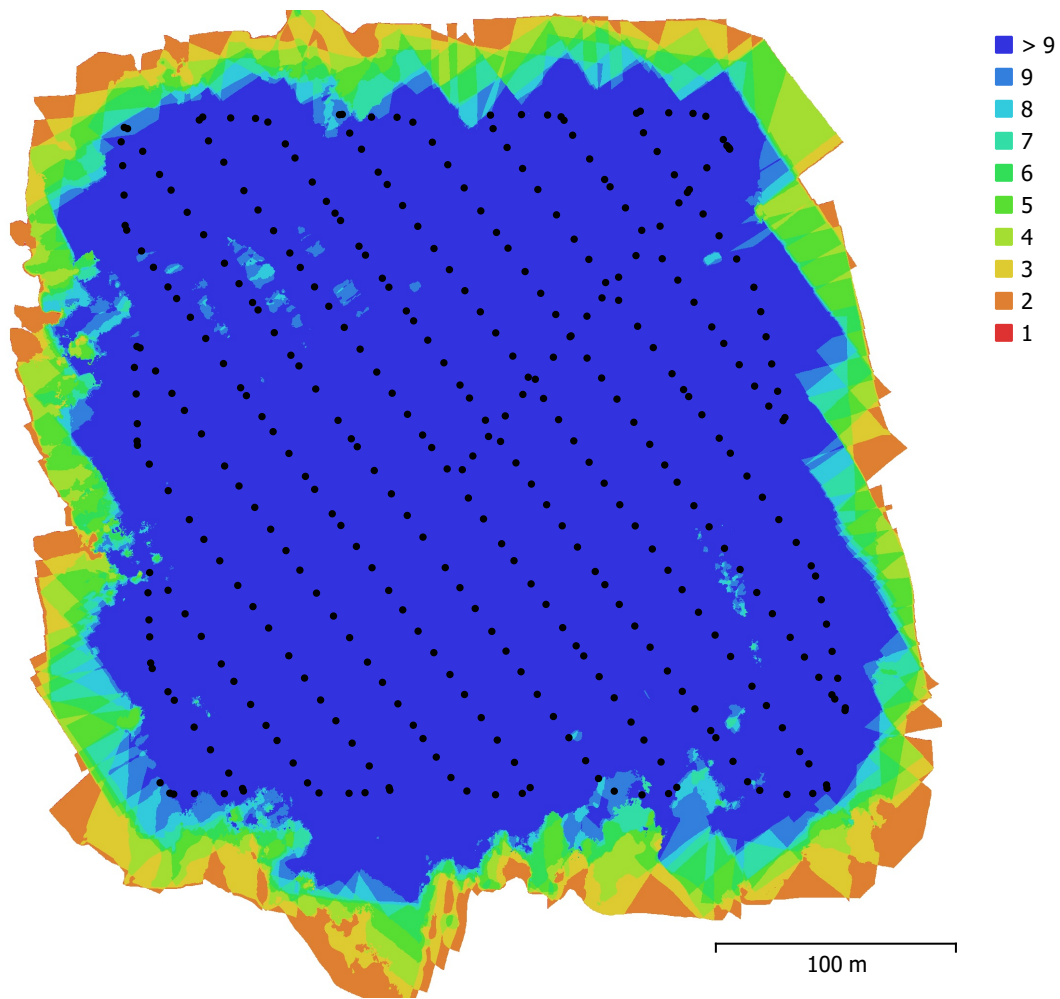


Fig. 1. Camera locations and image overlap.

Number of images:	375	Camera stations:	375
Flying altitude:	82.2 m	Tie points:	360,219
Ground resolution:	1 cm/pix	Projections:	1,225,250
Coverage area:	0.128 km <sup>2</sup>	Reprojection error:	0.558 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
ZenmuseP1 (35mm)	8192 x 5460	35 mm	4.39 x 4.39 $\mu\text{m}$	No

Table 1. Cameras.

# Camera Calibration

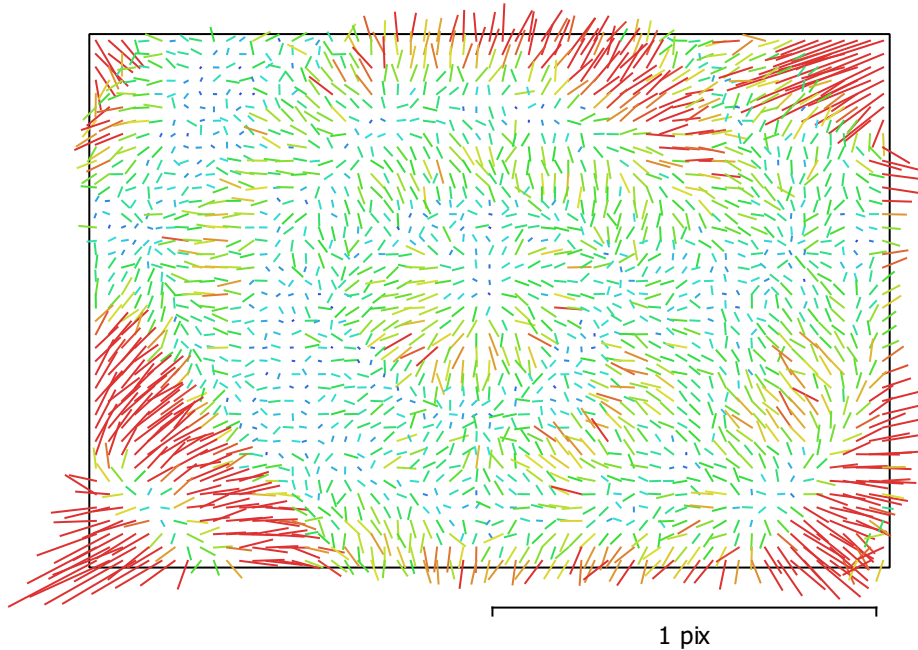


Fig. 2. Image residuals for ZenmuseP1 (35mm).

## ZenmuseP1 (35mm)

375 images

Type	Resolution	Focal Length	Pixel Size
<b>Frame</b>	<b>8192 x 5460</b>	<b>35 mm</b>	<b>4.39 x 4.39 <math>\mu</math>m</b>

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
<b>F</b>	<b>8195.68</b>	0.093	1.00	-0.03	0.07	-0.10	0.09	-0.11	-0.04	0.02
<b>Cx</b>	<b>-20.934</b>	0.028		1.00	0.00	-0.01	0.01	-0.01	0.70	0.02
<b>Cy</b>	<b>24.918</b>	0.025			1.00	-0.00	0.00	-0.00	0.03	0.71
<b>K1</b>	<b>-0.04977</b>	2.2e-05				1.00	-0.96	0.90	-0.01	0.00
<b>K2</b>	<b>0.0177067</b>	0.00013					1.00	-0.98	0.02	-0.00
<b>K3</b>	<b>-0.0931412</b>	0.00024						1.00	-0.02	0.00
<b>P1</b>	<b>-0.000746013</b>	9.5e-07							1.00	-0.00
<b>P2</b>	<b>0.00107125</b>	8.8e-07								1.00

Table 2. Calibration coefficients and correlation matrix.

# Ground Control Points

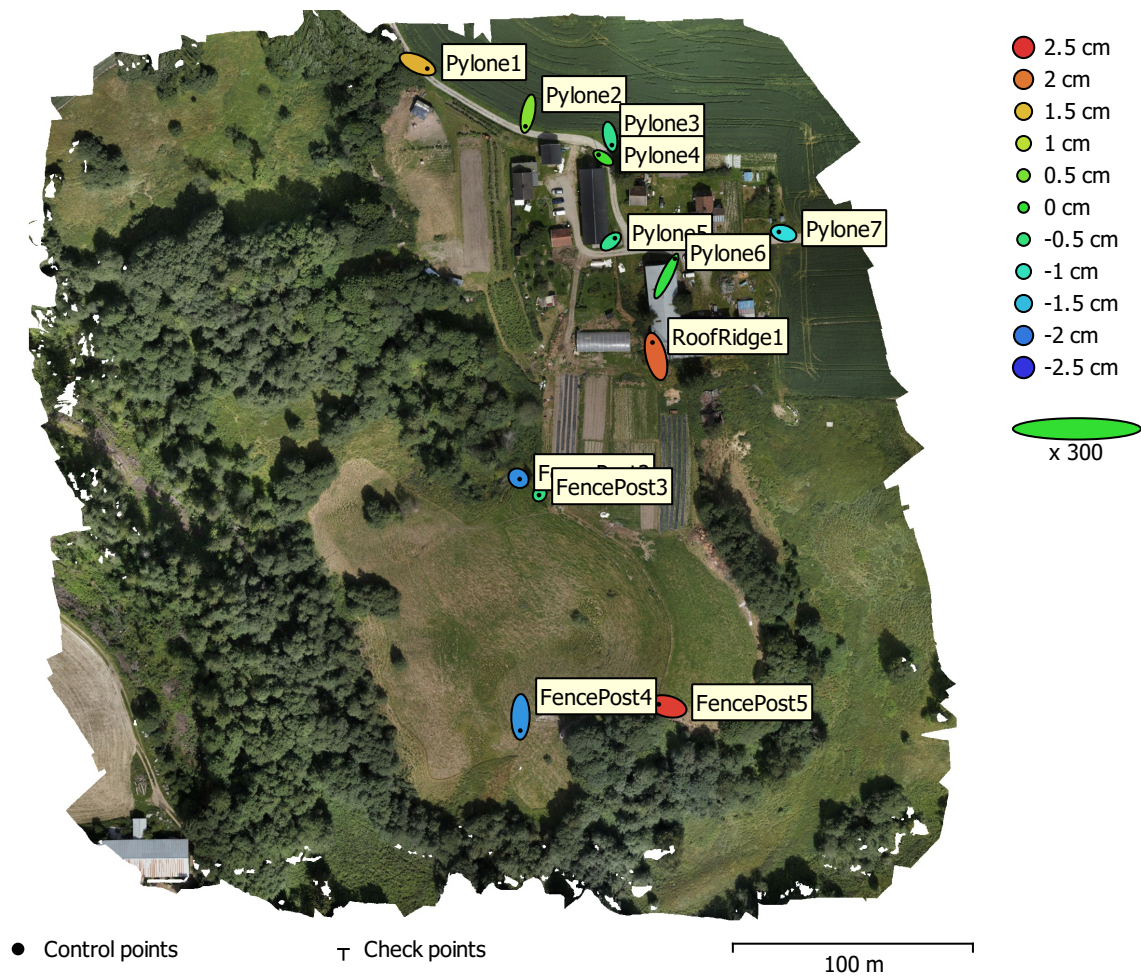


Fig. 3. GCP locations and error estimates.

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	1.44537	2.48091	1.37684	2.87123	3.18429

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	2.68843	-1.24857	1.58724	3.36243	0.419 (7)
Pylone2	-0.725448	-3.52494	0.600256	3.64853	0.453 (7)
Pylone3	0.491223	-2.31057	-0.680511	2.45828	0.279 (8)
Pylone4	-1.315	0.855274	0.129831	1.57403	1.055 (9)
Pylone5	1.10358	0.909565	-0.645485	1.56903	0.821 (9)
Pylone6	2.36179	4.78875	-0.10844	5.3406	0.445 (9)
Pylone7	-1.33141	0.37356	-1.25166	1.86517	0.610 (8)
FencePost2	0.312471	-0.24844	-1.8355	1.87841	0.358 (12)
FencePost3	-0.173059	-0.252384	-0.577912	0.653934	0.556 (10)
FencePost4	-0.055518	-3.7992	-1.78941	4.19988	1.638 (8)
FencePost5	-2.38932	0.58318	2.42542	3.45422	0.403 (8)
RoofRidge1	-0.967738	3.87374	2.14617	4.53304	0.394 (8)
<b>Total</b>	<b>1.44537</b>	<b>2.48091</b>	<b>1.37684</b>	<b>3.18429</b>	<b>0.716</b>

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

# Digital Elevation Model

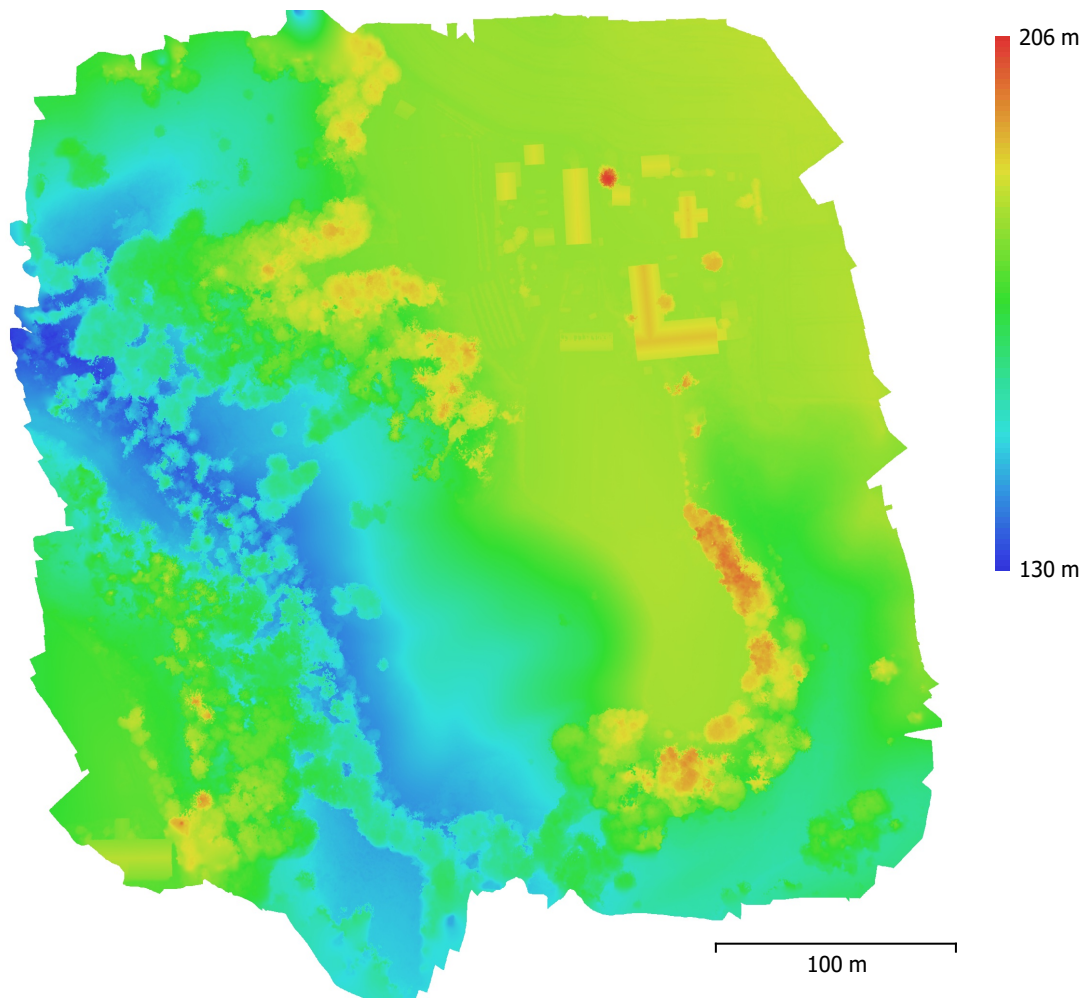


Fig. 4. Reconstructed digital elevation model.

Resolution: 2 cm/pix  
Point density: 0.25 points/cm<sup>2</sup>

# Processing Parameters

## General

Cameras	375
Aligned cameras	375
Markers	13
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Rotation angles	Yaw, Pitch, Roll

## Tie Points

Points	360,219 of 419,633
RMS reprojection error	0.144568 (0.557865 pix)
Max reprojection error	0.439574 (45.894 pix)
Mean key point size	2.55845 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.45469

## 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 52 seconds
Matching memory usage	642.68 MB
Alignment time	1 minutes 27 seconds
Alignment memory usage	889.52 MB
Date created	2024:06:25 15:56:36
Software version	2.1.0.17532
File size	75.81 MB

## Depth Maps

Count	375
<b>Depth maps generation parameters</b>	
Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	25 minutes 7 seconds
Memory usage	9.21 GB
Date created	2024:06:27 14:59:55
Software version	2.1.0.17532
File size	4.85 GB

## DEM

Size	19,377 x 20,620
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
<b>Depth maps generation parameters</b>	
Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	25 minutes 7 seconds

Memory usage	9.21 GB
<b>Reconstruction parameters</b>	
Source data	Depth maps
Interpolation	Enabled
Processing time	22 minutes 59 seconds
Memory usage	22.08 GB
Date created	2024:06:27 15:22:56
Software version	2.1.0.17532
File size	1.28 GB
<b>Orthomosaic</b>	
Size	38,600 x 41,100
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	14 minutes 4 seconds
Memory usage	5.86 GB
Date created	2024:06:27 15:47:26
Software version	2.1.0.17532
File size	29.50 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