2025-06-26_Sander_AltumPT_60m

Micasense Altum-PT on DJI M300
Flown by Luc Girod
Georeferencing through RTK with CPs.
Processing by Luc Girod - 2025-06-27

30 June 2025

Survey Data

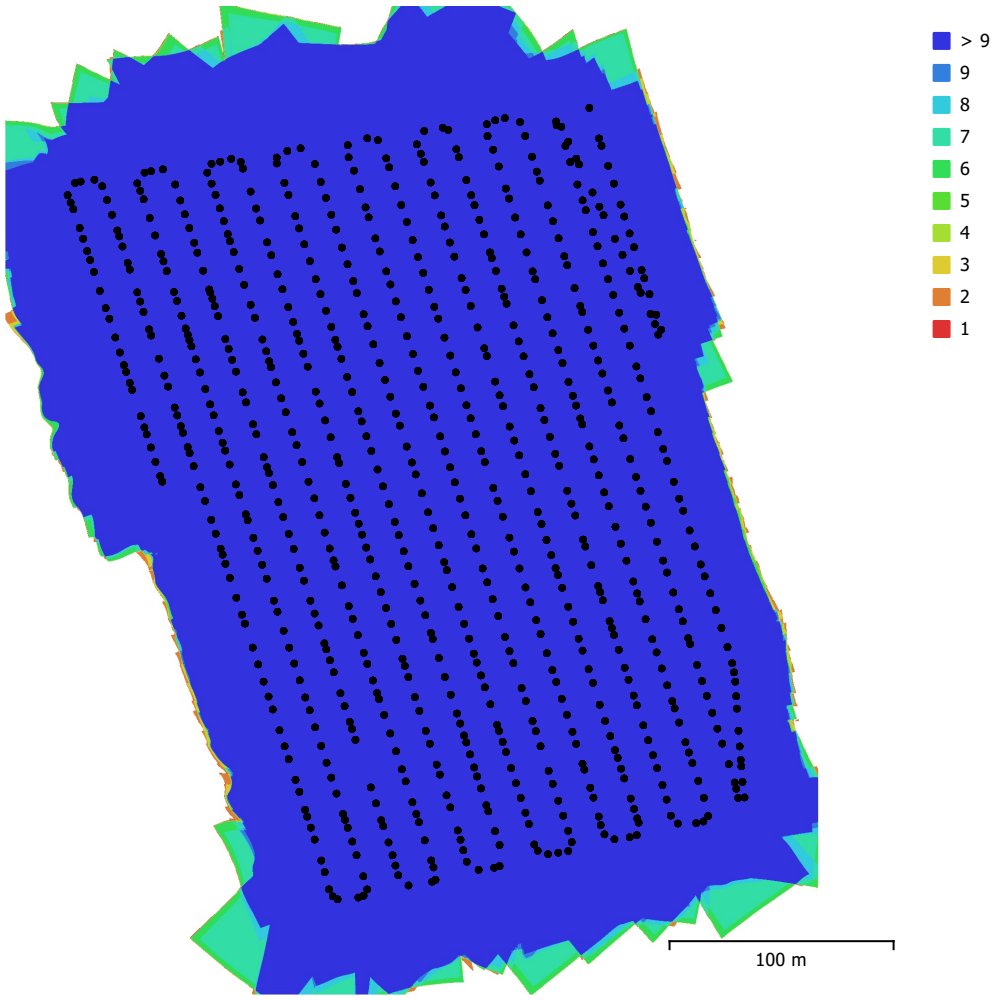

Fig. 1. Camera locations and image overlap.

Number of images:	5,257	Camera stations:	5,250
Flying altitude:	59.3 m	Tie points:	2,586,140
Ground resolution:	1.23 cm/pix	Projections:	16,502,321
Coverage area:	0.117 km²	Reprojection error:	0.508 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
Altum-PT, Blue (8mm)	2064 x 1544	8 mm	3.45 x 3.45 µm	Yes
Altum-PT, Green (8mm)	2064 x 1544	8 mm	3.45 x 3.45 µm	Yes
Altum-PT, Panchro (16.6mm)	4112 x 3008	16.6 mm	3.45 x 3.45 µm	Yes
Altum-PT, Red (8mm)	2064 x 1544	8 mm	3.45 x 3.45 µm	Yes
Altum-PT, Red edge (8mm)	2064 x 1544	8 mm	3.45 x 3.45 µm	Yes
Altum-PT, NIR (8mm)	2064 x 1544	8 mm	3.45 x 3.45 µm	Yes

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
Altum-PT, LWIR (4.5mm)	320 x 256	4.5 mm	12 x 12 µm	Yes

Table 1. Cameras.

Camera Calibration

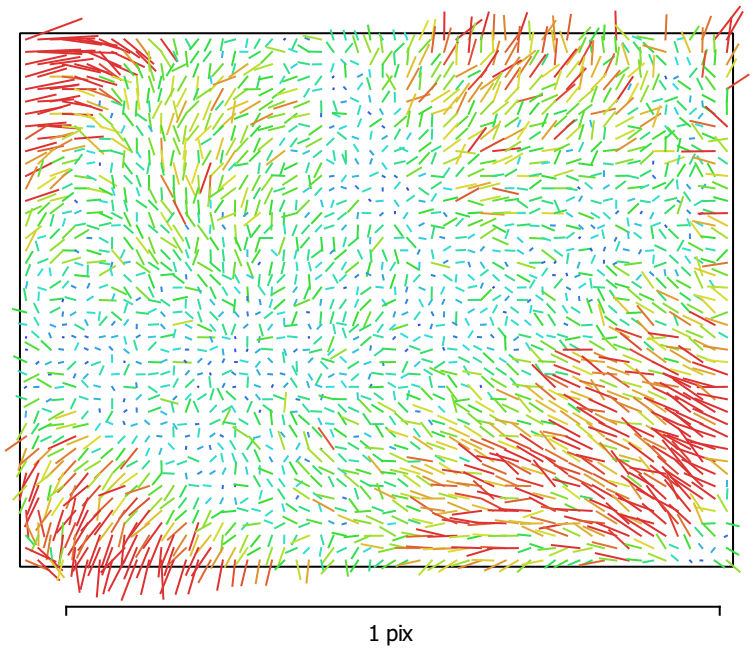

Fig. 2. Image residuals for Altum-PT, Blue (8mm).

Altum-PT, Blue (8mm)

751 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**2064 x 1544**	**8 mm**	**3.45 x 3.45 µm**

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	**2277.5**	0.032	1.00	0.05	-0.38	-0.18	0.14	-0.10	-0.02	0.10
Cx	**4.67306**	0.011		1.00	0.01	-0.00	0.00	-0.00	0.82	0.04
Cy	**-9.92584**	0.0096			1.00	0.03	-0.02	0.01	0.04	0.65
K1	**-0.123999**	4.2e-05				1.00	-0.97	0.92	0.00	-0.02
K2	**0.146589**	0.00029					1.00	-0.98	0.00	0.00
K3	**-0.0269089**	0.0006						1.00	-0.00	0.00
P1	**0.000362851**	1.4e-06							1.00	0.02
P2	**-7.35399e-05**	1.2e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Calibration

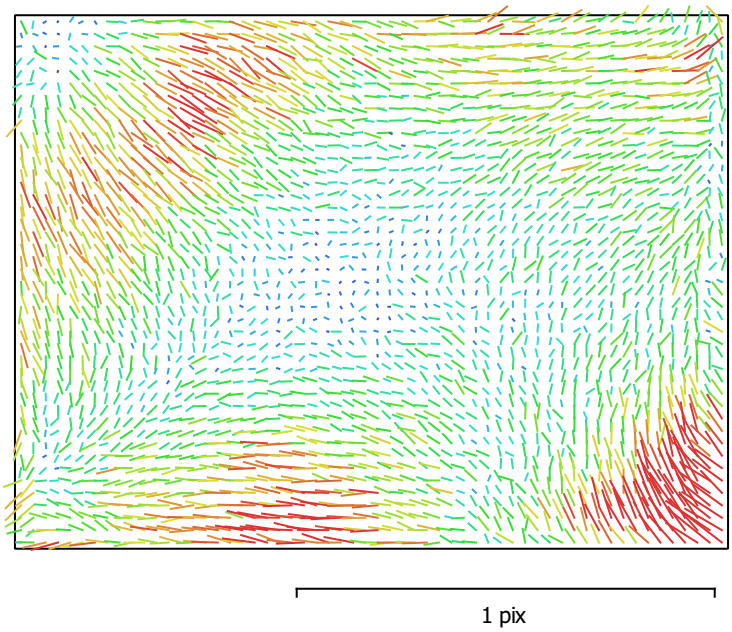

Fig. 3. Image residuals for Altum-PT, Green (8mm).

Altum-PT, Green (8mm)

751 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**2064 x 1544**	**8 mm**	**3.45 x 3.45 µm**

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	**2278.2**	0.032	1.00	0.06	-0.37	-0.18	0.13	-0.10	-0.02	0.11
Cx	**-0.439649**	0.01		1.00	-0.03	-0.01	0.00	-0.00	0.80	-0.00
Cy	**4.26497**	0.0088			1.00	0.03	-0.02	0.01	0.00	0.63
K1	**-0.131299**	3.8e-05				1.00	-0.97	0.92	0.00	-0.02
K2	**0.174077**	0.00026					1.00	-0.98	0.00	-0.00
K3	**-0.0760556**	0.00055						1.00	-0.00	0.01
P1	**-0.000165074**	1.2e-06							1.00	-0.01
P2	**-1.99213e-05**	1.1e-06								1.00

Table 3. Calibration coefficients and correlation matrix.

Camera Calibration

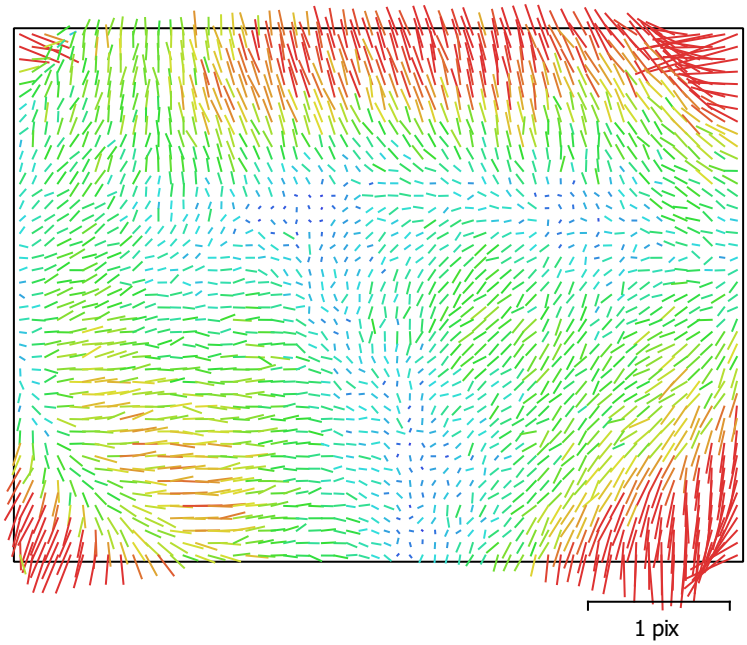

Fig. 4. Image residuals for Altum-PT, Panchro (16.6mm).

Altum-PT, Panchro (16.6mm)

751 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**4112 x 3008**	**16.6 mm**	**3.45 x 3.45 µm**

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	**4805.67**	0.068	1.00	0.03	-0.35	-0.19	0.14	-0.05	-0.01	0.07
Cx	**-18.772**	0.02		1.00	-0.01	0.01	-0.01	0.01	0.84	-0.00
Cy	**-31.832**	0.018			1.00	0.05	-0.04	0.02	0.00	0.69
K1	**-0.145381**	4.5e-05				1.00	-0.97	0.92	0.01	-0.01
K2	**0.210391**	0.00036					1.00	-0.98	-0.01	-0.01
K3	**0.544432**	0.00085						1.00	0.00	0.02
P1	**0.000609888**	1.4e-06							1.00	-0.00
P2	**0.000200897**	1.2e-06								1.00

Table 4. Calibration coefficients and correlation matrix.

Camera Calibration

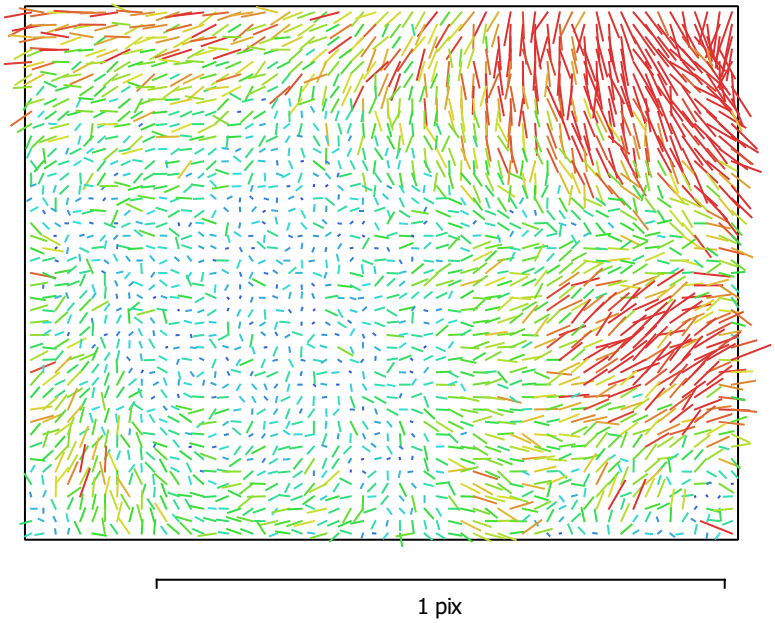

Fig. 5. Image residuals for Altum-PT, Red (8mm).

Altum-PT, Red (8mm)

751 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**2064 x 1544**	**8 mm**	**3.45 x 3.45 µm**

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	**2283.26**	0.032	1.00	0.05	-0.33	-0.19	0.15	-0.11	-0.02	0.09
Cx	**-4.05608**	0.012		1.00	0.01	-0.00	0.00	-0.00	0.83	0.03
Cy	**0.365909**	0.0099			1.00	0.03	-0.02	0.01	0.03	0.67
K1	**-0.13754**	4.4e-05				1.00	-0.97	0.92	0.00	-0.01
K2	**0.179525**	0.00031					1.00	-0.98	0.00	-0.00
K3	**-0.0761042**	0.00064						1.00	-0.01	0.01
P1	**-2.61473e-05**	1.4e-06							1.00	0.01
P2	**-0.000235225**	1.2e-06								1.00

Table 5. Calibration coefficients and correlation matrix.

Camera Calibration

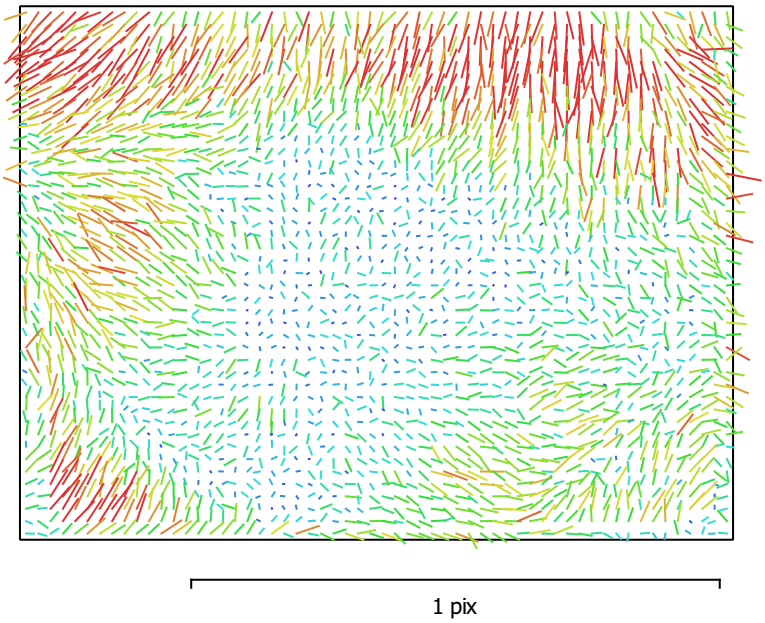

Fig. 6. Image residuals for Altum-PT, Red edge (8mm).

Altum-PT, Red edge (8mm)

751 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**2064 x 1544**	**8 mm**	**3.45 x 3.45 µm**

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	**2282.75**	0.032	1.00	0.05	-0.36	-0.19	0.14	-0.10	-0.02	0.11
Cx	**-7.286**	0.011		1.00	-0.01	-0.00	0.00	-0.00	0.81	0.01
Cy	**3.00012**	0.0091			1.00	0.03	-0.02	0.01	0.02	0.62
K1	**-0.138769**	4e-05				1.00	-0.97	0.92	-0.00	-0.02
K2	**0.173891**	0.00028					1.00	-0.98	0.01	-0.00
K3	**-0.0563565**	0.00058						1.00	-0.01	0.01
P1	**0.000137965**	1.3e-06							1.00	0.00
P2	**-1.95383e-05**	1.1e-06								1.00

Table 6. Calibration coefficients and correlation matrix.

Camera Calibration

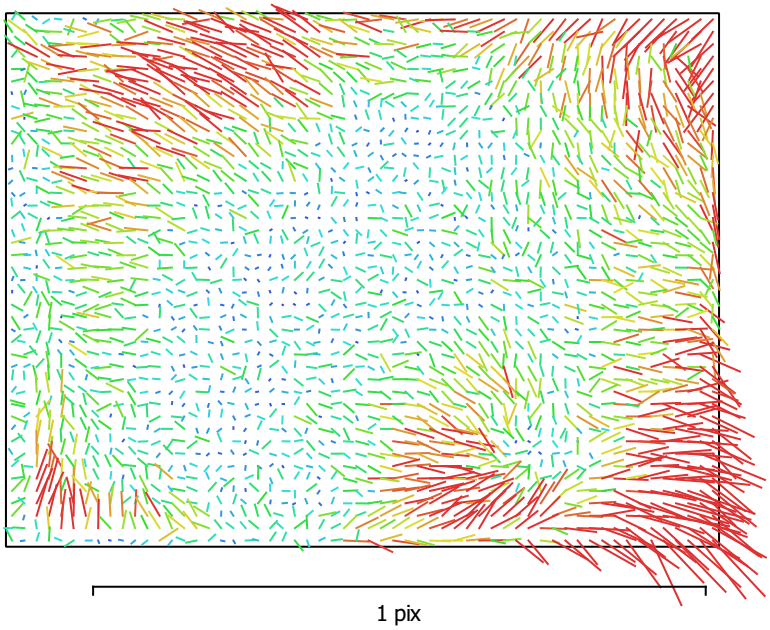

Fig. 7. Image residuals for Altum-PT, NIR (8mm).

Altum-PT, NIR (8mm)

751 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**2064 x 1544**	**8 mm**	**3.45 x 3.45 µm**

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	**2285.28**	0.032	1.00	0.06	-0.34	-0.19	0.14	-0.10	-0.02	0.11
Cx	**1.84225**	0.012		1.00	-0.04	-0.01	0.01	-0.01	0.82	-0.02
Cy	**0.55387**	0.0097			1.00	0.02	-0.01	0.00	-0.02	0.65
K1	**-0.137707**	4.3e-05				1.00	-0.97	0.92	-0.01	-0.01
K2	**0.155901**	0.0003					1.00	-0.98	0.01	-0.00
K3	**-0.0272763**	0.00063						1.00	-0.01	0.00
P1	**-7.61587e-05**	1.4e-06							1.00	-0.03
P2	**-0.000172297**	1.2e-06								1.00

Table 7. Calibration coefficients and correlation matrix.

Camera Calibration

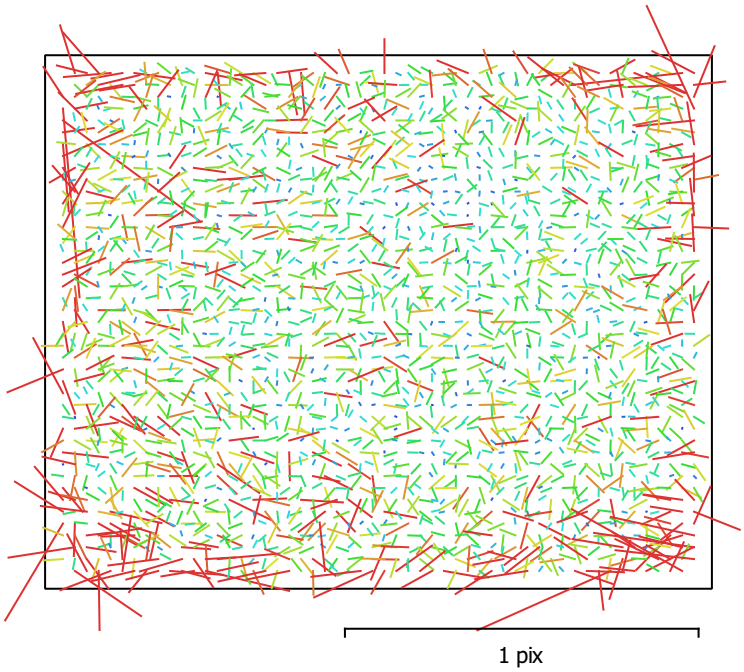

Fig. 8. Image residuals for Altum-PT, LWIR (4.5mm).

Altum-PT, LWIR (4.5mm)

751 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
Frame	**320 x 256**	**4.5 mm**	**12 x 12 µm**

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	**370.056**	0.031	1.00	0.00	-0.02	-0.66	0.56	-0.49	0.01	0.13
Cx	**4.48844**	0.061		1.00	0.00	0.00	-0.01	0.01	-0.47	0.01
Cy	**-9.67414**	0.061			1.00	-0.01	0.01	-0.00	-0.01	-0.34
K1	**-0.428587**	0.0013				1.00	-0.97	0.90	-0.01	-0.05
K2	**0.274745**	0.0095					1.00	-0.98	-0.00	0.02
K3	**-0.176944**	0.02						1.00	0.01	-0.03
P1	**-0.000844062**	3e-05							1.00	-0.02
P2	**0.000517237**	2.3e-05								1.00

Table 8. Calibration coefficients and correlation matrix.

Camera Locations

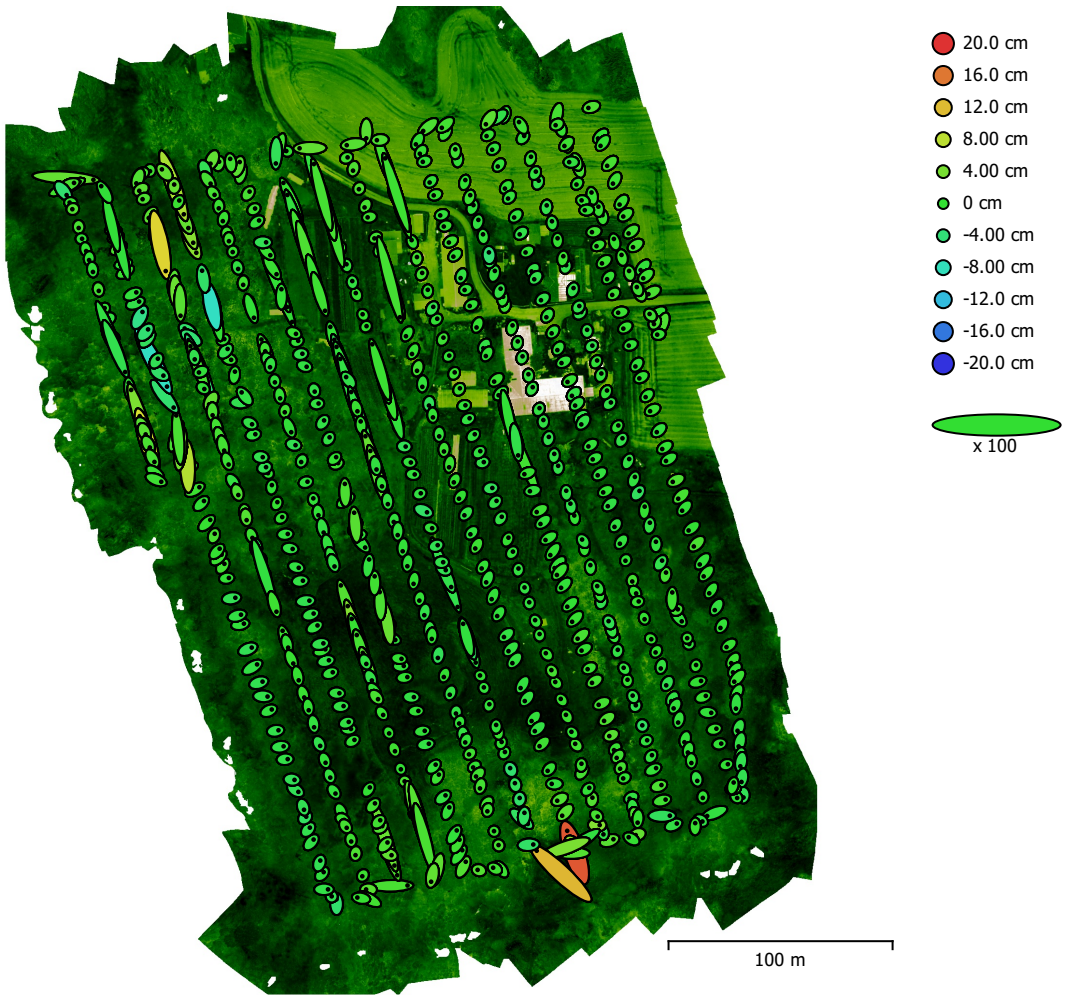

Fig. 9. Camera locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated camera locations are marked with a black dot.

X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total error (cm)
3.21221	7.15656	1.7297	7.8444	8.03284

Table 9. Average camera location error.
X - Easting, Y - Northing, Z - Altitude.

Ground Control Points

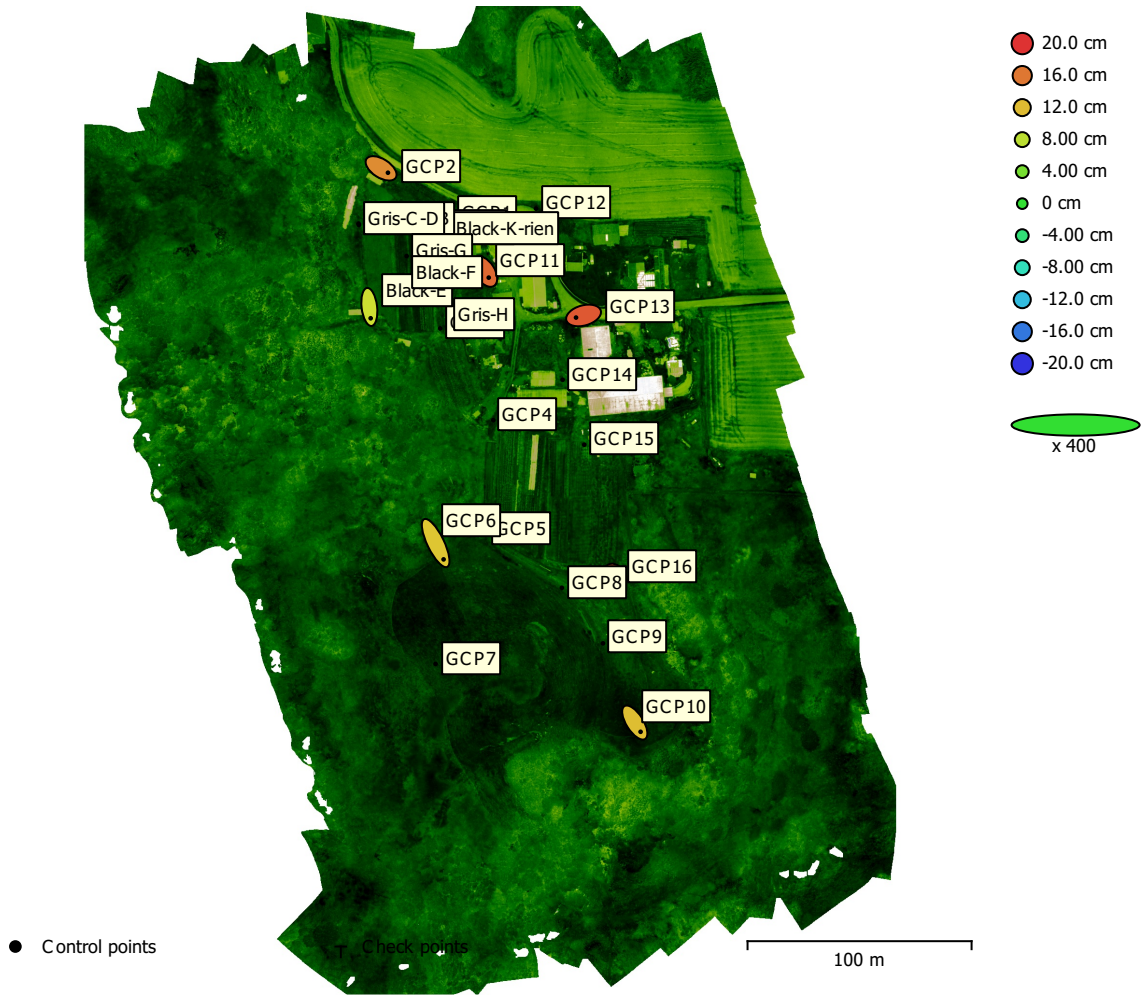

Fig. 10. GCP locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated GCP locations are marked with a dot or crossing.

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
7	1.25578	1.97554	14.5357	2.34089	14.7229

Table 10. Control points RMSE.
X - Easting, Y - Northing, Z - Altitude.

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
GCP1					
GCP2	1.52686	-0.977917	14.7616	14.8725	0.211 (4)
GCP3					
GCP4					
GCP5					
GCP6	1.76813	-3.64508	11.4048	12.103	0.258 (5)
GCP7					
GCP8					
GCP9					
GCP10	1.29726	-2.06064	11.8759	12.123	0.171 (4)
GCP11	0.858807	-1.35087	16.8092	16.8852	0.207 (4)
GCP12					
GCP13	-1.67914	-0.473116	17.7792	17.8646	0.185 (4)
GCP14					
GCP15					
GCP16	0.503061	-0.646059	17.5835	17.6026	0.101 (4)
Black1					
Gris-L					
Black-K-rien					
Gris-H					
Black-E	0.297011	-2.52273	9.0639	9.41311	0.131 (4)
Black-A-B					
Gris-C-D					
Gris-G					
Black-F					
Total	**1.25578**	**1.97554**	**14.5357**	**14.7229**	**0.190**

Table 11. Control points.

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

Digital Elevation Model

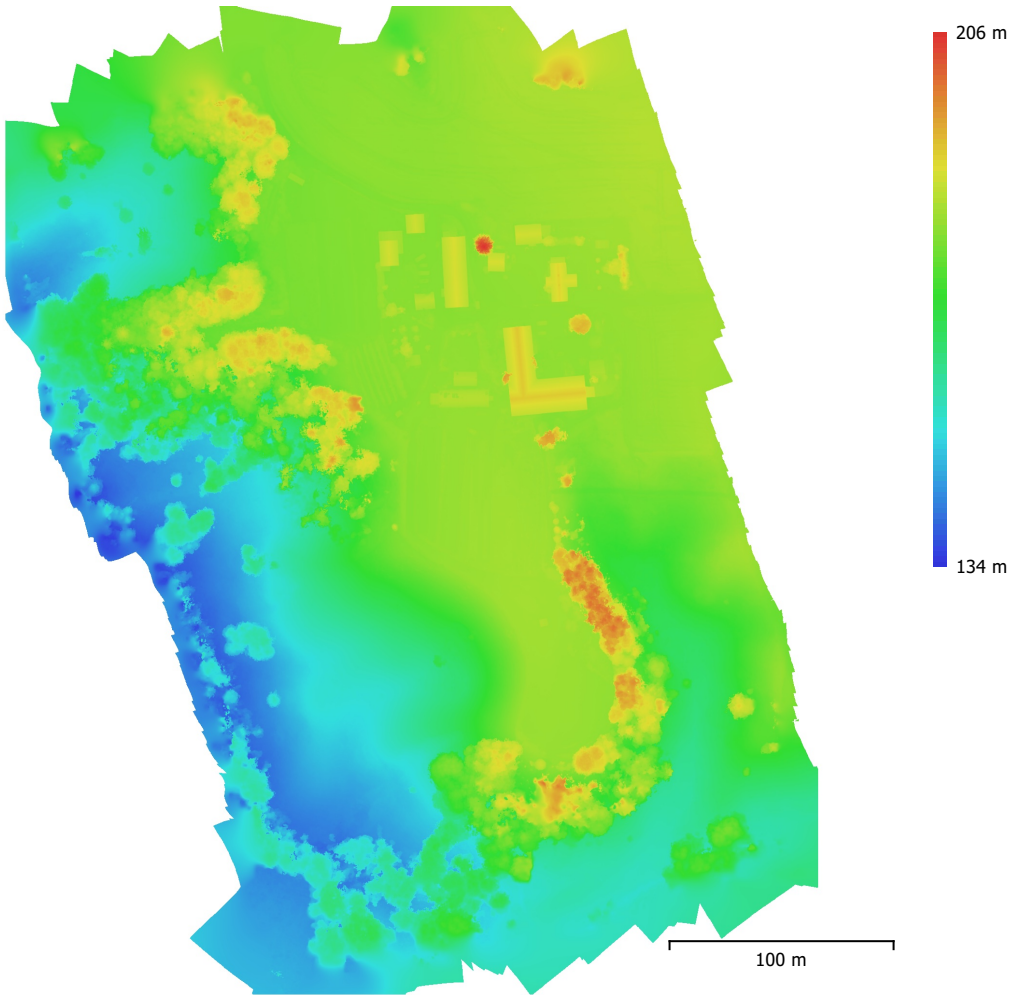

Fig. 11. Reconstructed digital elevation model.

Resolution:	5.00 cm/pix
Point density:	400 points/m²

Processing Parameters

General	
Images	5257
Aligned images	5250
Markers	25
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Rotation angles	Yaw, Pitch, Roll
Tie Points	
Points	2,586,140 of 2,896,418
RMS reprojection error	0.252212 (0.50761 pix)
Max reprojection error	0.75861 (37.0695 pix)
Mean key point size	1.79226 pix
Point colors	1 bands, uint16
Key points	No
Average tie point multiplicity	7.25909
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
Filter points by mask	No
Mask tie points	No
Exclude stationary tie points	Yes
Guided image matching	No
Adaptive camera model fitting	No
Matching time	18 minutes 11 seconds
Matching memory usage	8.52 GB
Alignment time	10 minutes 32 seconds
Alignment memory usage	3.89 GB
Date created	2025:06:27 14:24:25
Software version	2.2.1.20641
File size	1.16 GB
Depth Maps	
Count	750
Depth maps generation parameters	
Quality	High
Filtering mode	Moderate
Max neighbors	16
Processing time	18 minutes 57 seconds
Memory usage	6.03 GB
Date created	2025:06:27 15:03:17
Software version	2.2.1.20641
File size	3.29 GB
DEM	
Size	7,252 x 8,816
Resolution	5.00 cm/pix
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Depth maps generation parameters	
Quality	High
Filtering mode	Moderate
Max neighbors	16
Processing time	18 minutes 57 seconds
Memory usage	6.03 GB

Reconstruction parameters	
Source data	Depth maps
Interpolation	Enabled
Processing time	6 minutes 41 seconds
Memory usage	15.40 GB
Date created	2025:06:27 15:10:02
Software version	2.2.1.20641
File size	202.54 MB
Orthomosaic	
Size	14,480 x 17,640
Resolution	2.50 cm/pix
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Colors	7 bands, uint16
Orthophotos	52.13 GB
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	12 minutes 10 seconds
Memory usage	2.54 GB
Date created	2025:06:27 15:26:17
Software version	2.2.1.20641
File size	55.87 GB
Raster Transform	
Expression	B1/32768; B2/32768; B4/32768; B5/32768; B6/32768; B3/32768; (B5 - B3) / (B5 + B3); B7…
System	
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