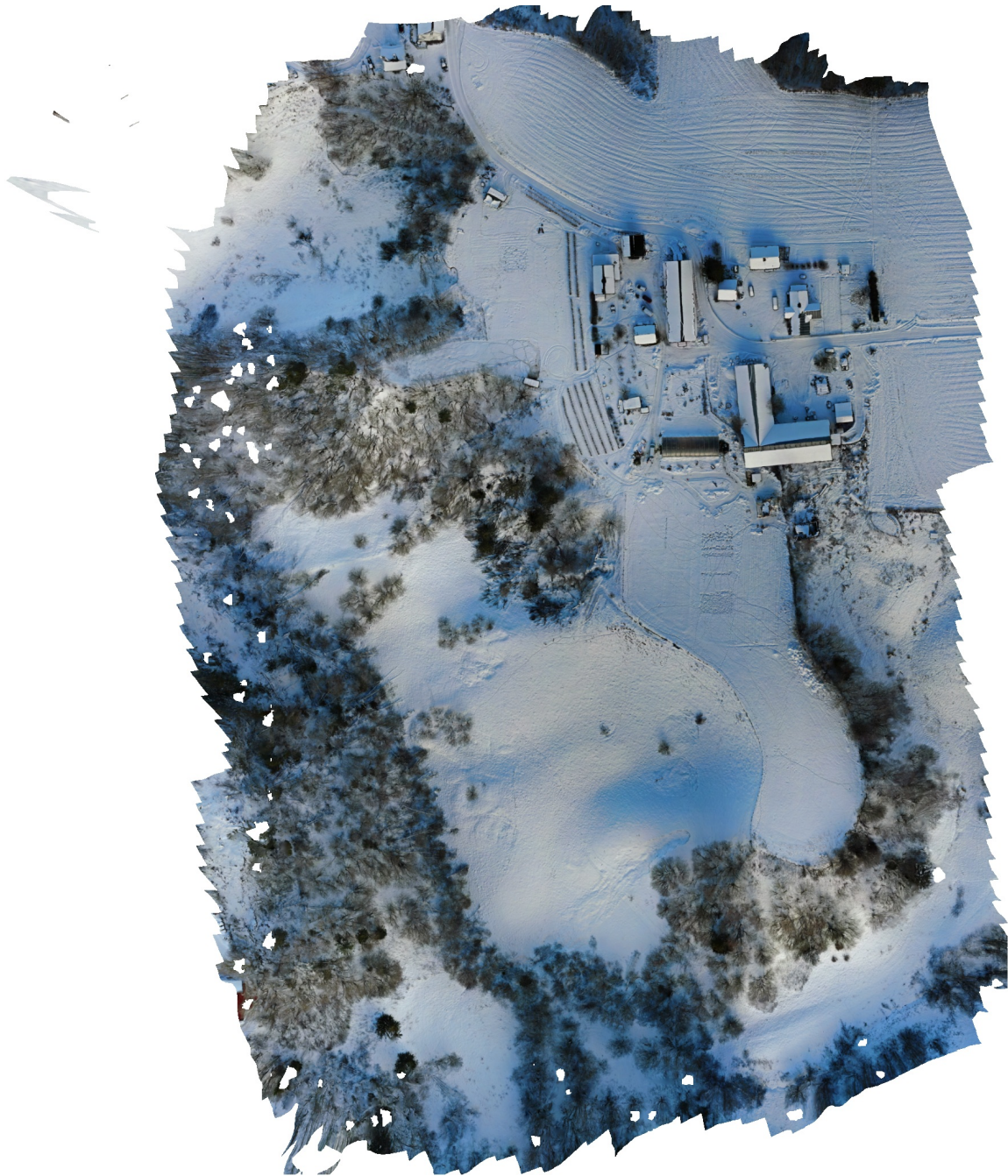


Sander_2022-01-13_H20T_Wide

Processing Report

28 June 2024



Survey Data

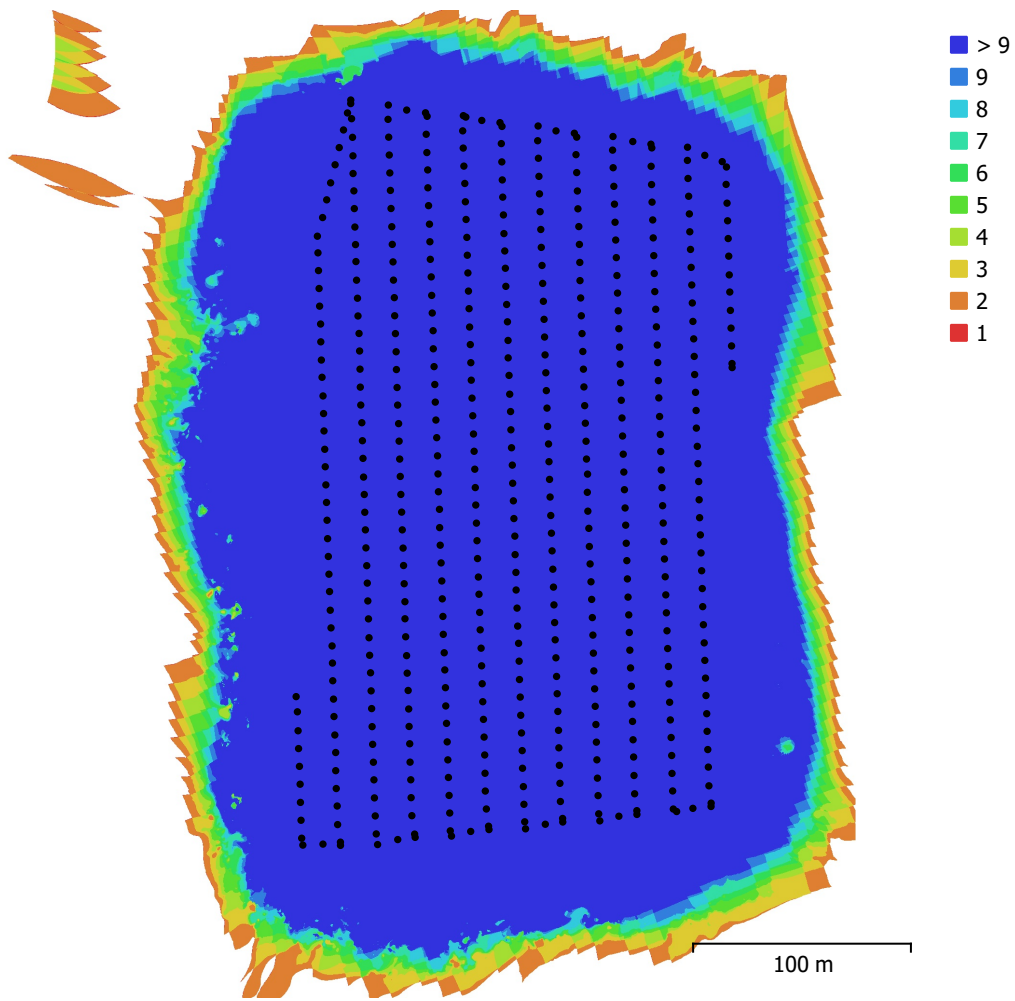


Fig. 1. Camera locations and image overlap.

Number of images:	494	Camera stations:	494
Flying altitude:	65.6 m	Tie points:	164,850
Ground resolution:	2.26 cm/pix	Projections:	1,833,227
Coverage area:	0.126 km ²	Reprojection error:	1.37 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
ZH20T (4.5mm)	4056 x 3040	4.5 mm	1.6 x 1.6 μ m	No

Table 1. Cameras.

Camera Calibration

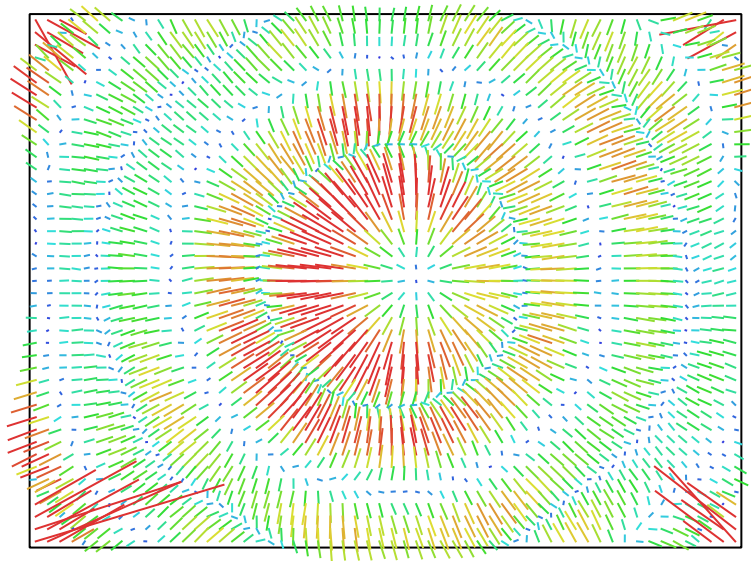


Fig. 2. Image residuals for ZH20T (4.5mm). 2 pix

ZH20T (4.5mm)

494 images

Type	Resolution	Focal Length	Pixel Size
Frame	4056 x 3040	4.5 mm	1.6 x 1.6 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
F	2895.48	0.41	1.00	-0.29	-0.15	-0.08	0.03	0.68	-0.81	0.80	-0.80	0.15	0.04
Cx	25.0471	0.017		1.00	0.08	-0.01	-0.10	-0.22	0.25	-0.25	0.25	0.38	0.01
Cy	-20.8191	0.014			1.00	0.09	-0.05	-0.10	0.12	-0.12	0.12	-0.01	0.37
B1	-2.90125	0.0083				1.00	0.02	-0.03	0.04	-0.05	0.05	0.02	-0.03
B2	-1.07532	0.0085					1.00	0.02	-0.02	0.02	-0.03	0.04	0.01
K1	0.248209	0.0001						1.00	-0.97	0.95	-0.94	0.08	0.03
K2	-0.934194	0.00064							1.00	-1.00	0.99	-0.11	-0.04
K3	1.20767	0.0013								1.00	-1.00	0.11	0.04
K4	-0.611501	0.00085									1.00	-0.11	-0.04
P1	0.000139986	1.3e-06										1.00	0.01
P2	-2.13351e-05	1.3e-06											1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

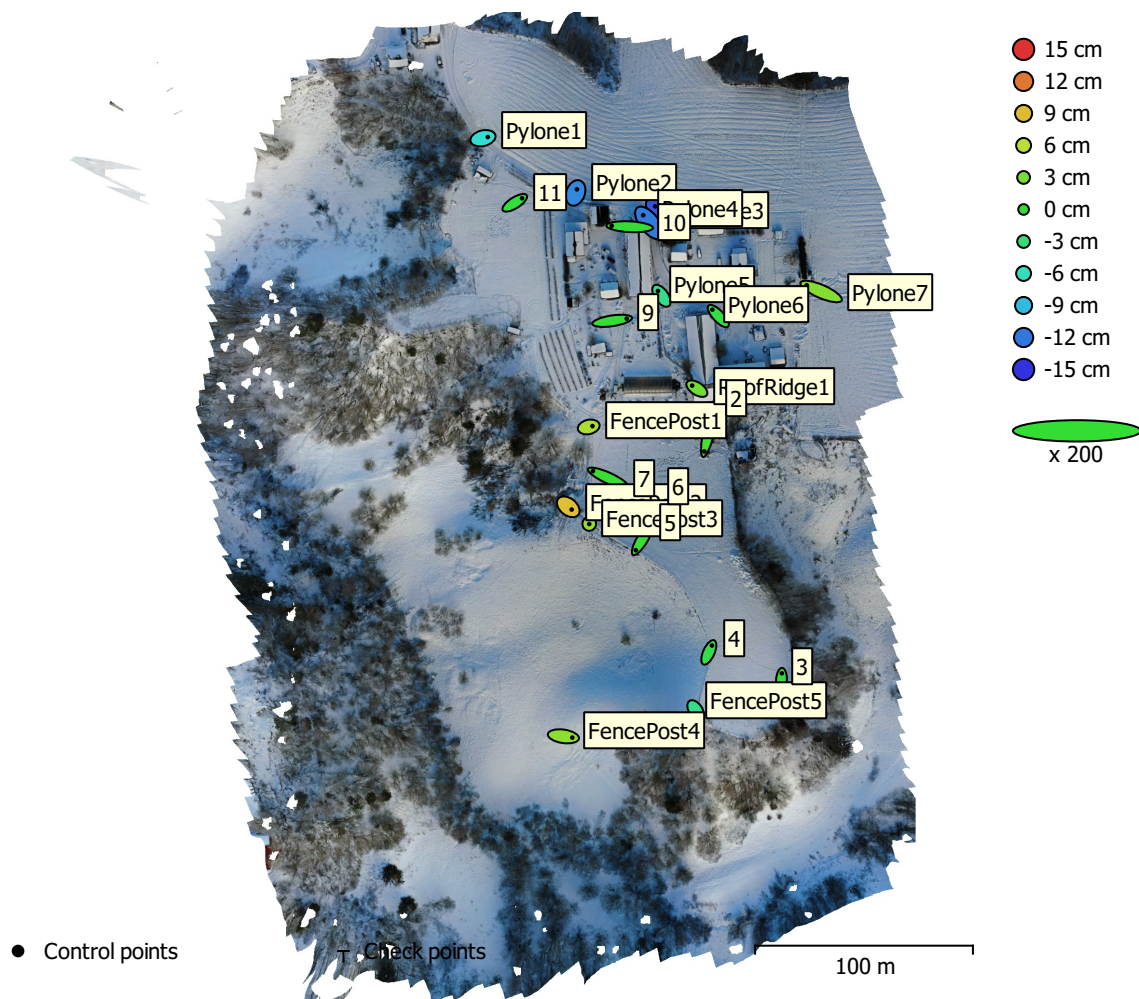


Fig. 3. GCP locations and error estimates.

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)
22	4.14874	3.26306	5.59896	5.27822	7.69467

Table 3. Control points RMSE.

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

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
Pylone1	2.21004	0.533707	-7.03409	7.3924	1.133 (12)
Pylone2	0.618715	1.6479	-11.2645	11.4012	1.130 (12)
Pylone3	-2.96129	2.18516	-13.5122	14.0044	1.023 (13)
Pylone4	-2.77569	3.51505	-11.8377	12.6567	1.788 (11)
Pylone5	-1.59358	2.22042	-3.8865	4.75128	0.784 (10)
Pylone6	-2.73316	2.94469	-0.684687	4.07556	0.734 (10)
Pylone7	-6.64292	2.87577	3.57792	8.07465	0.848 (8)
FencePost1	1.72882	0.403843	5.1844	5.47996	1.321 (8)
FencePost2	1.57342	-1.24895	8.81998	9.04586	0.772 (12)
FencePost3	-0.0138773	-0.0924761	4.19922	4.20027	1.523 (10)
FencePost4	4.07908	-0.587733	3.95325	5.71074	1.103 (9)
FencePost5	1.11156	-1.69508	-3.88436	4.38145	0.903 (9)
RoofRidge1	-2.153	1.37355	2.59611	3.64168	0.488 (6)
2	-2.51357	-10.8177	1.02751	11.1533	1.988 (12)
3	0.160859	3.11139	-0.141728	3.11877	1.237 (8)
4	1.44102	3.16973	-0.95006	3.6092	1.157 (9)
5	-3.02017	-5.01303	0.308165	5.86062	1.022 (15)
6	9.16041	2.77762	0.239475	9.57526	1.824 (12)
7	-7.01636	3.18917	0.276514	7.71211	1.586 (13)
9	6.69539	1.02013	-0.0806681	6.77314	1.424 (12)
10	-8.24733	0.425445	-0.156912	8.25979	1.984 (10)
11	3.35865	2.10205	-0.462861	3.98916	1.171 (11)
Total	4.14874	3.26306	5.59896	7.69467	1.312

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

Digital Elevation Model

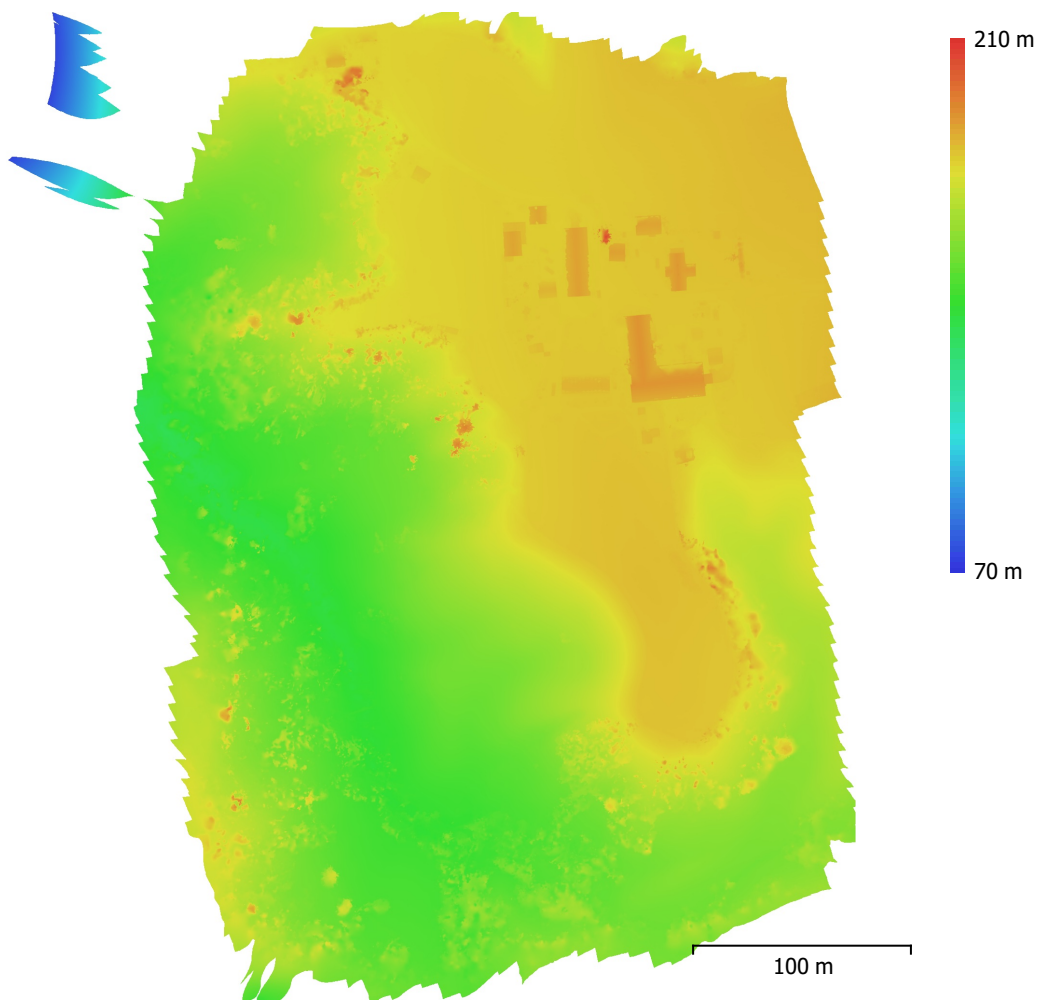


Fig. 4. Reconstructed digital elevation model.

Resolution: 5 cm/pix
Point density: 400 points/m²

Processing Parameters

General

Cameras	494
Aligned cameras	494
Markers	22
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Rotation angles	Yaw, Pitch, Roll

Tie Points

Points	164,850 of 192,322
RMS reprojection error	0.300506 (1.37131 pix)
Max reprojection error	4.10856 (75.9842 pix)
Mean key point size	4.21488 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	12.1682

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 48 seconds
Matching memory usage	946.16 MB
Alignment time	2 minutes 44 seconds
Alignment memory usage	864.27 MB

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	Yes
Optimization time	9 seconds
Date created	2024:06:28 10:57:53
Software version	2.1.0.17532
File size	111.45 MB

Depth Maps

Count	494
-------	-----

Depth maps generation parameters

Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	10 minutes 37 seconds
Memory usage	4.12 GB
Date created	2024:06:28 11:32:00
Software version	2.1.0.17532
File size	1.88 GB

DEM

Size	8,132 x 9,083
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)

Depth maps generation parameters

Quality	High
Filtering mode	Mild
Max neighbors	16
Processing time	10 minutes 37 seconds
Memory usage	4.12 GB
Reconstruction parameters	
Source data	Depth maps
Interpolation	Enabled
Processing time	6 minutes 16 seconds
Memory usage	14.79 GB
Date created	2024:06:28 11:38:18
Software version	2.1.0.17532
File size	218.54 MB
Orthomosaic	
Size	15,520 x 18,120
Coordinate system	ETRS89 / UTM zone 32N + NN2000 height (EPSG::5972)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	3 minutes 50 seconds
Memory usage	2.19 GB
Date created	2024:06:28 11:52:16
Software version	2.1.0.17532
File size	6.10 GB
System	
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