

Agisoft Metashape

Processing Report

23 August 2023



Survey Data

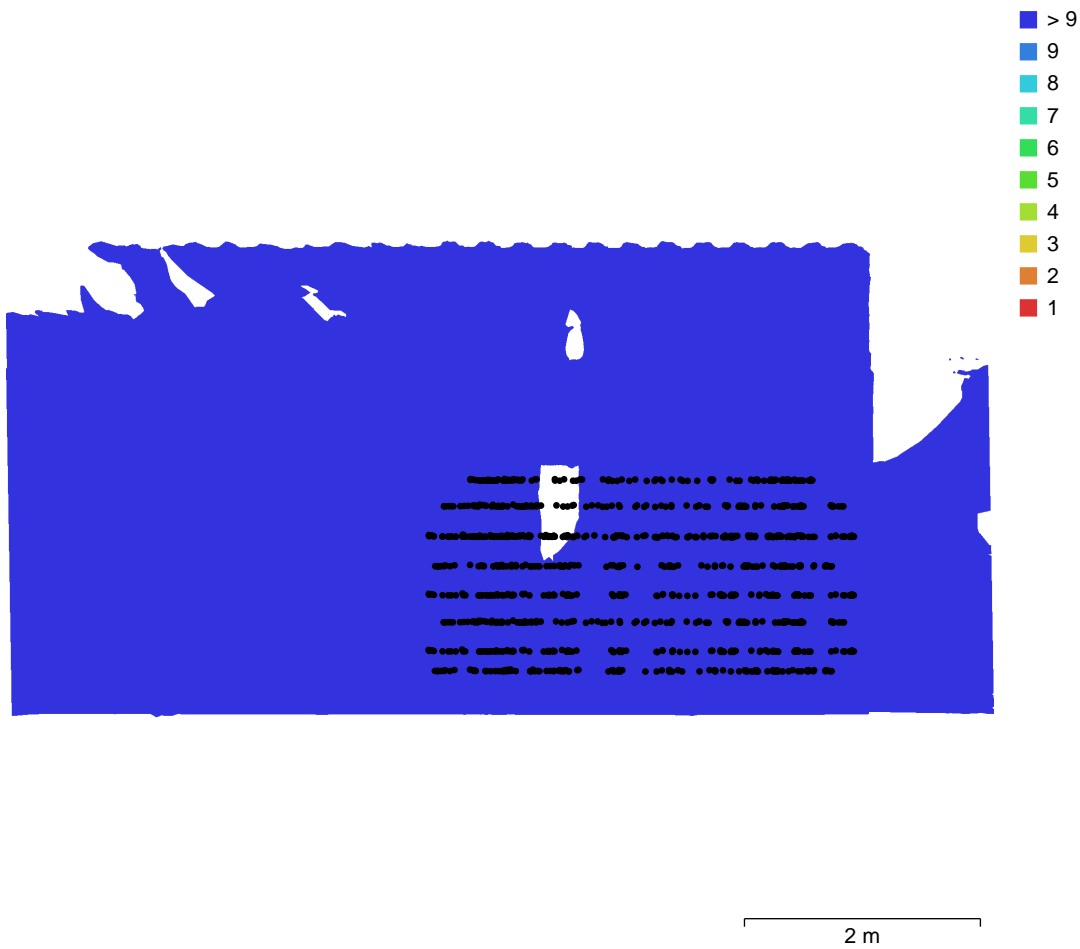


Fig. 1. Camera locations and image overlap.

Number of images:	1,188	Camera stations:	1,188
Flying altitude:	60 cm	Tie points:	1,233,429
Ground resolution:	0.18 mm/pix	Projections:	3,403,383
Coverage area:	30.6 m ²	Reprojection error:	1.1 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
Camera 0	5784 x 8660	14 mm	4.17 x 4.17 um	No
Camera 1	5784 x 8660	12 mm	4.17 x 4.17 um	No
Camera 2	5784 x 8660	12 mm	4.17 x 4.17 um	No
Camera 3	5784 x 8660	12 mm	4.17 x 4.17 um	No
Camera 4	5784 x 8660	12 mm	4.17 x 4.17 um	No

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
Camera 5	5784 x 8660	12 mm	4.17 x 4.17 um	No
Camera 6	5784 x 8660	12 mm	4.17 x 4.17 um	No
Camera 7	5784 x 8660	12 mm	4.17 x 4.17 um	No
Camera 8	5784 x 8660	12 mm	4.17 x 4.17 um	No

Table 1. Cameras.

Camera Calibration

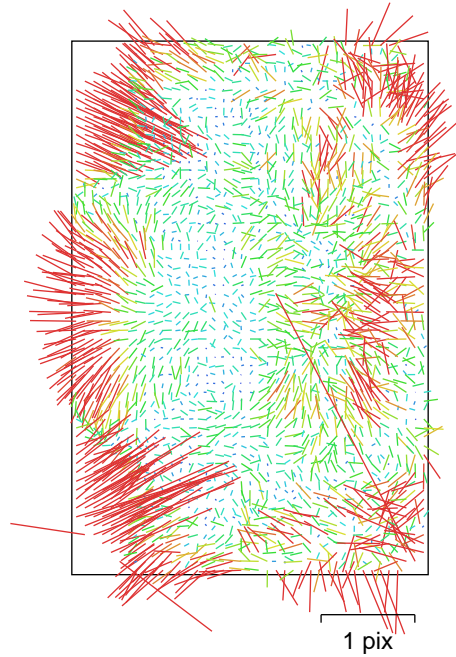


Fig. 2. Image residuals for Camera 0.

Camera 0

132 images

Type	Resolution	Focal Length	Pixel Size
Fisheye	5784 x 8660	14 mm	4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	3343.85	0.032	1.00	0.04	0.00	-0.85	0.75	-0.67	-0.08	0.03
Cx	-1.5218	0.035		1.00	0.02	0.03	-0.02	0.01	-0.74	0.01
Cy	0.810604	0.033			1.00	0.01	-0.01	0.02	-0.01	-0.55
K1	-0.0397009	2.6e-05				1.00	-0.97	0.92	-0.08	-0.03
K2	0.006555	2.4e-05					1.00	-0.98	0.09	0.03
K3	-0.00144924	6.7e-06						1.00	-0.08	-0.03
P1	-0.000501446	1.4e-06							1.00	-0.02
P2	0.000123343	8.4e-07								1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Calibration

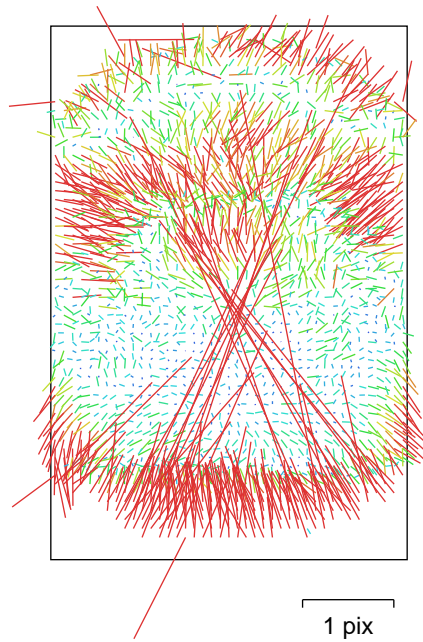


Fig. 3. Image residuals for Camera 1.

Camera 1

132 images

Type	Resolution	Focal Length	Pixel Size
Fisheye	5784 x 8660	12 mm	4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2913.74	0.026	1.00	-0.01	-0.06	-0.84	0.74	-0.66	0.03	0.20
Cx	20.4172	0.019		1.00	0.02	0.01	-0.01	0.01	-0.58	-0.01
Cy	28.2957	0.033			1.00	0.01	-0.02	0.01	-0.01	-0.73
K1	-0.0439382	2.2e-05				1.00	-0.97	0.92	-0.01	0.04
K2	0.00666755	1.9e-05					1.00	-0.98	0.00	-0.09
K3	-0.0013701	4.8e-06						1.00	0.00	0.13
P1	0.000155639	8.1e-07							1.00	0.01
P2	0.000430189	1.2e-06								1.00

Table 3. Calibration coefficients and correlation matrix.

Camera Calibration

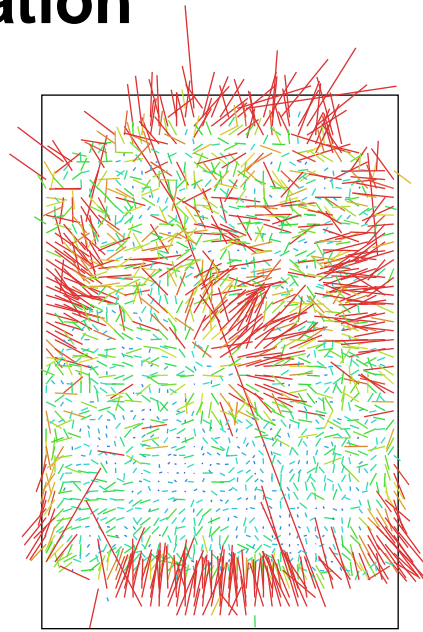


Fig. 4. Image residuals for Camera 2.

Camera 2

132 images

Type	Resolution	Focal Length	Pixel Size
Fisheye	5784 x 8660	12 mm	4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2904.63	0.03	1.00	0.00	-0.04	-0.88	0.80	-0.73	0.00	0.18
Cx	5.17589	0.019		1.00	-0.02	0.01	-0.01	0.01	-0.63	0.03
Cy	73.3301	0.031			1.00	0.02	-0.02	0.02	0.02	-0.72
K1	-0.0413206	2.4e-05				1.00	-0.98	0.93	-0.02	-0.03
K2	0.00436136	2e-05					1.00	-0.99	0.02	-0.02
K3	-0.000697651	4.9e-06						1.00	-0.02	0.04
P1	-0.000182007	8.1e-07							1.00	-0.04
P2	0.000170745	1.1e-06								1.00

Table 4. Calibration coefficients and correlation matrix.

Camera Calibration

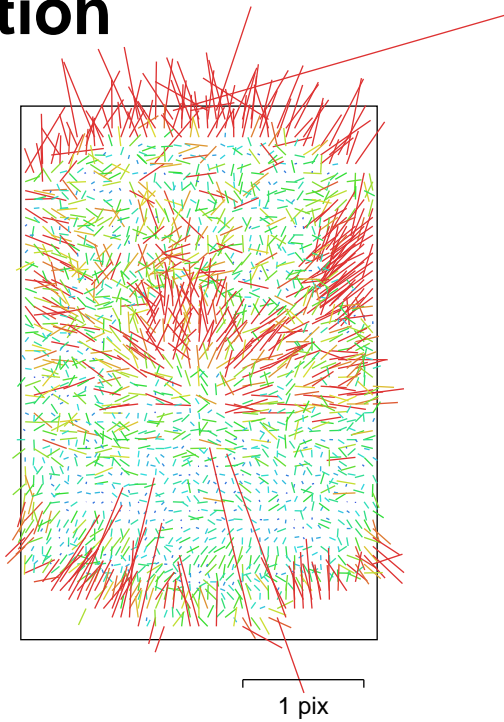


Fig. 5. Image residuals for Camera 3.

Camera 3

132 images

Type	Resolution	Focal Length	Pixel Size
Fisheye	5784 x 8660	12 mm	4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2932.45	0.029	1.00	-0.01	-0.02	-0.89	0.80	-0.73	0.02	0.13
Cx	-29.9765	0.017		1.00	0.02	0.01	-0.01	0.01	-0.62	-0.01
Cy	1.66136	0.031			1.00	0.01	-0.00	0.00	-0.01	-0.74
K1	-0.0407993	2.2e-05				1.00	-0.98	0.93	-0.01	-0.01
K2	0.00415732	1.8e-05					1.00	-0.99	0.01	-0.03
K3	-0.000626976	4.5e-06						1.00	-0.01	0.05
P1	-0.000341417	8.2e-07							1.00	0.01
P2	0.000433338	1.1e-06								1.00

Table 5. Calibration coefficients and correlation matrix.

Camera Calibration

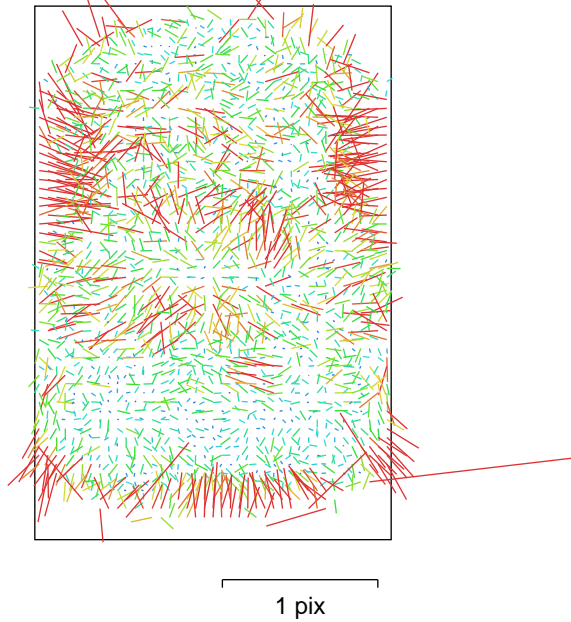


Fig. 6. Image residuals for Camera 4.

Camera 4

132 images

Type	Resolution	Focal Length	Pixel Size
Fisheye	5784 x 8660	12 mm	4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2900.03	0.026	1.00	0.02	0.00	-0.89	0.80	-0.73	-0.01	0.07
Cx	-18.737	0.015		1.00	0.00	-0.01	0.01	-0.00	-0.63	0.01
Cy	-1.00976	0.03			1.00	-0.01	0.01	-0.01	0.01	-0.77
K1	-0.0403366	2.1e-05				1.00	-0.98	0.93	0.01	0.02
K2	0.00331138	1.7e-05					1.00	-0.99	-0.01	-0.06
K3	-0.000438582	4.2e-06						1.00	0.01	0.07
P1	0.000135574	7.8e-07							1.00	-0.02
P2	6.91271e-05	1e-06								1.00

Table 6. Calibration coefficients and correlation matrix.

Camera Calibration

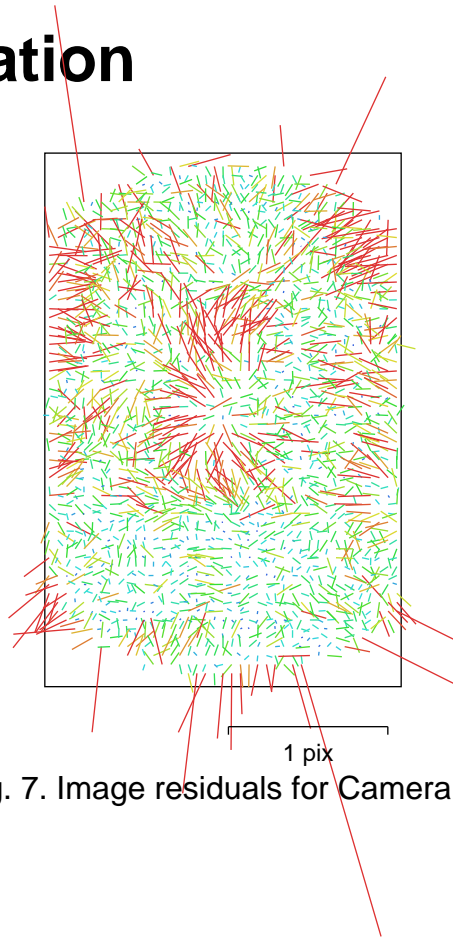


Fig. 7. Image residuals for Camera 5.

Camera 5

132 images

Type	Resolution	Focal Length	Pixel Size
Fisheye	5784 x 8660	12 mm	4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2877.39	0.026	1.00	0.00	0.03	-0.90	0.81	-0.74	0.01	0.03
Cx	46.465	0.015		1.00	0.05	0.00	-0.00	0.00	-0.63	-0.02
Cy	-9.83461	0.03			1.00	-0.02	0.02	-0.02	0.01	-0.79
K1	-0.0405645	2.1e-05				1.00	-0.98	0.93	-0.00	0.01
K2	0.00342842	1.6e-05					1.00	-0.99	0.00	-0.04
K3	-0.000485983	3.9e-06						1.00	-0.00	0.04
P1	0.000207393	8e-07							1.00	-0.01
P2	-0.000244199	1e-06								1.00

Table 7. Calibration coefficients and correlation matrix.

Camera Calibration

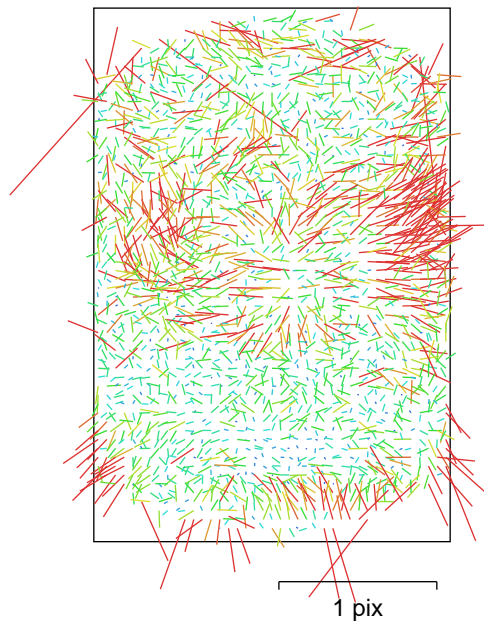


Fig. 8. Image residuals for Camera 6.

Camera 6

132 images

Type

Resolution

Focal Length

Pixel Size

Fisheye

5784 x 8660

12 mm

4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2913.24	0.026	1.00	-0.01	0.03	-0.90	0.81	-0.74	0.02	0.03
Cx	16.0946	0.016		1.00	-0.02	0.00	-0.01	0.01	-0.63	0.01
Cy	2.03987	0.031			1.00	-0.02	0.02	-0.02	0.02	-0.78
K1	-0.0410563	2.1e-05				1.00	-0.98	0.93	-0.01	0.00
K2	0.00380626	1.6e-05					1.00	-0.99	0.01	-0.03
K3	-0.00059278	3.9e-06						1.00	-0.01	0.03
P1	-0.000149722	8.2e-07							1.00	-0.02
P2	-0.000144676	1e-06								1.00

Table 8. Calibration coefficients and correlation matrix.

Camera Calibration

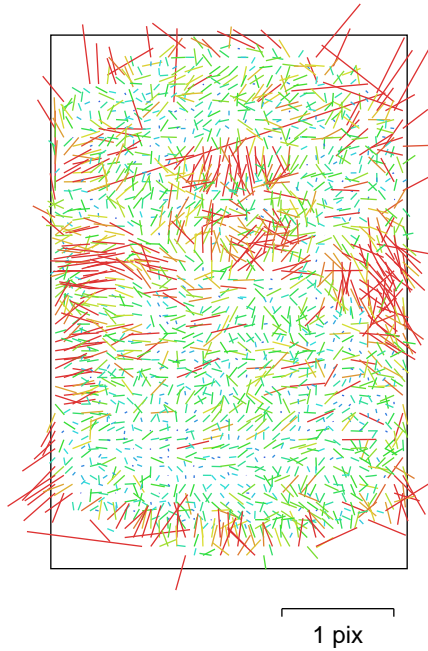


Fig. 9. Image residuals for Camera 7.

Camera 7

132 images

Type	Resolution	Focal Length	Pixel Size
Fisheye	5784 x 8660	12 mm	4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2890.14	0.04	1.00	0.01	0.02	-0.91	0.82	-0.74	-0.03	0.03
Cx	26.1938	0.018		1.00	0.01	-0.00	-0.00	0.00	-0.60	-0.01
Cy	5.56749	0.036			1.00	-0.00	0.00	-0.00	-0.00	-0.70
K1	-0.0403497	3.2e-05				1.00	-0.98	0.93	0.02	-0.02
K2	0.00321355	2.6e-05					1.00	-0.99	-0.01	0.00
K3	-0.000461955	6.2e-06						1.00	0.01	-0.00
P1	-5.03379e-05	1.2e-06							1.00	0.00
P2	1.51041e-05	1.3e-06								1.00

Table 9. Calibration coefficients and correlation matrix.

Camera Calibration

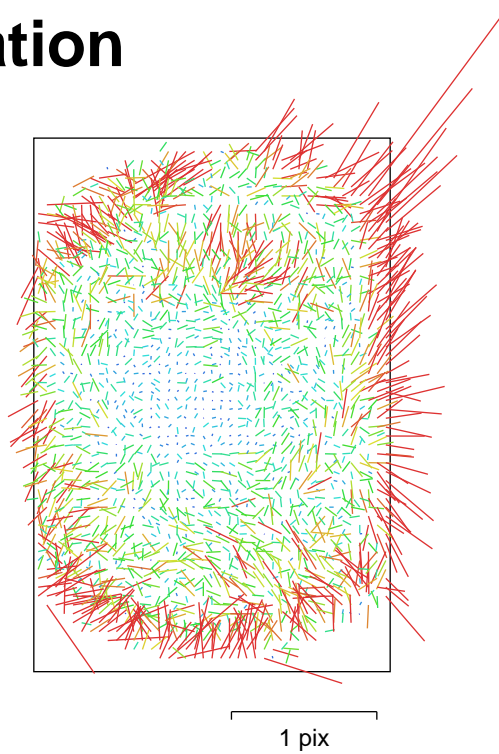


Fig. 10. Image residuals for Camera 8.

Camera 8

132 images

Type	Resolution	Focal Length	Pixel Size
Fisheye	5784 x 8660	12 mm	4.17 x 4.17 um

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	2892.72	0.062	1.00	0.01	0.02	-0.84	0.70	-0.61	0.01	-0.10
Cx	10.4706	0.016		1.00	-0.03	-0.03	0.02	-0.00	-0.62	0.01
Cy	7.78896	0.02			1.00	-0.01	0.01	-0.01	0.02	-0.68
K1	-0.0398567	4.4e-05				1.00	-0.96	0.90	0.01	0.07
K2	0.00396536	3.7e-05					1.00	-0.98	0.01	-0.07
K3	-0.000808418	9.4e-06						1.00	-0.02	0.07
P1	-0.000377706	6.4e-07							1.00	-0.00
P2	6.997e-05	5.4e-07								1.00

Table 10. Calibration coefficients and correlation matrix.

Scale Bars

Label	Distance (m)	Error (m)
003. 7-8	0.249997	-6.25428e-05
006. 15-16	0.249981	-4.91557e-05
009. 23-24	0.250016	-0.000104238
002a. 4-5	0.250111	0.000111043
002b. 5-6	0.25004	0.00013963
005a. 12-13	0.24985	-0.000130427
005b. 13-14	0.249667	-0.000222628
008a. 20-21	0.250162	0.000131987
008b. 21-22	0.25005	0.000170348
Total		0.000134178

Table 11. Control scale bars.

Digital Elevation Model

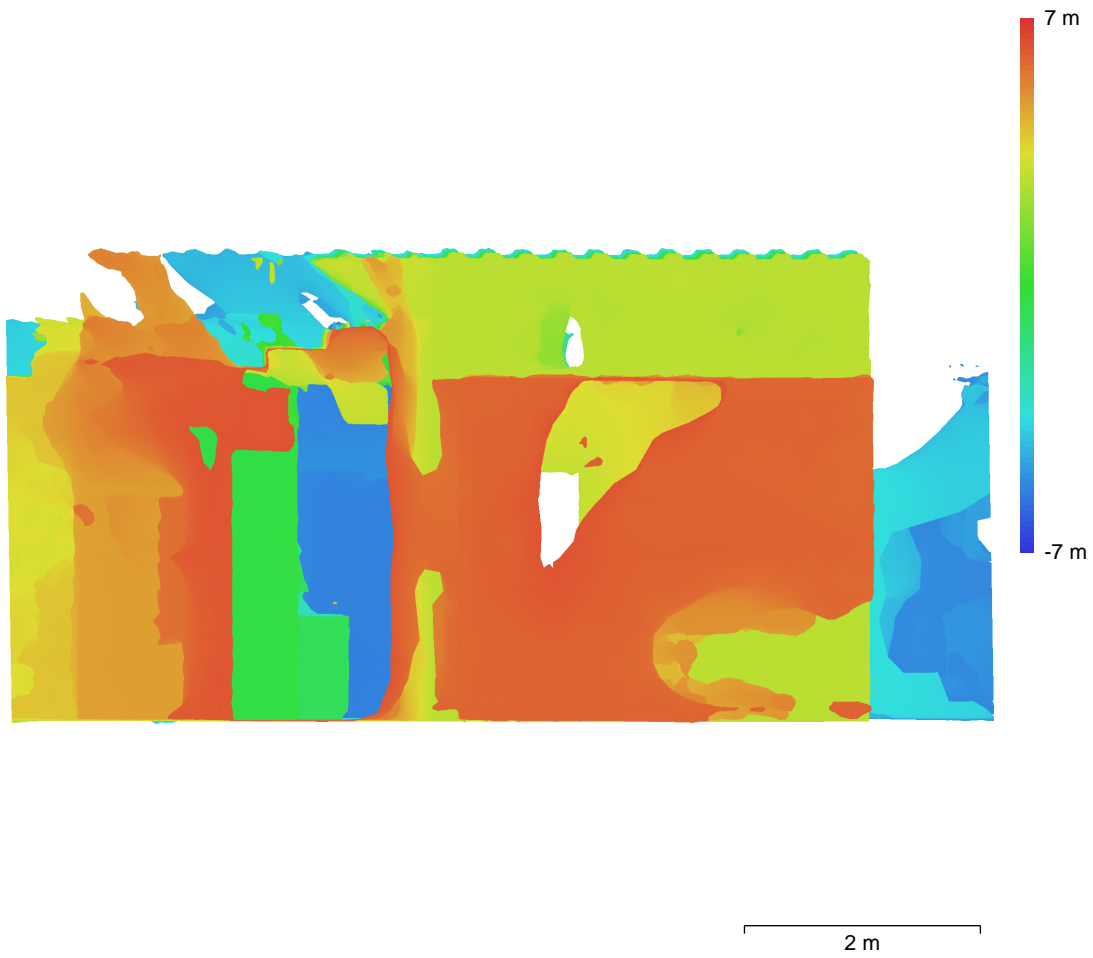


Fig. 11. Reconstructed digital elevation model.

Resolution: unknown
Point density: unknown

Processing Parameters

General

Cameras	1188
Aligned cameras	1188
Markers	15
Scale bars	9
Coordinate system	Local Coordinates (m)
Rotation angles	Yaw, Pitch, Roll

Tie Points

Points	1,233,429 of 2,604,159
RMS reprojection error	0.391274 (1.10403 pix)
Max reprojection error	1.24443 (21.3561 pix)
Mean key point size	2.73491 pix
Point colors	3 bands, uint8
Key points	5.63 GB
Average tie point multiplicity	4.7068

Alignment parameters

Accuracy	Highest
Generic preselection	Yes
Reference preselection	Estimated
Key point limit	60,000
Key point limit per Mpx	1,000
Tie point limit	0
Exclude stationary tie points	Yes
Guided image matching	No
Adaptive camera model fitting	No
Matching time	18 minutes 49 seconds
Matching memory usage	3.56 GB
Alignment time	6 minutes 28 seconds
Alignment memory usage	17.50 GB

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	11 seconds
Date created	2023:08:23 02:47:37
Software version	2.0.2.16404
File size	269.65 MB

Depth Maps

Count	1187
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Depth maps generation parameters

Quality	Medium
Filtering mode	Mild
Max neighbors	16
Processing time	24 minutes 47 seconds
Memory usage	5.57 GB
Date created	2023:08:23 04:37:46
Software version	2.0.2.16404
File size	4.43 GB

Point Cloud

Points	189,413,469
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Point attributes

Color	3 bands, uint8
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Normal

Point classes

Created (never classified) 189,413,469

Depth maps generation parameters

Quality Medium
Filtering mode Mild
Max neighbors 16
Processing time 24 minutes 47 seconds
Memory usage 5.57 GB

Point cloud generation parameters

Processing time 3 hours 37 minutes
Memory usage 40.16 GB
Date created 2023:08:23 08:15:42
Software version 2.0.2.16404
File size 2.50 GB

Model

Faces 1,961,963
Vertices 983,032
Vertex colors 3 bands, uint8
Texture 16,384 x 16,384, 4 bands, uint8

Depth maps generation parameters

Quality Medium
Filtering mode Mild
Max neighbors 16
Processing time 24 minutes 47 seconds
Memory usage 5.57 GB

Reconstruction parameters

Surface type Arbitrary
Source data Depth maps
Interpolation Enabled
Strict volumetric masks No
Processing time 11 minutes 45 seconds
Memory usage 8.62 GB

Texturing parameters

Mapping mode Generic
Blending mode Mosaic
Texture size 16,384
Enable hole filling Yes
Enable ghosting filter Yes
UV mapping time 4 minutes 22 seconds
UV mapping memory usage 2.08 GB
Blending time 13 minutes 43 seconds
Blending memory usage 11.38 GB
Blending GPU memory usage 7.56 GB
Date created 2023:08:23 08:28:06
Software version 2.0.2.16404
File size 290.91 MB

System

Software name Agisoft Metashape Professional
Software version 2.0.2 build 16404
OS Windows 64 bit
RAM 255.87 GB
CPU AMD Ryzen Threadripper 3970X 32-Core Processor
GPU(s) NVIDIA GeForce RTX 3090
NVIDIA GeForce RTX 3090
NVIDIA GeForce RTX 3090