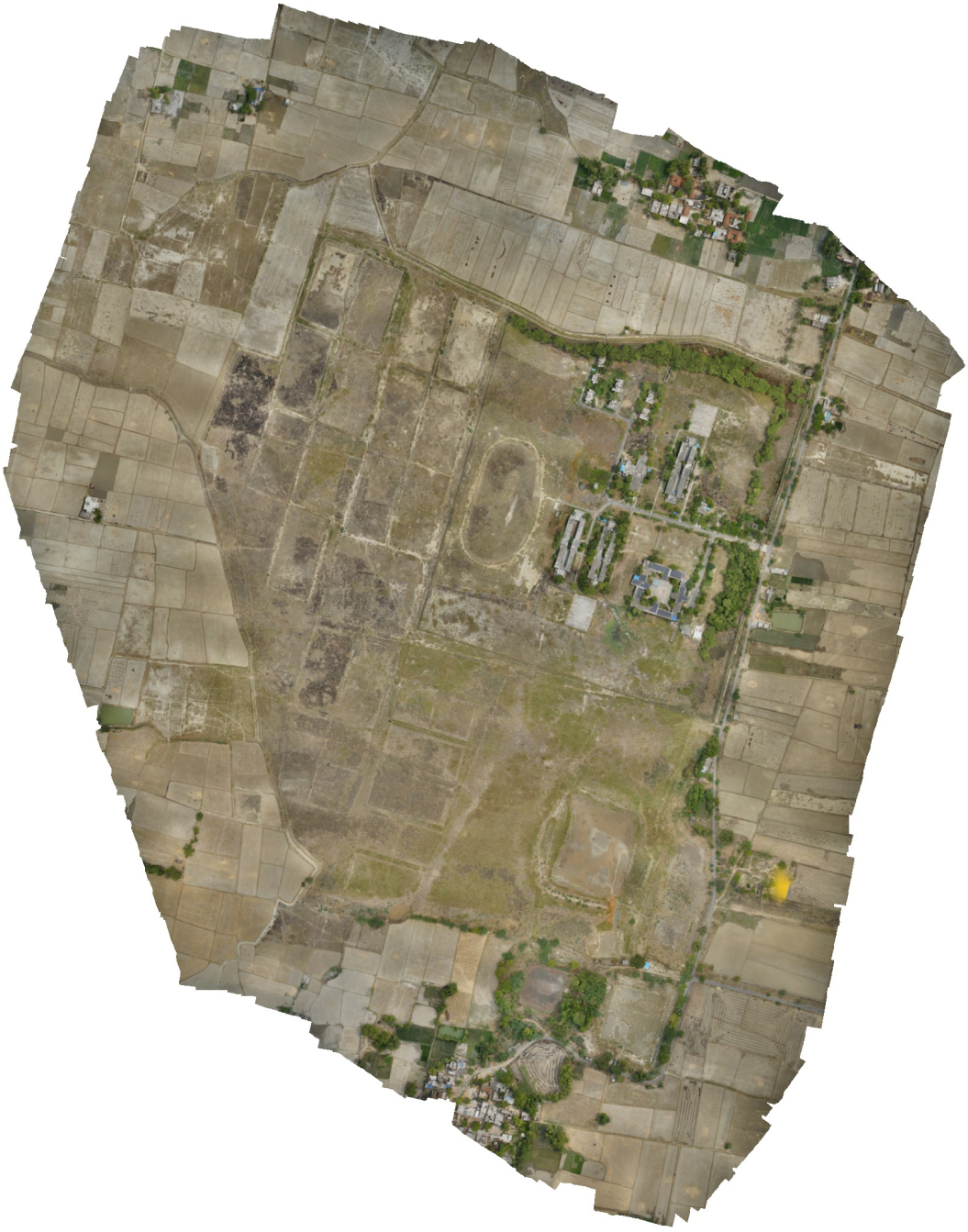
Agisoft Metashape

Processing Report

10 July 2024



Survey Data

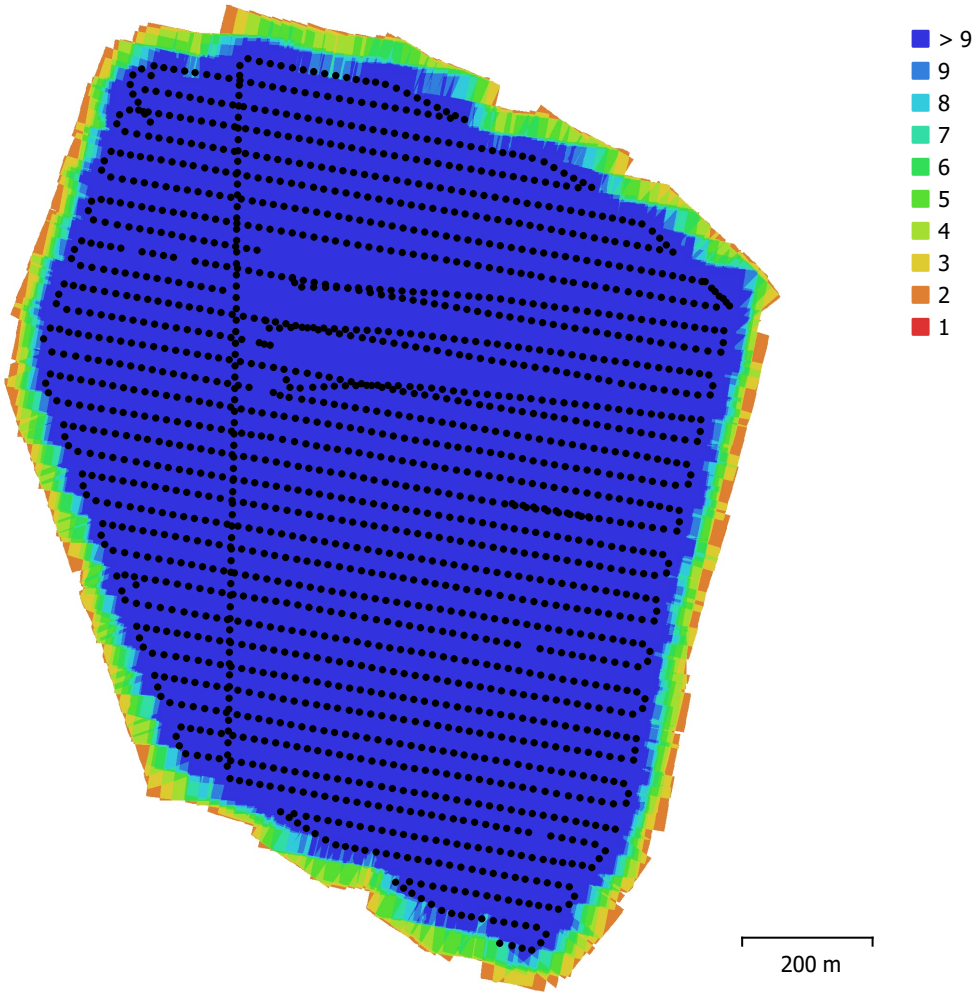


Fig. 1. Camera locations and image overlap.

Number of images:	1,830	Camera stations:	1,830
Flying altitude:	94.5 m	Tie points:	627,758
Ground resolution:	2.13 cm/pix	Projections:	4,842,364
Coverage area:	1.24 km²	Reprojection error:	0.702 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
ILCE-5100, E 16mm F2.8 (16mm)	6000 x 4000	16 mm	4 x 4 µm	No
ILCE-5100, E 16mm F2.8 (16mm)	6000 x 4000	16 mm	4 x 4 µm	No

Table 1. Cameras.

Camera Calibration

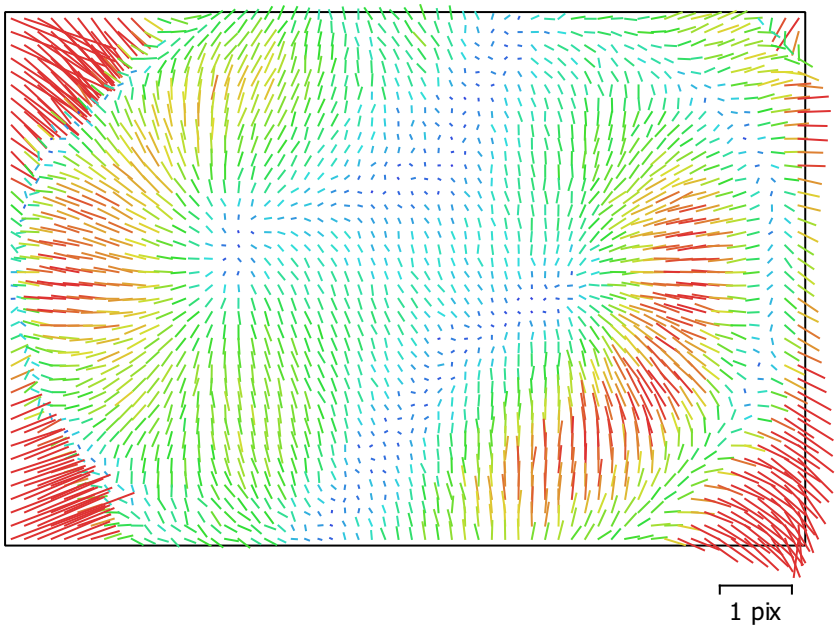


Fig. 2. Image residuals for ILCE-5100, E 16mm F2.8 (16mm).

ILCE-5100, E 16mm F2.8 (16mm)

625 images

Type	Resolution	Focal Length	Pixel Size
Frame	**6000 x 4000**	**16 mm**	**4 x 4 µm**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
F	**4018.46**	0.12	1.00	-0.06	-0.70	0.02	0.07	-0.20	0.13	-0.06	0.06	-0.04	0.04
Cx	**-33.3184**	0.022		1.00	0.05	-0.03	0.40	-0.01	0.02	-0.04	0.06	0.37	-0.01
Cy	**-8.08871**	0.031			1.00	-0.32	-0.07	0.10	-0.07	0.01	-0.01	0.03	0.09
B1	**1.10324**	0.0052				1.00	0.03	0.01	-0.02	0.02	-0.01	0.02	0.06
B2	**1.34783**	0.005					1.00	-0.01	0.01	-0.01	0.02	-0.03	0.04
K1	**-0.0636738**	3.2e-05						1.00	-0.97	0.92	-0.87	-0.01	-0.01
K2	**0.0894277**	0.00016							1.00	-0.98	0.96	0.02	-0.02
K3	**-0.00330266**	0.00031								1.00	-0.99	-0.03	0.01
K4	**0.00542554**	0.0002									1.00	0.03	-0.01
P1	**-0.00174713**	1e-06										1.00	-0.02
P2	**-0.000880217**	7.9e-07											1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Calibration

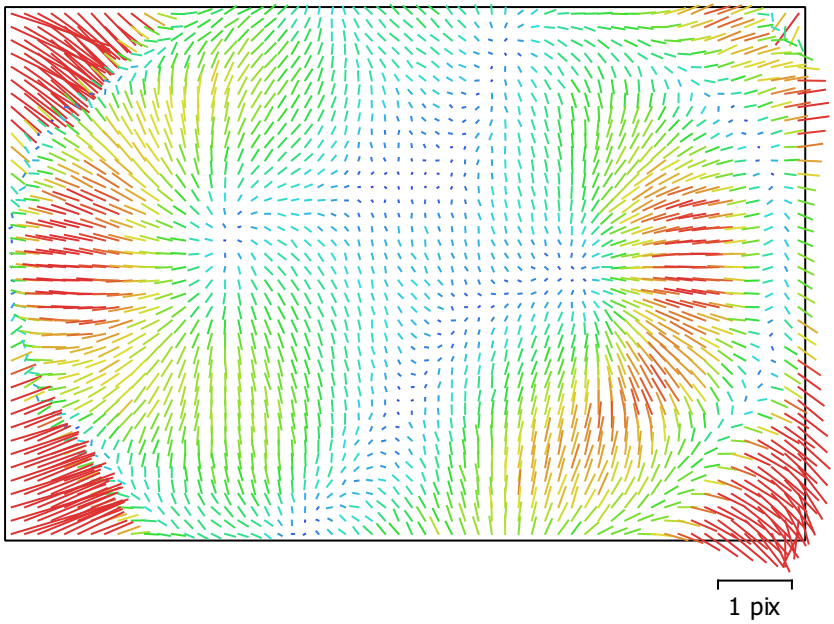


Fig. 3. Image residuals for ILCE-5100, E 16mm F2.8 (16mm).

ILCE-5100, E 16mm F2.8 (16mm)

1205 images

Type	Resolution	Focal Length	Pixel Size
Frame	**6000 x 4000**	**16 mm**	**4 x 4 µm**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
F	**4001.12**	0.11	1.00	-0.05	-0.74	-0.03	0.10	-0.23	0.15	-0.05	0.05	-0.06	0.06
Cx	**-33.4168**	0.016		1.00	0.04	-0.01	0.51	-0.01	0.02	-0.04	0.06	0.34	0.00
Cy	**-4.2526**	0.024			1.00	-0.34	-0.07	0.15	-0.09	0.02	-0.02	0.04	0.05
B1	**0.963418**	0.0033				1.00	-0.00	0.01	-0.02	0.02	-0.02	-0.04	0.09
B2	**1.29533**	0.0032					1.00	-0.03	0.02	-0.02	0.03	-0.04	-0.01
K1	**-0.0628032**	2.1e-05						1.00	-0.97	0.92	-0.87	0.00	-0.02
K2	**0.0869829**	0.0001							1.00	-0.98	0.95	0.01	-0.01
K3	**-0.00227558**	0.0002								1.00	-0.99	-0.02	0.01
K4	**0.00479052**	0.00013									1.00	0.03	-0.01
P1	**-0.00177927**	7e-07										1.00	-0.03
P2	**-0.000883568**	5.5e-07											1.00

Table 3. Calibration coefficients and correlation matrix.

Camera Locations

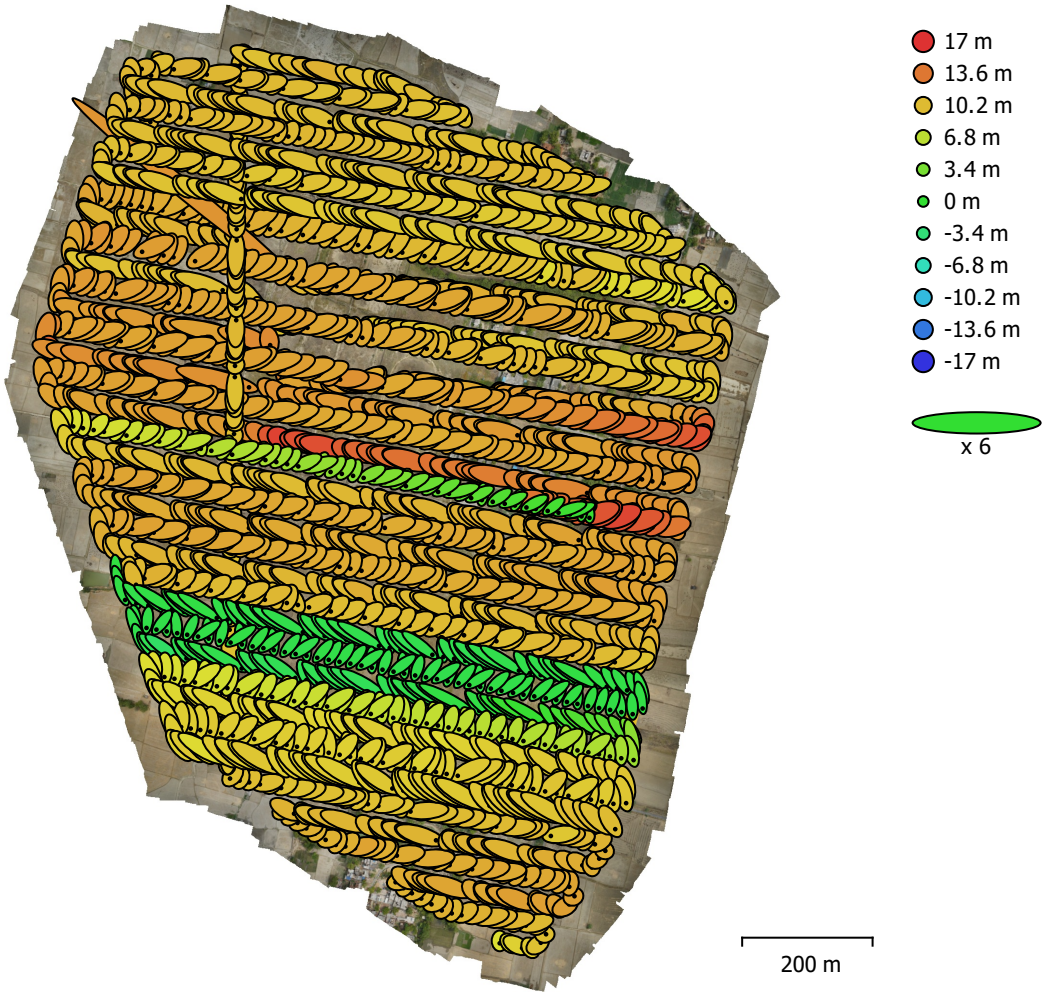


Fig. 4. Camera locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated camera locations are marked with a black dot.

X error (m)	Y error (m)	Z error (m)	XY error (m)	Total error (m)
4.57125	2.96009	10.1543	5.44596	11.5226

Table 4. Average camera location error.
X - Easting, Y - Northing, Z - Altitude.

Ground Control Points

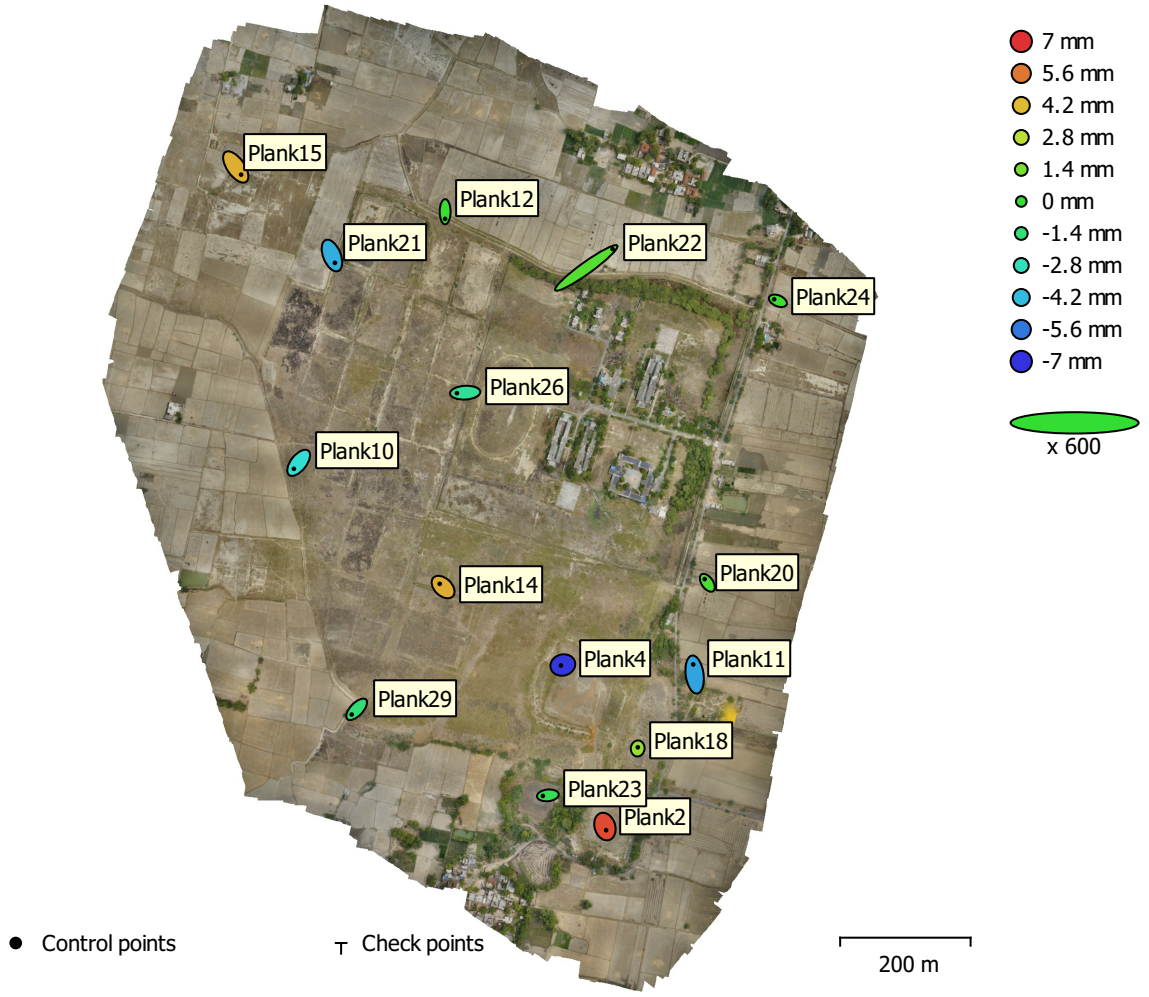


Fig. 5. GCP locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated GCP locations are marked with a dot or crossing.

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
15	3.97932	3.56261	0.359912	5.34109	5.3532

Table 5. Control points RMSE.
X - Easting, Y - Northing, Z - Altitude.

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
Plank18	0.0799814	0.59024	0.205059	0.629944	0.913 (3)
Plank2	0.601612	-1.86317	0.648839	2.06261	1.699 (4)
Plank23	-2.56581	-0.268221	-0.0690082	2.58071	1.826 (3)
Plank4	-0.990905	-0.25527	-0.688695	1.23343	2.379 (3)
Plank14	-1.73369	1.65105	0.450788	2.43615	1.836 (3)
Plank29	-2.52483	-2.65347	-0.133986	3.66519	3.006 (3)
Plank10	-2.43368	-3.07362	-0.327529	3.93411	3.035 (3)
Plank26	-4.22978	-0.244149	-0.201083	4.24159	4.401 (2)
Plank21	1.5151	-3.75898	-0.450285	4.07777	2.241 (4)
Plank15	2.74504	-3.90922	0.448414	4.79774	2.960 (4)
Plank12	0.000239314	-3.65685	0.0145911	3.65688	3.972 (2)
Plank22	13.4419	9.65128	0.0695789	16.548	11.825 (3)
Plank24	-1.89441	0.80304	0.0204695	2.05769	2.258 (2)
Plank20	-1.34057	1.90325	0.0466144	2.32844	2.462 (2)
Plank11	-0.703517	5.19171	-0.469678	5.26017	3.696 (3)
Total	**3.97932**	**3.56261**	**0.359912**	**5.3532**	**4.029**

Table 6. Control points.

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

Digital Elevation Model

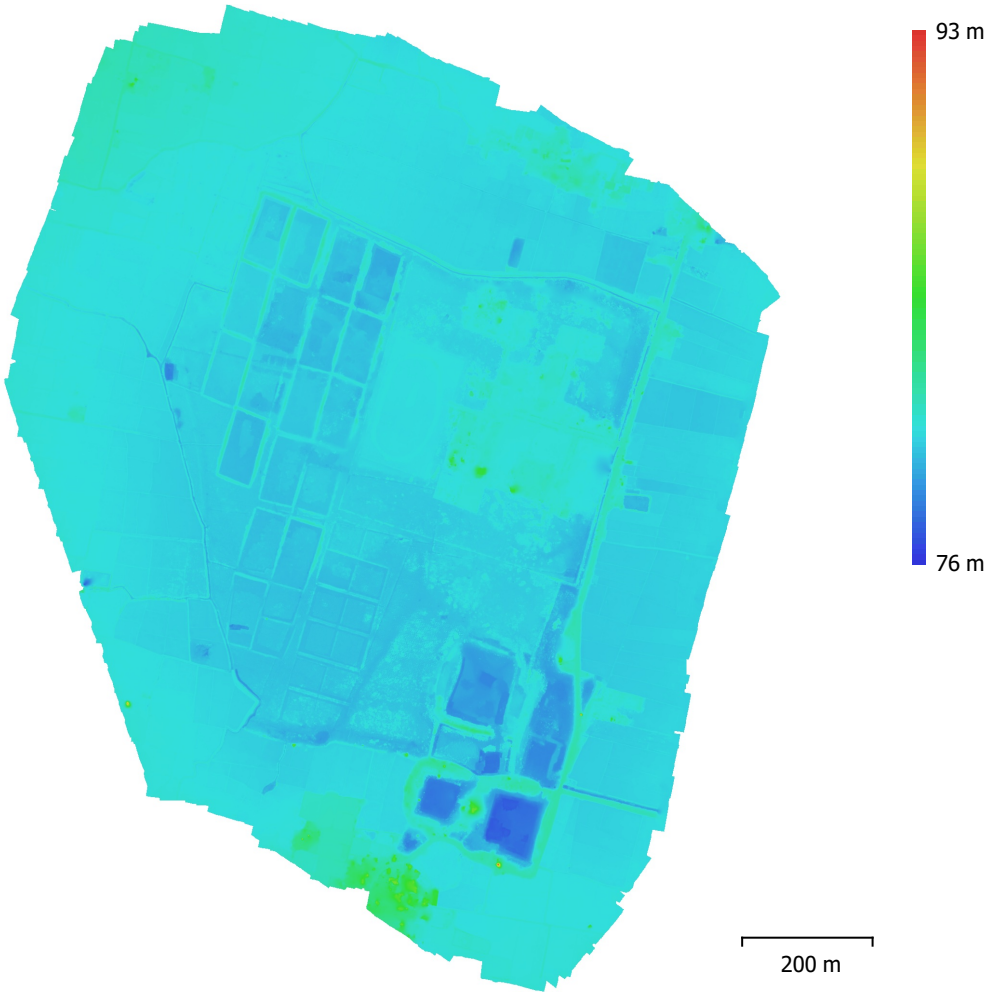


Fig. 6. Reconstructed digital elevation model.

Resolution:	4.27 cm/pix
Point density:	550 points/m²

Processing Parameters

General	
Cameras	1830
Aligned cameras	1830
Markers	15
Coordinate system	WGS 84 / UTM zone 44N (EPSG::32644)
Rotation angles	Yaw, Pitch, Roll
Point Cloud	
Points	627,758 of 708,969
RMS reprojection error	0.217646 (0.701715 pix)
Max reprojection error	1.06936 (54.0052 pix)
Mean key point size	3.161 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	8.36126
Alignment parameters	
Accuracy	High
Generic preselection	Yes
Reference preselection	Source
Key point limit	20,000
Tie point limit	3,000
Exclude stationary tie points	No
Guided image matching	No
Adaptive camera model fitting	Yes
Matching time	16 minutes 33 seconds
Matching memory usage	4.19 GB
Alignment time	8 minutes 34 seconds
Alignment memory usage	1.08 GB
Optimization parameters	
Parameters	f, b1, b2, cx, cy, k1-k4, p1, p2
Adaptive camera model fitting	No
Optimization time	24 seconds
Software version	1.7.2.12040
File size	107.09 MB
Depth Maps	
Count	1830
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	6 hours 54 minutes
File size	16.11 GB
Dense Point Cloud	
Points	659,161,789
Point colors	3 bands, uint8
Depth maps generation parameters	
Quality	High
Filtering mode	Mild
Processing time	6 hours 54 minutes
Dense cloud generation parameters	
Processing time	5 hours 14 minutes
Points classification parameters	

Confidence	0
Classification time	51 minutes 40 seconds
Classification memory usage	1.13 GB
Software version	1.7.2.12040
File size	11.32 GB
DEM	
Size	37,553 x 46,083
Coordinate system	WGS 84 / UTM zone 44N (EPSG::32644)
Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	9 minutes 38 seconds
Memory usage	384.48 MB
Software version	1.7.2.12040
File size	2.34 GB
Orthomosaic	
Size	55,917 x 70,957
Coordinate system	WGS 84 / UTM zone 44N (EPSG::32644)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	55 minutes 55 seconds
Memory usage	4.66 GB
Software version	1.7.2.12040
File size	43.90 GB
System	
Software name	Agisoft Metashape Professional
Software version	1.7.2 build 12040
OS	Windows 64 bit
RAM	127.66 GB
CPU	Intel(R) Xeon(R) Gold 5118 CPU @ 2.30GHz
GPU(s)	Quadro P4000