

Agisoft PhotoScan

Processing Report

16 April 2018



Survey Data

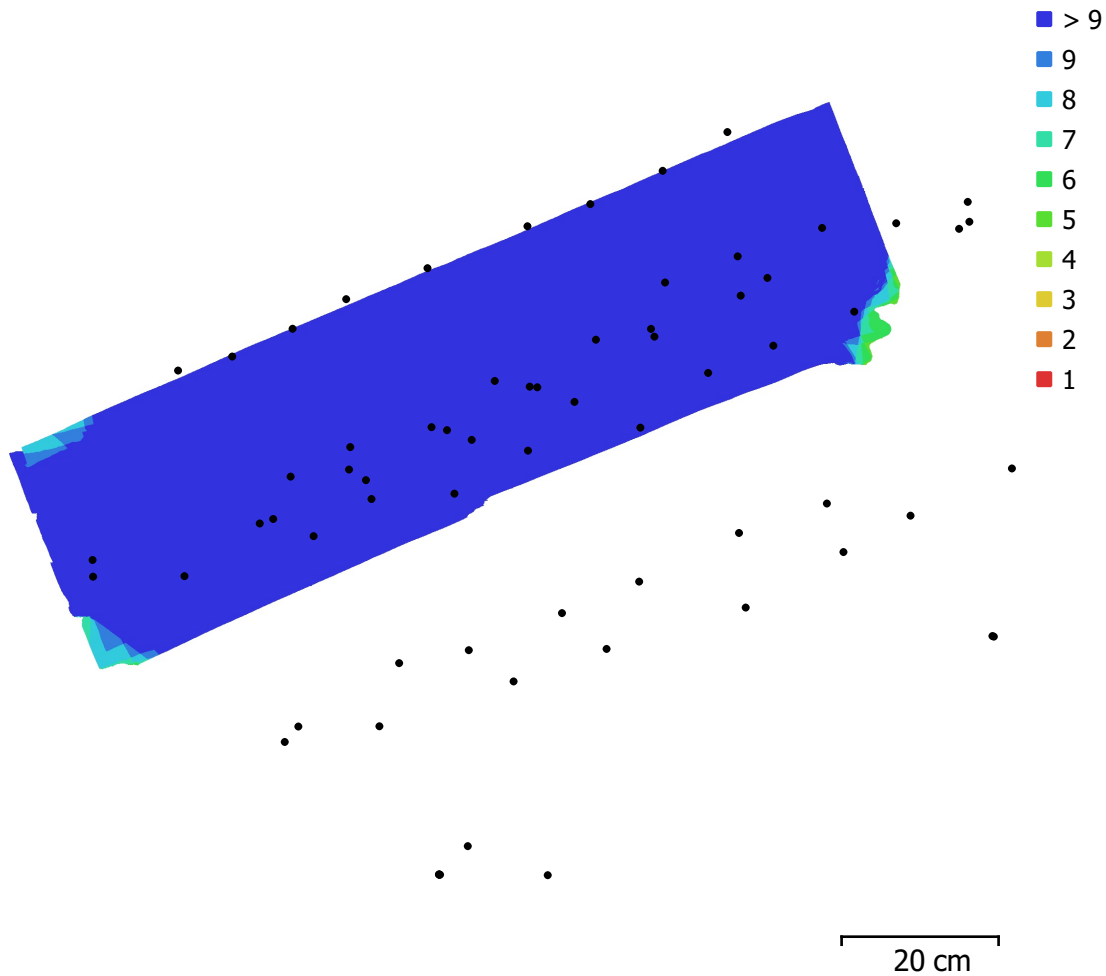


Fig. 1. Camera locations and image overlap.

Number of images:	68	Camera stations:	68
Flying altitude:	43.2 cm	Tie points:	12,181
Ground resolution:	0.0726 mm/pix	Projections:	87,795
Coverage area:	3.45e+03 cm ²	Reprojection error:	1.48 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
NIKON D600 (28 mm)	6034 x 4028	28 mm	5.96 x 5.96 μm	No
NIKON D600 (34 mm)	6034 x 4028	34 mm	5.96 x 5.96 μm	No
NIKON D600 (40 mm)	6034 x 4028	40 mm	5.96 x 5.96 μm	No
NIKON D600 (31 mm)	4028 x 6034	31 mm	5.96 x 5.96 μm	No
NIKON D600 (28 mm)	4028 x 6034	28 mm	5.96 x 5.96 μm	No

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
NIKON D600 (34 mm)	4028 x 6034	34 mm	5.96 x 5.96 μm	No
NIKON D600 (48 mm)	6034 x 4028	48 mm	5.96 x 5.96 μm	No
NIKON D600 (35 mm)	6034 x 4028	35 mm	5.96 x 5.96 μm	No
NIKON D600 (31 mm)	6034 x 4028	31 mm	5.96 x 5.96 μm	No

Table 1. Cameras.

Camera Calibration

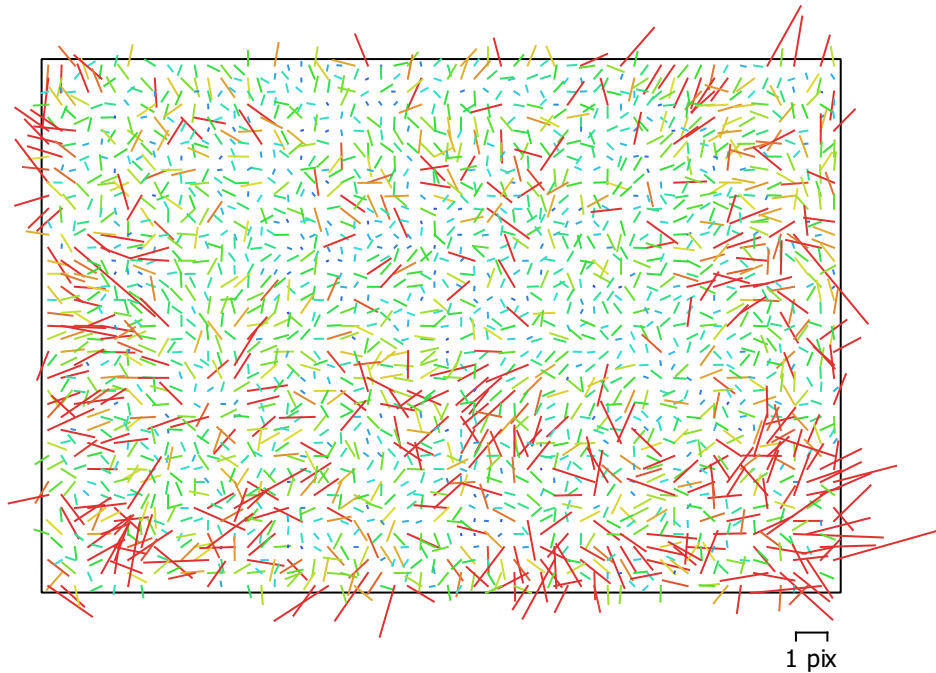


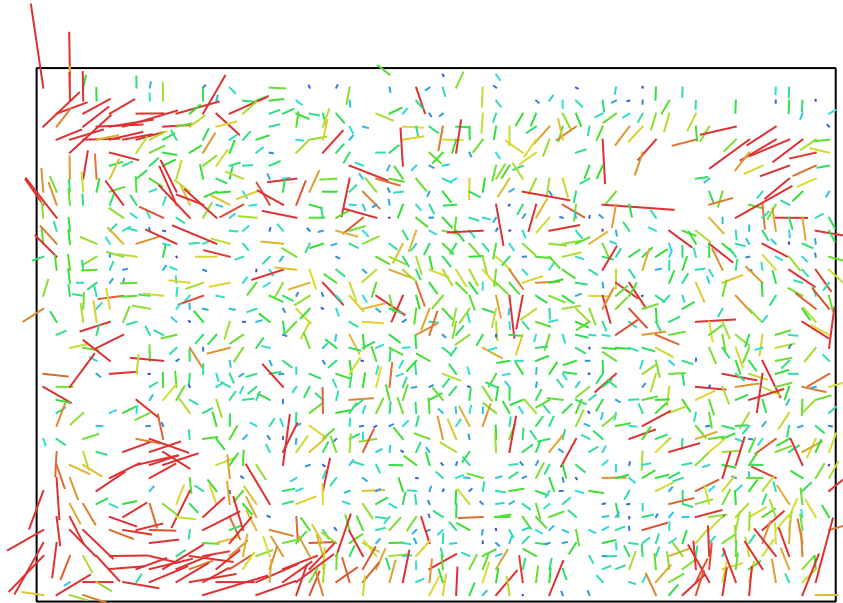
Fig. 2. Image residuals for NIKON D600 (28 mm).

NIKON D600 (28 mm)

24 images

Type	Resolution	Focal Length	Pixel Size
Frame	6034 x 4028	28 mm	5.96 x 5.96 μm
F:	4788.15		
Cx:	20.6488	B1:	7.24091
Cy:	10.9348	B2:	2.39403
K1:	-0.121753	P1:	0.000239254
K2:	0.0557381	P2:	-3.03369e-06
K3:	-0.02969	P3:	0
K4:	0	P4:	0

Camera Calibration



3 pix

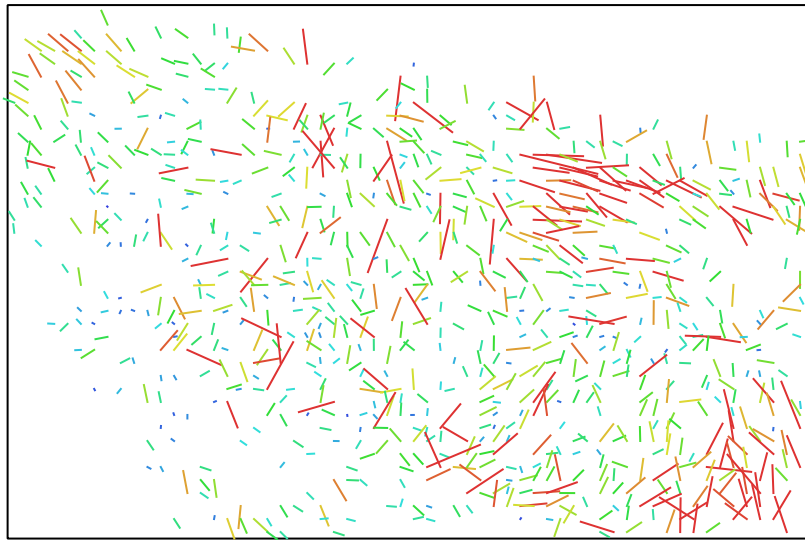
Fig. 3. Image residuals for NIKON D600 (34 mm).

NIKON D600 (34 mm)

2 images

Type	Resolution	Focal Length	Pixel Size
Frame	6034 x 4028	34 mm	5.96 x 5.96 μm
F:	5633.02		
Cx:	55.6679	B1:	-4.3006
Cy:	-43.2193	B2:	1.15574
K1:	-0.0797095	P1:	0.00224033
K2:	-0.103445	P2:	0.000469967
K3:	0.247197	P3:	0
K4:	0	P4:	0

Camera Calibration



2 pix

Fig. 4. Image residuals for NIKON D600 (40 mm).

NIKON D600 (40 mm)

1 images

Type	Resolution	Focal Length	Pixel Size
Frame	6034 x 4028	40 mm	5.96 x 5.96 μm
F:	6481.4		
Cx:	73.469	B1:	3.12744
Cy:	-27.8096	B2:	-1.55714
K1:	-0.0732272	P1:	0.00272985
K2:	-0.0114353	P2:	6.21694e-05
K3:	0.018484	P3:	0
K4:	0	P4:	0

Camera Calibration

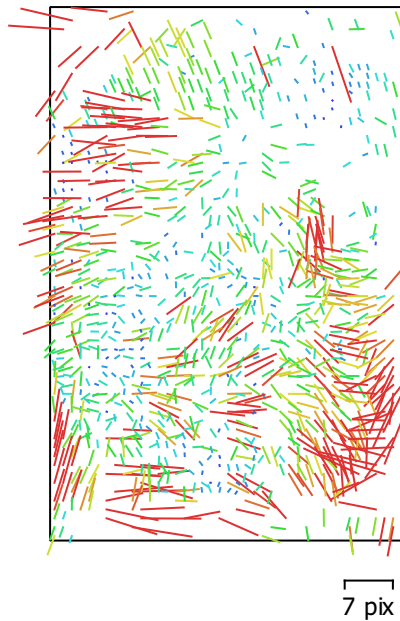


Fig. 5. Image residuals for NIKON D600 (31 mm).

NIKON D600 (31 mm)

2 images

Type	Resolution	Focal Length	Pixel Size
Frame	4028 x 6034	31 mm	5.96 x 5.96 μm
F:	5148.93		
Cx:	-0.319273	B1:	-3.34931
Cy:	20.2959	B2:	27.6429
K1:	-0.0647357	P1:	-0.000745877
K2:	-0.186705	P2:	0.00330766
K3:	0.312831	P3:	0
K4:	0	P4:	0

Camera Calibration

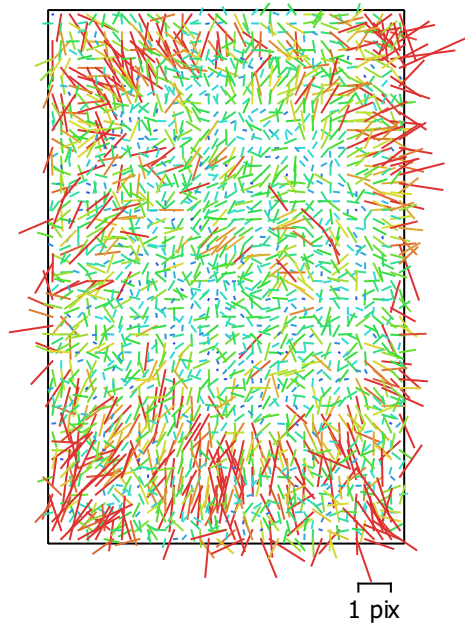


Fig. 6. Image residuals for NIKON D600 (28 mm).

NIKON D600 (28 mm)

32 images

Type	Resolution	Focal Length	Pixel Size
Frame	4028 x 6034	28 mm	5.96 x 5.96 μm
F:	4808.28		
Cx:	-3.84861	B1:	-2.70577
Cy:	-14.7895	B2:	-4.1473
K1:	-0.120577	P1:	0.000135064
K2:	0.0536242	P2:	-2.56604e-05
K3:	-0.0312886	P3:	0
K4:	0	P4:	0

Camera Calibration

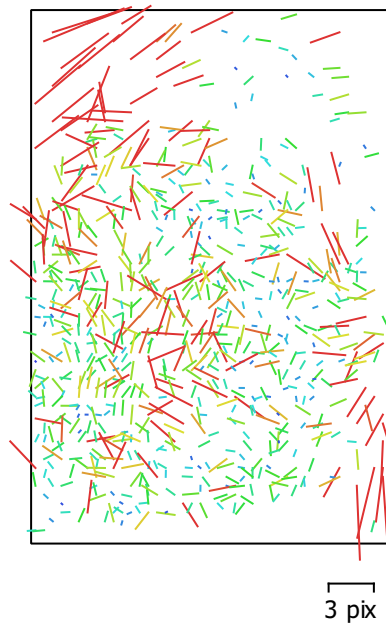


Fig. 7. Image residuals for NIKON D600 (34 mm).

NIKON D600 (34 mm)

1 images

Type	Resolution	Focal Length	Pixel Size
Frame	4028 x 6034	34 mm	5.96 x 5.96 μm
F:	5414.16		
Cx:	-5.97982	B1:	-2.23495
Cy:	-27.5277	B2:	13.4001
K1:	-0.0892388	P1:	-0.000652975
K2:	-0.0190343	P2:	-0.000139228
K3:	0.0648747	P3:	0
K4:	0	P4:	0

Camera Calibration

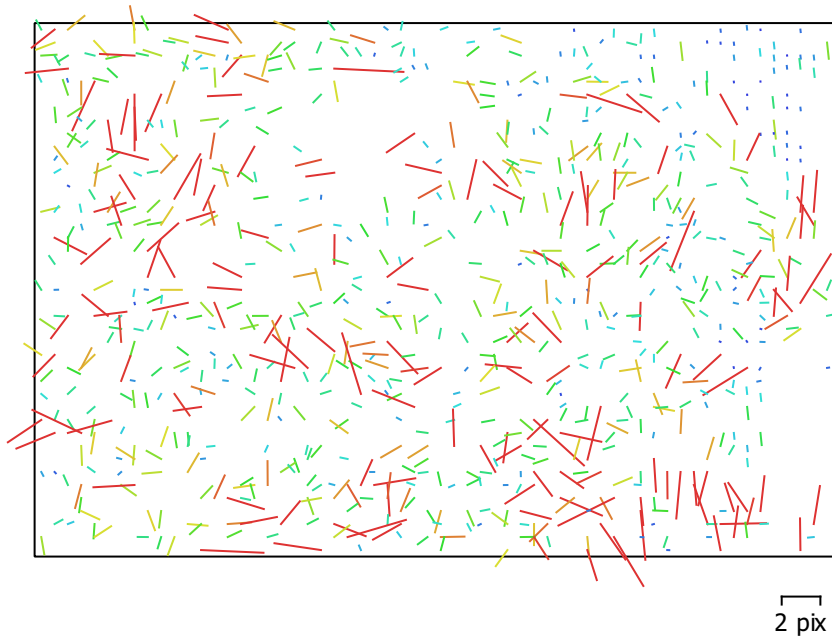


Fig. 8. Image residuals for NIKON D600 (48 mm).

NIKON D600 (48 mm)

1 images

Type	Resolution	Focal Length	Pixel Size
Frame	6034 x 4028	48 mm	5.96 x 5.96 μm
F:	7485.36		
Cx:	37.2761	B1:	16.1276
Cy:	-4.74227	B2:	6.95657
K1:	-0.0847809	P1:	0.00100937
K2:	0.285735	P2:	0.000234044
K3:	-0.776043	P3:	0
K4:	0	P4:	0

Camera Calibration

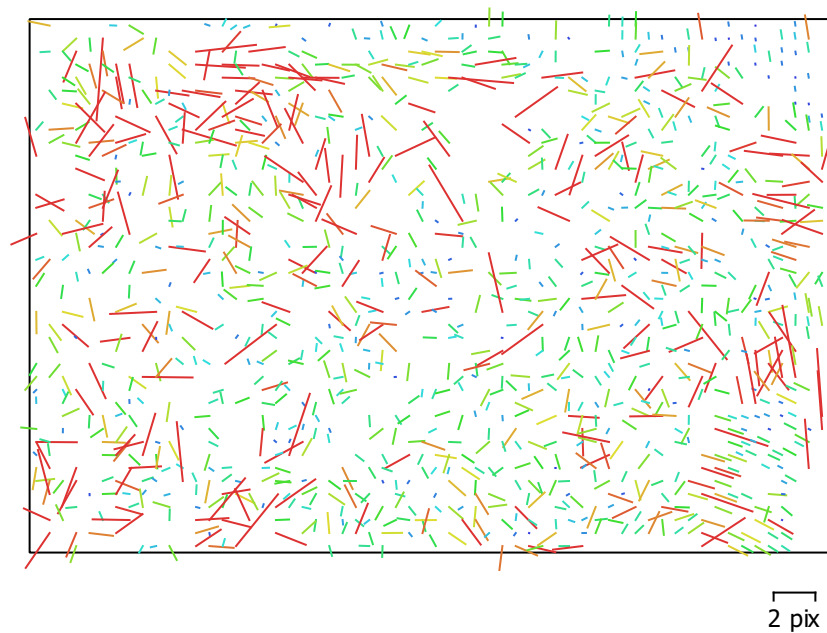


Fig. 9. Image residuals for NIKON D600 (35 mm).

NIKON D600 (35 mm)

1 images

Type	Resolution	Focal Length	Pixel Size
Frame	6034 x 4028	35 mm	5.96 x 5.96 μm
F:	5656.42		
Cx:	45.7552	B1:	8.51852
Cy:	-6.3112	B2:	1.20248
K1:	-0.100314	P1:	0.00172493
K2:	0.028863	P2:	0.000362011
K3:	0.0360234	P3:	0
K4:	0	P4:	0

Camera Calibration

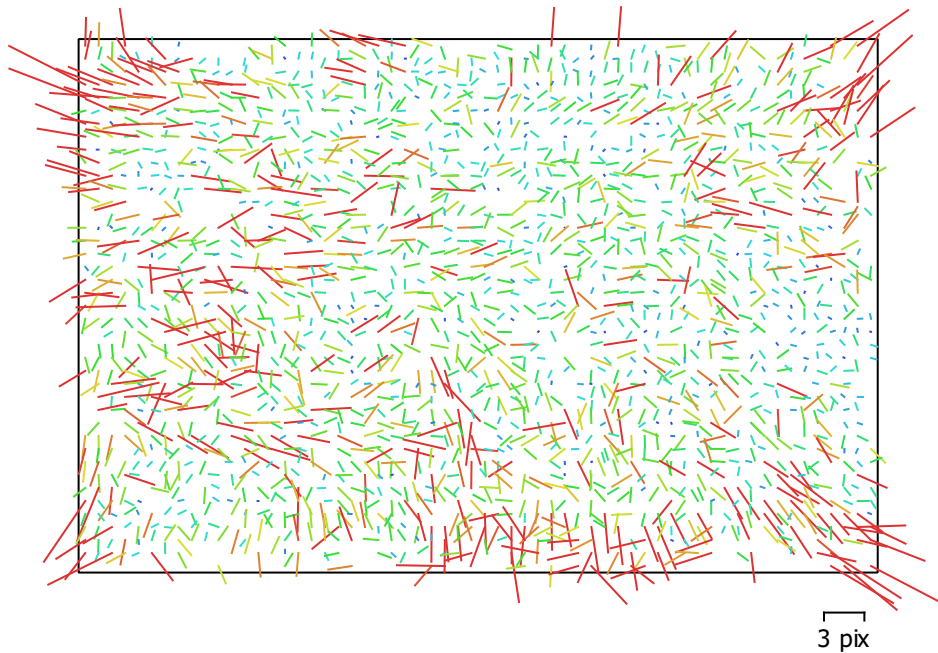


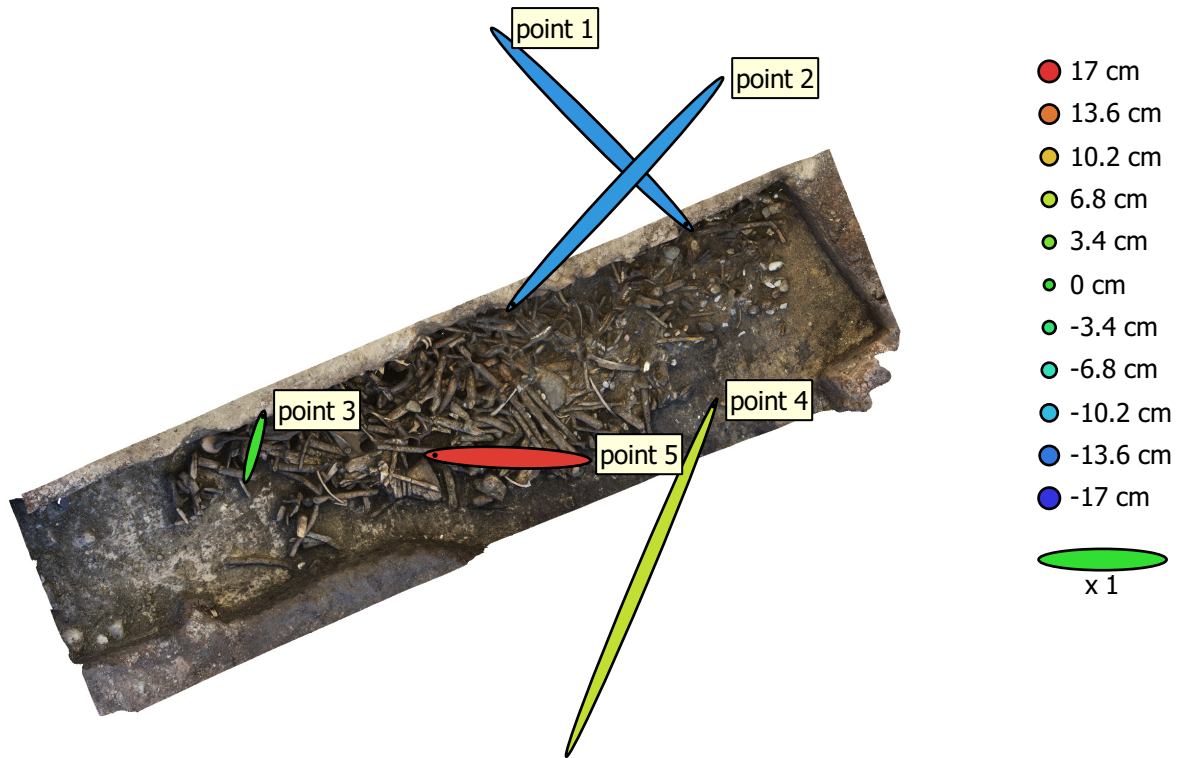
Fig. 10. Image residuals for NIKON D600 (31 mm).

NIKON D600 (31 mm)

4 images

Type	Resolution	Focal Length	Pixel Size
Frame	6034 x 4028	31 mm	5.96 x 5.96 μm
F:	5144.8		
Cx:	14.4313	B1:	10.0927
Cy:	26.6105	B2:	0.242119
K1:	-0.116938	P1:	0.000143208
K2:	0.0813871	P2:	-8.29289e-05
K3:	-0.052122	P3:	0
K4:	0	P4:	0

Ground Control Points



● Control points

⊕ Check points

20 cm

Fig. 11. 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)
5	19.6608	25.8897	11.0916	32.5088	34.3489

Table 2. Control points RMSE.

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
point 1	23.9733	-24.1586	-12.209	36.1582	0.437 (26)
point 2	-25.9412	-28.0592	-11.9477	40.0376	0.913 (27)
point 3	2.0574	7.7889	0.554271	8.07509	0.422 (28)
point 4	18.4056	43.8106	7.08652	48.0454	0.553 (36)
point 5	-18.4951	0.618207	16.516	24.8038	0.421 (18)
Total	19.6608	25.8897	11.0916	34.3489	0.588

Table 3. Control points.

Digital Elevation Model

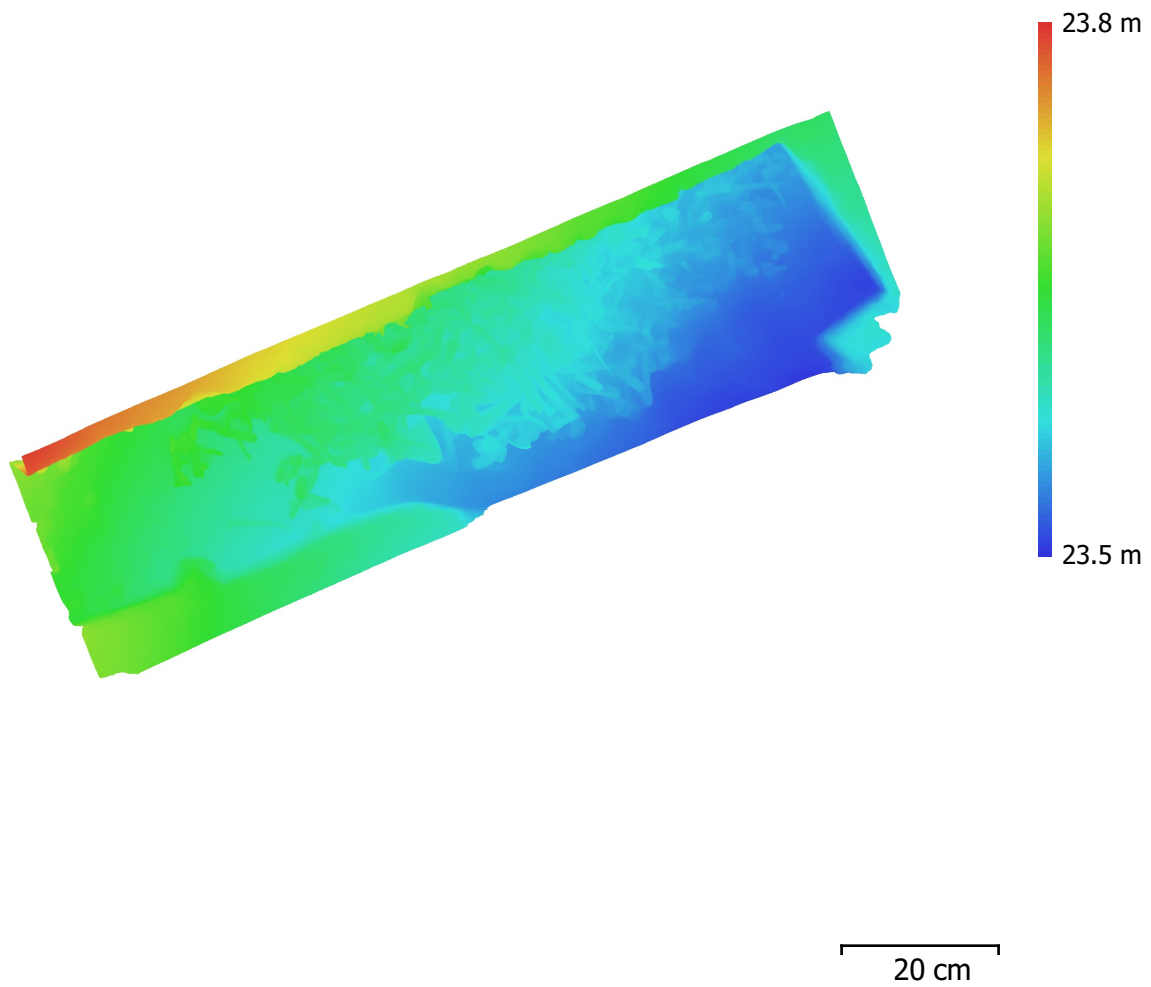


Fig. 12. Reconstructed digital elevation model.

Resolution: 0.145 mm/pix
Point density: $4.74e+04$ points/mm²

Processing Parameters

General

Cameras	68
Aligned cameras	68
Markers	5
Coordinate system	Local Coordinates (m)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	12,181 of 17,521
Point colors	3 bands, uint8
Reprojection error	1.48206 (18.7776 max)
Effective overlap	7.82569

Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	No
Key point limit	70,000
Tie point limit	1,500
Filter points by mask	No
Matching time	6 minutes 49 seconds
Alignment time	8 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k3, p1, p2
Optimization time	1 seconds

Dense Point Cloud

Points	36,968,624
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Dense cloud generation time	11 minutes 54 seconds

Model

Faces	50,000
Vertices	25,352
Vertex colors	3 bands, uint8
Texture	10,000 x 10,000, 4 bands, uint8

Reconstruction parameters

Surface type	Arbitrary
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	20,000,000
Processing time	22 minutes 41 seconds

Texturing parameters

Blending mode	Mosaic
Texture size	10,000 x 10,000
UV mapping time	1 minutes 0 seconds
Blending time	1 minutes 1 seconds

Software

Version	1.4.1 build 5925
Platform	Windows 64