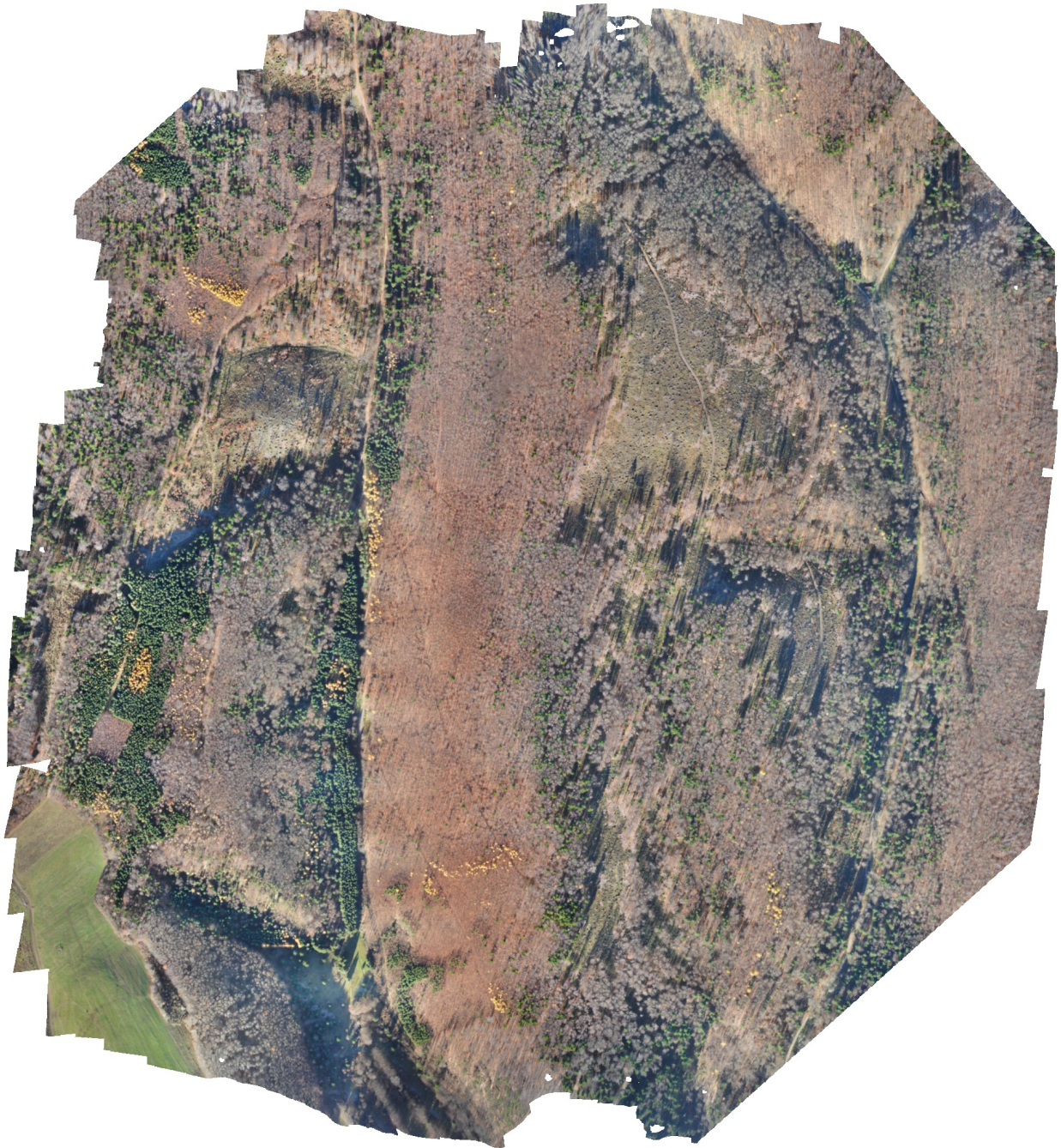


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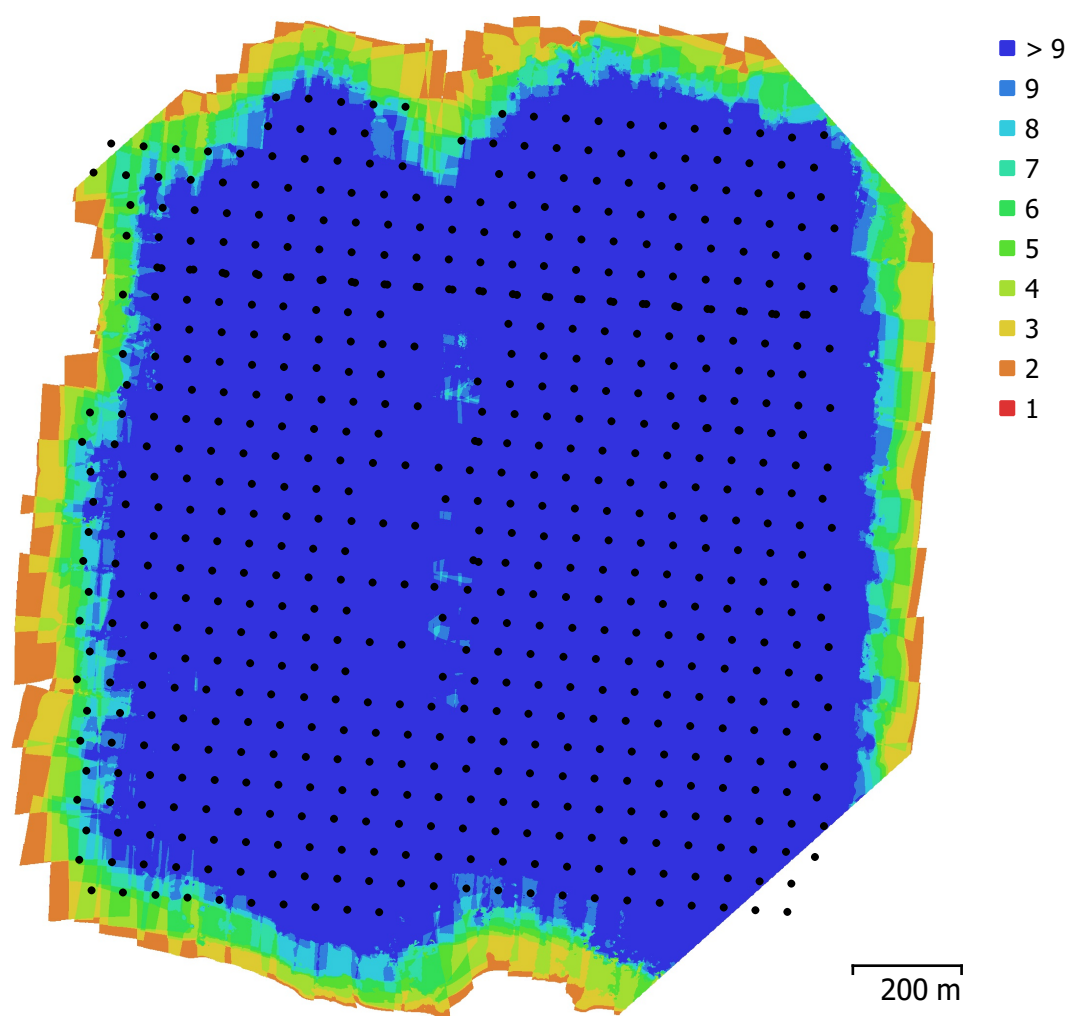


Fig. 1. Camera locations and image overlap.

Number of images:	666	Camera stations:	629
Flying altitude:	284 m	Tie points:	314,006
Ground resolution:	6.08 cm/pix	Projections:	927,913
Coverage area:	2.59 km ²	Reprojection error:	1.4 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

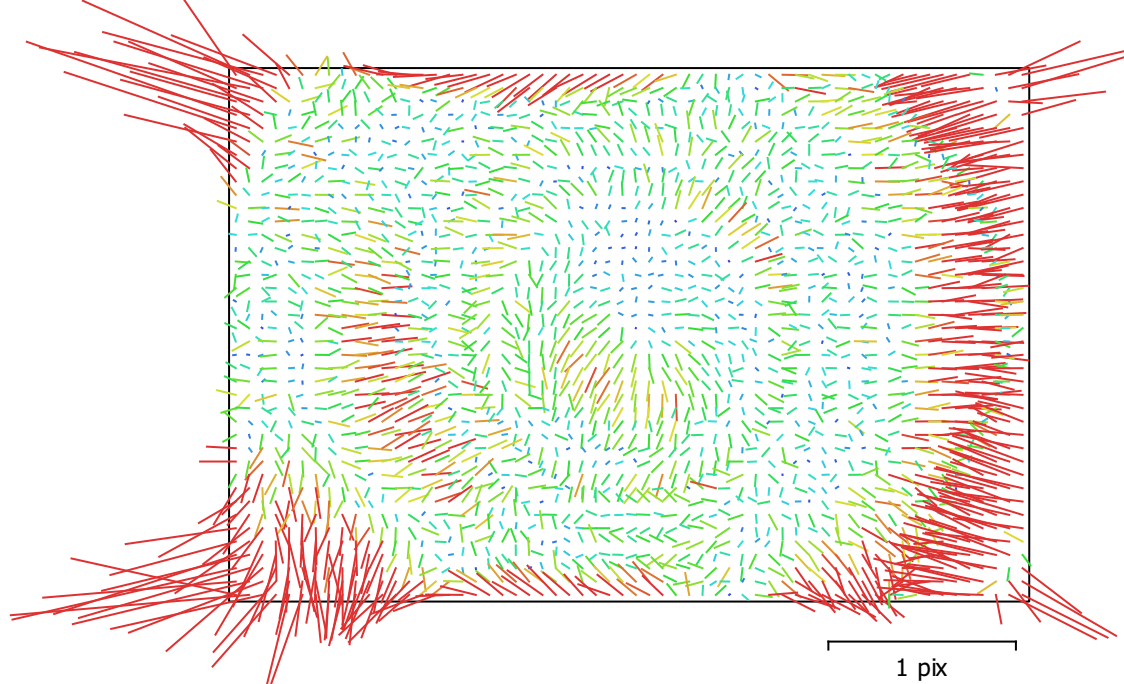


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

666 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4424.89	0.31	1.00	-0.16	-0.90	0.51	-0.32	0.48	-0.04	-0.68
Cx	33.6141	0.05		1.00	0.13	-0.08	0.06	-0.09	0.76	0.09
Cy	-7.24283	0.11			1.00	-0.47	0.30	-0.43	0.02	0.71
K1	0.037316	6.5e-05				1.00	-0.88	0.88	-0.07	-0.64
K2	-0.222243	0.00023					1.00	-0.97	0.03	0.29
K3	0.348734	0.00036						1.00	-0.04	-0.39
P1	0.00203796	3.5e-06							1.00	0.07
P2	-0.000643619	6.8e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

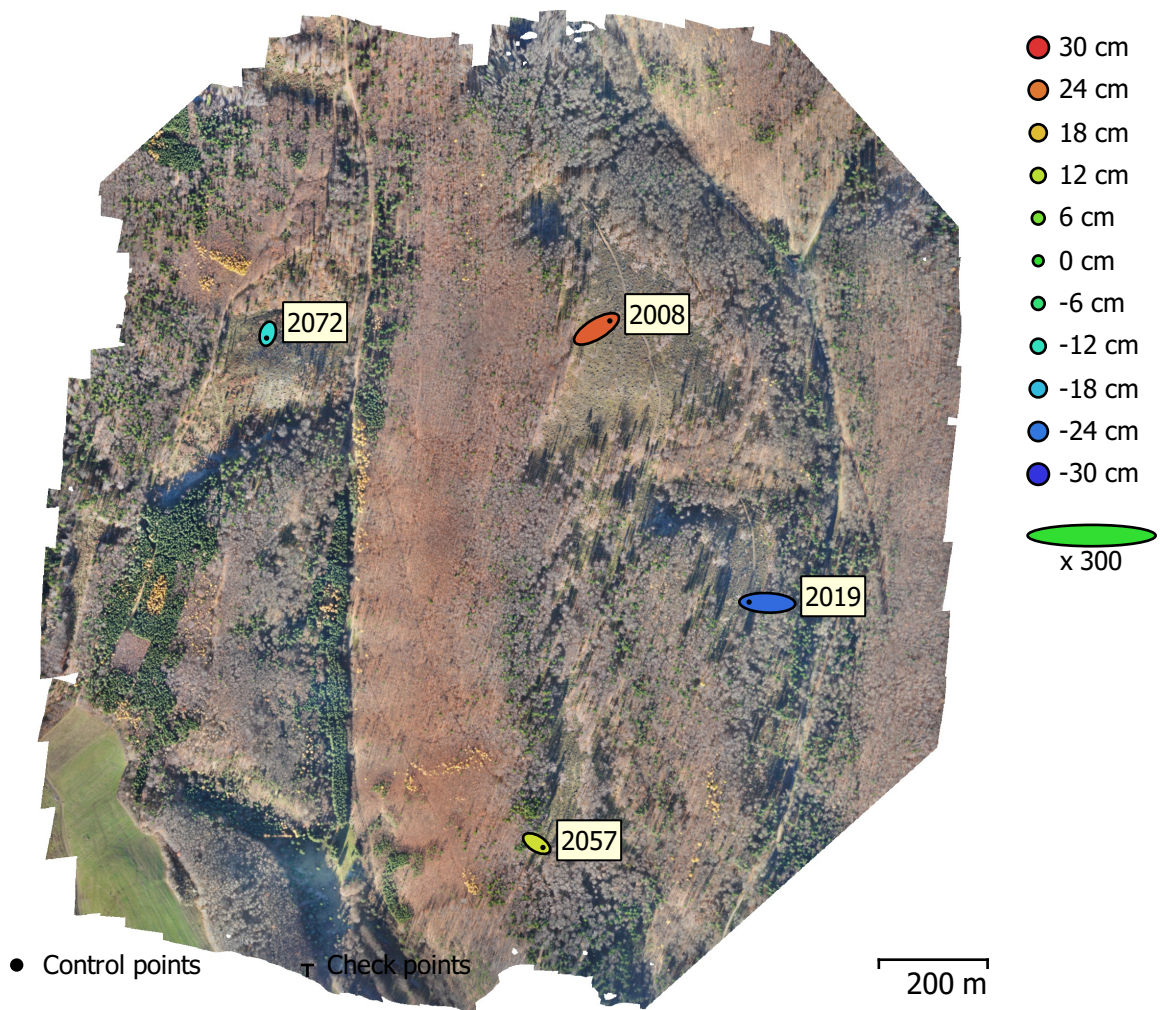


Fig. 3. GCP locations and error estimates.

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)
4	14.3649	6.09928	20.5962	15.6061	25.8409

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)
2019	-22.3092	0.898664	-25.0072	33.5242	0.788 (30)
2057	7.74475	-4.76841	13.7009	16.4448	0.994 (19)
2072	-1.47476	-5.34403	-14.1508	15.1979	1.935 (29)
2008	16.2954	9.83367	26.1437	32.3378	1.700 (28)
Total	14.3649	6.09928	20.5962	25.8409	1.463

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

Digital Elevation Model

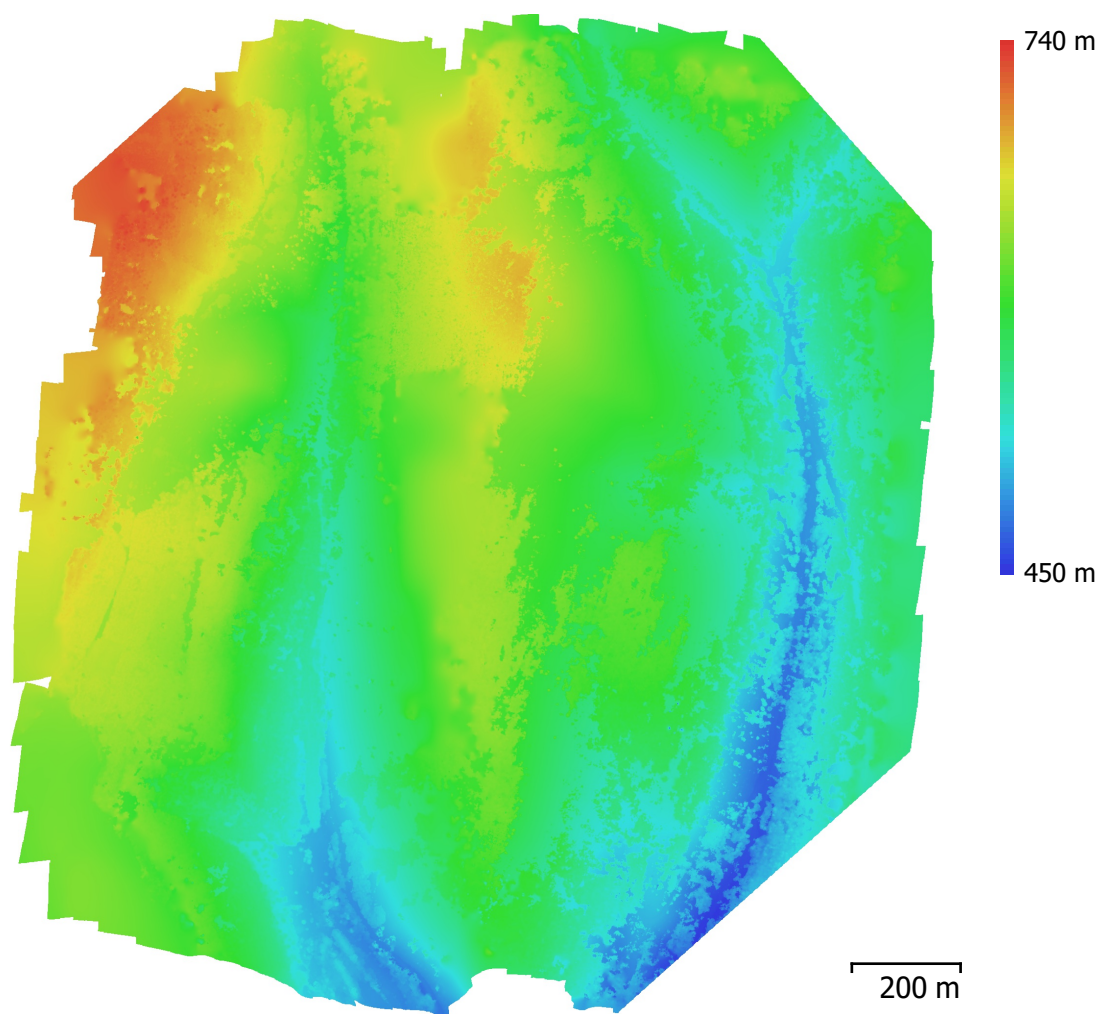


Fig. 4. Reconstructed digital elevation model.

Resolution: 12.2 cm/pix
Point density: 67.7 points/m²

Processing Parameters

General

Cameras	666
Aligned cameras	629
Markers	53
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	314,006 of 340,579
RMS reprojection error	0.136842 (1.39996 pix)
Max reprojection error	0.414278 (38.6274 pix)
Mean key point size	6.86029 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.24267

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	11 minutes 28 seconds
Alignment time	2 minutes 56 seconds

Dense Point Cloud

Points	169,663,543
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	45 minutes 41 seconds
Dense cloud generation time	2 hours 11 minutes

DEM

Size	23,083 x 22,852
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	7 minutes 56 seconds

Orthomosaic

Size	33,999 x 36,888
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8

Reconstruction parameters

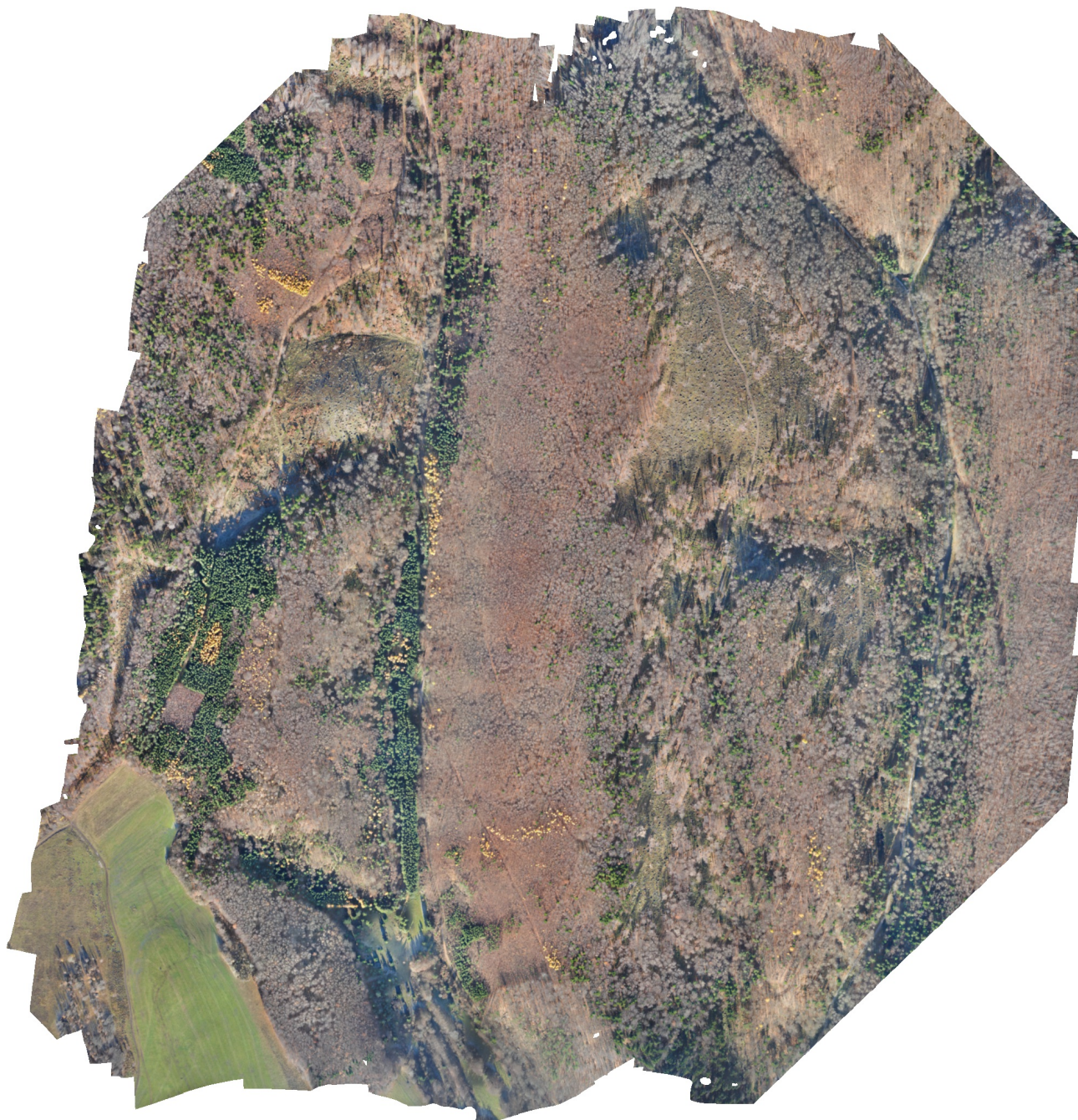
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	49 minutes 21 seconds

Software

Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

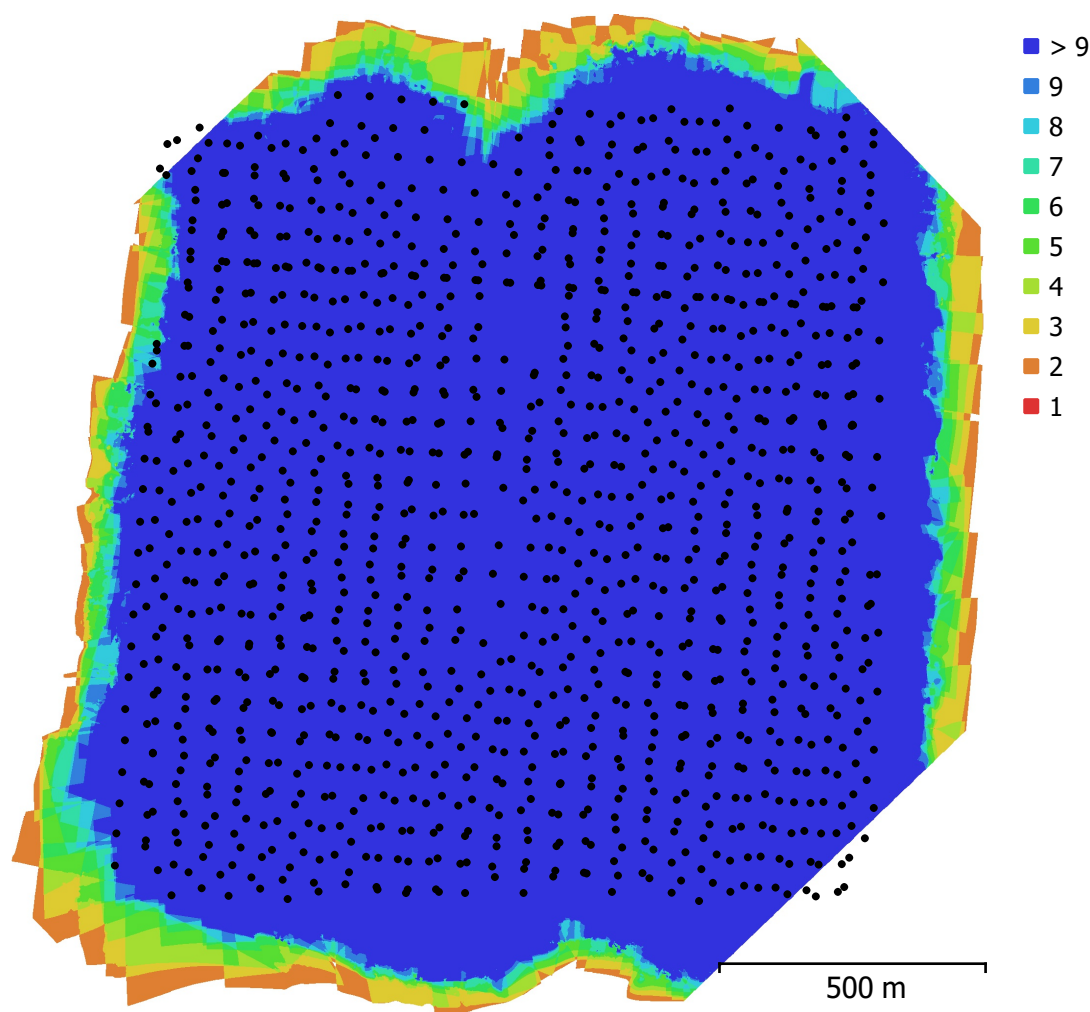


Fig. 1. Camera locations and image overlap.

Number of images:	1,304	Camera stations:	1,234
Flying altitude:	275 m	Tie points:	619,196
Ground resolution:	5.9 cm/pix	Projections:	1,760,536
Coverage area:	2.75 km ²	Reprojection error:	1.38 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

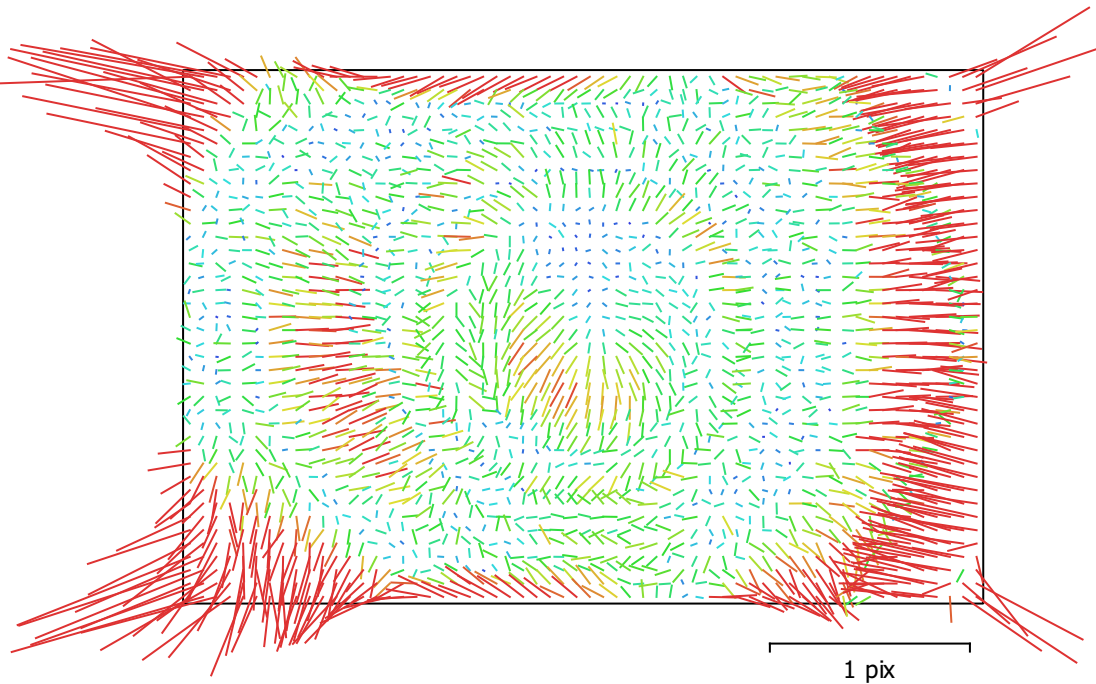


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

1304 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4413.96	0.19	1.00	-0.08	-0.89	0.40	-0.23	0.38	-0.02	-0.59
Cx	34.0752	0.035		1.00	0.07	-0.03	0.03	-0.04	0.78	0.03
Cy	-2.55662	0.069			1.00	-0.40	0.23	-0.35	0.01	0.71
K1	0.0364536	4.3e-05				1.00	-0.90	0.88	-0.03	-0.52
K2	-0.220101	0.00017					1.00	-0.97	0.02	0.21
K3	0.344549	0.00025						1.00	-0.02	-0.29
P1	0.00210201	2.4e-06							1.00	0.02
P2	-0.00054399	4.1e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

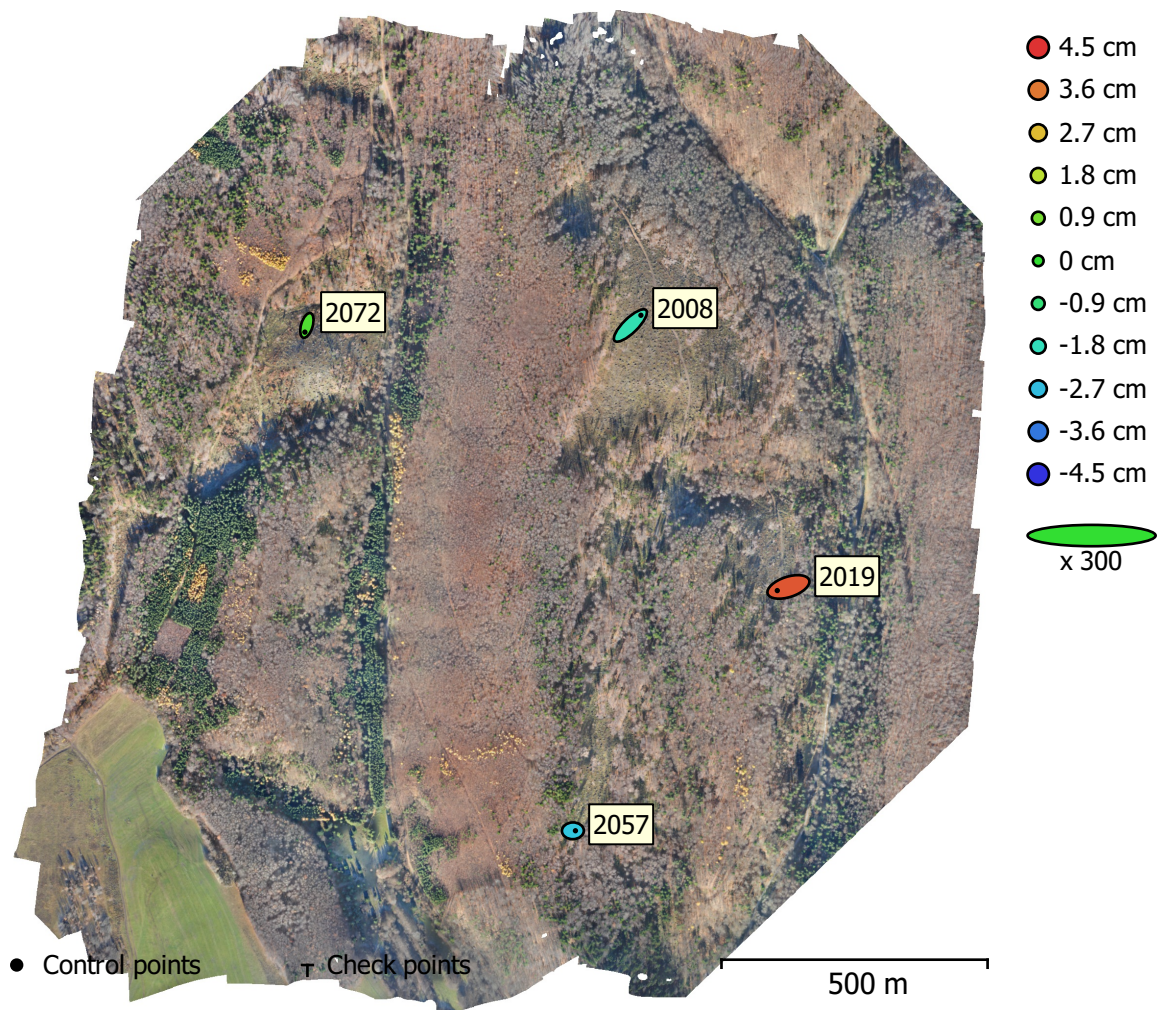


Fig. 3. GCP locations and error estimates.

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)
4	9.80166	8.00505	2.53893	12.6552	12.9073

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)
2019	-13.9584	-4.57616	4.03679	15.2339	1.224 (46)
2057	3.22404	0.0904312	-2.56042	4.11806	1.975 (36)
2072	-2.50396	-8.40915	0.393774	8.78286	1.768 (47)
2008	13.145	12.832	-1.66679	18.4453	1.575 (41)
Total	9.80166	8.00505	2.53893	12.9073	1.641

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

Digital Elevation Model

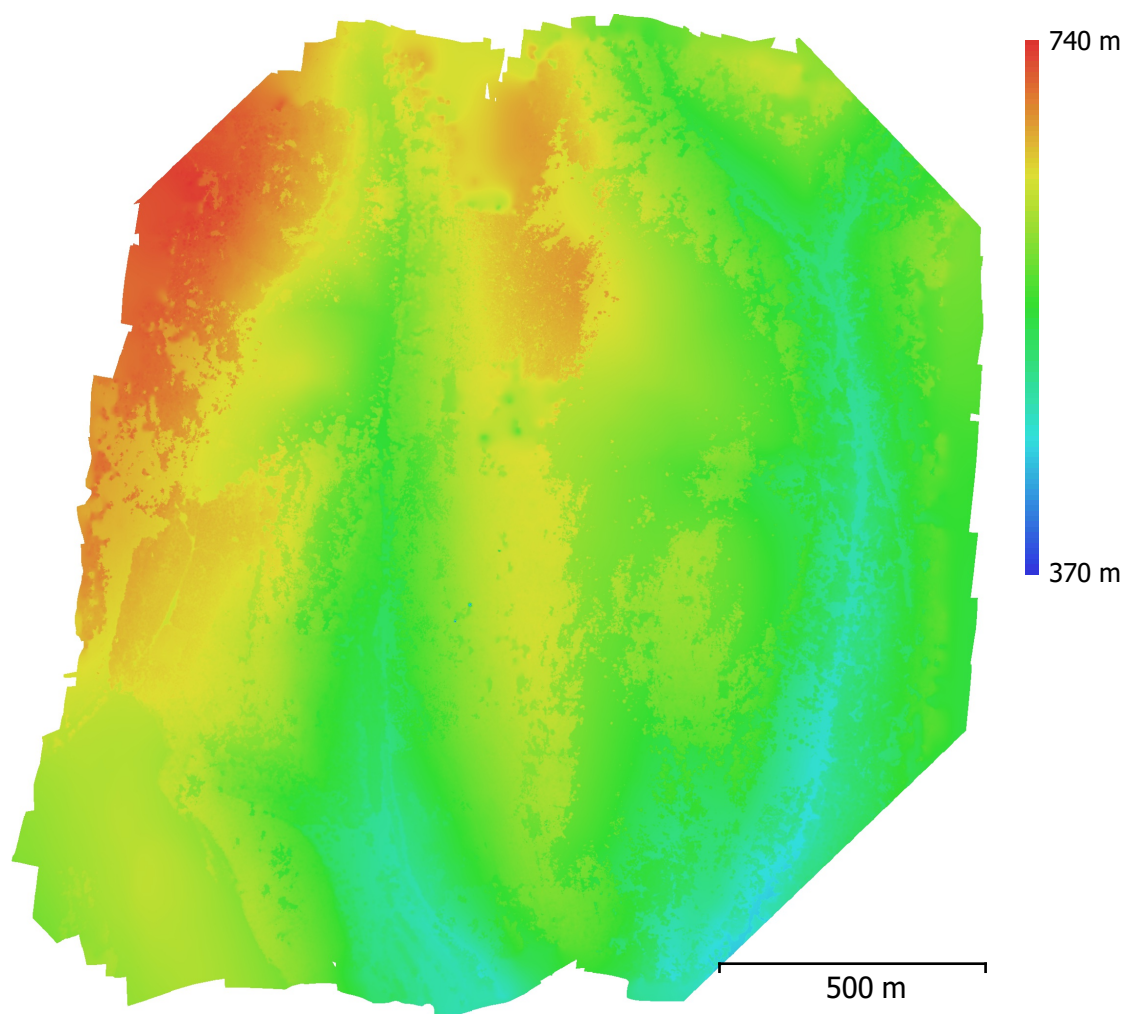


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.8 cm/pix
Point density: 71.8 points/m²

Processing Parameters

General

Cameras	1304
Aligned cameras	1234
Markers	53
Shapes	
Points	49
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	619,196 of 673,857
RMS reprojection error	0.135637 (1.37579 pix)
Max reprojection error	0.411709 (38.391 pix)
Mean key point size	6.77067 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.17312

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	24 minutes 58 seconds
Alignment time	8 minutes 3 seconds

Dense Point Cloud

Points	219,658,739
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	1 hours 41 minutes
Dense cloud generation time	10 hours 5 minutes

DEM

Size	23,893 x 23,793
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	9 minutes 24 seconds

Orthomosaic

Size	36,527 x 37,684
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8

Reconstruction parameters

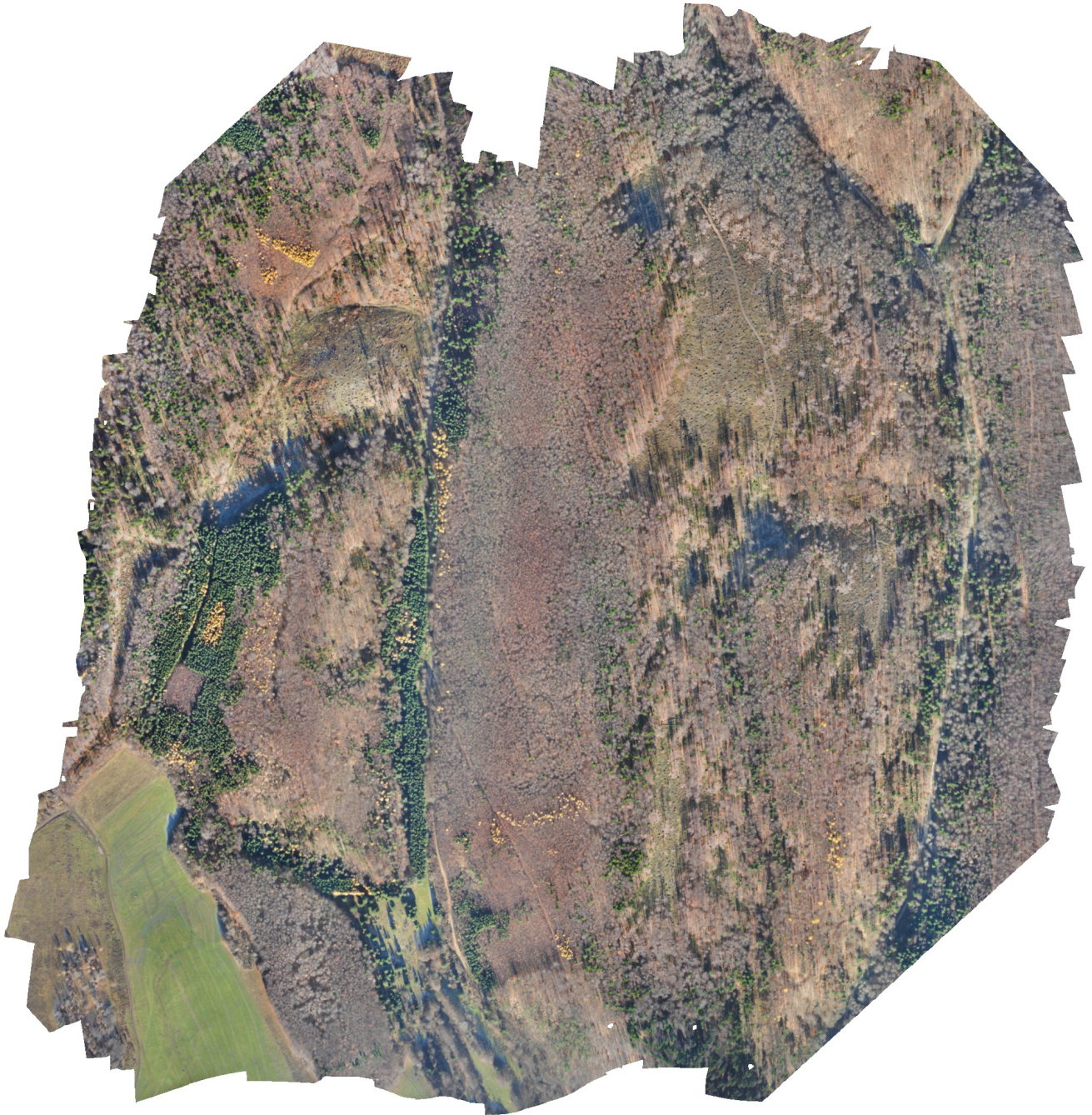
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	1 hours 39 minutes

Software

Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

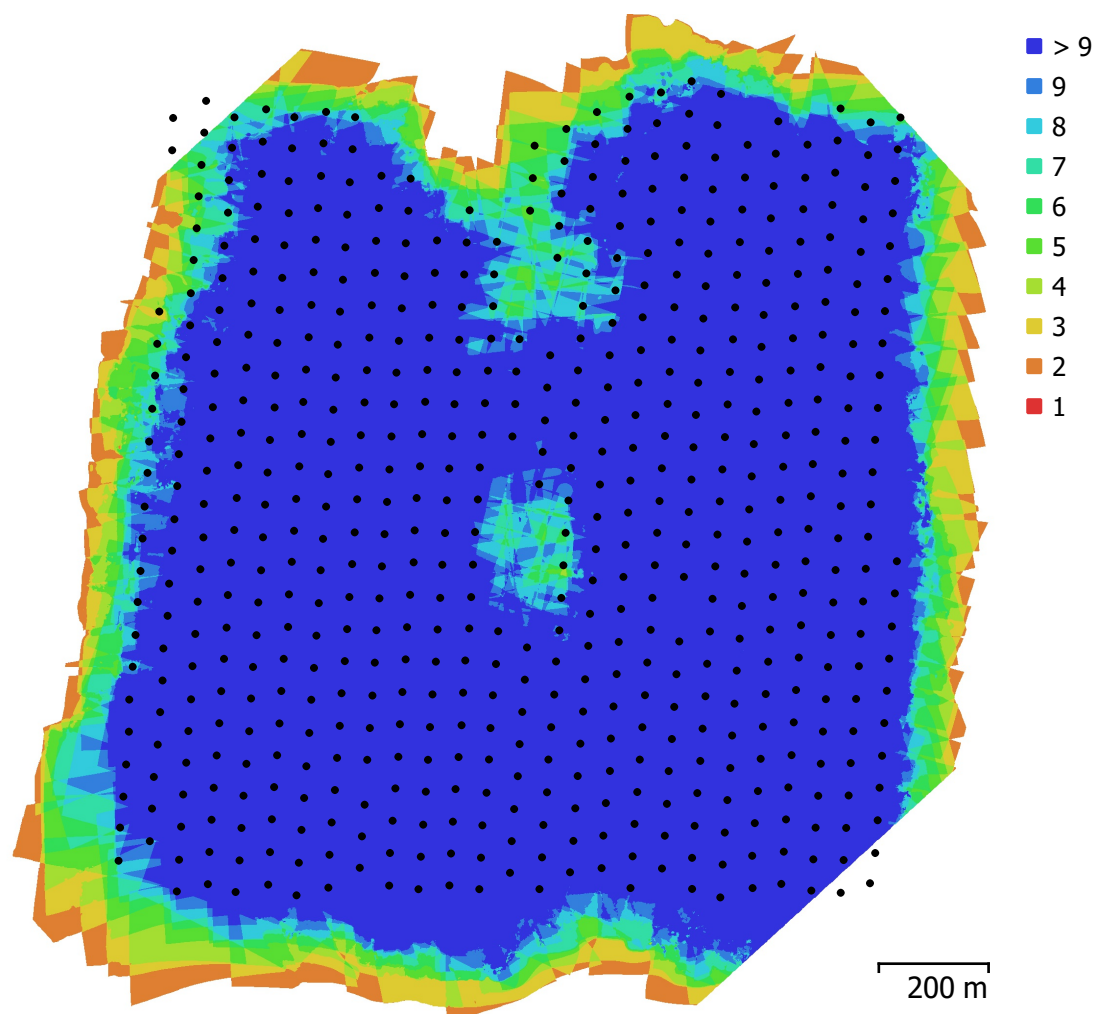


Fig. 1. Camera locations and image overlap.

Number of images:	638	Camera stations:	596
Flying altitude:	268 m	Tie points:	306,112
Ground resolution:	5.75 cm/pix	Projections:	843,321
Coverage area:	2.55 km ²	Reprojection error:	1.21 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

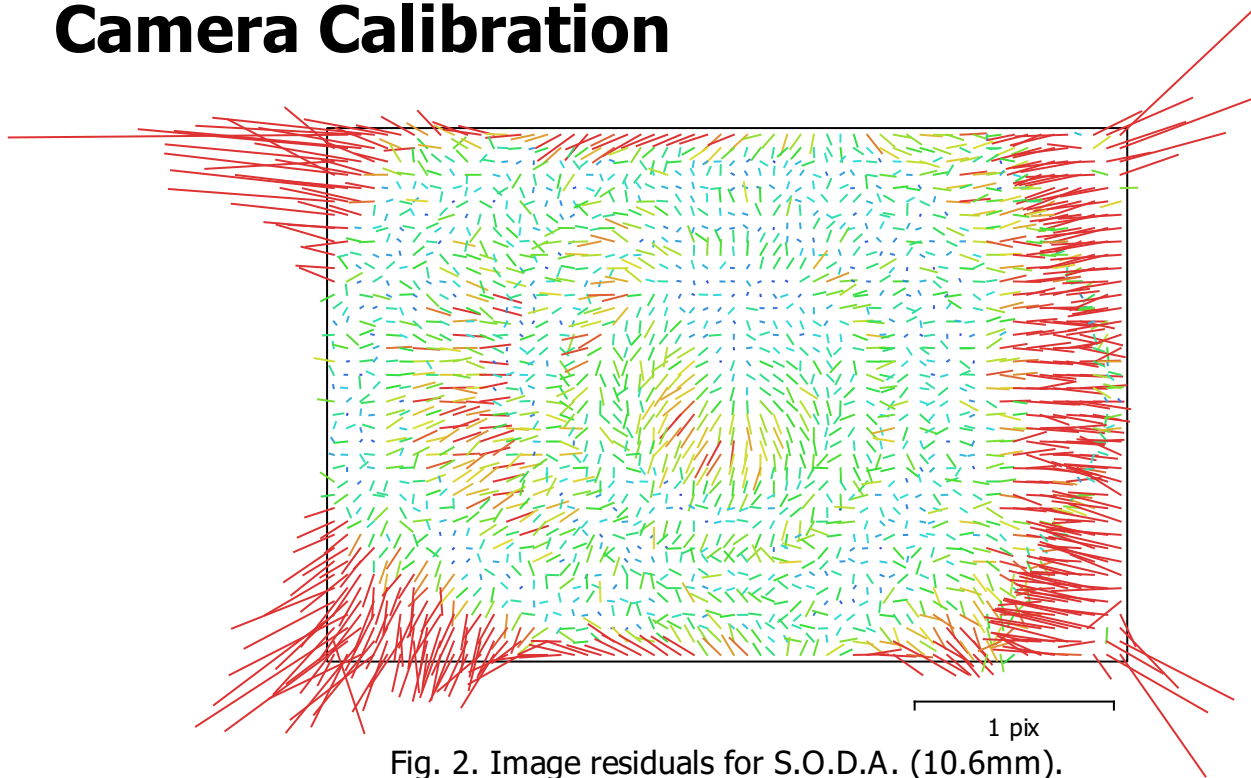


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

638 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4409.35	0.26	1.00	-0.02	-0.87	0.38	-0.23	0.37	0.01	-0.52
Cx	34.8338	0.05		1.00	0.02	-0.02	0.02	-0.01	0.77	0.00
Cy	-0.457769	0.095			1.00	-0.36	0.22	-0.33	0.00	0.68
K1	0.0360783	6.3e-05				1.00	-0.89	0.87	-0.02	-0.50
K2	-0.221124	0.00025					1.00	-0.97	0.02	0.20
K3	0.346367	0.00036						1.00	-0.02	-0.27
P1	0.00218068	3.3e-06							1.00	-0.00
P2	-0.000463496	5.8e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

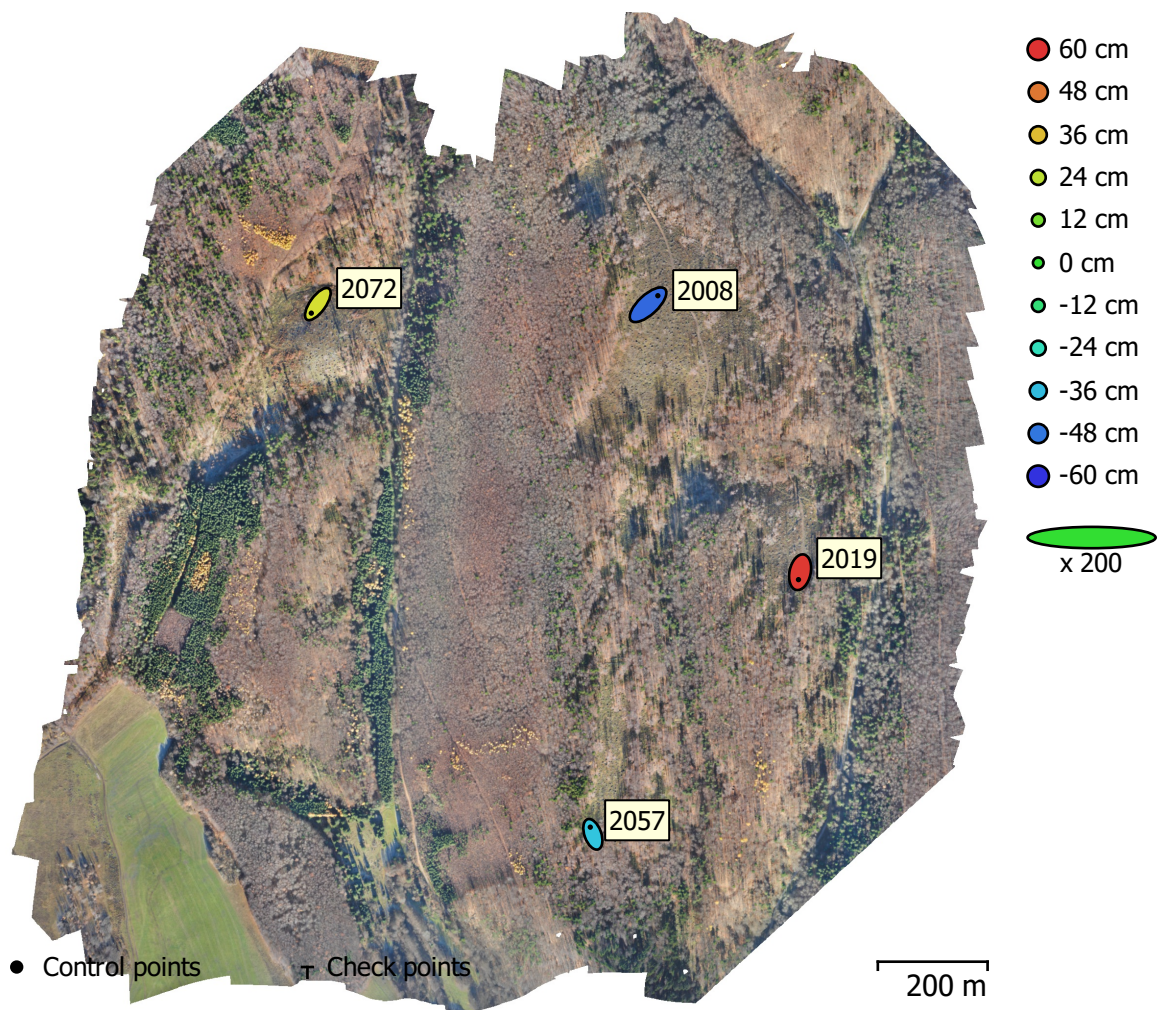


Fig. 3. GCP locations and error estimates.

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)
4	11.0855	14.9785	44.7236	18.6344	48.4504

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)
2019	-2.94242	-13.4894	58.7768	60.3766	1.585 (16)
2057	-4.69158	13.0392	-34.2684	36.9642	1.992 (17)
2072	-11.904	-16.5272	28.4067	34.9541	1.760 (18)
2008	17.8655	16.5011	-50.644	56.1807	1.142 (13)
Total	11.0855	14.9785	44.7236	48.4504	1.679

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

Digital Elevation Model

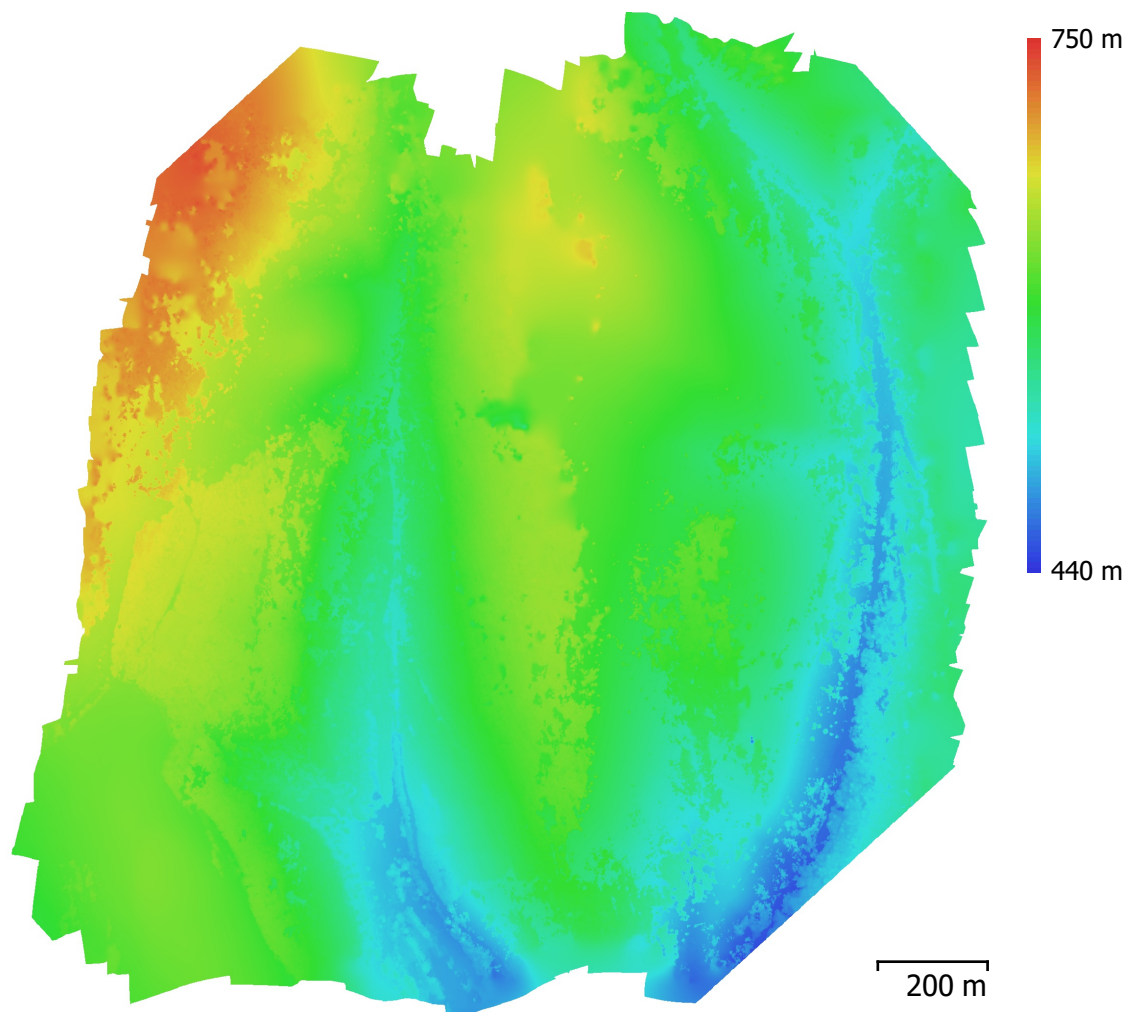


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.5 cm/pix
Point density: 75.6 points/m²

Processing Parameters

General

Cameras	638
Aligned cameras	596
Markers	52
Shapes	
Points	48
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	306,112 of 329,909
RMS reprojection error	0.130229 (1.21194 pix)
Max reprojection error	0.394479 (31.2169 pix)
Mean key point size	6.43199 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.94761

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	10 minutes 8 seconds
Alignment time	1 minutes 40 seconds

Dense Point Cloud

Points	168,562,147
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	32 minutes 50 seconds
Dense cloud generation time	1 hours 49 minutes

DEM

Size	24,240 x 24,024
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	7 minutes 54 seconds

Orthomosaic

Size	35,590 x 36,547
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8

Reconstruction parameters

Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	48 minutes 1 seconds

Software

Version	1.4.3 build 6488
Platform	Windows 64

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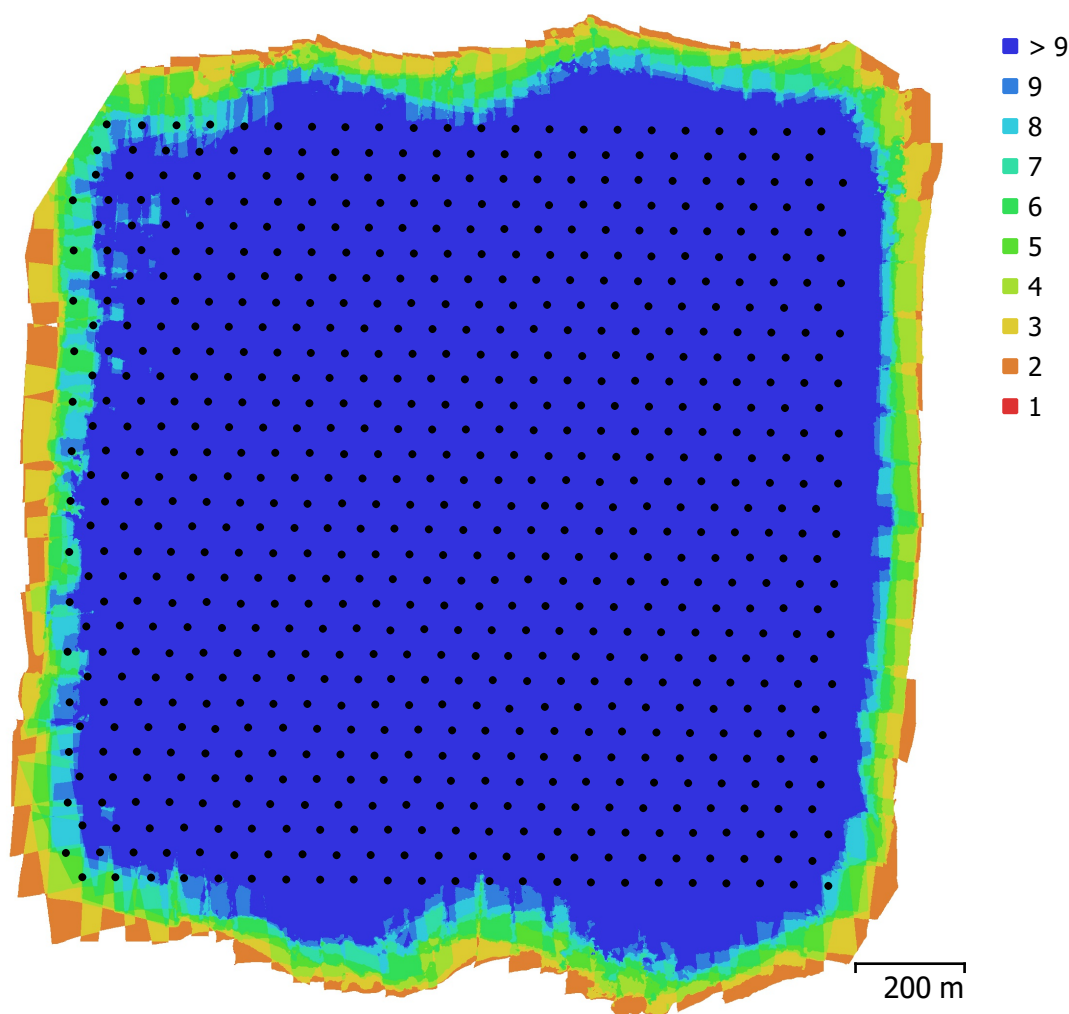


Fig. 1. Camera locations and image overlap.

Number of images:	711	Camera stations:	711
Flying altitude:	281 m	Tie points:	646,957
Ground resolution:	5.99 cm/pix	Projections:	1,782,844
Coverage area:	2.73 km ²	Reprojection error:	1.47 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

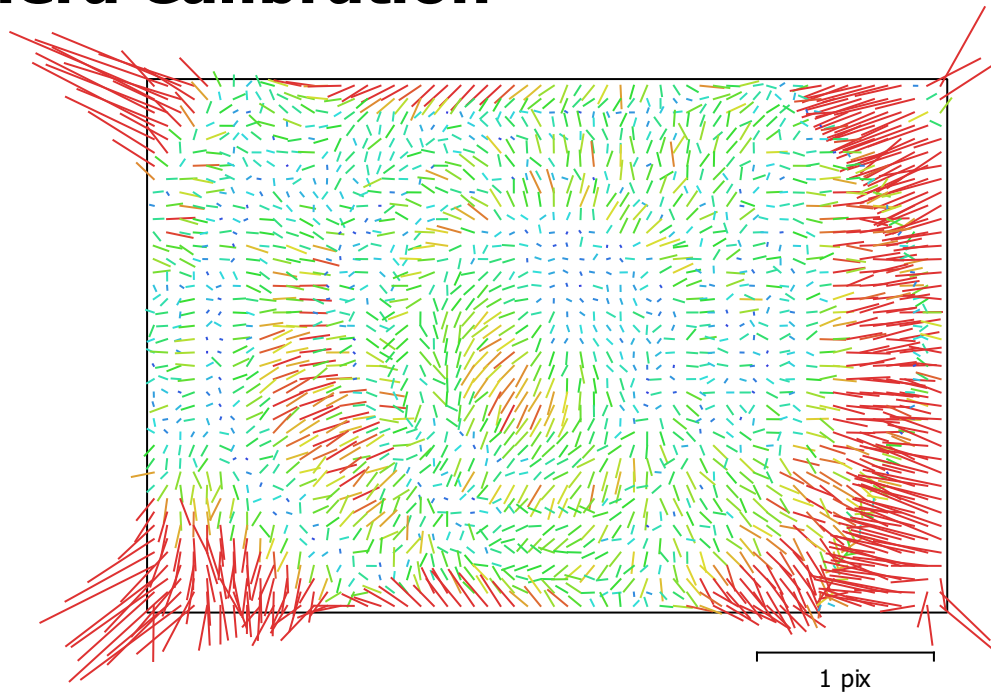


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

711 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4416.45	0.19	1.00	0.00	-0.93	0.36	-0.23	0.36	0.04	-0.57
Cx	31.2661	0.035		1.00	0.00	-0.00	0.02	-0.03	0.82	-0.00
Cy	-4.40095	0.08			1.00	-0.35	0.24	-0.35	-0.03	0.57
K1	0.0351003	4.7e-05				1.00	-0.91	0.88	0.02	-0.54
K2	-0.211374	0.00019					1.00	-0.98	0.01	0.21
K3	0.329525	0.00027						1.00	-0.01	-0.29
P1	0.00188508	2.4e-06							1.00	-0.04
P2	-0.000528579	4.8e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

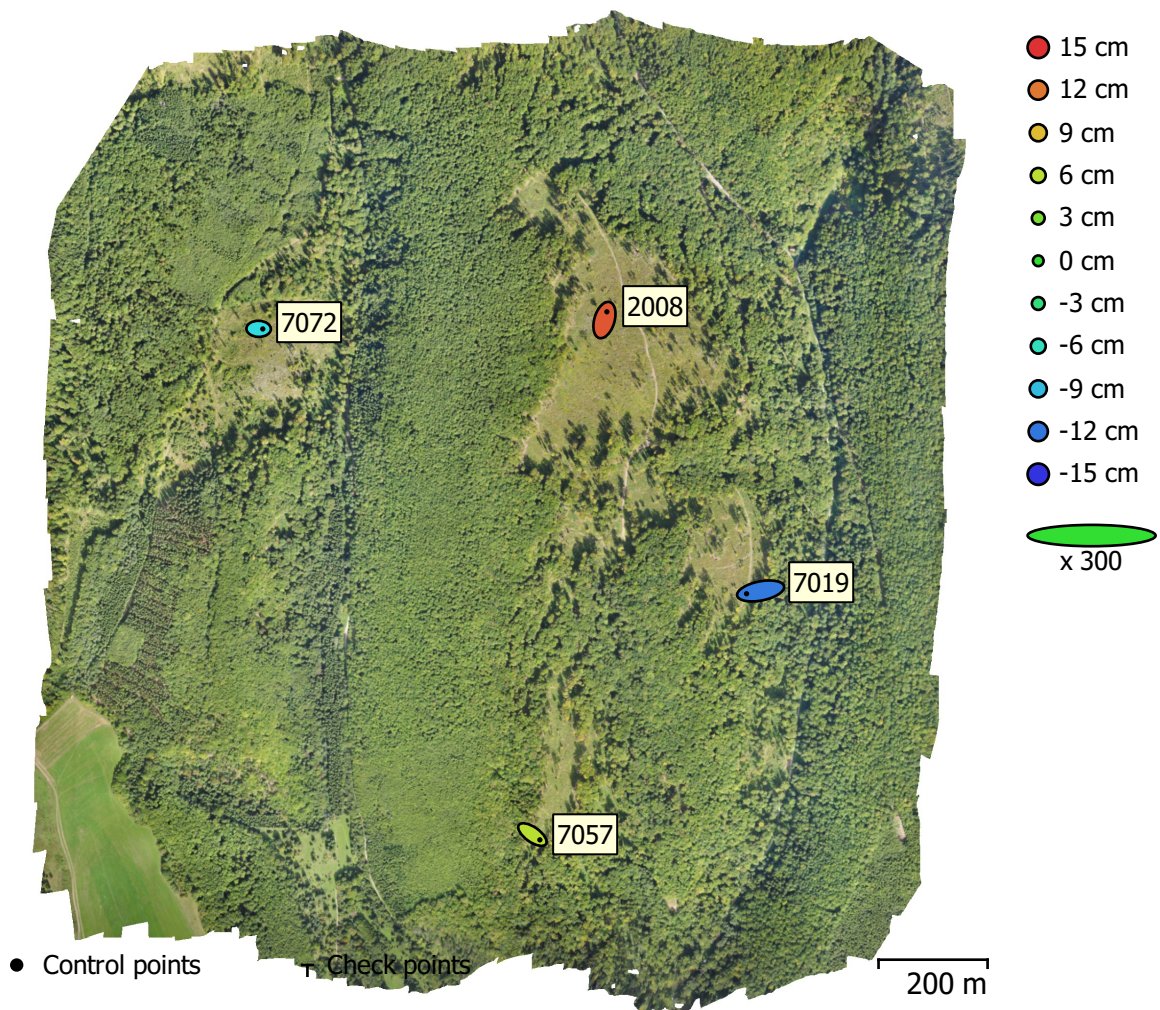


Fig. 3. GCP locations and error estimates.

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)
4	10.1794	6.22731	10.1689	11.9331	15.6782

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)
7019	-17.2042	-3.41372	-11.8789	21.1836	1.283 (41)
7057	9.15526	-6.46247	5.85308	12.6428	1.272 (21)
7072	5.073	-0.14462	-7.6346	9.16752	0.833 (26)
2008	2.99003	10.0836	13.4154	17.0468	1.372 (28)
Total	10.1794	6.22731	10.1689	15.6782	1.218

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

Digital Elevation Model

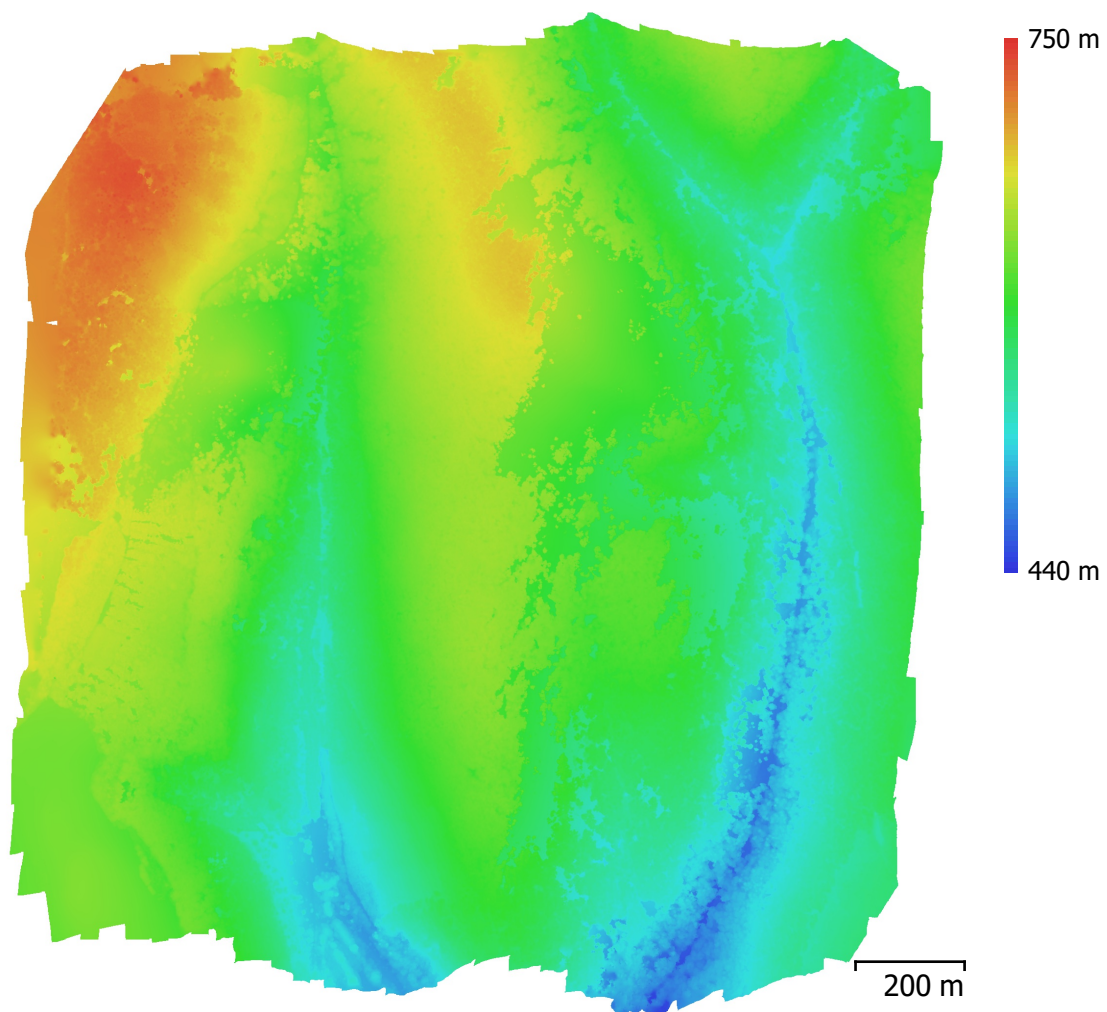


Fig. 4. Reconstructed digital elevation model.

Resolution: 12 cm/pix
Point density: 69.8 points/m²

Processing Parameters

General

Cameras	711
Aligned cameras	711
Markers	51
Shapes	
Points	47
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	646,957 of 689,953
RMS reprojection error	0.141571 (1.46993 pix)
Max reprojection error	0.427775 (38.2463 pix)
Mean key point size	7.52557 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.98887

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	14 minutes 29 seconds
Alignment time	2 minutes 28 seconds

Dense Point Cloud

Points	303,834,414
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	1 hours 32 minutes
Dense cloud generation time	5 hours 9 minutes

DEM

Size	24,032 x 24,538
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	7 minutes 15 seconds

Orthomosaic

Size	28,612 x 30,730
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8

Reconstruction parameters

Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	49 minutes 57 seconds

Software

Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

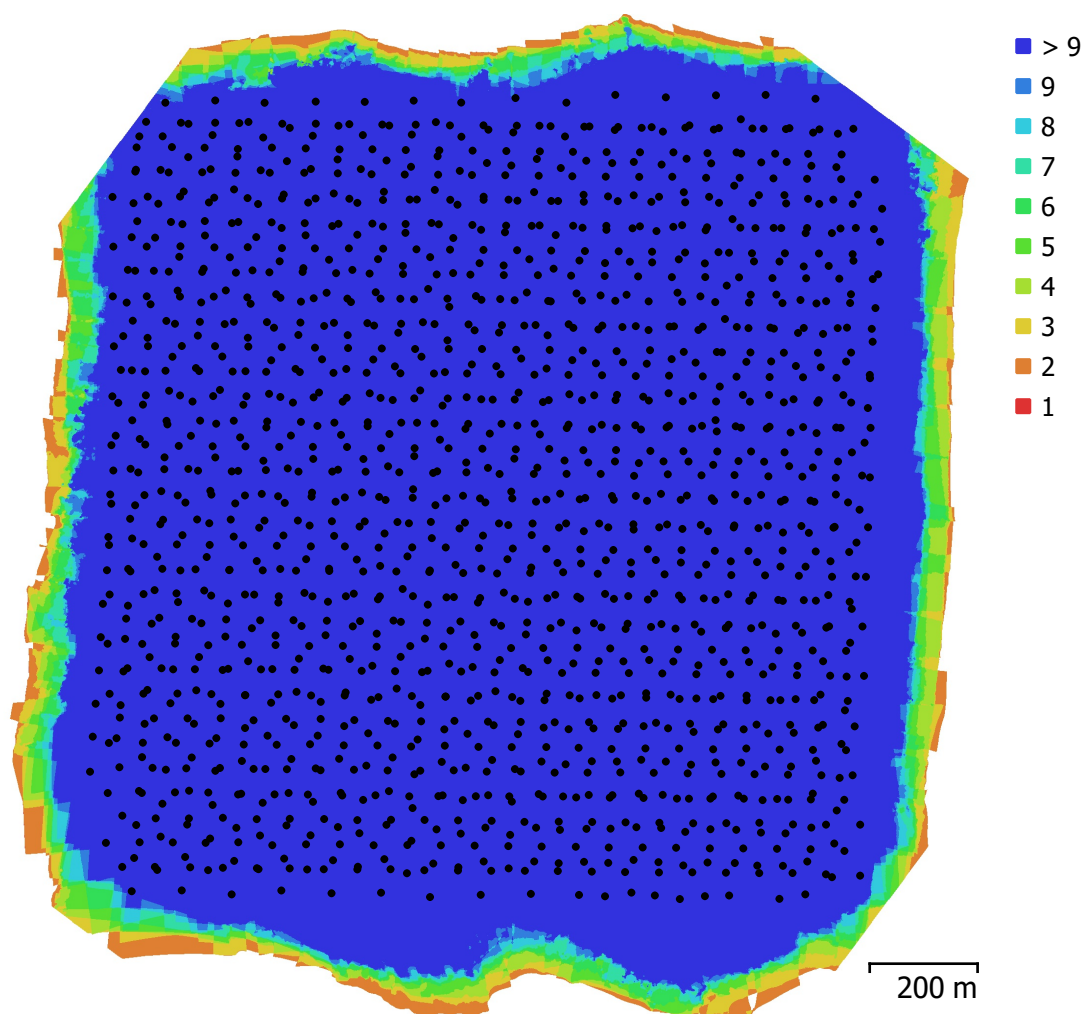


Fig. 1. Camera locations and image overlap.

Number of images:	1,446	Camera stations:	1,446
Flying altitude:	268 m	Tie points:	1,172,221
Ground resolution:	5.74 cm/pix	Projections:	3,180,109
Coverage area:	2.81 km ²	Reprojection error:	1.51 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

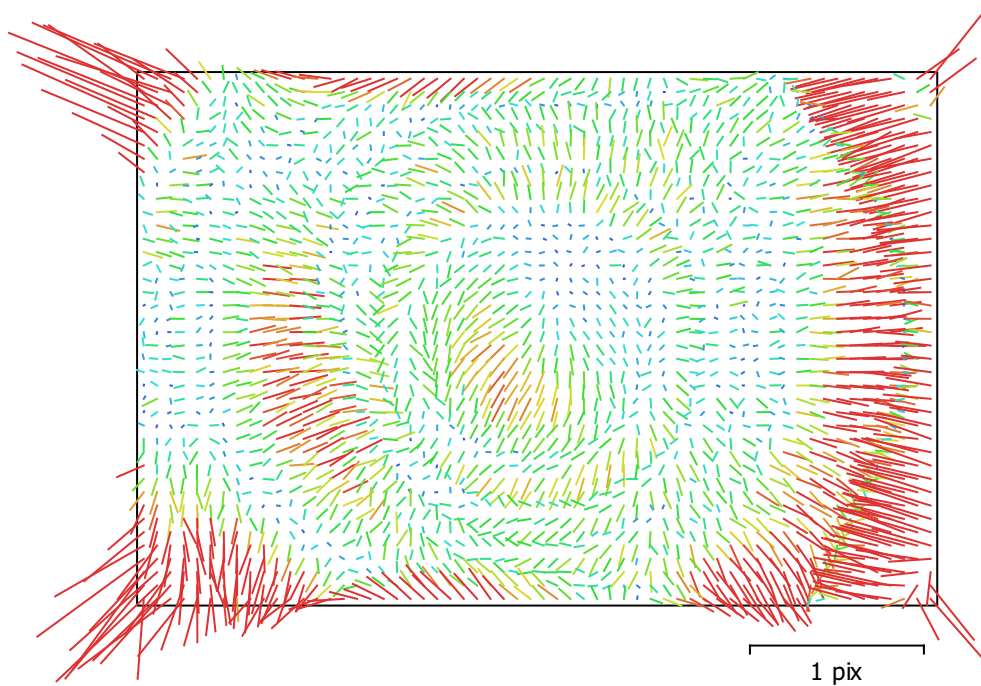


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

1446 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4411.74	0.12	1.00	0.07	-0.91	0.31	-0.15	0.27	0.07	-0.64
Cx	31.0336	0.026		1.00	-0.06	0.02	0.00	0.00	0.84	-0.05
Cy	-2.00312	0.051			1.00	-0.34	0.18	-0.28	-0.06	0.70
K1	0.0350585	3.5e-05				1.00	-0.93	0.90	0.04	-0.46
K2	-0.209429	0.00014					1.00	-0.98	-0.00	0.19
K3	0.326375	0.0002						1.00	0.01	-0.25
P1	0.00186957	1.9e-06							1.00	-0.08
P2	-0.000579939	3.1e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

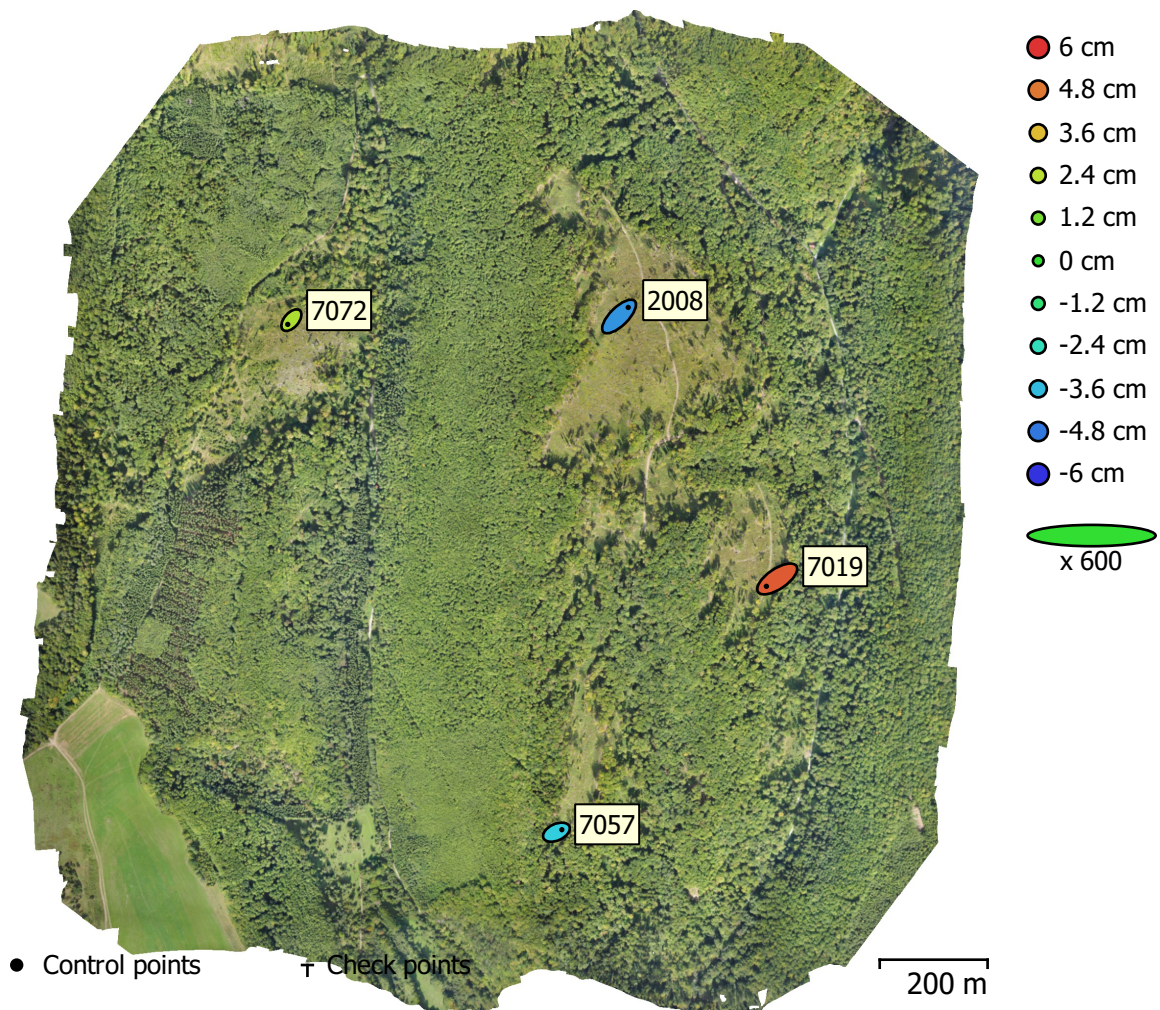


Fig. 3. GCP locations and error estimates.

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)
4	4.82616	3.91178	3.93428	6.2124	7.3534

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)
7019	-6.69302	-4.54192	5.30849	9.675	2.728 (61)
7057	3.35853	1.53759	-3.27117	4.93401	1.645 (46)
7072	-2.26584	-2.61762	2.15634	4.0787	1.895 (48)
2008	5.65306	5.60028	-4.28764	9.03903	7.811 (42)
Total	4.82616	3.91178	3.93428	7.3534	4.101

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

Digital Elevation Model

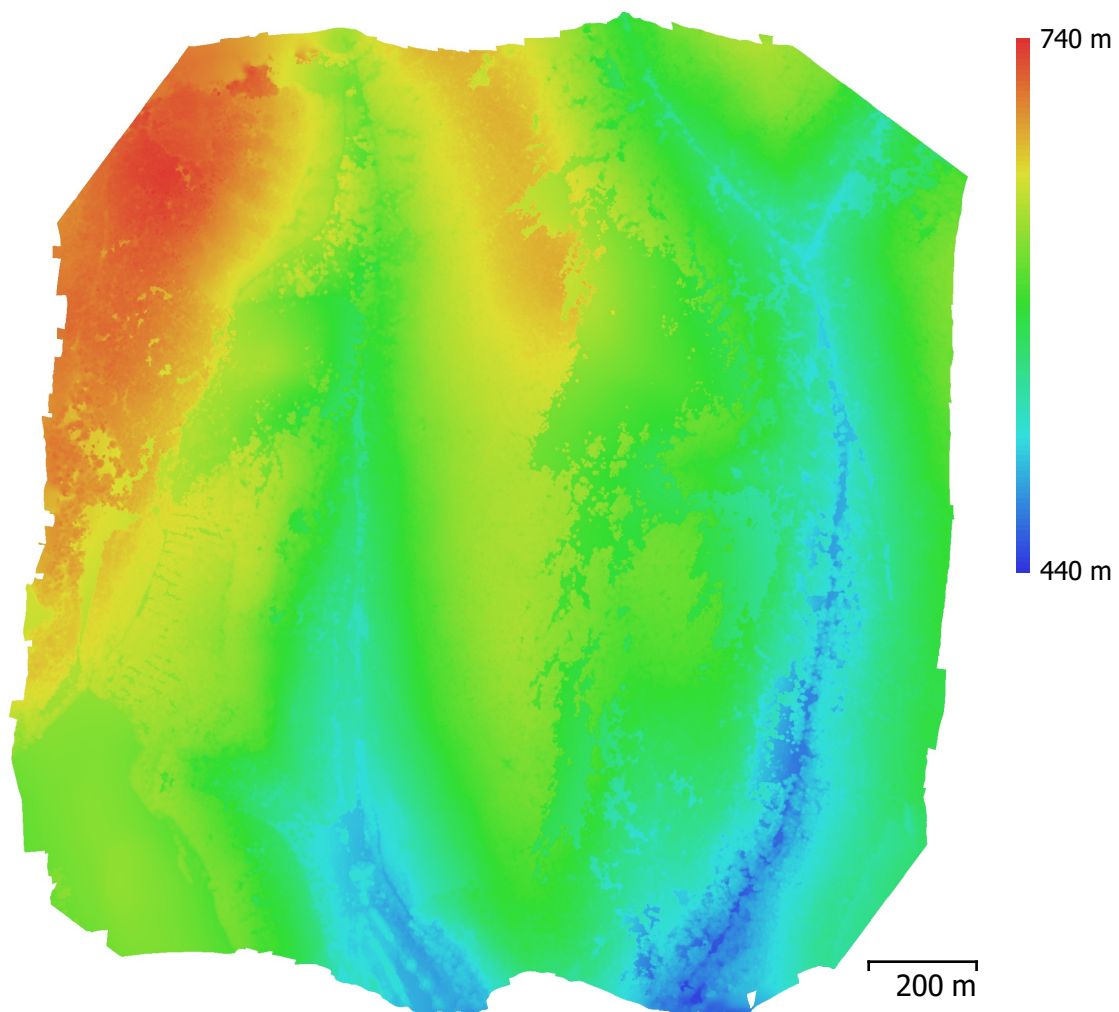


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.5 cm/pix
Point density: 76 points/m²

Processing Parameters

General

Cameras	1446
Aligned cameras	1446
Markers	4
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	1,172,221 of 1,257,377
RMS reprojection error	0.146447 (1.50585 pix)
Max reprojection error	0.442733 (48.0446 pix)
Mean key point size	7.46612 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.95649

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	38 minutes 4 seconds
Alignment time	6 minutes 15 seconds

Dense Point Cloud

Points	371,988,754
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	3 hours 13 minutes
Dense cloud generation time	1 days 3 hours

DEM

Size	24,787 x 24,992
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	8 minutes 4 seconds

Orthomosaic

Size	31,015 x 32,413
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8

Reconstruction parameters

Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	58 minutes 23 seconds

Software

Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

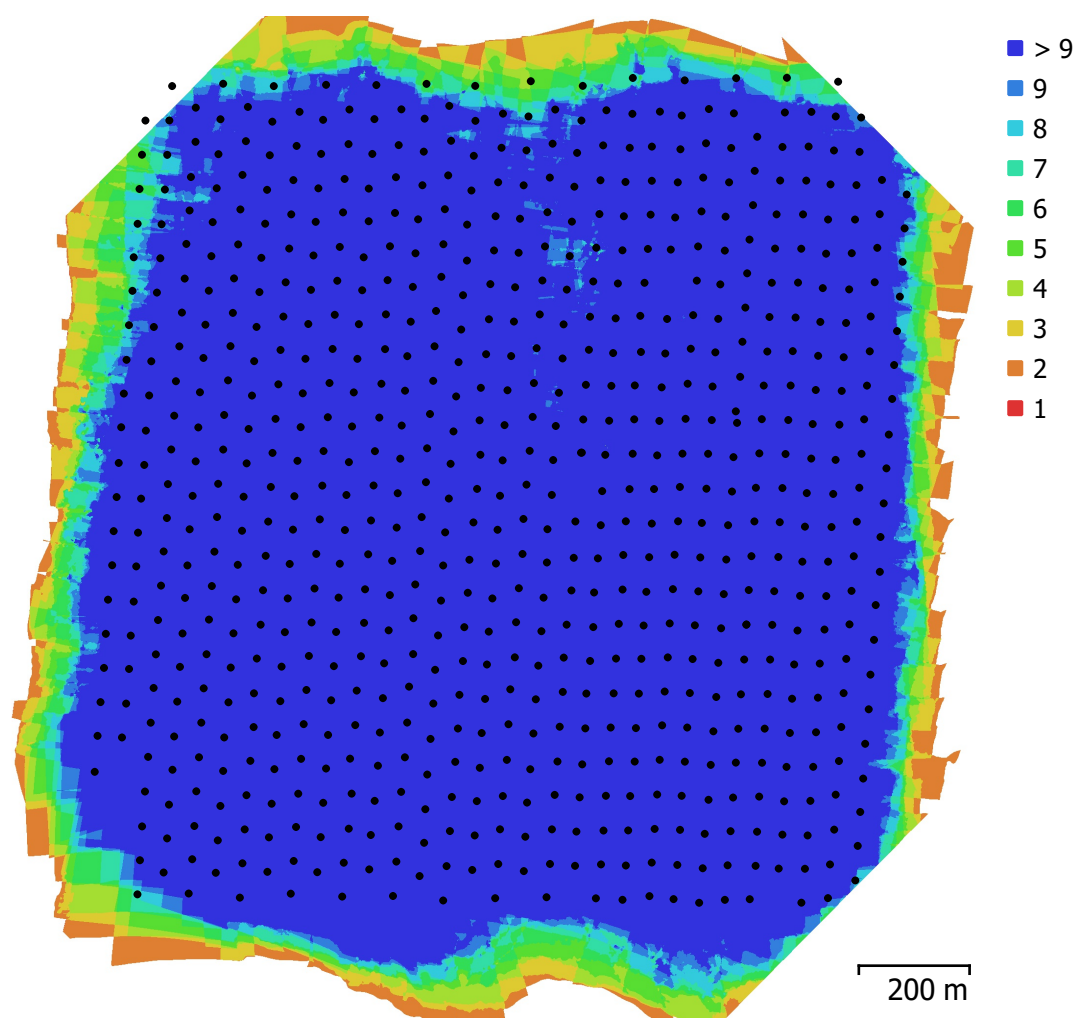


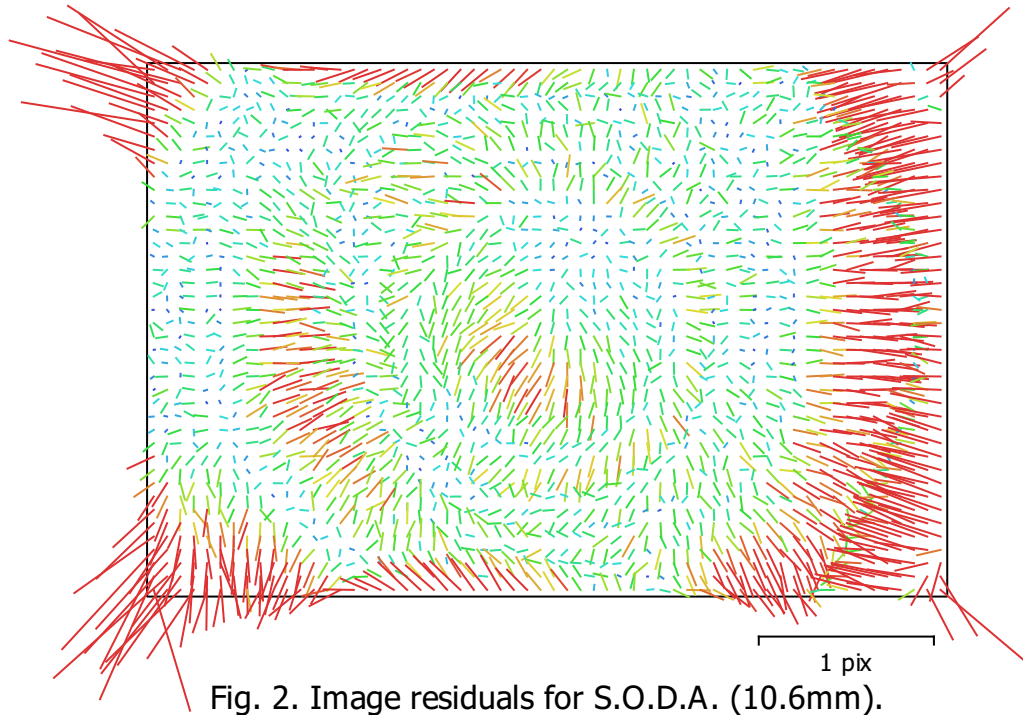
Fig. 1. Camera locations and image overlap.

Number of images:	735	Camera stations:	734
Flying altitude:	255 m	Tie points:	522,187
Ground resolution:	5.49 cm/pix	Projections:	1,378,315
Coverage area:	2.63 km ²	Reprojection error:	1.41 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration



S.O.D.A. (10.6mm)

735 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4410.38	0.16	1.00	0.11	-0.88	0.29	-0.12	0.22	0.12	-0.63
Cx	30.8164	0.041		1.00	-0.10	0.04	-0.01	0.02	0.84	-0.07
Cy	-1.59354	0.071			1.00	-0.30	0.14	-0.22	-0.10	0.70
K1	0.0345733	5.4e-05				1.00	-0.92	0.90	0.06	-0.43
K2	-0.21067	0.00022					1.00	-0.98	-0.01	0.16
K3	0.328246	0.00031						1.00	0.02	-0.22
P1	0.00184723	3e-06							1.00	-0.13
P2	-0.000428213	4.7e-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)
4	11.1669	8.12232	16.7859	13.8084	21.7356

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)
7019	17.0051	-3.5795	20.6263	26.9709	1.272 (21)
7072	-3.44164	-11.1707	11.1729	16.1698	1.771 (22)
7057	-14.023	10.0599	-10.9292	20.4277	3.362 (25)
2008	1.06536	5.00888	-21.3854	21.99	2.083 (14)
Total	11.1669	8.12232	16.7859	21.7356	2.333

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

Digital Elevation Model

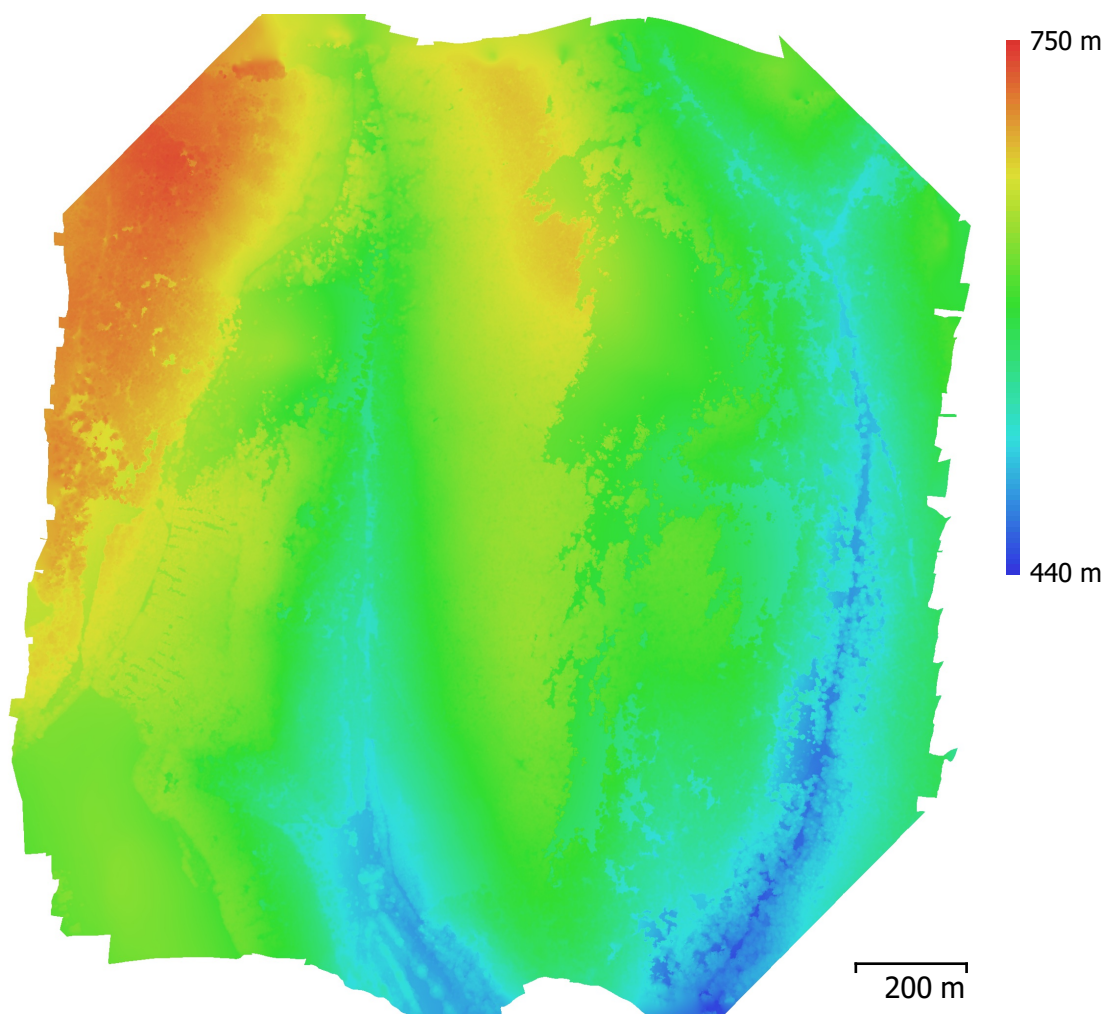


Fig. 4. Reconstructed digital elevation model.

Resolution: 11 cm/pix
Point density: 83.1 points/m²

Processing Parameters

General

Cameras	735
Aligned cameras	734
Markers	50

Shapes

Points	46
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	522,187 of 556,950
RMS reprojection error	0.143646 (1.41248 pix)
Max reprojection error	0.434183 (39.0947 pix)
Mean key point size	7.41465 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.79257

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	13 minutes 24 seconds
Alignment time	4 minutes 21 seconds

Dense Point Cloud

Points	329,039,503
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	1 hours 7 minutes
Dense cloud generation time	4 hours 41 minutes

DEM

Size	25,310 x 25,321
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	8 minutes 51 seconds

Software

Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

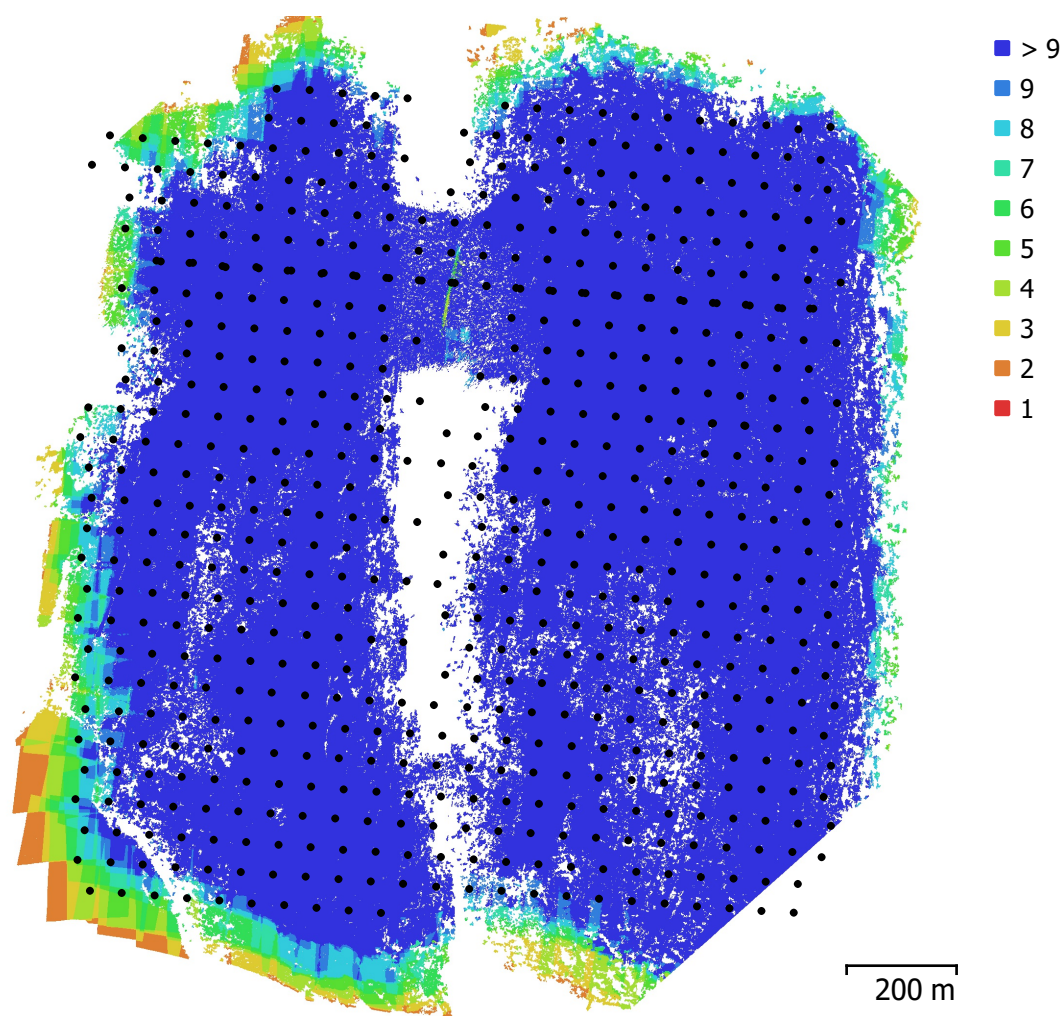


Fig. 1. Camera locations and image overlap.

Number of images:	666	Camera stations:	629
Flying altitude:	284 m	Tie points:	315,849
Ground resolution:	6.08 cm/pix	Projections:	933,836
Coverage area:	2 km ²	Reprojection error:	1.4 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μm	No

Table 1. Cameras.

Camera Calibration

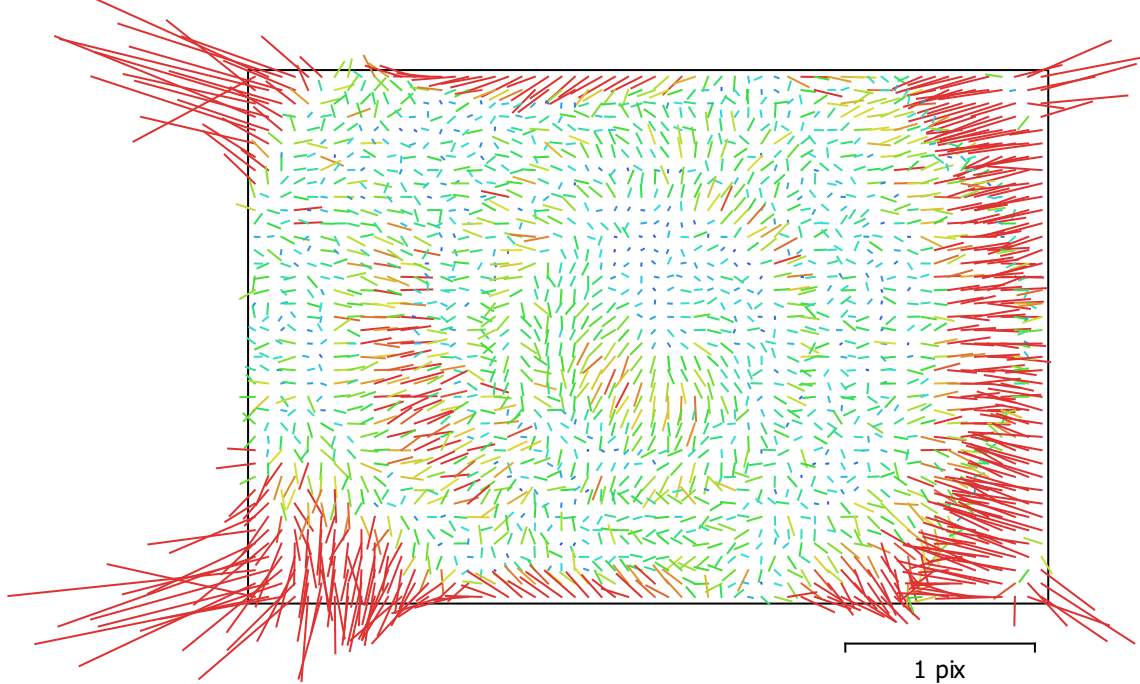


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

666 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4425.66	0.31	1.00	-0.16	-0.90	0.51	-0.32	0.48	-0.04	-0.68
Cx	33.5699	0.05		1.00	0.13	-0.08	0.06	-0.09	0.76	0.09
Cy	-7.59575	0.11			1.00	-0.47	0.30	-0.43	0.02	0.71
K1	0.0374181	6.4e-05				1.00	-0.88	0.88	-0.07	-0.64
K2	-0.222268	0.00023					1.00	-0.97	0.03	0.29
K3	0.34884	0.00035						1.00	-0.04	-0.39
P1	0.00203935	3.5e-06							1.00	0.07
P2	-0.000665011	6.8e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

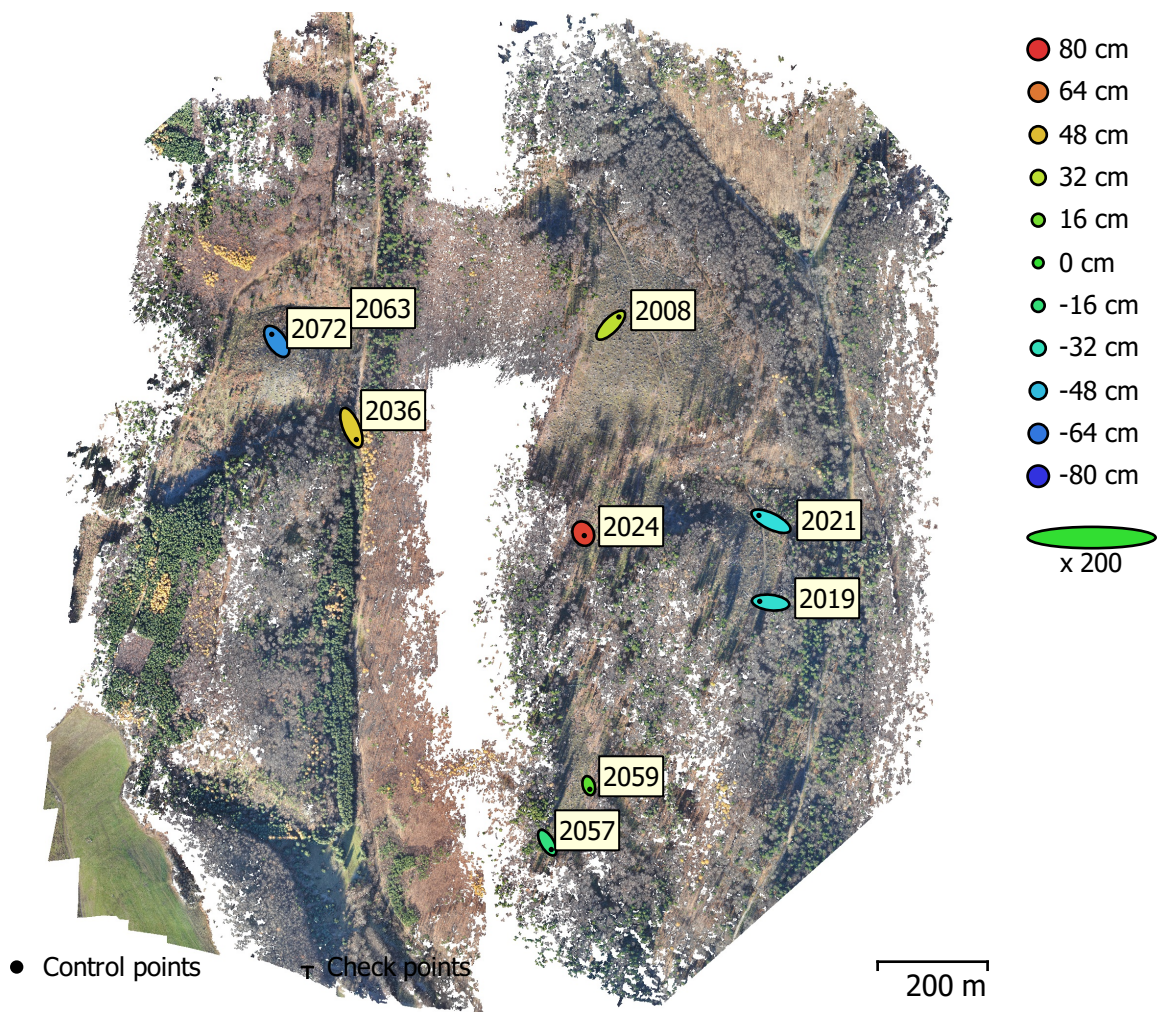


Fig. 3. GCP locations and error estimates.

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)
9	13.2092	11.4862	41.6458	17.5048	45.1751

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)
2019	-19.8819	2.27161	-36.5821	41.6977	1.024 (30)
2057	7.33464	-12.4138	-17.5593	22.7207	1.314 (19)
2072	-8.94926	12.9344	-57.8704	59.9698	2.247 (29)
2008	14.7498	14.96	32.3419	38.5662	1.307 (28)
2021	-21.9203	10.602	-39.4168	46.3312	0.928 (31)
2024	1.87415	-3.5899	76.3921	76.4994	1.174 (23)
2059	1.9554	-6.62575	10.1167	12.2503	1.028 (23)
2036	8.92278	-21.6134	44.5685	50.33	1.312 (33)
2063	16.0049	0.844719	-9.4677	18.6148	1.039 (36)
Total	13.2092	11.4862	41.6458	45.1751	1.317

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

Digital Elevation Model

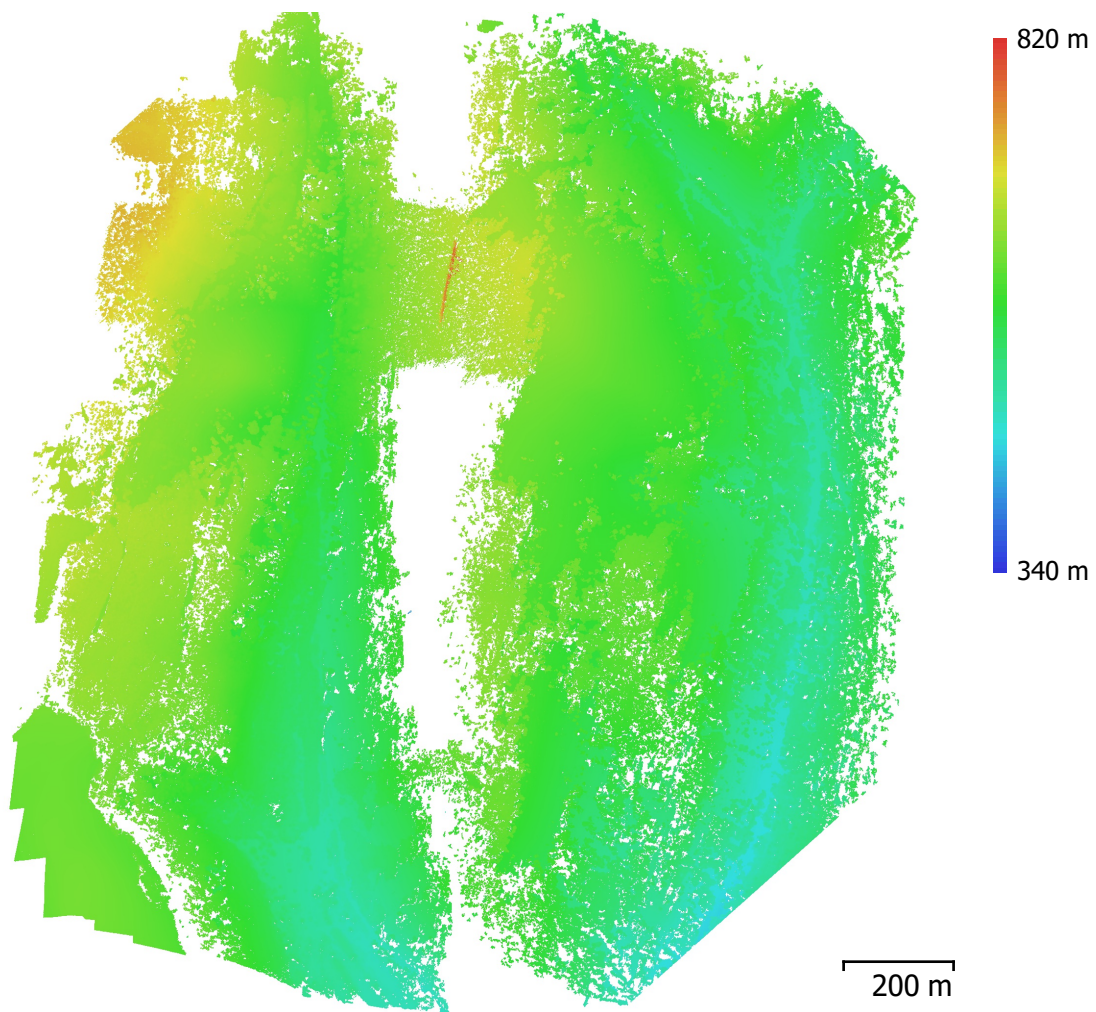


Fig. 4. Reconstructed digital elevation model.

Resolution: unknown

Point density: unknown

Processing Parameters

General

Cameras	666
Aligned cameras	629
Markers	58

Shapes

Points	49
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	315,849 of 342,497
RMS reprojection error	0.137187 (1.40201 pix)
Max reprojection error	0.41557 (38.6214 pix)
Mean key point size	6.85043 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.24563

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	10 minutes 53 seconds
Alignment time	3 minutes 21 seconds

Dense Point Cloud

Points	169,749,178
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	53 minutes 32 seconds
Dense cloud generation time	2 hours 22 minutes

Software

Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

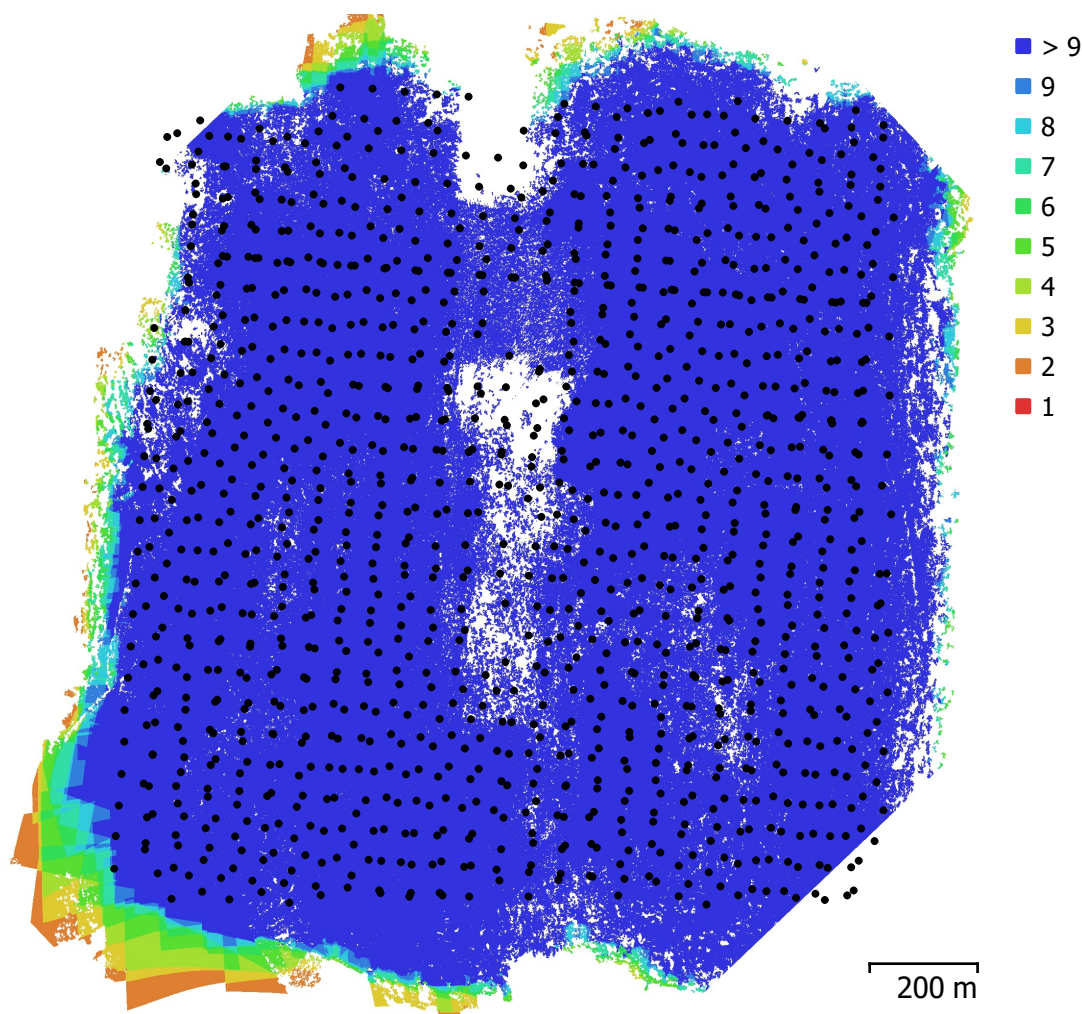


Fig. 1. Camera locations and image overlap.

Number of images:	1,304	Camera stations:	1,225
Flying altitude:	276 m	Tie points:	620,168
Ground resolution:	5.9 cm/pix	Projections:	1,763,027
Coverage area:	2.32 km ²	Reprojection error:	1.37 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μm	No

Table 1. Cameras.

Camera Calibration

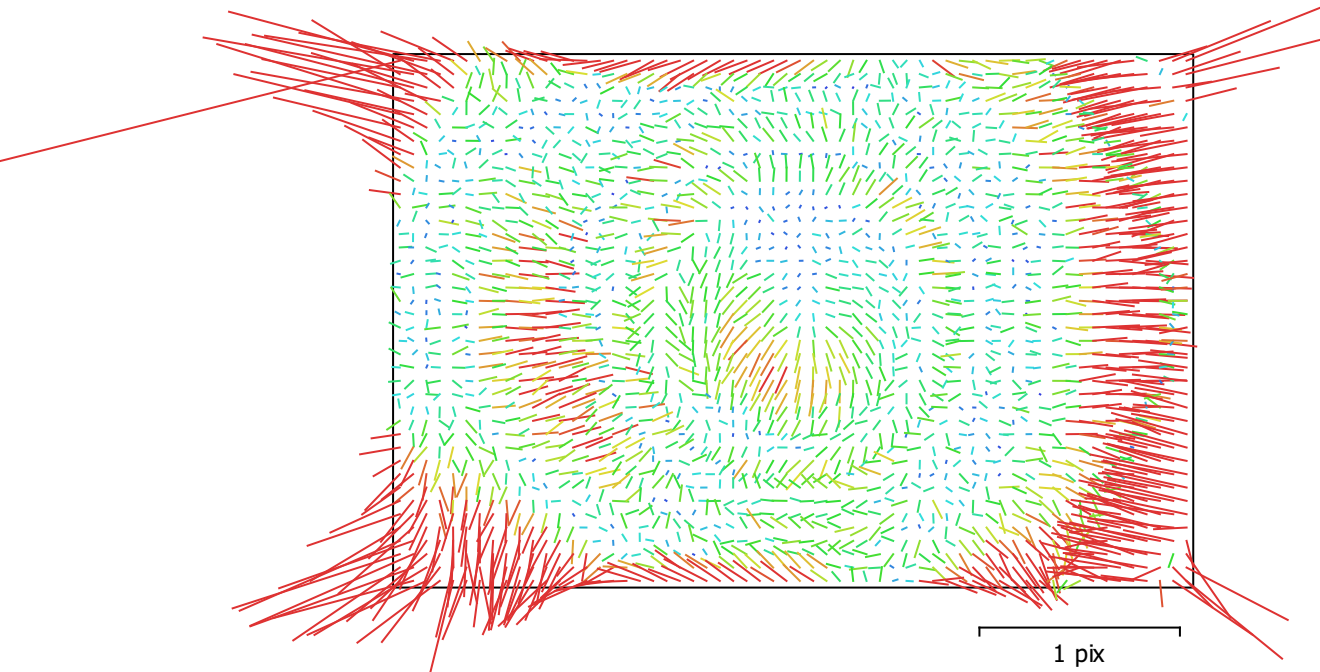


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

1304 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4414.15	0.19	1.00	-0.08	-0.89	0.40	-0.23	0.38	-0.02	-0.59
Cx	34.0989	0.035		1.00	0.07	-0.03	0.03	-0.04	0.78	0.03
Cy	-2.59963	0.069			1.00	-0.40	0.23	-0.35	0.01	0.71
K1	0.0364335	4.3e-05				1.00	-0.90	0.88	-0.03	-0.52
K2	-0.219877	0.00017					1.00	-0.97	0.02	0.21
K3	0.344239	0.00025						1.00	-0.02	-0.29
P1	0.00210129	2.4e-06							1.00	0.02
P2	-0.000545809	4.1e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

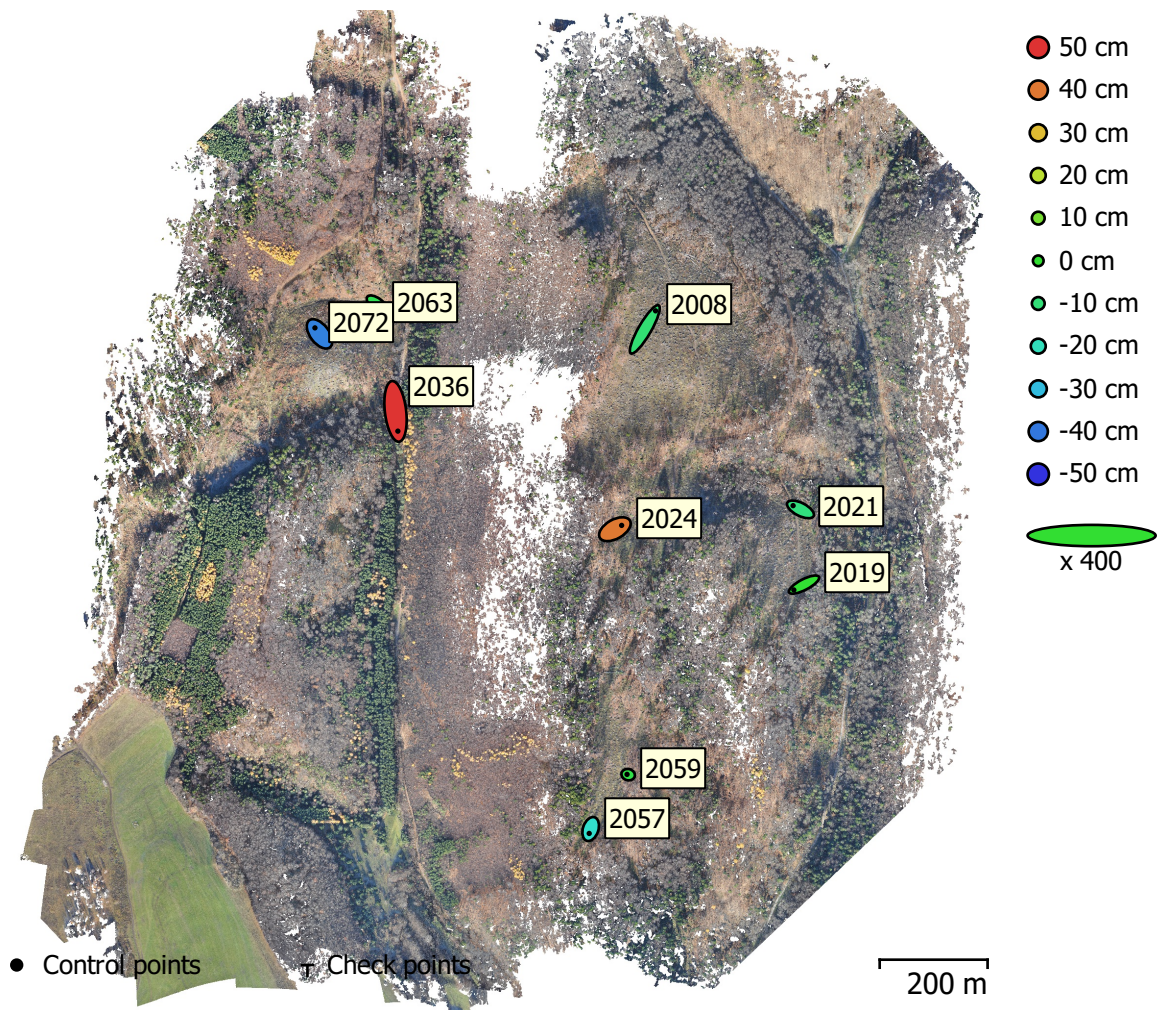


Fig. 3. GCP locations and error estimates.

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)
9	5.98178	9.06485	26.4129	10.8606	28.5586

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)
2019	-9.46818	-4.9425	-0.0439806	10.6807	0.976 (46)
2057	-1.36978	-4.0768	-22.374	22.7836	2.200 (35)
2072	-4.25795	5.57046	-38.5465	39.179	1.656 (47)
2008	9.97163	17.2013	-9.33921	21.9668	1.351 (41)
2021	-6.8355	3.48074	-10.8968	13.3259	1.443 (51)
2024	6.25391	3.55464	39.6643	40.3114	1.964 (41)
2036	2.16557	-18.2959	49.8126	53.1105	2.565 (64)
2059	-1.02685	0.268402	-3.07964	3.2574	2.447 (45)
2063	4.62271	-3.46606	-4.724	7.46319	1.639 (59)
Total	5.98178	9.06485	26.4129	28.5586	1.889

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

Digital Elevation Model

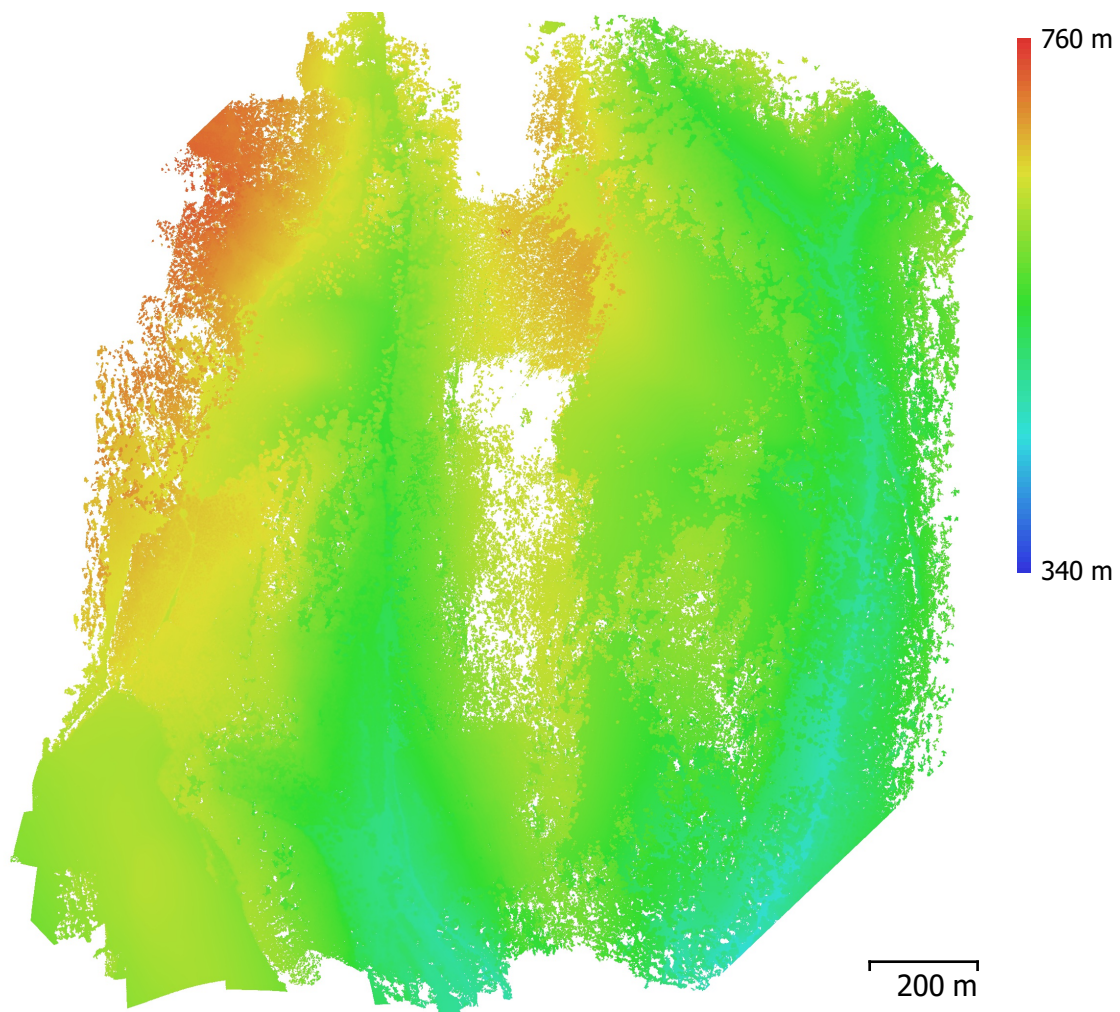


Fig. 4. Reconstructed digital elevation model.

Resolution: unknown

Point density: unknown

Processing Parameters

General

Cameras	1304
Aligned cameras	1225
Markers	59

Shapes

Points	50
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	620,168 of 675,907
RMS reprojection error	0.135744 (1.37267 pix)
Max reprojection error	0.41209 (38.4431 pix)
Mean key point size	6.75539 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.17

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	26 minutes 12 seconds
Alignment time	7 minutes 22 seconds

Dense Point Cloud

Points	220,226,912
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	1 hours 50 minutes
Dense cloud generation time	11 hours 13 minutes

Software

Version	1.4.3 build 6488
Platform	Windows 64

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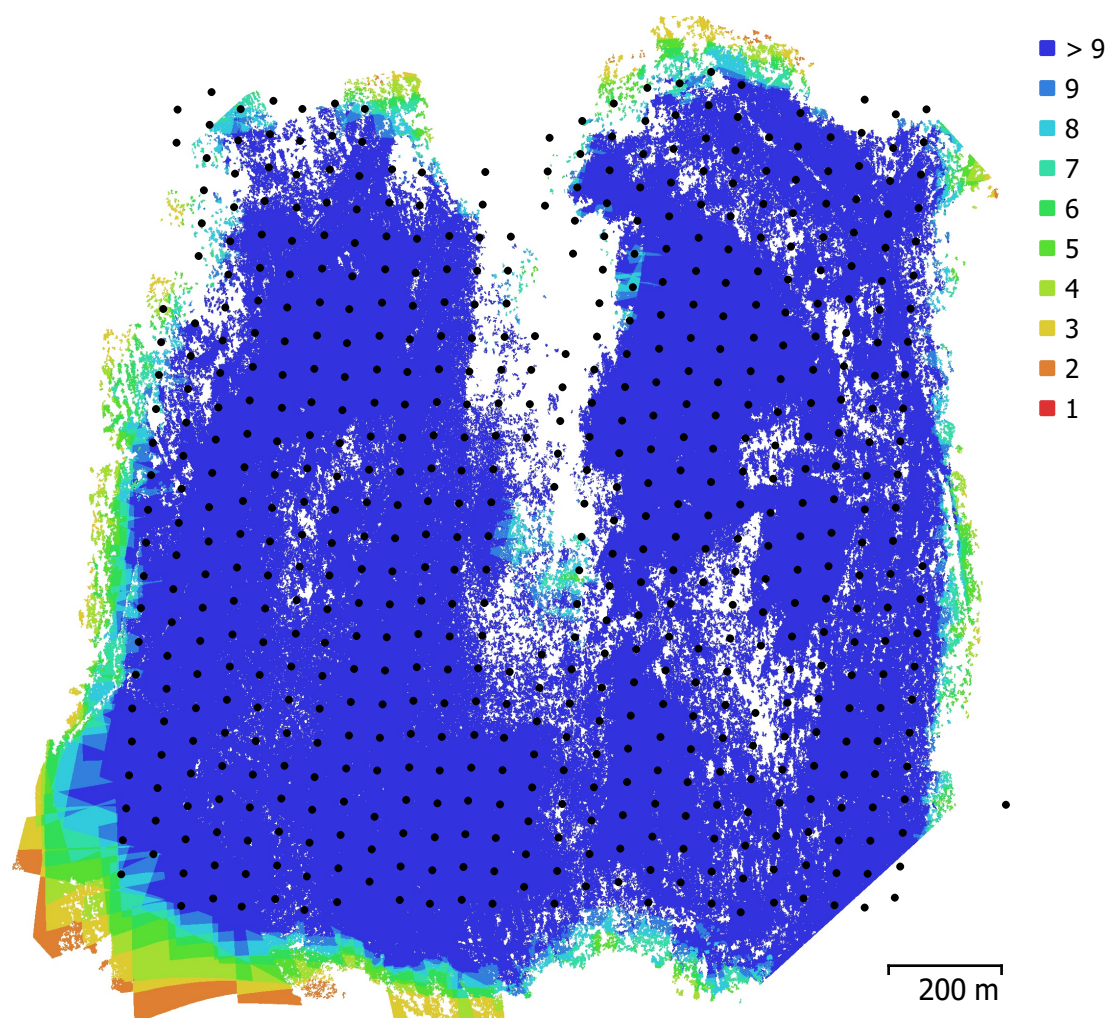


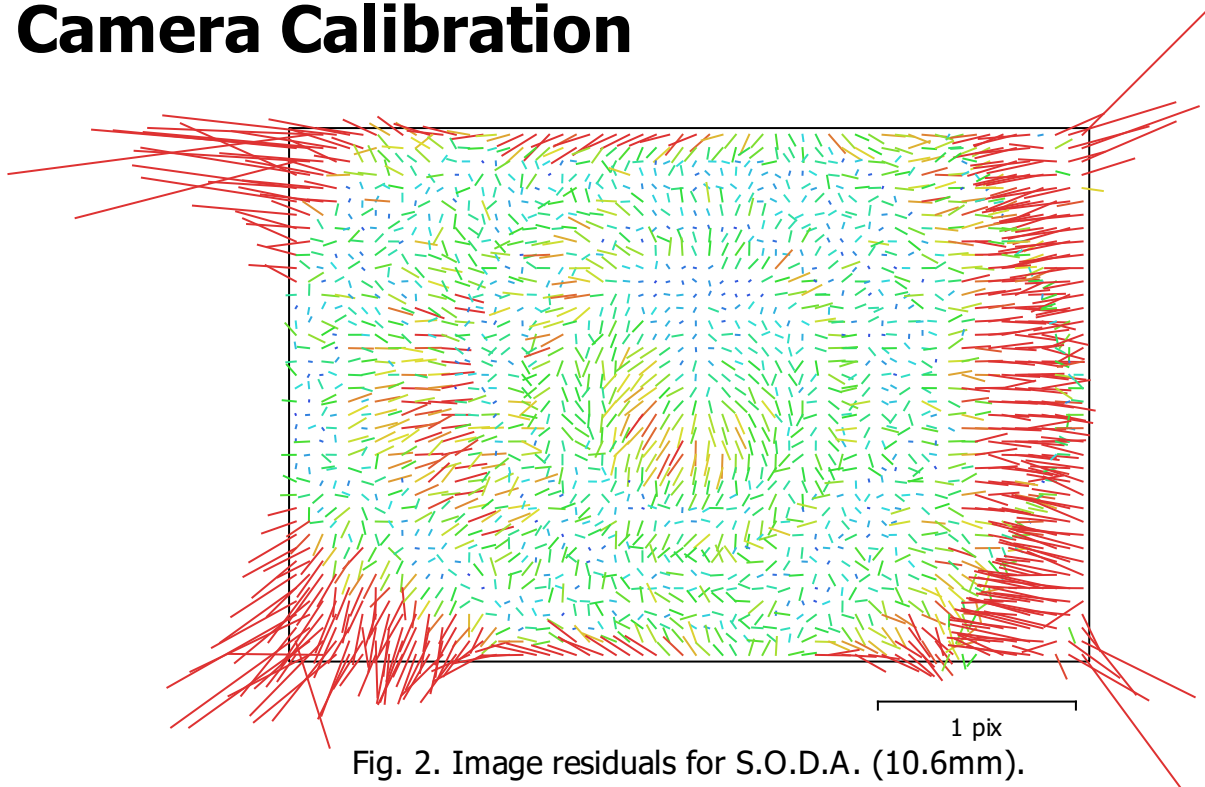
Fig. 1. Camera locations and image overlap.

Number of images:	638	Camera stations:	595
Flying altitude:	268 m	Tie points:	305,710
Ground resolution:	5.75 cm/pix	Projections:	842,875
Coverage area:	1.91 km ²	Reprojection error:	1.21 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μm	No

Table 1. Cameras.

Camera Calibration



S.O.D.A. (10.6mm)

638 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4409.55	0.26	1.00	-0.02	-0.87	0.38	-0.23	0.37	0.01	-0.52
Cx	34.8462	0.05		1.00	0.02	-0.02	0.02	-0.01	0.77	0.00
Cy	-0.518586	0.096			1.00	-0.36	0.22	-0.34	0.00	0.68
K1	0.0361755	6.3e-05				1.00	-0.89	0.87	-0.02	-0.50
K2	-0.221482	0.00025					1.00	-0.97	0.02	0.20
K3	0.347007	0.00037						1.00	-0.01	-0.27
P1	0.00218111	3.3e-06							1.00	-0.01
P2	-0.00046818	5.8e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

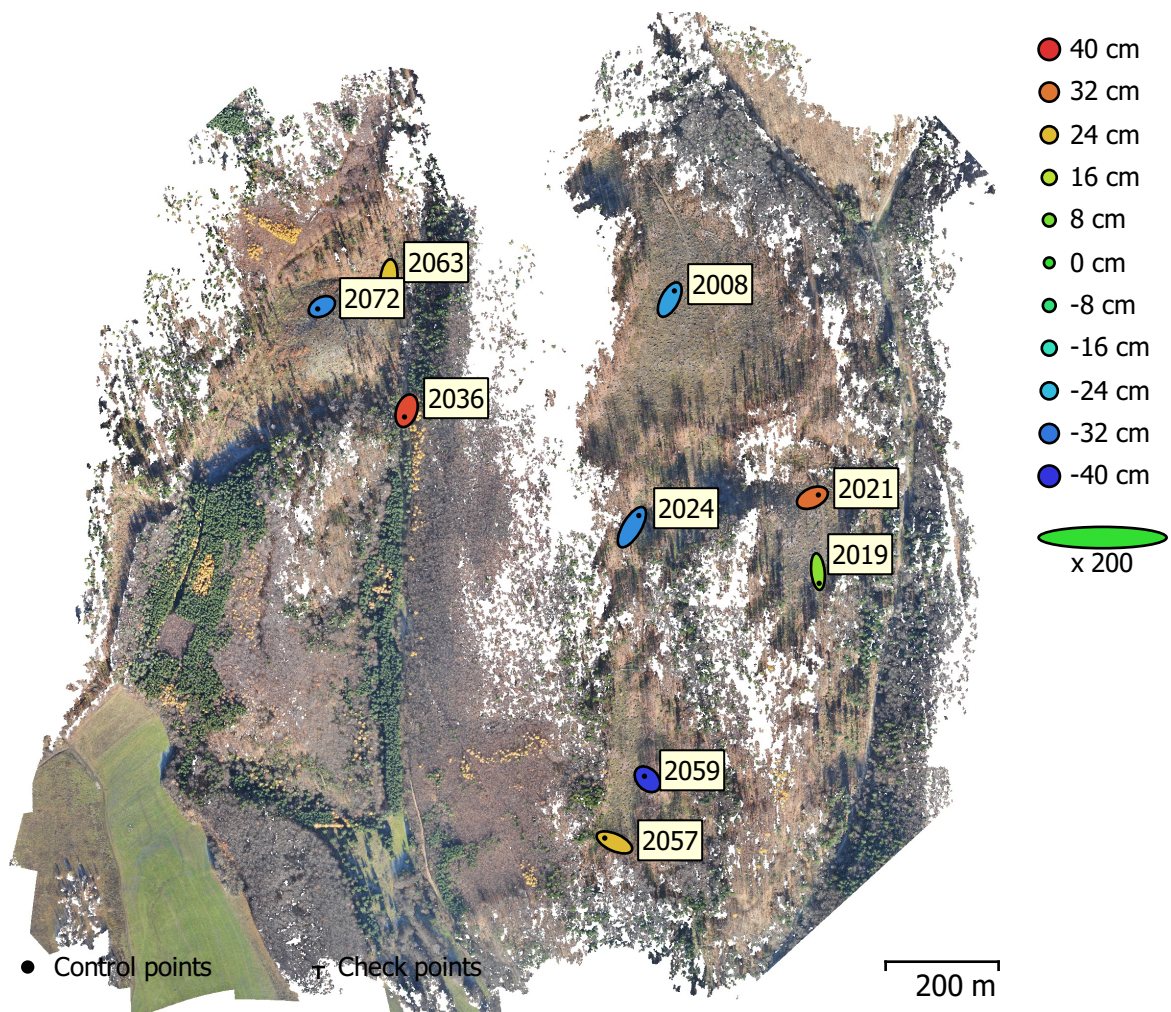


Fig. 3. GCP locations and error estimates.

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)
9	9.01297	13.583	29.289	16.3013	33.5198

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)
2036	-3.68298	-10.9799	37.2706	39.0285	46.143 (32)
2019	2.14458	-20.6472	10.2928	23.17	23.304 (17)
2057	-17.0973	7.69449	24.0029	30.4576	1.604 (17)
2072	-7.39926	-3.97413	-29.7372	30.9005	64.867 (19)
2021	10.727	4.92876	33.0461	35.0913	0.804 (20)
2024	12.2732	20.5916	-29.5895	38.0813	46.049 (19)
2059	-5.29801	5.3558	-39.0168	39.7375	39.187 (24)
2008	8.27157	15.4729	-27.2627	32.4204	1.464 (13)
2063	-1.91948	-17.9502	23.065	29.2897	54.358 (24)
Total	9.01297	13.583	29.289	33.5198	40.634

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

Digital Elevation Model

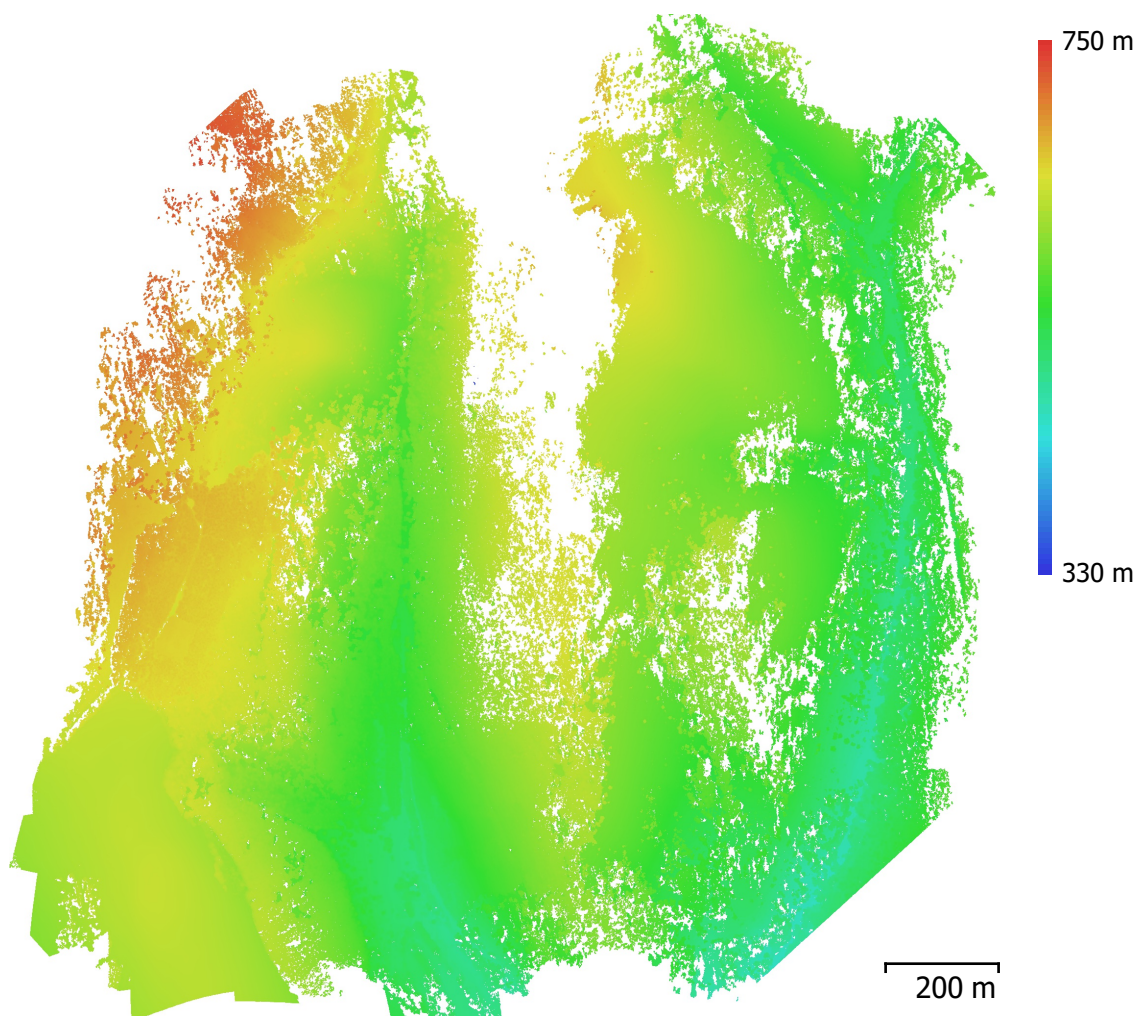


Fig. 4. Reconstructed digital elevation model.

Resolution: unknown

Point density: unknown

Processing Parameters

General

Cameras	638
Aligned cameras	595
Markers	58

Shapes

Points	49
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	305,710 of 329,578
RMS reprojection error	0.130515 (1.21487 pix)
Max reprojection error	0.395105 (31.2144 pix)
Mean key point size	6.42181 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.95075

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	9 minutes 47 seconds
Alignment time	1 minutes 49 seconds

Dense Point Cloud

Points	168,155,524
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Mild
Depth maps generation time	38 minutes 38 seconds
Dense cloud generation time	2 hours 2 minutes

Software

Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

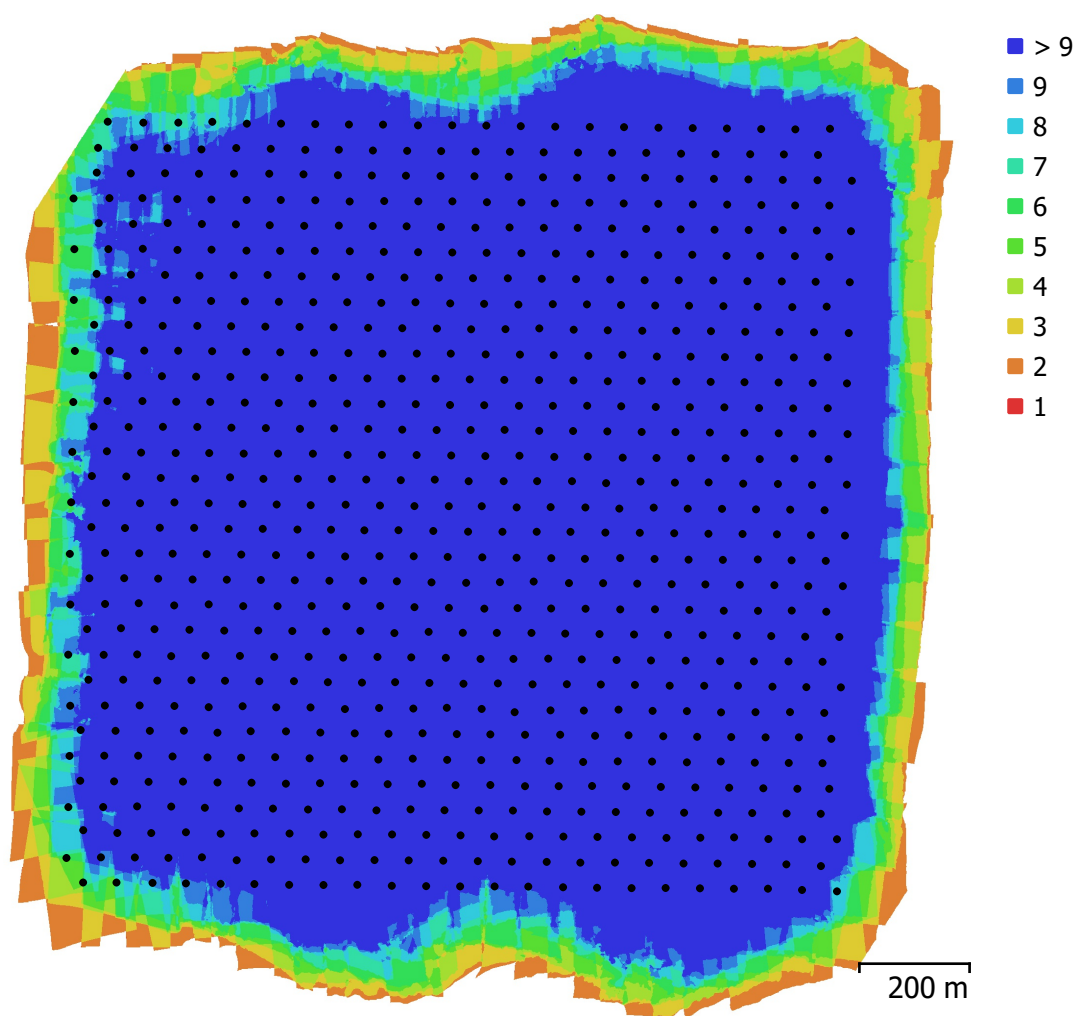


Fig. 1. Camera locations and image overlap.

Number of images:	711	Camera stations:	711
Flying altitude:	281 m	Tie points:	647,777
Ground resolution:	5.94 cm/pix	Projections:	1,785,701
Coverage area:	2.73 km ²	Reprojection error:	1.46 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

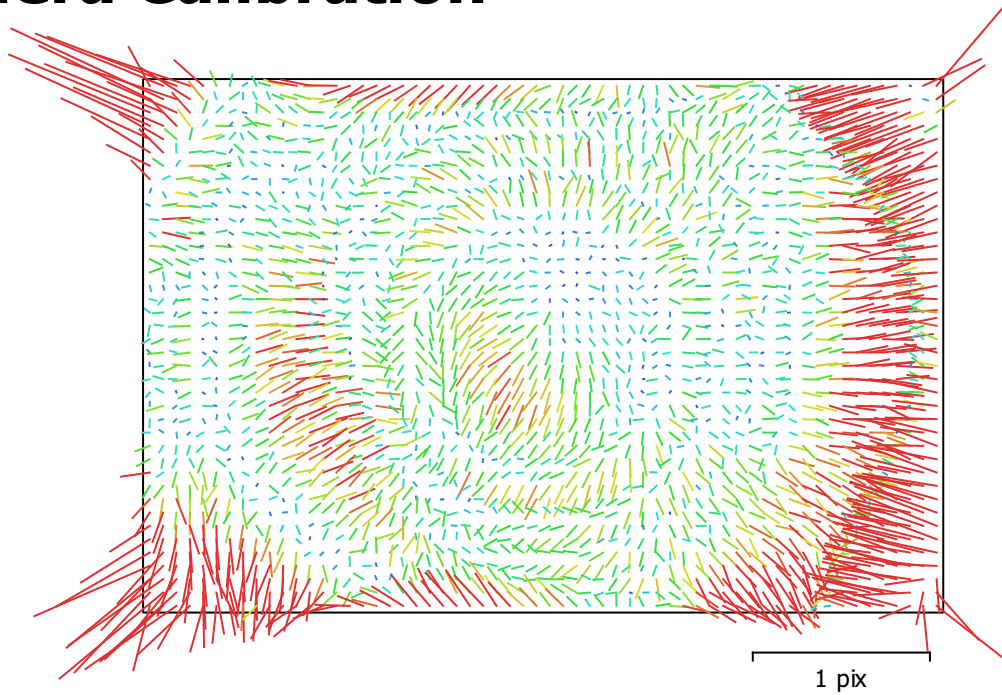


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

711 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4416.89	0.19	1.00	0.00	-0.93	0.36	-0.23	0.36	0.04	-0.57
Cx	31.2794	0.034		1.00	0.01	-0.00	0.02	-0.03	0.82	0.00
Cy	-4.59566	0.08			1.00	-0.35	0.24	-0.35	-0.03	0.57
K1	0.035272	4.7e-05				1.00	-0.91	0.88	0.02	-0.54
K2	-0.211984	0.00019					1.00	-0.98	0.01	0.21
K3	0.330521	0.00027						1.00	-0.01	-0.29
P1	0.00188736	2.4e-06							1.00	-0.04
P2	-0.000542096	4.8e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

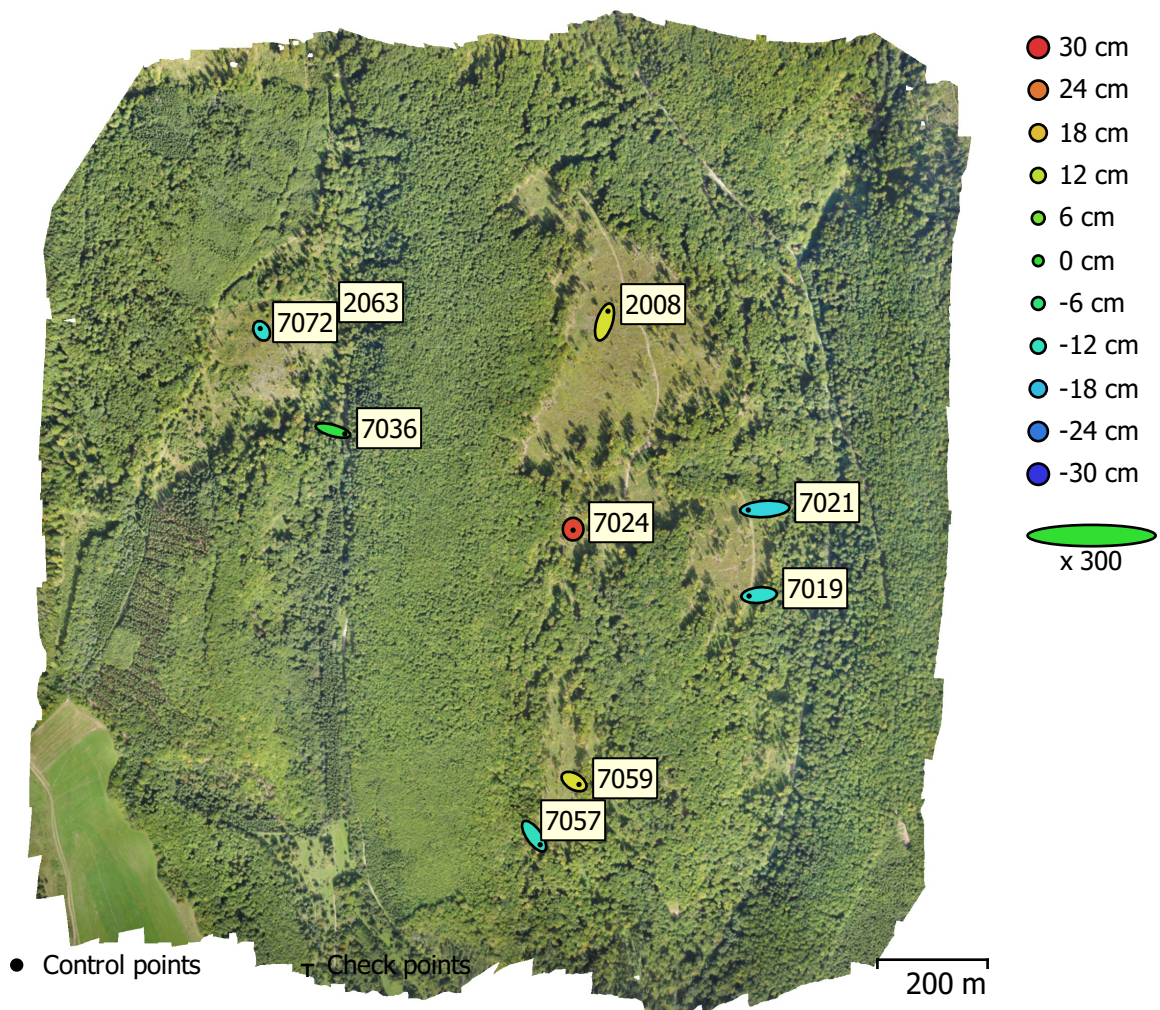


Fig. 3. GCP locations and error estimates.

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)
9	9.82338	6.20321	14.7627	11.618	18.7861

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)
7019	-12.1163	-1.13184	-13.5626	18.2217	1.438 (40)
7057	7.41223	-10.3992	-11.8939	17.4514	0.997 (21)
7072	-1.68545	2.81991	-13.158	13.5619	0.428 (26)
7036	14.3612	-4.02683	-1.57341	14.9979	1.019 (42)
2008	4.14701	13.0901	14.3834	19.8855	1.962 (28)
7021	-19.994	-1.28129	-15.8245	25.5307	0.584 (44)
7024	-0.0142516	-1.16705	28.0885	28.1127	0.957 (27)
7059	6.00171	-3.53868	14.5987	16.176	0.734 (23)
2063	2.16294	5.08416	-1.02495	5.61939	1.349 (33)
Total	9.82338	6.20321	14.7627	18.7861	1.144

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

Digital Elevation Model

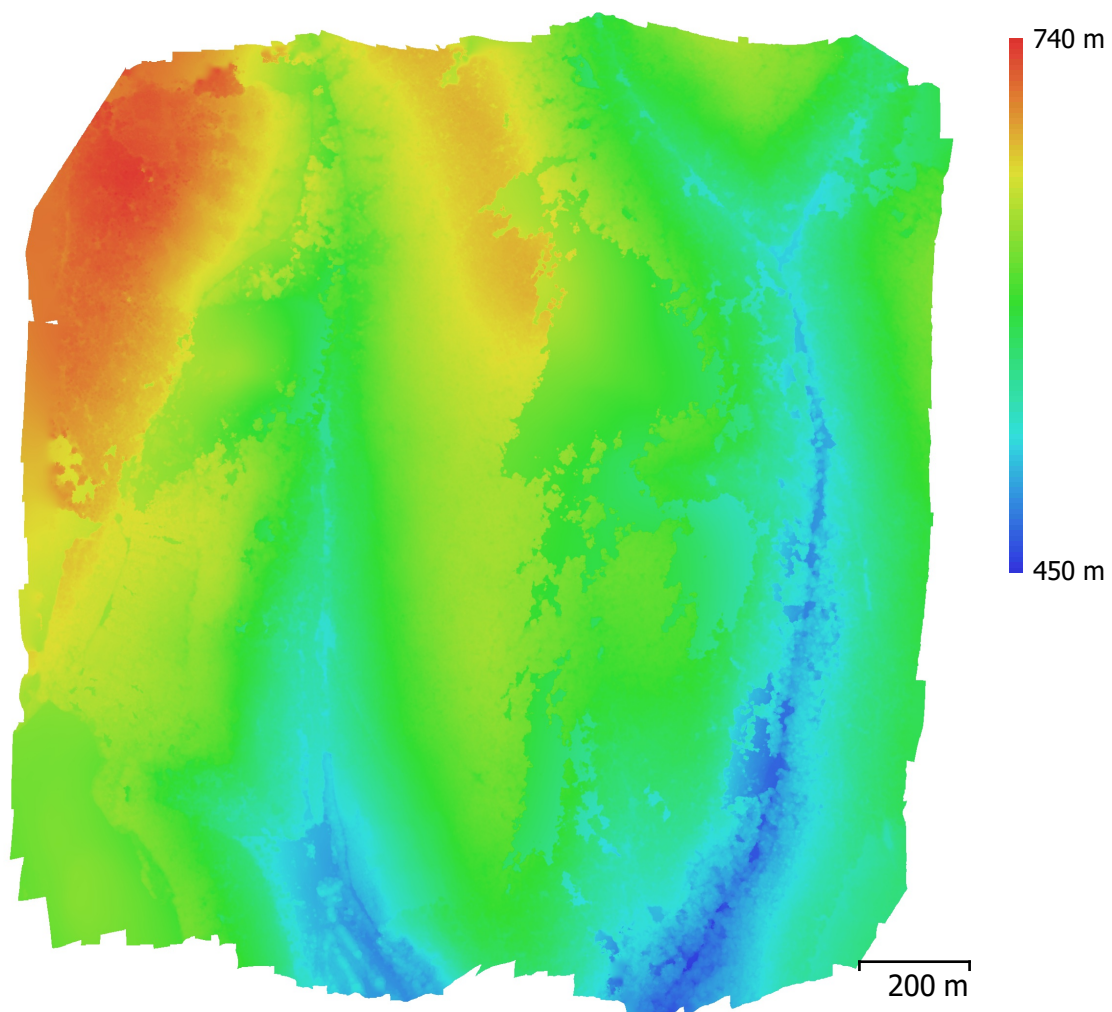


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.9 cm/pix
Point density: 70.7 points/m²

Processing Parameters

General

Cameras	711
Aligned cameras	711
Markers	56
Shapes	
Points	47
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	647,777 of 690,997
RMS reprojection error	0.14149 (1.46359 pix)
Max reprojection error	0.427584 (38.2439 pix)
Mean key point size	7.5173 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.98921

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	14 minutes 28 seconds
Alignment time	2 minutes 21 seconds

Depth Maps

Count	711
Reconstruction parameters	
Quality	High
Filtering mode	Aggressive
Processing time	49 minutes 39 seconds

Dense Point Cloud

Points	311,338,767
Point colors	3 bands, uint8
Reconstruction parameters	
Quality	High
Depth filtering	Aggressive
Depth maps generation time	49 minutes 39 seconds
Dense cloud generation time	6 hours 26 minutes

DEM

Size	24,196 x 24,708
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	4 minutes 37 seconds

Orthomosaic

Size	28,820 x 30,622
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	21 minutes 11 seconds

Software

Version
Platform

1.4.3 build 6488
Windows 64

9GCP_veg_FP12

Processing Report
08 February 2019



Survey Data

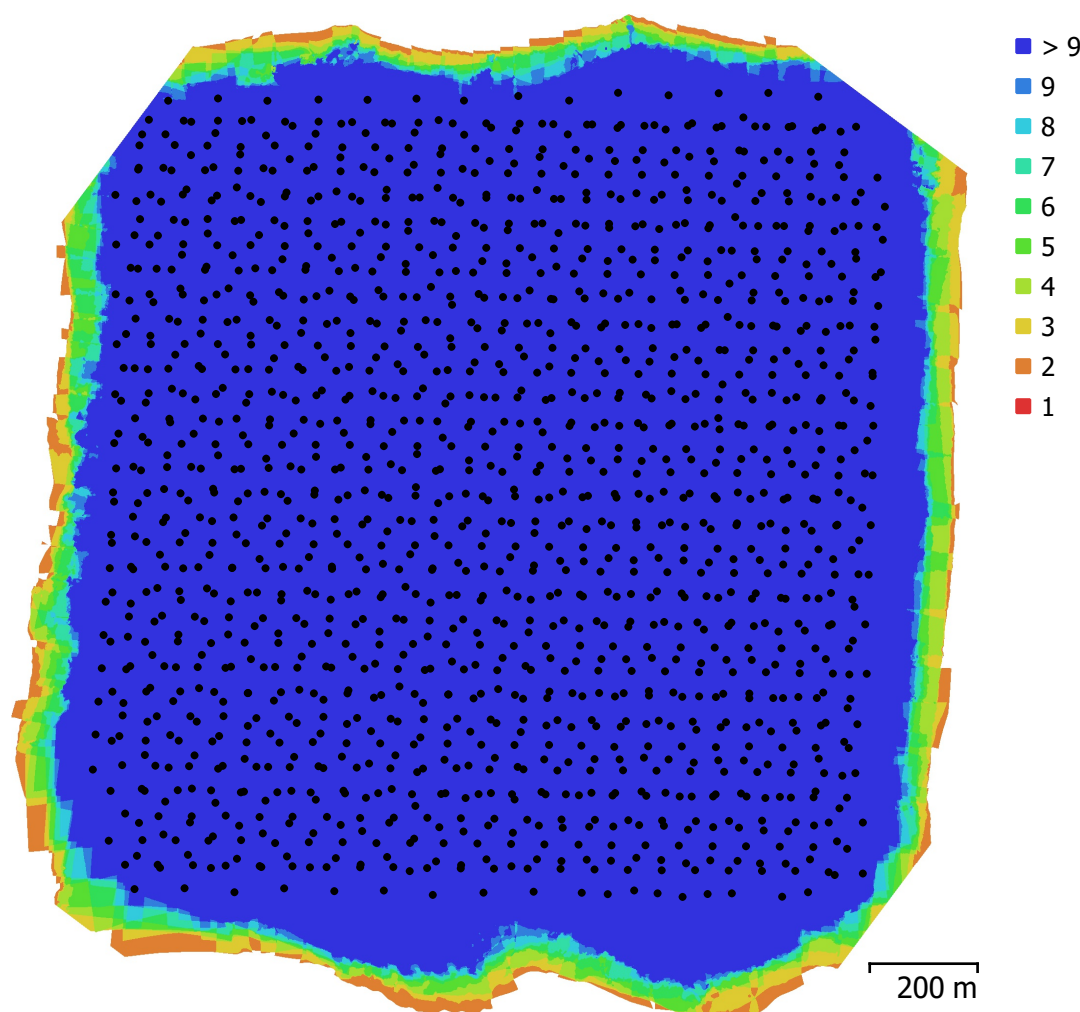


Fig. 1. Camera locations and image overlap.

Number of images:	1,446	Camera stations:	1,446
Flying altitude:	268 m	Tie points:	1,172,832
Ground resolution:	5.68 cm/pix	Projections:	3,183,139
Coverage area:	2.81 km ²	Reprojection error:	1.5 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

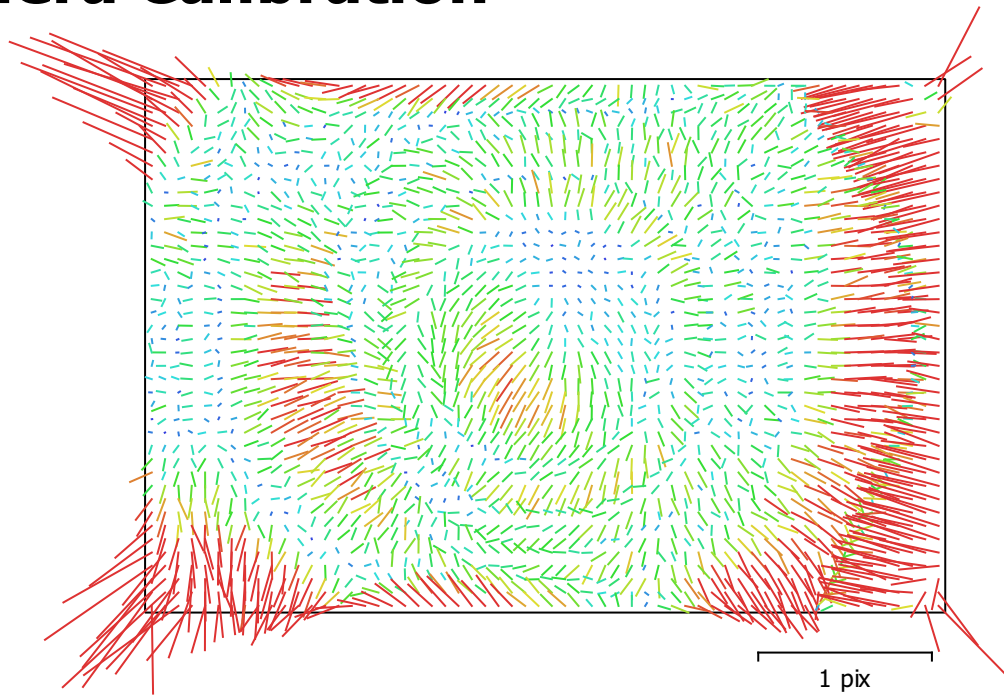


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

1446 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4411.71	0.12	1.00	0.07	-0.91	0.32	-0.15	0.27	0.07	-0.64
Cx	31.0715	0.026		1.00	-0.06	0.02	0.00	0.00	0.84	-0.05
Cy	-1.97979	0.05			1.00	-0.34	0.18	-0.28	-0.06	0.70
K1	0.0350558	3.5e-05				1.00	-0.93	0.90	0.04	-0.46
K2	-0.209395	0.00014					1.00	-0.98	-0.00	0.19
K3	0.326314	0.0002						1.00	0.01	-0.25
P1	0.001871	1.9e-06							1.00	-0.08
P2	-0.00057997	3.1e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

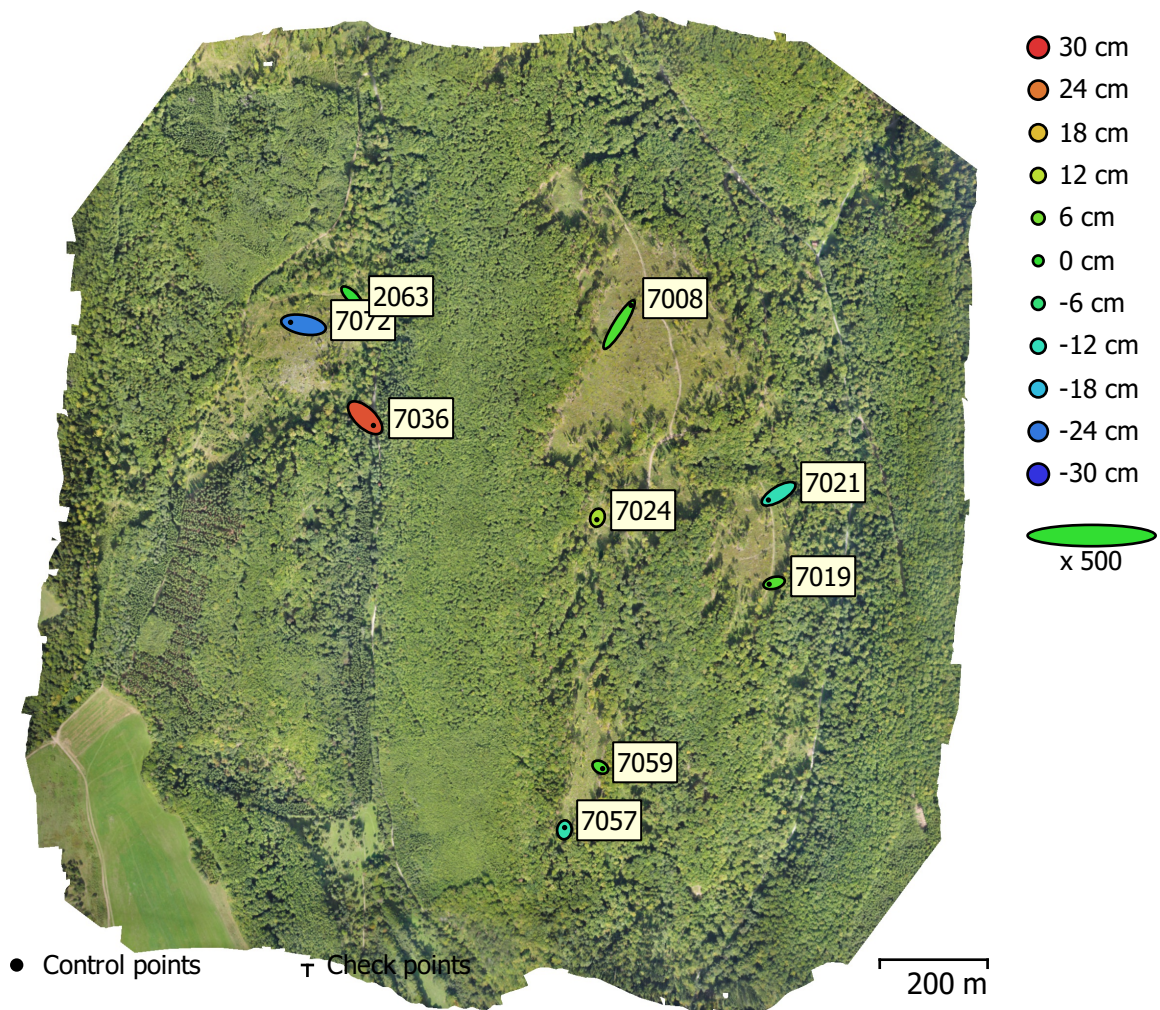


Fig. 3. GCP locations and error estimates.

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)
9	5.76777	5.62913	13.5745	8.05943	15.7868

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)
7036	6.12003	-5.71363	27.2848	28.5405	1.180 (78)
7019	-3.63798	-0.974369	3.00199	4.81625	1.633 (61)
7008	8.81946	14.2816	2.39877	16.9559	1.336 (42)
7021	-7.54004	-4.58109	-11.3414	14.3689	1.172 (66)
7024	-0.443023	-1.47489	10.2673	10.3821	1.953 (49)
7057	0.186983	1.65708	-10.7528	10.8813	1.857 (46)
7059	1.73768	-1.04498	2.42394	3.16022	1.681 (53)
7072	-9.59744	1.81381	-23.3127	25.2761	1.678 (48)
2063	4.32651	-4.16355	-0.403309	6.01802	1.849 (66)
Total	5.76777	5.62913	13.5745	15.7868	1.594

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

Digital Elevation Model

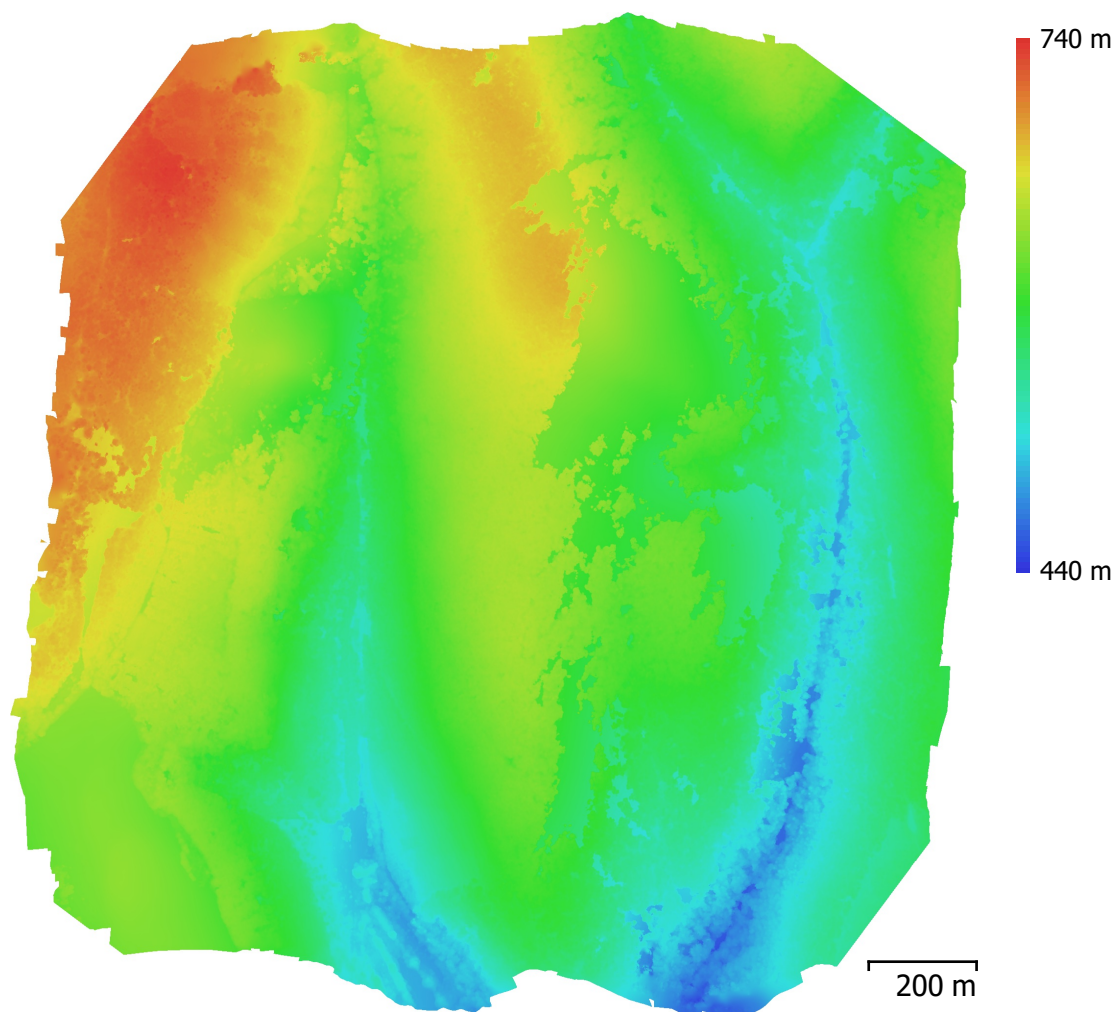


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.4 cm/pix
Point density: 77.4 points/m²

Processing Parameters

General

Cameras	1446
Aligned cameras	1446
Markers	55
Shapes	
Points	46
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	1,172,832 of 1,258,253
RMS reprojection error	0.146326 (1.50446 pix)
Max reprojection error	0.442272 (48.0542 pix)
Mean key point size	7.4635 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.95881

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	38 minutes 30 seconds
Alignment time	6 minutes 18 seconds

Depth Maps

Count	1444
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	2 hours 4 minutes

Dense Point Cloud

Points	379,553,883
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	2 hours 4 minutes
Dense cloud generation time	1 days 15 hours

DEM

Size	25,011 x 25,219
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	5 minutes 21 seconds

Orthomosaic

Size	31,194 x 32,714
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8

Reconstruction parameters

Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	39 minutes 8 seconds

Software

Version
Platform

1.4.3 build 6488
Windows 64

9GCP_veg_FP2

Processing Report
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Survey Data

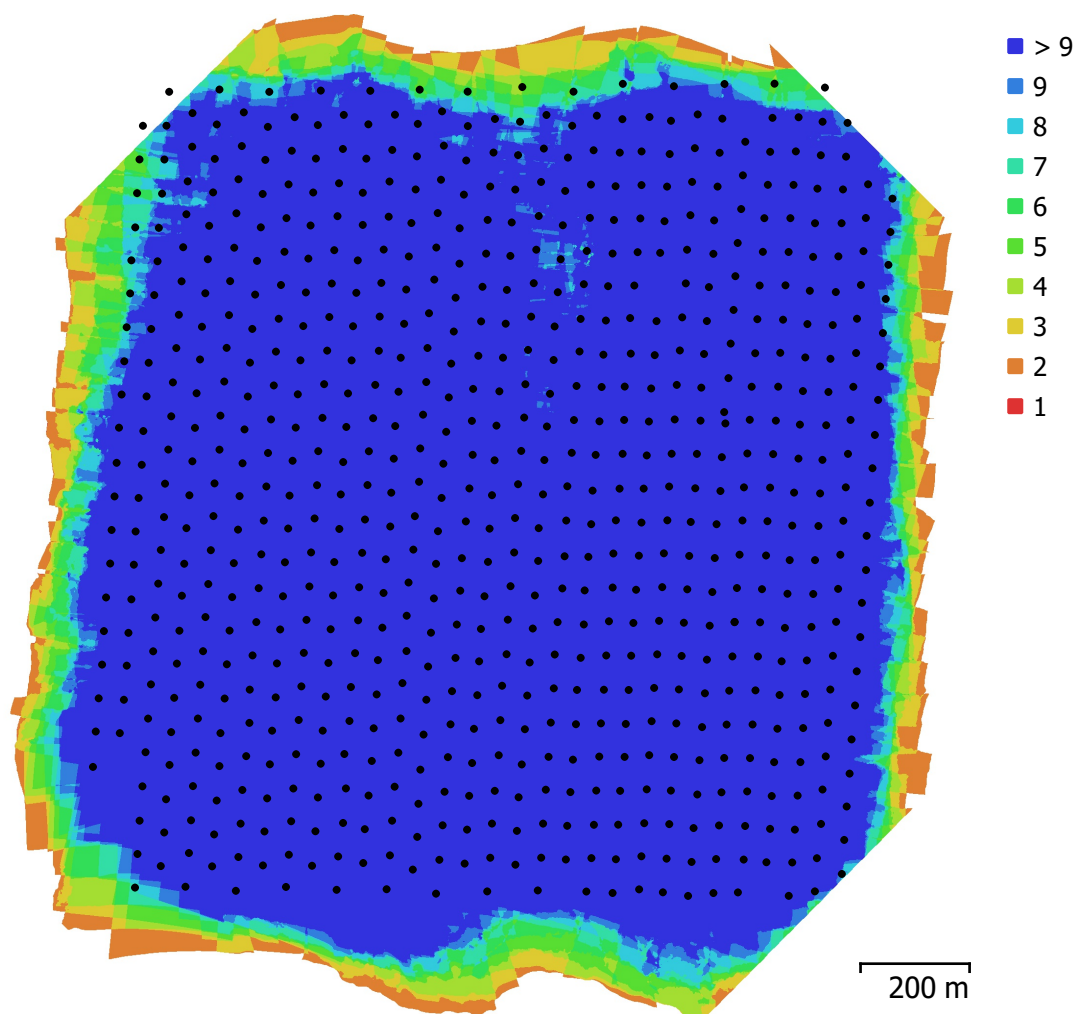


Fig. 1. Camera locations and image overlap.

Number of images:	735	Camera stations:	734
Flying altitude:	255 m	Tie points:	523,821
Ground resolution:	5.43 cm/pix	Projections:	1,380,997
Coverage area:	2.63 km ²	Reprojection error:	1.41 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

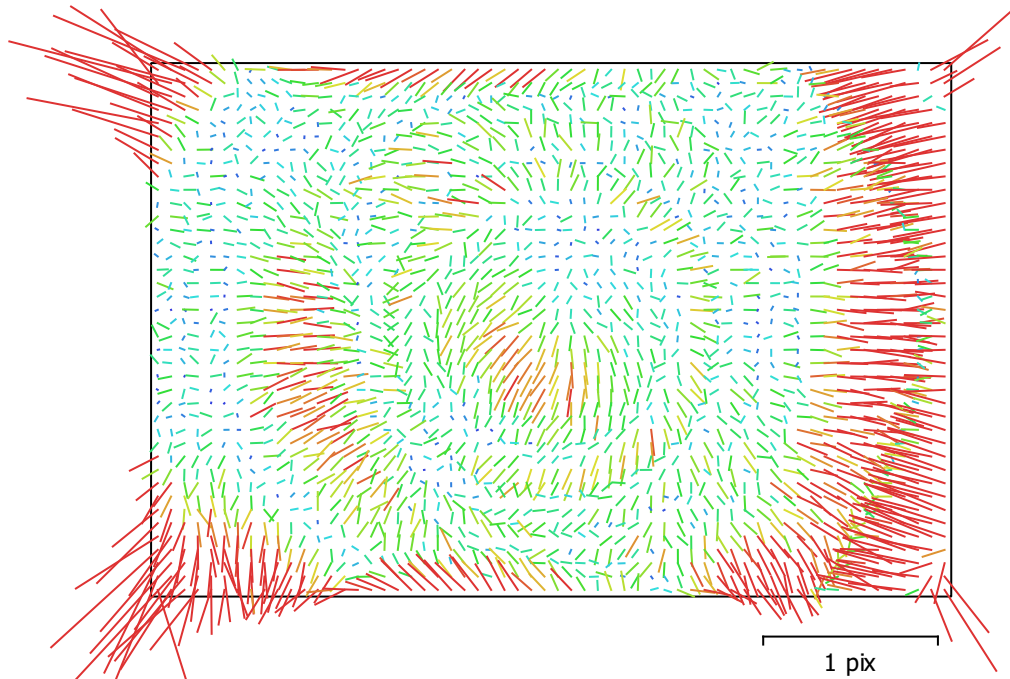


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

735 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4410.46	0.16	1.00	0.11	-0.88	0.28	-0.11	0.22	0.12	-0.63
Cx	30.8467	0.041		1.00	-0.10	0.04	-0.01	0.02	0.84	-0.07
Cy	-1.66516	0.071			1.00	-0.30	0.14	-0.22	-0.10	0.70
K1	0.0346501	5.4e-05				1.00	-0.92	0.90	0.06	-0.43
K2	-0.211322	0.00022					1.00	-0.98	-0.01	0.16
K3	0.329357	0.00031						1.00	0.02	-0.22
P1	0.00184884	3e-06							1.00	-0.13
P2	-0.000424285	4.7e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

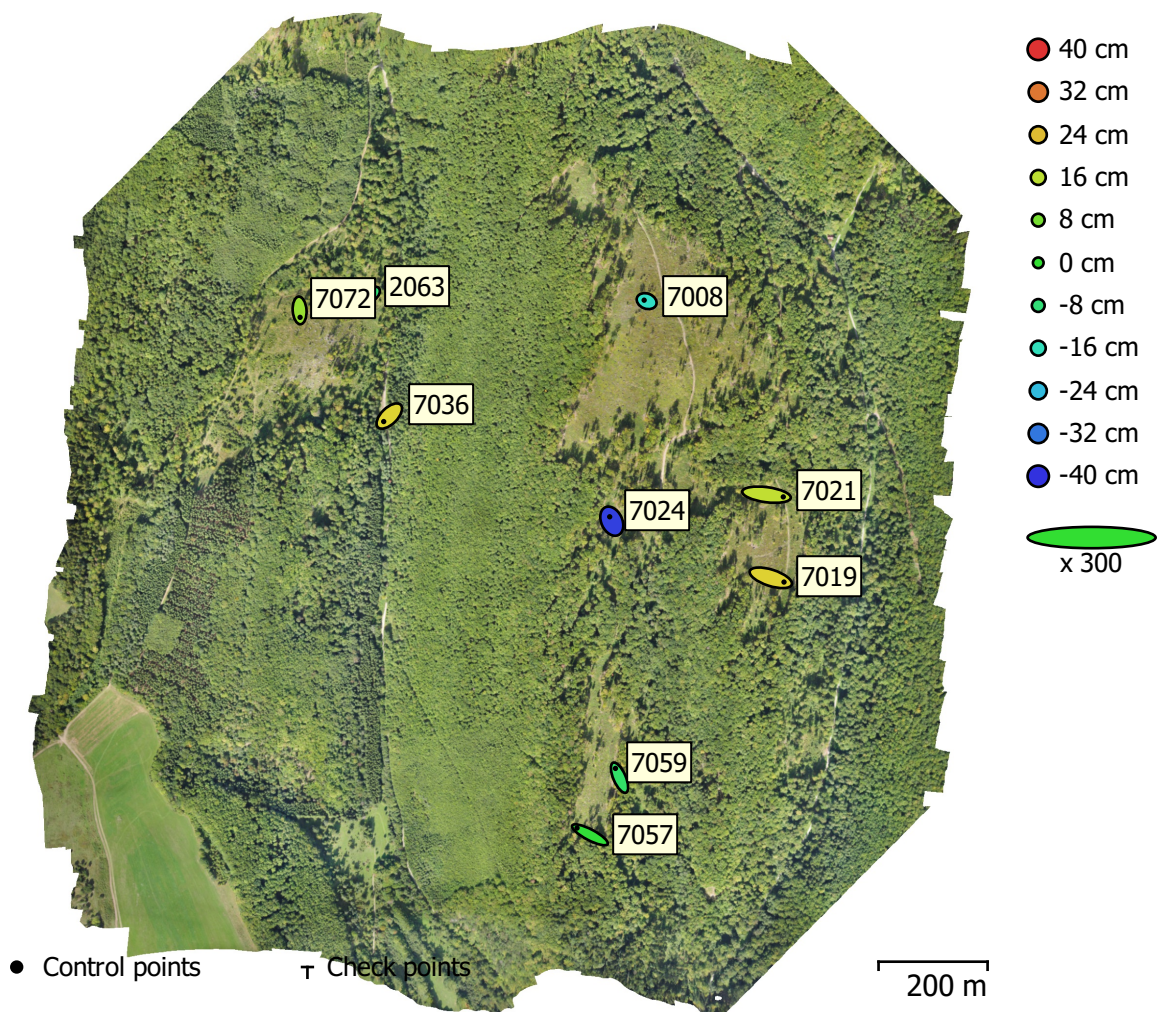


Fig. 3. GCP locations and error estimates.

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)
9	10.7105	6.55341	18.8207	12.5563	22.6248

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)
7036	-6.83542	-6.72711	21.143	23.2165	0.898 (36)
7019	16.1472	-5.18714	21.4336	27.332	1.451 (21)
7072	0.575297	-8.43533	11.9048	14.6017	0.573 (22)
7057	-15.802	8.2837	-0.661956	17.8539	1.606 (25)
7008	-3.05241	1.17553	-16.9525	17.2651	0.981 (14)
7021	20.498	-2.68841	16.5981	26.5121	0.660 (22)
7024	-2.55376	5.39882	-38.4376	38.8988	1.441 (22)
7059	-4.95958	11.3485	-6.19898	13.8496	0.841 (30)
2063	-3.78694	-2.8365	-7.78534	9.11033	2.231 (33)
Total	10.7105	6.55341	18.8207	22.6248	1.332

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

Digital Elevation Model

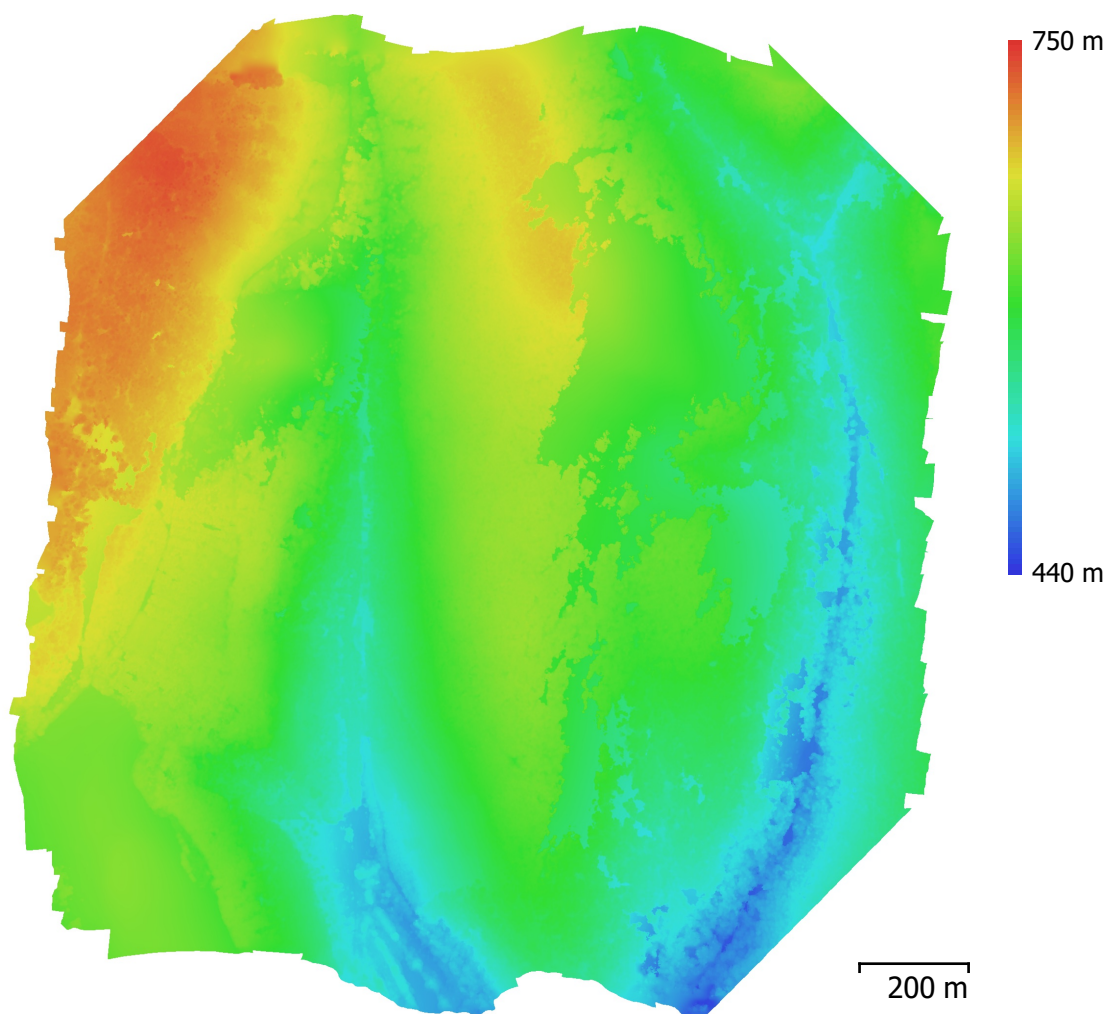


Fig. 4. Reconstructed digital elevation model.

Resolution: 10.9 cm/pix
Point density: 84.7 points/m²

Processing Parameters

General

Cameras	735
Aligned cameras	734
Markers	55

Shapes

Points	46
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	523,821 of 557,197
RMS reprojection error	0.14333 (1.41348 pix)
Max reprojection error	0.432387 (39.9867 pix)
Mean key point size	7.41585 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.78962

Alignment parameters

Accuracy	High
Generic preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	13 minutes 9 seconds
Alignment time	2 minutes 17 seconds

Depth Maps

Count	734
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	37 minutes 54 seconds

Dense Point Cloud

Points	348,779,898
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	37 minutes 54 seconds
Dense cloud generation time	5 hours 34 minutes

DEM

Size	25,543 x 25,553
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled
Processing time	5 minutes 48 seconds

Orthomosaic

Size	31,854 x 33,862
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8

Reconstruction parameters

Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Processing time	24 minutes 7 seconds

Software

Version
Platform

1.4.3 build 6488
Windows 64

RTK_nonveg_FP1

Processing Report
08 February 2019



Survey Data

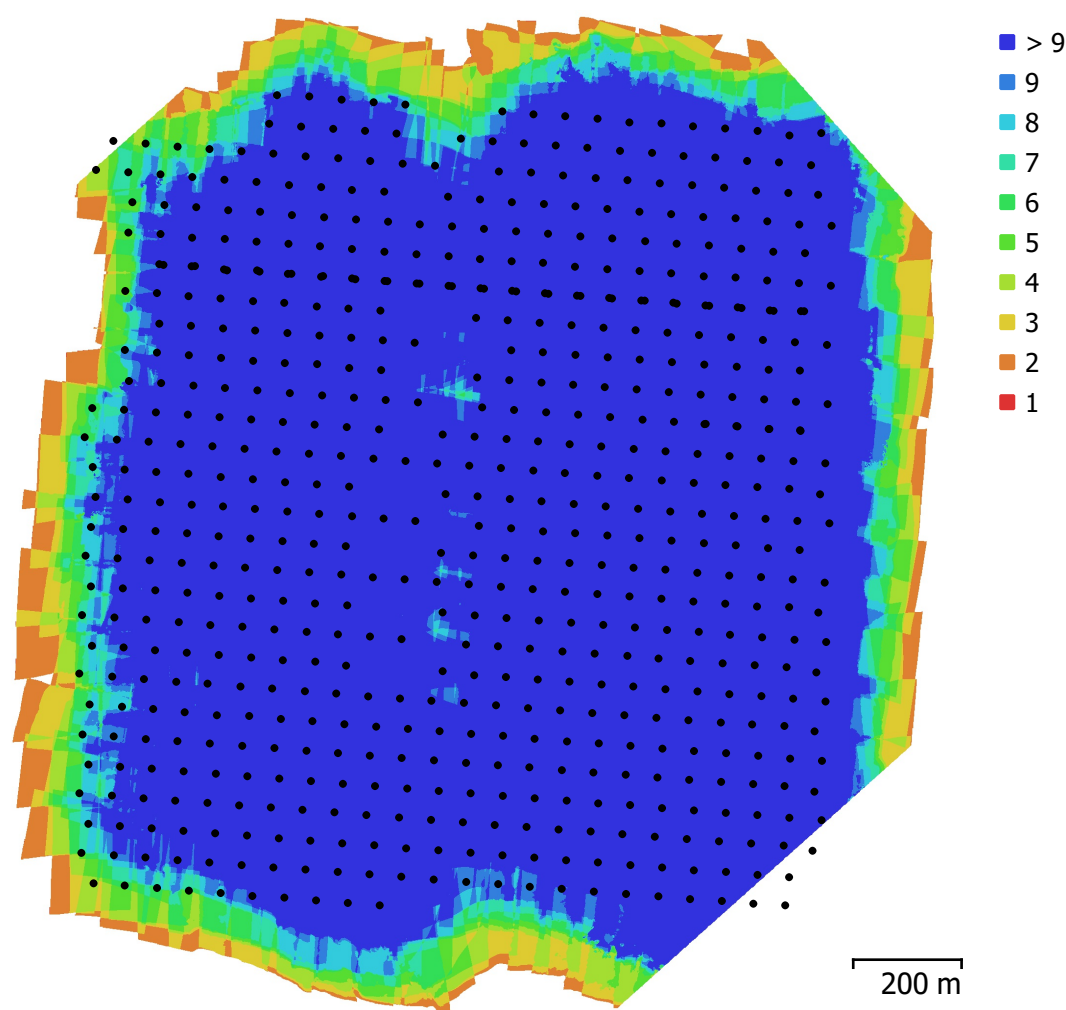


Fig. 1. Camera locations and image overlap.

Number of images:	666	Camera stations:	631
Flying altitude:	284 m	Tie points:	316,813
Ground resolution:	6 cm/pix	Projections:	939,874
Coverage area:	2.58 km ²	Reprojection error:	1.41 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

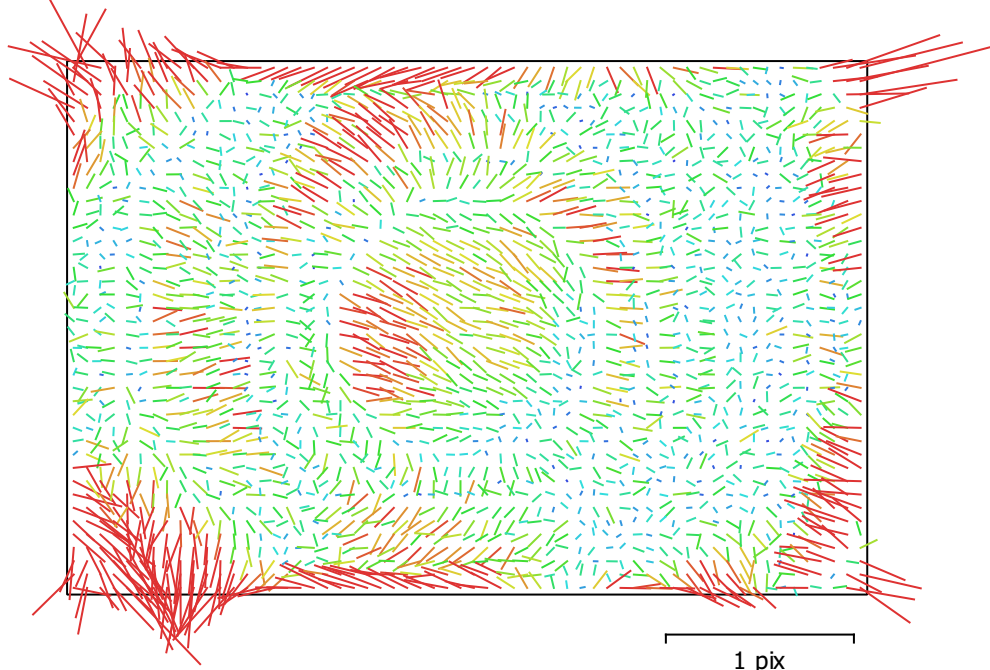


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

666 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μ m

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2	P3	P4
F	4408.55	0.093	1.00	-0.06	-0.76	-0.17	-0.01	-0.10	0.08	-0.06	0.06	0.01	-0.09	-0.00	-0.01
Cx	34.9905	0.041		1.00	-0.00	0.01	-0.02	0.03	-0.02	0.01	-0.01	0.72	-0.23	-0.37	0.29
Cy	-2.97158	0.041			1.00	0.02	0.02	-0.05	0.04	-0.05	0.04	-0.09	0.54	0.07	-0.05
B1	1.32022	0.028				1.00	0.04	-0.01	-0.00	0.01	-0.02	-0.00	0.01	0.01	-0.01
B2	1.36611	0.026					1.00	-0.00	0.00	0.00	-0.00	-0.01	0.02	0.02	-0.01
K1	0.0481128	8.6e-05						1.00	-0.97	0.92	-0.87	0.07	-0.08	-0.08	0.08
K2	-0.328614	0.00068							1.00	-0.99	0.96	-0.06	0.04	0.08	-0.08
K3	0.692276	0.0021								1.00	-0.99	0.05	-0.04	-0.07	0.07
K4	-0.36702	0.0022									1.00	-0.05	0.03	0.06	-0.07
P1	0.00154498	5.8e-06										1.00	-0.47	-0.88	0.76
P2	-0.000324712	2.1e-06											1.00	0.48	-0.42
P3	0.658793	0.019												1.00	-0.96
P4	0.580351	0.025													1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

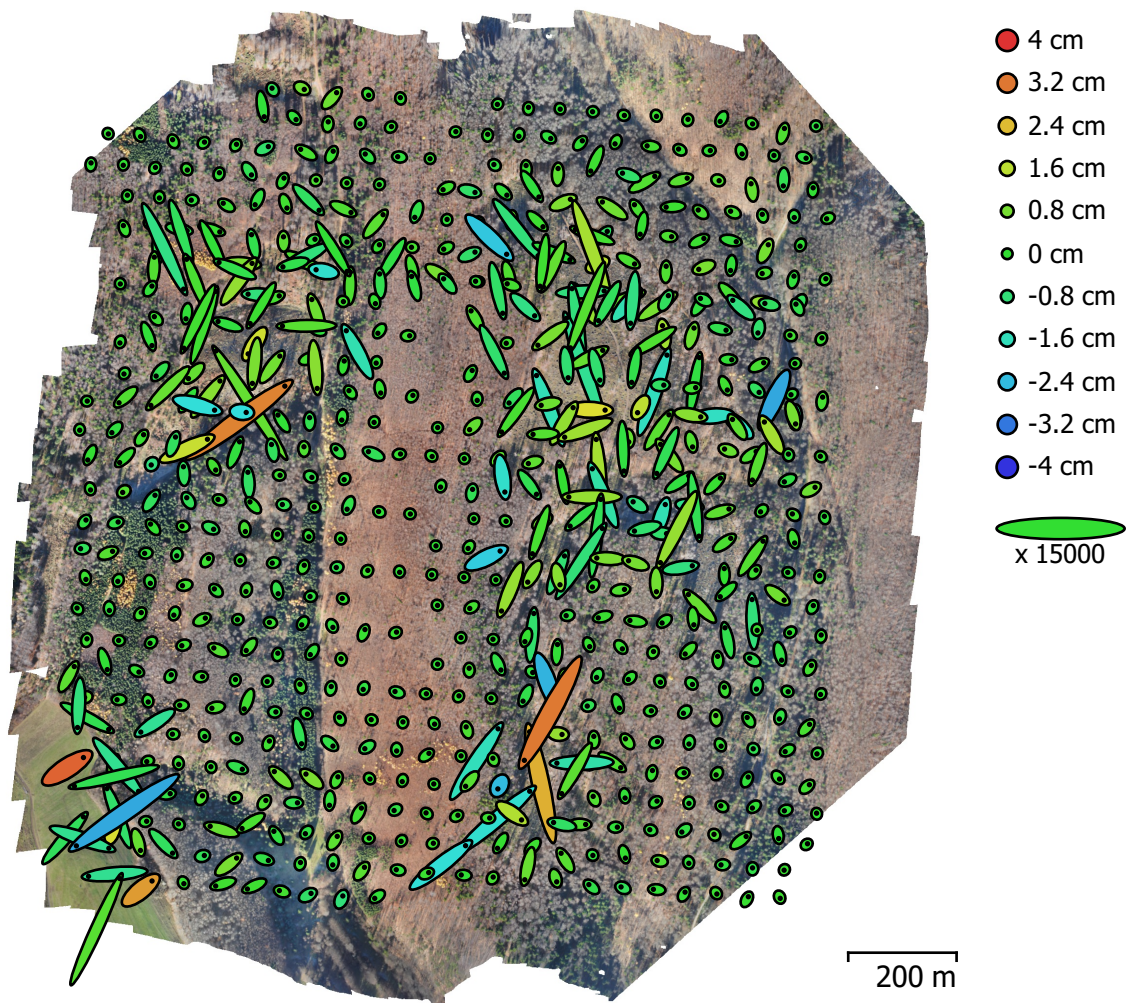


Fig. 3. Camera locations and error estimates.

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 (mm)	Y error (mm)	Z error (mm)	XY error (mm)	Total error (mm)
1.778	2.4311	6.22623	3.0119	6.91646

Table 3. Average camera location error.

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

Digital Elevation Model

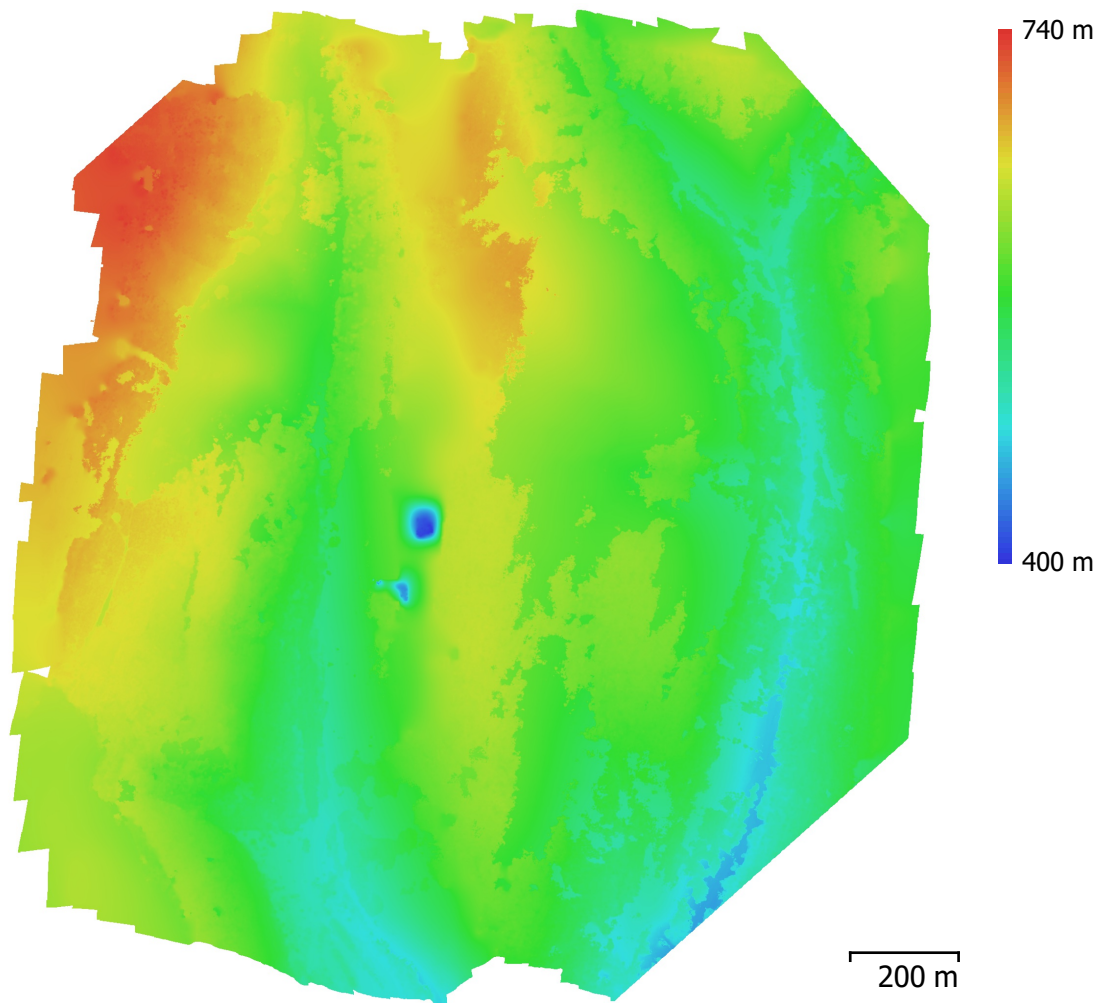


Fig. 4. Reconstructed digital elevation model.

Resolution: 12 cm/pix
Point density: 69.5 points/m²

Processing Parameters

General

Cameras	666
Aligned cameras	631
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	316,813 of 346,185
RMS reprojection error	0.136358 (1.40758 pix)
Max reprojection error	0.840093 (38.1753 pix)
Mean key point size	6.83814 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.24282

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	17 minutes 43 seconds
Alignment time	3 minutes 29 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1-p4
Adaptive camera model fitting	No
Optimization time	4 seconds

Depth Maps

Count	610
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	21 minutes 35 seconds

Dense Point Cloud

Points	202,397,424
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	21 minutes 35 seconds
Dense cloud generation time	2 hours 48 minutes

Model

Faces	40,379,431
Vertices	20,195,870
Vertex colors	3 bands, uint8

Reconstruction parameters

Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	40,479,422
Processing time	19 minutes 29 seconds

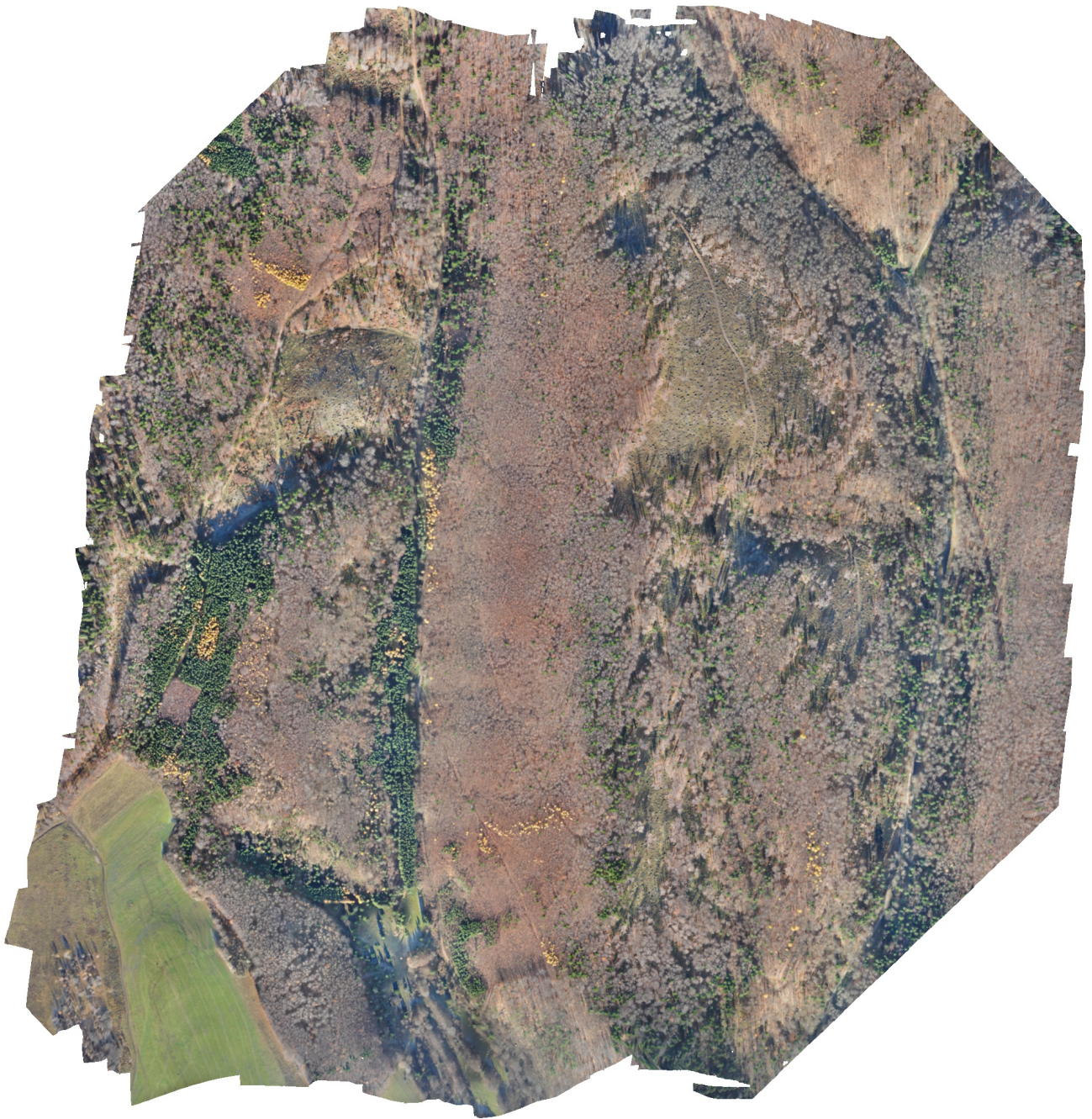
DEM

Size	23,321 x 23,090
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	4 minutes 44 seconds
Orthomosaic	
Size	33,972 x 37,023
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	27 minutes 17 seconds
Software	
Version	1.4.3 build 6488
Platform	Windows 64

RTK_nonveg_FP12

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Survey Data

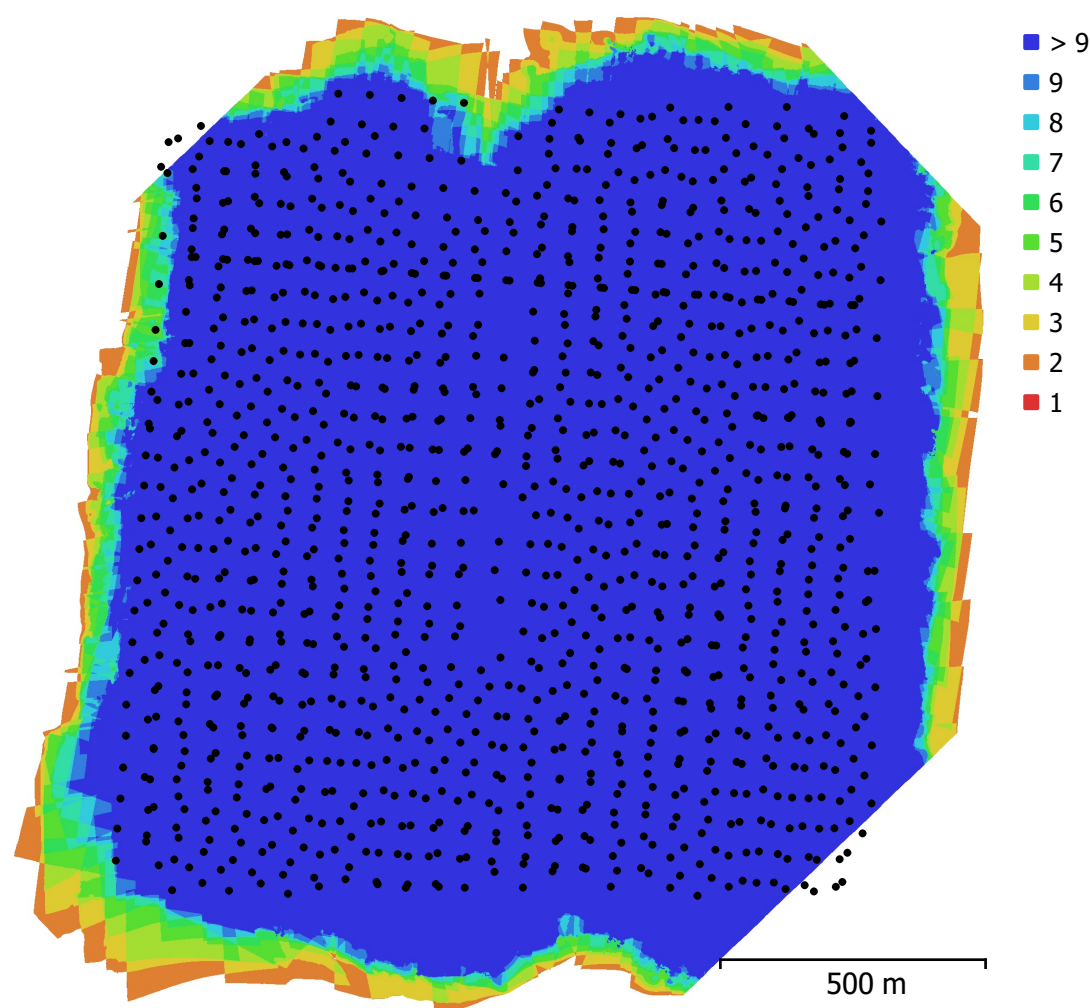


Fig. 1. Camera locations and image overlap.

Number of images:	1,304	Camera stations:	1,238
Flying altitude:	275 m	Tie points:	621,397
Ground resolution:	5.82 cm/pix	Projections:	1,764,115
Coverage area:	2.75 km ²	Reprojection error:	1.39 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

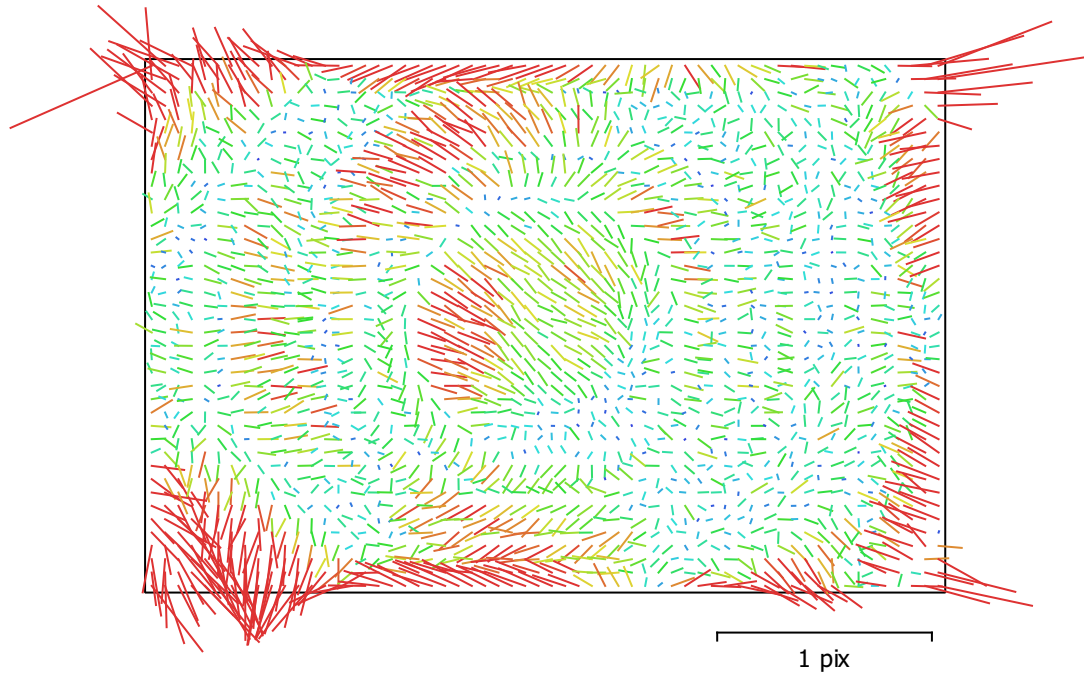


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

1304 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2	P3	P4
F	4408.63	0.043	1.00	-0.04	-0.57	-0.06	0.01	-0.23	0.21	-0.18	0.17	-0.01	-0.08	0.02	-0.02
Cx	35.4209	0.028		1.00	-0.02	0.03	-0.00	0.00	-0.00	0.00	-0.00	0.71	-0.21	-0.38	0.31
Cy	-2.89759	0.025			1.00	-0.02	0.02	-0.02	0.01	-0.02	0.01	-0.08	0.68	0.07	-0.06
B1	1.26118	0.0088				1.00	-0.01	0.03	-0.04	0.03	-0.03	0.02	0.04	-0.01	0.01
B2	0.613531	0.0085					1.00	-0.00	0.00	-0.00	0.00	-0.02	0.04	0.02	-0.02
K1	0.0484642	6.5e-05						1.00	-0.97	0.92	-0.87	0.04	-0.05	-0.06	0.06
K2	-0.330244	0.00052							1.00	-0.99	0.96	-0.04	0.03	0.05	-0.06
K3	0.695495	0.0016								1.00	-0.99	0.03	-0.03	-0.05	0.06
K4	-0.368737	0.0017									1.00	-0.03	0.02	0.05	-0.06
P1	0.00164585	4.3e-06										1.00	-0.44	-0.89	0.78
P2	-0.000334387	1.6e-06											1.00	0.45	-0.40
P3	0.591434	0.013												1.00	-0.96
P4	0.525995	0.018													1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

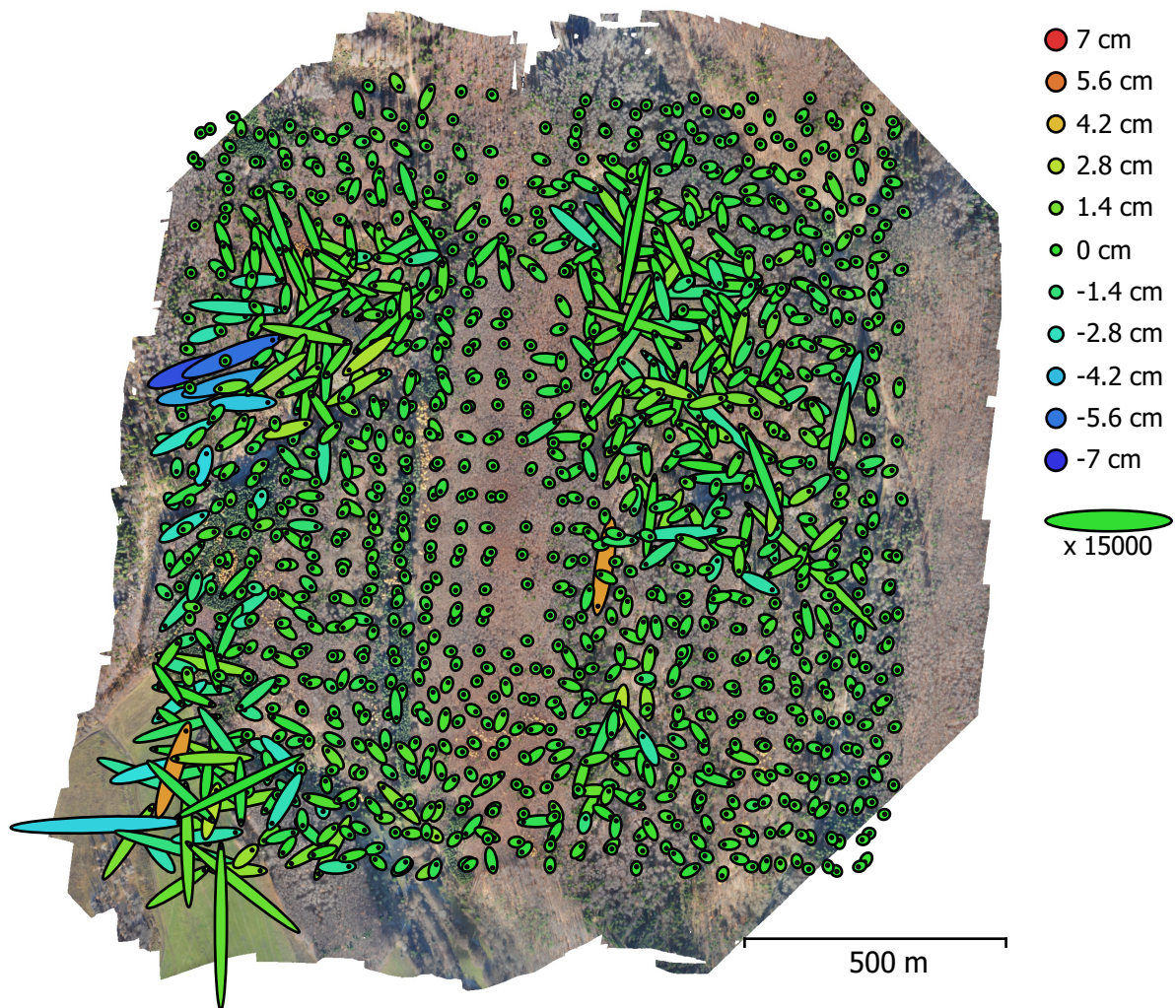


Fig. 3. Camera locations and error estimates.

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 (mm)	Y error (mm)	Z error (mm)	XY error (mm)	Total error (mm)
2.30024	2.21376	7.88868	3.19247	8.51018

Table 3. Average camera location error.

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

Digital Elevation Model

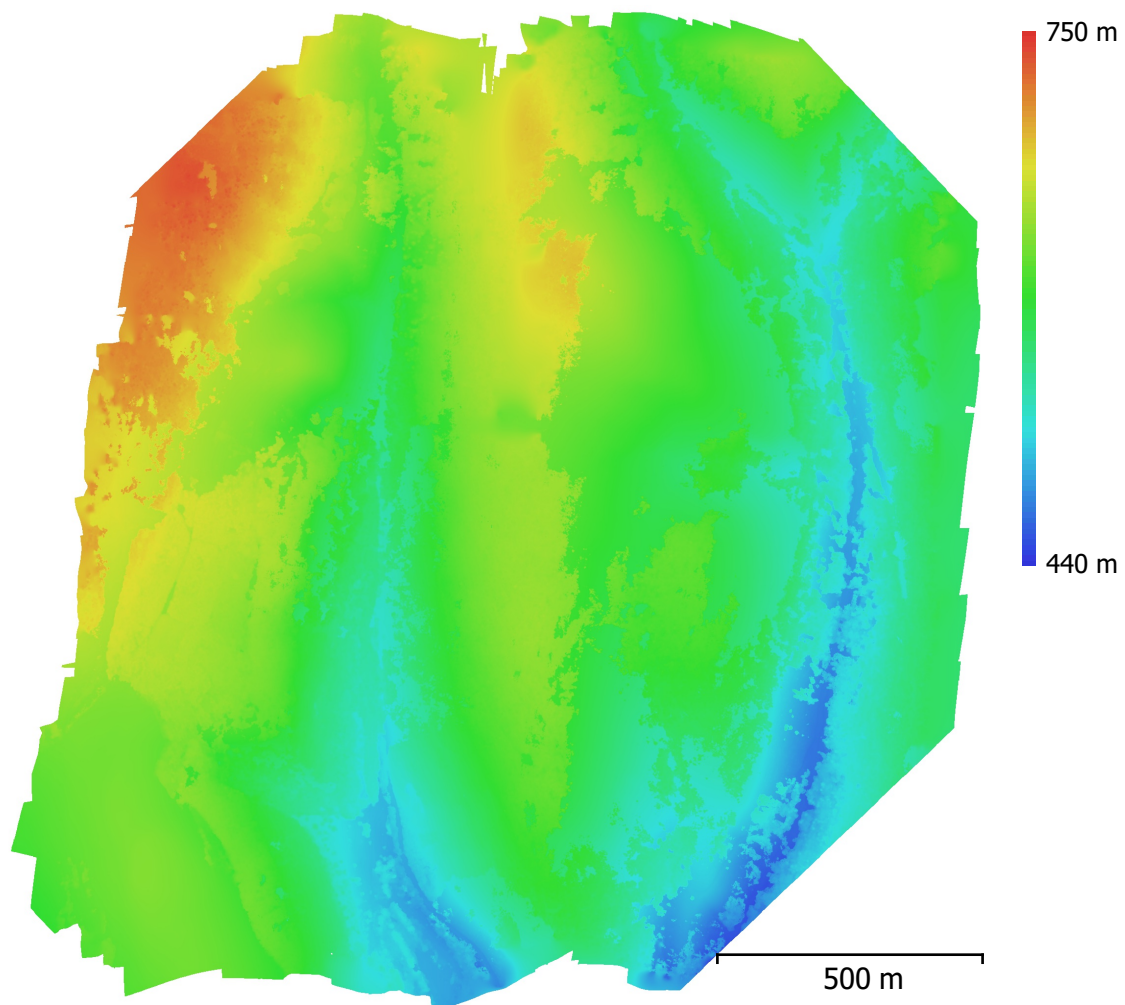


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.6 cm/pix
Point density: 73.8 points/m²

Processing Parameters

General

Cameras	1304
Aligned cameras	1238
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	621,397 of 679,345
RMS reprojection error	0.133131 (1.38687 pix)
Max reprojection error	0.850672 (39.8377 pix)
Mean key point size	6.78909 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.15214

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	29 minutes 3 seconds
Alignment time	7 minutes 5 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1-p4
Adaptive camera model fitting	No
Optimization time	11 seconds

Depth Maps

Count	1194
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	40 minutes 21 seconds

Dense Point Cloud

Points	250,590,591
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	40 minutes 21 seconds
Dense cloud generation time	14 hours 6 minutes

Model

Faces	50,011,240
Vertices	25,012,085
Vertex colors	3 bands, uint8

Reconstruction parameters

Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	50,118,050
Processing time	22 minutes 42 seconds

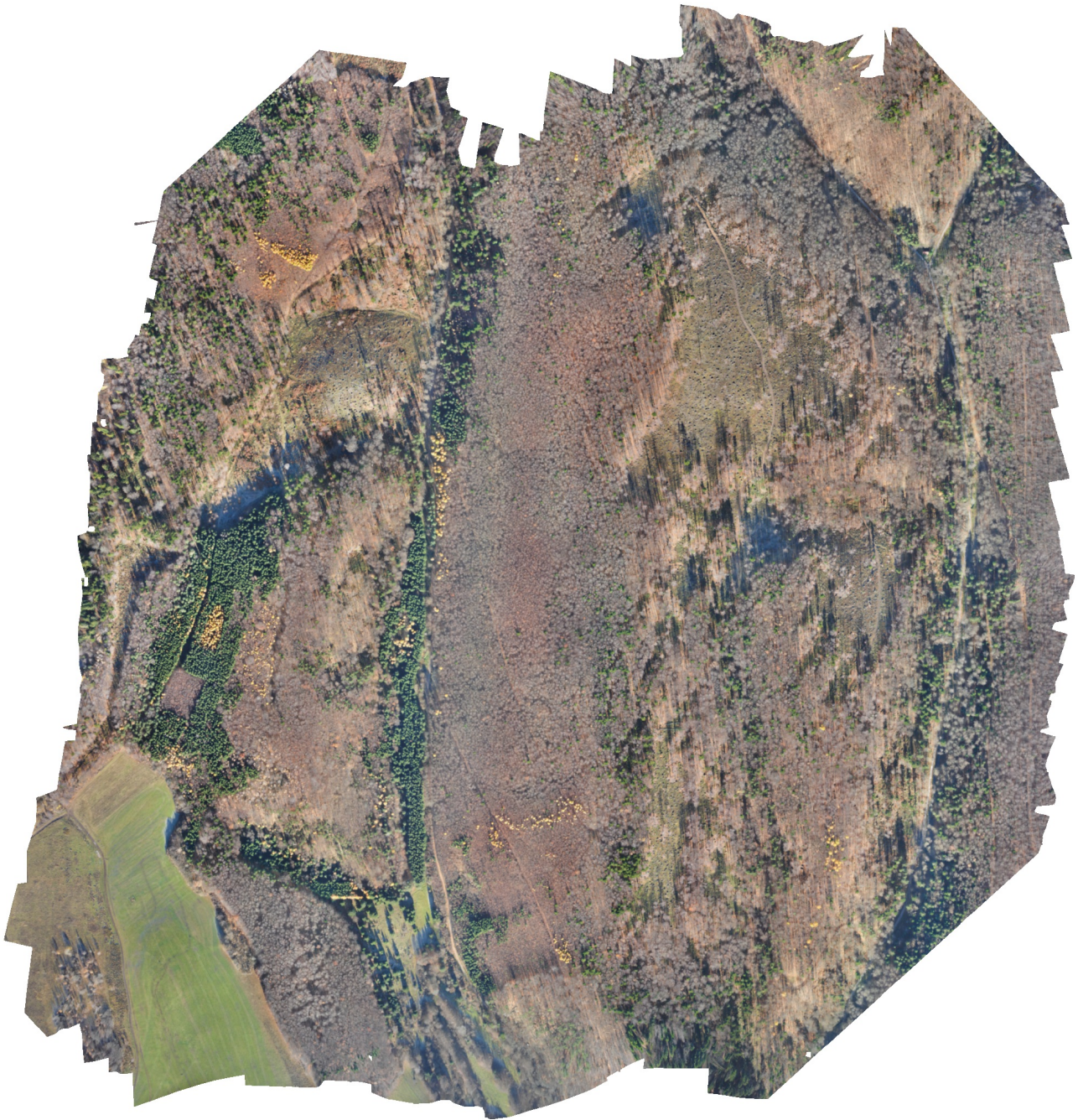
DEM

Size	24,239 x 24,129
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	5 minutes 19 seconds
Orthomosaic	
Size	36,493 x 37,816
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	48 minutes 24 seconds
Software	
Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

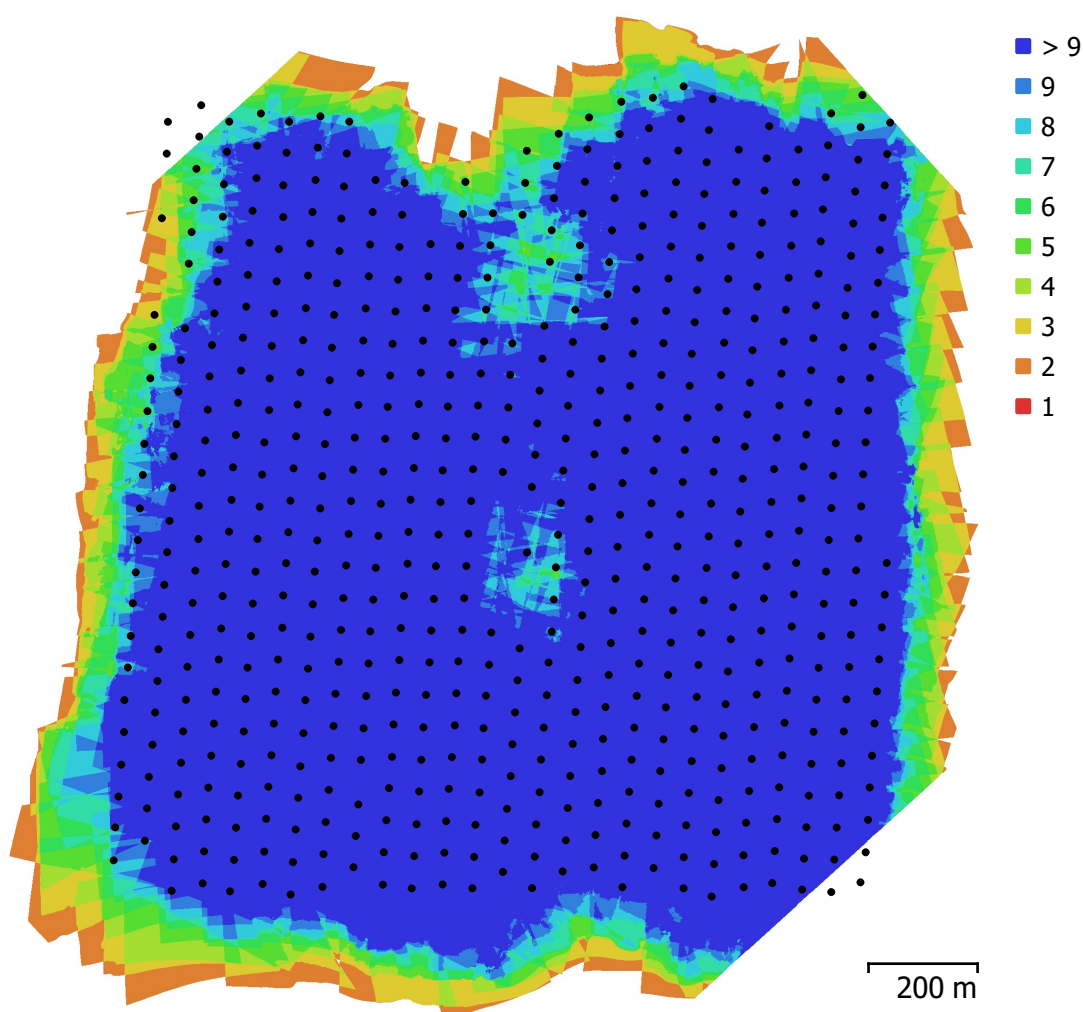


Fig. 1. Camera locations and image overlap.

Number of images:	638	Camera stations:	603
Flying altitude:	267 m	Tie points:	307,832
Ground resolution:	5.66 cm/pix	Projections:	850,618
Coverage area:	2.55 km ²	Reprojection error:	1.24 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μm	No

Table 1. Cameras.

Camera Calibration

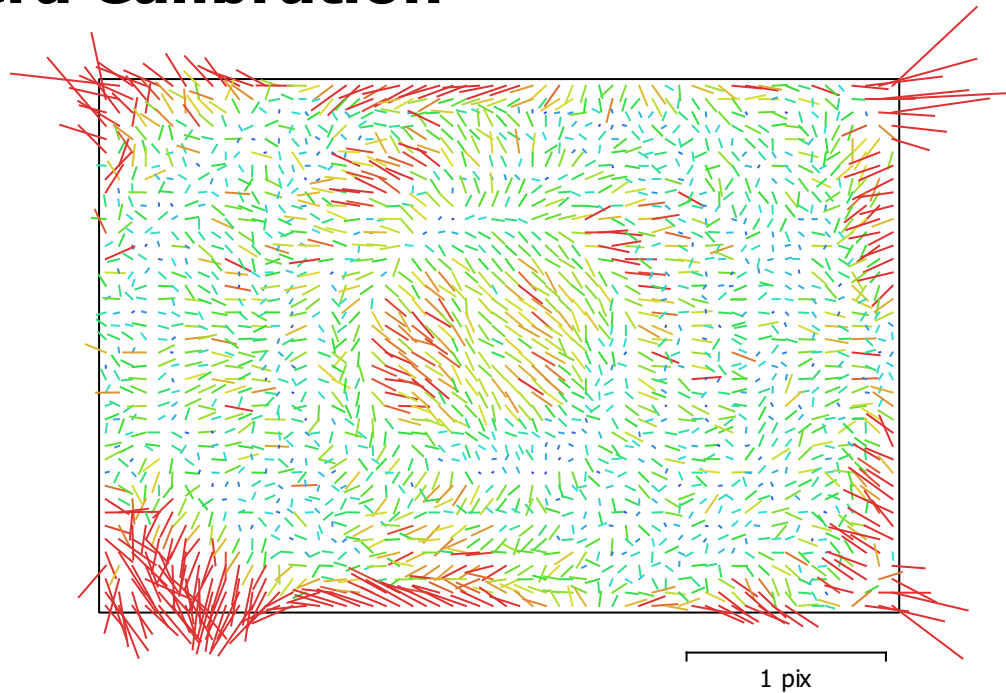


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

638 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2	P3	P4
F	4407.39	0.077	1.00	-0.04	-0.64	-0.00	-0.05	-0.19	0.16	-0.14	0.13	-0.01	-0.09	0.01	-0.01
Cx	35.1293	0.04		1.00	-0.02	0.06	-0.00	-0.01	0.01	-0.00	-0.00	0.70	-0.20	-0.39	0.32
Cy	-2.38529	0.042			1.00	-0.04	0.07	-0.02	0.01	-0.02	0.02	-0.08	0.68	0.08	-0.07
B1	1.76924	0.016				1.00	-0.01	0.01	-0.02	0.02	-0.02	0.04	0.03	-0.02	0.02
B2	0.212003	0.018					1.00	-0.01	0.01	-0.01	0.01	-0.03	0.08	0.02	-0.02
K1	0.0471726	9.7e-05						1.00	-0.97	0.92	-0.87	0.01	-0.04	-0.03	0.04
K2	-0.321353	0.00078							1.00	-0.99	0.96	-0.01	0.02	0.03	-0.05
K3	0.670391	0.0024								1.00	-0.99	0.02	-0.02	-0.04	0.06
K4	-0.343973	0.0026									1.00	-0.03	0.02	0.05	-0.07
P1	0.00169844	6.4e-06										1.00	-0.43	-0.89	0.77
P2	-0.000350991	2.6e-06											1.00	0.43	-0.38
P3	0.430196	0.018												1.00	-0.96
P4	0.720499	0.026													1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

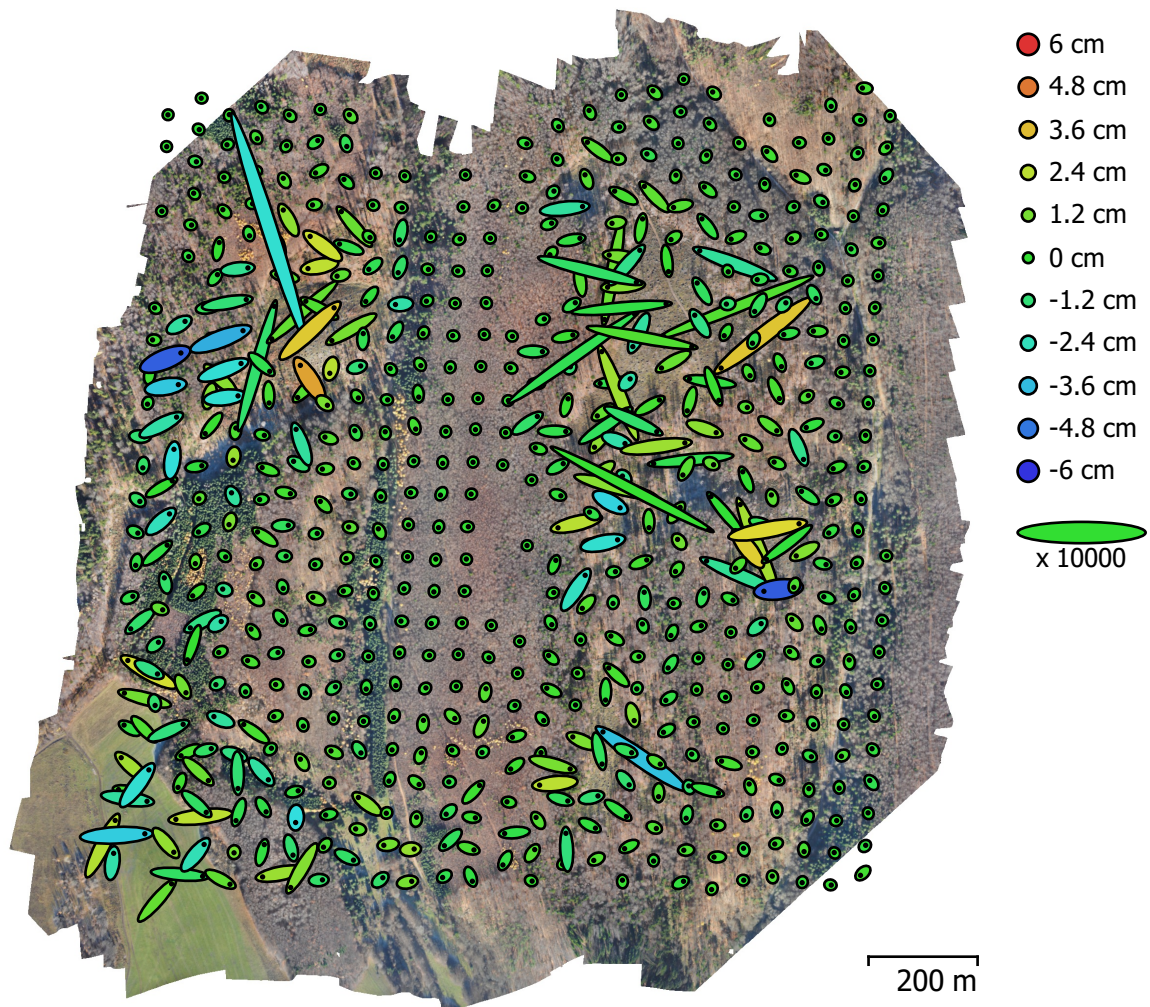


Fig. 3. Camera locations and error estimates.

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)
0.346937	0.2986	0.952125	0.457742	1.05644

Table 3. Average camera location error.

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

Digital Elevation Model

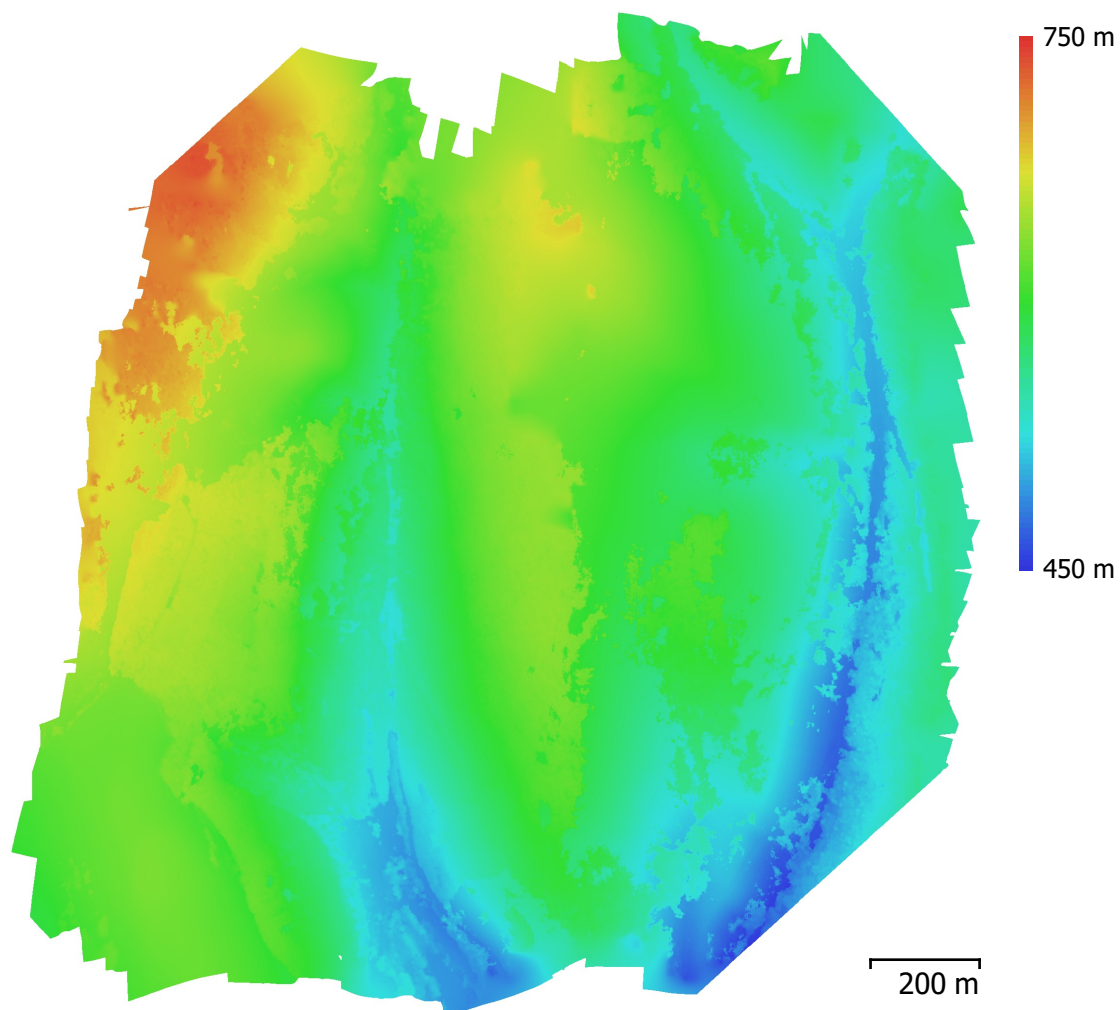


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.3 cm/pix
Point density: 78.1 points/m²

Processing Parameters

General

Cameras	638
Aligned cameras	603
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	307,832 of 333,922
RMS reprojection error	0.131011 (1.23699 pix)
Max reprojection error	0.852493 (31.4025 pix)
Mean key point size	6.44441 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.94803

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	16 minutes 39 seconds
Alignment time	2 minutes 59 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1-p4
Adaptive camera model fitting	No
Optimization time	4 seconds

Depth Maps

Count	580
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	16 minutes 16 seconds

Dense Point Cloud

Points	207,983,822
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	16 minutes 16 seconds
Dense cloud generation time	2 hours 17 minutes

Model

Faces	41,474,472
Vertices	20,744,668
Vertex colors	3 bands, uint8

Reconstruction parameters

Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	41,596,709
Processing time	20 minutes 29 seconds

DEM

Size	24,682 x 24,445
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	4 minutes 45 seconds
Orthomosaic	
Size	35,278 x 36,789
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	25 minutes 13 seconds
Software	
Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

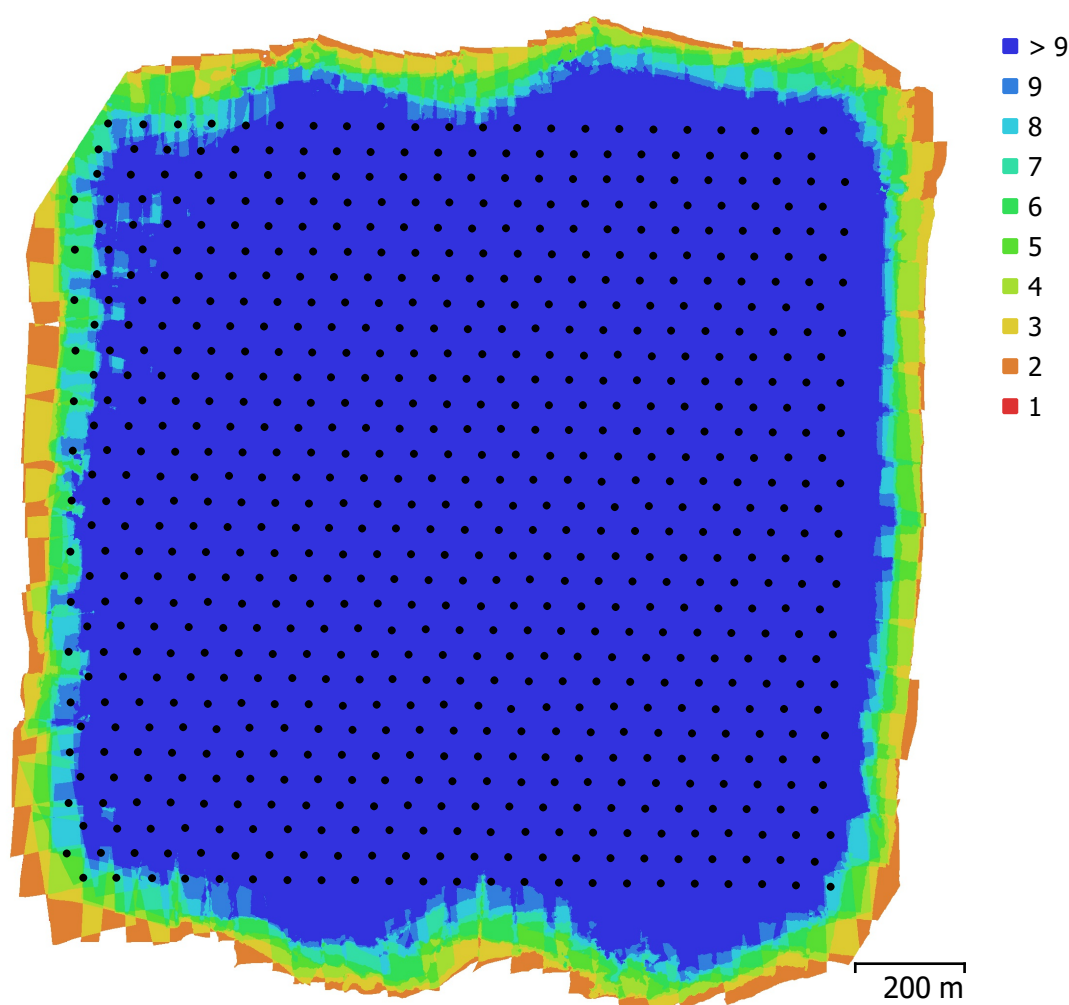


Fig. 1. Camera locations and image overlap.

Number of images:	711	Camera stations:	711
Flying altitude:	281 m	Tie points:	645,112
Ground resolution:	5.95 cm/pix	Projections:	1,771,647
Coverage area:	2.73 km ²	Reprojection error:	1.48 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μ m	No

Table 1. Cameras.

Camera Calibration

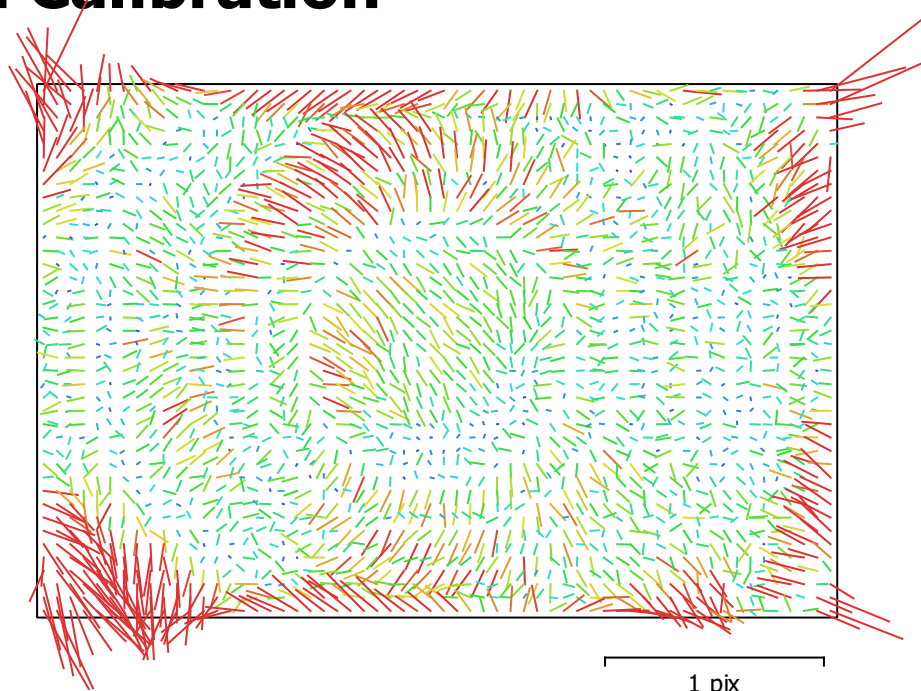


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

711 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2	P3	P4
F	4410.27	0.063	1.00	0.01	-0.81	-0.04	-0.03	-0.16	0.13	-0.11	0.11	0.00	-0.04	0.00	-0.00
Cx	31.9625	0.029		1.00	-0.03	0.04	0.02	0.02	-0.01	0.01	-0.00	0.69	-0.26	-0.39	0.31
Cy	-2.97359	0.033			1.00	-0.03	0.04	-0.03	0.03	-0.03	0.02	-0.06	0.41	0.06	-0.05
B1	1.33071	0.014				1.00	0.01	0.04	-0.04	0.04	-0.04	0.03	-0.02	-0.02	0.01
B2	0.41695	0.014					1.00	-0.00	-0.00	0.00	-0.00	0.02	0.05	0.01	-0.01
K1	0.0469025	7.5e-05						1.00	-0.97	0.93	-0.88	0.03	-0.05	-0.04	0.04
K2	-0.314365	0.00058							1.00	-0.99	0.96	-0.02	0.01	0.03	-0.04
K3	0.652181	0.0018								1.00	-0.99	0.01	-0.00	-0.02	0.02
K4	-0.331001	0.0018									1.00	0.00	-0.01	0.00	-0.01
P1	0.00141376	4.7e-06										1.00	-0.59	-0.90	0.80
P2	-0.000343388	1.6e-06											1.00	0.62	-0.55
P3	0.829631	0.017												1.00	-0.96
P4	0.293015	0.024													1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

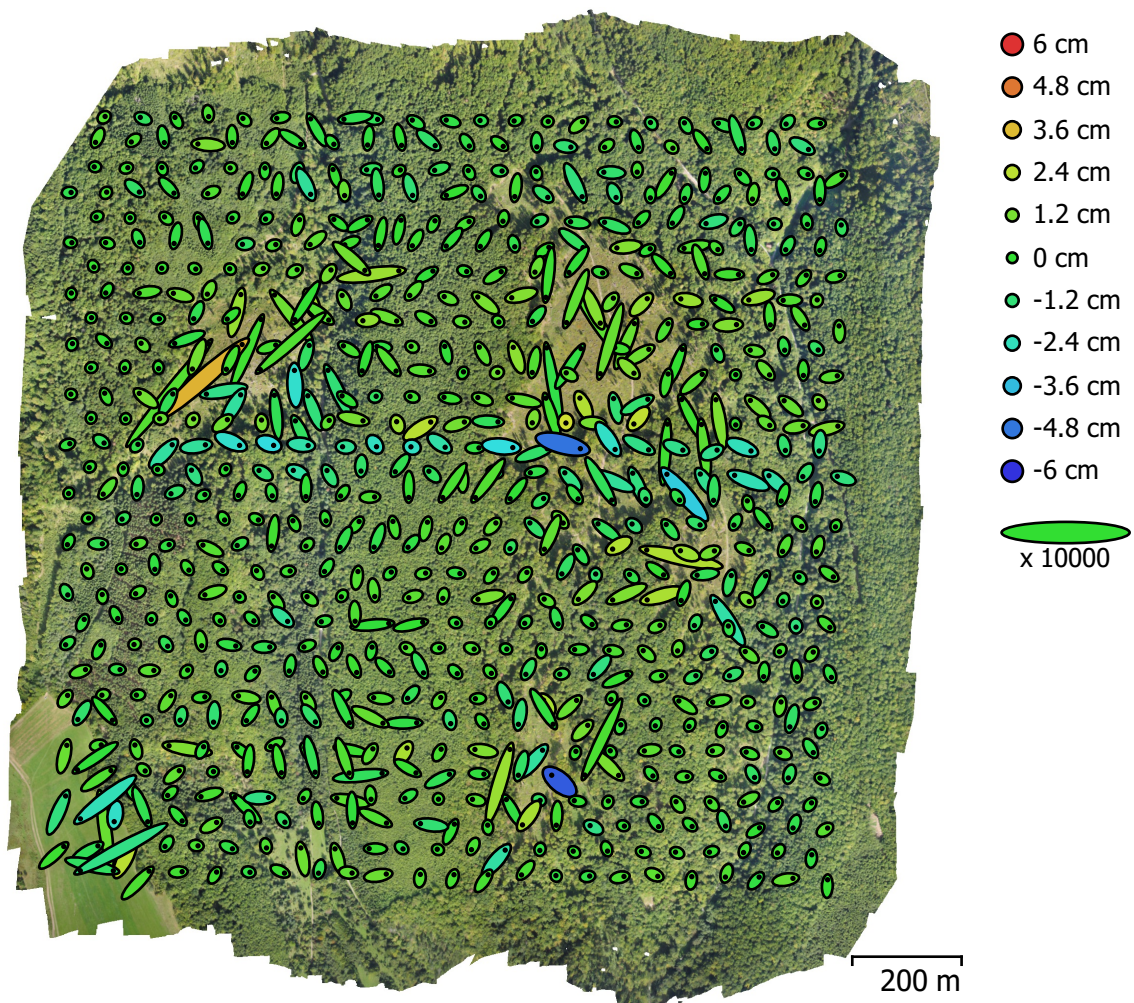


Fig. 3. Camera locations and error estimates.

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 (mm)	Y error (mm)	Z error (mm)	XY error (mm)	Total error (mm)
2.2638	2.64128	8.74477	3.47867	9.41128

Table 3. Average camera location error.

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

Digital Elevation Model

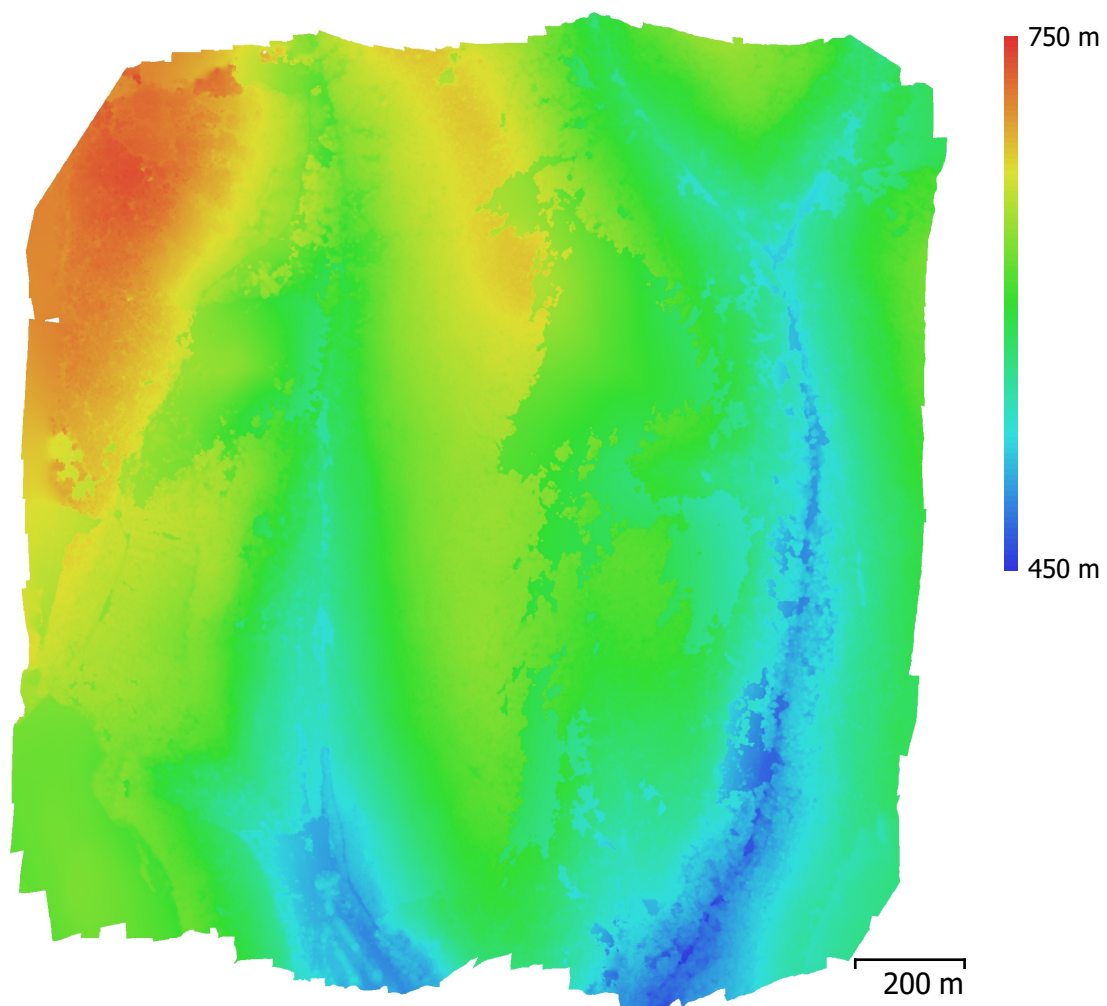


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.9 cm/pix
Point density: 70.7 points/m²

Processing Parameters

General

Cameras	711
Aligned cameras	711
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	645,112 of 689,350
RMS reprojection error	0.137661 (1.4766 pix)
Max reprojection error	0.692184 (47.8894 pix)
Mean key point size	7.57873 pix
Point colors	3 bands, uint8
Key points	Yes
Average tie point multiplicity	2.97475

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	16 minutes 20 seconds
Alignment time	3 minutes 43 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1-p4
Adaptive camera model fitting	No
Optimization time	9 seconds

Depth Maps

Count	711
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	39 minutes 35 seconds

Dense Point Cloud

Points	312,493,674
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	39 minutes 35 seconds
Dense cloud generation time	1 days 14 hours

Model

Faces	62,206,127
Vertices	31,113,572
Vertex colors	3 bands, uint8
Reconstruction parameters	
Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	62,498,691
Processing time	22 minutes 6 seconds

DEM

Size	24,205 x 24,713
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	4 minutes 54 seconds
Orthomosaic	
Size	34,157 x 36,702
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	33 minutes 3 seconds
Software	
Version	1.4.3 build 6488
Platform	Windows 64

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Survey Data

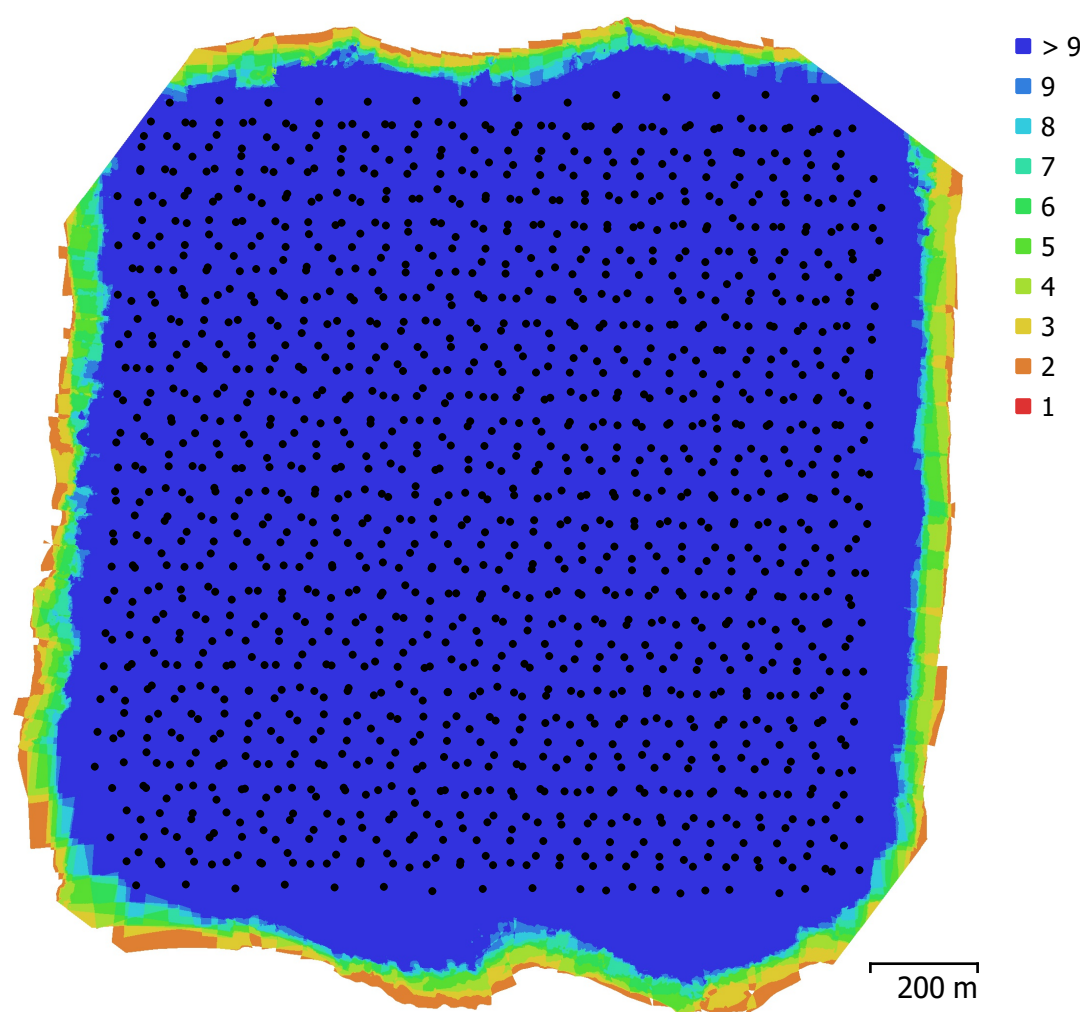


Fig. 1. Camera locations and image overlap.

Number of images:	1,446	Camera stations:	1,446
Flying altitude:	268 m	Tie points:	1,173,265
Ground resolution:	5.69 cm/pix	Projections:	3,172,130
Coverage area:	2.81 km ²	Reprojection error:	1.51 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μm	No

Table 1. Cameras.

Camera Calibration

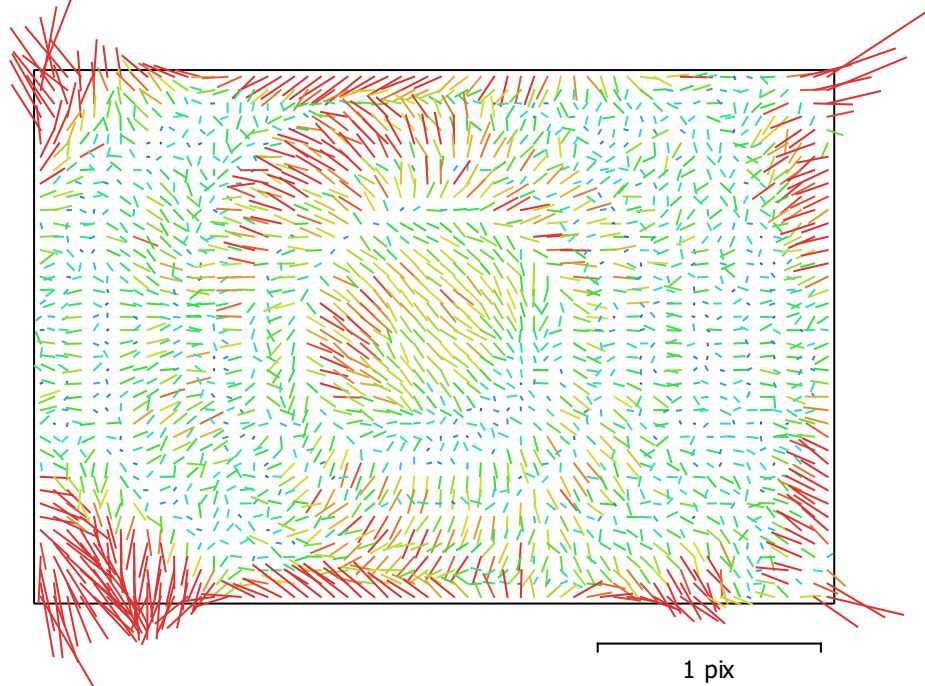


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

1446 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2	P3	P4
F	4409.22	0.031	1.00	0.02	-0.63	0.04	-0.02	-0.32	0.28	-0.25	0.23	0.01	-0.05	-0.01	0.01
Cx	31.4201	0.022		1.00	-0.06	0.04	0.02	0.01	-0.01	0.01	-0.00	0.70	-0.31	-0.41	0.33
Cy	-2.5512	0.019			1.00	-0.07	0.05	-0.01	0.00	-0.00	0.00	-0.11	0.54	0.11	-0.09
B1	1.23981	0.0065				1.00	0.02	0.04	-0.05	0.05	-0.04	0.03	0.03	-0.02	0.02
B2	0.12143	0.0059					1.00	-0.00	0.00	-0.00	0.00	0.00	0.06	0.01	-0.01
K1	0.0477796	6.1e-05						1.00	-0.97	0.93	-0.88	0.03	-0.04	-0.03	0.03
K2	-0.320781	0.00047							1.00	-0.99	0.96	-0.02	0.01	0.03	-0.03
K3	0.671175	0.0014								1.00	-0.99	0.01	0.00	-0.02	0.02
K4	-0.349837	0.0014									1.00	-0.00	-0.01	0.00	-0.01
P1	0.00131479	3.7e-06										1.00	-0.64	-0.91	0.81
P2	-0.000333678	1.2e-06											1.00	0.66	-0.59
P3	1.02946	0.015												1.00	-0.96
P4	0.147507	0.02													1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

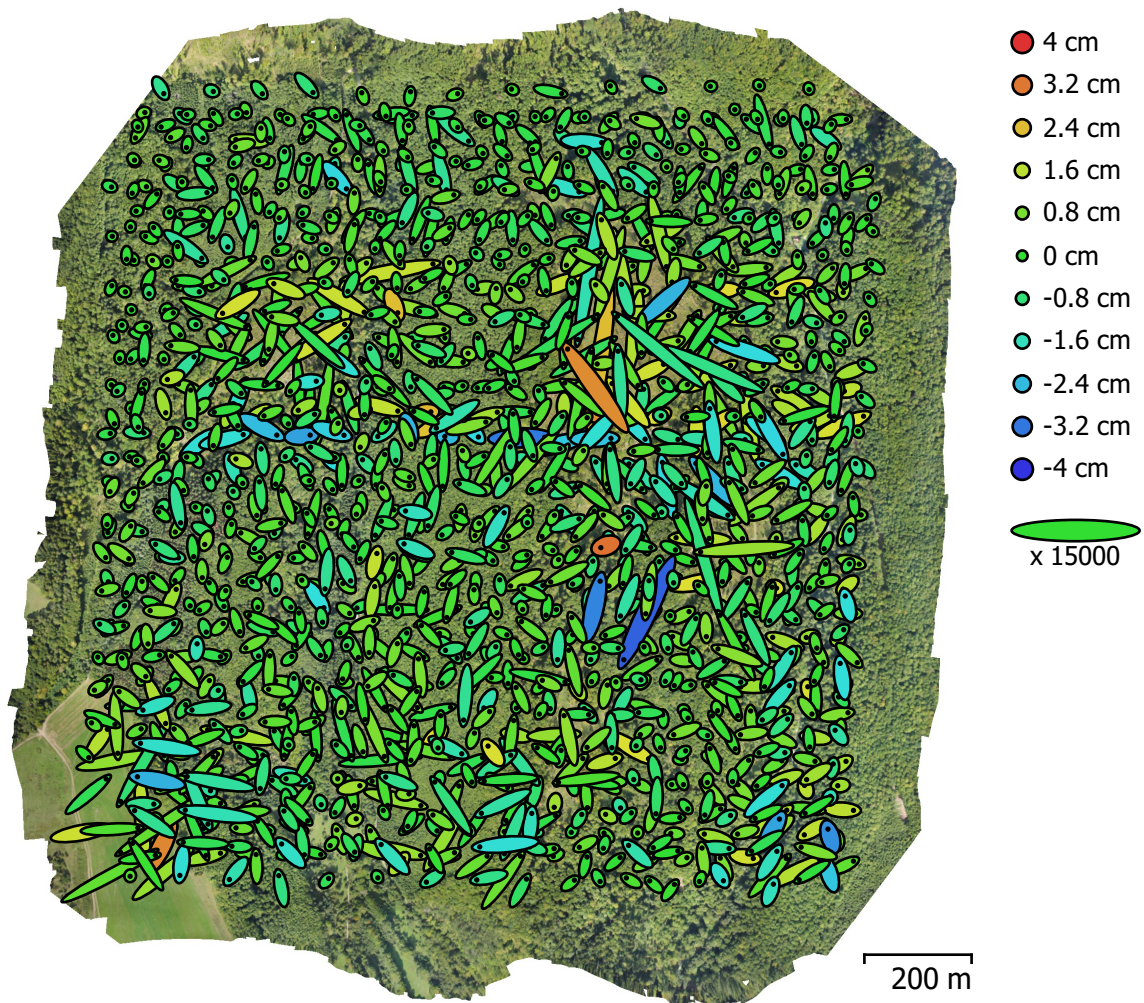


Fig. 3. Camera locations and error estimates.

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 (mm)	Y error (mm)	Z error (mm)	XY error (mm)	Total error (mm)
2.12581	2.26886	7.9361	3.10915	8.52341

Table 3. Average camera location error.

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

Digital Elevation Model

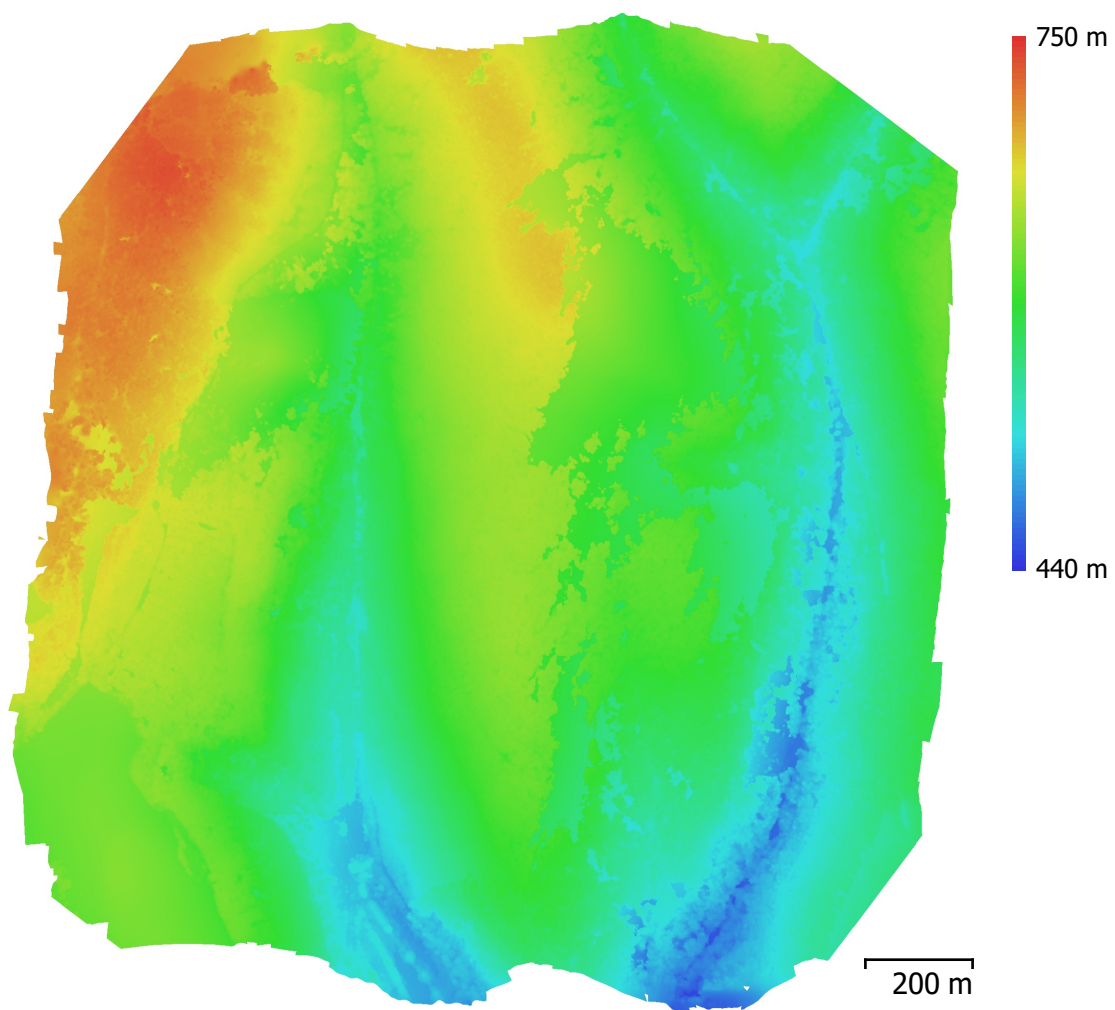


Fig. 4. Reconstructed digital elevation model.

Resolution: 11.4 cm/pix
Point density: 77.3 points/m²

Processing Parameters

General

Cameras	1446
Aligned cameras	1446
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	1,173,265 of 1,257,143
RMS reprojection error	0.141643 (1.50651 pix)
Max reprojection error	0.728423 (47.8104 pix)
Mean key point size	7.51369 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.93483

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	32 minutes 25 seconds
Alignment time	8 minutes 22 seconds

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1-p4
Adaptive camera model fitting	No
Optimization time	22 seconds

Depth Maps

Count	1444
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	1 hours 13 minutes

Dense Point Cloud

Points	379,633,977
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	1 hours 13 minutes
Dense cloud generation time	1 days 11 hours

Model

Faces	75,633,121
Vertices	37,826,792
Vertex colors	3 bands, uint8

Reconstruction parameters

Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	75,926,733
Processing time	26 minutes 27 seconds

DEM

Size	24,990 x 25,199
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	6 minutes 9 seconds
Orthomosaic	
Size	35,603 x 37,423
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	58 minutes 35 seconds
Software	
Version	1.4.3 build 6488
Platform	Windows 64

RTK_veg_PL2

Processing Report
08 February 2019



Survey Data

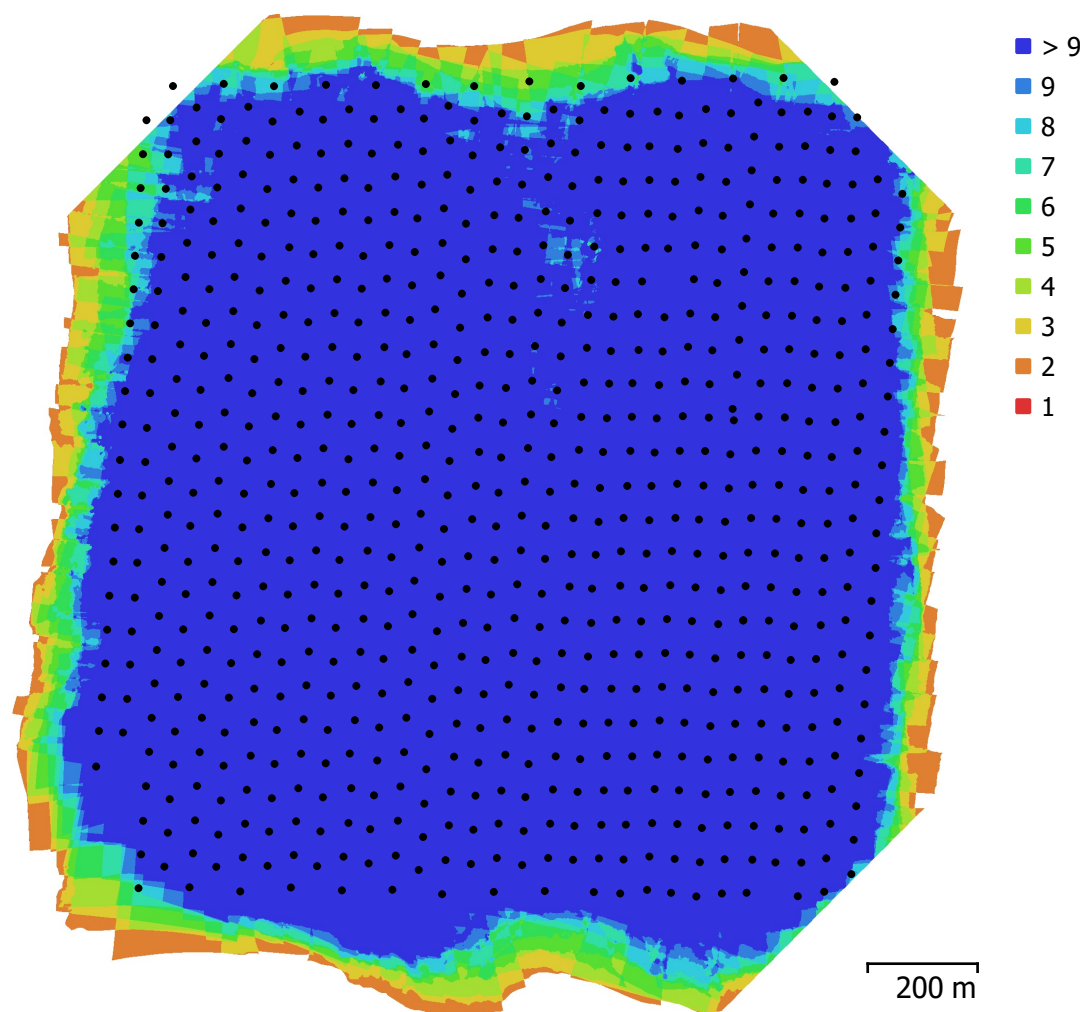


Fig. 1. Camera locations and image overlap.

Number of images:	735	Camera stations:	735
Flying altitude:	255 m	Tie points:	521,729
Ground resolution:	5.43 cm/pix	Projections:	1,377,098
Coverage area:	2.63 km ²	Reprojection error:	1.42 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
S.O.D.A. (10.6mm)	5472 x 3648	10.6 mm	2.4 x 2.4 μm	No

Table 1. Cameras.

Camera Calibration

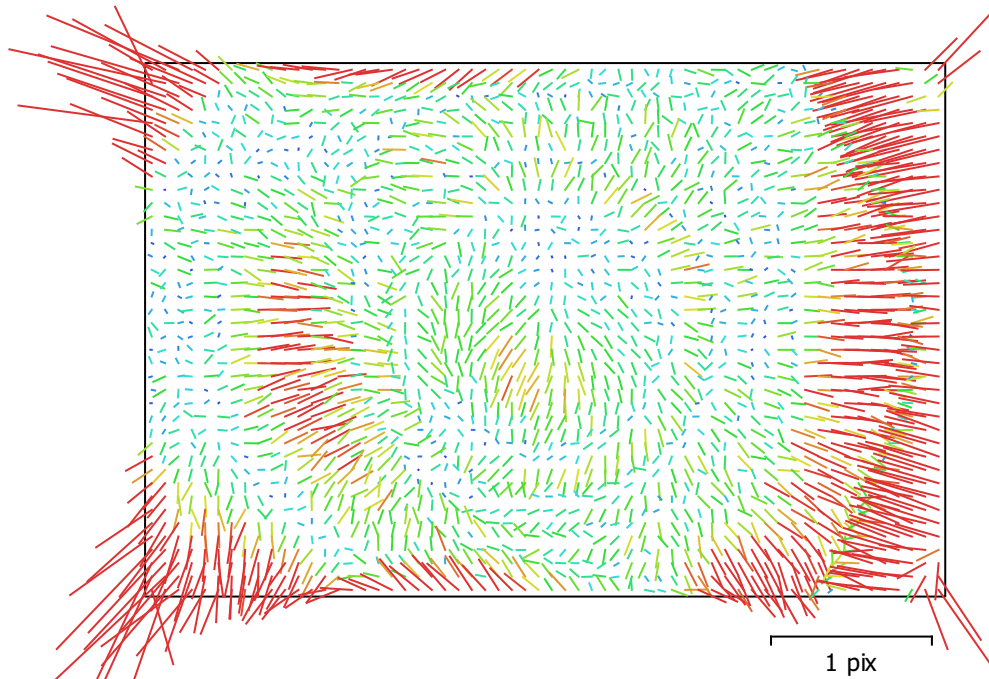


Fig. 2. Image residuals for S.O.D.A. (10.6mm).

S.O.D.A. (10.6mm)

735 images

Type
Frame

Resolution
5472 x 3648

Focal Length
10.6 mm

Pixel Size
2.4 x 2.4 μm

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
F	4412.26	0.051	1.00	0.05	-0.62	-0.21	0.19	-0.13	0.02	-0.08
Cx	31.2761	0.034		1.00	-0.04	-0.00	0.00	-0.00	0.95	-0.00
Cy	-3.20707	0.032			1.00	-0.04	0.01	-0.02	-0.02	0.70
K1	0.0354662	4.7e-05				1.00	-0.97	0.91	0.00	-0.10
K2	-0.214031	0.00021					1.00	-0.98	0.01	0.03
K3	0.333528	0.00029						1.00	-0.01	-0.01
P1	0.00180814	2.8e-06							1.00	-0.01
P2	-0.000475561	2.3e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

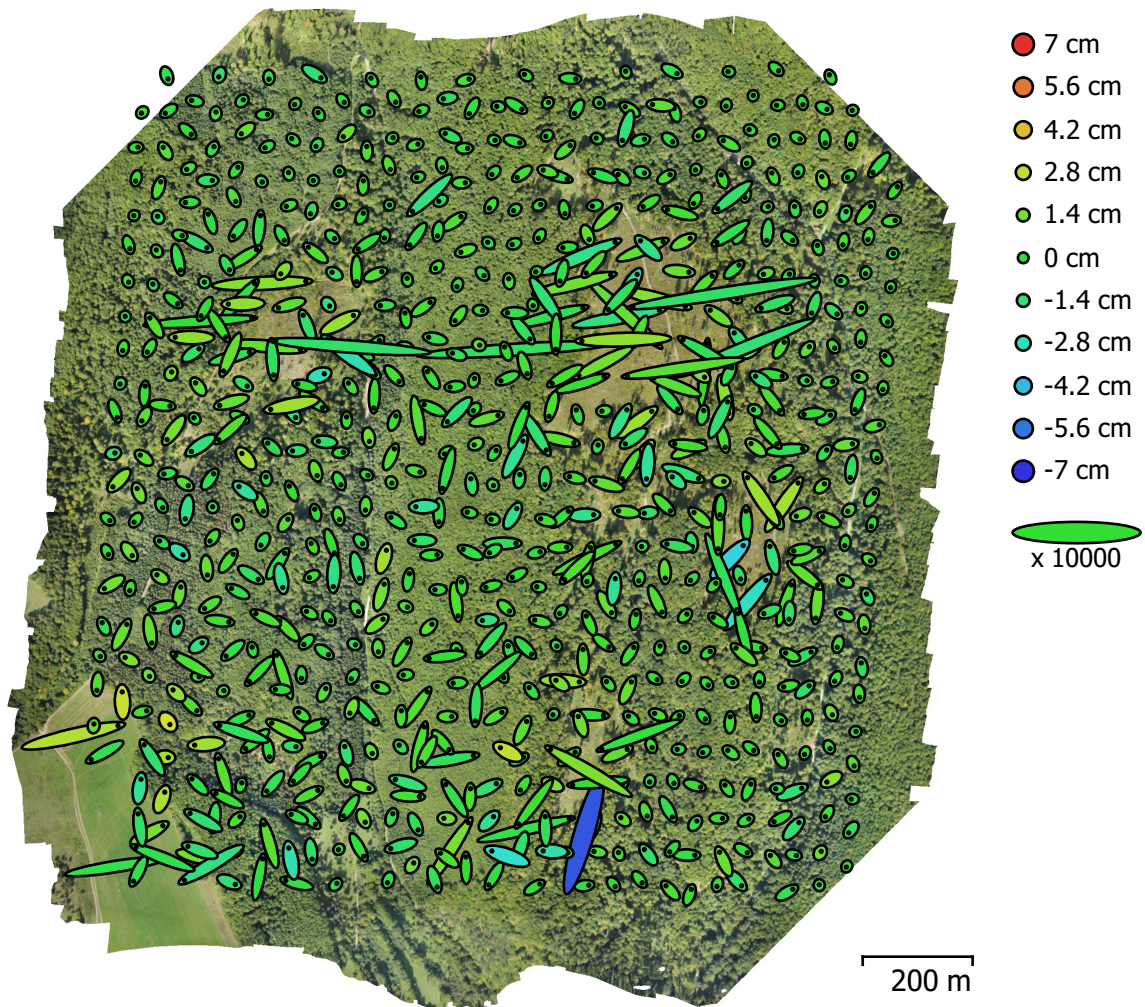


Fig. 3. Camera locations and error estimates.

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)
0.3808	0.251844	0.895183	0.456546	1.00488

Table 3. Average camera location error.

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

Digital Elevation Model

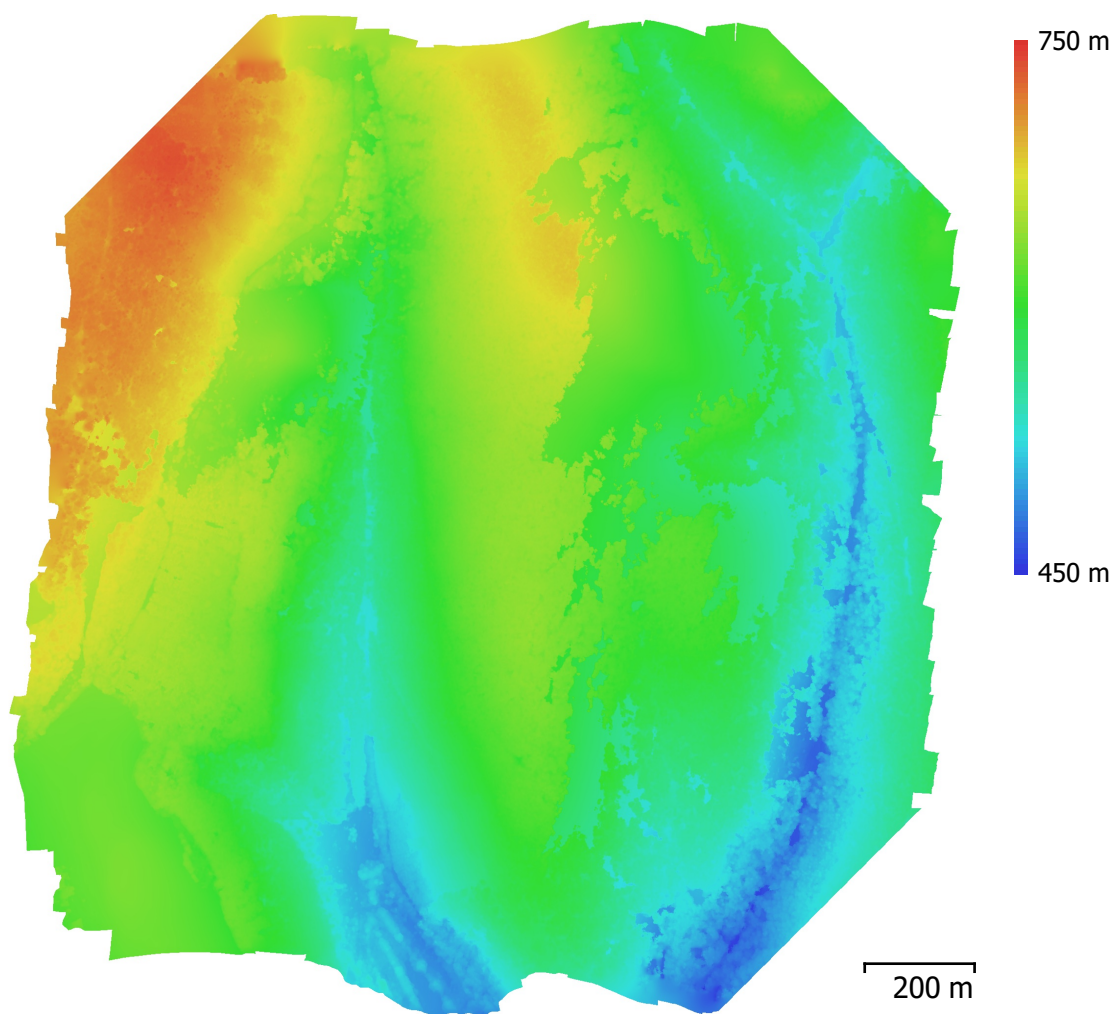


Fig. 4. Reconstructed digital elevation model.

Resolution: 10.9 cm/pix
Point density: 84.7 points/m²

Processing Parameters

General

Cameras	735
Aligned cameras	735
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	521,729 of 556,837
RMS reprojection error	0.146824 (1.42336 pix)
Max reprojection error	0.678627 (50.3698 pix)
Mean key point size	7.42125 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.78884

Alignment parameters

Accuracy	High
Generic preselection	No
Reference preselection	Yes
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	19 minutes 39 seconds
Alignment time	3 minutes 12 seconds

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	7 seconds

Depth Maps

Count	733
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Reconstruction parameters

Quality	High
Filtering mode	Aggressive
Processing time	30 minutes 12 seconds

Dense Point Cloud

Points	348,254,454
Point colors	3 bands, uint8

Reconstruction parameters

Quality	High
Depth filtering	Aggressive
Depth maps generation time	30 minutes 12 seconds
Dense cloud generation time	5 hours 7 minutes

Model

Faces	69,439,399
Vertices	34,728,268
Vertex colors	3 bands, uint8

Reconstruction parameters

Surface type	Height field
Source data	Dense
Interpolation	Enabled
Quality	High
Depth filtering	Aggressive
Face count	69,650,779
Processing time	25 minutes 37 seconds

DEM

Size	25,549 x 25,547
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)

Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	6 minutes 22 seconds
Orthomosaic	
Size	34,786 x 36,514
Coordinate system	S-JTSK [JTSK03] / Krovak East North (EPSG::8353)
Colors	3 bands, uint8
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	31 minutes 38 seconds
Software	
Version	1.4.3 build 6488
Platform	Windows 64

Tukey multiple comparisons of means
95% family-wise confidence level

Fit: aov(formula = Error ~ GCP * Season * Flights, data = ANOVA_XY)

\$GCP

	diff	lwr	upr	p adj
9GCP-4GCP	-0.00802292	-0.02377988	0.00773404	0.4560421
PPK-4GCP	-0.06153805	-0.07651134	-0.04656476	0.0000000
PPK-9GCP	-0.05351513	-0.06894025	-0.03809002	0.0000000

\$Season

	diff	lwr	upr	p adj
LeafON-LeafOFF	-0.03778518	-0.04828677	-0.02728358	0

\$Flights

	diff	lwr	upr	p adj
FP12-FP1	-0.02277109	-0.0381171115	-0.007425061	0.0015128
FP2-FP1	0.01507020	-0.0002447299	0.030385128	0.0549105
FP2-FP12	0.03784129	0.0224952601	0.053187310	0.0000000

\$`GCP:Season`

	diff	lwr	upr	p adj
9GCP:LeafOFF-4GCP:LeafOFF	-0.001276893	-0.027308833	0.024755048	0.9999925
PPK:LeafOFF-4GCP:LeafOFF	-0.083657472	-0.108431910	-0.058883034	0.0000000
4GCP:LeafON-4GCP:LeafOFF	-0.051354828	-0.077810189	-0.024899466	0.0000006
9GCP:LeafON-4GCP:LeafOFF	-0.066887918	-0.094108735	-0.039667100	0.0000000
PPK:LeafON-4GCP:LeafOFF	-0.086420990	-0.112122702	-0.060719278	0.0000000
PPK:LeafOFF-9GCP:LeafOFF	-0.082380579	-0.107946871	-0.056814288	0.0000000
4GCP:LeafON-9GCP:LeafOFF	-0.050077935	-0.077276255	-0.022879615	0.0000028
9GCP:LeafON-9GCP:LeafOFF	-0.065611025	-0.093554457	-0.037667593	0.0000000
PPK:LeafON-9GCP:LeafOFF	-0.085144097	-0.111609933	-0.058678261	0.0000000
4GCP:LeafON-PPK:LeafOFF	0.032302645	0.006305348	0.058299942	0.0054650
9GCP:LeafON-PPK:LeafOFF	0.016769555	-0.010006297	0.043545406	0.4731407
PPK:LeafON-PPK:LeafOFF	-0.002763518	-0.027993486	0.022466451	0.9995998
9GCP:LeafON-4GCP:LeafON	-0.015533090	-0.043871396	0.012805216	0.6211864
PPK:LeafON-4GCP:LeafON	-0.035066162	-0.061948586	-0.008183739	0.0028544
PPK:LeafON-9GCP:LeafON	-0.019533072	-0.047169126	0.008102981	0.3320953

\$`GCP:Flights`

	diff	lwr	upr	p adj
9GCP:FP1-4GCP:FP1	-0.024834414	-0.060954541	0.0112857127	0.4473442
PPK:FP1-4GCP:FP1	-0.075599095	-0.109889232	-0.0413089573	0.0000000
4GCP:FP12-4GCP:FP1	-0.028055325	-0.063231640	0.0071209905	0.2427432
9GCP:FP12-4GCP:FP1	-0.054566916	-0.090687043	-0.0184467891	0.0001080
PPK:FP12-4GCP:FP1	-0.087761927	-0.122142815	-0.0533810381	0.0000000
4GCP:FP2-4GCP:FP1	-0.010194816	-0.045264375	0.0248747422	0.9927202
9GCP:FP2-4GCP:FP1	0.017267573	-0.018852554	0.0533876999	0.8614200
PPK:FP2-4GCP:FP1	-0.059466875	-0.093757012	-0.0251767372	0.0000033
PPK:FP1-9GCP:FP1	-0.050764681	-0.086128549	-0.0154008128	0.0003154
4GCP:FP12-9GCP:FP1	-0.003220911	-0.039444698	0.0330028769	0.9999990
9GCP:FP12-9GCP:FP1	-0.029732502	-0.066873492	0.0074084888	0.2381718
PPK:FP12-9GCP:FP1	-0.062927513	-0.098379383	-0.0274756421	0.0000017
4GCP:FP2-9GCP:FP1	0.014639598	-0.021480529	0.0507597246	0.9420919
9GCP:FP2-9GCP:FP1	0.042101987	0.004960997	0.0792429778	0.0132065
PPK:FP2-9GCP:FP1	-0.034632461	-0.069996329	0.0007314074	0.0602567
4GCP:FP12-PPK:FP1	0.047543770	0.013144457	0.0819430835	0.0006531
9GCP:FP12-PPK:FP1	0.021032179	-0.014331689	0.0563960470	0.6482707
PPK:FP12-PPK:FP1	-0.012162832	-0.045748321	0.0214226576	0.9701217
4GCP:FP2-PPK:FP1	0.065404279	0.031114141	0.0996944162	0.0000002
9GCP:FP2-PPK:FP1	0.092866668	0.057502800	0.1282305360	0.0000000
PPK:FP2-PPK:FP1	0.016132220	-0.017360363	0.0496248035	0.8562603
9GCP:FP12-4GCP:FP12	-0.026511591	-0.062735379	0.0097121964	0.3574939
PPK:FP12-4GCP:FP12	-0.059706602	-0.094196379	-0.0252168248	0.0000035
4GCP:FP2-4GCP:FP12	0.017860509	-0.017315807	0.0530368238	0.8158066
9GCP:FP2-4GCP:FP12	0.045322898	0.009099110	0.0815466855	0.0034521
PPK:FP2-4GCP:FP12	-0.031411550	-0.065810863	0.0029877634	0.1054571

PPK:FP12-9GCP:FP12	-0.033195011	-0.068646881	0.0022568597	0.0872431
4GCP:FP2-9GCP:FP12	0.044372100	0.008251973	0.0804922264	0.0045269
9GCP:FP2-9GCP:FP12	0.071834489	0.034693498	0.1089754796	0.0000001
PPK:FP2-9GCP:FP12	-0.004899959	-0.040263827	0.0304639092	0.9999679
4GCP:FP2-PPK:FP12	0.077567111	0.043186222	0.1119479990	0.0000000
9GCP:FP2-PPK:FP12	0.105029500	0.069577629	0.1404813703	0.0000000
PPK:FP2-PPK:FP12	0.028295052	-0.005290437	0.0618805414	0.1795653
9GCP:FP2-4GCP:FP2	0.027462389	-0.008657737	0.0635825160	0.3047679
PPK:FP2-4GCP:FP2	-0.049272059	-0.083562196	-0.0149819210	0.0003092
PPK:FP2-9GCP:FP2	-0.076734448	-0.112098316	-0.0413705798	0.0000000

\$`Season:Flights`

	diff	lwr	upr	p adj
LeafON:FP1-LeafOFF:FP1	-0.0420050484	-0.06842579	-0.015584303	0.0000948
LeafOFF:FP12-LeafOFF:FP1	-0.0349367221	-0.06033308	-0.009540368	0.0012984
LeafON:FP12-LeafOFF:FP1	-0.0502987952	-0.07690863	-0.023688961	0.0000013
LeafOFF:FP2-LeafOFF:FP1	0.0215622342	-0.00383412	0.046958588	0.1486318
LeafON:FP2-LeafOFF:FP1	-0.0346028413	-0.06108566	-0.008120023	0.0027880
LeafOFF:FP12-LeafON:FP1	0.0070683263	-0.01930666	0.033443317	0.9731202
LeafON:FP12-LeafON:FP1	-0.0082937468	-0.03583914	0.019251645	0.9556679
LeafOFF:FP2-LeafON:FP1	0.0635672826	0.03719229	0.089942273	0.0000000
LeafON:FP2-LeafON:FP1	0.0074022072	-0.02002050	0.034824916	0.9722617
LeafON:FP12-LeafOFF:FP12	-0.0153620731	-0.04192648	0.011202333	0.5639135
LeafOFF:FP2-LeafOFF:FP12	0.0564989563	0.03115021	0.081847707	0.0000000
LeafON:FP2-LeafOFF:FP12	0.0003338809	-0.02610329	0.026771052	1.0000000
LeafOFF:FP2-LeafON:FP12	0.0718610294	0.04529662	0.098425435	0.0000000
LeafON:FP2-LeafON:FP12	0.0156959540	-0.01190898	0.043300890	0.5823980
LeafON:FP2-LeafOFF:FP2	-0.0561650755	-0.08260225	-0.029727905	0.0000000

\$`GCP:Season:Flights`

	diff	lwr	upr	p adj
9GCP:LeafOFF:FP1-4GCP:LeafOFF:FP1	-0.0221644135	-0.077417167	3.308834e-02	0.9954392
PPK:LeafOFF:FP1-4GCP:LeafOFF:FP1	-0.1077559247	-0.160514774	-5.499708e-02	0.0000000
4GCP:LeafON:FP1-4GCP:LeafOFF:FP1	-0.0661627002	-0.122179940	-1.014546e-02	0.0050718
9GCP:LeafON:FP1-4GCP:LeafOFF:FP1	-0.0936601751	-0.151436318	-3.588403e-02	0.0000030
PPK:LeafON:FP1-4GCP:LeafOFF:FP1	-0.1036248301	-0.157847583	-4.940208e-02	0.0000000
4GCP:LeafOFF:FP12-4GCP:LeafOFF:FP1	-0.0414116763	-0.095014721	1.219137e-02	0.3786675
9GCP:LeafOFF:FP12-4GCP:LeafOFF:FP1	-0.0792549791	-0.134507732	-2.400223e-02	0.0000938
PPK:LeafOFF:FP12-4GCP:LeafOFF:FP1	-0.1179694972	-0.170467205	-6.547179e-02	0.0000000
4GCP:LeafON:FP12-4GCP:LeafOFF:FP1	-0.0777743962	-0.134200560	-2.134823e-02	0.0002437
9GCP:LeafON:FP12-4GCP:LeafOFF:FP1	-0.0907977770	-0.148573920	-3.302163e-02	0.0000078
PPK:LeafON:FP12-4GCP:LeafOFF:FP1	-0.1174480397	-0.172342909	-6.255317e-02	0.0000000
4GCP:LeafOFF:FP2-4GCP:LeafOFF:FP1	-0.0167270062	-0.070330050	3.687604e-02	0.9998038
9GCP:LeafOFF:FP2-4GCP:LeafOFF:FP1	0.0396959606	-0.015556793	9.494871e-02	0.5190529
PPK:LeafOFF:FP2-4GCP:LeafOFF:FP1	-0.0835099660	-0.136007674	-3.101226e-02	0.0000054
4GCP:LeafON:FP2-4GCP:LeafOFF:FP1	-0.0683135486	-0.124330788	-1.229631e-02	0.0029274
9GCP:LeafON:FP2-4GCP:LeafOFF:FP1	-0.0744959625	-0.132272105	-1.671982e-02	0.0010215
PPK:LeafON:FP2-4GCP:LeafOFF:FP1	-0.0964885326	-0.151040377	-4.193669e-02	0.0000001
PPK:LeafOFF:FP1-9GCP:LeafOFF:FP1	-0.0855915113	-0.140025660	-3.115736e-02	0.0000077
4GCP:LeafON:FP1-9GCP:LeafOFF:FP1	-0.0439982868	-0.101596130	1.359956e-02	0.4001431
9GCP:LeafON:FP1-9GCP:LeafOFF:FP1	-0.0714957616	-0.130805652	-1.218587e-02	0.0035881
PPK:LeafON:FP1-9GCP:LeafOFF:FP1	-0.0814604167	-0.137314578	-2.560626e-02	0.0000616
4GCP:LeafOFF:FP12-9GCP:LeafOFF:FP1	-0.0192472628	-0.074500016	3.600549e-02	0.9991724
9GCP:LeafOFF:FP12-9GCP:LeafOFF:FP1	-0.0570905657	-0.113945180	-2.359516e-04	0.0477350
PPK:LeafOFF:FP12-9GCP:LeafOFF:FP1	-0.0958050837	-0.149986167	-4.162400e-02	0.0000001
4GCP:LeafON:FP12-9GCP:LeafOFF:FP1	-0.0556099828	-0.113605606	2.385640e-03	0.0778414
9GCP:LeafON:FP12-9GCP:LeafOFF:FP1	-0.0686333636	-0.127943254	-9.323473e-03	0.0070654
PPK:LeafON:FP12-9GCP:LeafOFF:FP1	-0.0952836262	-0.151790502	-3.877675e-02	0.0000008
4GCP:LeafOFF:FP2-9GCP:LeafOFF:FP1	0.0054374072	-0.049815346	6.069016e-02	1.0000000
9GCP:LeafOFF:FP2-9GCP:LeafOFF:FP1	0.0618603740	0.005005760	1.187150e-01	0.0175531
PPK:LeafOFF:FP2-9GCP:LeafOFF:FP1	-0.0613455525	-0.115526635	-7.164470e-03	0.0098971
4GCP:LeafON:FP2-9GCP:LeafOFF:FP1	-0.0461491351	-0.103746978	1.144871e-02	0.3116910
9GCP:LeafON:FP2-9GCP:LeafOFF:FP1	-0.0523315490	-0.111641439	6.978341e-03	0.1627818
PPK:LeafON:FP2-9GCP:LeafOFF:FP1	-0.0743241192	-0.130497815	-1.815042e-02	0.0006004
4GCP:LeafON:FP1-PPK:LeafOFF:FP1	0.0415932245	-0.013616747	9.680320e-02	0.4268325
9GCP:LeafON:FP1-PPK:LeafOFF:FP1	0.0140957497	-0.042898044	7.108954e-02	0.9999926
PPK:LeafON:FP1-PPK:LeafOFF:FP1	0.0041310946	-0.049257263	5.751945e-02	1.0000000

4GCP:LeafOFF:FP12-PPK:LeafOFF:FP1	0.0663442484	0.013585399	1.191031e-01	0.0016652
9GCP:LeafOFF:FP12-PPK:LeafOFF:FP1	0.0285009456	-0.025933203	8.293509e-02	0.9338592
PPK:LeafOFF:FP12-PPK:LeafOFF:FP1	-0.0102135724	-0.061849017	4.142187e-02	0.9999997
4GCP:LeafON:FP12-PPK:LeafOFF:FP1	0.0299815285	-0.025643301	8.560636e-02	0.9159319
9GCP:LeafON:FP12-PPK:LeafOFF:FP1	0.0169581477	-0.040035646	7.395194e-02	0.9998974
PPK:LeafON:FP12-PPK:LeafOFF:FP1	-0.0096921149	-0.063762962	4.437873e-02	0.9999999
4GCP:LeafOFF:FP2-PPK:LeafOFF:FP1	0.0910289185	0.038270069	1.437878e-01	0.0000004
9GCP:LeafOFF:FP2-PPK:LeafOFF:FP1	0.1474518853	0.093017737	2.018860e-01	0.0000000
PPK:LeafOFF:FP2-PPK:LeafOFF:FP1	0.0242459588	-0.027389486	7.588140e-02	0.9755594
4GCP:LeafON:FP2-PPK:LeafOFF:FP1	0.0394423762	-0.015767595	9.465235e-02	0.5299365
9GCP:LeafON:FP2-PPK:LeafOFF:FP1	0.0332599622	-0.023733831	9.025376e-02	0.8469640
PPK:LeafON:FP2-PPK:LeafOFF:FP1	0.0112673921	-0.042455169	6.498995e-02	0.9999994
9GCP:LeafON:FP1-4GCP:LeafON:FP1	-0.0274974748	-0.087520199	3.252525e-02	0.9808756
PPK:LeafON:FP1-4GCP:LeafON:FP1	-0.0374621299	-0.094072657	1.914840e-02	0.6706247
4GCP:LeafOFF:FP12-4GCP:LeafON:FP1	0.0247510239	-0.031266216	8.076826e-02	0.9868155
9GCP:LeafOFF:FP12-4GCP:LeafON:FP1	-0.0130922789	-0.070690122	4.450556e-02	0.9999979
PPK:LeafOFF:FP12-4GCP:LeafON:FP1	-0.0518067969	-0.106767275	3.153681e-03	0.0919136
4GCP:LeafON:FP12-4GCP:LeafON:FP1	-0.0116116960	-0.070336109	4.711272e-02	0.9999998
9GCP:LeafON:FP12-4GCP:LeafON:FP1	-0.0246350768	-0.084657801	3.538765e-02	0.9940862
PPK:LeafON:FP12-4GCP:LeafON:FP1	-0.0512853394	-0.108539959	5.969280e-03	0.1442635
4GCP:LeafOFF:FP2-4GCP:LeafON:FP1	0.0494356940	-0.006581546	1.054529e-01	0.1625399
9GCP:LeafOFF:FP2-4GCP:LeafON:FP1	0.1058586608	0.048260818	1.634565e-01	0.0000000
PPK:LeafOFF:FP2-4GCP:LeafON:FP1	-0.0173472657	-0.072307744	3.761321e-02	0.9997714
4GCP:LeafON:FP2-4GCP:LeafON:FP1	-0.0021508483	-0.060482452	5.618075e-02	1.0000000
9GCP:LeafON:FP2-4GCP:LeafON:FP1	-0.0083332623	-0.068355987	5.168946e-02	1.0000000
PPK:LeafON:FP2-4GCP:LeafON:FP1	-0.0303258324	-0.087251648	2.659998e-02	0.9235827
PPK:LeafON:FP1-9GCP:LeafON:FP1	-0.0099646551	-0.068316204	4.838689e-02	1.0000000
4GCP:LeafOFF:FP12-9GCP:LeafON:FP1	0.0522484988	-0.005527644	1.100246e-01	0.1332662
9GCP:LeafOFF:FP12-9GCP:LeafON:FP1	0.0144051959	-0.044904694	7.371509e-02	0.9999944
PPK:LeafOFF:FP12-9GCP:LeafON:FP1	-0.0243093221	-0.081061465	3.244282e-02	0.9905265
4GCP:LeafON:FP12-9GCP:LeafON:FP1	0.0158857788	-0.044518759	7.629032e-02	0.9999820
9GCP:LeafON:FP12-9GCP:LeafON:FP1	0.0028623980	-0.058805089	6.452989e-02	1.0000000
PPK:LeafON:FP12-9GCP:LeafON:FP1	-0.0237878646	-0.082764495	3.518877e-02	0.9951450
4GCP:LeafOFF:FP2-9GCP:LeafON:FP1	0.0769331688	0.019157026	1.347093e-01	0.0005243
9GCP:LeafOFF:FP2-9GCP:LeafON:FP1	0.1333561356	0.074046246	1.926660e-01	0.0000000
PPK:LeafOFF:FP2-9GCP:LeafON:FP1	0.0101502091	-0.046601933	6.690235e-02	0.9999999
4GCP:LeafON:FP2-9GCP:LeafON:FP1	0.0253466265	-0.034676098	8.536935e-02	0.9918873
9GCP:LeafON:FP2-9GCP:LeafON:FP1	0.0191642126	-0.042503275	8.083170e-02	0.9998145
PPK:LeafON:FP2-9GCP:LeafON:FP1	-0.0028283576	-0.061485838	5.582912e-02	1.0000000
4GCP:LeafOFF:FP12-PPK:LeafON:FP1	0.0622131539	0.007990401	1.164359e-01	0.0080778
9GCP:LeafOFF:FP12-PPK:LeafON:FP1	0.0243698510	-0.031484311	8.022401e-02	0.9884573
PPK:LeafOFF:FP12-PPK:LeafON:FP1	-0.0143446670	-0.067474978	3.878564e-02	0.9999738
4GCP:LeafON:FP12-PPK:LeafON:FP1	0.0258504339	-0.031164762	8.286563e-02	0.9827832
9GCP:LeafON:FP12-PPK:LeafON:FP1	0.0128270531	-0.045524496	7.117860e-02	0.9999987
PPK:LeafON:FP12-PPK:LeafON:FP1	-0.0138232095	-0.069323365	4.167695e-02	0.9999918
4GCP:LeafOFF:FP2-PPK:LeafON:FP1	0.0868978239	0.032675071	1.411206e-01	0.0000043
9GCP:LeafOFF:FP2-PPK:LeafON:FP1	0.1433207907	0.087466629	1.991750e-01	0.0000000
PPK:LeafOFF:FP2-PPK:LeafON:FP1	0.0201148642	-0.033015447	7.324518e-02	0.9976869
4GCP:LeafON:FP2-PPK:LeafON:FP1	0.0353112816	-0.021299245	9.192181e-02	0.7637484
9GCP:LeafON:FP2-PPK:LeafON:FP1	0.0291288676	-0.029222681	8.748042e-02	0.9564568
PPK:LeafON:FP2-PPK:LeafON:FP1	0.0071362975	-0.048024597	6.229719e-02	1.0000000
9GCP:LeafOFF:FP12-4GCP:LeafOFF:FP12	-0.0378433028	-0.093096056	1.740945e-02	0.6095264
PPK:LeafOFF:FP12-4GCP:LeafOFF:FP12	-0.0765578209	-0.129055529	-2.406011e-02	0.0000618
4GCP:LeafON:FP12-4GCP:LeafOFF:FP12	-0.0363627200	-0.092788883	2.006344e-02	0.7144662
9GCP:LeafON:FP12-4GCP:LeafOFF:FP12	-0.0493861008	-0.107162244	8.390042e-03	0.2062387
PPK:LeafON:FP12-4GCP:LeafOFF:FP12	-0.0760363634	-0.130931233	-2.114149e-02	0.0002175
4GCP:LeafOFF:FP2-4GCP:LeafOFF:FP12	0.0246846700	-0.028918374	7.828771e-02	0.9798481
9GCP:LeafOFF:FP2-4GCP:LeafOFF:FP12	0.0811076369	0.025854884	1.363604e-01	0.0000521
PPK:LeafOFF:FP2-4GCP:LeafOFF:FP12	-0.0420982897	-0.094595998	1.039942e-02	0.3101915
4GCP:LeafON:FP2-4GCP:LeafOFF:FP12	-0.0269018723	-0.082919112	2.911537e-02	0.9696217
9GCP:LeafON:FP2-4GCP:LeafOFF:FP12	-0.0330842862	-0.090860429	2.469186e-02	0.8662686
PPK:LeafON:FP2-4GCP:LeafOFF:FP12	-0.0550768564	-0.109628701	-5.250120e-04	0.0448828
PPK:LeafOFF:FP12-9GCP:LeafOFF:FP12	-0.0387145180	-0.092895601	1.546656e-02	0.5295785
4GCP:LeafON:FP12-9GCP:LeafOFF:FP12	0.0014805829	-0.056515040	5.947621e-02	1.0000000
9GCP:LeafON:FP12-9GCP:LeafOFF:FP12	-0.0115427979	-0.070852688	4.776709e-02	0.9999998
PPK:LeafON:FP12-9GCP:LeafOFF:FP12	-0.0381930605	-0.094699937	1.831382e-02	0.6335512
4GCP:LeafOFF:FP2-9GCP:LeafOFF:FP12	0.0625279729	0.007275220	1.177807e-01	0.0099712

9GCP:LeafOFF:FP2-9GCP:LeafOFF:FP12	0.1189509397	0.062096326	1.758056e-01	0.0000000
PPK:LeafOFF:FP2-9GCP:LeafOFF:FP12	-0.0042549868	-0.058436070	4.992610e-02	1.0000000
4GCP:LeafON:FP2-9GCP:LeafOFF:FP12	0.0109414306	-0.046656413	6.853927e-02	0.9999999
9GCP:LeafON:FP2-9GCP:LeafOFF:FP12	0.0047590166	-0.054550874	6.406891e-02	1.0000000
PPK:LeafON:FP2-9GCP:LeafOFF:FP12	-0.0172335535	-0.073407249	3.894014e-02	0.9998441
4GCP:LeafON:FP12-PPK:LeafOFF:FP12	0.0401951009	-0.015182105	9.557231e-02	0.4991795
9GCP:LeafON:FP12-PPK:LeafOFF:FP12	0.0271717201	-0.029580422	8.392386e-02	0.9704949
PPK:LeafON:FP12-PPK:LeafOFF:FP12	0.0005214575	-0.053294615	5.433753e-02	1.0000000
4GCP:LeafOFF:FP2-PPK:LeafOFF:FP12	0.1012424909	0.048744783	1.537402e-01	0.0000000
9GCP:LeafOFF:FP2-PPK:LeafOFF:FP12	0.1576654577	0.103484375	2.118465e-01	0.0000000
PPK:LeafOFF:FP2-PPK:LeafOFF:FP12	0.0344595312	-0.016909062	8.582812e-02	0.6469468
4GCP:LeafON:FP2-PPK:LeafOFF:FP12	0.0496559486	-0.005304529	1.046164e-01	0.1343153
9GCP:LeafON:FP2-PPK:LeafOFF:FP12	0.0434735347	-0.013278608	1.002257e-01	0.3948064
PPK:LeafON:FP2-PPK:LeafOFF:FP12	0.0214809645	-0.031985162	7.494709e-02	0.9953575
9GCP:LeafON:FP12-4GCP:LeafON:FP12	-0.0130233808	-0.073427919	4.738116e-02	0.9999991
PPK:LeafON:FP12-4GCP:LeafON:FP12	-0.0396736434	-0.097328411	1.798112e-02	0.6009085
4GCP:LeafOFF:FP2-4GCP:LeafON:FP12	0.0610473900	0.004621227	1.174736e-01	0.0189630
9GCP:LeafOFF:FP2-4GCP:LeafON:FP12	0.1174703568	0.059474734	1.754660e-01	0.0000000
PPK:LeafOFF:FP2-4GCP:LeafON:FP12	-0.0057355697	-0.061112775	4.964164e-02	1.0000000
4GCP:LeafON:FP2-4GCP:LeafON:FP12	0.0094608477	-0.049263565	6.818526e-02	1.0000000
9GCP:LeafON:FP2-4GCP:LeafON:FP12	0.0032784337	-0.057126104	6.368297e-02	1.0000000
PPK:LeafON:FP2-4GCP:LeafON:FP12	-0.0187141364	-0.076042395	3.861412e-02	0.9996426
PPK:LeafON:FP12-9GCP:LeafON:FP12	-0.0266502626	-0.085626893	3.232637e-02	0.9833628
4GCP:LeafOFF:FP2-9GCP:LeafON:FP12	0.0740707708	0.016294628	1.318469e-01	0.0011448
9GCP:LeafOFF:FP2-9GCP:LeafON:FP12	0.1304937376	0.071183847	1.898036e-01	0.0000000
PPK:LeafOFF:FP2-9GCP:LeafON:FP12	0.0072878111	-0.049464331	6.403995e-02	1.0000000
4GCP:LeafON:FP2-9GCP:LeafON:FP12	0.0224842285	-0.037538496	8.250695e-02	0.9979646
9GCP:LeafON:FP2-9GCP:LeafON:FP12	0.0163018145	-0.045365673	7.796930e-02	0.9999806
PPK:LeafON:FP2-9GCP:LeafON:FP12	-0.0056907556	-0.064348236	5.296673e-02	1.0000000
4GCP:LeafOFF:FP2-PPK:LeafON:FP12	0.1007210334	0.045826164	1.556159e-01	0.0000000
9GCP:LeafOFF:FP2-PPK:LeafON:FP12	0.1571440002	0.100637124	2.136509e-01	0.0000000
PPK:LeafOFF:FP2-PPK:LeafON:FP12	0.0339380737	-0.019877999	8.775415e-02	0.7477853
4GCP:LeafON:FP2-PPK:LeafON:FP12	0.0491344911	-0.008120128	1.063891e-01	0.2004926
9GCP:LeafON:FP2-PPK:LeafON:FP12	0.0429520772	-0.016024554	1.019287e-01	0.4926331
PPK:LeafON:FP2-PPK:LeafON:FP12	0.0209595070	-0.034862209	7.678122e-02	0.9979063
9GCP:LeafOFF:FP2-4GCP:LeafOFF:FP2	0.0564229668	0.001170214	1.116757e-01	0.0393411
PPK:LeafOFF:FP2-4GCP:LeafOFF:FP2	-0.0667829597	-0.119280668	-1.428525e-02	0.0013334
4GCP:LeafON:FP2-4GCP:LeafOFF:FP2	-0.0515865423	-0.107603782	4.430697e-03	0.1138690
9GCP:LeafON:FP2-4GCP:LeafOFF:FP2	-0.0577689563	-0.115545099	7.186493e-06	0.0500693
PPK:LeafON:FP2-4GCP:LeafOFF:FP2	-0.0797615264	-0.134313371	-2.520968e-02	0.0000577
PPK:LeafOFF:FP2-9GCP:LeafOFF:FP2	-0.1232059265	-0.177387010	-6.902484e-02	0.0000000
4GCP:LeafON:FP2-9GCP:LeafOFF:FP2	-0.1080095091	-0.165607352	-5.041167e-02	0.0000000
9GCP:LeafON:FP2-9GCP:LeafOFF:FP2	-0.1141919231	-0.173501813	-5.488203e-02	0.0000000
PPK:LeafON:FP2-9GCP:LeafOFF:FP2	-0.1361844932	-0.192358189	-8.001080e-02	0.0000000
4GCP:LeafON:FP2-PPK:LeafOFF:FP2	0.0151964174	-0.039764061	7.015690e-02	0.9999632
9GCP:LeafON:FP2-PPK:LeafOFF:FP2	0.0090140034	-0.047738139	6.576615e-02	1.0000000
PPK:LeafON:FP2-PPK:LeafOFF:FP2	-0.0129785667	-0.066444694	4.048756e-02	0.9999944
9GCP:LeafON:FP2-4GCP:LeafON:FP2	-0.0061824139	-0.066205139	5.384031e-02	1.0000000
PPK:LeafON:FP2-4GCP:LeafON:FP2	-0.0281749841	-0.085100800	2.875083e-02	0.9597251
PPK:LeafON:FP2-9GCP:LeafON:FP2	-0.0219925701	-0.080650051	3.666491e-02	0.9979423

Tukey multiple comparisons of means
95% family-wise confidence level

Fit: aov(formula = Error ~ GCP * Season * Flights, data = ANOVA_Z)

\$GCP

	diff	lwr	upr	p adj
9GCP-4GCP	0.09520531	0.03043906	0.15997156	0.0017016
PPK-4GCP	0.08756428	0.02601918	0.14910938	0.0025211
PPK-9GCP	-0.00764103	-0.07104328	0.05576122	0.9568036

\$Season

	diff	lwr	upr	p adj
LeafON-LeafOFF	0.09378621	0.05062122	0.1369512	2.26e-05

\$Flights

	diff	lwr	upr	p adj
FP12-FP1	0.0007602457	-0.06231692	0.06383742	0.9995584
FP2-FP1	-0.0049352419	-0.06788460	0.05801411	0.9814840
FP2-FP12	-0.0056954875	-0.06877266	0.05738168	0.9755153

\$`GCP:Season`

	diff	lwr	upr	p adj
9GCP:LeafOFF-4GCP:LeafOFF	0.126582382	0.019582612	0.23358215	0.0098900
PPK:LeafOFF-4GCP:LeafOFF	0.179519215	0.077688192	0.28135024	0.0000088
4GCP:LeafON-4GCP:LeafOFF	0.188679079	0.079938913	0.29741925	0.0000131
9GCP:LeafON-4GCP:LeafOFF	0.245403828	0.133517386	0.35729027	0.0000000
PPK:LeafON-4GCP:LeafOFF	0.166600887	0.060958463	0.27224331	0.0001121
PPK:LeafOFF-9GCP:LeafOFF	0.052936833	-0.052148965	0.15802263	0.7028591
4GCP:LeafON-9GCP:LeafOFF	0.062096697	-0.049697272	0.17389067	0.6073445
9GCP:LeafON-9GCP:LeafOFF	0.118821446	0.003964825	0.23367807	0.0377386
PPK:LeafON-9GCP:LeafOFF	0.040018505	-0.068764717	0.14880173	0.9002502
4GCP:LeafON-PPK:LeafOFF	0.009159864	-0.097697509	0.11601724	0.9998800
9GCP:LeafON-PPK:LeafOFF	0.065884613	-0.044172872	0.17594210	0.5251917
PPK:LeafON-PPK:LeafOFF	-0.012918328	-0.116621732	0.09078508	0.9992506
9GCP:LeafON-4GCP:LeafON	0.056724749	-0.059754934	0.17320443	0.7322162
PPK:LeafON-4GCP:LeafON	-0.022078192	-0.132573724	0.08841734	0.9928698
PPK:LeafON-9GCP:LeafON	-0.078802941	-0.192396139	0.03479026	0.3535166

\$`GCP:Flights`

	diff	lwr	upr	p adj
9GCP:FP1-4GCP:FP1	0.110010859	-0.038454647	0.258476365	0.3401385
PPK:FP1-4GCP:FP1	0.146735518	0.005791865	0.287679172	0.0339660
4GCP:FP12-4GCP:FP1	-0.004158573	-0.148744706	0.140427560	1.0000000
9GCP:FP12-4GCP:FP1	0.172981221	0.024515715	0.321446728	0.0093532
PPK:FP12-4GCP:FP1	0.100903609	-0.040413060	0.242220279	0.3927112
4GCP:FP2-4GCP:FP1	0.078007527	-0.066139800	0.222154855	0.7565419
9GCP:FP2-4GCP:FP1	0.076820887	-0.071644619	0.225286393	0.7994311
PPK:FP2-4GCP:FP1	0.089125553	-0.051818100	0.230069207	0.5668014
PPK:FP1-9GCP:FP1	0.036724659	-0.108632377	0.182081695	0.9972277
4GCP:FP12-9GCP:FP1	-0.114169432	-0.263061018	0.034722154	0.2933632
9GCP:FP12-9GCP:FP1	0.062970362	-0.089691227	0.215631952	0.9360855
PPK:FP12-9GCP:FP1	-0.009107250	-0.154826005	0.136611505	0.9999999
4GCP:FP2-9GCP:FP1	-0.032003332	-0.180468838	0.116462174	0.9991104
9GCP:FP2-9GCP:FP1	-0.033189972	-0.185851562	0.119471618	0.9990534
PPK:FP2-9GCP:FP1	-0.020885306	-0.166242342	0.124471730	0.9999576
4GCP:FP12-PPK:FP1	-0.150894091	-0.292286493	-0.009501689	0.0262837
9GCP:FP12-PPK:FP1	0.026245703	-0.119111333	0.171602740	0.9997599
PPK:FP12-PPK:FP1	-0.045831909	-0.183879229	0.092215411	0.9826133
4GCP:FP2-PPK:FP1	-0.068727991	-0.209671644	0.072215663	0.8474935
9GCP:FP2-PPK:FP1	-0.069914631	-0.215271667	0.075442405	0.8572415
PPK:FP2-PPK:FP1	-0.057609965	-0.195275411	0.080055481	0.9307550
9GCP:FP12-4GCP:FP12	0.177139794	0.028248208	0.326031380	0.0070929
PPK:FP12-4GCP:FP12	0.105062182	-0.036702056	0.246826419	0.3399145
4GCP:FP2-4GCP:FP12	0.082166100	-0.062420033	0.226752233	0.7033676
9GCP:FP2-4GCP:FP12	0.080979460	-0.067912126	0.229871046	0.7513999
PPK:FP2-4GCP:FP12	0.093284126	-0.048108276	0.234676528	0.5069522

PPK:FP12-9GCP:FP12	-0.072077612	-0.217796368	0.073641143	0.8368185
4GCP:FP2-9GCP:FP12	-0.094973694	-0.243439200	0.053491812	0.5507100
9GCP:FP2-9GCP:FP12	-0.096160334	-0.248821924	0.056501255	0.5721750
PPK:FP2-9GCP:FP12	-0.083855668	-0.229212705	0.061501368	0.6857277
4GCP:FP2-PPK:FP12	-0.022896082	-0.164212751	0.118420588	0.9998939
9GCP:FP2-PPK:FP12	-0.024082722	-0.169801477	0.121636033	0.9998767
PPK:FP2-PPK:FP12	-0.011778056	-0.149825376	0.126269264	0.9999993
9GCP:FP2-4GCP:FP2	-0.001186640	-0.149652146	0.147278866	1.0000000
PPK:FP2-4GCP:FP2	0.011118026	-0.129825628	0.152061679	0.9999996
PPK:FP2-9GCP:FP2	0.012304666	-0.133052370	0.157661702	0.9999993

\$`Season:Flights`

	diff	lwr	upr	p adj
LeafON:FP1-LeafOFF:FP1	0.08814320	-0.020454681	0.19674109	0.1876036
LeafOFF:FP12-LeafOFF:FP1	0.05158835	-0.052798953	0.15597565	0.7197114
LeafON:FP12-LeafOFF:FP1	0.02798654	-0.081388559	0.13736164	0.9780697
LeafOFF:FP2-LeafOFF:FP1	-0.06360109	-0.167988389	0.04078621	0.5050451
LeafON:FP2-LeafOFF:FP1	0.15211653	0.043263504	0.26096955	0.0010118
LeafOFF:FP12-LeafON:FP1	-0.03655485	-0.144964671	0.07185496	0.9292696
LeafON:FP12-LeafON:FP1	-0.06015666	-0.173377208	0.05306389	0.6526387
LeafOFF:FP2-LeafON:FP1	-0.15174429	-0.260154107	-0.04333447	0.0009855
LeafON:FP2-LeafON:FP1	0.06397332	-0.048742958	0.17668961	0.5843614
LeafON:FP12-LeafOFF:FP12	-0.02360181	-0.132790181	0.08558657	0.9897504
LeafOFF:FP2-LeafOFF:FP12	-0.11518944	-0.219381072	-0.01099780	0.0204036
LeafON:FP2-LeafOFF:FP12	0.10052818	-0.008137221	0.20919358	0.0883810
LeafOFF:FP2-LeafON:FP12	-0.09158763	-0.200776005	0.01760074	0.1586440
LeafON:FP2-LeafON:FP12	0.12412998	0.010664689	0.23759528	0.0226252
LeafON:FP2-LeafOFF:FP2	0.21571761	0.107052215	0.32438301	0.0000003

\$`GCP:Season:Flights`

	diff	lwr	upr	p adj
9GCP:LeafOFF:FP1-4GCP:LeafOFF:FP1	0.150303972	-0.076802872	0.377410816	0.6704476
PPK:LeafOFF:FP1-4GCP:LeafOFF:FP1	0.241497056	0.024640972	0.458353139	0.0126442
4GCP:LeafON:FP1-4GCP:LeafOFF:FP1	0.190718854	-0.039530279	0.420967986	0.2549422
9GCP:LeafON:FP1-4GCP:LeafOFF:FP1	0.251753869	0.014275071	0.489232667	0.0248143
PPK:LeafON:FP1-4GCP:LeafOFF:FP1	0.224615525	0.001742317	0.447488732	0.0458074
4GCP:LeafOFF:FP12-4GCP:LeafOFF:FP1	0.056724667	-0.163601335	0.277050668	0.9999868
9GCP:LeafOFF:FP12-4GCP:LeafOFF:FP1	0.276671222	0.049564378	0.503778066	0.0029819
PPK:LeafOFF:FP12-4GCP:LeafOFF:FP1	0.225772549	0.009989839	0.441555258	0.0293087
4GCP:LeafON:FP12-4GCP:LeafOFF:FP1	0.111536222	-0.120393720	0.343466164	0.9692204
9GCP:LeafON:FP12-4GCP:LeafOFF:FP1	0.239150928	0.001672130	0.476629726	0.0462098
PPK:LeafON:FP12-4GCP:LeafOFF:FP1	0.141656954	-0.083978869	0.367292777	0.7543858
4GCP:LeafOFF:FP2-4GCP:LeafOFF:FP1	0.019410444	-0.200915557	0.239736446	1.0000000
9GCP:LeafOFF:FP2-4GCP:LeafOFF:FP1	0.028880972	-0.198225872	0.255987816	1.0000000
PPK:LeafOFF:FP2-4GCP:LeafOFF:FP1	0.148139283	-0.067643426	0.363921993	0.6052144
4GCP:LeafON:FP2-4GCP:LeafOFF:FP1	0.337177801	0.106928669	0.567426934	0.0000555
9GCP:LeafON:FP2-4GCP:LeafOFF:FP1	0.321430928	0.083952130	0.558909726	0.0003672
PPK:LeafON:FP2-4GCP:LeafOFF:FP1	0.207684794	-0.016541086	0.431910673	0.1081333
PPK:LeafOFF:FP1-9GCP:LeafOFF:FP1	0.091193083	-0.132549029	0.314935195	0.9945328
4GCP:LeafON:FP1-9GCP:LeafOFF:FP1	0.040414882	-0.196331047	0.277160810	1.0000000
9GCP:LeafON:FP1-9GCP:LeafOFF:FP1	0.101449897	-0.142333103	0.345232897	0.9930970
PPK:LeafON:FP1-9GCP:LeafOFF:FP1	0.074311552	-0.155267276	0.303890380	0.9996804
4GCP:LeafOFF:FP12-9GCP:LeafOFF:FP1	-0.093579306	-0.320686150	0.133527538	0.9938187
9GCP:LeafOFF:FP12-9GCP:LeafOFF:FP1	0.126367250	-0.107323765	0.360058265	0.9137083
PPK:LeafOFF:FP12-9GCP:LeafOFF:FP1	0.075468577	-0.147233353	0.298170506	0.9994183
4GCP:LeafON:FP12-9GCP:LeafOFF:FP1	-0.038767750	-0.277148684	0.199613184	1.0000000
9GCP:LeafON:FP12-9GCP:LeafOFF:FP1	0.088846956	-0.154936044	0.332629956	0.9985441
PPK:LeafON:FP12-9GCP:LeafOFF:FP1	-0.008647018	-0.240908717	0.223614680	1.0000000
4GCP:LeafOFF:FP2-9GCP:LeafOFF:FP1	-0.130893528	-0.358000372	0.096213316	0.8598712
9GCP:LeafOFF:FP2-9GCP:LeafOFF:FP1	-0.121423000	-0.355114015	0.112268015	0.9380348
PPK:LeafOFF:FP2-9GCP:LeafOFF:FP1	-0.002164689	-0.224866618	0.220537241	1.0000000
4GCP:LeafON:FP2-9GCP:LeafOFF:FP1	0.186873829	-0.049872100	0.423619758	0.3386619
9GCP:LeafON:FP2-9GCP:LeafOFF:FP1	0.171126956	-0.072656044	0.414909556	0.5635724
PPK:LeafON:FP2-9GCP:LeafOFF:FP1	0.057380821	-0.173511397	0.288273040	0.9999921
4GCP:LeafON:FP1-PPK:LeafOFF:FP1	-0.050778202	-0.277709198	0.176152795	0.9999983
9GCP:LeafON:FP1-PPK:LeafOFF:FP1	0.010256814	-0.224006273	0.244519900	1.0000000
PPK:LeafON:FP1-PPK:LeafOFF:FP1	-0.016881531	-0.236325102	0.202562040	1.0000000

4GCP:LeafOFF:FP12-PPK:LeafOFF:FP1	-0.184772389	-0.401628473	0.032083695	0.2109507
9GCP:LeafOFF:FP12-PPK:LeafOFF:FP1	0.035174167	-0.188567945	0.258916279	1.0000000
PPK:LeafOFF:FP12-PPK:LeafOFF:FP1	-0.015724507	-0.227963033	0.196514019	1.0000000
4GCP:LeafON:FP12-PPK:LeafOFF:FP1	-0.129960833	-0.358597034	0.098675367	0.8732895
9GCP:LeafON:FP12-PPK:LeafOFF:FP1	-0.002346127	-0.236609214	0.231916959	1.0000000
PPK:LeafON:FP12-PPK:LeafOFF:FP1	-0.099840102	-0.322088924	0.122408721	0.9843386
4GCP:LeafOFF:FP2-PPK:LeafOFF:FP1	-0.222086611	-0.438942695	-0.005230527	0.0380296
9GCP:LeafOFF:FP2-PPK:LeafOFF:FP1	-0.212616083	-0.436358195	0.011126029	0.0850452
PPK:LeafOFF:FP2-PPK:LeafOFF:FP1	-0.093357772	-0.305596298	0.118880754	0.9874216
4GCP:LeafON:FP2-PPK:LeafOFF:FP1	0.095680746	-0.131250251	0.322611742	0.9920241
9GCP:LeafON:FP2-PPK:LeafOFF:FP1	0.079933873	-0.154329214	0.314196959	0.9993645
PPK:LeafON:FP2-PPK:LeafOFF:FP1	-0.033812262	-0.254629515	0.187004991	1.0000000
9GCP:LeafON:FP1-4GCP:LeafON:FP1	0.061035015	-0.185677967	0.307747998	0.9999926
PPK:LeafON:FP1-4GCP:LeafON:FP1	0.033896671	-0.198791066	0.266584407	1.0000000
4GCP:LeafOFF:FP12-4GCP:LeafON:FP1	-0.133994187	-0.364243320	0.096254945	0.8499151
9GCP:LeafOFF:FP12-4GCP:LeafON:FP1	0.085952368	-0.150793560	0.322698297	0.9986113
PPK:LeafOFF:FP12-4GCP:LeafON:FP1	0.035053695	-0.190851803	0.260959192	1.0000000
4GCP:LeafON:FP12-4GCP:LeafON:FP1	-0.079182632	-0.320559130	0.162193867	0.9996188
9GCP:LeafON:FP12-4GCP:LeafON:FP1	0.048432074	-0.198280908	0.295145057	0.9999998
PPK:LeafON:FP12-4GCP:LeafON:FP1	-0.049061900	-0.284397067	0.186273267	0.9999994
4GCP:LeafOFF:FP2-4GCP:LeafON:FP1	-0.171308409	-0.401557542	0.058940723	0.4510560
9GCP:LeafOFF:FP2-4GCP:LeafON:FP1	-0.161837882	-0.398583810	0.074908047	0.6130594
PPK:LeafOFF:FP2-4GCP:LeafON:FP1	-0.042579570	-0.268485068	0.183325927	0.9999999
4GCP:LeafON:FP2-4GCP:LeafON:FP1	0.146458947	-0.093302975	0.386220869	0.7924526
9GCP:LeafON:FP2-4GCP:LeafON:FP1	0.130712074	-0.116000908	0.377425057	0.9269677
PPK:LeafON:FP2-4GCP:LeafON:FP1	0.016965940	-0.217017737	0.250949617	1.0000000
PPK:LeafON:FP1-9GCP:LeafON:FP1	-0.027138345	-0.266982251	0.212705561	1.0000000
4GCP:LeafOFF:FP12-9GCP:LeafON:FP1	-0.195029203	-0.432508001	0.042449595	0.2690899
9GCP:LeafOFF:FP12-9GCP:LeafON:FP1	0.024917353	-0.218865647	0.268700353	1.0000000
PPK:LeafOFF:FP12-9GCP:LeafON:FP1	-0.025981321	-0.259251143	0.207288502	1.0000000
4GCP:LeafON:FP12-9GCP:LeafON:FP1	-0.140217647	-0.388500008	0.108064713	0.8792161
9GCP:LeafON:FP12-9GCP:LeafON:FP1	-0.012602941	-0.266076435	0.240870553	1.0000000
PPK:LeafON:FP12-9GCP:LeafON:FP1	-0.110096915	-0.352510111	0.132316280	0.9824809
4GCP:LeafOFF:FP2-9GCP:LeafON:FP1	-0.232343425	-0.469822223	0.005135373	0.0633439
9GCP:LeafOFF:FP2-9GCP:LeafON:FP1	-0.222872897	-0.466655897	0.020910103	0.1213976
PPK:LeafOFF:FP2-9GCP:LeafON:FP1	-0.103614586	-0.336884409	0.129655237	0.9860680
4GCP:LeafON:FP2-9GCP:LeafON:FP1	0.085423932	-0.161289050	0.332136914	0.9992337
9GCP:LeafON:FP2-9GCP:LeafON:FP1	0.069677059	-0.183796435	0.323150553	0.9999661
PPK:LeafON:FP2-9GCP:LeafON:FP1	-0.044069076	-0.285170460	0.197032309	0.9999999
4GCP:LeafOFF:FP12-PPK:LeafON:FP1	-0.167890858	-0.390764065	0.054982350	0.4269923
9GCP:LeafOFF:FP12-PPK:LeafON:FP1	0.052055698	-0.177523130	0.281634526	0.9999980
PPK:LeafOFF:FP12-PPK:LeafON:FP1	0.001157024	-0.217225890	0.219539939	1.0000000
4GCP:LeafON:FP12-PPK:LeafON:FP1	-0.113079302	-0.347430359	0.121271754	0.9682236
9GCP:LeafON:FP12-PPK:LeafON:FP1	0.014535404	-0.225308502	0.254379309	1.0000000
PPK:LeafON:FP12-PPK:LeafON:FP1	-0.082958571	-0.311082319	0.145165178	0.9985827
4GCP:LeafOFF:FP2-PPK:LeafON:FP1	-0.205205080	-0.428078288	0.017668127	0.1140660
9GCP:LeafOFF:FP2-PPK:LeafON:FP1	-0.195734552	-0.425313380	0.033844276	0.2100306
PPK:LeafOFF:FP2-PPK:LeafON:FP1	-0.076476241	-0.294859156	0.141906673	0.9991152
4GCP:LeafON:FP2-PPK:LeafON:FP1	0.112562277	-0.120125460	0.345250013	0.9674505
9GCP:LeafON:FP2-PPK:LeafON:FP1	0.096815404	-0.143028502	0.336659309	0.9951014
PPK:LeafON:FP2-PPK:LeafON:FP1	-0.016930731	-0.243660007	0.209798545	1.0000000
9GCP:LeafOFF:FP12-4GCP:LeafOFF:FP12	0.219946556	-0.007160288	0.447053400	0.0703918
PPK:LeafOFF:FP12-4GCP:LeafOFF:FP12	0.169047882	-0.046734827	0.384830591	0.3525429
4GCP:LeafON:FP12-4GCP:LeafOFF:FP12	0.054811556	-0.177118386	0.286741497	0.9999962
9GCP:LeafON:FP12-4GCP:LeafOFF:FP12	0.182426261	-0.055052537	0.419905059	0.3894555
PPK:LeafON:FP12-4GCP:LeafOFF:FP12	0.084932287	-0.140703536	0.310568111	0.9978421
4GCP:LeafOFF:FP2-4GCP:LeafOFF:FP12	-0.037314222	-0.257640224	0.183011779	1.0000000
9GCP:LeafOFF:FP2-4GCP:LeafOFF:FP12	-0.027843694	-0.254950538	0.199263150	1.0000000
PPK:LeafOFF:FP2-4GCP:LeafOFF:FP12	0.091414617	-0.124368093	0.307197326	0.9915971
4GCP:LeafON:FP2-4GCP:LeafOFF:FP12	0.280453135	0.050204002	0.510702267	0.0029907
9GCP:LeafON:FP2-4GCP:LeafOFF:FP12	0.264706261	0.027227463	0.502185059	0.0124766
PPK:LeafON:FP2-4GCP:LeafOFF:FP12	0.150960127	-0.073265752	0.375186006	0.6405650
PPK:LeafOFF:FP12-9GCP:LeafOFF:FP12	-0.050898673	-0.273600603	0.171803256	0.9999977
4GCP:LeafON:FP12-9GCP:LeafOFF:FP12	-0.165135000	-0.403515934	0.073245934	0.5884968
9GCP:LeafON:FP12-9GCP:LeafOFF:FP12	-0.037520294	-0.281303294	0.206262706	1.0000000
PPK:LeafON:FP12-9GCP:LeafOFF:FP12	-0.135014268	-0.367275967	0.097247430	0.8510922
4GCP:LeafOFF:FP2-9GCP:LeafOFF:FP12	-0.257260778	-0.484367622	-0.030153934	0.0098259

9GCP:LeafOFF:FP2-9GCP:LeafOFF:FP12	-0.247790250	-0.481481265	-0.014099235	0.0247474
PPK:LeafOFF:FP2-9GCP:LeafOFF:FP12	-0.128531939	-0.351233868	0.094169991	0.8584811
4GCP:LeafON:FP2-9GCP:LeafOFF:FP12	0.060506579	-0.176239350	0.297252508	0.9999881
9GCP:LeafON:FP2-9GCP:LeafOFF:FP12	0.044759706	-0.199023294	0.288542706	0.9999999
PPK:LeafON:FP2-9GCP:LeafOFF:FP12	-0.068986429	-0.299878647	0.161905790	0.9998914
4GCP:LeafON:FP12-PPK:LeafOFF:FP12	-0.114236327	-0.341854710	0.113382057	0.9542993
9GCP:LeafON:FP12-PPK:LeafOFF:FP12	0.013378379	-0.219891443	0.246648202	1.0000000
PPK:LeafON:FP12-PPK:LeafOFF:FP12	-0.084115595	-0.305317212	0.137086023	0.9975616
4GCP:LeafOFF:FP2-PPK:LeafOFF:FP12	-0.206362104	-0.422144814	0.009420605	0.0799025
9GCP:LeafOFF:FP2-PPK:LeafOFF:FP12	-0.196891577	-0.419593506	0.025810353	0.1602502
PPK:LeafOFF:FP2-PPK:LeafOFF:FP12	-0.077633265	-0.288774944	0.133508413	0.9983773
4GCP:LeafON:FP2-PPK:LeafOFF:FP12	0.111405252	-0.114500245	0.337310750	0.9610461
9GCP:LeafON:FP2-PPK:LeafOFF:FP12	0.095658379	-0.137611443	0.328928202	0.9941431
PPK:LeafON:FP2-PPK:LeafOFF:FP12	-0.018087755	-0.237850982	0.201675471	1.0000000
9GCP:LeafON:FP12-4GCP:LeafON:FP12	0.127614706	-0.120667655	0.375897066	0.9435628
PPK:LeafON:FP12-4GCP:LeafON:FP12	0.030120732	-0.206859174	0.267100638	1.0000000
4GCP:LeafOFF:FP2-4GCP:LeafON:FP12	-0.092125778	-0.324055720	0.139804164	0.9959282
9GCP:LeafOFF:FP2-4GCP:LeafON:FP12	-0.082655250	-0.321036184	0.155725684	0.9992198
PPK:LeafOFF:FP2-4GCP:LeafON:FP12	0.036603061	-0.191015323	0.264221445	1.0000000
4GCP:LeafON:FP2-4GCP:LeafON:FP12	0.225641579	-0.015734920	0.467018078	0.0993767
9GCP:LeafON:FP2-4GCP:LeafON:FP12	0.209894706	-0.038387655	0.458177066	0.2227465
PPK:LeafON:FP2-4GCP:LeafON:FP12	0.096148571	-0.139489278	0.331786421	0.9944636
PPK:LeafON:FP12-9GCP:LeafON:FP12	-0.097493974	-0.339907170	0.144919221	0.9953026
4GCP:LeafOFF:FP2-9GCP:LeafON:FP12	-0.219740484	-0.457219282	0.017738314	0.1091123
9GCP:LeafOFF:FP2-9GCP:LeafON:FP12	-0.210269956	-0.454052956	0.033513044	0.1932806
PPK:LeafOFF:FP2-9GCP:LeafON:FP12	-0.091011645	-0.324281467	0.142258178	0.9966952
4GCP:LeafON:FP2-9GCP:LeafON:FP12	0.098026873	-0.148686109	0.344739855	0.9959142
9GCP:LeafON:FP2-9GCP:LeafON:FP12	0.082280000	-0.171193494	0.335753494	0.9996681
PPK:LeafON:FP2-9GCP:LeafON:FP12	-0.031466134	-0.272567519	0.209635250	1.0000000
4GCP:LeafOFF:FP2-PPK:LeafON:FP12	-0.122246509	-0.347882333	0.103389314	0.9123657
9GCP:LeafOFF:FP2-PPK:LeafON:FP12	-0.112775982	-0.345037680	0.119485717	0.9662860
PPK:LeafOFF:FP2-PPK:LeafON:FP12	0.006482330	-0.214719288	0.227683947	1.0000000
4GCP:LeafON:FP2-PPK:LeafON:FP12	0.195520847	-0.039814320	0.430856015	0.2500444
9GCP:LeafON:FP2-PPK:LeafON:FP12	0.179773974	-0.062639221	0.422187170	0.4573711
PPK:LeafON:FP2-PPK:LeafON:FP12	0.066027840	-0.163417629	0.295473308	0.9999354
9GCP:LeafOFF:FP2-4GCP:LeafOFF:FP2	0.009470528	-0.217636316	0.236577372	1.0000000
PPK:LeafOFF:FP2-4GCP:LeafOFF:FP2	0.128728839	-0.087053870	0.344511548	0.8220967
4GCP:LeafON:FP2-4GCP:LeafOFF:FP2	0.317767357	0.087518224	0.548016489	0.0002366
9GCP:LeafON:FP2-4GCP:LeafOFF:FP2	0.302020484	0.064541686	0.539499282	0.0013402
PPK:LeafON:FP2-4GCP:LeafOFF:FP2	0.188274349	-0.035951530	0.412500229	0.2332244
PPK:LeafOFF:FP2-9GCP:LeafOFF:FP2	0.119258311	-0.103443618	0.341960241	0.9202504
4GCP:LeafON:FP2-9GCP:LeafOFF:FP2	0.308296829	0.071550900	0.545042758	0.0008359
9GCP:LeafON:FP2-9GCP:LeafOFF:FP2	0.292549956	0.048766956	0.536332956	0.0038782
PPK:LeafON:FP2-9GCP:LeafOFF:FP2	0.178803821	-0.052088397	0.409696040	0.3741740
4GCP:LeafON:FP2-PPK:LeafOFF:FP2	0.189038518	-0.036866980	0.414944015	0.2385805
9GCP:LeafON:FP2-PPK:LeafOFF:FP2	0.173291645	-0.059978178	0.406561467	0.4540183
PPK:LeafON:FP2-PPK:LeafOFF:FP2	0.059545510	-0.160217716	0.279308737	0.9999724
9GCP:LeafON:FP2-4GCP:LeafON:FP2	-0.015746873	-0.262459855	0.230966109	1.0000000
PPK:LeafON:FP2-4GCP:LeafON:FP2	-0.129493008	-0.363476685	0.104490670	0.8964155
PPK:LeafON:FP2-9GCP:LeafON:FP2	-0.113746134	-0.354847519	0.127355250	0.9744081