

Agisoft Metashape

Processing Report

26 March 2024



Survey Data

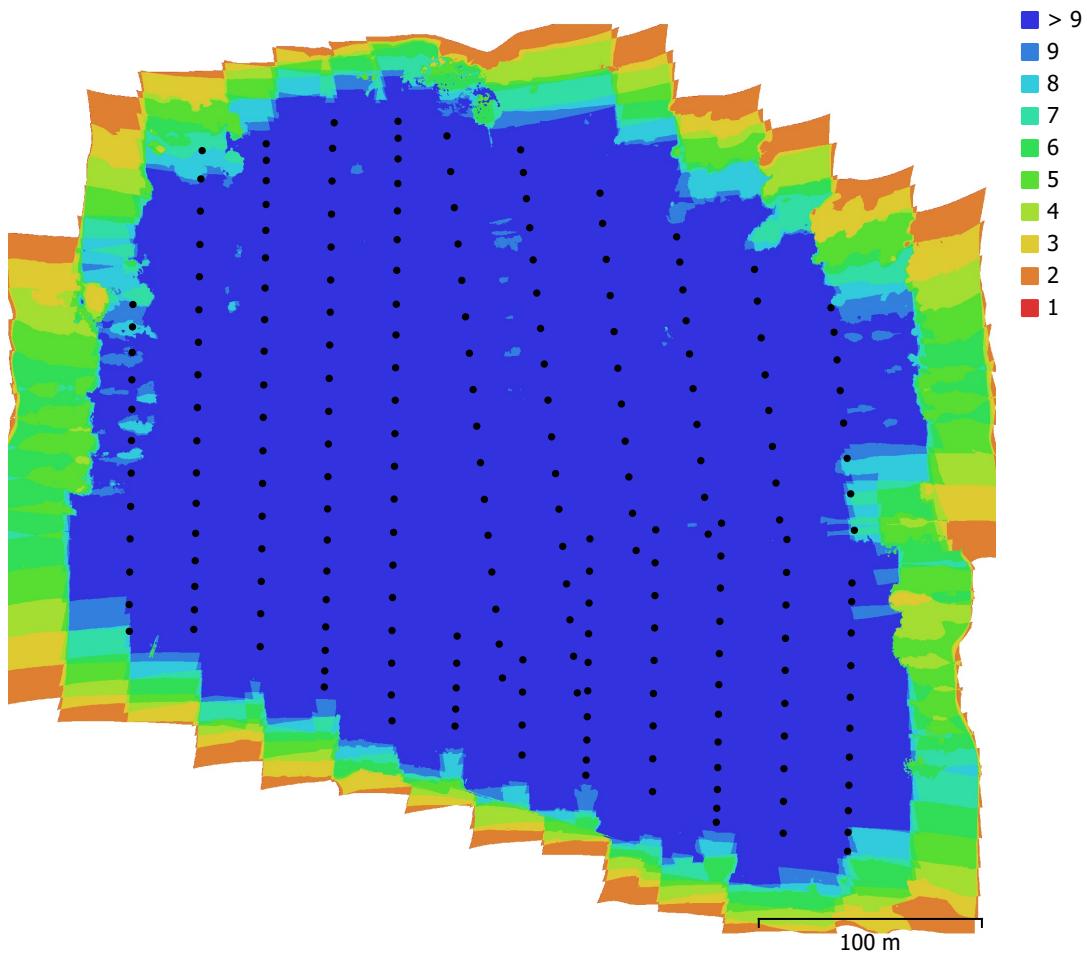


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|-----------------------|---------------------|-----------|
| Number of images: | 219 | Camera stations: | 219 |
| Flying altitude: | 73.1 m | Tie points: | 193,797 |
| Ground resolution: | 1.92 cm/pix | Projections: | 707,319 |
| Coverage area: | 0.144 km ² | Reprojection error: | 0.911 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|---------------|-------------|--------------|----------------|---------------|
| M3E (12.29mm) | 5280 x 3956 | 12.29 mm | 3.36 x 3.36 µm | No |

Table 1. Cameras.

Camera Calibration

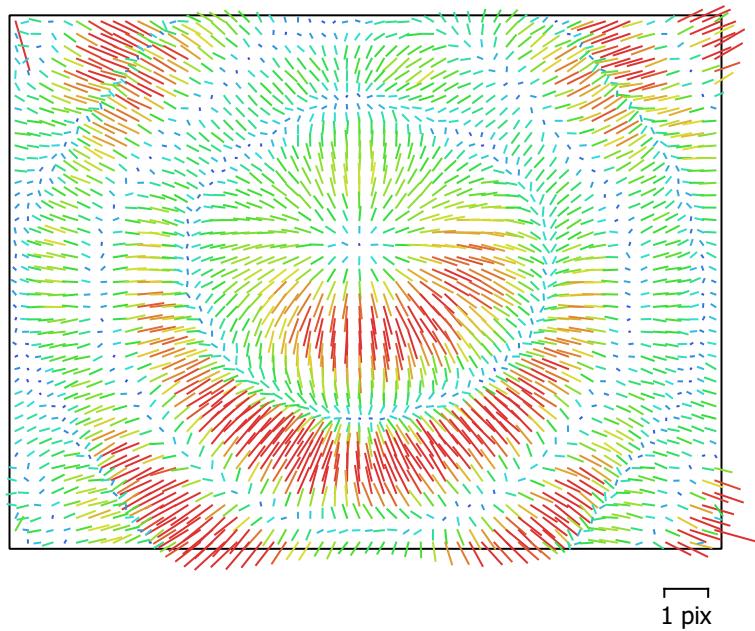


Fig. 2. Image residuals for M3E (12.29mm).

M3E (12.29mm)

219 images

| Type | Resolution | Focal Length | Pixel Size |
|--------------|--------------------|-----------------|-----------------------|
| Frame | 5280 x 3956 | 12.29 mm | 3.36 x 3.36 μm |

| | Value | Error | Cx | Cy | K1 | K2 | K3 | P1 | P2 |
|-----------|---------------------|---------|------|------|-------|-------|-------|-------|-------|
| F | 3659.69 | | | | | | | | |
| Cx | -7.91177 | 0.061 | 1.00 | 0.02 | -0.08 | 0.02 | 0.03 | -0.62 | -0.02 |
| Cy | -43.2887 | 0.051 | | 1.00 | -0.01 | 0.02 | -0.01 | -0.02 | -0.52 |
| K1 | -0.112101 | 9.2e-05 | | | 1.00 | -0.49 | -0.17 | 0.48 | 0.22 |
| K2 | 0.0101794 | 6.6e-05 | | | | 1.00 | -0.77 | -0.14 | -0.06 |
| K3 | -0.0216496 | 5.1e-05 | | | | | 1.00 | -0.18 | -0.09 |
| P1 | 2.333e-05 | 2.7e-06 | | | | | | 1.00 | 0.12 |
| P2 | -3.77765e-05 | 2e-06 | | | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

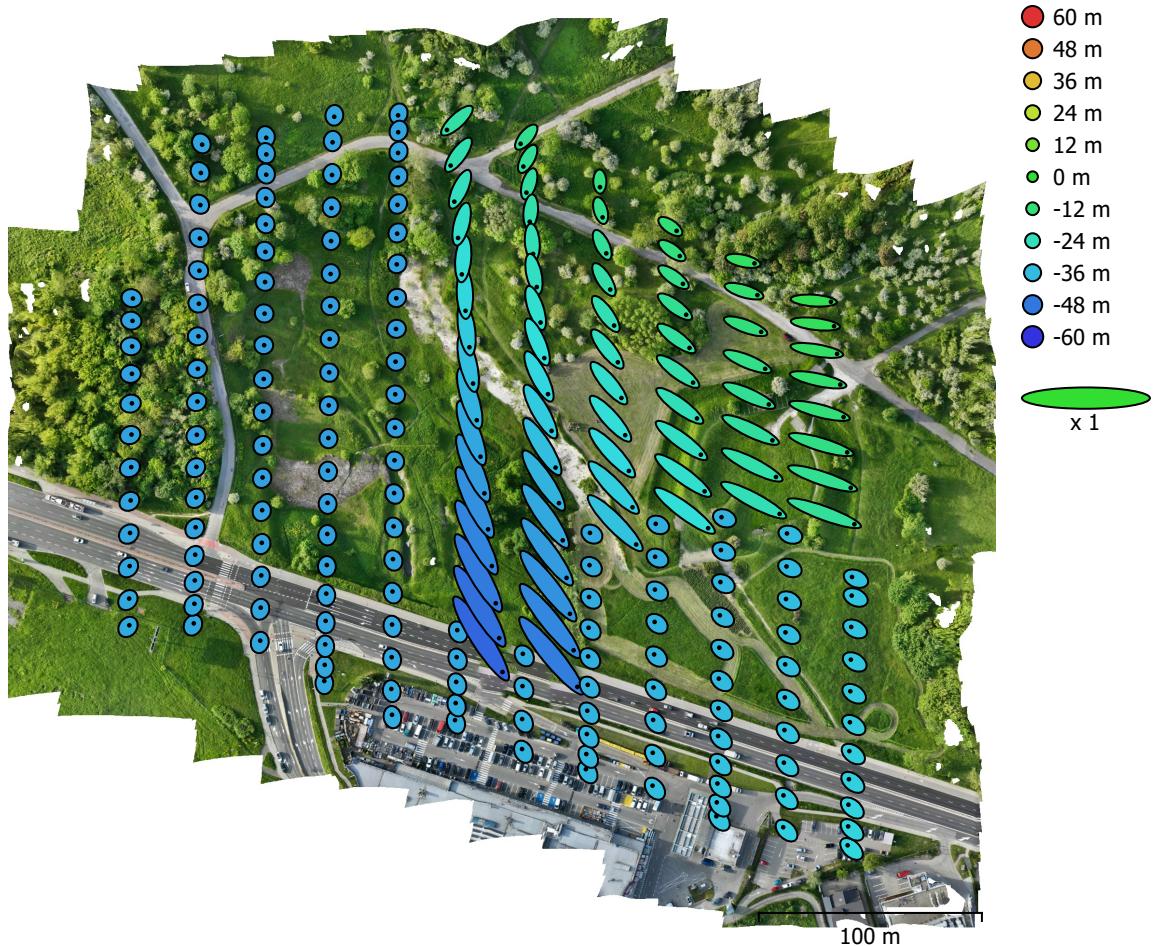


Fig. 3. Camera locations and error estimates.

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 (m) | Y error (m) | Z error (m) | XY error (m) | Total error (m) |
|-------------|-------------|-------------|--------------|-----------------|
| 7.94893 | 8.48091 | 35.7446 | 11.6237 | 37.5871 |

Table 3. Average camera location error.

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

Ground Control Points

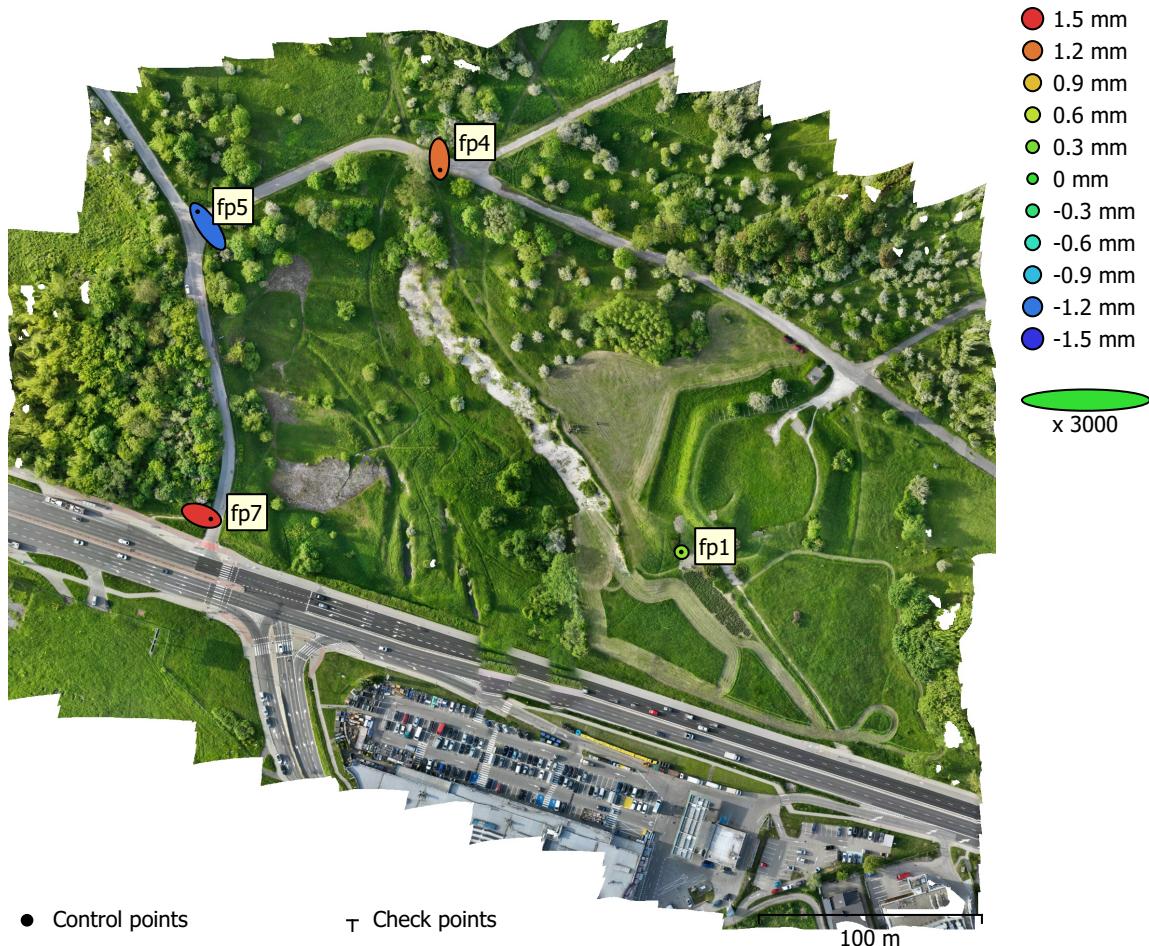


Fig. 4. GCP locations and error estimates.

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 (mm) | Y error (mm) | Z error (mm) | XY error (mm) | Total (mm) |
|-------|--------------|--------------|--------------|---------------|------------|
| 4 | 2.06587 | 2.78411 | 1.1639 | 3.46686 | 3.65702 |

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

| Label | X error (mm) | Y error (mm) | Z error (mm) | Total (mm) | Image (pix) |
|--------------|---------------------|---------------------|---------------------|-------------------|--------------------|
| fp1 | -0.0938436 | 0.0386494 | 0.410983 | 0.423329 | 1.026 (4) |
| fp4 | 0.188633 | -3.2432 | 1.23835 | 3.47669 | 0.315 (3) |
| fp5 | -3.04189 | 4.40995 | -1.23649 | 5.49815 | 0.836 (5) |
| fp7 | 2.78816 | -1.01865 | 1.47896 | 3.31645 | 0.857 (7) |
| Total | 2.06587 | 2.78411 | 1.1639 | 3.65702 | 0.831 |

Table 5. Control points.

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

Digital Elevation Model

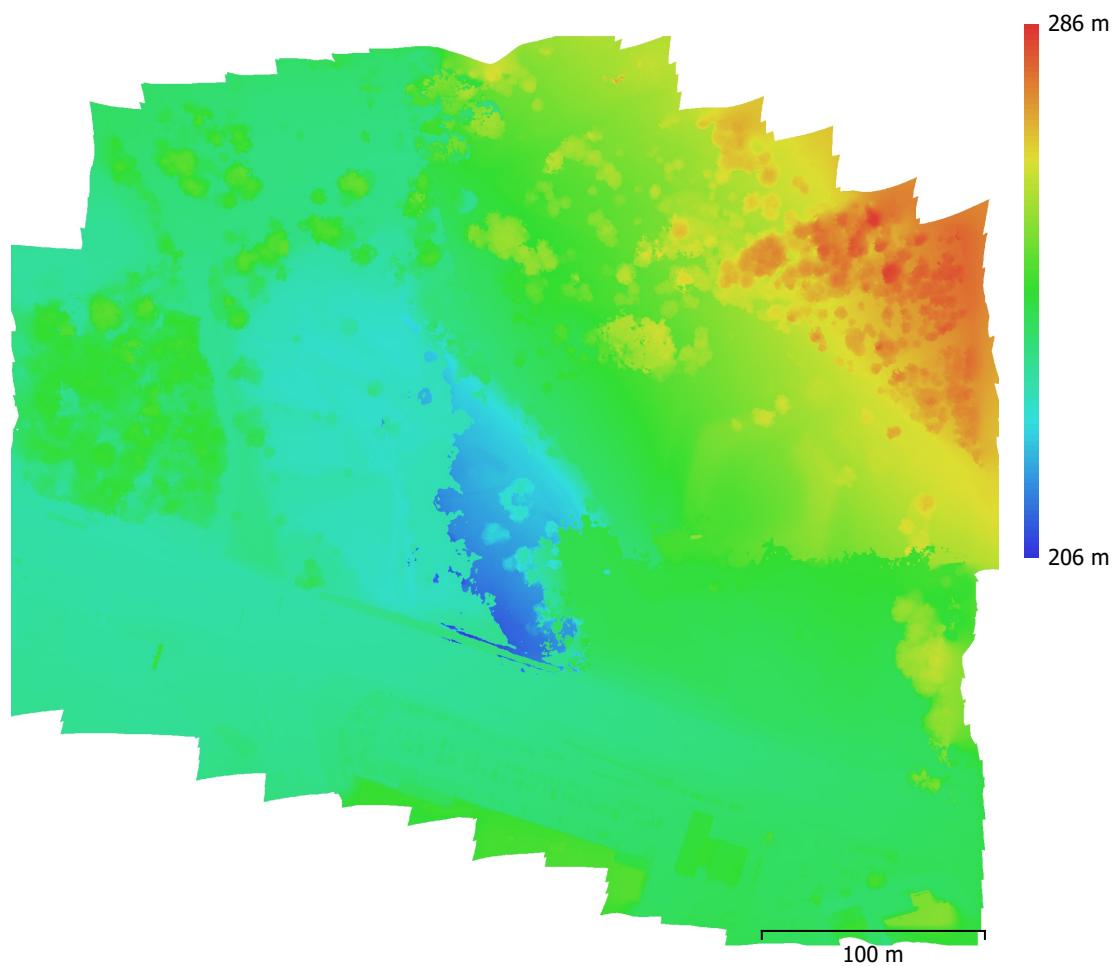


Fig. 5. Reconstructed digital elevation model.

Resolution: 7.67 cm/pix
Point density: 170 points/m²

Processing Parameters

General

| | |
|-------------------|--------------------------------------|
| Cameras | 219 |
| Aligned cameras | 219 |
| Markers | 4 |
| Coordinate system | ETRF2000-PL / CS2000/21 (EPSG::2178) |
| Rotation angles | Yaw, Pitch, Roll |

Tie Points

| | |
|--------------------------------|-------------------------|
| Points | 193,797 of 229,282 |
| RMS reprojection error | 0.252001 (0.910954 pix) |
| Max reprojection error | 0.757183 (48.8255 pix) |
| Mean key point size | 3.34179 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 4.06052 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | High |
| Generic preselection | Yes |
| Reference preselection | Source |
| Key point limit | 40,000 |
| Key point limit per Mpx | 1,000 |
| Tie point limit | 4,000 |
| Exclude stationary tie points | No |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 4 minutes 47 seconds |
| Matching memory usage | 1.62 GB |
| Alignment time | 4 minutes 12 seconds |
| Alignment memory usage | 226.33 MB |
| Date created | 2024:03:26 20:30:45 |
| Software version | 2.1.1.17821 |
| File size | 19.33 MB |

Depth Maps

| | |
|-------|-----|
| Count | 219 |
|-------|-----|

Depth maps generation parameters

| | |
|------------------|-----------------------|
| Quality | Medium |
| Filtering mode | Mild |
| Max neighbors | 16 |
| Processing time | 11 minutes 27 seconds |
| Memory usage | 1.28 GB |
| Date created | 2024:03:26 22:19:36 |
| Software version | 2.1.1.17821 |
| File size | 463.37 MB |

Point Cloud

| | |
|--------|------------|
| Points | 32,909,797 |
|--------|------------|

Point attributes

| | |
|--------|----------------|
| Color | 3 bands, uint8 |
| Normal | |

Point classes

| | |
|----------------------------|------------|
| Created (never classified) | 32,909,797 |
|----------------------------|------------|

Depth maps generation parameters

| | |
|--|--------------------------------------|
| Quality | Medium |
| Filtering mode | Mild |
| Max neighbors | 16 |
| Processing time | 11 minutes 27 seconds |
| Memory usage | 1.28 GB |
| Point cloud generation parameters | |
| Processing time | 11 minutes 38 seconds |
| Memory usage | 2.85 GB |
| Date created | 2024:03:26 22:31:14 |
| Software version | 2.1.1.17821 |
| File size | 434.81 MB |
| Model | |
| Faces | 3,001,818 |
| Vertices | 1,502,190 |
| Vertex colors | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | Medium |
| Filtering mode | Mild |
| Max neighbors | 16 |
| Processing time | 11 minutes 27 seconds |
| Memory usage | 1.28 GB |
| Reconstruction parameters | |
| Surface type | Arbitrary |
| Source data | Depth maps |
| Interpolation | Enabled |
| Strict volumetric masks | No |
| Processing time | 8 minutes 52 seconds |
| Memory usage | 4.30 GB |
| Date created | 2024:03:26 22:43:42 |
| Software version | 2.1.1.17821 |
| File size | 57.27 MB |
| DEM | |
| Size | 5,765 x 5,305 |
| Coordinate system | ETRF2000-PL / CS2000/21 (EPSG::2178) |
| Reconstruction parameters | |
| Source data | Point cloud |
| Interpolation | Enabled |
| Processing time | 35 seconds |
| Memory usage | 317.85 MB |
| Date created | 2024:03:26 22:50:01 |
| Software version | 2.1.1.17821 |
| File size | 97.21 MB |
| Orthomosaic | |
| Size | 23,060 x 21,220 |
| Coordinate system | ETRF2000-PL / CS2000/21 (EPSG::2178) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Enable ghosting filter | No |
| Processing time | 7 minutes 59 seconds |
| Memory usage | 1.61 GB |
| Date created | 2024:03:26 22:56:00 |
| Software version | 2.1.1.17821 |
| File size | 2.65 GB |

System

| | |
|------------------|---|
| Software name | Agisoft Metashape Professional |
| Software version | 2.1.1 build 17821 |
| OS | Windows 64 bit |
| RAM | 15.87 GB |
| CPU | Intel(R) Core(TM) i7-7700HQ CPU @ 2.80GHz |
| GPU(s) | NVIDIA GeForce GTX 1050 Ti |