# Kampesteindalen

**Processing Report**

**10 February 2022**

# Survey Data

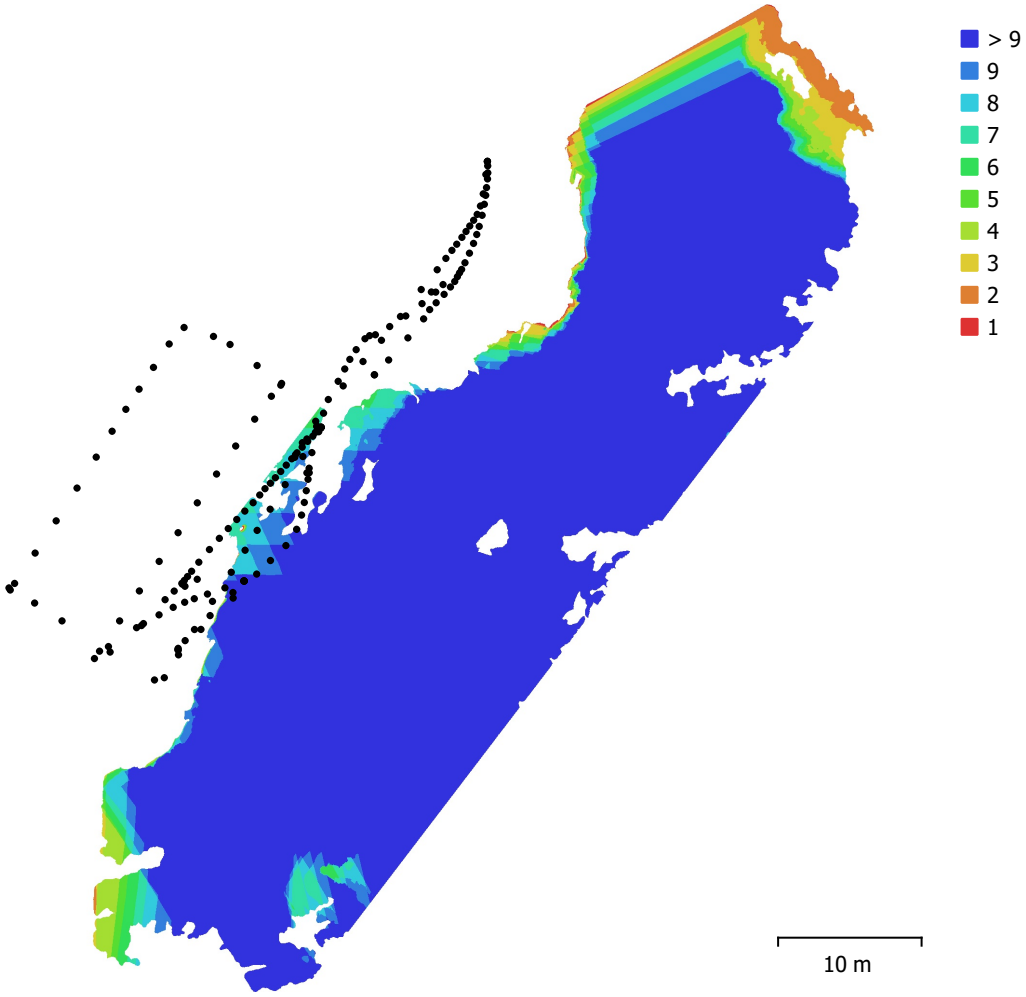


Fig. 1. Camera locations and image overlap.

| | | | |
|---|---|---|---|
| Number of images: | 183 | Camera stations: | 183 |
| Flying altitude: | 13.4 m | Tie points: | 51,648 |
| Ground resolution: | 2.97 mm/pix | Projections: | 148,642 |
| Coverage area: | 1.35e+03 m² | Reprojection error: | 0.251 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|---|---|---|---|---|
| L1D-20c (10.26mm) | 5472 x 3648 | 10.26 mm | 2.41 x 2.41 µm | No |

Table 1. Cameras.

# Camera Calibration

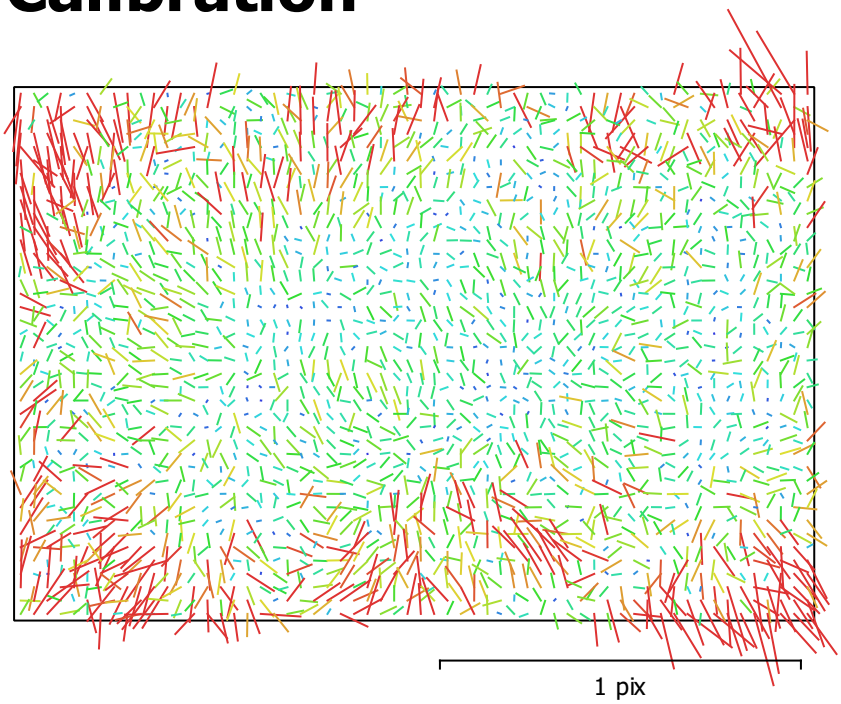


Fig. 2. Image residuals for L1D-20c (10.26mm).

**L1D-20c (10.26mm)**

183 images

| Type | Resolution | Focal Length | Pixel Size |
|---|---|---|---|
| **Frame** | **5472 x 3648** | **10.26 mm** | **2.41 x 2.41 µm** |

| | Value | Error | F | Cx | Cy | K1 | K2 | K3 | P1 | P2 |
|---|---|---|---|---|---|---|---|---|---|---|
| **F** | **4351.38** | 0.14 | 1.00 | 0.01 | -0.20 | 0.17 | 0.07 | -0.07 | -0.02 | -0.18 |
| **Cx** | **-16.404** | 0.29 | | 1.00 | 0.16 | -0.00 | 0.00 | -0.00 | 0.97 | 0.19 |
| **Cy** | **-40.4875** | 0.19 | | | 1.00 | -0.08 | 0.01 | -0.01 | 0.19 | 0.88 |
| **K1** | **0.00695363** | 5.5e-05 | | | | 1.00 | -0.92 | 0.86 | -0.01 | -0.08 |
| **K2** | **0.0320001** | 0.00024 | | | | | 1.00 | -0.98 | 0.00 | 0.01 |
| **K3** | **-0.0331074** | 0.00032 | | | | | | 1.00 | 0.00 | -0.01 |
| **P1** | **-0.00103887** | 1.9e-05 | | | | | | | 1.00 | 0.22 |
| **P2** | **-0.00326413** | 1e-05 | | | | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

# Camera Locations

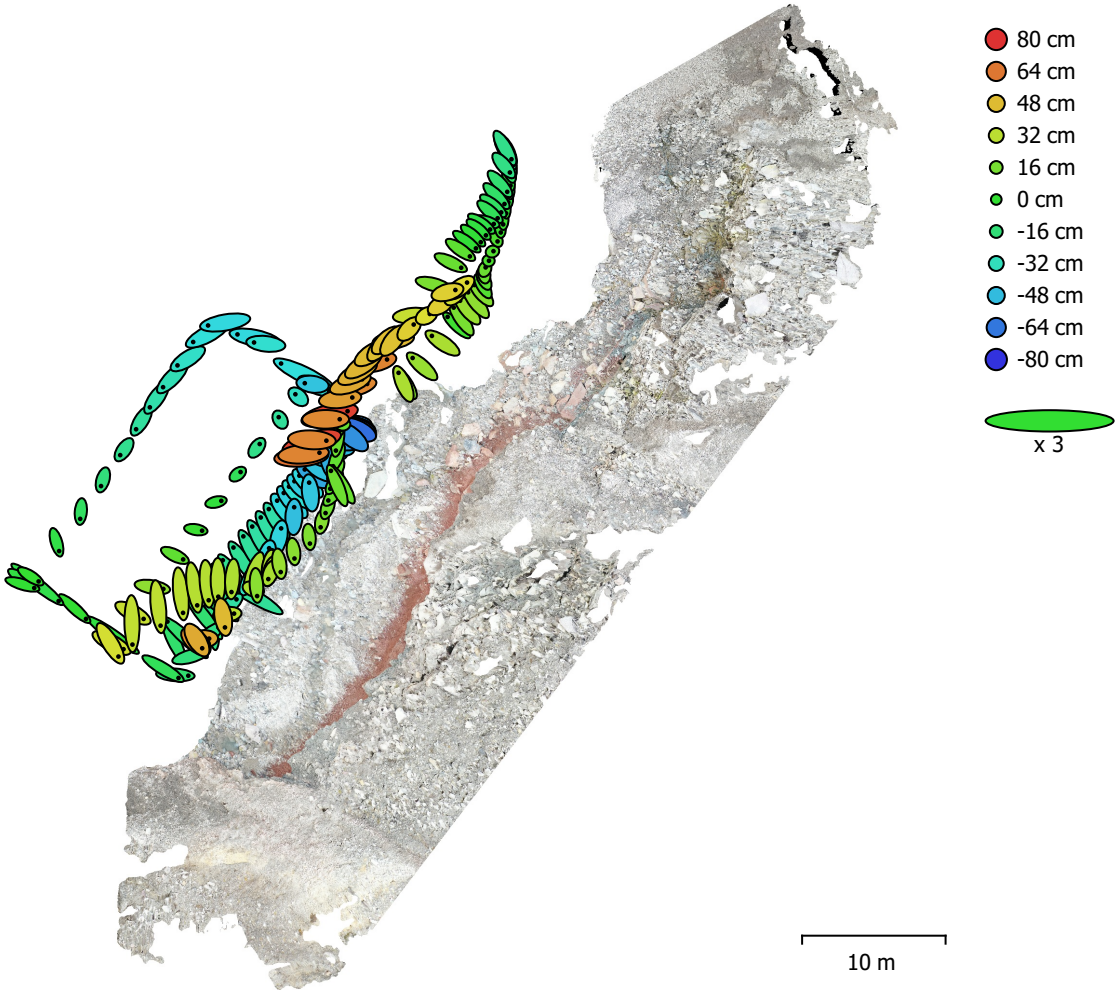


Fig. 3. Camera locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated camera locations are marked with a black dot.

| X error (cm) | Y error (cm) | Z error (cm) | XY error (cm) | Total error (cm) |
|---|---|---|---|---|
| 41.3067 | 40.381 | 34.33 | 57.7656 | 67.1968 |

Table 3. Average camera location error.
X - Longitude, Y - Latitude, Z - Altitude.

# Digital Elevation Model

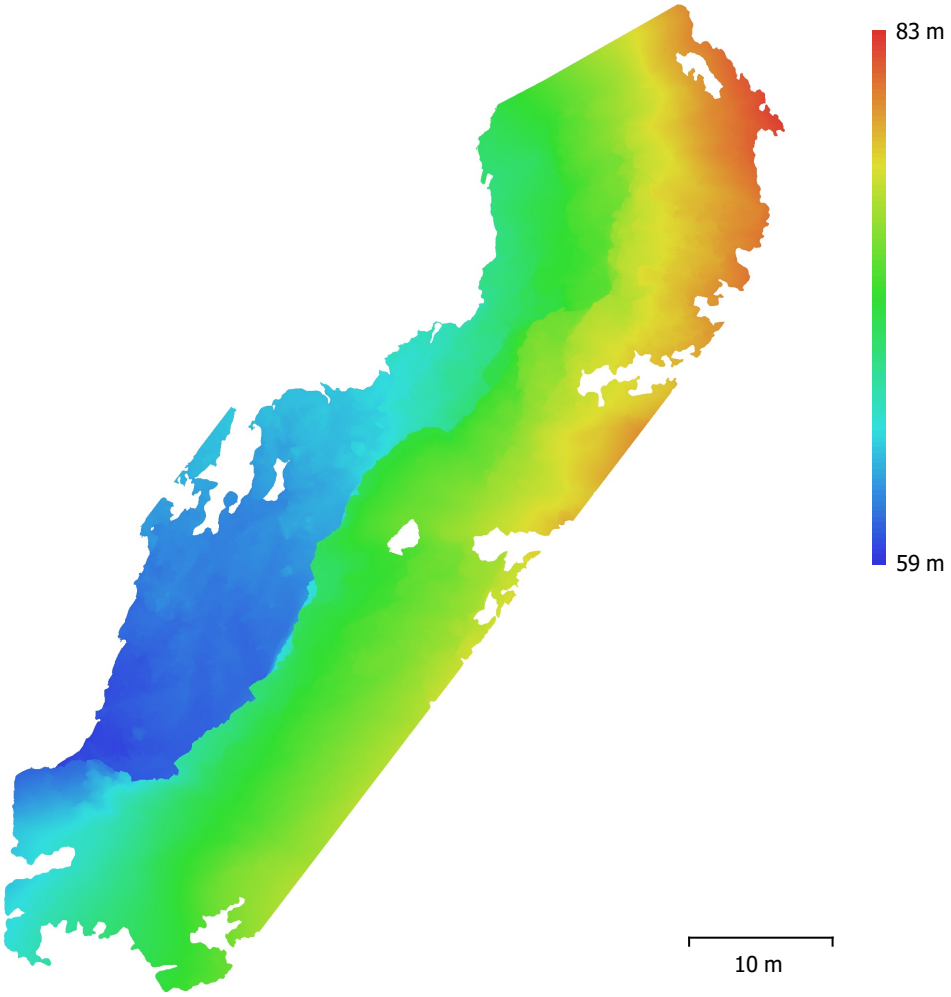


Fig. 4. Reconstructed digital elevation model.

| | |
|---|---|
| Resolution: | 5.95 mm/pix |
| Point density: | 2.83 points/cm² |

# Processing Parameters

| | |
|---|---|
| **General** | |
| Cameras | 183 |
| Aligned cameras | 183 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |
| **Point Cloud** | |
| Points | 51,648 of 1,069,858 |
| RMS reprojection error | 0.142549 (0.250895 pix) |
| Max reprojection error | 0.589044 (1.67899 pix) |
| Mean key point size | 1.67041 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 5.66028 |
| **Alignment parameters** | |
| Accuracy | Highest |
| Generic preselection | Yes |
| Reference preselection | No |
| Key point limit | 60,000 |
| Tie point limit | 0 |
| Exclude stationary tie points | Yes |
| Guided image matching | No |
| Adaptive camera model fitting | No |
| Matching time | 43 minutes 26 seconds |
| Matching memory usage | 631.92 MB |
| Alignment time | 22 minutes 38 seconds |
| Alignment memory usage | 446.96 MB |
| **Optimization parameters** | |
| Parameters | f, cx, cy, k1-k3, p1, p2 |
| Adaptive camera model fitting | No |
| Optimization time | 4 seconds |
| Software version | 1.7.2.12040 |
| File size | 96.67 MB |
| **Depth Maps** | |
| Count | 169 |
| **Depth maps generation parameters** | |
| Quality | High |
| Filtering mode | Mild |
| Processing time | 15 minutes 51 seconds |
| Memory usage | 3.24 GB |
| Software version | 1.7.2.12040 |
| File size | 1.30 GB |
| **Dense Point Cloud** | |
| Points | 55,244,425 |
| Point colors | 3 bands, uint8 |
| **Depth maps generation parameters** | |
| Quality | High |
| Filtering mode | Mild |
| Processing time | 15 minutes 51 seconds |
| Memory usage | 3.24 GB |
| **Dense cloud generation parameters** | |

| | |
|---|---|
| Processing time | 1 hours 15 minutes |
| Memory usage | 9.09 GB |
| Software version | 1.7.2.12040 |
| File size | 1002.19 MB |
| **Model** | |
| Faces | 10,867,575 |
| Vertices | 5,446,216 |
| Vertex colors | 3 bands, uint8 |
| Texture | 4,096 x 4,096 x 10, 4 bands, uint8 |
| **Depth maps generation parameters** | |
| Quality | High |
| Filtering mode | Mild |
| Processing time | 15 minutes 51 seconds |
| Memory usage | 3.24 GB |
| **Reconstruction parameters** | |
| Surface type | Arbitrary |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Strict volumetric masks | No |
| Processing time | 24 minutes 23 seconds |
| Memory usage | 32.45 GB |
| **Texturing parameters** | |
| Mapping mode | Generic |
| Blending mode | Mosaic |
| Texture size | 4,096 |
| Enable hole filling | Yes |
| Enable ghosting filter | Yes |
| UV mapping time | 4 minutes 17 seconds |
| UV mapping memory usage | 3.76 GB |
| Blending time | 2 minutes 33 seconds |
| Blending memory usage | 7.40 GB |
| Software version | 1.7.2.12040 |
| File size | 724.64 MB |
| **Tiled Model** | |
| Texture | 3 bands, uint8 |
| **Depth maps generation parameters** | |
| Quality | High |
| Filtering mode | Mild |
| Processing time | 15 minutes 51 seconds |
| Memory usage | 3.24 GB |
| **Reconstruction parameters** | |
| Source data | Dense cloud |
| Tile size | 256 |
| Face count | High |
| Enable ghosting filter | No |
| Processing time | 1 hours 20 minutes |
| Memory usage | 4.86 GB |
| Software version | 1.7.2.12040 |
| File size | 1.12 GB |
| **System** | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.7.2 build 12040 |
| OS | Windows 64 bit |
| RAM | 127.78 GB |
| CPU | Intel(R) Core(TM) i9-10900 CPU @ 2.80GHz |
| GPU(s) | NVIDIA GeForce RTX 2080 SUPER |