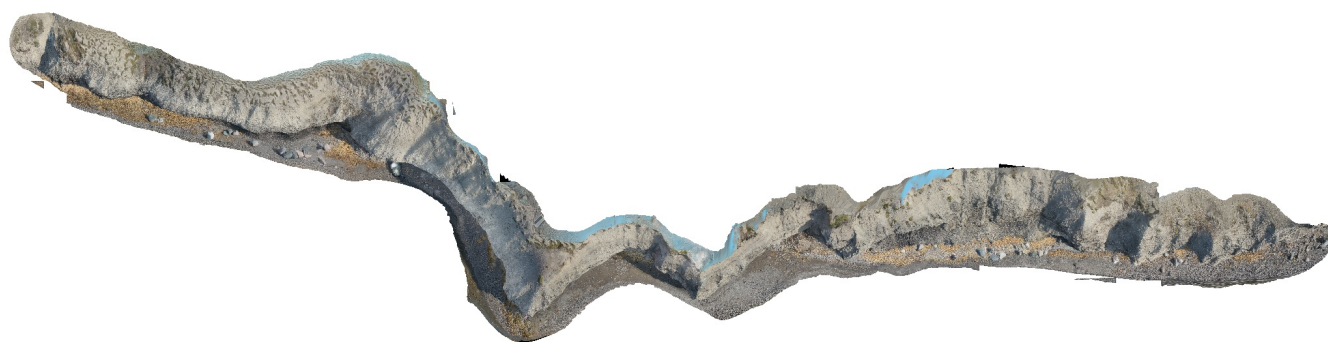


# FortetBeachLowRes\_processing\_report

Processing Report  
22 February 2021



# Survey Data

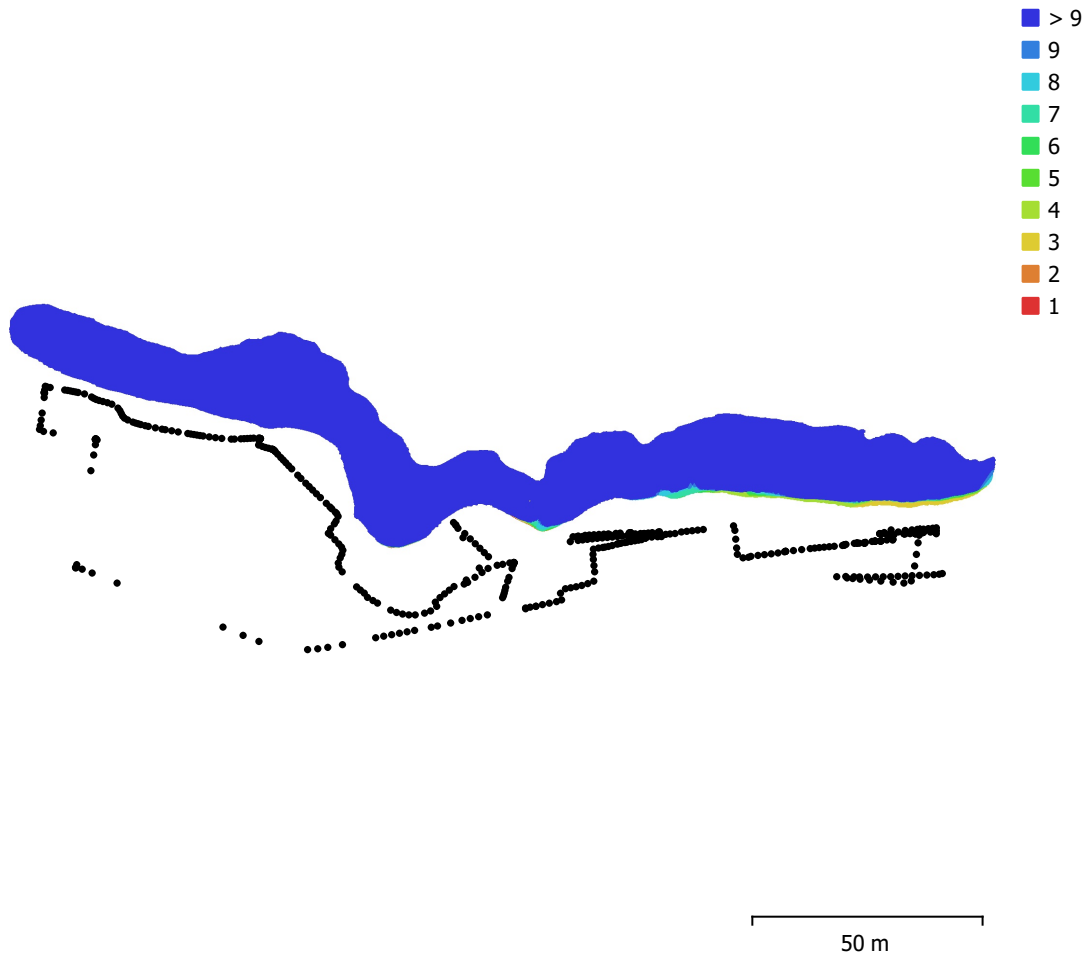


Fig. 1. Camera locations and image overlap.

|                    |                         |                     |           |
|--------------------|-------------------------|---------------------|-----------|
| Number of images:  | 458                     | Camera stations:    | 458       |
| Flying altitude:   | 18 m                    | Tie points:         | 136,089   |
| Ground resolution: | 7.12 mm/pix             | Projections:        | 1,060,553 |
| Coverage area:     | 3.28e+03 m <sup>2</sup> | Reprojection error: | 0.792 pix |

| Camera Model | Resolution  | Focal Length | Pixel Size | Precalibrated |
|--------------|-------------|--------------|------------|---------------|
| unknown      | 2688 x 1512 | unknown      | unknown    | No            |

Table 1. Cameras.

# Camera Calibration

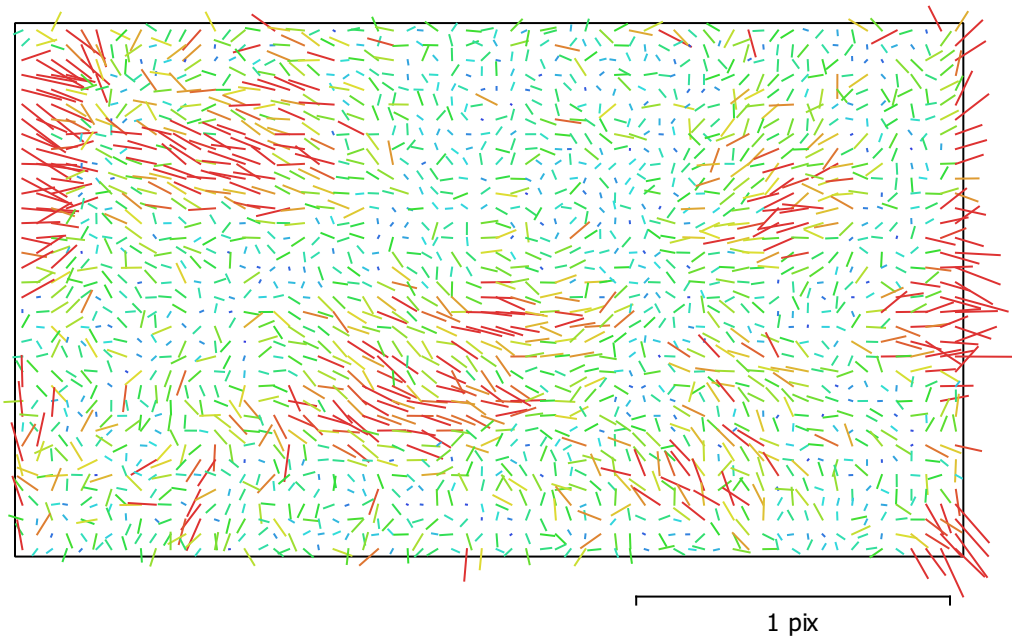


Fig. 2. Image residuals for unknown.

**unknown**  
458 images

|              |                    |                |                |
|--------------|--------------------|----------------|----------------|
| Type         | Resolution         | Focal Length   | Pixel Size     |
| <b>Frame</b> | <b>2688 x 1512</b> | <b>unknown</b> | <b>unknown</b> |

|           | Value              | Error   | F    | Cx   | Cy    | K1    | K2    | K3    | P1    | P2    |
|-----------|--------------------|---------|------|------|-------|-------|-------|-------|-------|-------|
| <b>F</b>  | <b>2210.46</b>     | 0.058   | 1.00 | 0.03 | -0.14 | -0.07 | 0.15  | -0.14 | 0.02  | -0.01 |
| <b>Cx</b> | <b>9.90276</b>     | 0.1     |      | 1.00 | 0.10  | 0.00  | 0.01  | -0.01 | 0.94  | 0.08  |
| <b>Cy</b> | <b>-11.7258</b>    | 0.075   |      |      | 1.00  | 0.00  | -0.00 | 0.00  | 0.08  | 0.66  |
| <b>K1</b> | <b>0.0102183</b>   | 7.4e-05 |      |      |       | 1.00  | -0.96 | 0.91  | 0.01  | 0.00  |
| <b>K2</b> | <b>0.0231403</b>   | 0.00036 |      |      |       |       | 1.00  | -0.98 | 0.00  | 0.00  |
| <b>K3</b> | <b>-0.0161061</b>  | 0.00054 |      |      |       |       |       | 1.00  | -0.01 | -0.01 |
| <b>P1</b> | <b>0.000640346</b> | 1.3e-05 |      |      |       |       |       |       | 1.00  | 0.08  |
| <b>P2</b> | <b>-0.00317401</b> | 5.7e-06 |      |      |       |       |       |       |       | 1.00  |

Table 2. Calibration coefficients and correlation matrix.

# Ground Control Points

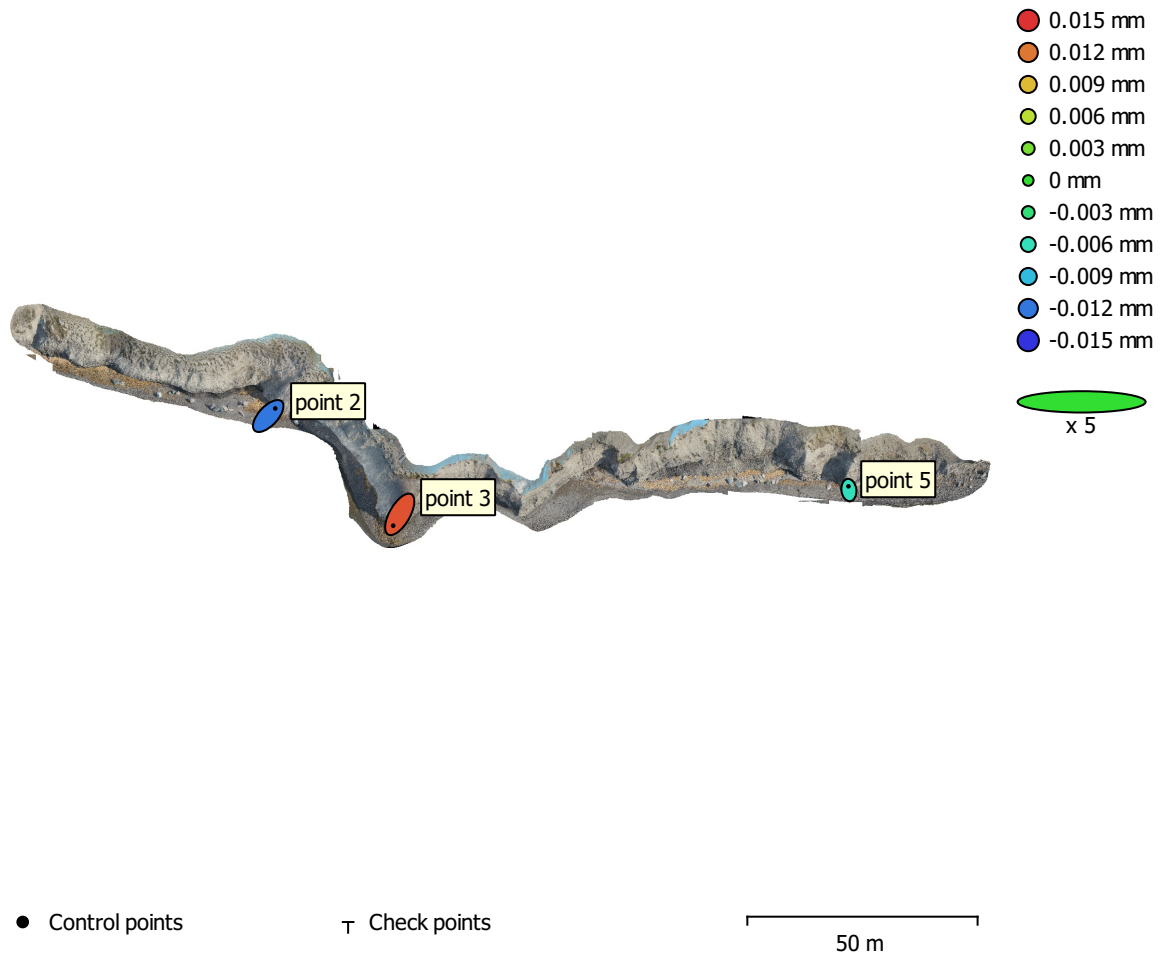


Fig. 3. GCP locations and error estimates.

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) |
|-------|--------------|--------------|--------------|---------------|------------|
| 3     | 48.1225      | 70.6934      | 0.00110292   | 85.518        | 85.518     |

Table 3. Control points RMSE.

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

| <b>Label</b> | <b>X error (cm)</b> | <b>Y error (cm)</b> | <b>Z error (cm)</b> | <b>Total (cm)</b> | <b>Image (pix)</b> |
|--------------|---------------------|---------------------|---------------------|-------------------|--------------------|
| point 5      | -3.96932            | 32.3518             | -0.00060028         | 32.5944           | 1.730 (42)         |
| point 3      | -56.853             | -98.0987            | 0.00136157          | 113.383           | 18.844 (19)        |
| point 2      | 60.8219             | 65.7469             | -0.00119795         | 89.5654           | 5.351 (39)         |
| <b>Total</b> | <b>48.1225</b>      | <b>70.6934</b>      | <b>0.00110292</b>   | <b>85.518</b>     | <b>8.938</b>       |

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

# Digital Elevation Model

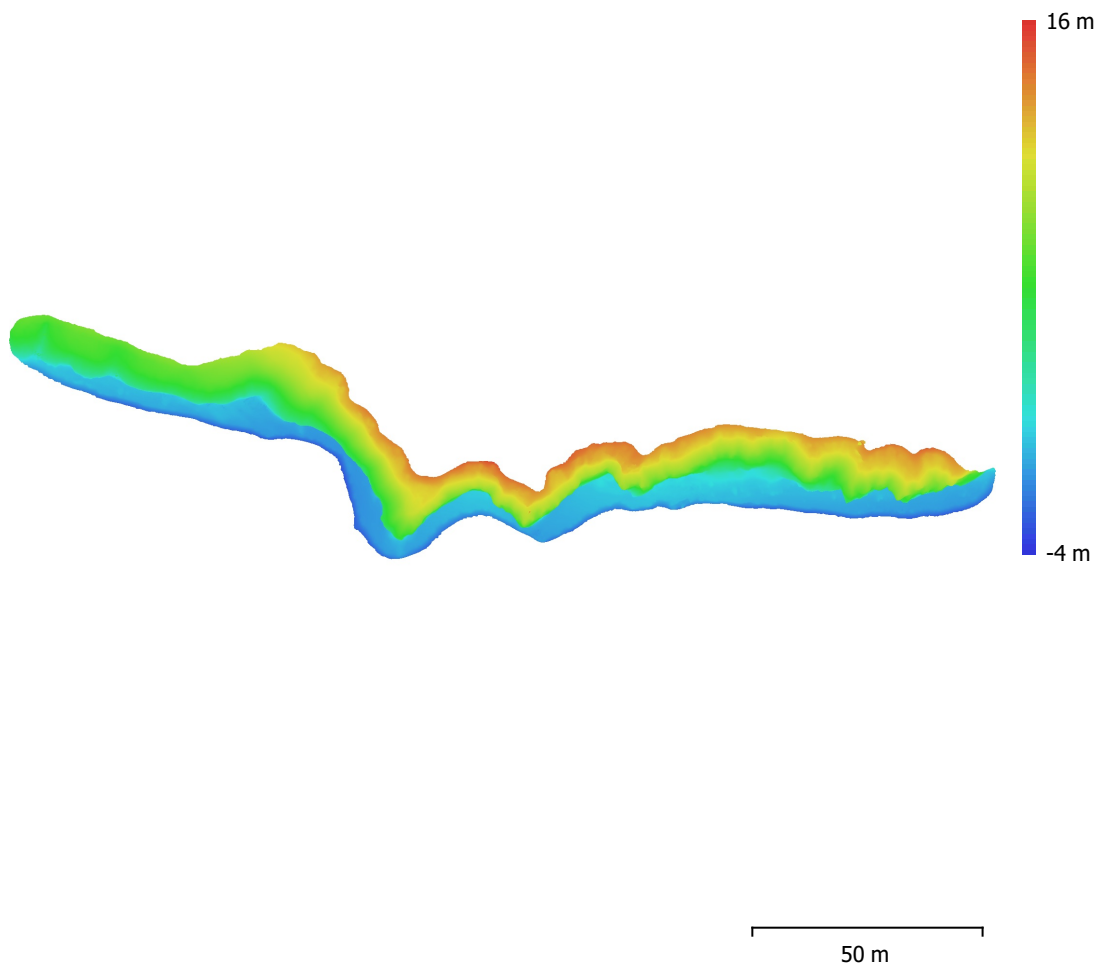


Fig. 4. Reconstructed digital elevation model.

Resolution: 5.69 cm/pix  
Point density: 308 points/m<sup>2</sup>

# Processing Parameters

## General

|                   |                                     |
|-------------------|-------------------------------------|
| Cameras           | 458                                 |
| Aligned cameras   | 458                                 |
| Markers           | 3                                   |
| Coordinate system | WGS 84 / UTM zone 33N (EPSG::32633) |
| Rotation angles   | Yaw, Pitch, Roll                    |

## Point Cloud

|                                |                         |
|--------------------------------|-------------------------|
| Points                         | 136,089 of 193,365      |
| RMS reprojection error         | 0.204407 (0.791658 pix) |
| Max reprojection error         | 0.651825 (38.8693 pix)  |
| Mean key point size            | 3.46344 pix             |
| Point colors                   | 3 bands, uint8          |
| Key points                     | No                      |
| Average tie point multiplicity | 11.0727                 |

## Alignment parameters

|                               |                      |
|-------------------------------|----------------------|
| Accuracy                      | High                 |
| Generic preselection          | Yes                  |
| Reference preselection        | Source               |
| Key point limit               | 40,000               |
| Tie point limit               | 4,000                |
| Guided image matching         | No                   |
| Adaptive camera model fitting | No                   |
| Matching time                 | 2 minutes 9 seconds  |
| Matching memory usage         | 329.05 MB            |
| Alignment time                | 1 minutes 57 seconds |
| Alignment memory usage        | 180.44 MB            |
| Software version              | 1.6.1.10009          |
| File size                     | 36.40 MB             |

## Depth Maps

|   |                      |
|---|----------------------|
| Count                                   | 458                  |
| <b>Depth maps generation parameters</b> |                      |
| Quality                                 | Low                  |
| Filtering mode                          | Mild                 |
| Processing time                         | 1 minutes 13 seconds |
| Memory usage                            | 380.10 MB            |
| Software version                        | 1.6.1.10009          |
| File size                               | 47.45 MB             |

## Dense Point Cloud

|  |                      |
|--|----------------------|
| Points                                   | 1,781,355            |
| Point colors                             | 3 bands, uint8       |
| <b>Depth maps generation parameters</b>  |                      |
| Quality                                  | Low                  |
| Filtering mode                           | Mild                 |
| Processing time                          | 1 minutes 13 seconds |
| Memory usage                             | 380.10 MB            |
| <b>Dense cloud generation parameters</b> |                      |
| Processing time                          | 7 seconds            |
| Memory usage                             | 817.43 MB            |
| Software version                         | 1.6.1.10009          |
| File size                                | 33.84 MB             |

**Model**

Faces 356,270  
Vertices 179,571  
Vertex colors 3 bands, uint8  
Texture 4,096 x 4,096, 4 bands, uint8

**Depth maps generation parameters**

Quality Low  
Filtering mode Mild  
Processing time 1 minutes 13 seconds  
Memory usage 380.10 MB

**Reconstruction parameters**

Surface type Arbitrary  
Source data Dense cloud  
Interpolation Enabled  
Strict volumetric masks No  
Processing time 1 minutes 36 seconds  
Memory usage 914.62 MB

**Texturing parameters**

Mapping mode Generic  
Blending mode Mosaic  
Texture size 4,096  
Enable hole filling Yes  
Enable ghosting filter Yes  
UV mapping time 1 minutes 3 seconds  
Blending time 14 minutes 1 seconds  
Software version 1.6.1.10009  
File size 45.10 MB

**Tiled Model**

Texture 3 bands, uint8

**Depth maps generation parameters**

Quality Low  
Filtering mode Mild  
Processing time 1 minutes 13 seconds  
Memory usage 380.10 MB

**Reconstruction parameters**

Source data Dense cloud  
Tile size 256  
Face count Medium  
Enable ghosting filter No  
Processing time 4 minutes 14 seconds  
Memory usage 1.66 GB  
Software version 1.7.1.11797  
File size 171.26 MB

**System**

Software name Agisoft Metashape Professional  
Software version 1.7.1 build 11797  
OS Windows 64 bit  
RAM 127.78 GB  
CPU Intel(R) Core(TM) i9-9900K CPU @ 3.60GHz  
GPU(s) GeForce RTX 2080