# Quercus_petraea_6F

**Processing Report**

**07 November 2018**

# Survey Data

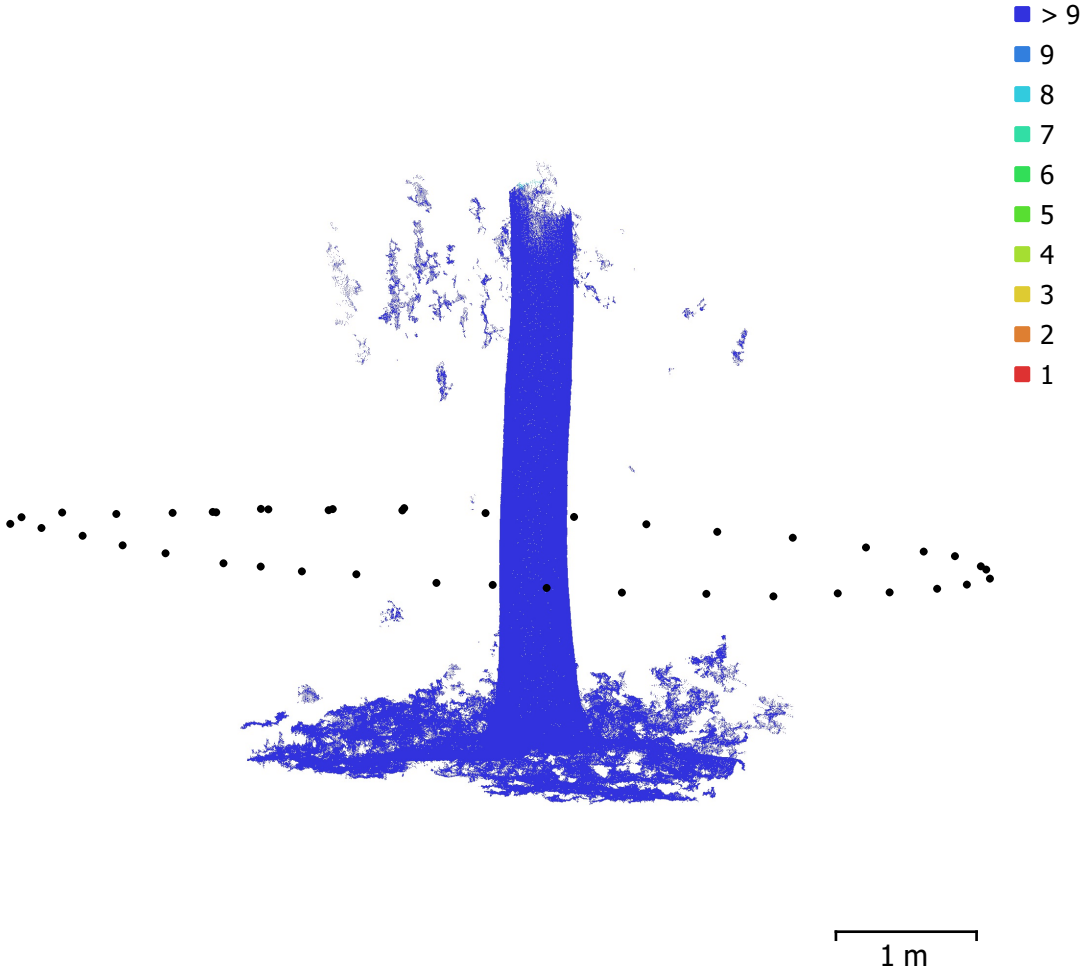


Fig. 1. Camera locations and image overlap.

| | | | |
|---|---|---|---|
| Number of images: | 42 | Camera stations: | 42 |
| Flying altitude: | 3.62 m | Tie points: | 29,751 |
| Ground resolution: | 0.771 mm/pix | Projections: | 82,109 |
| Coverage area: | 3.55 m² | Reprojection error: | 0.335 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|---|---|---|---|---|
| Canon EOS 70D (15 mm) | 5472 x 3648 | 15 mm | 4.17 x 4.17 µm | No |

Table 1. Cameras.

# Camera Calibration

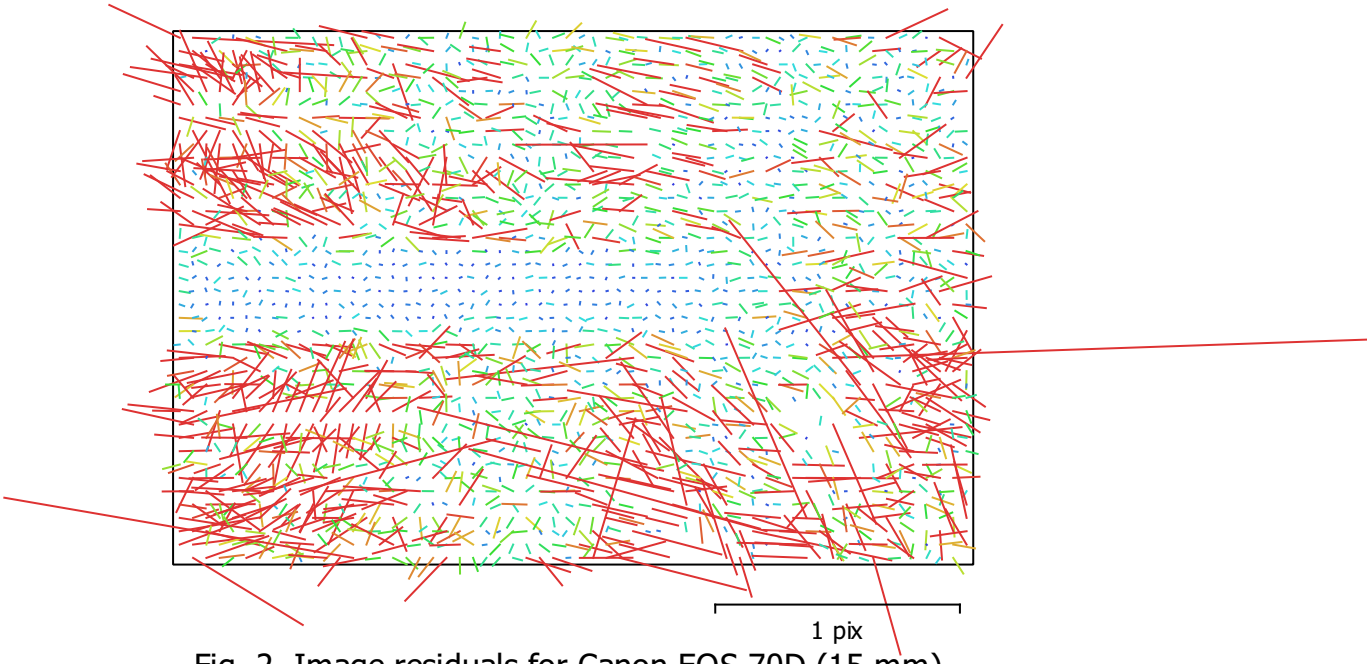


Fig. 2. Image residuals for Canon EOS 70D (15 mm).

**Canon EOS 70D (15 mm)**

42 images

| Type | Resolution | Focal Length | Pixel Size |
|---|---|---|---|
| **Fisheye** | **5472 x 3648** | **15 mm** | **4.17 x 4.17 µm** |

| | Value | Error | F | Cx | Cy | B2 | K1 | P1 | P2 |
|---|---|---|---|---|---|---|---|---|---|
| **F** | **3749.16** | 0.29 | 1.00 | -0.46 | -0.09 | -0.02 | -0.09 | 0.50 | 0.04 |
| **Cx** | **22.164** | 0.48 | | 1.00 | 0.14 | 0.01 | -0.06 | -0.77 | -0.12 |
| **Cy** | **-57.1204** | 0.25 | | | 1.00 | 0.55 | -0.08 | -0.18 | 0.46 |
| **B2** | **0.116171** | 0.073 | | | | 1.00 | -0.00 | -0.08 | 0.43 |
| **K1** | **-0.0342054** | 3.8e-05 | | | | | 1.00 | 0.39 | -0.07 |
| **P1** | **-3.14519e-05** | 3.1e-05 | | | | | | 1.00 | 0.10 |
| **P2** | **-0.000141274** | 9.4e-06 | | | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

# Ground Control Points

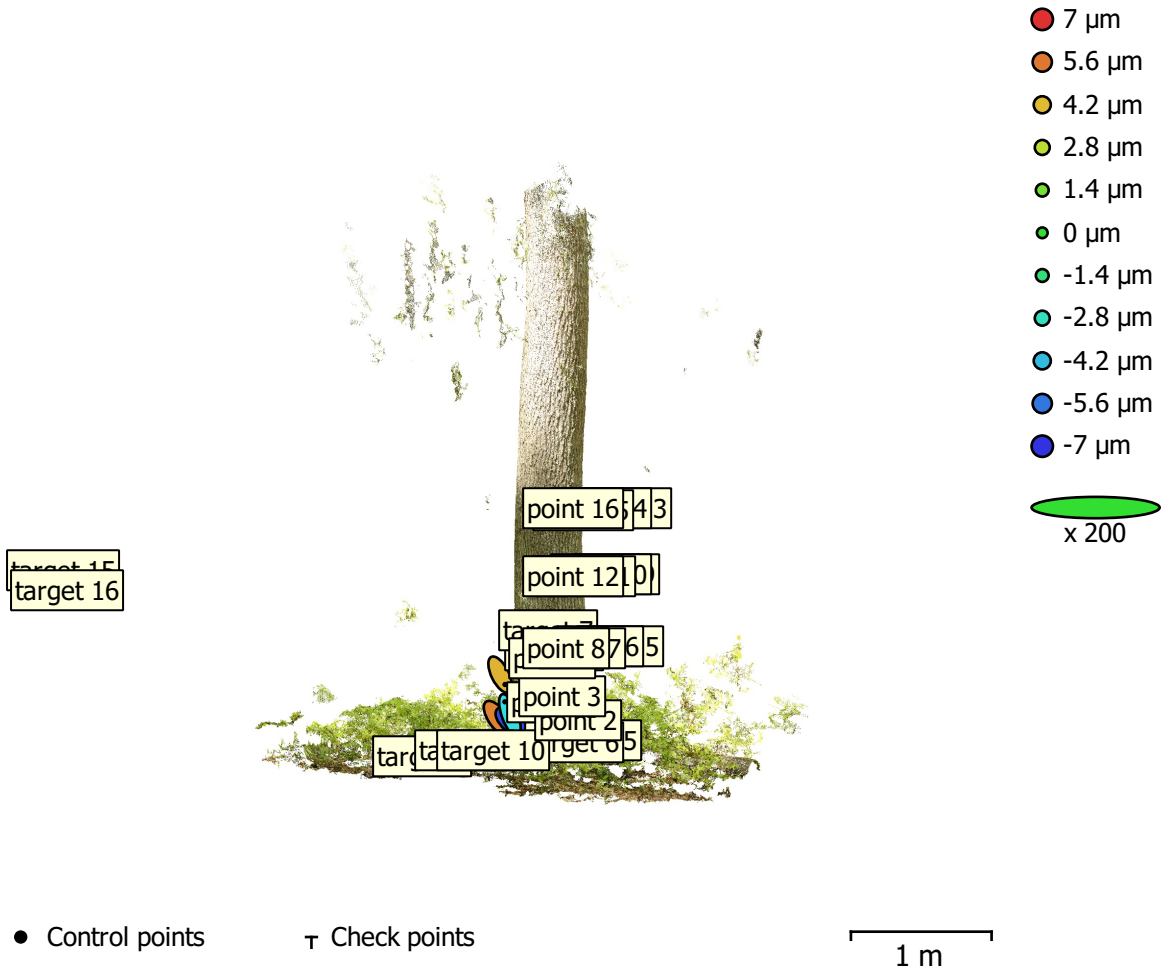


Fig. 3. GCP locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated GCP locations are marked with a dot or crossing.

| Count | X error (mm) | Y error (mm) | Z error (mm) | XY error (mm) | Total (mm) |
|---|---|---|---|---|---|
| 4 | 0.420718 | 0.717274 | 0.0050759 | 0.831556 | 0.831572 |

Table 3. Control points RMSE.

| Label | X error (mm) | Y error (mm) | Z error (mm) | Total (mm) | Image (pix) |
|---|---|---|---|---|---|
| point 1 | 0.481803 | -0.672366 | 0.00537314 | 0.827188 | 0.004 (42) |
| point 2 | -0.474901 | 0.403679 | -0.00652487 | 0.623322 | 0.004 (42) |
| point 3 | -0.357695 | 0.973832 | -0.00350296 | 1.03745 | 0.004 (42) |
| point 4 | 0.349862 | -0.70324 | 0.00439816 | 0.785474 | 0.004 (42) |
| **Total** | **0.420718** | **0.717274** | **0.0050759** | **0.831572** | **0.004** |

Table 4. Control points.

| Label | X error (mm) | Y error (mm) | Z error (mm) | Total (mm) | Image (pix) |
|---|---|---|---|---|---|
| target 2 | | | | | 0.045 (2) |
| target 5 | | | | | 0.244 (9) |
| target 6 | | | | | 0.034 (4) |
| target 8 | | | | | 0.179 (16) |
| target 9 | | | | | 0.209 (8) |
| target 10 | | | | | 0.173 (9) |
| target 15 | | | | | 0.208 (6) |
| target 16 | | | | | 0.174 (6) |
| target 7 | | | | | 0.004 (42) |
| point 5 | | | | | 0.004 (42) |
| point 6 | | | | | 0.004 (42) |
| point 7 | | | | | 0.004 (42) |
| point 8 | | | | | 0.004 (42) |
| point 9 | | | | | 0.004 (42) |
| point 10 | | | | | 0.004 (42) |
| point 11 | | | | | 0.004 (42) |
| point 12 | | | | | 0.004 (42) |
| point 13 | | | | | 0.004 (42) |
| point 14 | | | | | 0.004 (42) |
| point 15 | | | | | 0.004 (42) |
| point 16 | | | | | 0.004 (42) |
| **Total** | | | | | |

Table 5. Check points.

# Scale Bars

| Label | Distance (m) | Error (m) |
|---|---|---|
| target 5_target 6 | 0.147812 | -0.000188314 |
| target 8_target 7 | 0.148606 | 0.000605787 |
| target 9_target 10 | 0.14794 | -6.01721e-05 |
| target 15_target 16 | 0.14763 | -0.000370014 |
| **Total** | | **0.000368433** |

Table 6. Control scale bars.

| Label | Distance (m) | Error (m) |
|---|---|---|
| point 1_point 2 | 0.0881179 | |
| point 1_point 3 | 0.188916 | |
| point 1_point 4 | 0.311897 | |
| **Total** | | |

Table 7. Check scale bars.

# Digital Elevation Model

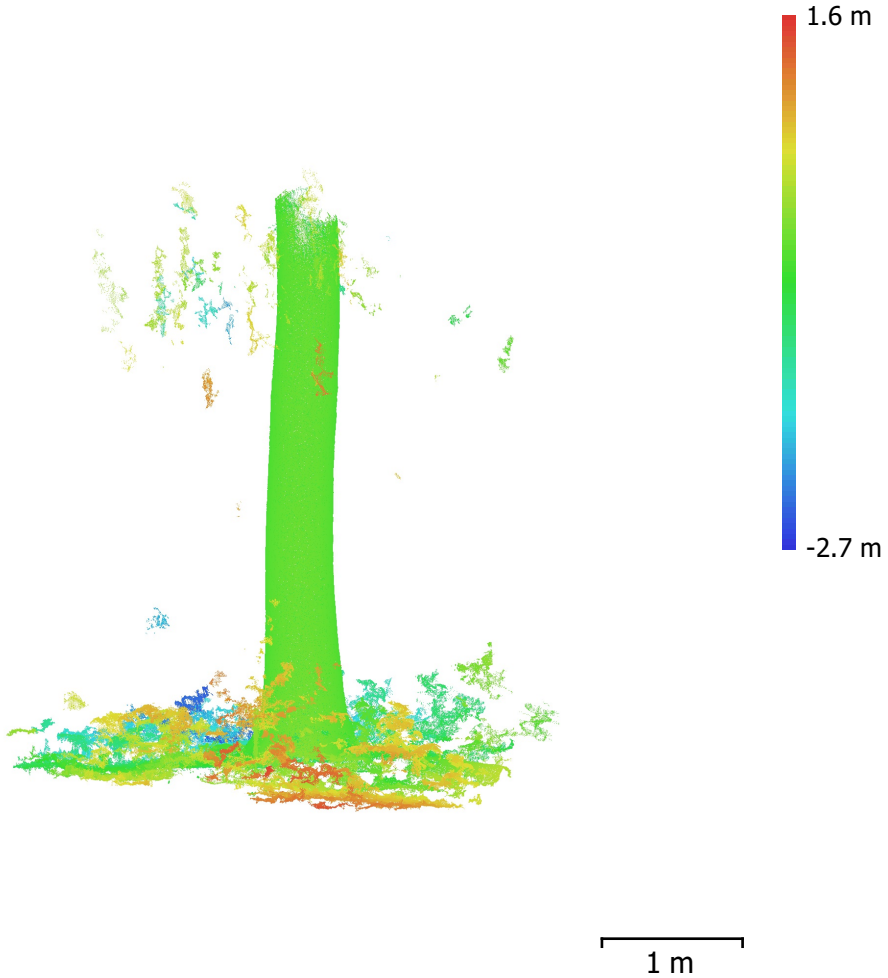


Fig. 4. Reconstructed digital elevation model.

| | |
|---|---|
| Resolution: | unknown |
| Point density: | unknown |

# Processing Parameters

| | |
|---|---|
| **General** | |
| Cameras | 42 |
| Aligned cameras | 42 |
| Markers | 26 |
| Scale bars | 7 |
| Coordinate system | Local Coordinates (m) |
| Rotation angles | Yaw, Pitch, Roll |
| **Point Cloud** | |
| Points | 29,751 of 36,649 |
| RMS reprojection error | 0.0955897 (0.334927 pix) |
| Max reprojection error | 0.291398 (9.91517 pix) |
| Mean key point size | 3.13864 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.79456 |
| **Alignment parameters** | |
| Accuracy | High |
| Generic preselection | Yes |
| Key point limit | 40,000 |
| Tie point limit | 4,000 |
| Adaptive camera model fitting | Yes |
| Matching time | 5 minutes 59 seconds |
| Alignment time | 15 seconds |
| **Depth Maps** | |
| Count | 42 |
| **Reconstruction parameters** | |
| Quality | Medium |
| Filtering mode | Aggressive |
| Processing time | 19 minutes 15 seconds |
| **Dense Point Cloud** | |
| Points | 1,586,325 |
| Point colors | 3 bands, uint8 |
| **Reconstruction parameters** | |
| Quality | Medium |
| Depth filtering | Aggressive |
| Depth maps generation time | 19 minutes 15 seconds |
| Dense cloud generation time | 3 minutes 37 seconds |
| **Software** | |
| Version | 1.4.4 build 6848 |
| Platform | Windows 64 |