

Castillo de Orgiva

Report
25 March 2020



Survey Data

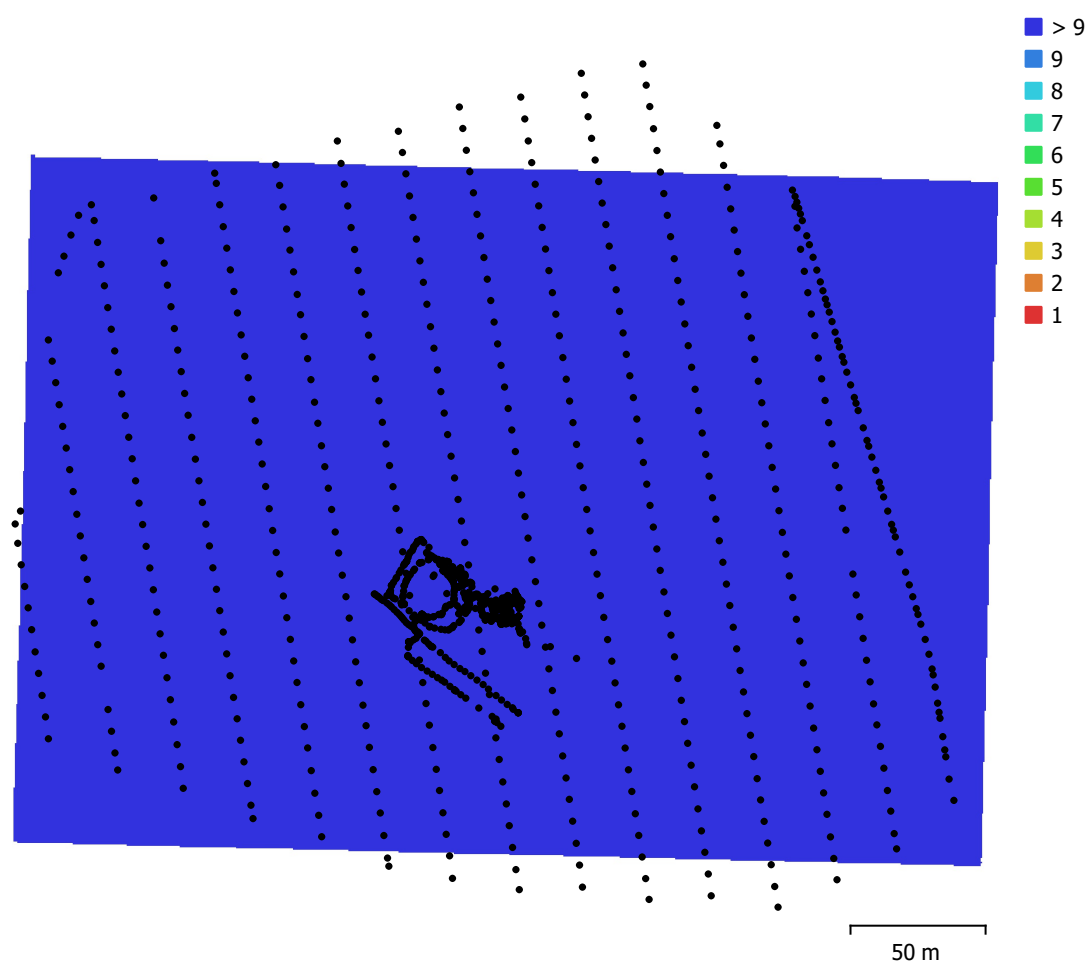


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|------------------------|---------------------|-----------|
| Number of images: | 1,120 | Camera stations: | 1,119 |
| Flying altitude: | 57.4 m | Tie points: | 1,244,513 |
| Ground resolution: | 1.42 cm/pix | Projections: | 6,214,654 |
| Coverage area: | 0.0908 km ² | Reprojection error: | 1.16 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|----------------|---------------|
| FC6310 (8.8 mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μm | No |

Table 1. Cameras.

Camera Calibration

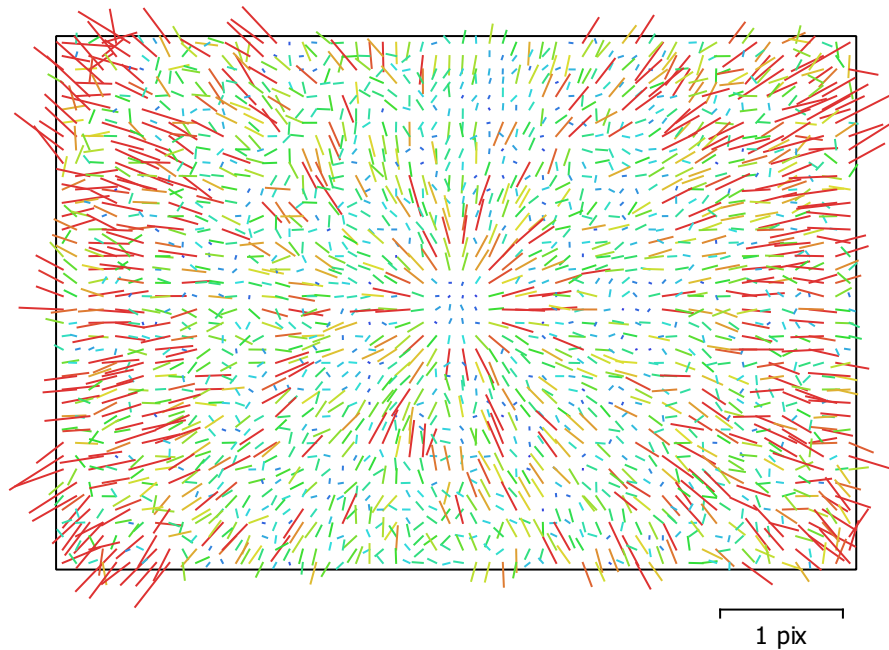


Fig. 2. Image residuals for FC6310 (8.8 mm).

FC6310 (8.8 mm)

1120 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | F | Cx | Cy | B1 | B2 | K1 | K2 | K3 | K4 | P1 | P2 |
|-----------|--------------------|---------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| F | 3670.65 | 0.015 | 1.00 | 0.01 | -0.10 | -0.55 | -0.01 | -0.42 | 0.39 | -0.36 | 0.32 | 0.01 | -0.08 |
| Cx | 27.5166 | 0.011 | | 1.00 | 0.01 | 0.00 | 0.00 | -0.00 | 0.01 | -0.01 | 0.02 | 0.91 | -0.00 |
| Cy | -15.1735 | 0.0082 | | | 1.00 | -0.01 | -0.01 | -0.02 | 0.01 | -0.01 | 0.01 | 0.01 | 0.76 |
| B1 | 0.13472 | 0.0076 | | | | 1.00 | -0.01 | 0.02 | -0.02 | 0.02 | -0.02 | 0.01 | 0.07 |
| B2 | 0.126087 | 0.0073 | | | | | 1.00 | -0.01 | 0.01 | -0.01 | 0.01 | -0.11 | 0.00 |
| K1 | 0.0133907 | 2.7e-05 | | | | | | 1.00 | -0.97 | 0.92 | -0.87 | 0.00 | -0.02 |
| K2 | -0.0548328 | 0.00013 | | | | | | | 1.00 | -0.99 | 0.96 | 0.01 | 0.01 |
| K3 | 0.101582 | 0.00024 | | | | | | | | 1.00 | -0.99 | -0.01 | -0.01 |
| K4 | -0.0620866 | 0.00016 | | | | | | | | | 1.00 | 0.01 | 0.01 |
| P1 | 0.0023728 | 1.1e-06 | | | | | | | | | | 1.00 | -0.01 |
| P2 | -0.00209775 | 7.6e-07 | | | | | | | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

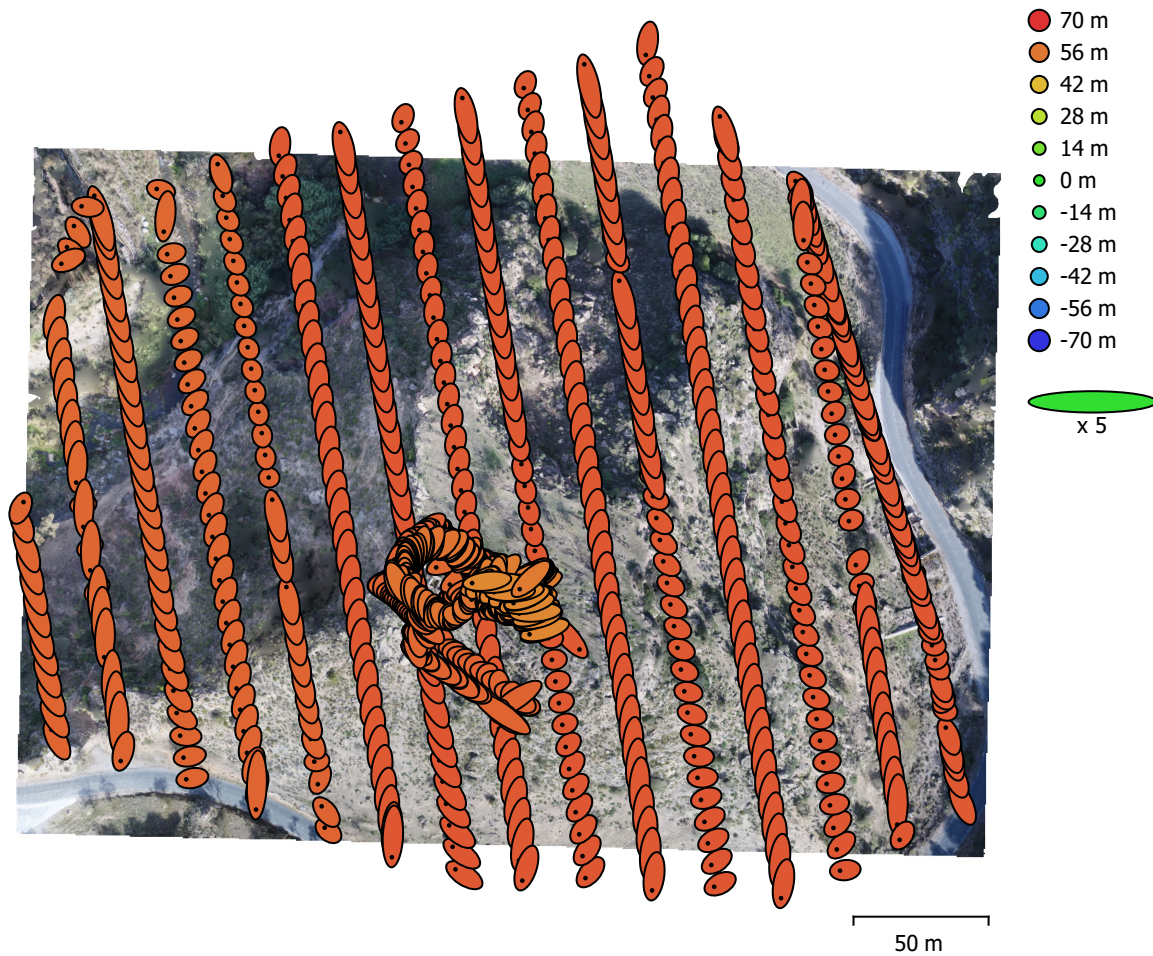


Fig. 3. Camera locations and error estimates.

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) |
|-------------|-------------|-------------|--------------|-----------------|
| 0.932663 | 1.26989 | 59.3941 | 1.57559 | 59.415 |

Table 3. Average camera location error.

Ground Control Points

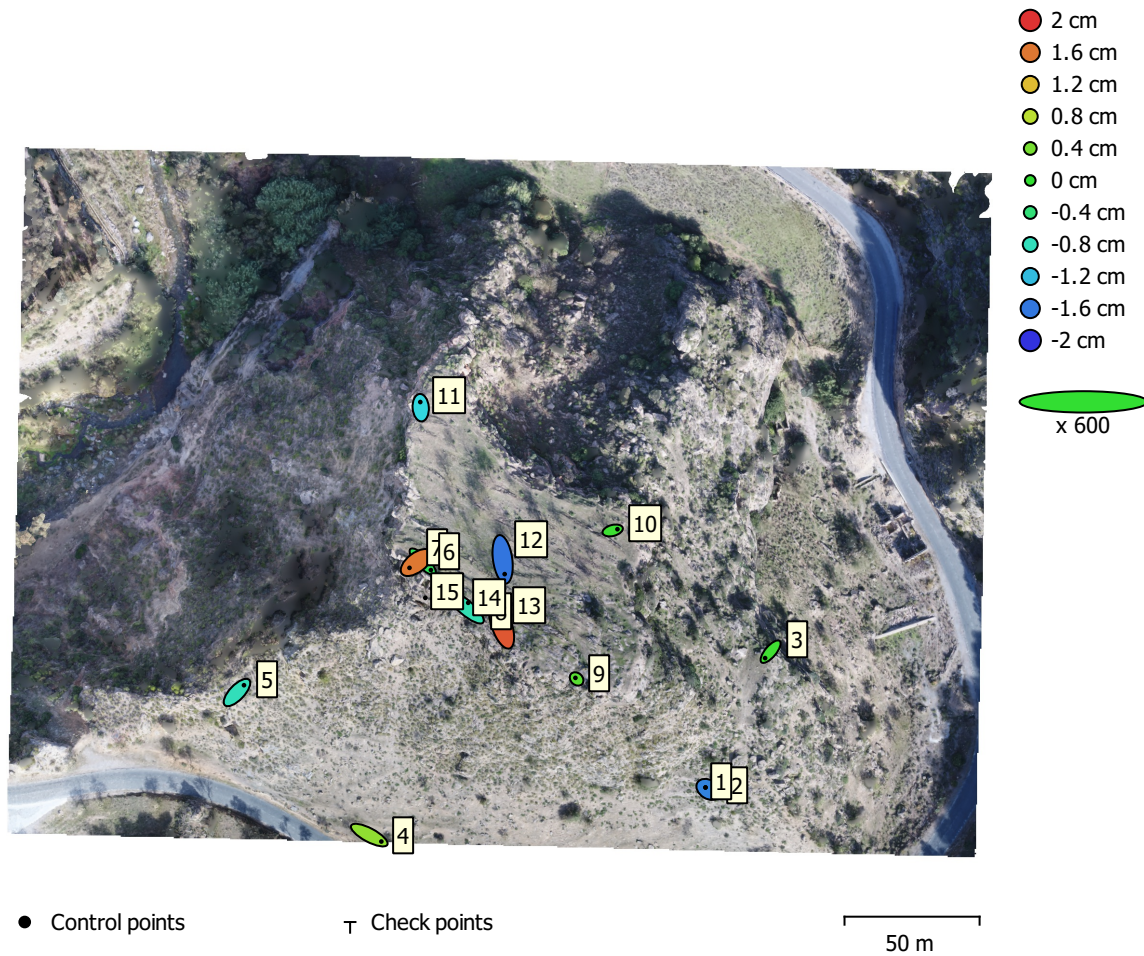


Fig. 4. GCP locations and error estimates.

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 (cm) | Y error (cm) | Z error (cm) | XY error (cm) | Total (cm) |
|-------|--------------|--------------|--------------|---------------|------------|
| 12 | 0.830038 | 0.99916 | 1.05467 | 1.29895 | 1.6732 |

Table 4. Control points RMSE.

| Label | X error (cm) | Y error (cm) | Z error (cm) | Total (cm) | Image (pix) |
|--------------|---------------------|---------------------|---------------------|-------------------|--------------------|
| 2 | -0.393787 | 0.237516 | -1.52773 | 1.59545 | 0.149 (61) |
| 3 | -0.676551 | -0.794968 | 0.0808181 | 1.04701 | 0.140 (59) |
| 5 | 0.864034 | 0.901494 | -0.789456 | 1.47732 | 0.126 (33) |
| 10 | 0.586531 | 0.152421 | 0.0640803 | 0.609391 | 0.121 (31) |
| 12 | 0.254683 | -1.81605 | -1.6126 | 2.442 | 0.213 (28) |
| 11 | -0.0535571 | 0.693679 | -1.04144 | 1.25246 | 0.100 (29) |
| 7 | 1.01063 | -1.02672 | -0.250869 | 1.46235 | 0.256 (28) |
| 13 | -0.58399 | 1.71918 | 1.78641 | 2.54713 | 0.171 (23) |
| 4 | 1.48984 | -0.792306 | 0.547556 | 1.77403 | 0.105 (37) |
| 9 | -0.145936 | 0.131768 | 0.224653 | 0.298545 | 0.073 (12) |
| 6 | -0.870403 | -0.659114 | 1.59604 | 1.93375 | 0.256 (24) |
| 8 | -1.46134 | 1.25978 | -0.736985 | 2.06536 | 0.213 (28) |
| 1 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| Total | 0.830038 | 0.99916 | 1.05467 | 1.6732 | 0.166 |

Table 5. Control points.

Digital Elevation Model

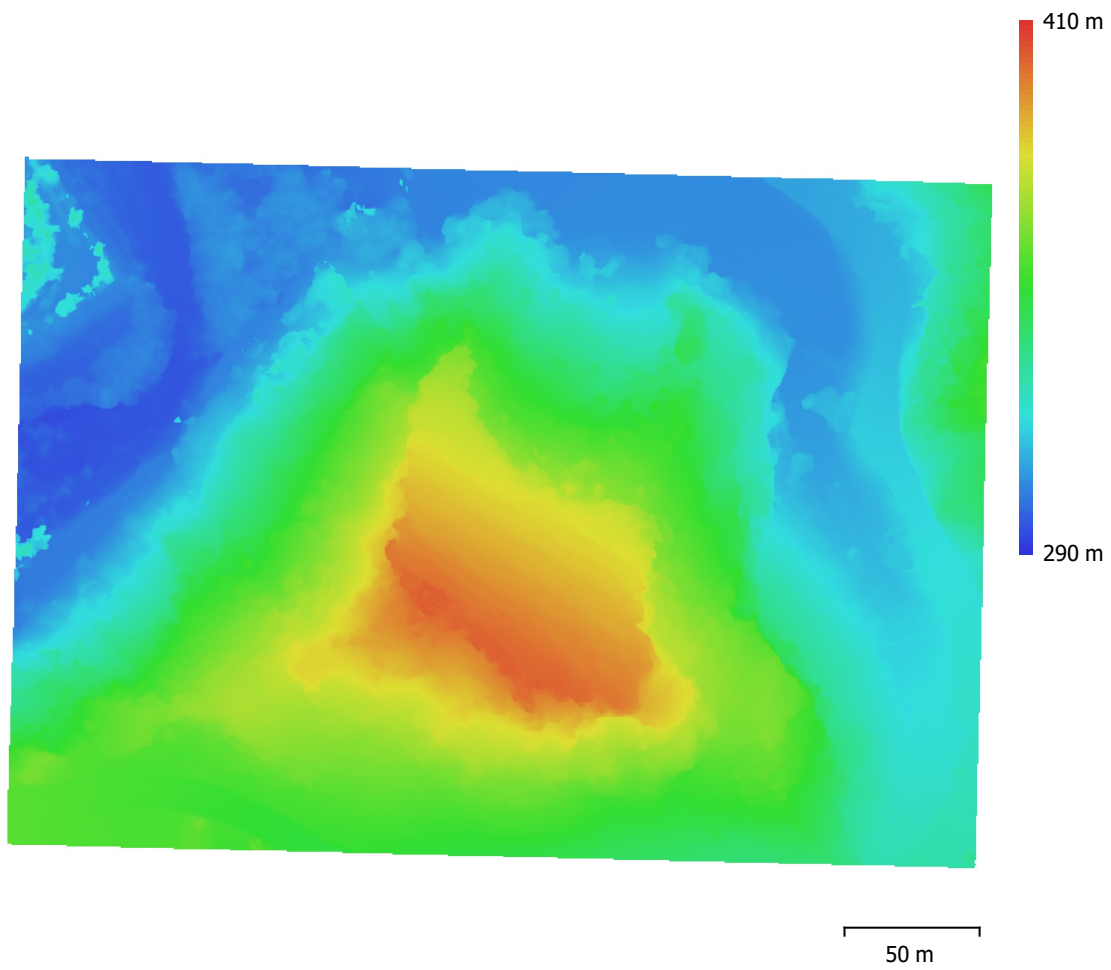


Fig. 5. Reconstructed digital elevation model.

Resolution: 50 cm/pix
Point density: 4 points/m²

Processing Parameters

General

| | |
|-----------------|------|
| Cameras | 1120 |
| Aligned cameras | 1119 |
| Markers | 15 |

Shapes

| | |
|-------------------|-----------------------|
| Polylines | 495 |
| Polygons | 14302 |
| Coordinate system | Local Coordinates (m) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|------------------------|
| Points | 1,244,513 of 1,572,607 |
| RMS reprojection error | 0.120973 (1.15776 pix) |
| Max reprojection error | 0.860443 (52.7492 pix) |
| Mean key point size | 7.72824 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 7.15404 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Yes |
| Key point limit | 40,000 |
| Tie point limit | 10,000 |
| Adaptive camera model fitting | Yes |
| Matching time | 1 hours 54 minutes |
| Alignment time | 44 minutes 0 seconds |

Optimization parameters

| | |
|-------------------|----------------------------------|
| Parameters | f, b1, b2, cx, cy, k1-k4, p1, p2 |
| Optimization time | 1 minutes 1 seconds |

Depth Maps

| | |
|-------|------|
| Count | 1119 |
|-------|------|

Depth maps generation parameters

| | |
|-----------------|----------------|
| Quality | Medium |
| Filtering mode | Aggressive |
| Processing time | 1 days 5 hours |

Dense Point Cloud

| | |
|--------------|----------------|
| Points | 52,522,795 |
| Point colors | 3 bands, uint8 |

Depth maps generation parameters

| | |
|-----------------|----------------|
| Quality | Medium |
| Filtering mode | Aggressive |
| Processing time | 1 days 5 hours |

Dense cloud generation parameters

| | |
|-----------------|-----------------|
| Processing time | 2 days 11 hours |
|-----------------|-----------------|

Model

| | |
|---------------|----------------|
| Faces | 3,501,425 |
| Vertices | 1,755,132 |
| Vertex colors | 3 bands, uint8 |

Depth maps generation parameters

| | |
|---------|--------|
| Quality | Medium |
|---------|--------|

| | |
|----------------------------------|--|
| Filtering mode | Aggressive |
| Processing time | 1 days 5 hours |
| Reconstruction parameters | |
| Surface type | Arbitrary |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Strict volumetric masks | No |
| Processing time | 45 minutes 17 seconds |
| Software version | 1.6.2.10247 |
| DEM | |
| Size | 733 x 528 |
| Coordinate system | Local Coordinates (m) |
| Reconstruction parameters | |
| Source data | Mesh |
| Interpolation | Enabled |
| Processing time | 11 seconds |
| Software version | 1.6.2.10247 |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.2 build 10247 |
| OS | Windows 64 bit |
| RAM | 15.98 GB |
| CPU | Intel(R) Core(TM) i7-2600K CPU @ 3.40GHz |
| GPU(s) | GeForce GTX 1050 Ti |