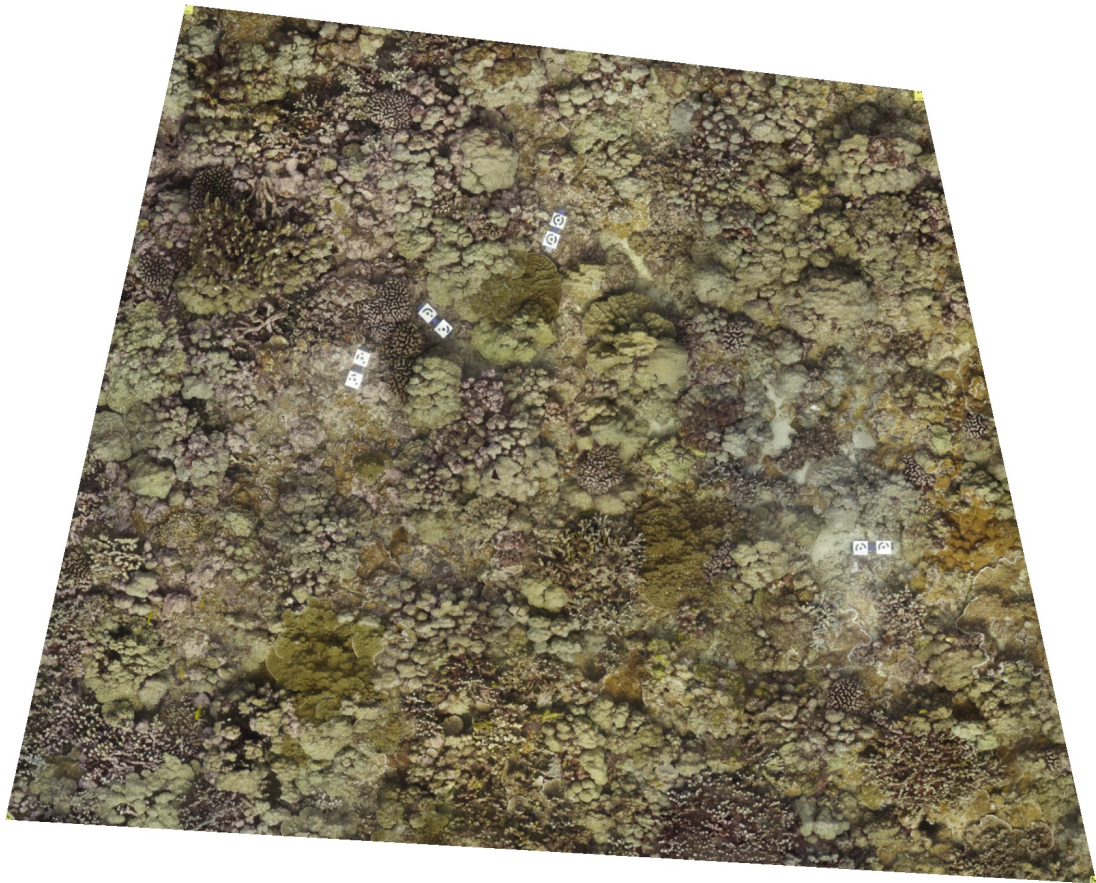


Deep Horseshoe West Permanent 2024_01_13

Processing report for Deep Horseshoe West Permanent on chunk 2024_01_13
16 January 2025



Survey Data

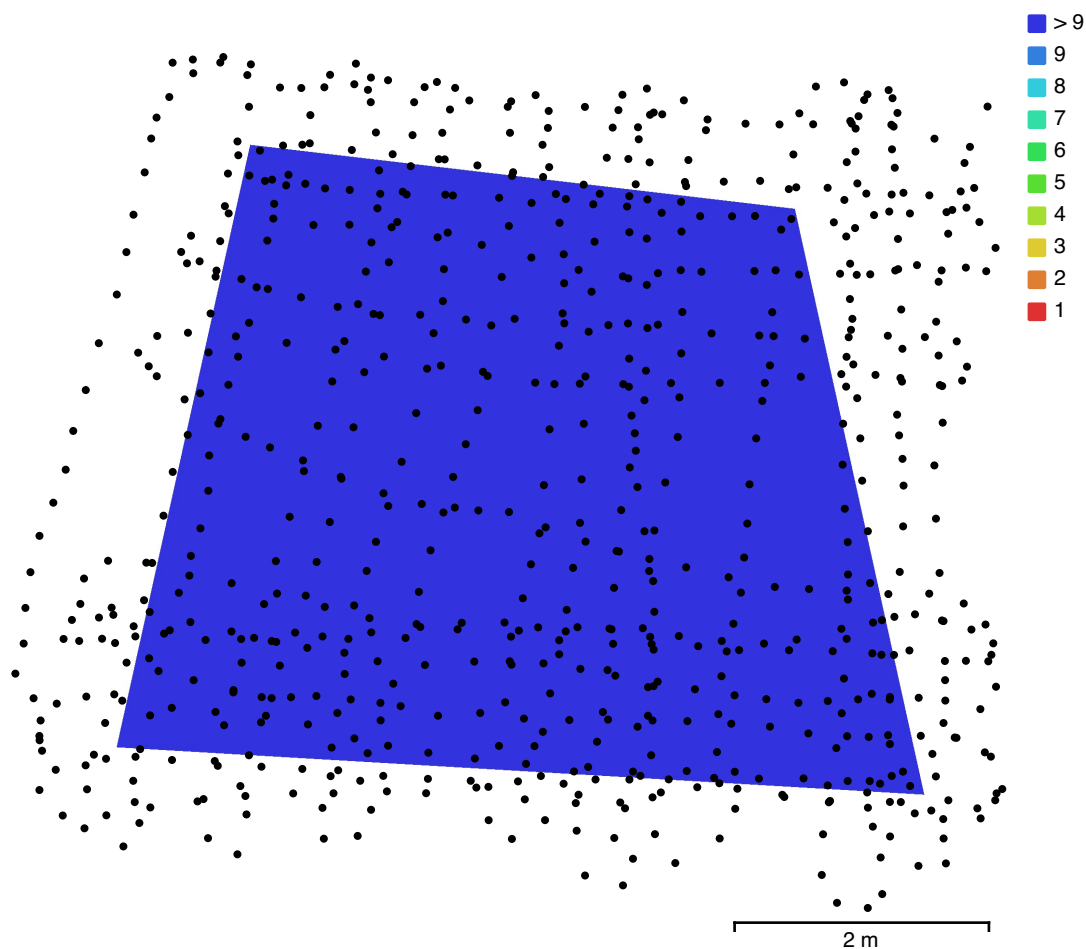


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|---------------------|---------------------|-----------|
| Number of images: | 732 | Camera stations: | 732 |
| Flying altitude: | 1.35 m | Tie points: | 305,850 |
| Ground resolution: | 0.423 mm/pix | Projections: | 1,952,433 |
| Coverage area: | 24.8 m ² | Reprojection error: | 6.83 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|------------------------------|-------------|--------------|------------|---------------|
| ILCE-6400, SAMYANG AF 12m... | 6000 x 4000 | 12 mm | 4 x 4 µm | No |

Table 1. Cameras.

Camera Calibration

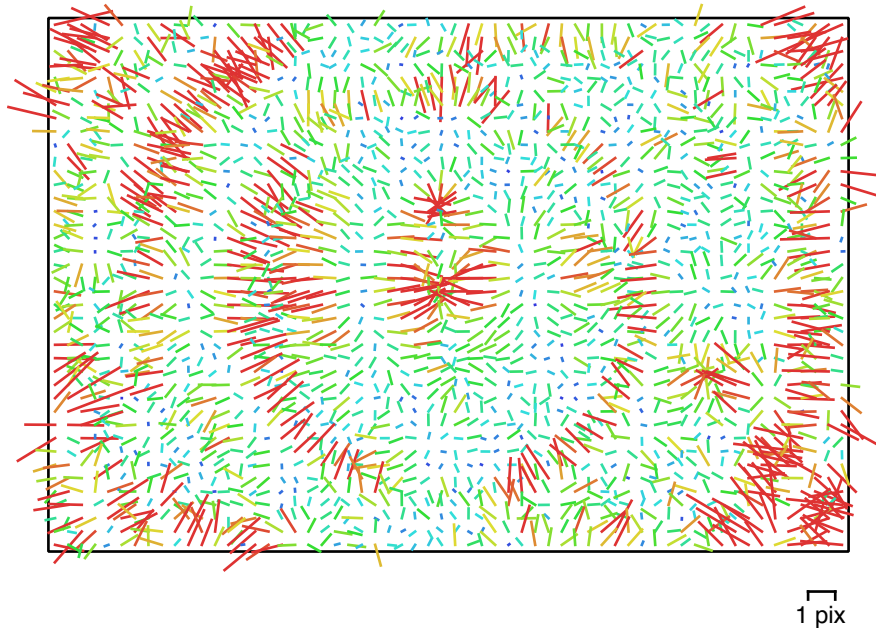


Fig. 2. Image residuals for ILCE-6400, SAMYANG AF 12mm F2.0 (12mm).

ILCE-6400, SAMYANG AF 12mm F2.0 (12mm)

732 images, additional corrections

| Type | Resolution | Focal Length | Pixel Size |
|-------|-------------|--------------|---------------------|
| Frame | 6000 x 4000 | 12 mm | 4 x 4 μm |

| | Value | Error | F | Cx | Cy | B1 | B2 | K1 | K2 | K3 | K4 | P1 | P2 |
|----|-------------|---------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| F | 3195.49 | 1.3 | 1.00 | -0.01 | -0.03 | -0.42 | 0.01 | -0.98 | 0.96 | -0.93 | 0.89 | 0.01 | -0.01 |
| Cx | 2.80604 | 0.29 | | 1.00 | 0.02 | -0.07 | 0.05 | -0.01 | 0.01 | -0.01 | 0.01 | 0.95 | 0.01 |
| Cy | -2.34863 | 0.33 | | | 1.00 | -0.01 | -0.13 | 0.01 | -0.01 | 0.01 | -0.01 | 0.01 | 0.97 |
| B1 | -14.7867 | 0.081 | | | | 1.00 | -0.01 | 0.44 | -0.45 | 0.43 | -0.39 | -0.08 | -0.01 |
| B2 | 1.01689 | 0.041 | | | | | 1.00 | -0.01 | 0.01 | -0.01 | 0.01 | 0.03 | -0.14 |
| K1 | -0.102672 | 0.0019 | | | | | | 1.00 | -0.99 | 0.97 | -0.94 | -0.02 | 0.01 |
| K2 | 0.111602 | 0.0033 | | | | | | | 1.00 | -0.99 | 0.97 | 0.02 | -0.01 |
| K3 | -0.0735671 | 0.0025 | | | | | | | | 1.00 | -0.99 | -0.02 | 0.01 |
| K4 | 0.0174466 | 0.00069 | | | | | | | | | 1.00 | 0.02 | -0.01 |
| P1 | -0.00118107 | 4.4e-05 | | | | | | | | | | 1.00 | 0.01 |
| P2 | 0.000342387 | 5.2e-05 | | | | | | | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Ground Control Points

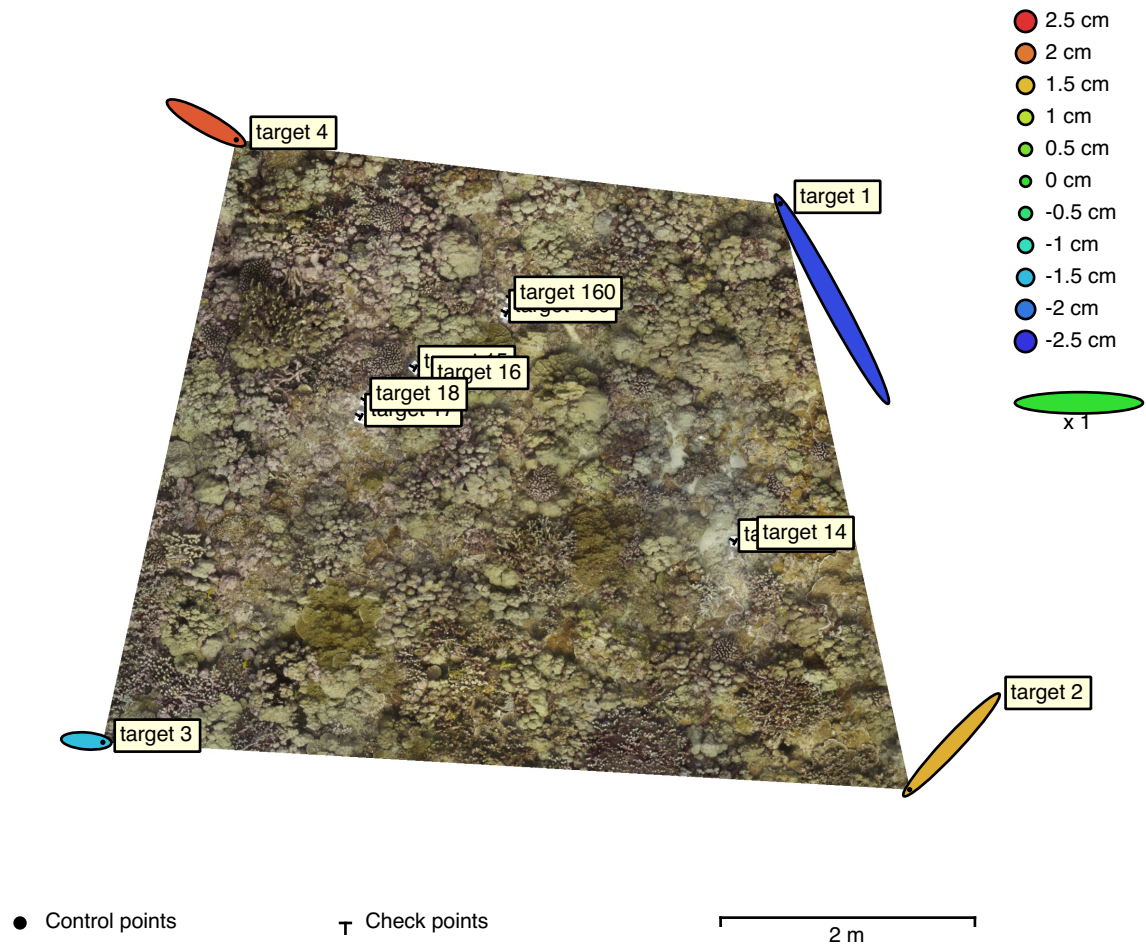


Fig. 3. GCP locations and error estimates.
 Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
 Estimated GCP locations are marked with a dot or crossing.

| Count | X error (m) | Y error (m) | Z error (m) | XY error (m) | Total (m) |
|-------|-------------|-------------|-------------|--------------|-----------|
| 4 | 0.587963 | 0.839392 | 0.0194459 | 1.02483 | 1.02502 |

Table 3. Control points RMSE.
 X - Longitude, Y - Latitude, Z - Altitude.

| Label | X error (m) | Y error (m) | Z error (m) | Total (m) | Image (pix) |
|--------------|--------------------|--------------------|--------------------|------------------|--------------------|
| target 1 | -0.810102 | 1.50069 | -0.0234014 | 1.70555 | 6.453 (61) |
| target 2 | -0.658336 | -0.703626 | 0.0159857 | 0.963718 | 7.718 (16) |
| target 3 | 0.261014 | -0.0211431 | -0.0147566 | 0.262285 | 8.831 (44) |
| target 4 | 0.474342 | -0.265883 | 0.022173 | 0.544229 | 8.052 (51) |
| Total | 0.587963 | 0.839392 | 0.0194459 | 1.02502 | 7.713 |

Table 4. Control points.
X - Longitude, Y - Latitude, Z - Altitude.

| Label | X error (m) | Y error (m) | Z error (m) | Total (m) | Image (pix) |
|--------------|--------------------|--------------------|--------------------|------------------|--------------------|
| target 13 | | | | | 3.584 (60) |
| target 14 | | | | | 3.682 (58) |
| target 15 | | | | | 4.634 (40) |
| target 16 | | | | | 4.594 (48) |
| target 17 | | | | | 5.330 (41) |
| target 18 | | | | | 6.209 (35) |
| target 159 | | | | | 3.241 (17) |
| target 160 | | | | | 5.208 (54) |
| Total | | | | | |

Table 5. Check points.
X - Longitude, Y - Latitude, Z - Altitude.

Scale Bars

| Label | Distance (m) | Error (m) |
|-----------------------|--------------|--------------------|
| target 13_target 14 | 0.134202 | 0.00020209 |
| target 15_target 16 | 0.130209 | -0.000791226 |
| target 17_target 18 | 0.131928 | -7.18092e-05 |
| target 159_target 160 | 0.118595 | 0.000594918 |
| Total | | 0.000506449 |

Table 6. Control scale bars.

Digital Elevation Model

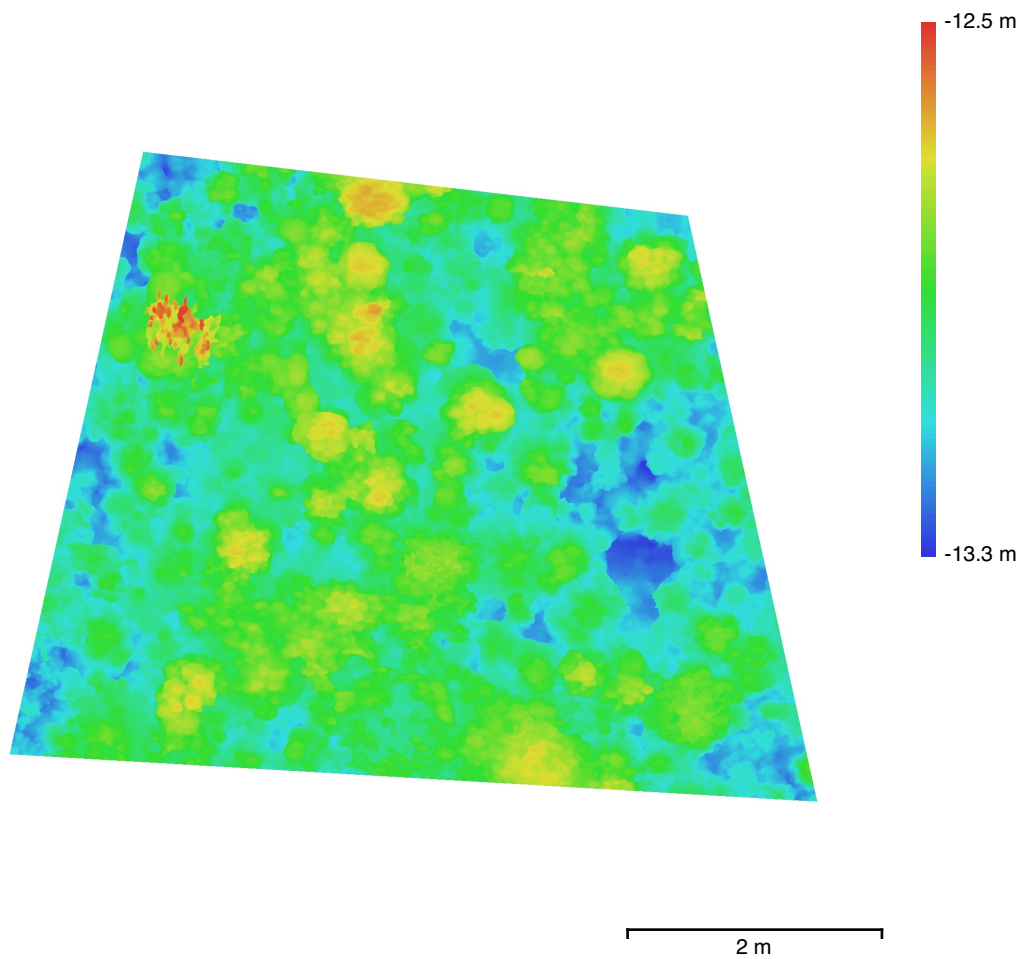


Fig. 4. Reconstructed digital elevation model.

Resolution: 3.63 mm/pix
Point density: 7.61 points/cm²

Processing Parameters

General

| | |
|-------------------|------------------------------------|
| Cameras | 732 |
| Aligned cameras | 732 |
| Markers | 12 |
| Scale bars | 4 |
| Shapes | |
| Polygon | 1 |
| Coordinate system | WGS 84 + EGM96 height (EPSG::9707) |
| Rotation angles | Yaw, Pitch, Roll |

Tie Points

| | |
|--------------------------------|-----------------------|
| Points | 305,850 of 440,807 |
| RMS reprojection error | 1.25008 (6.83281 pix) |
| Max reprojection error | 8.82626 (89.8961 pix) |
| Mean key point size | 6.10725 pix |
| Point colors | 3 bands, uint8 |
| Key points | 2.35 GB |
| Average tie point multiplicity | 7.59657 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | High |
| Generic preselection | Yes |
| Reference preselection | Source |
| Key point limit | 40,000 |
| Key point limit per Mpx | 300 |
| Tie point limit | 4,000 |
| Exclude stationary tie points | Yes |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 9 minutes 4 seconds |
| Matching memory usage | 2.25 GB |
| Alignment time | 4 minutes 38 seconds |
| Alignment memory usage | 1.72 GB |

Optimization parameters

| | |
|-------------------------------|----------------------------------|
| Parameters | f, b1, b2, cx, cy, k1-k4, p1, p2 |
| Fit additional corrections | Yes |
| Adaptive camera model fitting | No |
| Optimization time | 41 seconds |
| Date created | 2025:01:17 00:10:34 |
| Software version | 2.0.3.16960 |
| File size | 84.91 MB |

Depth Maps

| | |
|-------|-----|
| Count | 732 |
|-------|-----|

Depth maps generation parameters

| | |
|------------------|-----------------------|
| Quality | Medium |
| Filtering mode | Mild |
| Max neighbors | 16 |
| Processing time | 17 minutes 38 seconds |
| Memory usage | 430.05 MB |
| Date created | 2025:01:17 00:45:29 |
| Software version | 2.0.3.16960 |
| File size | 1.10 GB |

Model

| | |
|---|------------------------------------|
| Faces | 8,058,647 |
| Vertices | 4,031,382 |
| Vertex colors | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | Medium |
| Filtering mode | Mild |
| Max neighbors | 16 |
| Processing time | 17 minutes 38 seconds |
| Memory usage | 430.05 MB |
| Reconstruction parameters | |
| Surface type | Arbitrary |
| Source data | Depth maps |
| Interpolation | Enabled |
| Strict volumetric masks | No |
| Processing time | 8 minutes 11 seconds |
| Memory usage | 6.46 GB |
| Date created | 2025:01:17 00:53:28 |
| Software version | 2.0.3.16960 |
| File size | 184.48 MB |
| DEM | |
| Size | 3,528 x 3,219 |
| Coordinate system | WGS 84 + EGM96 height (EPSG::9707) |
| Reconstruction parameters | |
| Source data | Mesh |
| Interpolation | Disabled |
| Processing time | 7 seconds |
| Memory usage | 92.64 MB |
| Date created | 2025:01:17 01:59:08 |
| Software version | 2.0.3.16960 |
| File size | 35.37 MB |
| Orthomosaic | |
| Size | 25,579 x 23,336 |
| Coordinate system | WGS 84 + EGM96 height (EPSG::9707) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | Mesh |
| Enable hole filling | Yes |
| Enable ghosting filter | No |
| Processing time | 27 minutes 4 seconds |
| Memory usage | 3.85 GB |
| Date created | 2025:01:17 01:51:55 |
| Software version | 2.0.3.16960 |
| File size | 16.50 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 2.0.3 build 16960 |
| OS | Mac OS 64 bit |
| RAM | 64.00 GB |
| CPU | |
| GPU(s) | Apple M2 Ultra |