

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-81)

Código de estudio: ITE-2022-057

16 September 2022



Survey Data

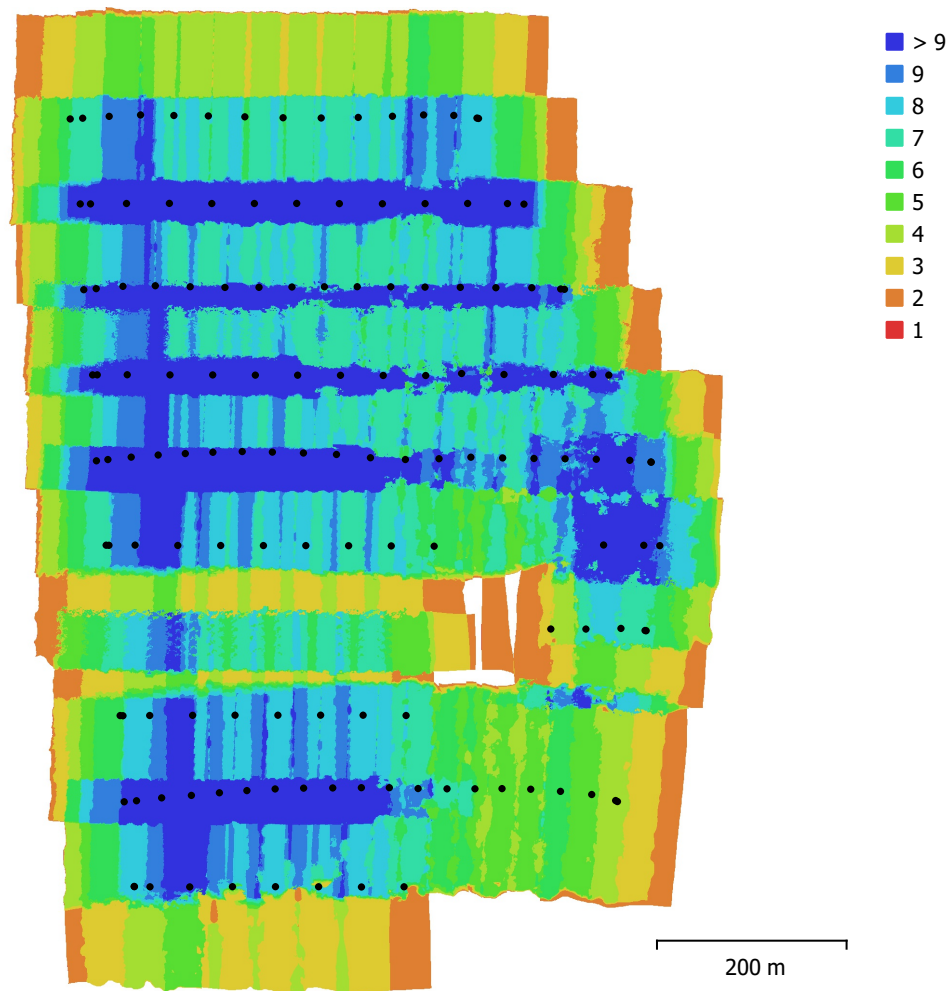


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|-----------------------|---------------------|-----------|
| Number of images: | 167 | Camera stations: | 137 |
| Flying altitude: | 167 m | Tie points: | 104,046 |
| Ground resolution: | 4.04 cm/pix | Projections: | 231,701 |
| Coverage area: | 0.655 km ² | Reprojection error: | 0.675 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

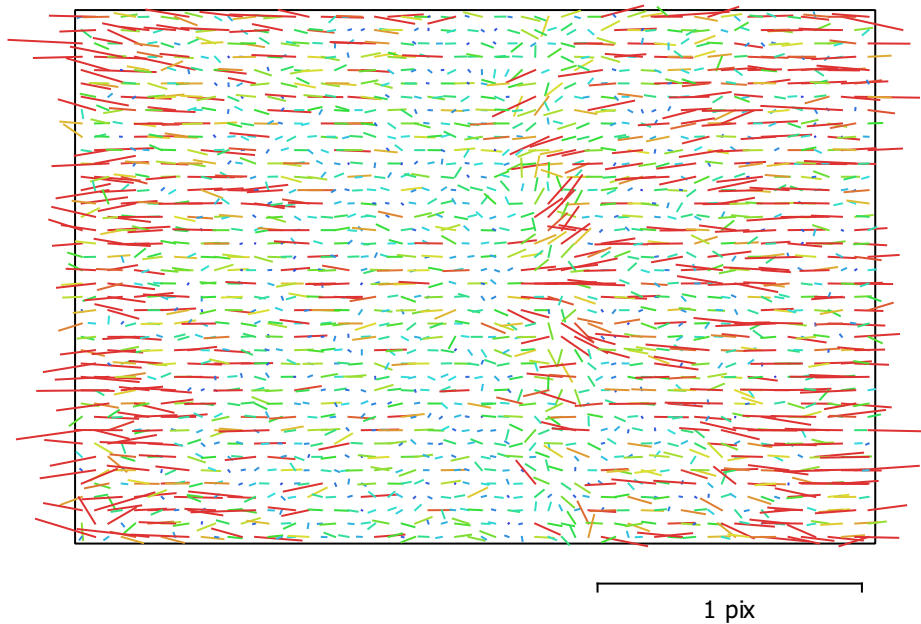


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

167 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | K1 | K2 | P1 | P2 |
|-----------|--------------------|---------|------|------|------|-------|
| F | 3648 | | | | | |
| K1 | -0.00981098 | 0.00071 | 1.00 | 0.08 | 0.13 | -0.03 |
| K2 | 0.00959577 | 8.5e-05 | | 1.00 | 0.37 | 0.02 |
| P1 | -0.00037824 | 2.3e-05 | | | 1.00 | 0.07 |
| P2 | -0.00253628 | 4.2e-05 | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

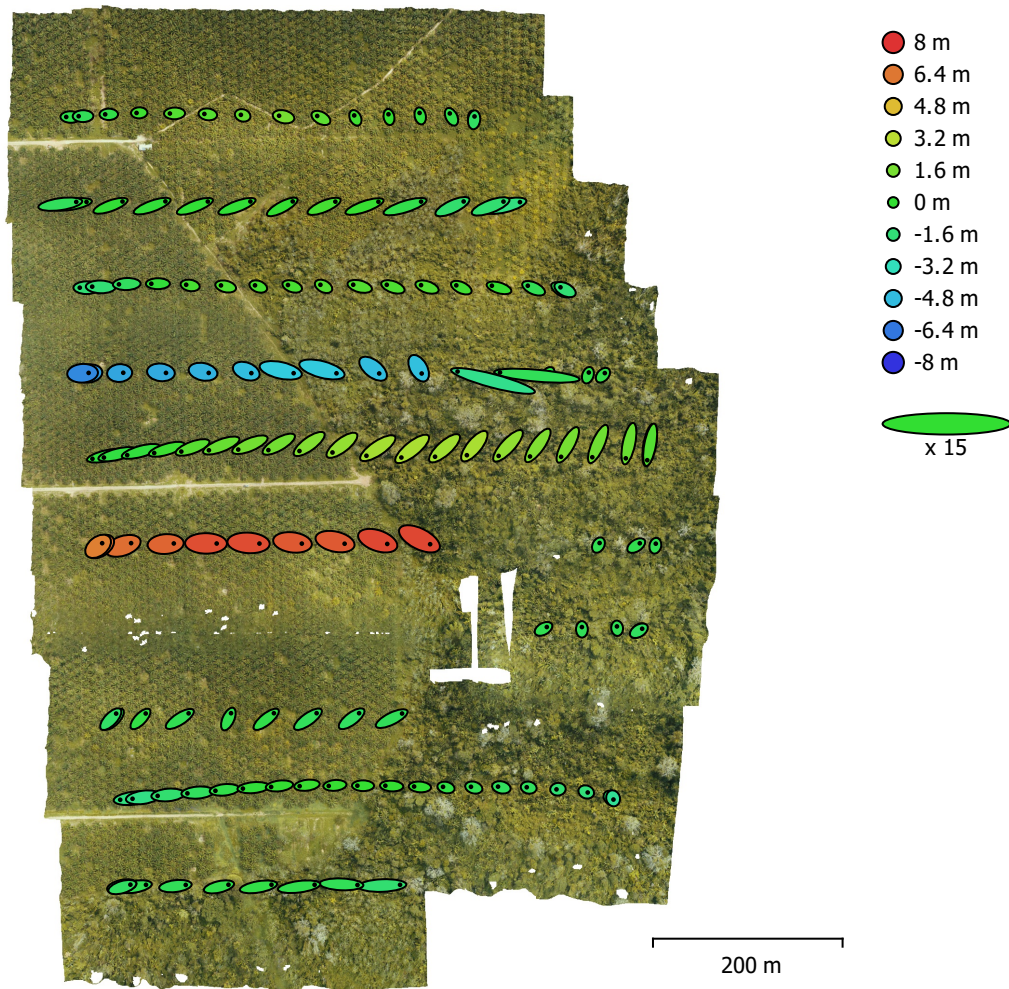


Fig. 3. Camera locations and error estimates.

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 (m) | Y error (m) | Z error (m) | XY error (m) | Total error (m) |
|-------------|-------------|-------------|--------------|-----------------|
| 1.32132 | 0.630934 | 2.55194 | 1.46423 | 2.94217 |

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

Digital Elevation Model

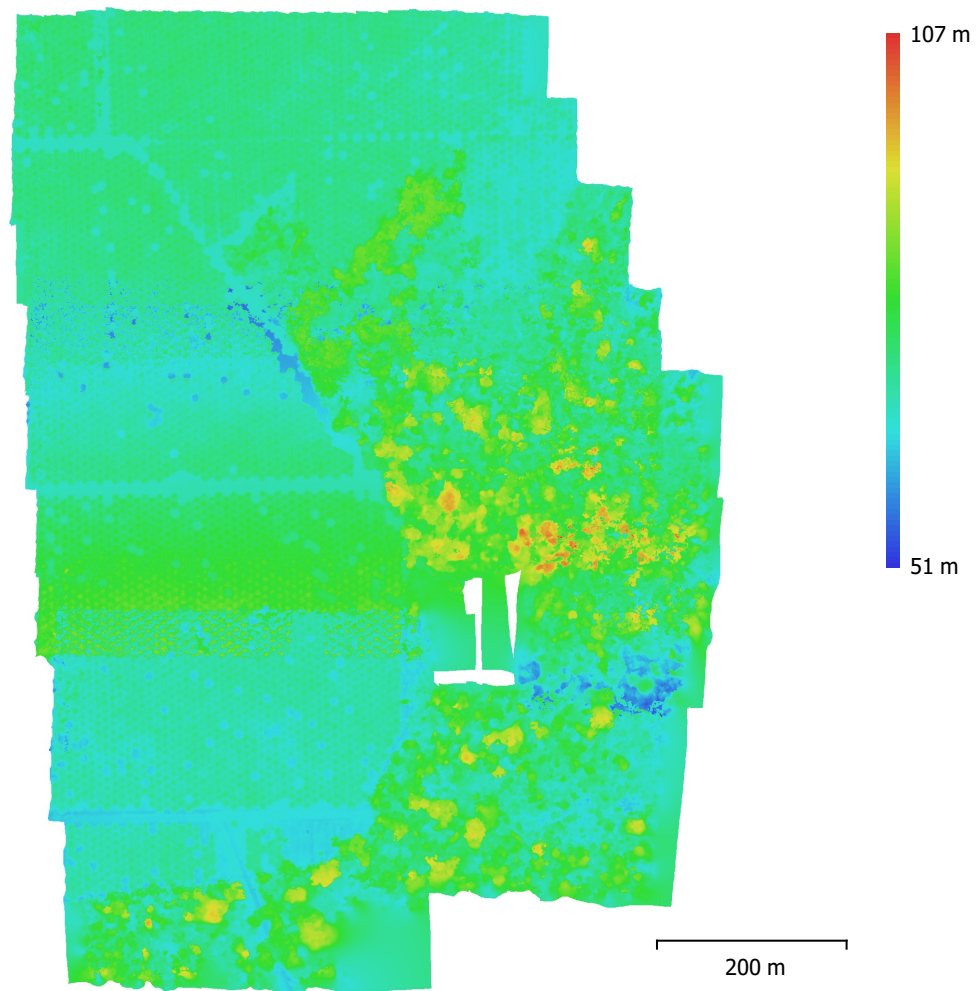


Fig. 4. Reconstructed digital elevation model.

Resolution: 9.13 cm/pix
Point density: 120 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 167 |
| Aligned cameras | 137 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|-------------------------|
| Points | 104,046 of 131,798 |
| RMS reprojection error | 0.121616 (0.674915 pix) |
| Max reprojection error | 0.364863 (25.7707 pix) |
| Mean key point size | 4.72083 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.34253 |

Alignment parameters

| | |
|-------------------------------|---------------------|
| Accuracy | High |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 1 minutes 2 seconds |
| Matching memory usage | 1.14 GB |
| Alignment time | 14 seconds |
| Alignment memory usage | 40.55 MB |
| Software version | 1.6.5.11249 |
| File size | 9.83 MB |

Depth Maps

| | |
|---|----------------------|
| Count | 137 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 1 minutes 52 seconds |
| Memory usage | 1.82 GB |
| Software version | 1.6.5.11249 |
| File size | 625.82 MB |

Dense Point Cloud

| | |
|--|----------------------|
| Points | 217,120,145 |
| Point colors | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 1 minutes 52 seconds |
| Memory usage | 1.82 GB |
| Dense cloud generation parameters | |
| Processing time | 7 minutes 9 seconds |
| Memory usage | 10.45 GB |
| Software version | 1.6.5.11249 |
| File size | 2.74 GB |

DEM

| | |
|---|--|
| Size | 13,004 x 15,801 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 1 minutes 52 seconds |
| Memory usage | 1.82 GB |
| Reconstruction parameters | |
| Source data | Depth maps |
| Interpolation | Enabled |
| Processing time | 18 minutes 13 seconds |
| Memory usage | 5.74 GB |
| Software version | 1.6.5.11249 |
| File size | 386.55 MB |
| Orthomosaic | |
| Size | 18,660 x 25,774 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 12 minutes 55 seconds |
| Memory usage | 629.00 MB |
| Software version | 1.6.5.11249 |
| File size | 3.56 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

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Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-82)

Código de estudio: ITE-2022-057

16 September 2022



Survey Data

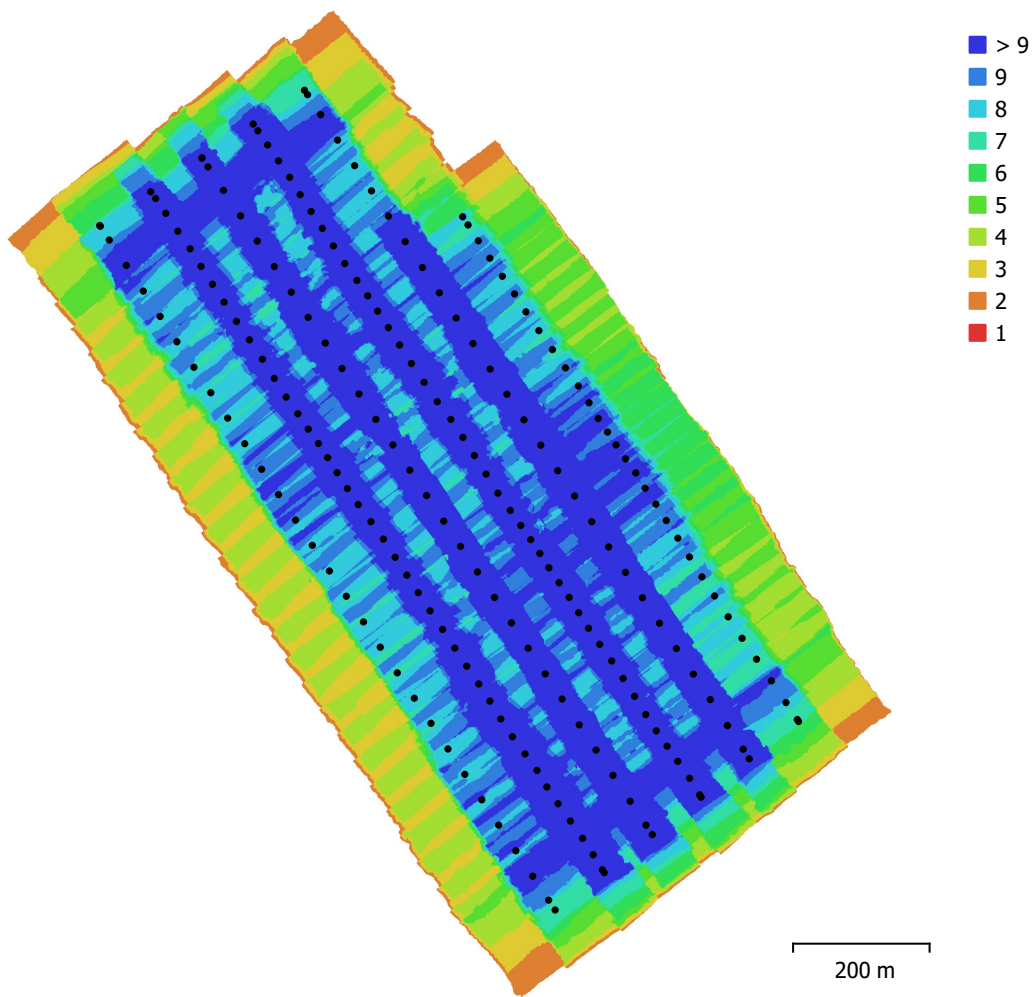


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|-----------------------|---------------------|----------|
| Number of images: | 205 | Camera stations: | 205 |
| Flying altitude: | 171 m | Tie points: | 229,973 |
| Ground resolution: | 4.24 cm/pix | Projections: | 608,808 |
| Coverage area: | 0.895 km ² | Reprojection error: | 0.67 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

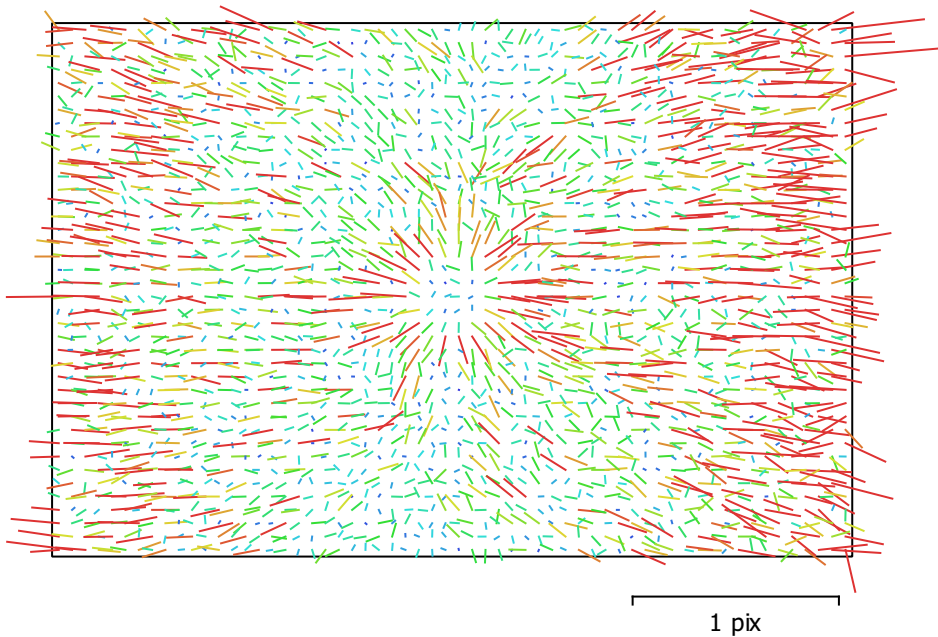


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

205 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μ m

| | Value | Error | Cx | Cy | K1 | K2 | K3 | P1 | P2 |
|-----------|---------------------|---------|------|------|-------|-------|-------|-------|-------|
| F | 3648 | | | | | | | | |
| Cx | -11.9728 | 0.19 | 1.00 | 0.02 | 0.01 | 0.00 | -0.01 | 0.08 | -0.01 |
| Cy | -17.0592 | 0.13 | | 1.00 | -0.02 | -0.02 | 0.01 | -0.02 | 0.19 |
| K1 | -0.0108773 | 0.00011 | | | 1.00 | -0.38 | 0.38 | -0.27 | 0.32 |
| K2 | -0.000204289 | 0.0001 | | | | 1.00 | -0.98 | 0.04 | -0.03 |
| K3 | 0.00822529 | 8.9e-05 | | | | | 1.00 | -0.05 | 0.04 |
| P1 | -0.00118138 | 3.5e-06 | | | | | | 1.00 | -0.16 |
| P2 | -0.00142554 | 4.4e-06 | | | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

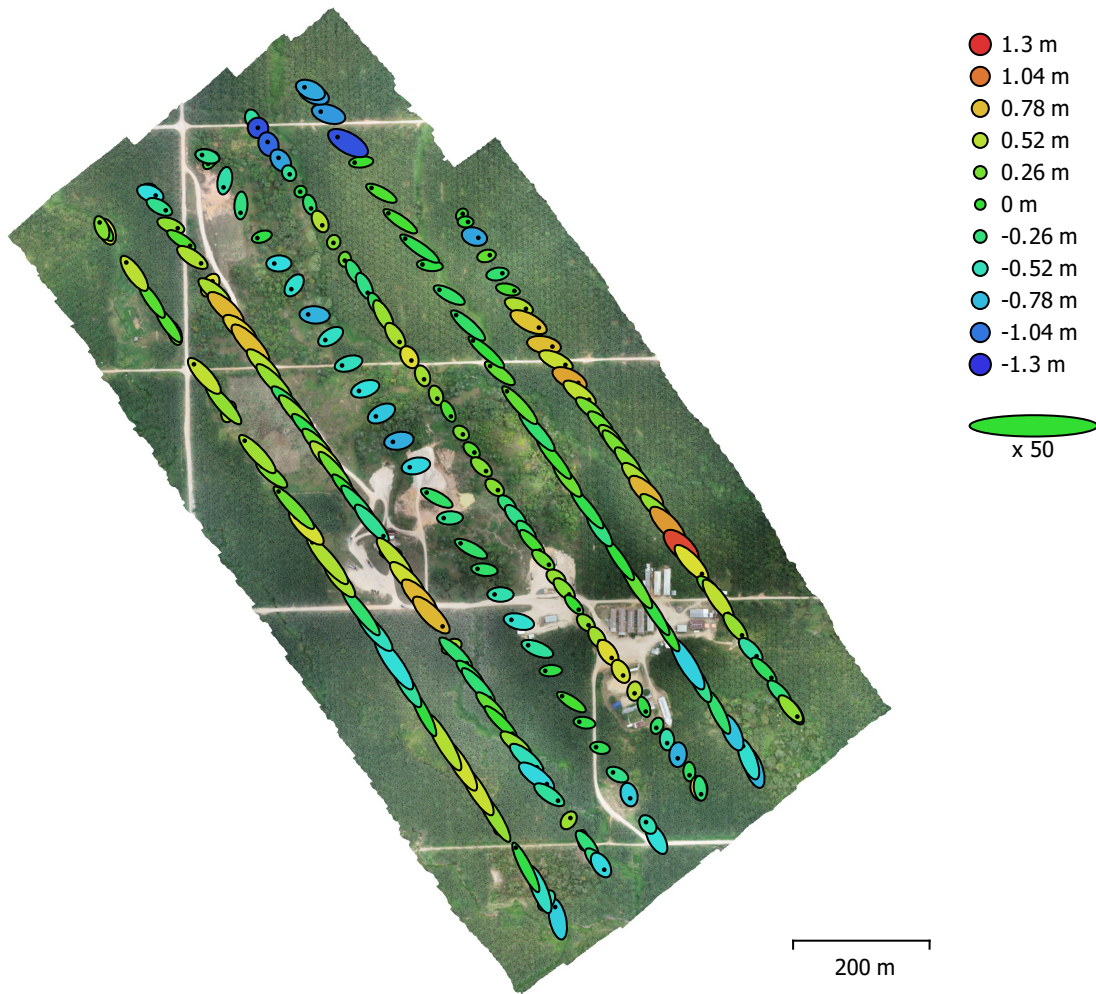


Fig. 3. Camera locations and error estimates.

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) |
|---------------------|---------------------|---------------------|----------------------|-------------------------|
| 46.1623 | 51.4159 | 46.7739 | 69.0981 | 83.4407 |

Table 3. Average camera location error.

X - Longitude, Y - Latitude, Z - Altitude.

Digital Elevation Model

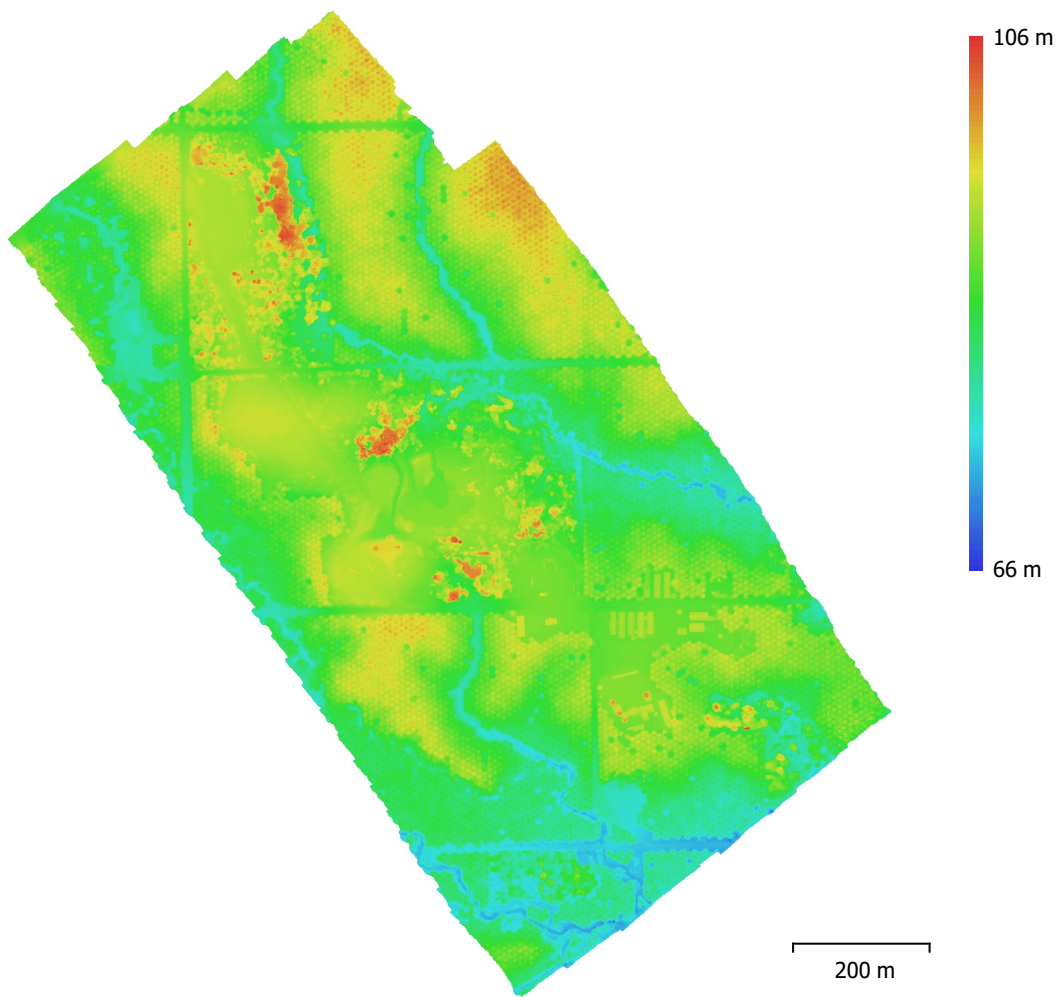


Fig. 4. Reconstructed digital elevation model.

Resolution: 9.37 cm/pix
Point density: 114 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 205 |
| Aligned cameras | 205 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|-------------------------|
| Points | 229,973 of 245,816 |
| RMS reprojection error | 0.117982 (0.669961 pix) |
| Max reprojection error | 0.356125 (18.2479 pix) |
| Mean key point size | 5.30067 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.67012 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | Highest |
| Generic preselection | Yes |
| Reference preselection | Source |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 1 minutes 54 seconds |
| Matching memory usage | 2.65 GB |
| Alignment time | 36 seconds |
| Alignment memory usage | 155.89 MB |
| Software version | 1.6.5.11249 |
| File size | 20.99 MB |

Depth Maps

| | |
|-------|-----|
| Count | 205 |
|-------|-----|

Depth maps generation parameters

| | |
|------------------|----------------------|
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 4 minutes 39 seconds |
| Memory usage | 2.16 GB |
| Software version | 1.6.5.11249 |
| File size | 1.19 GB |

Dense Point Cloud

| | |
|--------------|----------------|
| Points | 254,696,135 |
| Point colors | 3 bands, uint8 |

Depth maps generation parameters

| | |
|-----------------|----------------------|
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 4 minutes 39 seconds |
| Memory usage | 2.16 GB |

Dense cloud generation parameters

| | |
|------------------|-----------------------|
| Processing time | 10 minutes 48 seconds |
| Memory usage | 11.55 GB |
| Software version | 1.6.5.11249 |
| File size | 3.21 GB |

DEM

| | |
|---|--|
| Size | 19,563 x 21,653 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 4 minutes 39 seconds |
| Memory usage | 2.16 GB |
| Reconstruction parameters | |
| Source data | Depth maps |
| Interpolation | Enabled |
| Processing time | 26 minutes 9 seconds |
| Memory usage | 6.90 GB |
| Software version | 1.6.5.11249 |
| File size | 487.27 MB |
| Orthomosaic | |
| Size | 30,570 x 34,082 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 28 minutes 31 seconds |
| Memory usage | 726.00 MB |
| Software version | 1.6.5.11249 |
| File size | 4.22 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

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Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-83)
Código de estudio: ITE-2022-057

16 September 2022



Survey Data

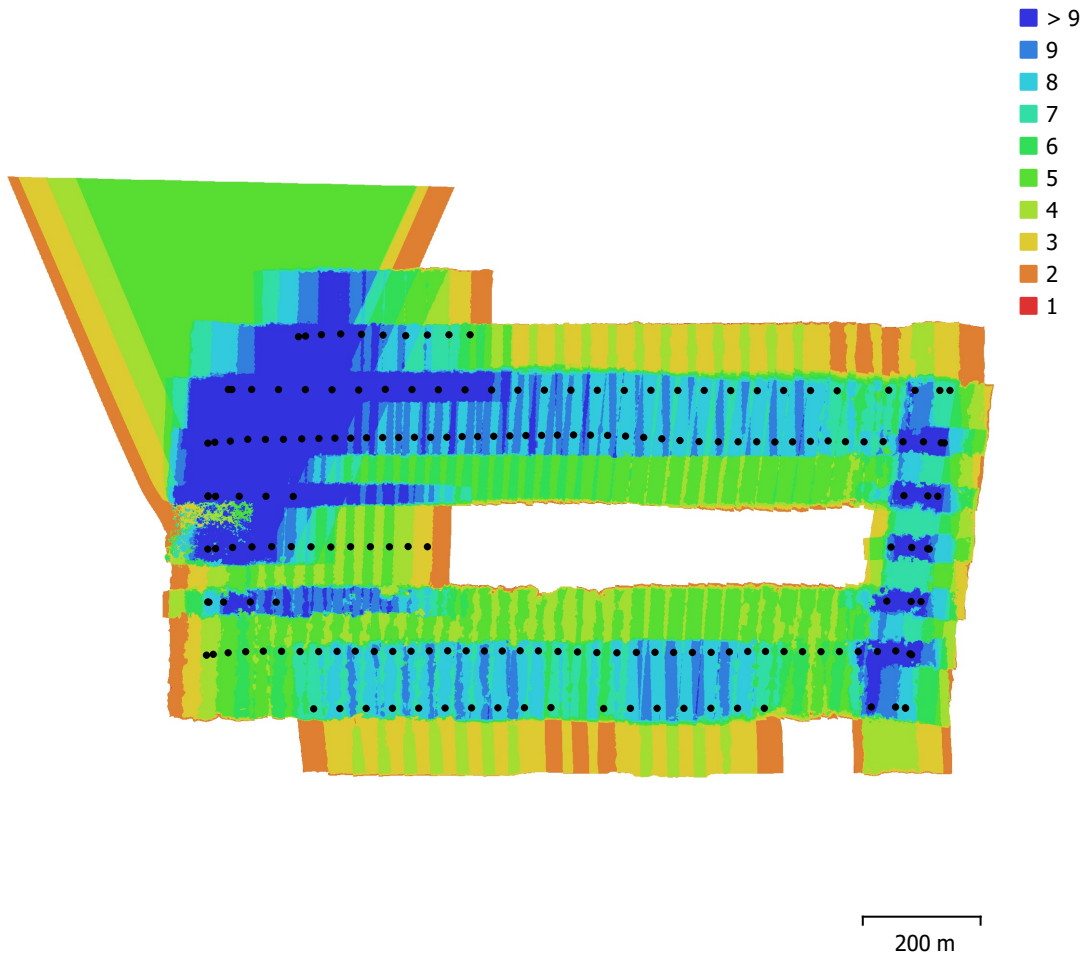


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|----------------------|---------------------|----------|
| Number of images: | 258 | Camera stations: | 180 |
| Flying altitude: | 167 m | Tie points: | 96,643 |
| Ground resolution: | 4.09 cm/pix | Projections: | 215,136 |
| Coverage area: | 1.12 km ² | Reprojection error: | 1.09 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

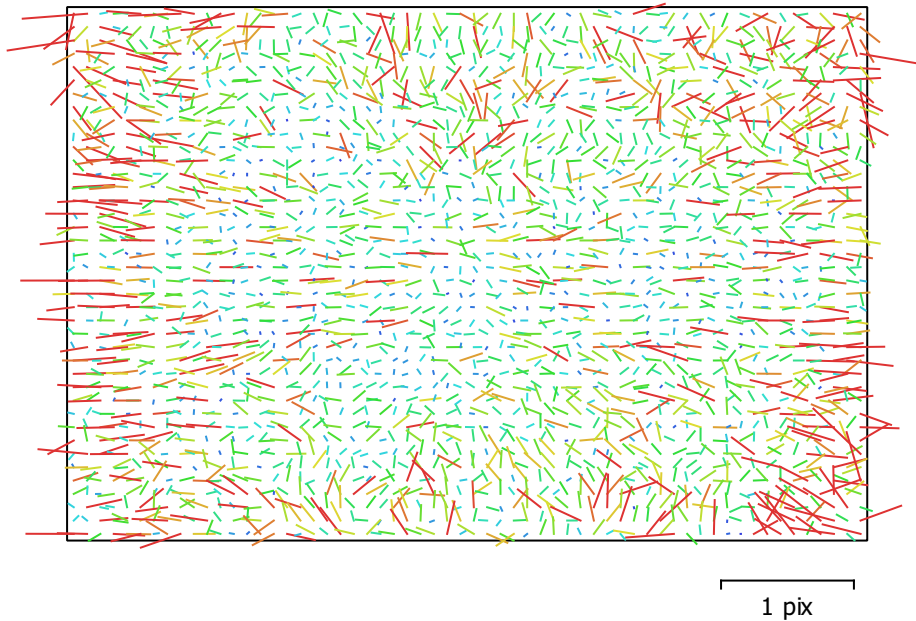


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

258 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | K1 | K2 |
|-----------|-------------------|---------|------|-------|
| F | 3648 | | | |
| K1 | -0.012897 | 0.00019 | 1.00 | -0.41 |
| K2 | 0.00983004 | 9.9e-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 (m) | Y error (m) | Z error (m) | XY error (m) | Total error (m) |
|-------------|-------------|-------------|--------------|-----------------|
| 1.14861 | 0.517897 | 0.650472 | 1.25997 | 1.41797 |

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

Digital Elevation Model

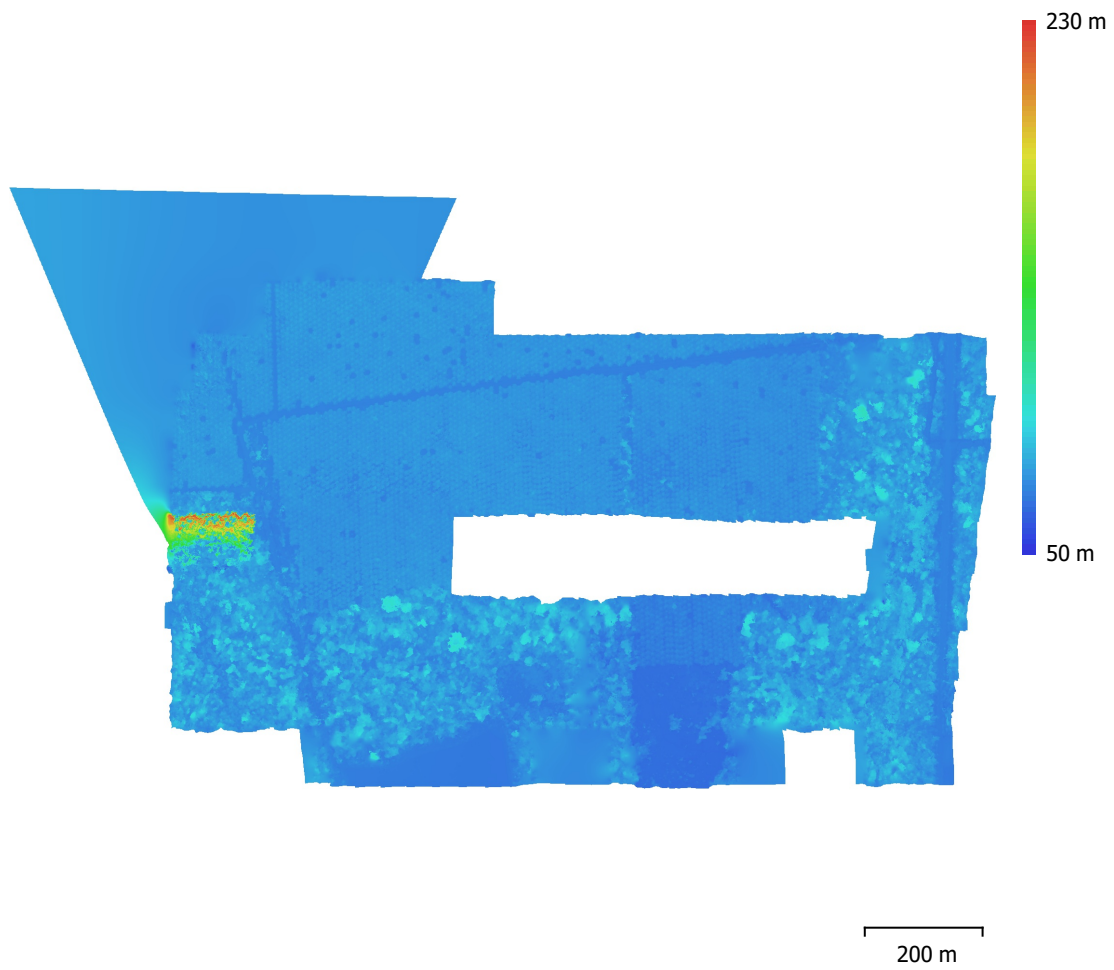


Fig. 4. Reconstructed digital elevation model.

Resolution: 8.18 cm/pix
Point density: 149 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 258 |
| Aligned cameras | 180 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|------------------------|
| Points | 96,643 of 118,278 |
| RMS reprojection error | 0.106547 (1.09276 pix) |
| Max reprojection error | 0.319089 (23.4334 pix) |
| Mean key point size | 8.67168 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.2129 |

Alignment parameters

| | |
|-------------------------------|-------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 46 seconds |
| Matching memory usage | 1.83 GB |
| Alignment time | 27 seconds |
| Alignment memory usage | 212.91 MB |
| Software version | 1.6.5.11249 |
| File size | 6.58 MB |

Depth Maps

| | |
|---|----------------------|
| Count | 174 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 1 minutes 43 seconds |
| File size | 678.58 MB |

Dense Point Cloud

| | |
|--|----------------------|
| Points | 293,093,838 |
| Point colors | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 1 minutes 43 seconds |
| Dense cloud generation parameters | |
| Processing time | 8 minutes 15 seconds |
| Memory usage | 9.15 GB |
| Software version | 1.6.5.11249 |
| File size | 3.70 GB |

DEM

| | |
|----------------------------------|-------------------------------------|
| Size | 27,870 x 16,314 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Reconstruction parameters | |

| | |
|----------------------------------|--|
| Source data | Dense cloud |
| Interpolation | Enabled |
| Processing time | 1 minutes 56 seconds |
| Memory usage | 360.59 MB |
| Software version | 1.6.5.11249 |
| File size | 748.23 MB |
| Orthomosaic | |
| Size | 40,965 x 24,929 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 4 minutes 53 seconds |
| Memory usage | 4.06 GB |
| Software version | 1.6.5.11249 |
| File size | 5.07 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-84-86-88)
Código de estudio: ITE-2022-057

16 September 2022



Survey Data

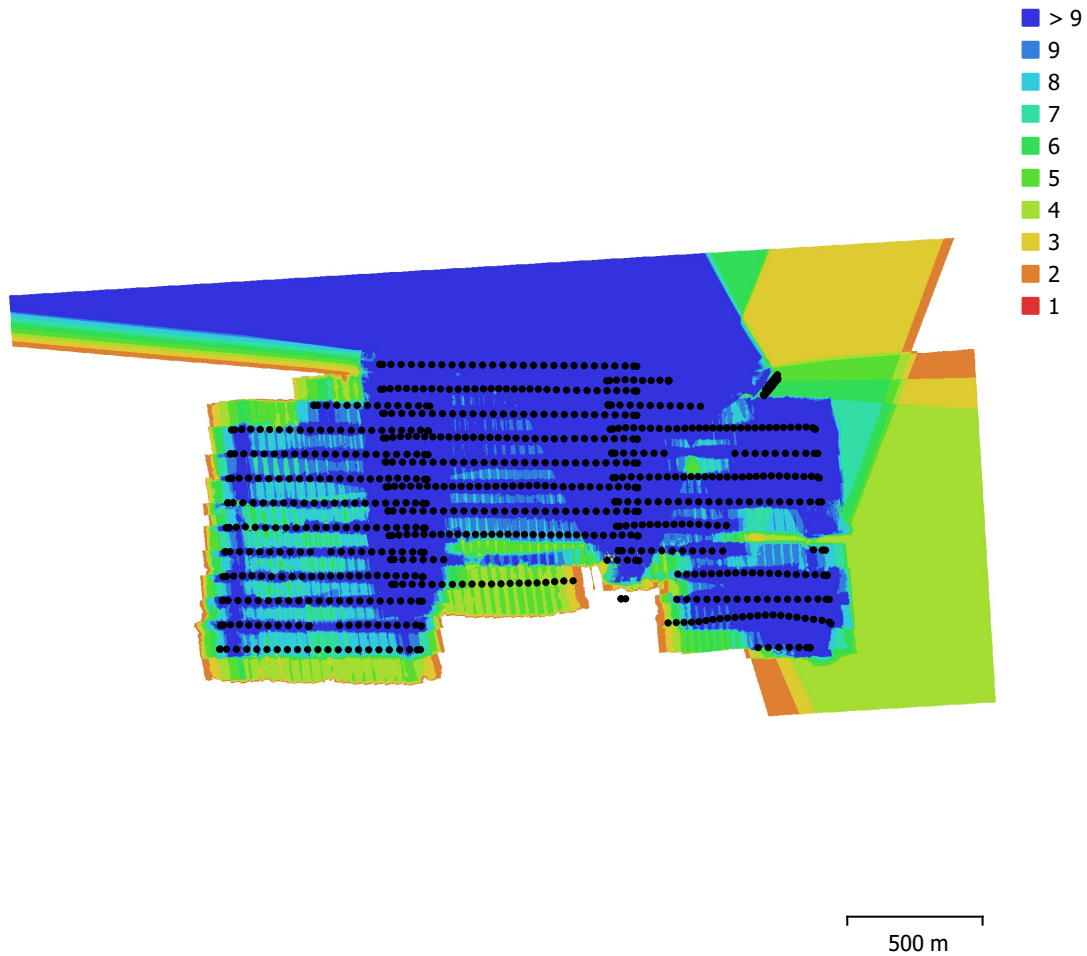


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|----------------------|---------------------|-----------|
| Number of images: | 866 | Camera stations: | 777 |
| Flying altitude: | 162 m | Tie points: | 489,098 |
| Ground resolution: | 3.99 cm/pix | Projections: | 1,149,972 |
| Coverage area: | 4.36 km ² | Reprojection error: | 0.648 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

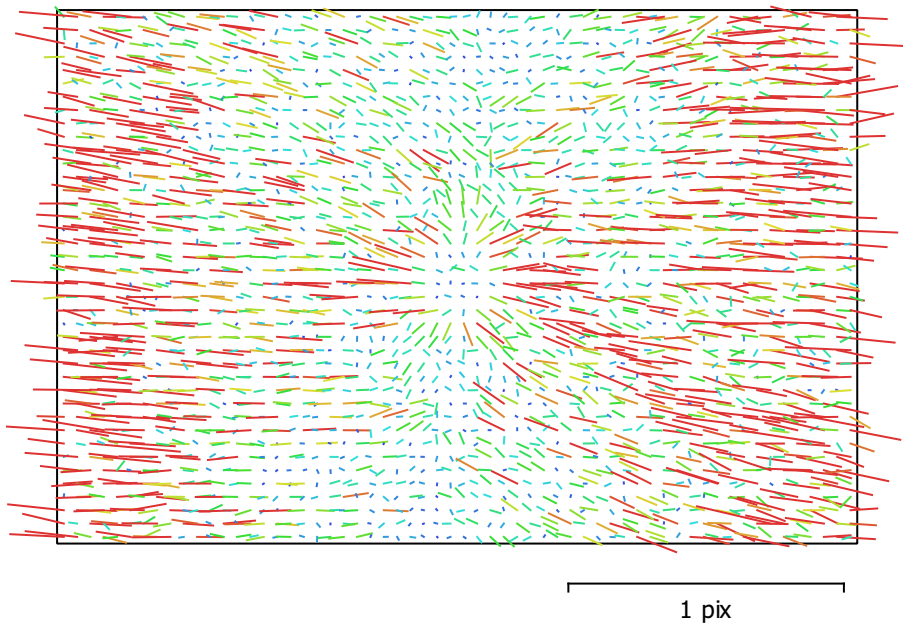


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

866 images

| | | | |
|--------------|--------------------|---------------|---|
| Type | Resolution | Focal Length | Pixel Size |
| Frame | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μm |

| | Value | Error | K1 | K2 | K3 | P1 | P2 |
|-----------|--------------------|---------|------|-------|-------|-------|-------|
| F | 3648 | | | | | | |
| K1 | -0.0155095 | 5.6e-05 | 1.00 | -0.73 | 0.68 | -0.08 | 0.04 |
| K2 | 0.00143429 | 0.00011 | | 1.00 | -0.98 | 0.02 | -0.01 |
| K3 | 0.00672443 | 9.3e-05 | | | 1.00 | -0.00 | 0.01 |
| P1 | -0.00117858 | 5e-06 | | | | 1.00 | -0.17 |
| P2 | -0.00139585 | 8e-06 | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

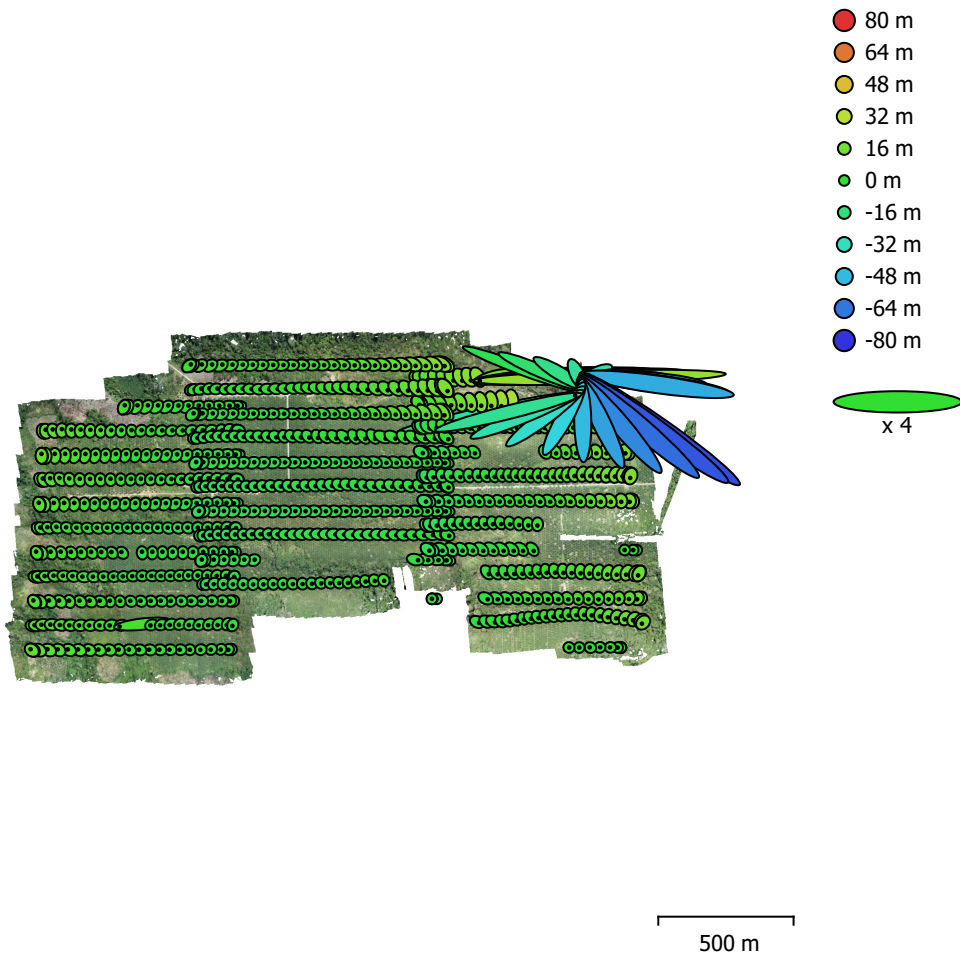


Fig. 3. Camera locations and error estimates.

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) |
|-------------|-------------|-------------|--------------|-----------------|
| 19.5214 | 8.31543 | 9.86868 | 21.2187 | 23.4013 |

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

Digital Elevation Model

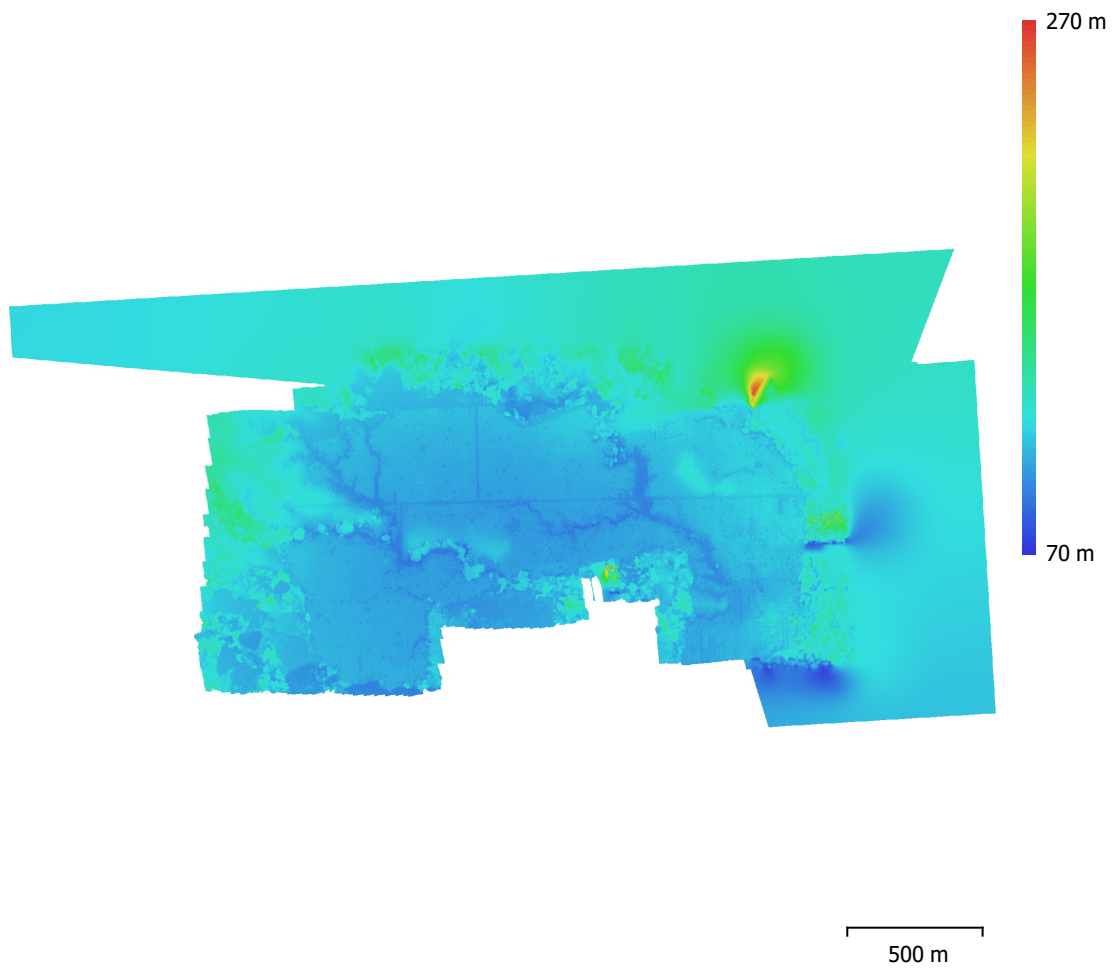


Fig. 4. Reconstructed digital elevation model.

Resolution: 8.91 cm/pix
Point density: 126 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 866 |
| Aligned cameras | 777 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|-------------------------|
| Points | 489,098 of 569,003 |
| RMS reprojection error | 0.126271 (0.648078 pix) |
| Max reprojection error | 0.384532 (20.6089 pix) |
| Mean key point size | 4.33493 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.36322 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | Highest |
| Generic preselection | Yes |
| Reference preselection | Source |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 8 minutes 20 seconds |
| Matching memory usage | 2.78 GB |
| Alignment time | 3 minutes 30 seconds |
| Alignment memory usage | 364.91 MB |
| Software version | 1.6.5.11249 |
| File size | 43.60 MB |

Depth Maps

| | |
|---|-----------------------|
| Count | 771 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 11 minutes 17 seconds |
| Memory usage | 1.66 GB |
| Software version | 1.6.5.11249 |
| File size | 3.36 GB |

Dense Point Cloud

| | |
|--------------|----------------|
| Points | 891,323,623 |
| Point colors | 3 bands, uint8 |

Depth maps generation parameters

| | |
|-----------------|-----------------------|
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 11 minutes 17 seconds |
| Memory usage | 1.66 GB |

Dense cloud generation parameters

| | |
|------------------|-----------------------|
| Processing time | 40 minutes 56 seconds |
| Memory usage | 14.03 GB |
| Software version | 1.6.5.11249 |
| File size | 11.25 GB |

DEM

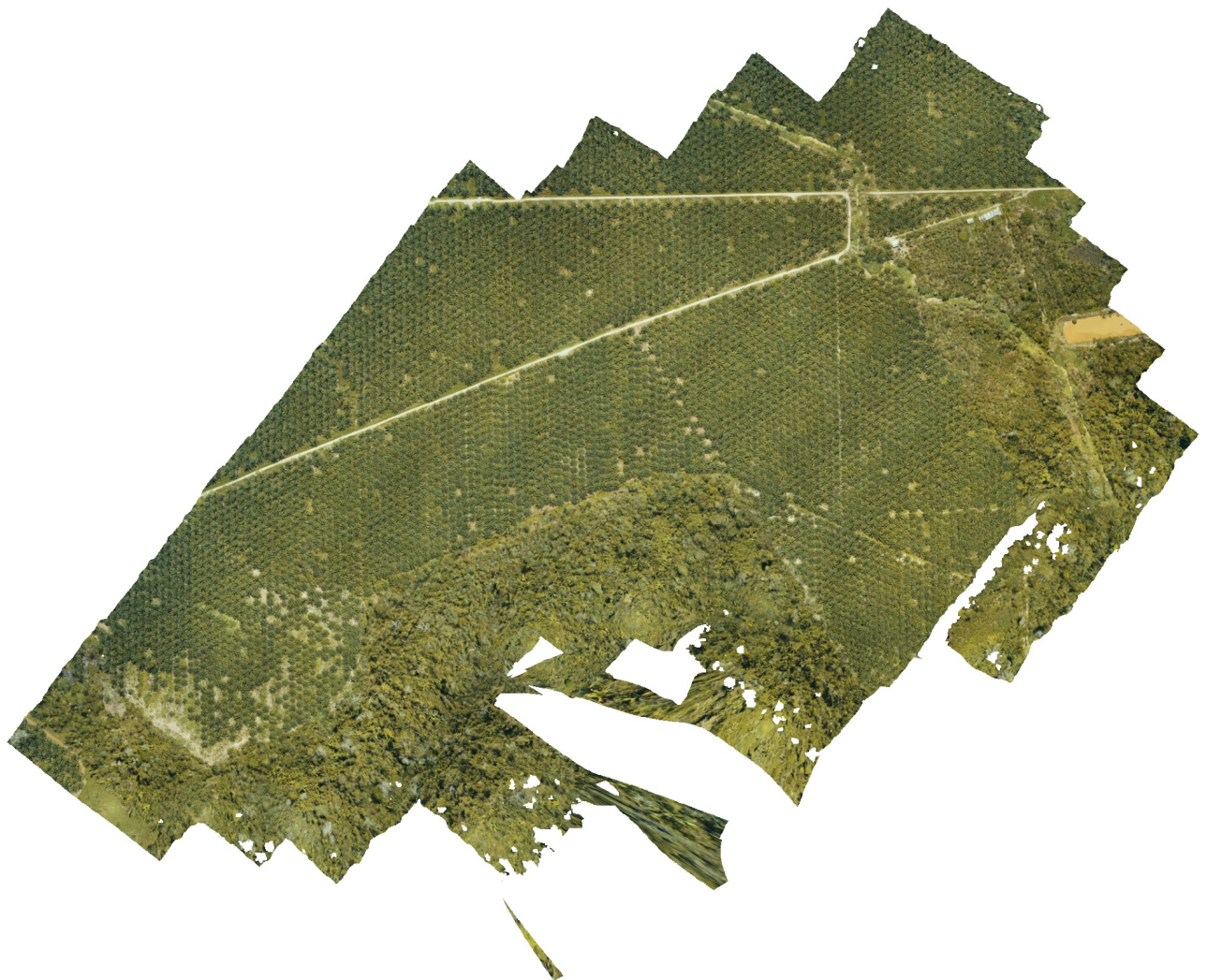
| | |
|---|--|
| Size | 40,956 x 21,725 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 11 minutes 17 seconds |
| Memory usage | 1.66 GB |
| Reconstruction parameters | |
| Source data | Depth maps |
| Interpolation | Enabled |
| Processing time | 1 hours 15 minutes |
| Memory usage | 8.28 GB |
| Software version | 1.6.5.11249 |
| File size | 2.37 GB |
| Orthomosaic | |
| Size | 91,332 x 44,249 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 1 hours 26 minutes |
| Memory usage | 897.93 MB |
| Software version | 1.6.5.11249 |
| File size | 19.30 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-85)

Código de estudio: ITE-2022-057

16 September 2022



Survey Data

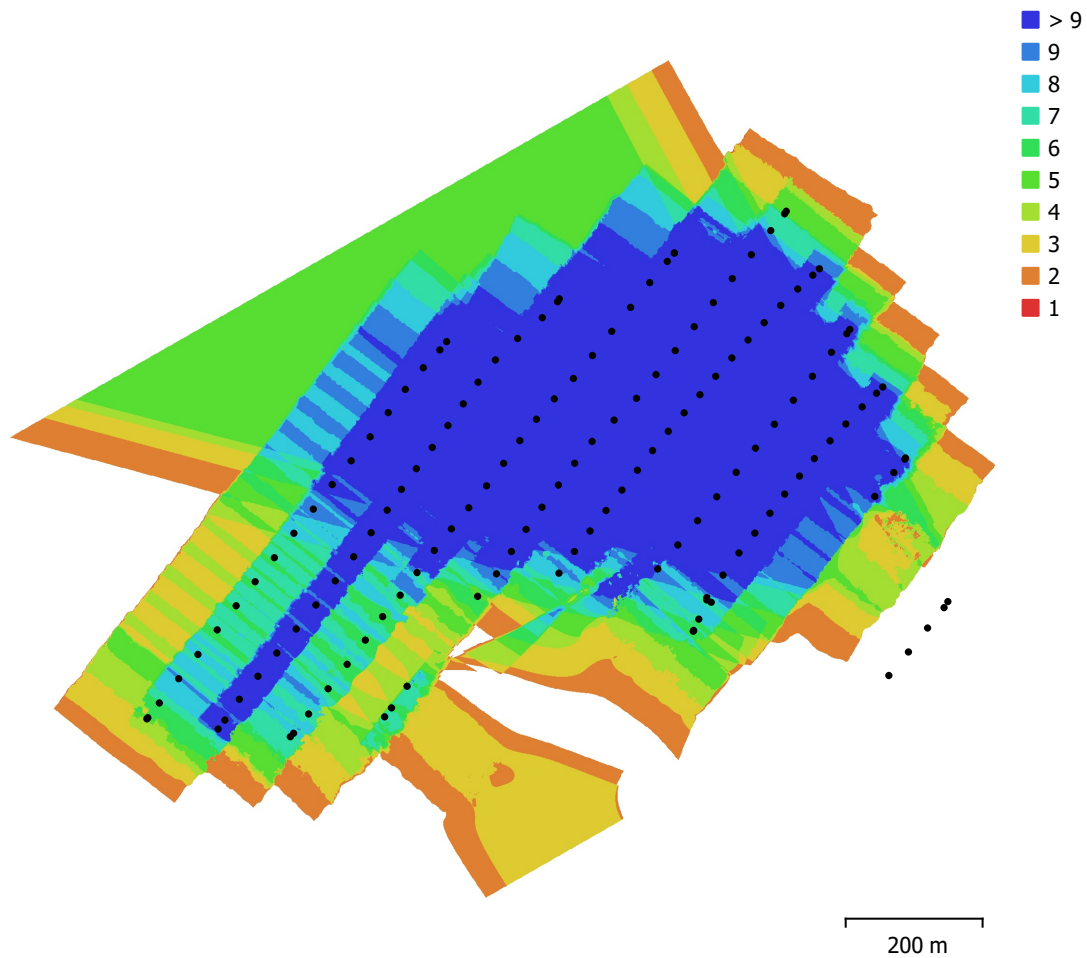


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|-----------------------|---------------------|----------|
| Number of images: | 183 | Camera stations: | 145 |
| Flying altitude: | 170 m | Tie points: | 83,785 |
| Ground resolution: | 4.14 cm/pix | Projections: | 198,801 |
| Coverage area: | 0.947 km ² | Reprojection error: | 1.06 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

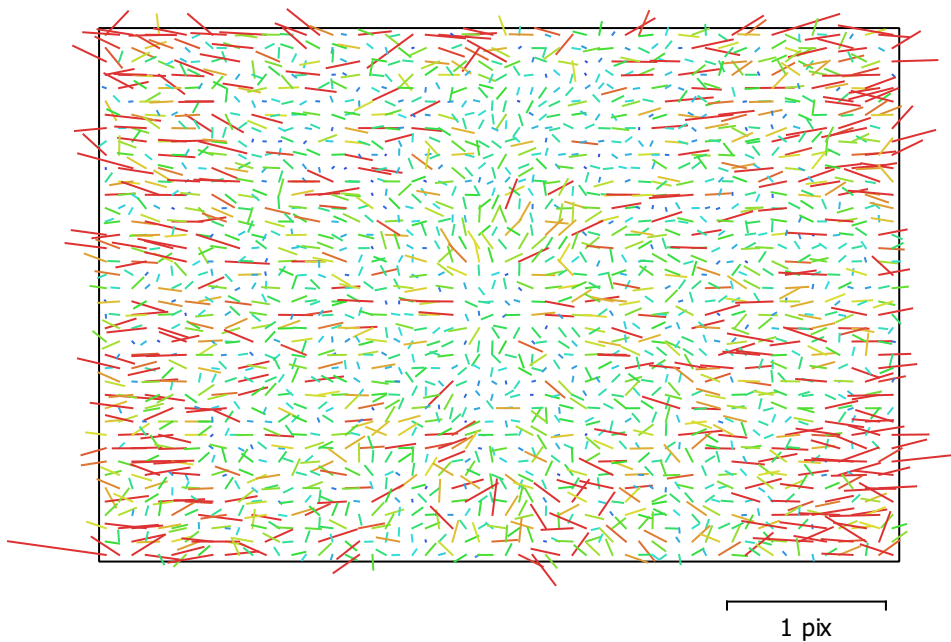


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

183 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | K1 | K2 | P1 | P2 |
|-----------|---------------------|---------|------|-------|------|-------|
| F | 3648 | | | | | |
| K1 | -0.012279 | 0.00019 | 1.00 | -0.30 | 0.06 | 0.02 |
| K2 | 0.00925698 | 8.7e-05 | | 1.00 | 0.02 | 0.01 |
| P1 | -0.000361504 | 1.7e-05 | | | 1.00 | -0.27 |
| P2 | -0.00255804 | 1.7e-05 | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

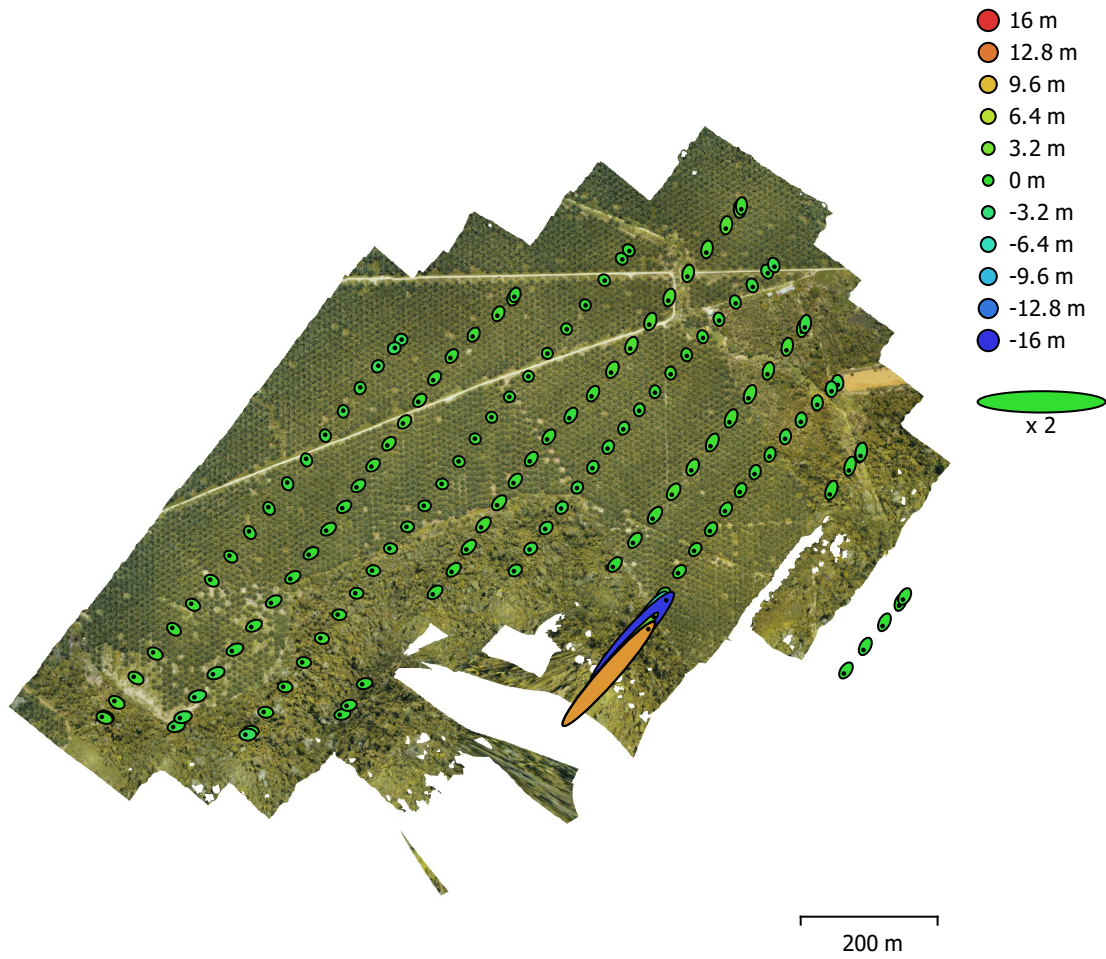


Fig. 3. Camera locations and error estimates.

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 (m) | Y error (m) | Z error (m) | XY error (m) | Total error (m) |
|-------------|-------------|-------------|--------------|-----------------|
| 9.59967 | 10.9873 | 2.11028 | 14.5902 | 14.7421 |

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

Digital Elevation Model

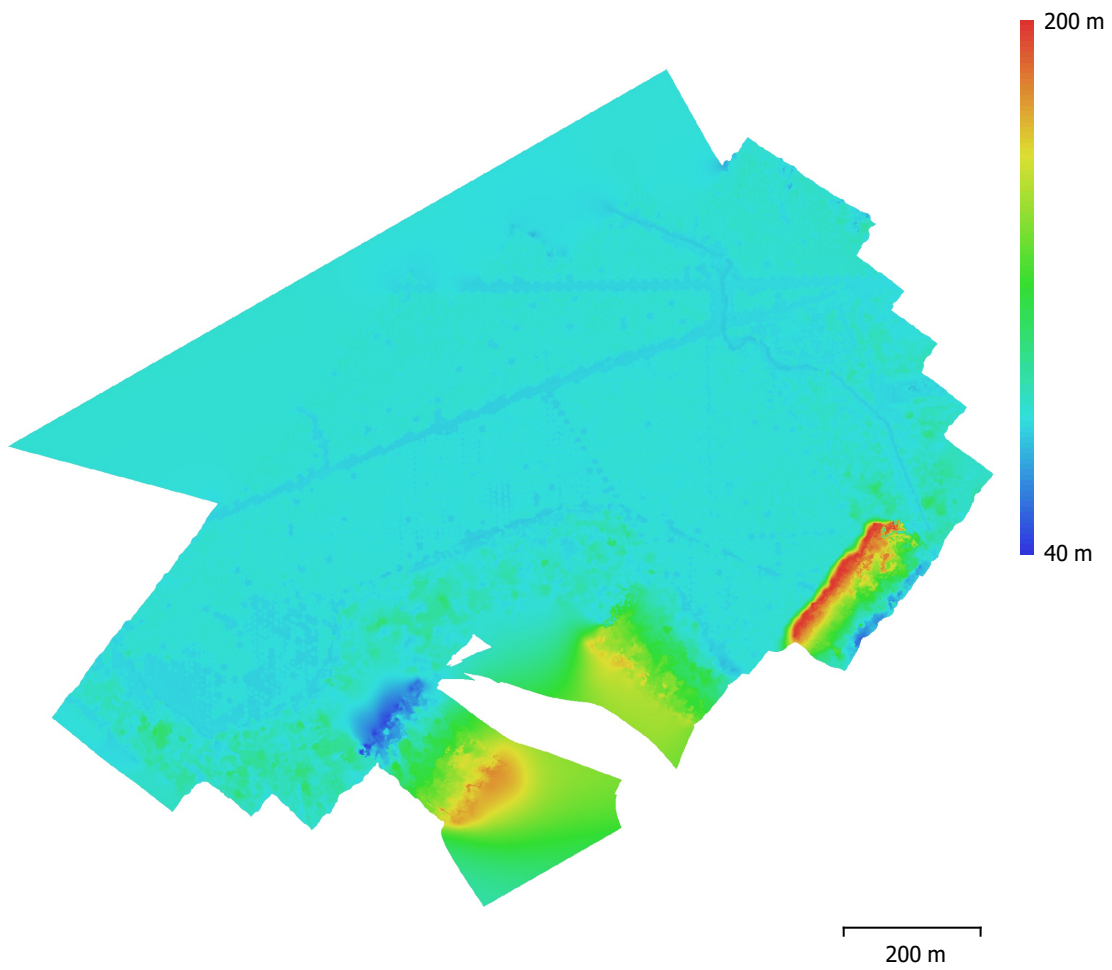


Fig. 4. Reconstructed digital elevation model.

Resolution: 8.28 cm/pix
Point density: 146 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 183 |
| Aligned cameras | 145 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|------------------------|
| Points | 83,785 of 110,774 |
| RMS reprojection error | 0.103382 (1.05774 pix) |
| Max reprojection error | 0.311544 (23.3551 pix) |
| Mean key point size | 8.2096 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.3503 |

Alignment parameters

| | |
|-------------------------------|-------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 52 seconds |
| Matching memory usage | 540.51 MB |
| Alignment time | 24 seconds |
| Alignment memory usage | 24.91 MB |
| Software version | 1.6.5.11249 |
| File size | 6.23 MB |

Depth Maps

| | |
|---|---------------------|
| Count | 141 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 2 minutes 0 seconds |
| Memory usage | 1.68 GB |
| Software version | 1.6.5.11249 |
| File size | 497.64 MB |

Dense Point Cloud

| | |
|--------------|----------------|
| Points | 216,010,096 |
| Point colors | 3 bands, uint8 |

Depth maps generation parameters

| | |
|-----------------|---------------------|
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 2 minutes 0 seconds |
| Memory usage | 1.68 GB |

Dense cloud generation parameters

| | |
|------------------|---------------------|
| Processing time | 7 minutes 0 seconds |
| Memory usage | 9.92 GB |
| Software version | 1.6.5.11249 |
| File size | 2.73 GB |

DEM

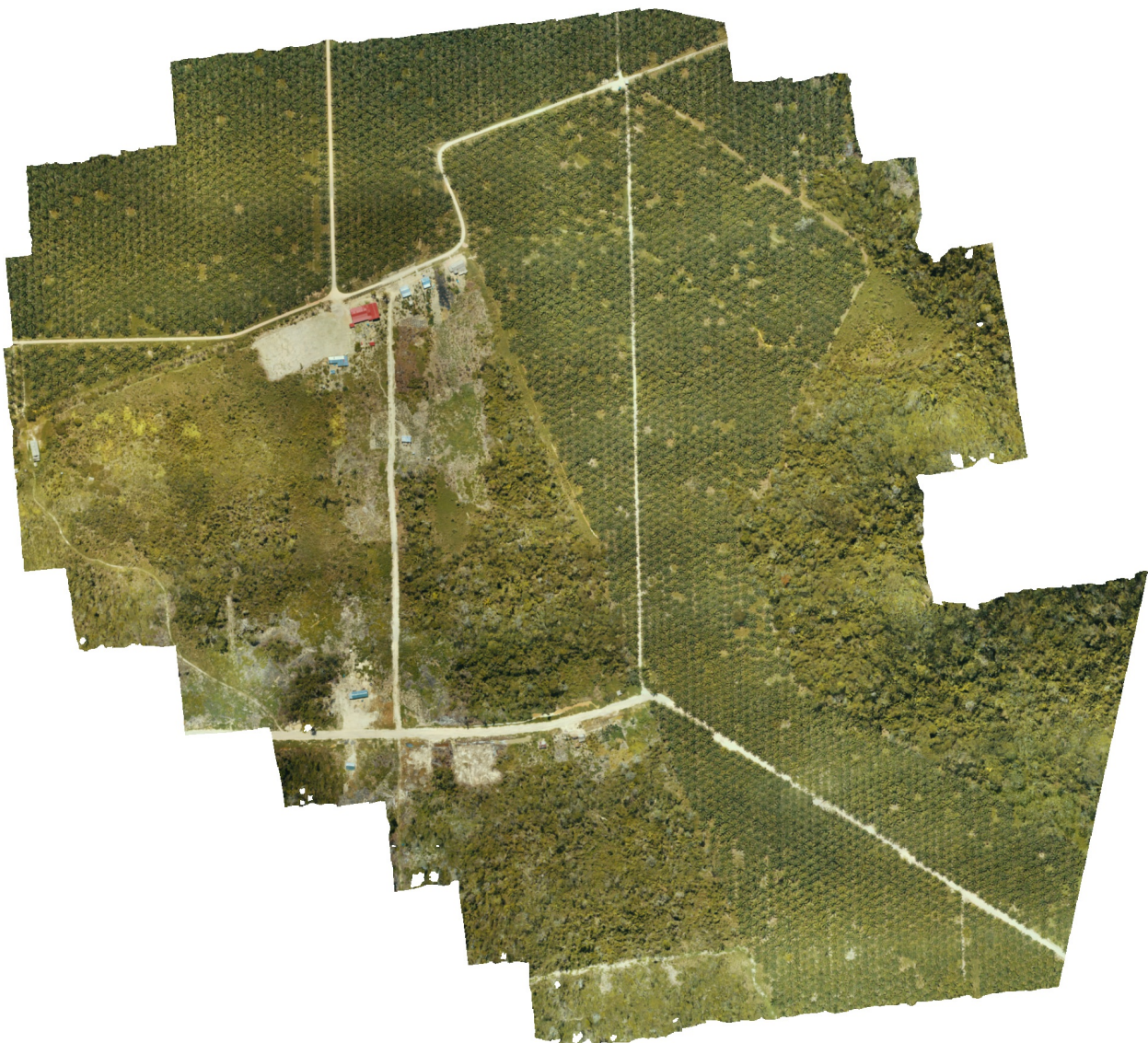
| | |
|----------------------------------|--|
| Size | 26,644 x 21,798 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Processing time | 1 minutes 33 seconds |
| Memory usage | 356.27 MB |
| Software version | 1.6.5.11249 |
| File size | 612.81 MB |
| Orthomosaic | |
| Size | 34,843 x 29,563 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 4 minutes 19 seconds |
| Memory usage | 5.60 GB |
| Software version | 1.6.5.11249 |
| File size | 3.89 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-87)

Código de estudio: ITE-2022-057

16 September 2022



Survey Data

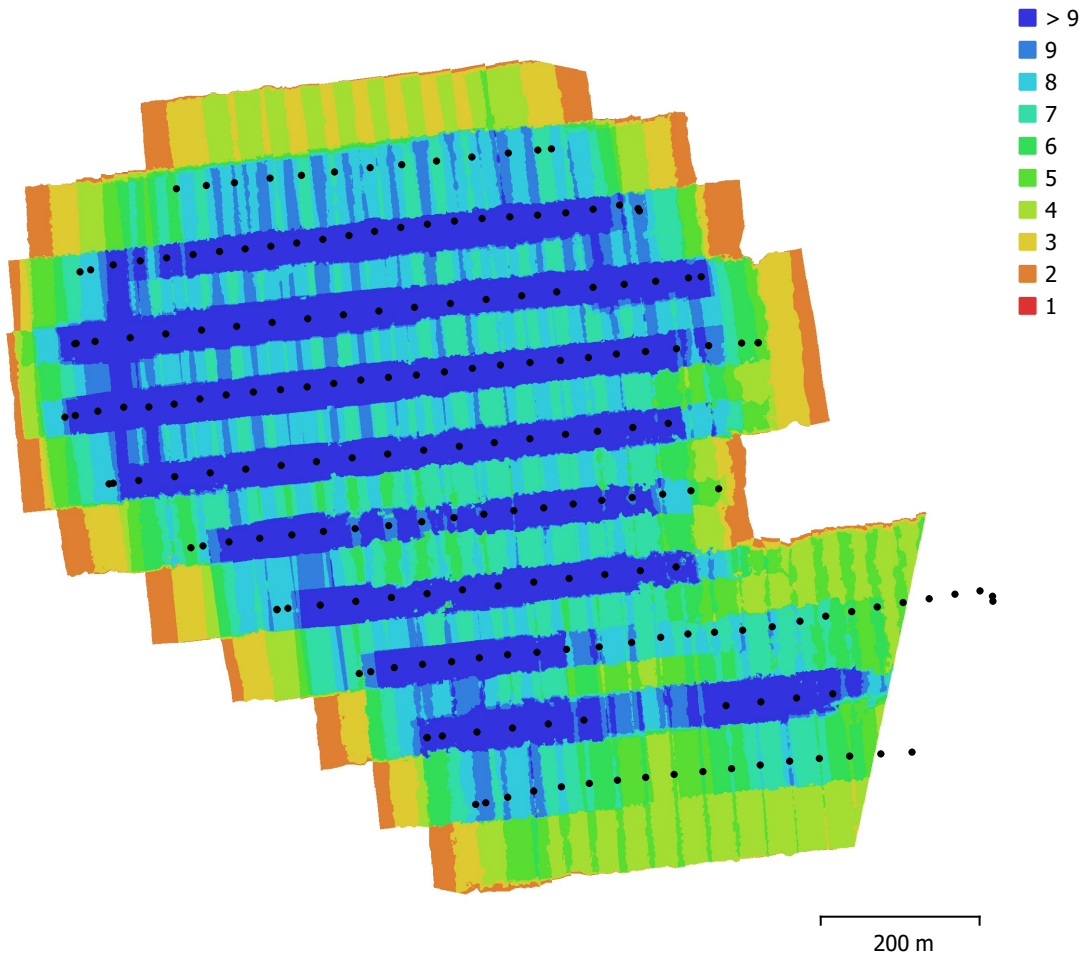


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|-----------------------|---------------------|-----------|
| Number of images: | 243 | Camera stations: | 191 |
| Flying altitude: | 169 m | Tie points: | 159,358 |
| Ground resolution: | 4.14 cm/pix | Projections: | 445,509 |
| Coverage area: | 0.841 km ² | Reprojection error: | 0.967 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

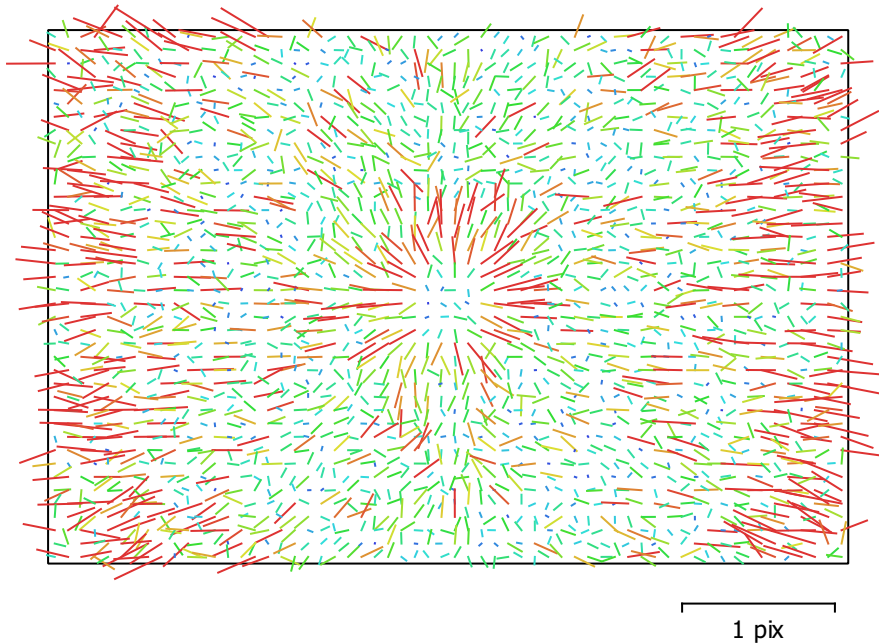


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

243 images

| | | | |
|--------------|--------------------|---------------|---|
| Type | Resolution | Focal Length | Pixel Size |
| Frame | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μm |

| | Value | Error | B2 | K1 | K2 | P1 | P2 |
|-----------|---------------------|---------|------|-------|-------|-------|-------|
| F | 3648 | | | | | | |
| B2 | 1.81637 | 0.37 | 1.00 | -0.00 | 0.02 | 0.08 | 0.08 |
| K1 | -0.0123606 | 0.00016 | | 1.00 | -0.09 | 0.20 | -0.02 |
| K2 | 0.00944831 | 3.7e-05 | | | 1.00 | -0.03 | -0.01 |
| P1 | -0.000364214 | 7e-06 | | | | 1.00 | 0.03 |
| P2 | -0.00248041 | 7.5e-06 | | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

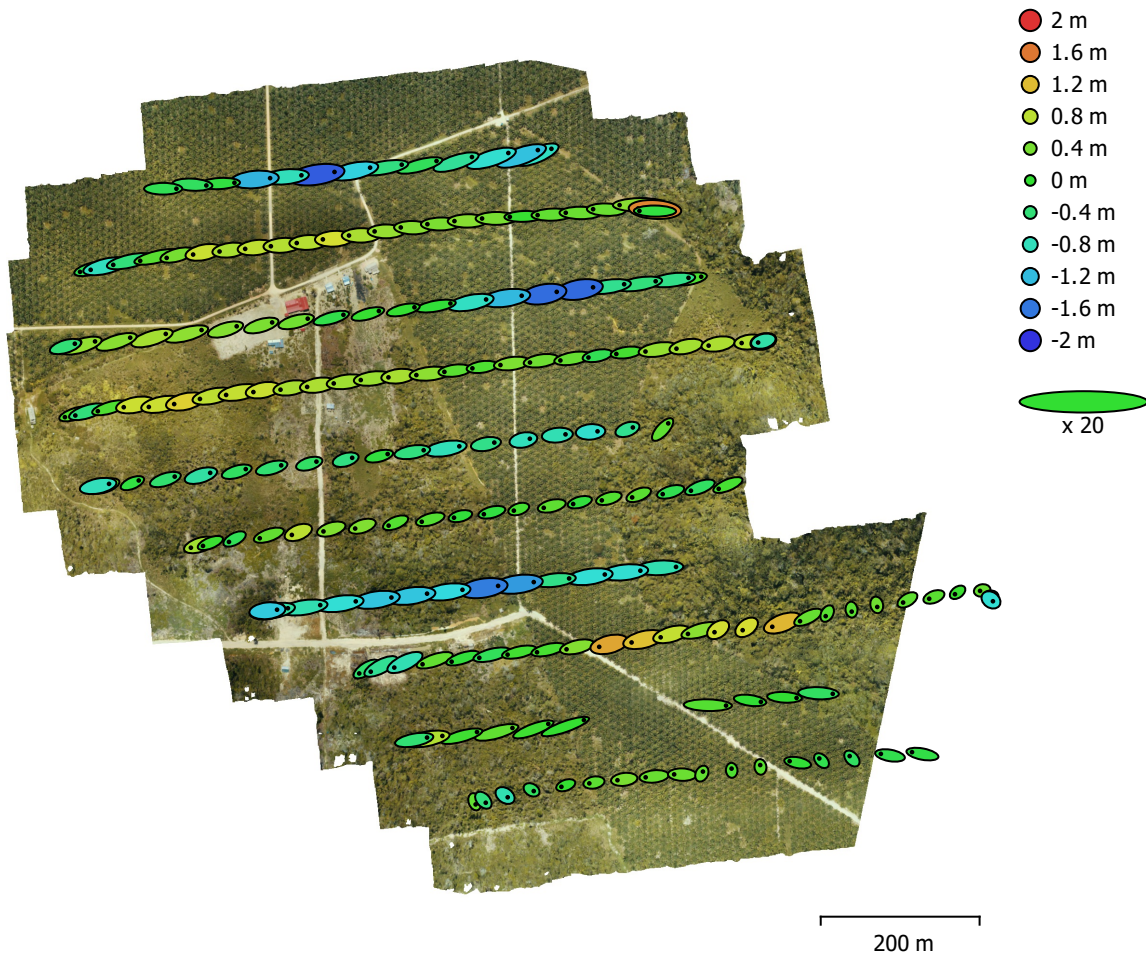


Fig. 3. Camera locations and error estimates.

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) |
|-------------|-------------|-------------|--------------|-----------------|
| 1.43932 | 0.326637 | 0.632405 | 1.47592 | 1.6057 |

Table 3. Average camera location error.

X - Longitude, Y - Latitude, Z - Altitude.

Digital Elevation Model

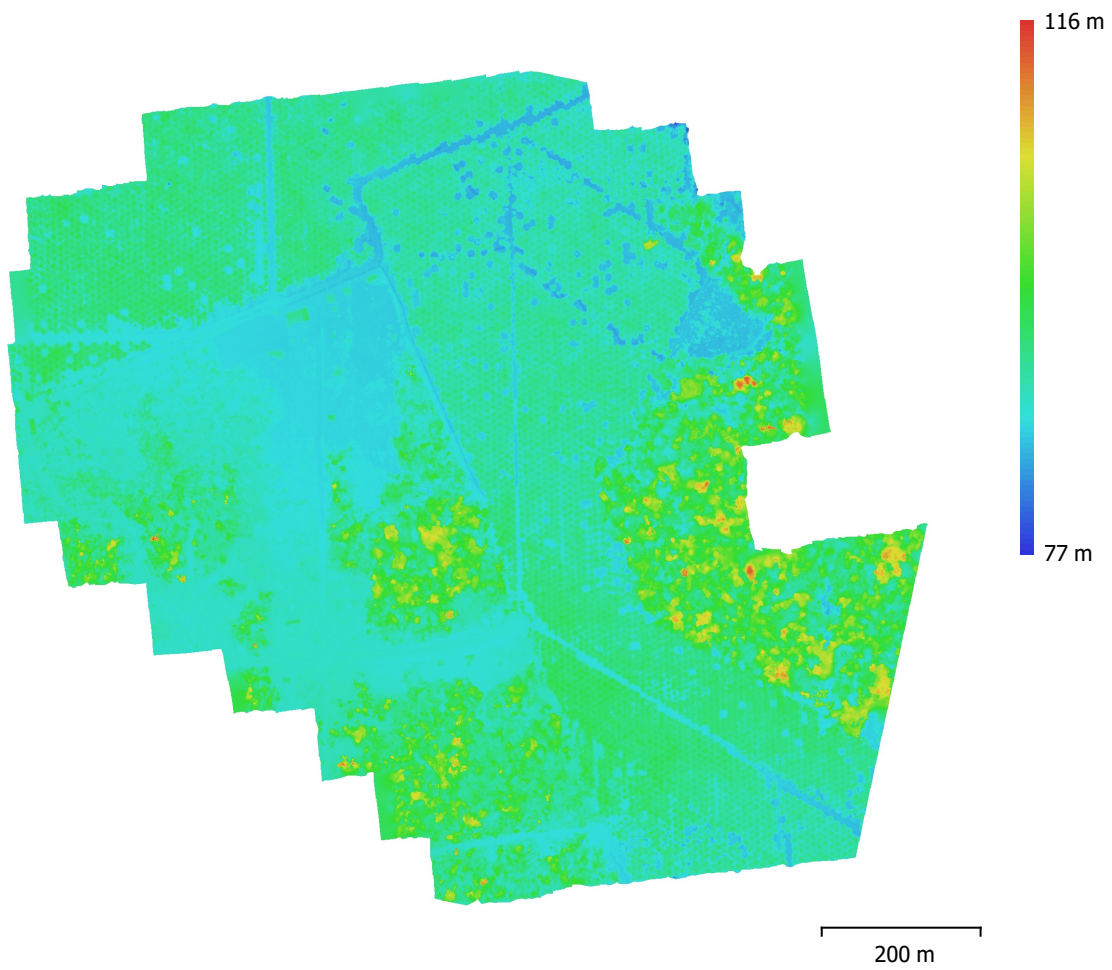


Fig. 4. Reconstructed digital elevation model.

Resolution: 8.29 cm/pix
Point density: 146 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 243 |
| Aligned cameras | 191 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|-------------------------|
| Points | 159,358 of 206,891 |
| RMS reprojection error | 0.110733 (0.967003 pix) |
| Max reprojection error | 0.333673 (23.2515 pix) |
| Mean key point size | 7.53813 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.74147 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 1 minutes 17 seconds |
| Matching memory usage | 525.04 MB |
| Alignment time | 38 seconds |
| Alignment memory usage | 47.67 MB |
| Software version | 1.6.5.11249 |
| File size | 12.93 MB |

Depth Maps

| | |
|---|----------------------|
| Count | 185 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 3 minutes 12 seconds |
| Memory usage | 2.17 GB |
| Software version | 1.6.5.11249 |
| File size | 801.55 MB |

Dense Point Cloud

| | |
|--|----------------------|
| Points | 248,267,773 |
| Point colors | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 3 minutes 12 seconds |
| Memory usage | 2.17 GB |
| Dense cloud generation parameters | |
| Processing time | 9 minutes 39 seconds |
| Memory usage | 12.16 GB |
| Software version | 1.6.5.11249 |
| File size | 3.14 GB |

DEM

| | |
|----------------------------------|--|
| Size | 18,438 x 15,721 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Processing time | 1 minutes 30 seconds |
| Memory usage | 356.33 MB |
| Software version | 1.6.5.11249 |
| File size | 518.02 MB |
| Orthomosaic | |
| Size | 27,974 x 25,370 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 3 minutes 33 seconds |
| Memory usage | 3.79 GB |
| Software version | 1.6.5.11249 |
| File size | 4.08 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-89)

Código de estudio: ITE-2022-057

16 September 2022



Survey Data

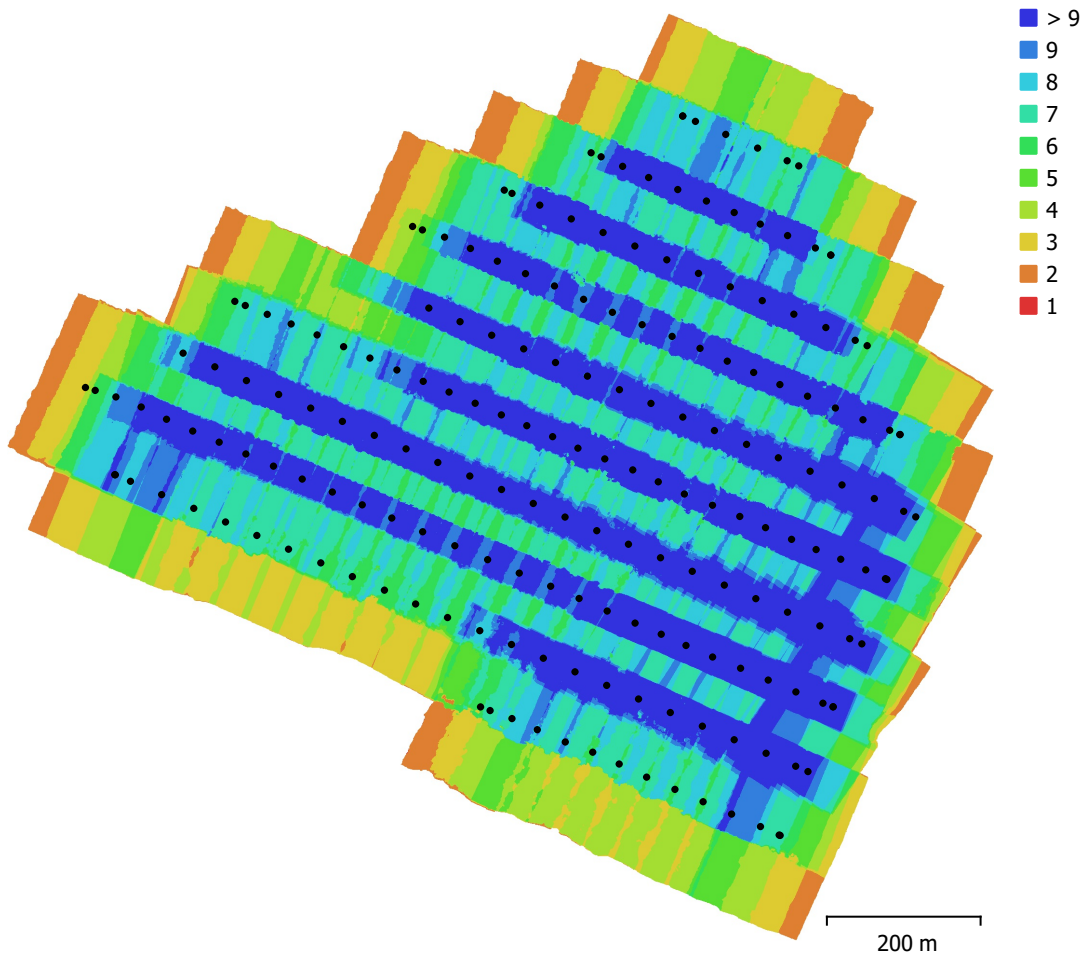


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|-----------------------|---------------------|----------|
| Number of images: | 199 | Camera stations: | 191 |
| Flying altitude: | 170 m | Tie points: | 178,413 |
| Ground resolution: | 4.18 cm/pix | Projections: | 503,137 |
| Coverage area: | 0.892 km ² | Reprojection error: | 1.01 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

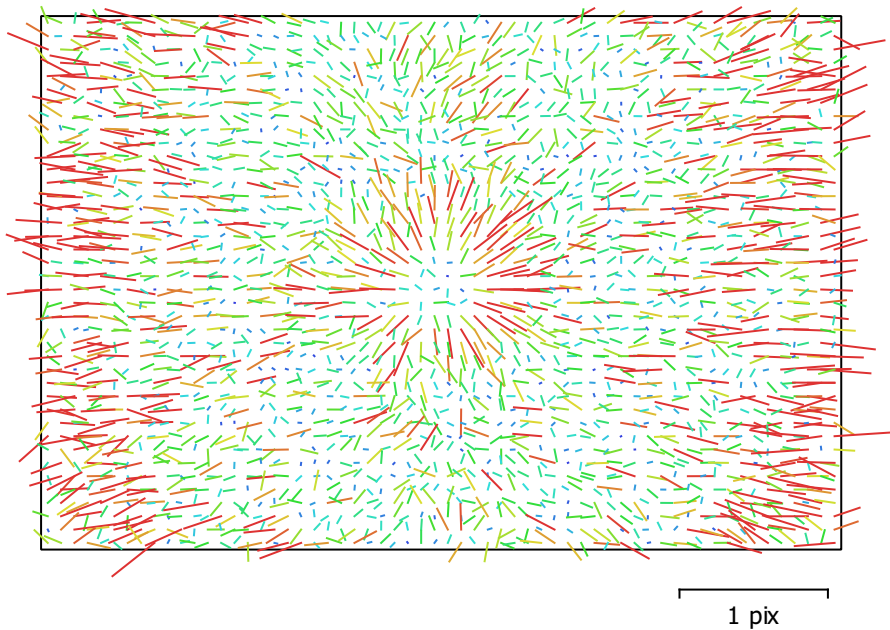


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

199 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | K1 | K2 | P1 | P2 |
|-----------|---------------------|---------|------|-------|------|-------|
| F | 3648 | | | | | |
| K1 | -0.0119539 | 0.00016 | 1.00 | -0.06 | 0.15 | -0.00 |
| K2 | 0.00938886 | 3.4e-05 | | 1.00 | 0.08 | -0.01 |
| P1 | -0.000347302 | 5.8e-06 | | | 1.00 | 0.07 |
| P2 | -0.00250611 | 6.1e-06 | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

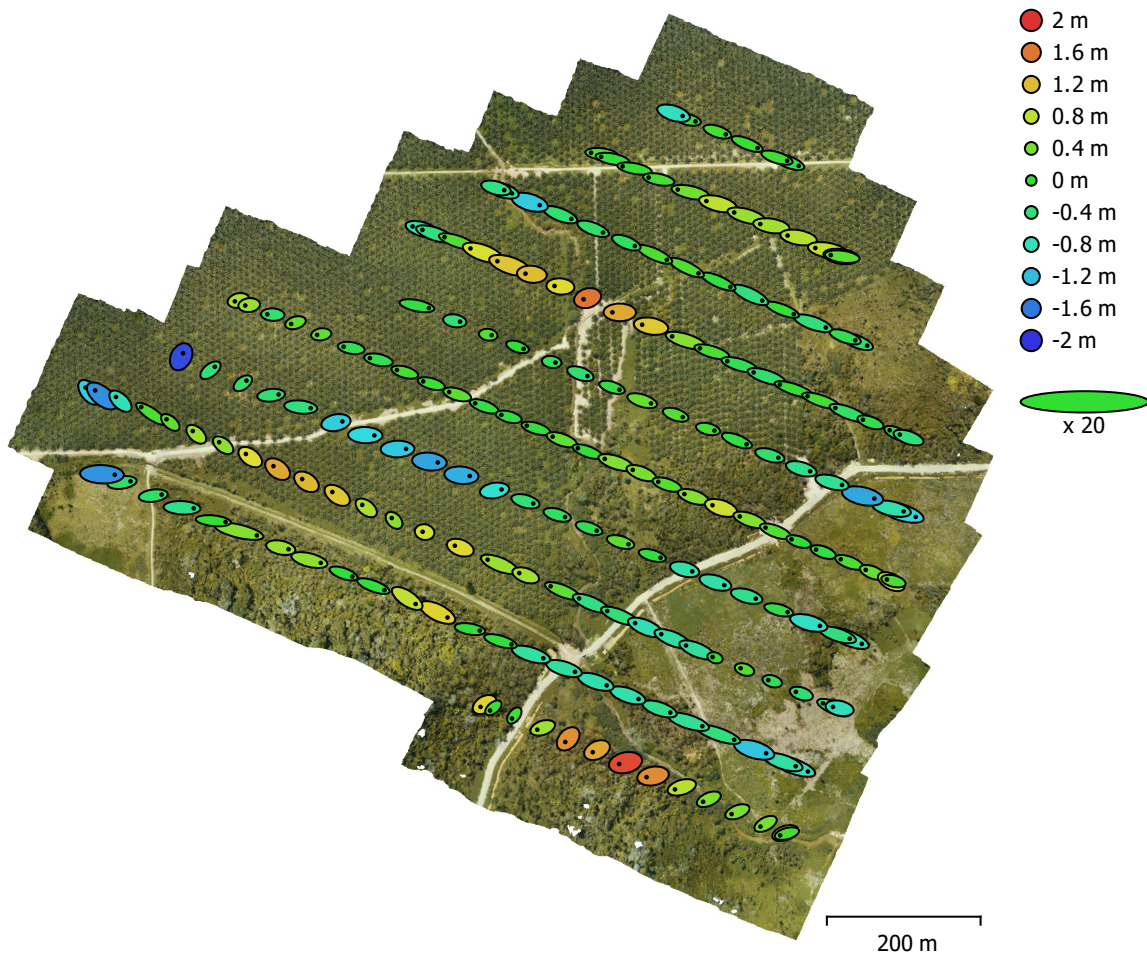


Fig. 3. Camera locations and error estimates.

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) |
|-------------|-------------|-------------|--------------|-----------------|
| 1.20214 | 0.400022 | 0.657268 | 1.26695 | 1.42729 |

Table 3. Average camera location error.

X - Longitude, Y - Latitude, Z - Altitude.

Digital Elevation Model

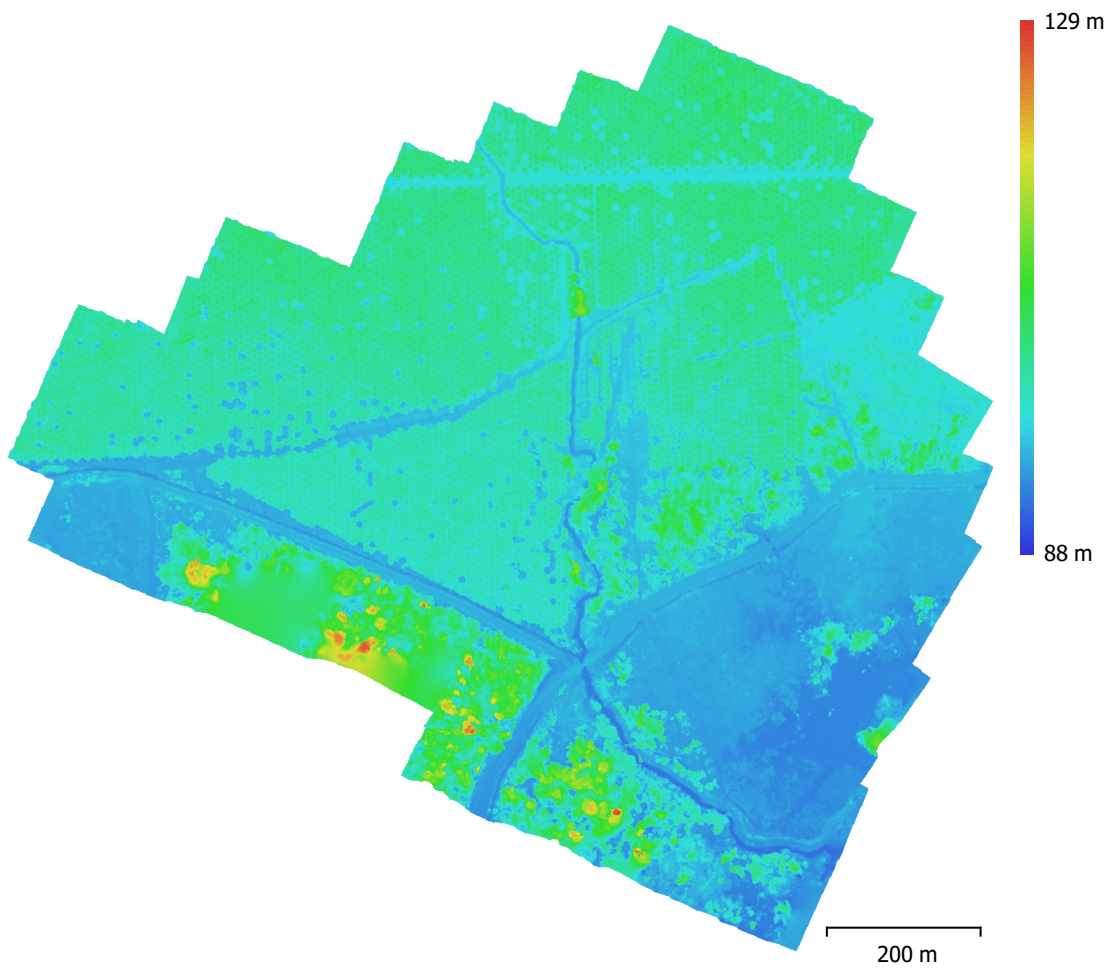


Fig. 4. Reconstructed digital elevation model.

Resolution: 8.35 cm/pix
Point density: 143 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 199 |
| Aligned cameras | 191 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|------------------------|
| Points | 178,413 of 207,739 |
| RMS reprojection error | 0.117564 (1.00875 pix) |
| Max reprojection error | 0.353727 (26.3973 pix) |
| Mean key point size | 7.35865 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.83963 |

Alignment parameters

| | |
|-------------------------------|---------------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 1 minutes 7 seconds |
| Matching memory usage | 525.17 MB |
| Alignment time | 45 seconds |
| Alignment memory usage | 48.58 MB |
| Software version | 1.6.5.11249 |
| File size | 13.71 MB |

Depth Maps

| | |
|---|----------------------|
| Count | 191 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 3 minutes 46 seconds |
| Memory usage | 2.18 GB |
| Software version | 1.6.5.11249 |
| File size | 835.92 MB |

Dense Point Cloud

| | |
|--------------|----------------|
| Points | 243,375,331 |
| Point colors | 3 bands, uint8 |

Depth maps generation parameters

| | |
|-----------------|----------------------|
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 3 minutes 46 seconds |
| Memory usage | 2.18 GB |

Dense cloud generation parameters

| | |
|------------------|-----------------------|
| Processing time | 10 minutes 13 seconds |
| Memory usage | 12.56 GB |
| Software version | 1.6.5.11249 |
| File size | 3.08 GB |

DEM

| | |
|----------------------------------|--|
| Size | 23,064 x 20,106 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Processing time | 1 minutes 40 seconds |
| Memory usage | 356.97 MB |
| Software version | 1.6.5.11249 |
| File size | 560.40 MB |
| Orthomosaic | |
| Size | 30,739 x 28,871 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 4 minutes 16 seconds |
| Memory usage | 5.30 GB |
| Software version | 1.6.5.11249 |
| File size | 4.36 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-90)

Código de estudio: ITE-2022-057

16 September 2022



Survey Data

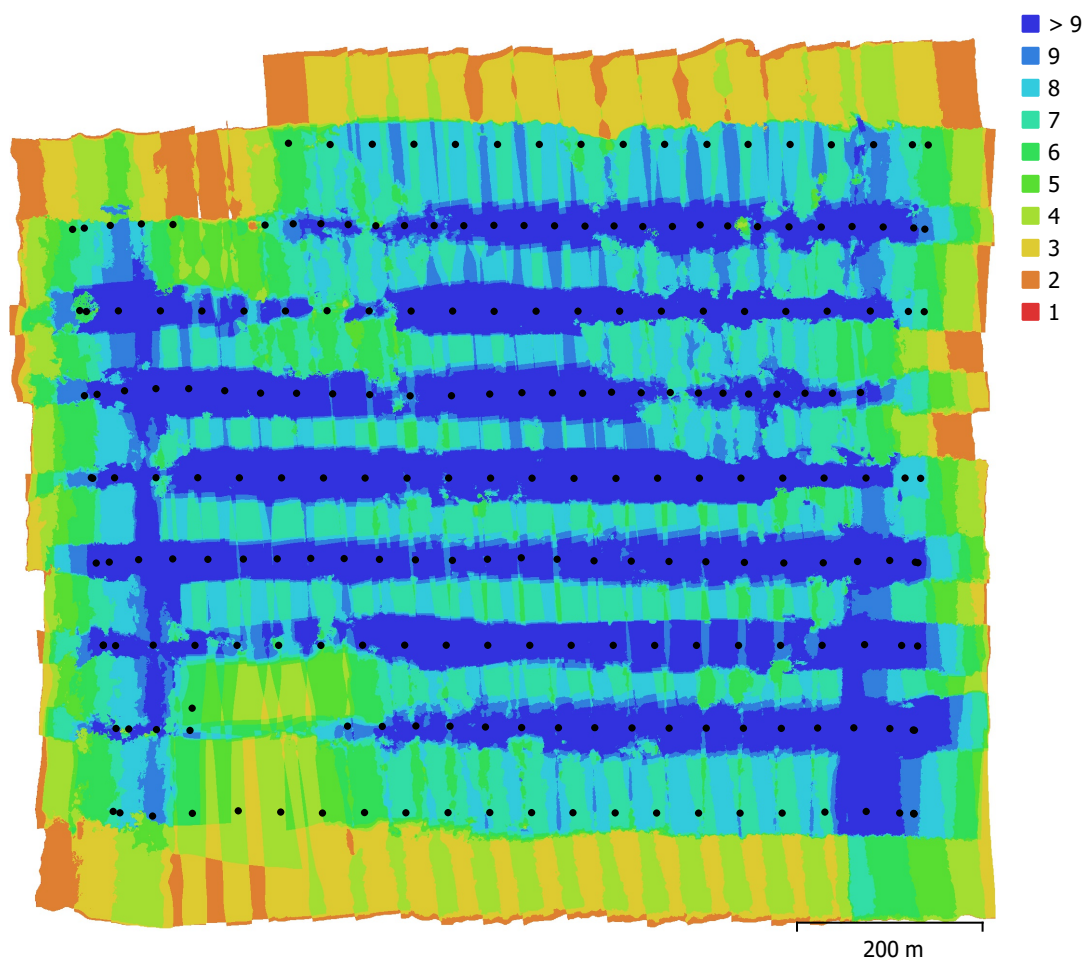


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|-----------------------|---------------------|-----------|
| Number of images: | 228 | Camera stations: | 214 |
| Flying altitude: | 169 m | Tie points: | 171,554 |
| Ground resolution: | 4.11 cm/pix | Projections: | 433,157 |
| Coverage area: | 0.947 km ² | Reprojection error: | 0.992 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|----------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μm | No |

Table 1. Cameras.

Camera Calibration

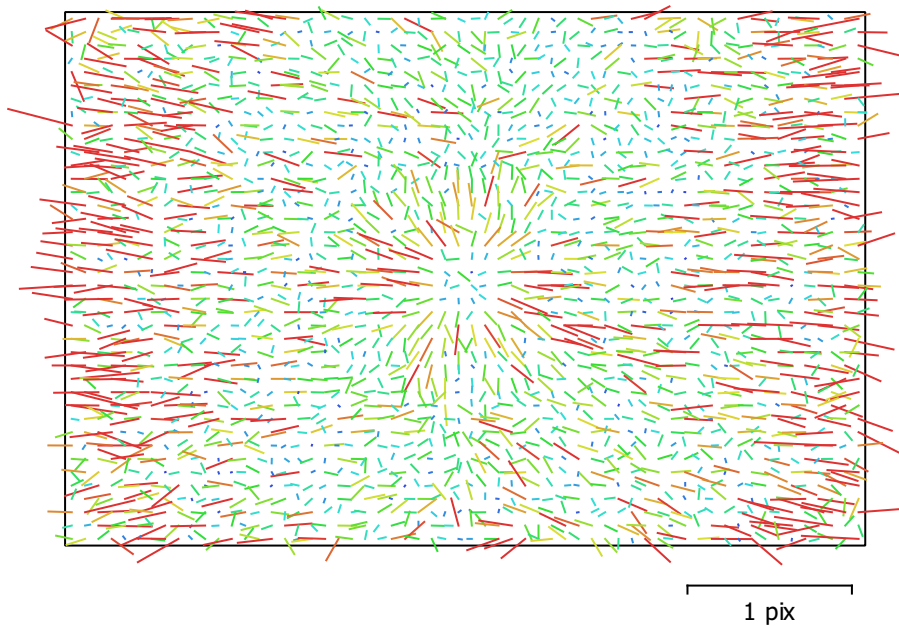


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

228 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | K1 | K2 | P1 | P2 |
|-----------|--------------------|---------|------|-------|-------|-------|
| F | 3648 | | | | | |
| K1 | -0.014615 | 0.00015 | 1.00 | -0.20 | -0.10 | 0.26 |
| K2 | 0.00918023 | 4.4e-05 | | 1.00 | 0.07 | -0.00 |
| P1 | -0.00118289 | 7.2e-06 | | | 1.00 | -0.13 |
| P2 | -0.00122538 | 9.7e-06 | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

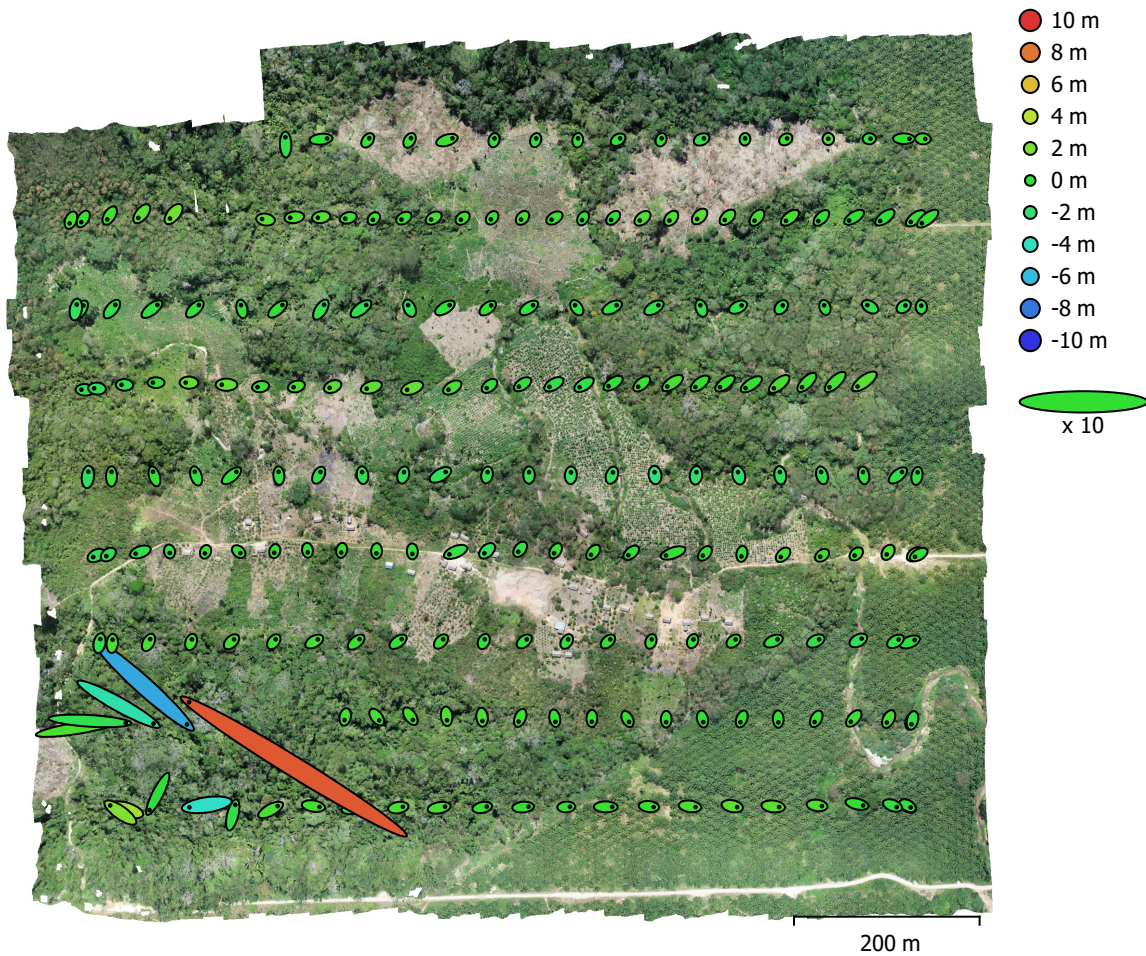


Fig. 3. Camera locations and error estimates.

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) |
|-------------|-------------|-------------|--------------|-----------------|
| 2.04506 | 1.31991 | 1.08494 | 2.43402 | 2.66487 |

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

Digital Elevation Model

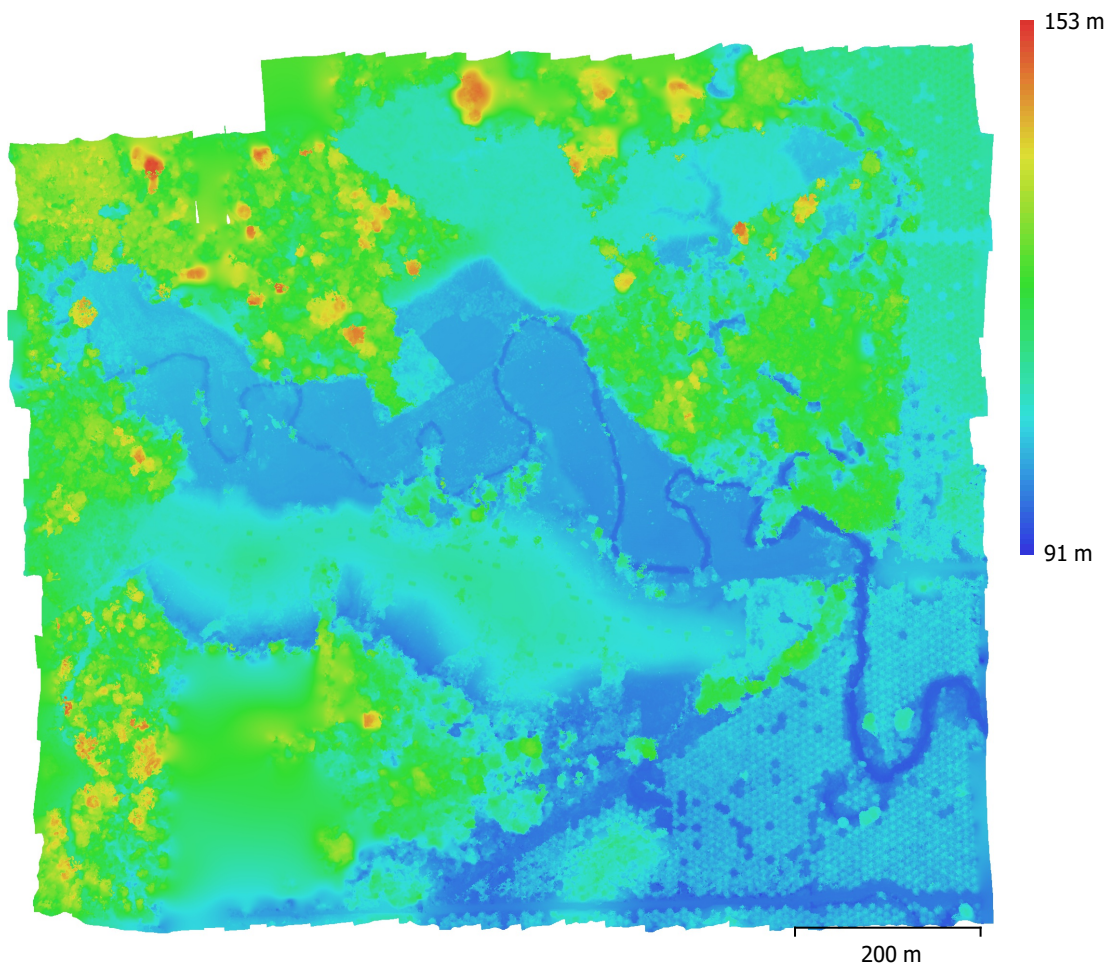


Fig. 4. Reconstructed digital elevation model.

Resolution: 8.22 cm/pix
Point density: 148 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 228 |
| Aligned cameras | 214 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|-------------------------|
| Points | 171,554 of 191,991 |
| RMS reprojection error | 0.104053 (0.992384 pix) |
| Max reprojection error | 0.313009 (24.6087 pix) |
| Mean key point size | 8.1567 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.55232 |

Alignment parameters

| | |
|-------------------------------|---------------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 1 minutes 0 seconds |
| Matching memory usage | 502.46 MB |
| Alignment time | 40 seconds |
| Alignment memory usage | 43.59 MB |
| Software version | 1.6.5.11249 |
| File size | 11.98 MB |

Depth Maps

| | |
|---|----------------------|
| Count | 210 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 3 minutes 36 seconds |
| Memory usage | 1.64 GB |
| Software version | 1.6.5.11249 |
| File size | 823.05 MB |

Dense Point Cloud

| | |
|--|----------------------|
| Points | 233,778,286 |
| Point colors | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 3 minutes 36 seconds |
| Memory usage | 1.64 GB |
| Dense cloud generation parameters | |
| Processing time | 9 minutes 25 seconds |
| Memory usage | 11.55 GB |
| Software version | 1.6.5.11249 |
| File size | 2.96 GB |

DEM

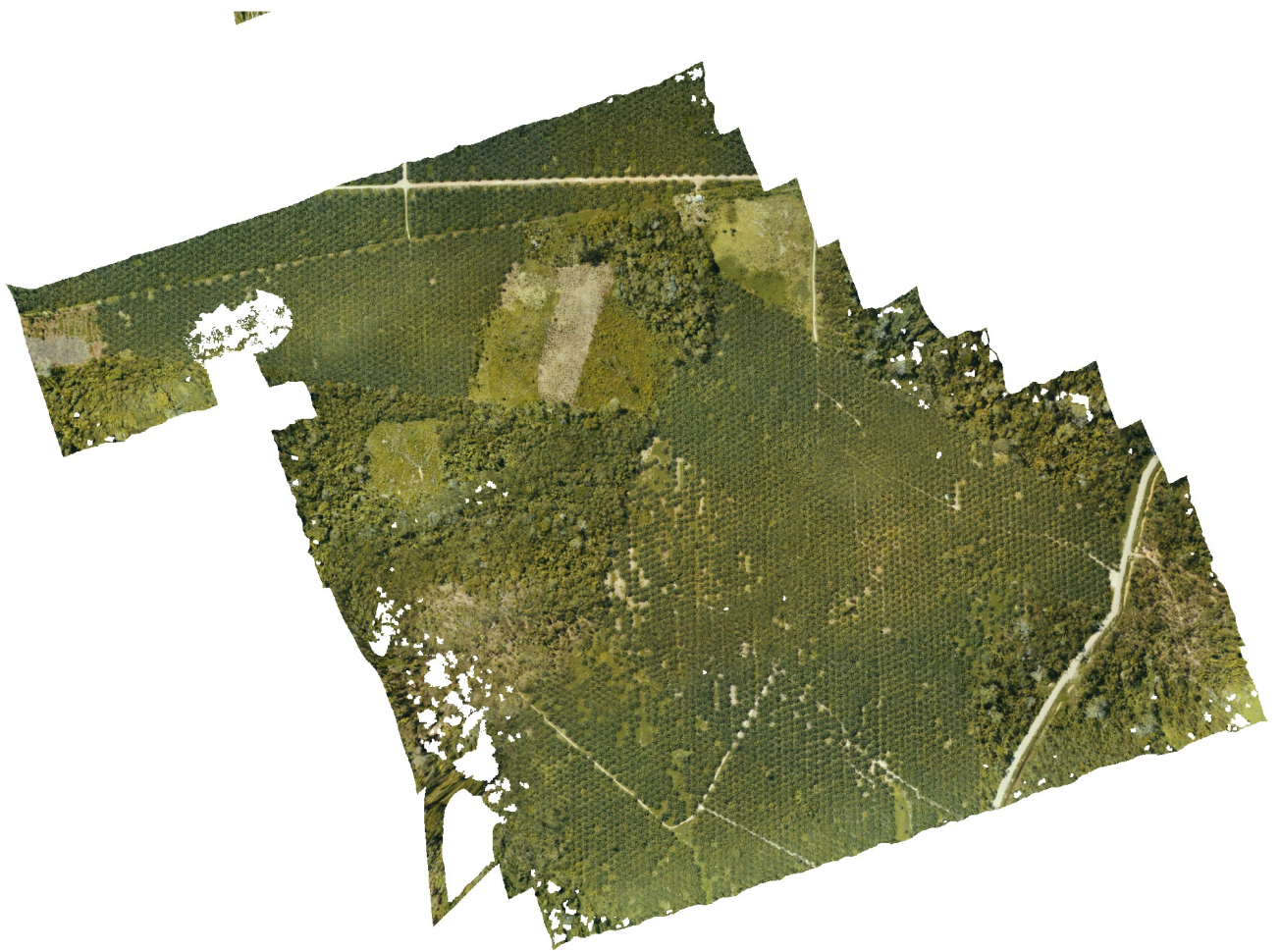
| | |
|----------------------------------|--|
| Size | 19,567 x 14,397 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Processing time | 1 minutes 30 seconds |
| Memory usage | 349.70 MB |
| Software version | 1.6.5.11249 |
| File size | 628.65 MB |
| Orthomosaic | |
| Size | 25,879 x 23,341 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 4 minutes 5 seconds |
| Memory usage | 3.83 GB |
| Software version | 1.6.5.11249 |
| File size | 5.60 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-91)

Código de estudio: ITE-2022-057

16 September 2022



Survey Data

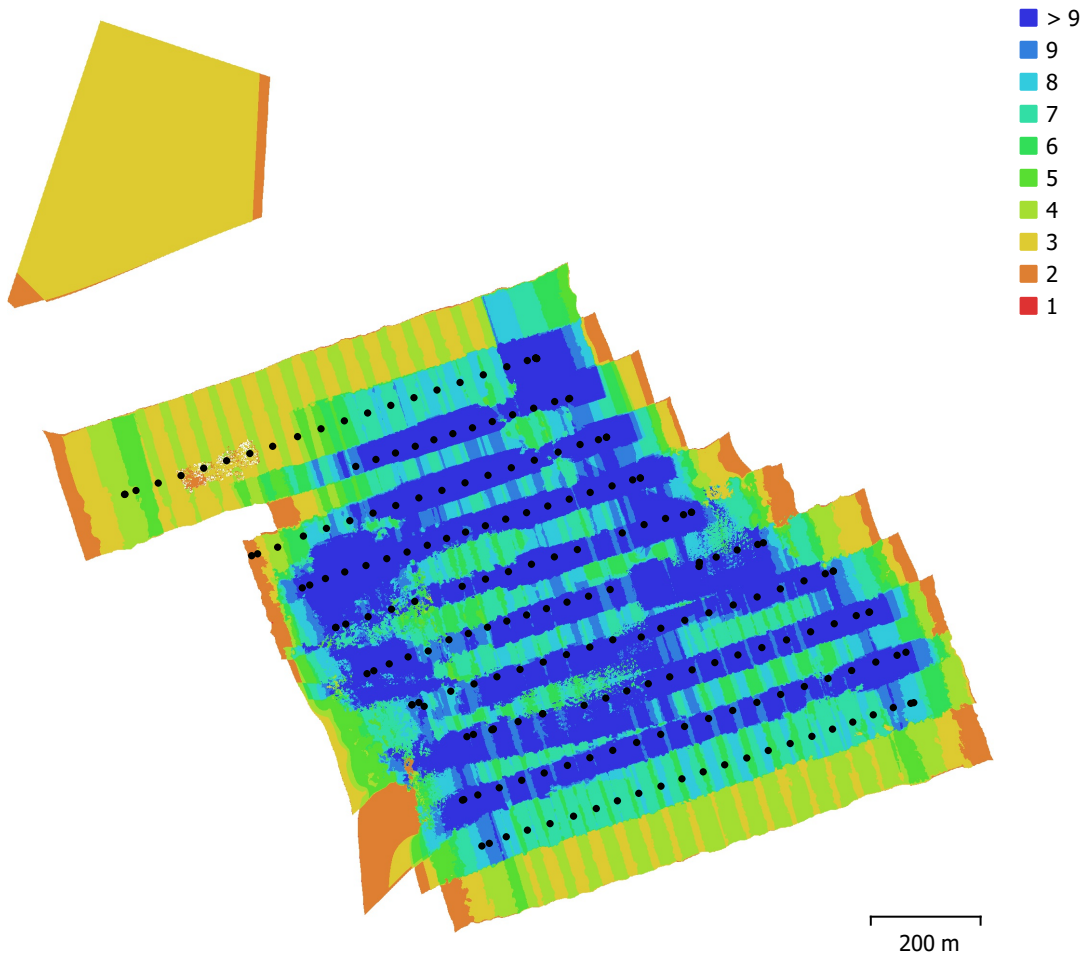


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|----------------------|---------------------|----------|
| Number of images: | 219 | Camera stations: | 207 |
| Flying altitude: | 179 m | Tie points: | 138,000 |
| Ground resolution: | 4.38 cm/pix | Projections: | 358,014 |
| Coverage area: | 1.26 km ² | Reprojection error: | 1.05 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

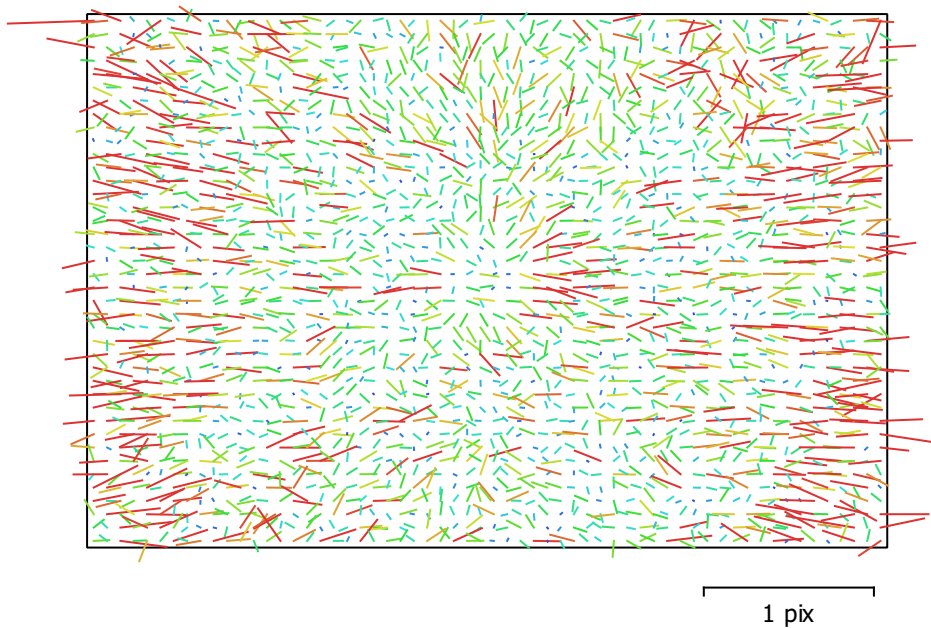


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

219 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | K1 | K2 | P1 | P2 |
|-----------|---------------------|---------|------|-------|------|-------|
| F | 3648 | | | | | |
| K1 | -0.0435357 | 0.00023 | 1.00 | -0.50 | 0.10 | -0.03 |
| K2 | 0.0115688 | 7.5e-05 | | 1.00 | 0.03 | -0.00 |
| P1 | -0.000826209 | 1.7e-05 | | | 1.00 | 0.16 |
| P2 | -0.00227571 | 1.6e-05 | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

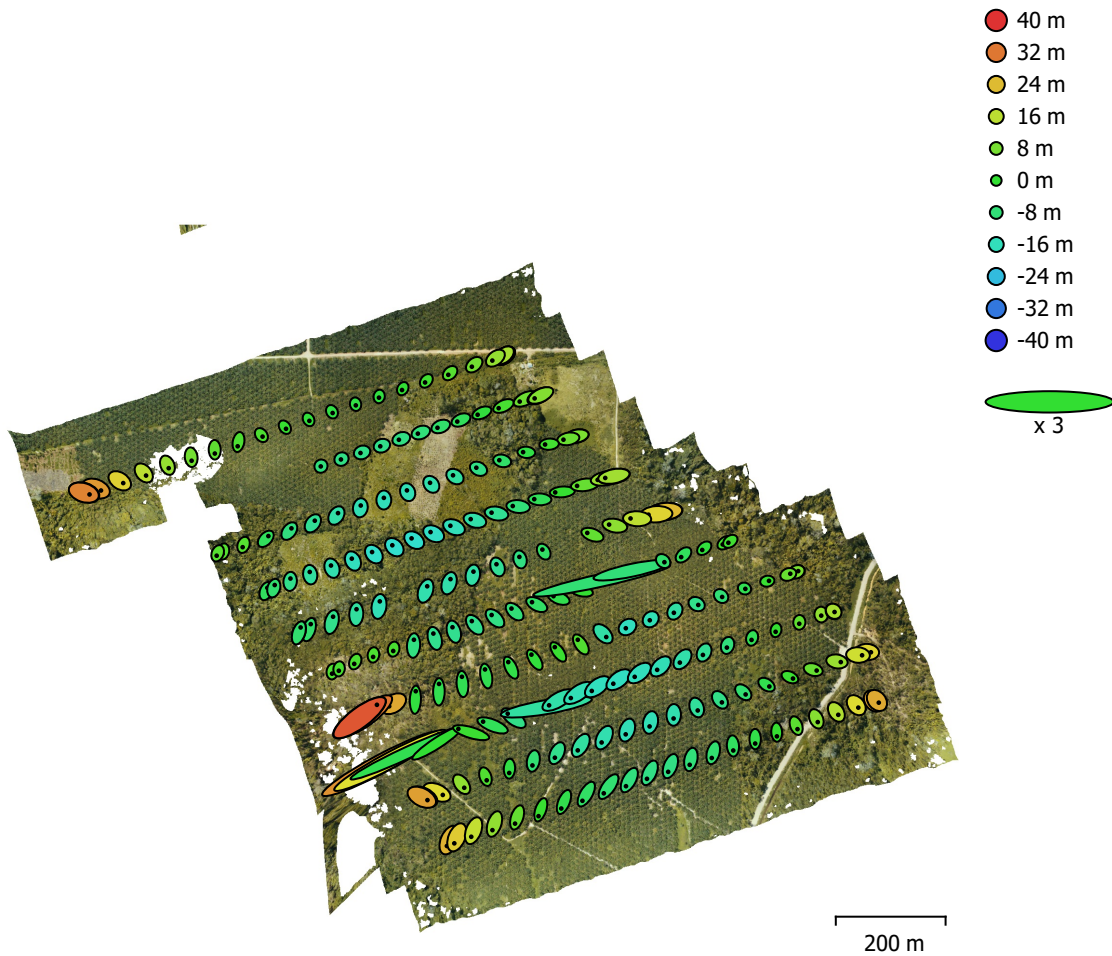


Fig. 3. Camera locations and error estimates.

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 (m) | Y error (m) | Z error (m) | XY error (m) | Total error (m) |
|-------------|-------------|-------------|--------------|-----------------|
| 11.2238 | 5.99122 | 12.6951 | 12.7228 | 17.9732 |

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

Digital Elevation Model

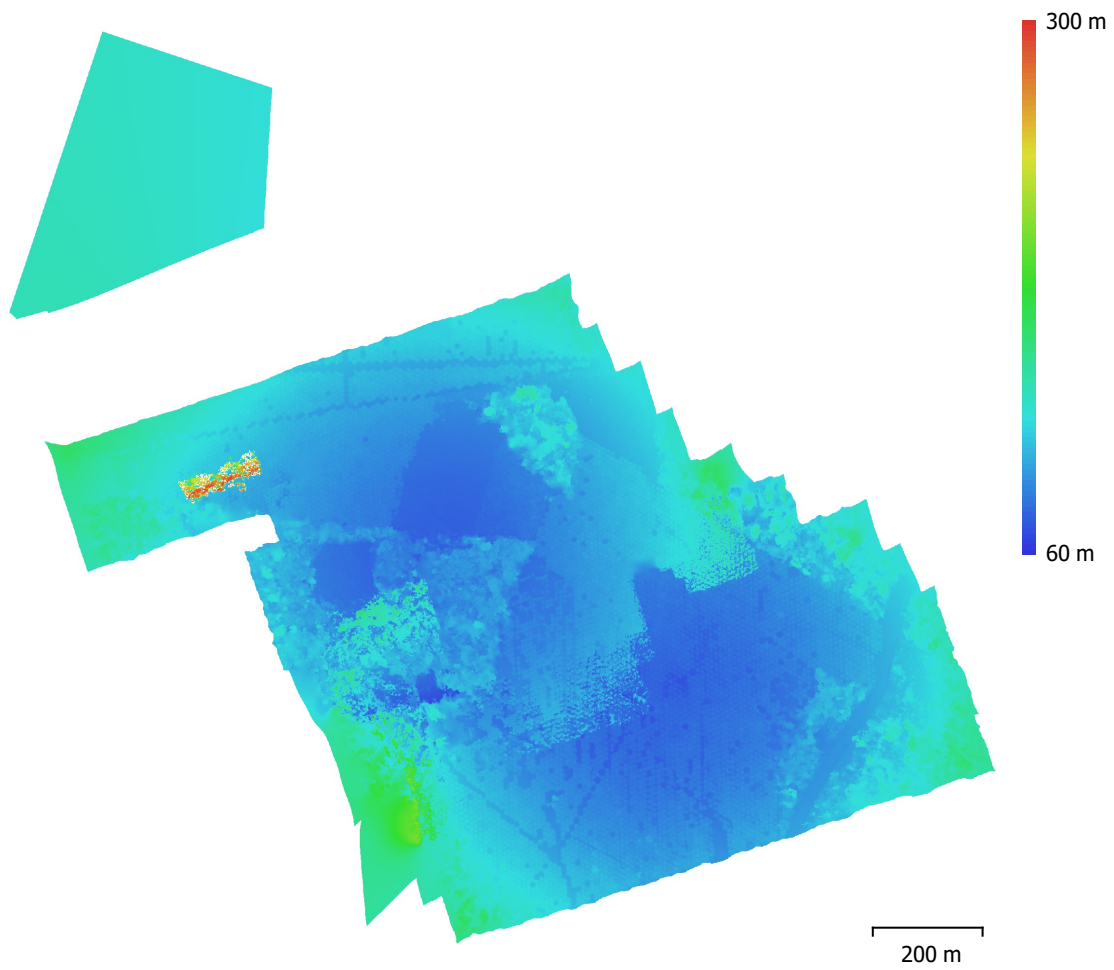


Fig. 4. Reconstructed digital elevation model.

Resolution: 8.76 cm/pix
Point density: 130 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 219 |
| Aligned cameras | 207 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|------------------------|
| Points | 138,000 of 167,646 |
| RMS reprojection error | 0.114622 (1.05406 pix) |
| Max reprojection error | 0.346622 (32.8445 pix) |
| Mean key point size | 7.86833 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.5764 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 1 minutes 12 seconds |
| Matching memory usage | 550.52 MB |
| Alignment time | 41 seconds |
| Alignment memory usage | 30.16 MB |
| Software version | 1.6.5.11249 |
| File size | 10.26 MB |

Depth Maps

| | |
|---|----------------------|
| Count | 199 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 2 minutes 38 seconds |
| Memory usage | 1.65 GB |
| Software version | 1.6.5.11249 |
| File size | 785.19 MB |

Dense Point Cloud

| | |
|--------------|----------------|
| Points | 293,942,056 |
| Point colors | 3 bands, uint8 |

Depth maps generation parameters

| | |
|-----------------|----------------------|
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 2 minutes 38 seconds |
| Memory usage | 1.65 GB |

Dense cloud generation parameters

| | |
|------------------|-----------------------|
| Processing time | 10 minutes 22 seconds |
| Memory usage | 11.91 GB |
| Software version | 1.6.5.11249 |
| File size | 3.71 GB |

DEM

| | |
|----------------------------------|--|
| Size | 29,239 x 23,819 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Processing time | 2 minutes 6 seconds |
| Memory usage | 345.93 MB |
| Software version | 1.6.5.11249 |
| File size | 742.29 MB |
| Orthomosaic | |
| Size | 41,025 x 37,931 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 6 minutes 37 seconds |
| Memory usage | 5.24 GB |
| Software version | 1.6.5.11249 |
| File size | 4.58 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-92)

Código de estudio: ITE-2022-057

16 September 2022



Survey Data

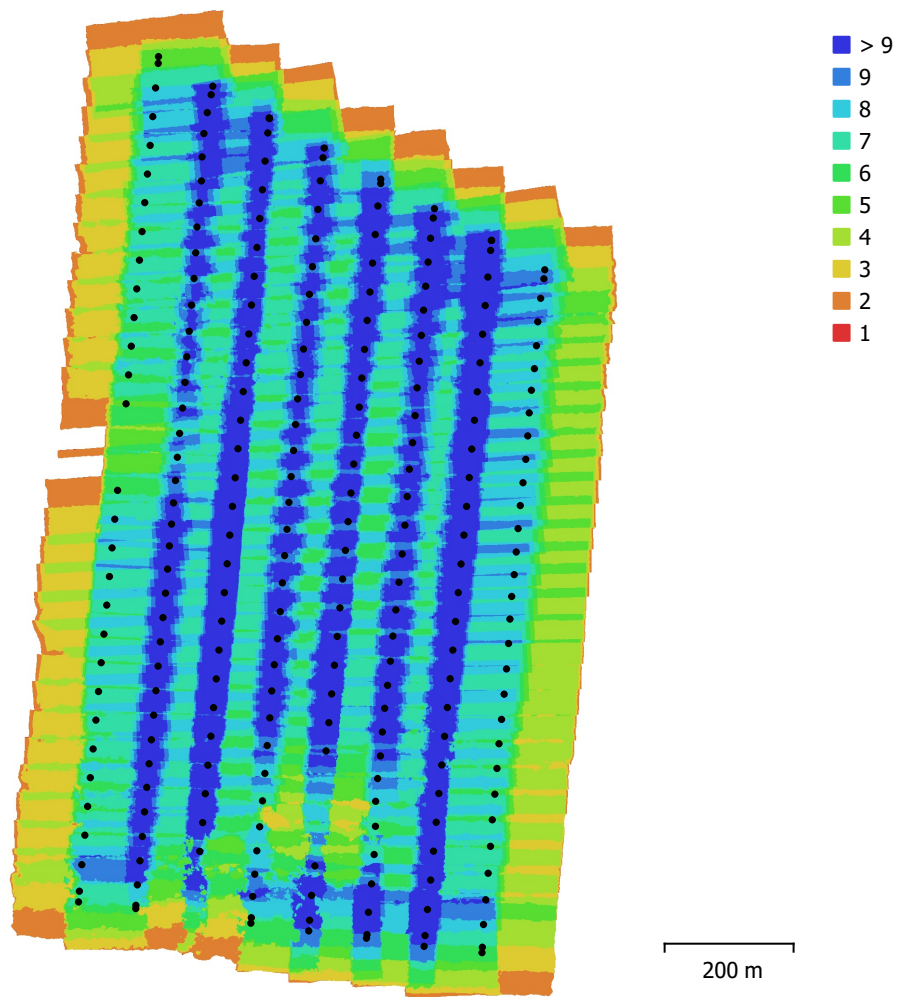


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|----------------------|---------------------|----------|
| Number of images: | 253 | Camera stations: | 243 |
| Flying altitude: | 166 m | Tie points: | 207,103 |
| Ground resolution: | 4.09 cm/pix | Projections: | 486,767 |
| Coverage area: | 1.13 km ² | Reprojection error: | 1.15 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

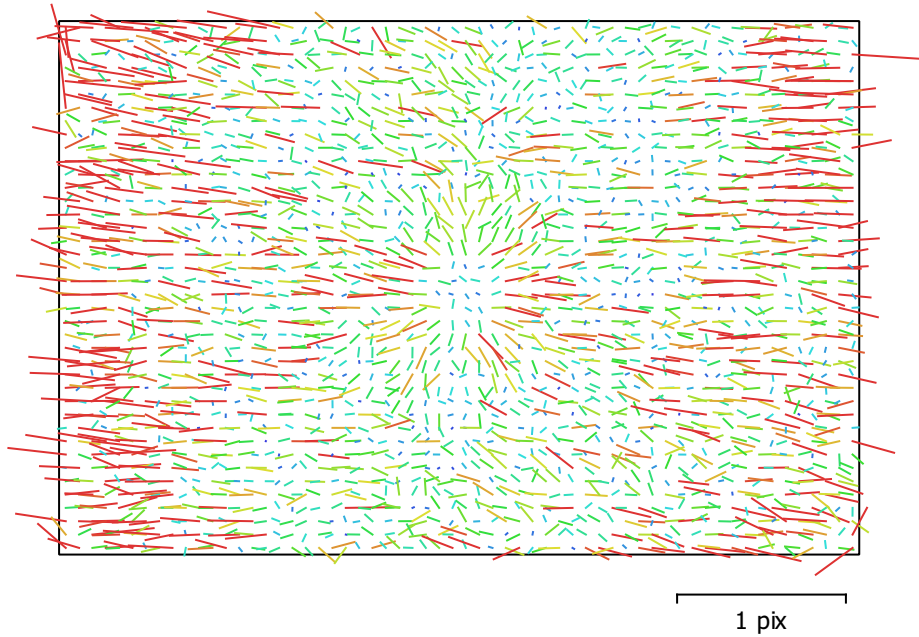


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

253 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | K1 | K2 | P1 | P2 |
|-----------|--------------------|---------|------|-------|-------|-------|
| F | 3648 | | | | | |
| K1 | -0.0146298 | 0.00011 | 1.00 | -0.29 | -0.09 | 0.19 |
| K2 | 0.00965424 | 4.4e-05 | | 1.00 | 0.04 | -0.02 |
| P1 | -0.00121176 | 7.8e-06 | | | 1.00 | -0.13 |
| P2 | -0.00148767 | 1e-05 | | | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

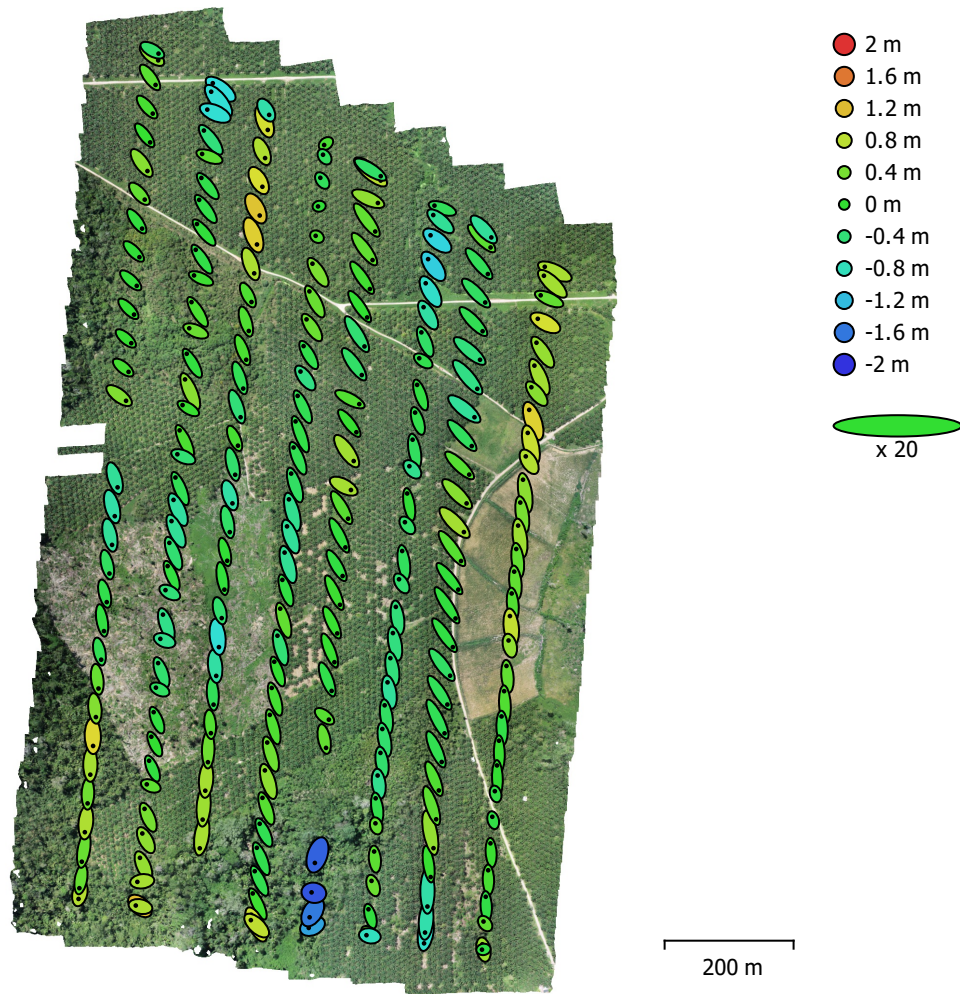


Fig. 3. Camera locations and error estimates.

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 (m) | Y error (m) | Z error (m) | XY error (m) | Total error (m) |
|-------------|-------------|-------------|--------------|-----------------|
| 0.772223 | 1.4068 | 0.501484 | 1.60481 | 1.68134 |

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

Digital Elevation Model

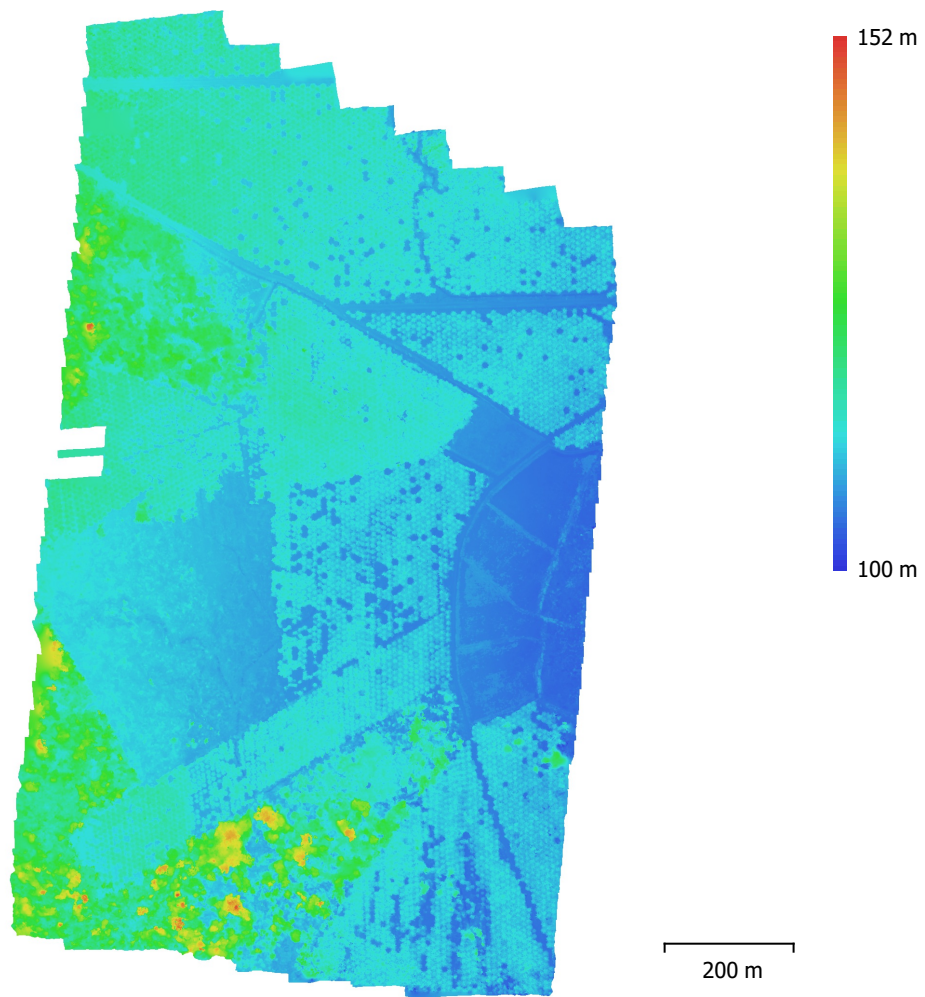


Fig. 4. Reconstructed digital elevation model.

Resolution: 8.19 cm/pix
Point density: 149 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 253 |
| Aligned cameras | 243 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|------------------------|
| Points | 207,103 of 224,335 |
| RMS reprojection error | 0.107596 (1.15447 pix) |
| Max reprojection error | 0.322882 (46.0448 pix) |
| Mean key point size | 8.54914 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.38023 |

Alignment parameters

| | |
|-------------------------------|----------------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 1 minutes 17 seconds |
| Matching memory usage | 521.88 MB |
| Alignment time | 43 seconds |
| Alignment memory usage | 48.20 MB |
| Software version | 1.6.5.11249 |
| File size | 13.56 MB |

Depth Maps

| | |
|---|----------------------|
| Count | 243 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 3 minutes 47 seconds |
| Memory usage | 1.60 GB |
| Software version | 1.6.5.11249 |
| File size | 1003.72 MB |

Dense Point Cloud

| | |
|--------------|----------------|
| Points | 342,294,358 |
| Point colors | 3 bands, uint8 |

Depth maps generation parameters

| | |
|-----------------|----------------------|
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 3 minutes 47 seconds |
| Memory usage | 1.60 GB |

Dense cloud generation parameters

| | |
|------------------|-----------------------|
| Processing time | 12 minutes 32 seconds |
| Memory usage | 12.64 GB |
| Software version | 1.6.5.11249 |
| File size | 4.32 GB |

DEM

| | |
|----------------------------------|--|
| Size | 18,340 x 26,646 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Processing time | 2 minutes 4 seconds |
| Memory usage | 360.02 MB |
| Software version | 1.6.5.11249 |
| File size | 750.23 MB |
| Orthomosaic | |
| Size | 23,009 x 37,375 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 4 minutes 44 seconds |
| Memory usage | 3.51 GB |
| Software version | 1.6.5.11249 |
| File size | 6.72 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |

RSPF-0134-2022-ITEGI

Zona: Área de expansión agrícola de la UF Fundo Zanja Seca (FT-OU-93)
Código de estudio: ITE-2022-057

16 September 2022



Survey Data

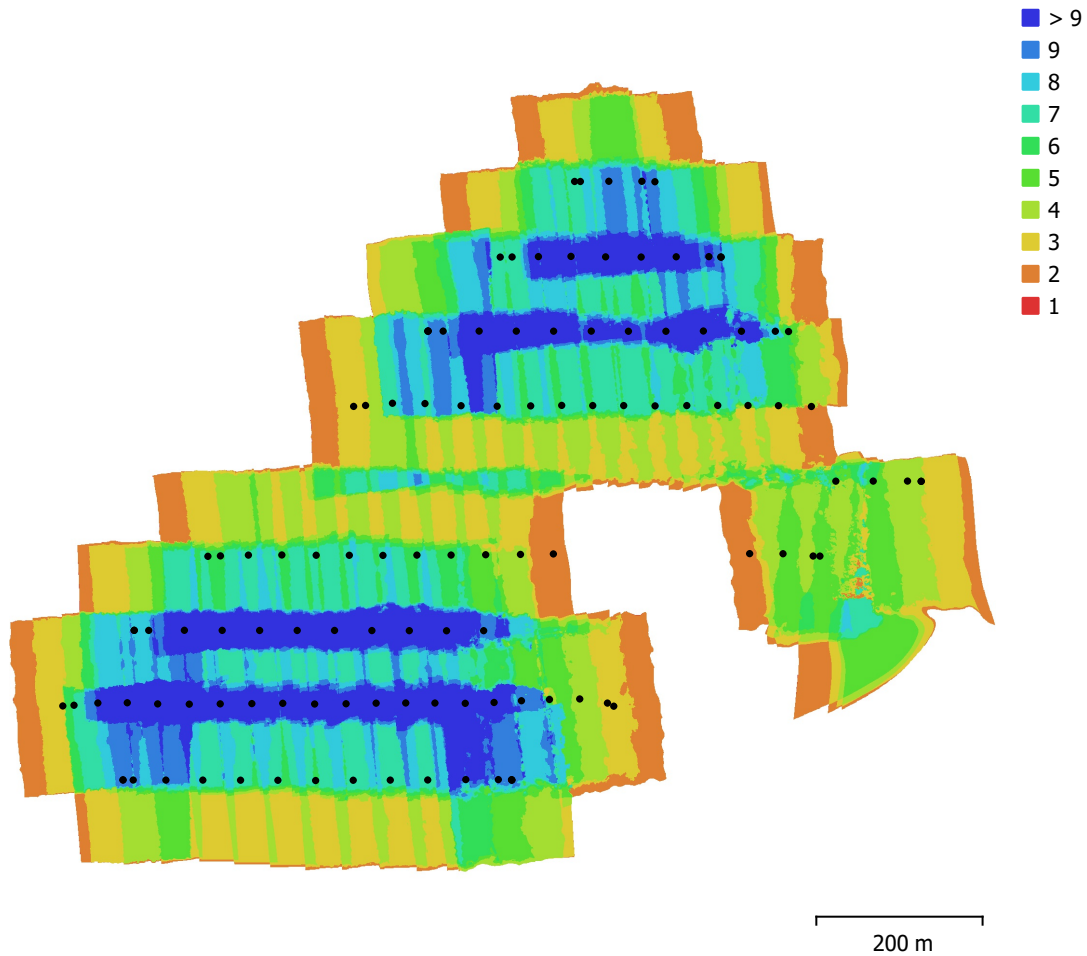


Fig. 1. Camera locations and image overlap.

| | | | |
|--------------------|----------------------|---------------------|----------|
| Number of images: | 147 | Camera stations: | 115 |
| Flying altitude: | 162 m | Tie points: | 84,801 |
| Ground resolution: | 3.91 cm/pix | Projections: | 207,628 |
| Coverage area: | 0.61 km ² | Reprojection error: | 1.08 pix |

| Camera Model | Resolution | Focal Length | Pixel Size | Precalibrated |
|-----------------|-------------|--------------|---------------------|---------------|
| FC6310S (8.8mm) | 5472 x 3648 | 8.8 mm | 2.41 x 2.41 μ m | No |

Table 1. Cameras.

Camera Calibration

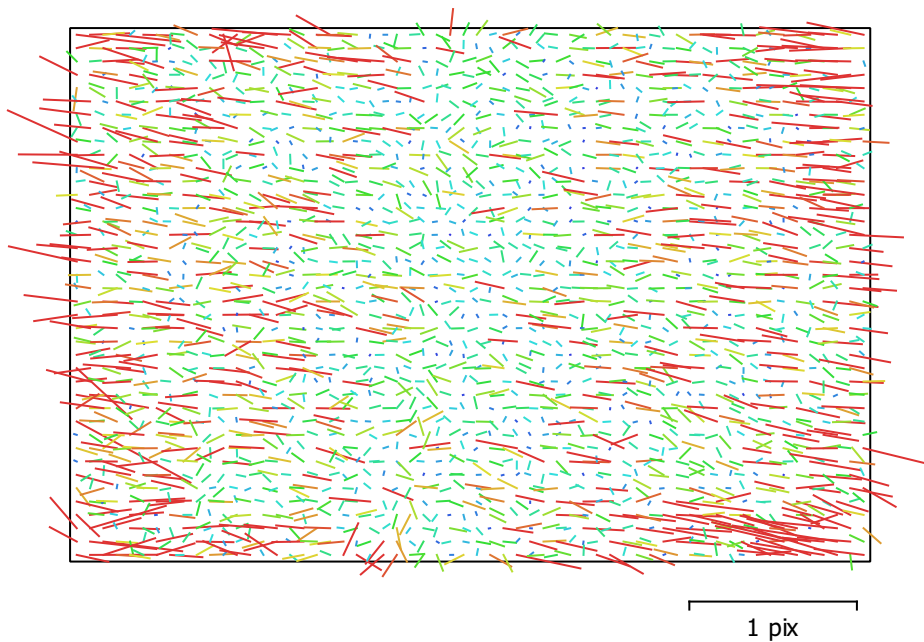


Fig. 2. Image residuals for FC6310S (8.8mm).

FC6310S (8.8mm)

147 images

Type
Frame

Resolution
5472 x 3648

Focal Length
8.8 mm

Pixel Size
2.41 x 2.41 μm

| | Value | Error | P1 | P2 |
|-----------|---------------------|---------|------|-------|
| F | 3648 | | | |
| P1 | -0.00106568 | 2.5e-05 | 1.00 | -0.13 |
| P2 | -0.000769696 | 4.3e-05 | | 1.00 |

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

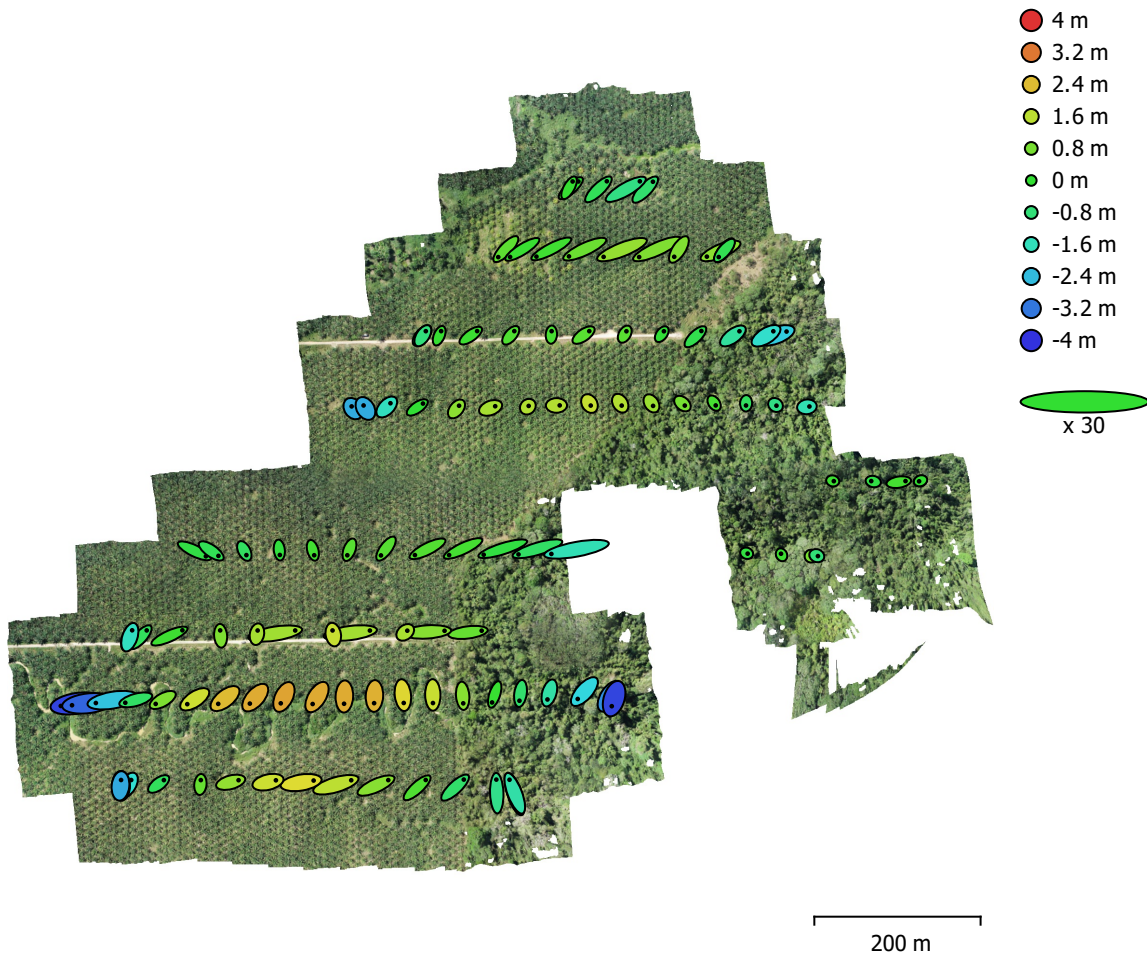


Fig. 3. Camera locations and error estimates.

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 (m) | Y error (m) | Z error (m) | XY error (m) | Total error (m) |
|-------------|-------------|-------------|--------------|-----------------|
| 0.672486 | 0.452889 | 1.3971 | 0.810769 | 1.61532 |

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

Digital Elevation Model

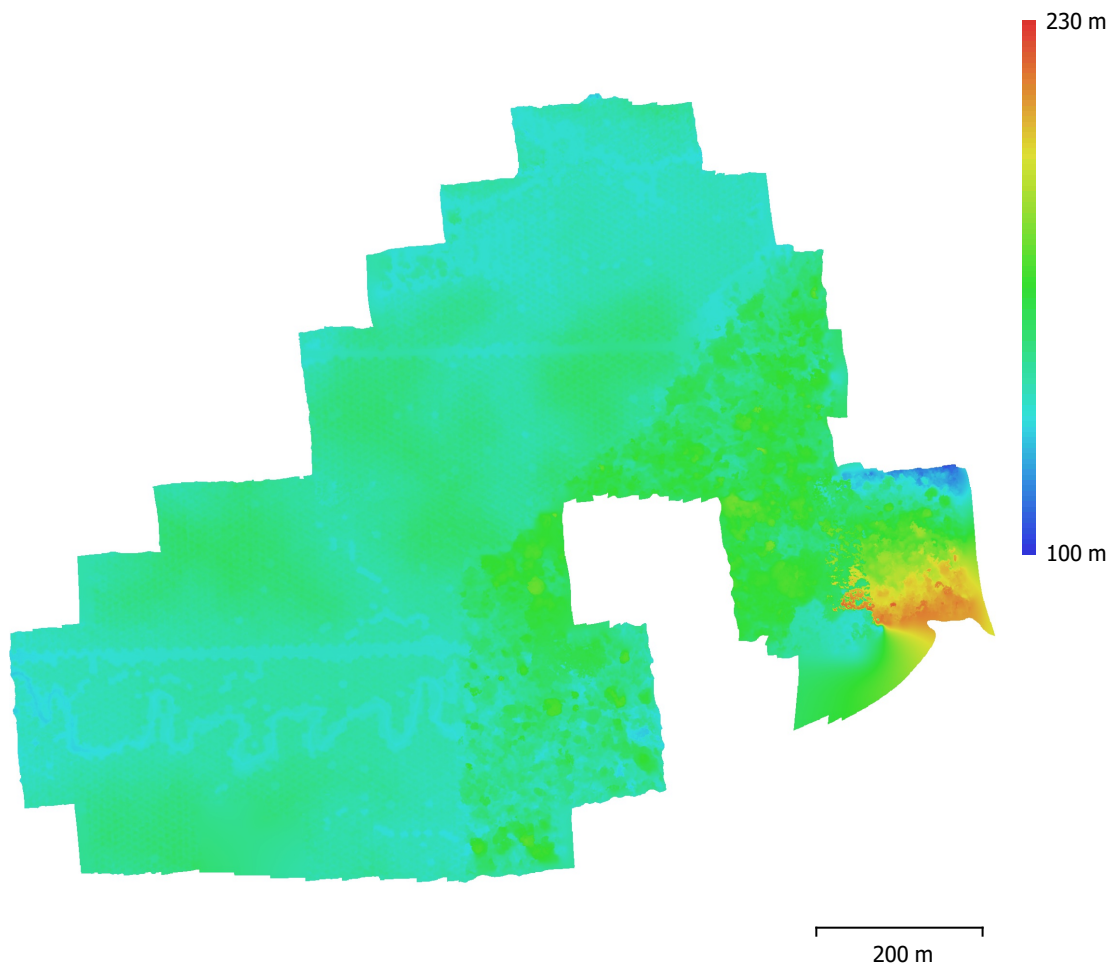


Fig. 4. Reconstructed digital elevation model.

Resolution: 7.81 cm/pix
Point density: 164 points/m²

Processing Parameters

General

| | |
|-------------------|---------------------|
| Cameras | 147 |
| Aligned cameras | 115 |
| Coordinate system | WGS 84 (EPSG::4326) |
| Rotation angles | Yaw, Pitch, Roll |

Point Cloud

| | |
|--------------------------------|------------------------|
| Points | 84,801 of 124,154 |
| RMS reprojection error | 0.102093 (1.08273 pix) |
| Max reprojection error | 0.305599 (29.0723 pix) |
| Mean key point size | 8.77531 pix |
| Point colors | 3 bands, uint8 |
| Key points | No |
| Average tie point multiplicity | 2.40178 |

Alignment parameters

| | |
|-------------------------------|-------------|
| Accuracy | Medium |
| Generic preselection | Yes |
| Reference preselection | Estimated |
| Key point limit | 60,000 |
| Tie point limit | 6,000 |
| Guided image matching | No |
| Adaptive camera model fitting | Yes |
| Matching time | 40 seconds |
| Matching memory usage | 518.75 MB |
| Alignment time | 19 seconds |
| Alignment memory usage | 21.79 MB |
| Software version | 1.6.5.11249 |
| File size | 6.87 MB |

Depth Maps

| | |
|---|----------------------|
| Count | 115 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 1 minutes 39 seconds |
| Memory usage | 1.71 GB |
| Software version | 1.6.5.11249 |
| File size | 449.15 MB |

Dense Point Cloud

| | |
|--|----------------------|
| Points | 197,858,368 |
| Point colors | 3 bands, uint8 |
| Depth maps generation parameters | |
| Quality | High |
| Filtering mode | Aggressive |
| Processing time | 1 minutes 39 seconds |
| Memory usage | 1.71 GB |
| Dense cloud generation parameters | |
| Processing time | 6 minutes 17 seconds |
| Memory usage | 10.77 GB |
| Software version | 1.6.5.11249 |
| File size | 2.50 GB |

DEM

| | |
|----------------------------------|--|
| Size | 23,759 x 23,498 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Reconstruction parameters | |
| Source data | Dense cloud |
| Interpolation | Enabled |
| Processing time | 1 minutes 19 seconds |
| Memory usage | 348.77 MB |
| Software version | 1.6.5.11249 |
| File size | 432.77 MB |
| Orthomosaic | |
| Size | 30,390 x 24,294 |
| Coordinate system | WGS 84 / UTM zone 18S (EPSG::32718) |
| Colors | 3 bands, uint8 |
| Reconstruction parameters | |
| Blending mode | Mosaic |
| Surface | DEM |
| Enable hole filling | Yes |
| Processing time | 2 minutes 43 seconds |
| Memory usage | 3.68 GB |
| Software version | 1.6.5.11249 |
| File size | 3.24 GB |
| System | |
| Software name | Agisoft Metashape Professional |
| Software version | 1.6.5 build 11249 |
| OS | Windows 64 bit |
| RAM | 255.89 GB |
| CPU | AMD Ryzen Threadripper 3970X 32-Core Processor |
| GPU(s) | Quadro RTX 4000 Quadro RTX 4000 |