

# Agisoft Metashape

Processing Report

15 April 2021



# Survey Data

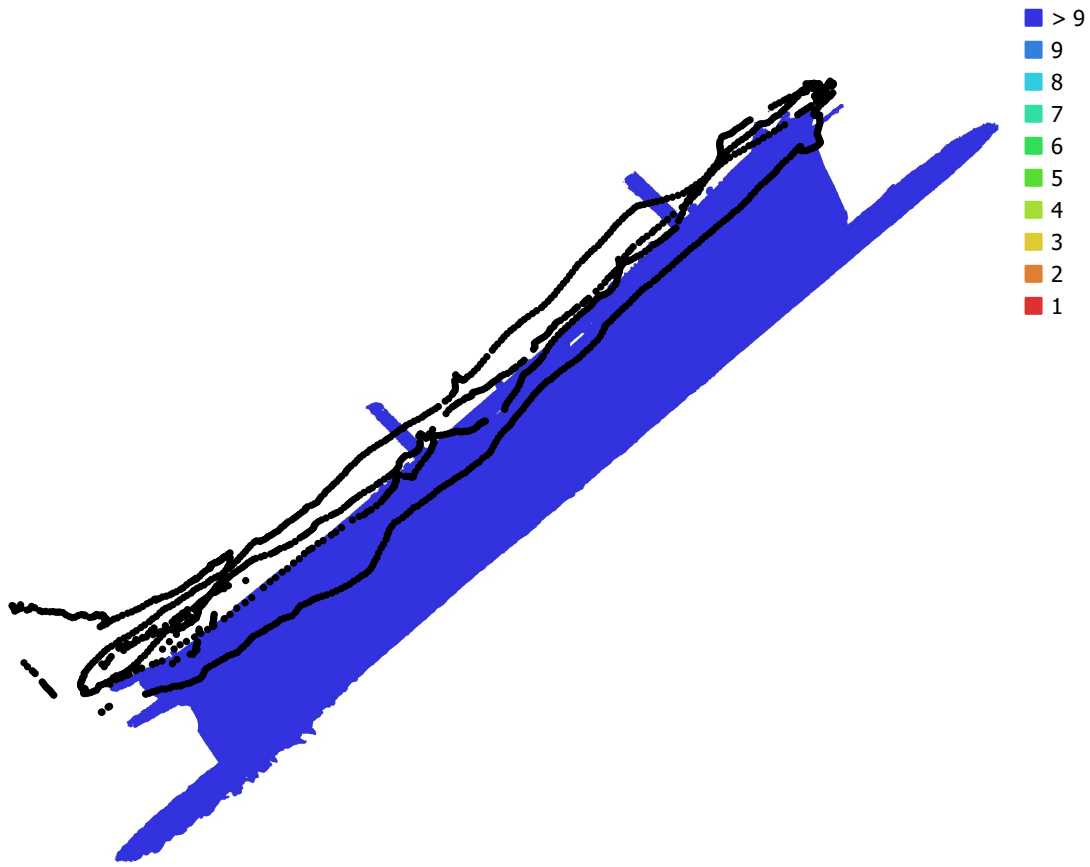


Fig. 1. Camera locations and image overlap.

Number of images: 1,442

Camera stations: 1,431

Tie points: 1,194,923

Projections: 4,164,521

Reprojection error: 0.668 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
EOS 5D Mark IV, EF8-15mm f/4L FISHEYE USM (9.8mm)	4000 x 6000	9.8 mm	3.92 x 3.92 $\mu\text{m}$	Yes
EOS 5D Mark IV, EF8-15mm f/4L FISHEYE USM (9.8mm)	6000 x 4000	9.8 mm	3.92 x 3.92 $\mu\text{m}$	Yes
EOS 5D Mark IV, EF16-35mm f/2.8L II USM (18mm)	6720 x 4480	18 mm	5.36 x 5.36 $\mu\text{m}$	No
EOS 5D Mark IV, EF16-35mm f/2.8L II USM (16mm)	6720 x 4480	16 mm	5.36 x 5.36 $\mu\text{m}$	No

Table 1. Cameras.

# Camera Calibration

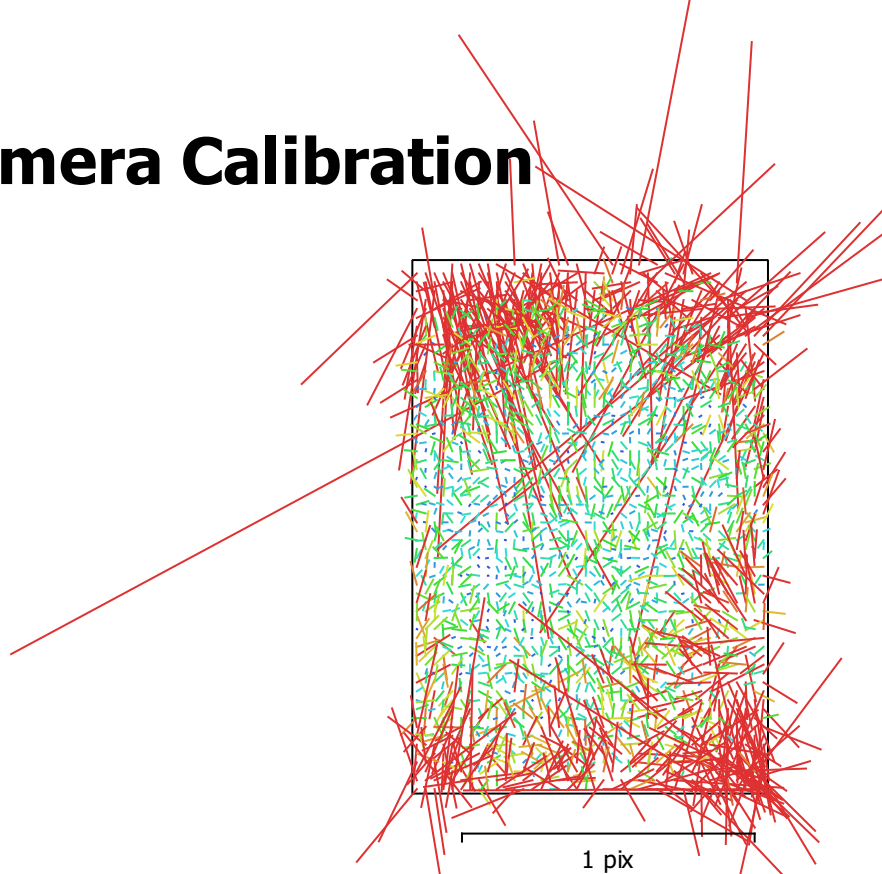


Fig. 2. Image residuals for ILCE-6500, .7x EF8-15mm f/4L FISHEYE USM (9.8mm).

## ILCE-6500, .7x EF8-15mm f/4L FISHEYE USM (9.8mm)

92 images, precalibrated

Type  
**Fisheye**

Resolution  
**4000 x 6000**

Focal Length  
**9.8 mm**

Pixel Size  
**3.92 x 3.92  $\mu\text{m}$**

	Value	Error	F	Cx	Cy	B1	B2	K1	P1	P2
<b>K2</b>	<b>0.00619471</b>									
<b>K3</b>	<b>-0.000962947</b>									
<b>F</b>	<b>2652.22</b>	0.031	1.00	-0.06	-0.05	-0.23	-0.07	-0.63	-0.03	0.03
<b>Cx</b>	<b>-30.7824</b>	0.061		1.00	0.07	-0.12	0.08	0.08	-0.74	-0.03
<b>Cy</b>	<b>-33.397</b>	0.058			1.00	-0.07	-0.05	0.15	-0.03	-0.74
<b>B1</b>	<b>-0.513289</b>	0.018				1.00	0.02	0.08	0.05	0.13
<b>B2</b>	<b>2.09804</b>	0.017					1.00	0.07	-0.20	0.04
<b>K1</b>	<b>-0.042497</b>	4.8e-06						1.00	-0.08	-0.30
<b>P1</b>	<b>-0.000425348</b>	2.9e-06							1.00	0.00
<b>P2</b>	<b>-6.81639e-05</b>	2.5e-06								1.00

Table 2. Calibration coefficients and correlation matrix.

# Camera Calibration

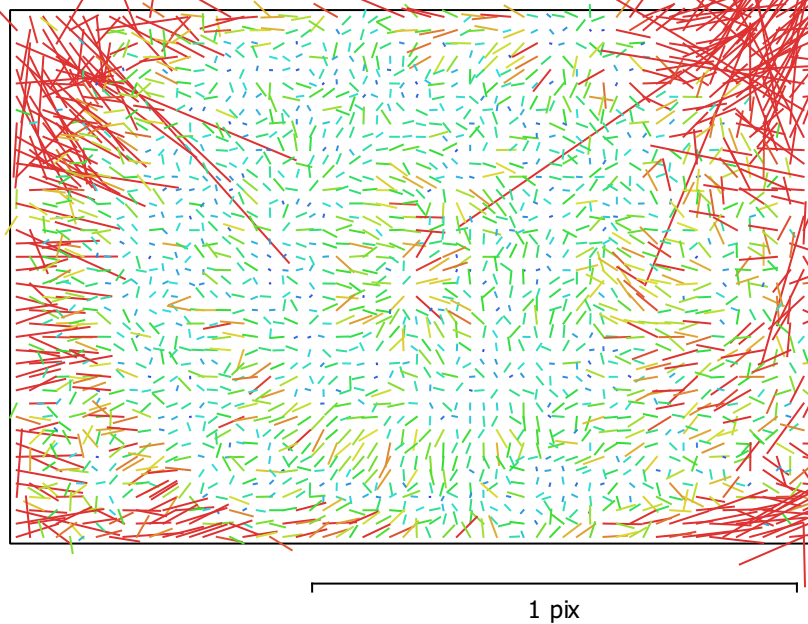


Fig. 3. Image residuals for ILCE-6500, .7x EF8-15mm f/4L FISHEYE USM (9.8mm).

## ILCE-6500, .7x EF8-15mm f/4L FISHEYE USM (9.8mm)

512 images, precalibrated

Type	Resolution	Focal Length	Pixel Size
<b>Fisheye</b>	<b>6000 x 4000</b>	<b>9.8 mm</b>	<b>3.92 x 3.92 μm</b>

	Value	Error	F	Cx	Cy	B1	B2	K1	P1	P2
<b>K2</b>	<b>0.0058886</b>									
<b>K3</b>	<b>-0.000804612</b>									
<b>F</b>	<b>2651.63</b>	0.024	1.00	0.03	0.07	-0.35	0.06	-0.61	0.01	-0.03
<b>Cx</b>	<b>-34.1235</b>	0.044		1.00	-0.10	0.09	0.00	-0.03	-0.84	0.10
<b>Cy</b>	<b>31.0855</b>	0.049			1.00	-0.08	0.07	-0.03	0.11	-0.82
<b>B1</b>	<b>0.541139</b>	0.015				1.00	0.01	-0.10	-0.04	0.18
<b>B2</b>	<b>-0.875253</b>	0.015					1.00	-0.04	-0.08	-0.02
<b>K1</b>	<b>-0.0421897</b>	3e-06						1.00	-0.04	-0.14
<b>P1</b>	<b>-0.000155178</b>	1.9e-06							1.00	-0.10
<b>P2</b>	<b>0.000431237</b>	2.3e-06								1.00

Table 3. Calibration coefficients and correlation matrix.

# Camera Calibration

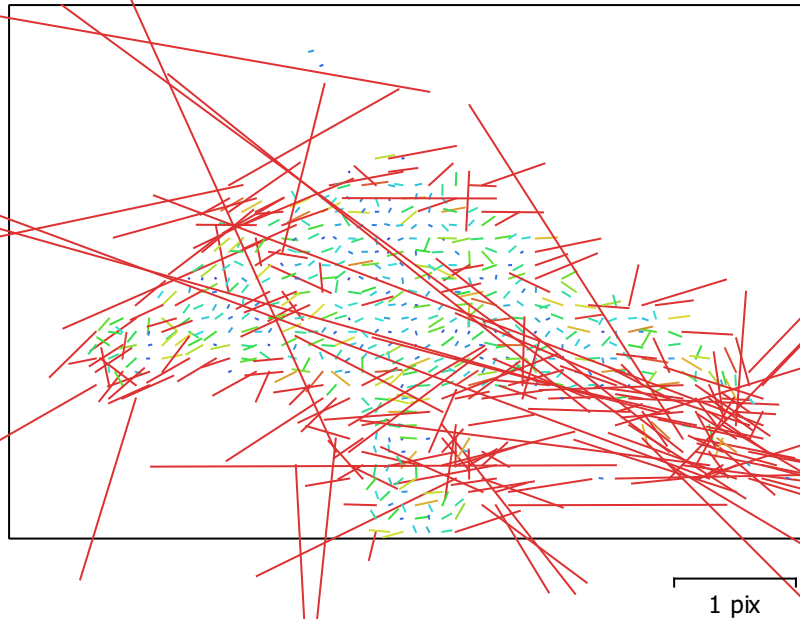


Fig. 4. Image residuals for Canon EOS 5D Mark IV, EF16-35mm f/2.8L II USM (18mm).

## Canon EOS 5D Mark IV, EF16-35mm f/2.8L II USM (18mm)

16 images

Type  
**Frame**

Resolution  
**6720 x 4480**

Focal Length  
**18 mm**

Pixel Size  
**5.36 x 5.36  $\mu\text{m}$**

	Value	Error	P1	P2
<b>F</b>	<b>3360</b>			
<b>P1</b>	<b>-0.00339619</b>	7.8e-05	1.00	0.12
<b>P2</b>	<b>-0.00879392</b>	8e-05		1.00

Table 4. Calibration coefficients and correlation matrix.

# Camera Calibration

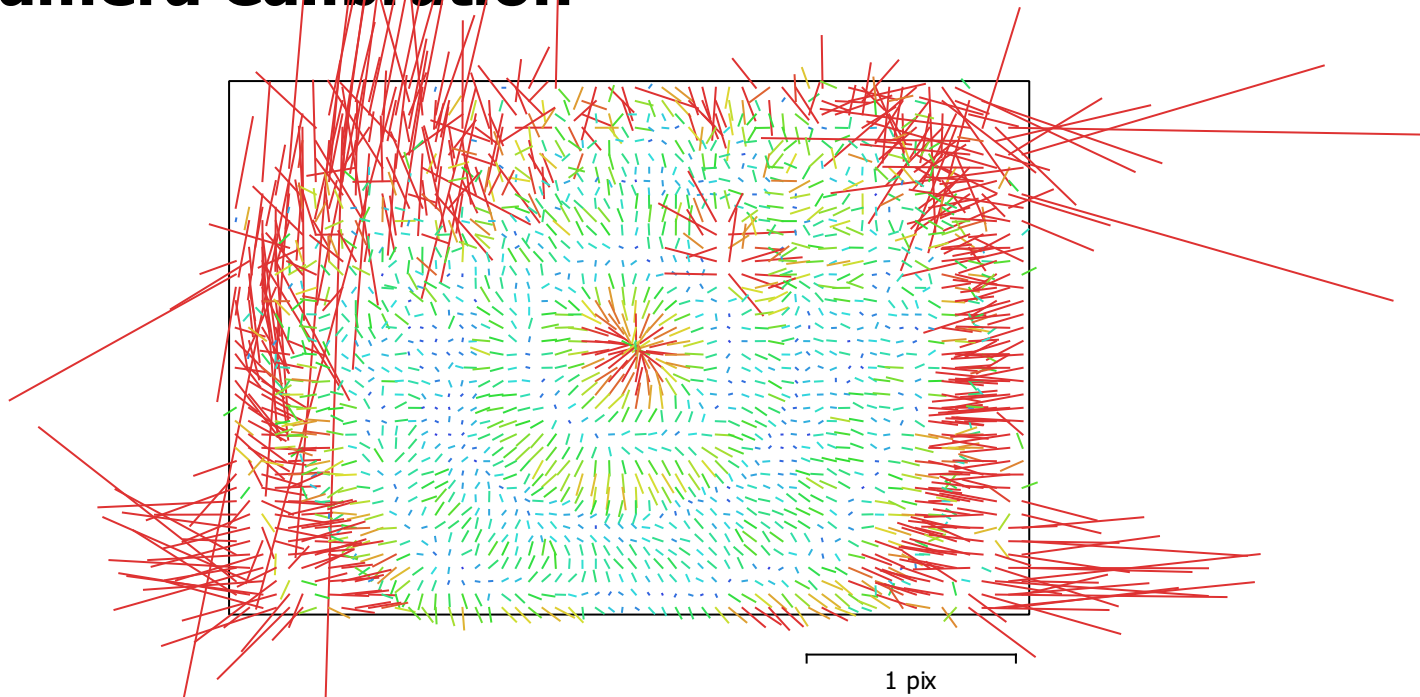


Fig. 5. Image residuals for Canon EOS 5D Mark IV, EF16-35mm f/2.8L II USM (16mm).

## Canon EOS 5D Mark IV, EF16-35mm f/2.8L II USM (16mm)

822 images

Type  
Frame

Resolution  
**6720 x 4480**

Focal Length  
**16 mm**

Pixel Size  
**5.36 x 5.36  $\mu$ m**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
<b>F</b>	<b>3127.43</b>	0.05	1.00	-0.01	-0.04	-0.39	0.05	0.16	0.14	-0.14	0.14	-0.04	-0.14
<b>Cx</b>	<b>27.2398</b>	0.062		1.00	-0.12	-0.04	0.02	0.04	-0.03	0.03	-0.04	0.91	-0.14
<b>Cy</b>	<b>-13.0255</b>	0.081			1.00	0.01	-0.01	-0.14	0.17	-0.17	0.17	-0.12	0.91
<b>B1</b>	<b>0.893392</b>	0.026				1.00	-0.03	0.03	-0.03	0.03	-0.03	-0.03	0.14
<b>B2</b>	<b>2.15863</b>	0.024					1.00	-0.00	0.00	0.00	-0.00	-0.12	0.02
<b>K1</b>	<b>-0.0835843</b>	2.2e-05						1.00	-0.88	0.80	-0.73	0.02	-0.17
<b>K2</b>	<b>0.10427</b>	6.1e-05							1.00	-0.98	0.93	-0.04	0.15
<b>K3</b>	<b>-0.0748966</b>	7e-05								1.00	-0.99	0.04	-0.14
<b>K4</b>	<b>0.0210977</b>	2.7e-05									1.00	-0.04	0.14
<b>P1</b>	<b>0.000565565</b>	4.6e-06										1.00	-0.16
<b>P2</b>	<b>0.00031415</b>	5.5e-06											1.00

Table 5. Calibration coefficients and correlation matrix.

# Digital Elevation Model

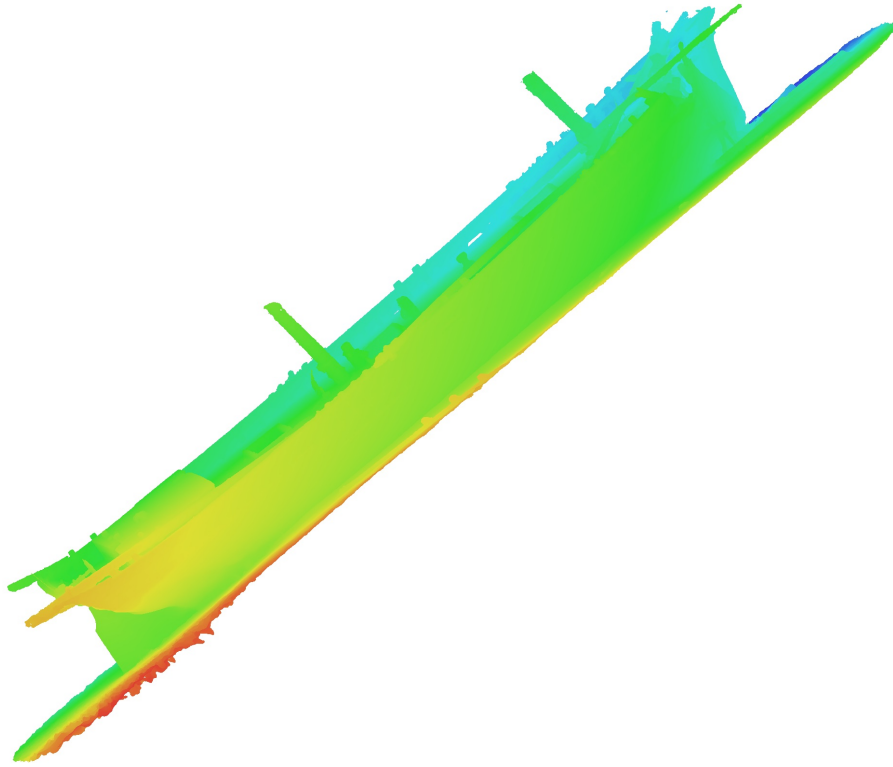


Fig. 6. Reconstructed digital elevation model.

# Processing Parameters

## General

Cameras	1442
Aligned cameras	1431

## Point Cloud

Points	1,194,923 of 1,302,494
RMS reprojection error	0.11165 (0.667889 pix)
Max reprojection error	0.338617 (32.9429 pix)
Mean key point size	4.90061 pix
Point colors	3 bands, uint8
Key points	3.44 GB
Average tie point multiplicity	3.74805

## Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	No
Key point limit	30,000
Tie point limit	4,000
Filter points by mask	Yes
Mask tie points	No
Guided image matching	No
Adaptive camera model fitting	Yes
Matching time	6 seconds
Matching memory usage	1.61 MB
Alignment time	12 minutes 50 seconds
Alignment memory usage	607.51 MB
Software version	1.6.3.10732
File size	124.41 MB

## Depth Maps

Count	1419
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## Depth maps generation parameters

Quality	Medium
Filtering mode	Mild
Processing time	51 minutes 26 seconds
Memory usage	1022.18 MB
Software version	1.6.3.10732
File size	2.54 GB

## Dense Point Cloud

Points	144,541,650
Point colors	3 bands, uint8

## Depth maps generation parameters

Quality	Medium
Filtering mode	Mild
Processing time	51 minutes 26 seconds
Memory usage	1022.18 MB

## Dense cloud generation parameters

Processing time	3 hours 38 minutes
Memory usage	17.52 GB
Software version	1.6.3.10732
File size	1.91 GB

## Model



Faces	7,999,999
Vertices	4,003,868
Vertex colors	3 bands, uint8
Texture	4,096 x 4,096 x 2, 4 bands, uint8
<b>Depth maps generation parameters</b>	
Quality	Medium
Filtering mode	Mild
Processing time	51 minutes 26 seconds
Memory usage	1022.18 MB
<b>Reconstruction parameters</b>	
Surface type	Arbitrary
Source data	Depth maps
Interpolation	Extrapolated
Strict volumetric masks	No
Processing time	32 minutes 6 seconds
Memory usage	9.66 GB
<b>Texturing parameters</b>	
Mapping mode	Generic
Blending mode	Mosaic
Texture size	4,096
Enable hole filling	Yes
Enable ghosting filter	No
UV mapping time	3 minutes 46 seconds
Blending time	6 minutes 3 seconds
Software version	1.6.3.10732
File size	398.70 MB
<b>System</b>	
Software name	Agisoft Metashape Standard
Software version	1.7.1 build 11797
OS	Windows 64 bit
RAM	63.92 GB
CPU	Intel(R) Core(TM) i9-9900K CPU @ 3.60GHz
GPU(s)	GeForce RTX 2060 SUPER