

# Gypsum Breccia

Processing Report  
28 March 2020



# Survey Data

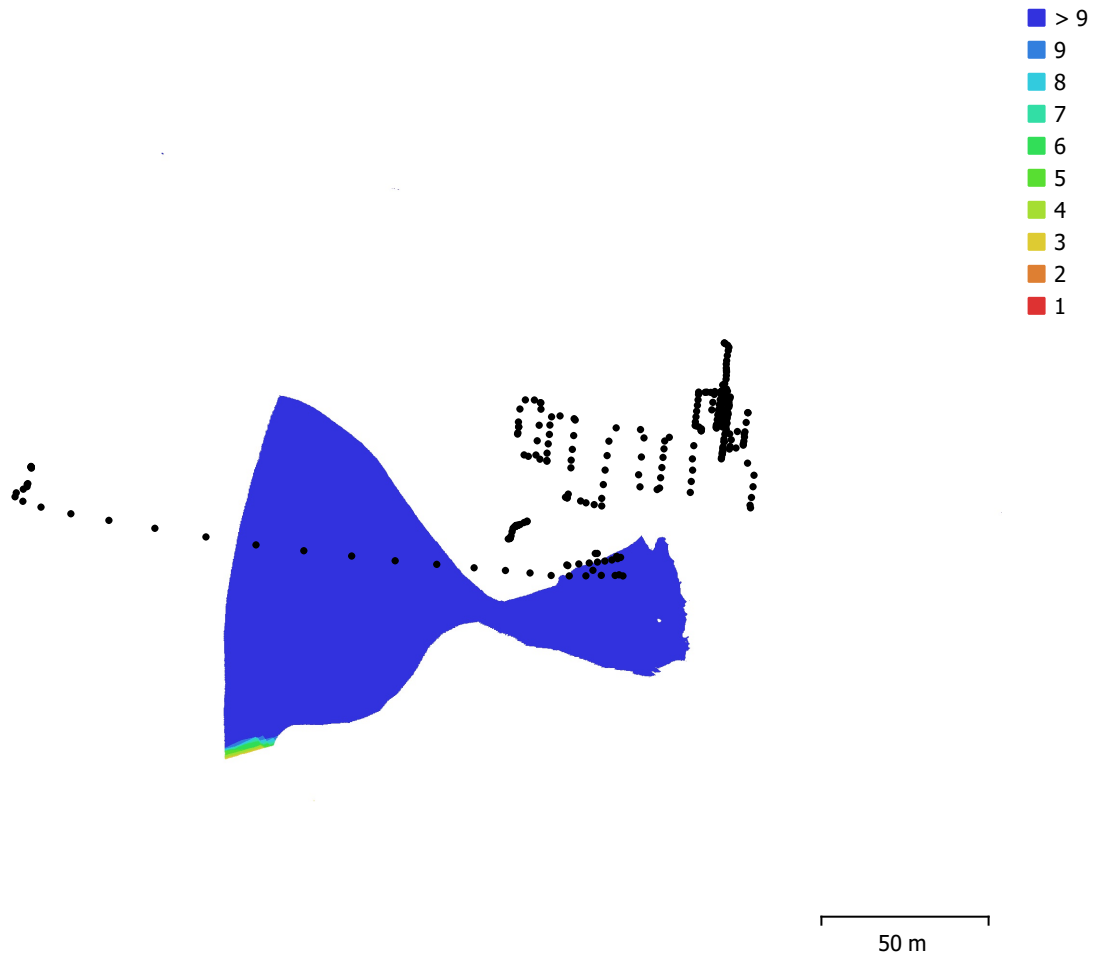


Fig. 1. Camera locations and image overlap.

Number of images:	262	Camera stations:	262
Flying altitude:	67.6 m	Tie points:	169,520
Ground resolution:	1.12 cm/pix	Projections:	838,259
Coverage area:	6.66e+03 m <sup>2</sup>	Reprojection error:	1.16 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC220 (4.73mm)	4000 x 3000	4.73 mm	1.57 x 1.57 μm	No

Table 1. Cameras.

# Camera Calibration

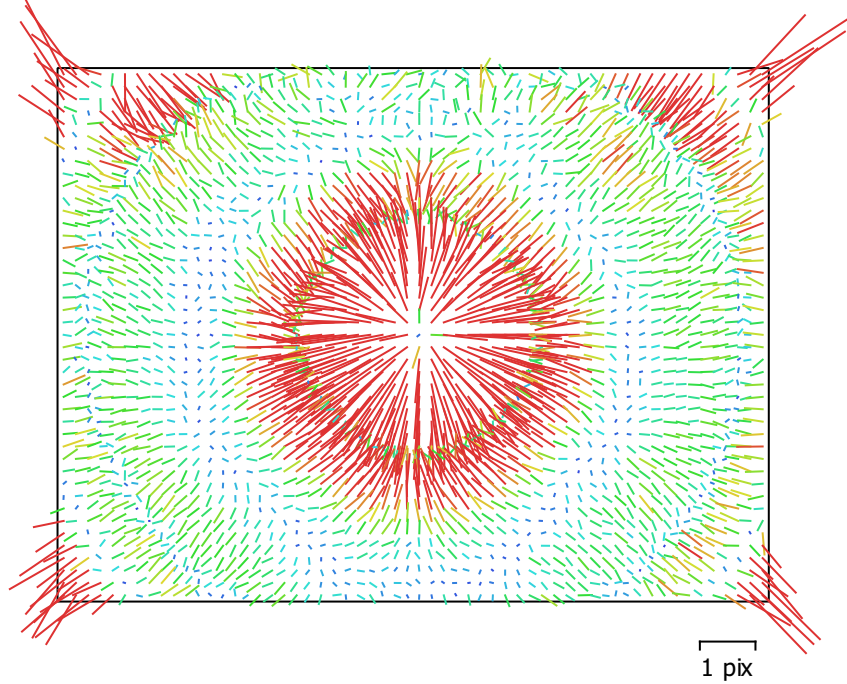


Fig. 2. Image residuals for FC220 (4.73mm).

## FC220 (4.73mm)

262 images

Type  
Frame

Resolution  
**4000 x 3000**

Focal Length  
**4.73 mm**

Pixel Size  
**1.57 x 1.57  $\mu\text{m}$**

	Value	Error	F	Cx	Cy	K1	K2	K3	P1	P2
<b>F</b>	<b>3030.07</b>	0.092	1.00	0.06	-0.33	-0.07	0.16	-0.13	0.06	-0.23
<b>Cx</b>	<b>19.7158</b>	0.14		1.00	-0.08	0.02	0.00	-0.00	0.94	-0.09
<b>Cy</b>	<b>1.74735</b>	0.17			1.00	-0.04	0.01	-0.00	-0.08	0.80
<b>K1</b>	<b>0.0542422</b>	9.8e-05				1.00	-0.96	0.90	0.02	-0.04
<b>K2</b>	<b>-0.1315</b>	0.00035					1.00	-0.98	-0.00	-0.01
<b>K3</b>	<b>0.122876</b>	0.00039						1.00	0.00	0.01
<b>P1</b>	<b>-2.17881e-05</b>	1.5e-05							1.00	-0.10
<b>P2</b>	<b>0.000429387</b>	1.2e-05								1.00

Table 2. Calibration coefficients and correlation matrix.

# Camera Locations

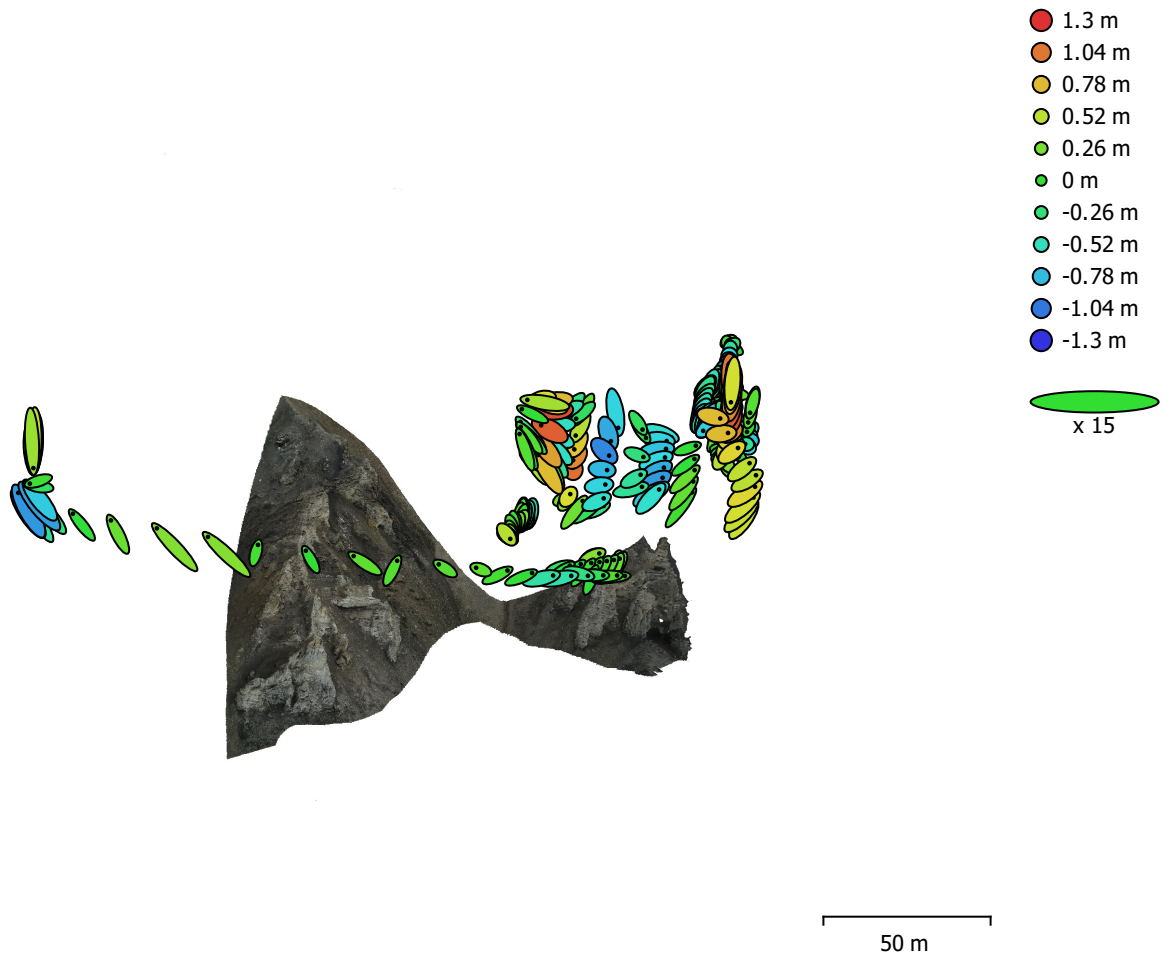


Fig. 3. Camera locations and error estimates.

Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.

Estimated camera locations are marked with a black dot.

<b>X error (cm)</b>	<b>Y error (cm)</b>	<b>Z error (cm)</b>	<b>XY error (cm)</b>	<b>Total error (cm)</b>
23.9401	32.1422	52.3382	40.0781	65.9207

Table 3. Average camera location error.

X - Easting, Y - Northing, Z - Altitude.

# Digital Elevation Model

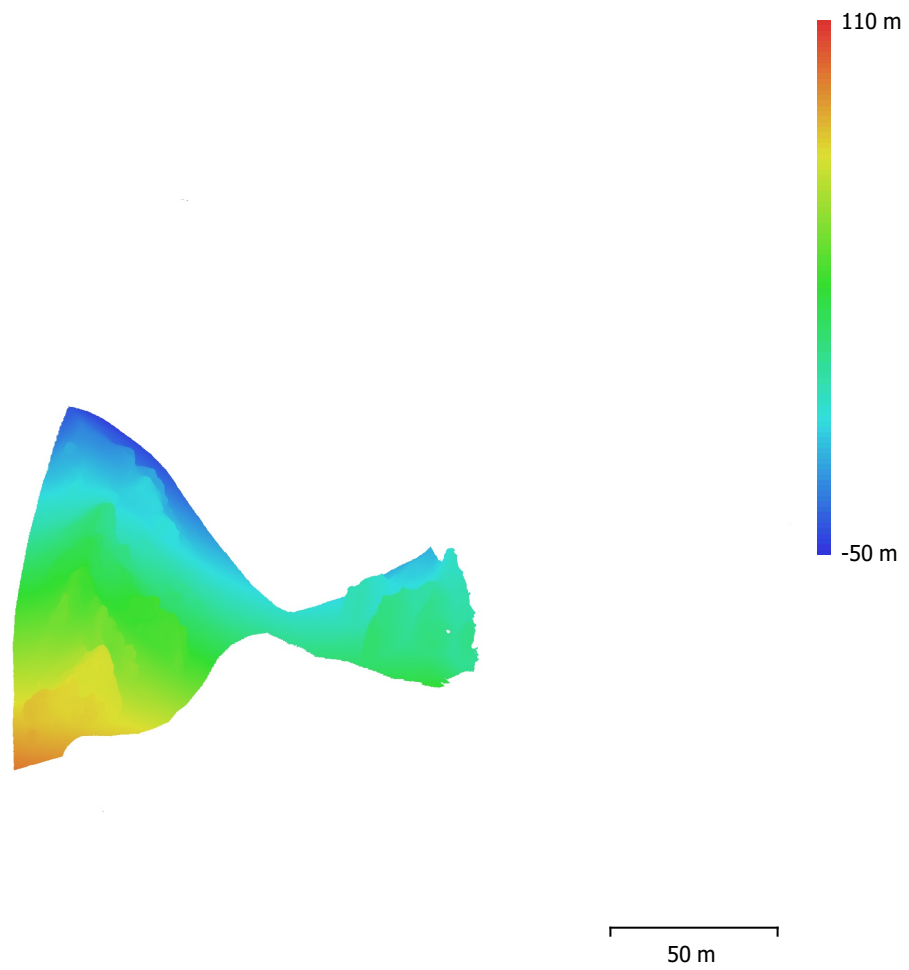


Fig. 4. Reconstructed digital elevation model.

Resolution: 2.23 cm/pix  
Point density: 0.201 points/cm<sup>2</sup>

# Processing Parameters

## General

Cameras	262
Aligned cameras	262
Coordinate system	WGS 84 / UTM zone 33N (EPSG::32633)
Rotation angles	Yaw, Pitch, Roll

## Point Cloud

Points	169,520 of 209,255
RMS reprojection error	0.400933 (1.15922 pix)
Max reprojection error	1.78443 (34.4071 pix)
Mean key point size	2.99369 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	5.40648

## Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	Source
Key point limit	40,000
Tie point limit	4,000
Guided image matching	No
Adaptive camera model fitting	No
Matching time	24 minutes 53 seconds
Matching memory usage	454.79 MB
Alignment time	4 minutes 52 seconds
Alignment memory usage	93.72 MB

## Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	31 seconds
Software version	1.6.1.10009

## Depth Maps

Count	262
<b>Depth maps generation parameters</b>	
Quality	High
Filtering mode	Mild
Processing time	38 minutes 1 seconds
Software version	1.6.1.10009

## Dense Point Cloud

Points	119,491,886
Point colors	3 bands, uint8
<b>Depth maps generation parameters</b>	
Quality	High
Filtering mode	Mild
Processing time	38 minutes 1 seconds
<b>Dense cloud generation parameters</b>	
Processing time	2 hours 13 minutes
Software version	1.6.1.10009

## Model

Faces	5,019,490
Vertices	2,514,884

## General

Vertex colors 3 bands, uint8  
Texture 4,096 x 4,096 x 25, 4 bands, uint8

### Depth maps generation parameters

Quality High  
Filtering mode Mild  
Processing time 38 minutes 1 seconds

### Reconstruction parameters

Surface type Arbitrary  
Source data Dense cloud  
Interpolation Enabled  
Strict volumetric masks No  
Processing time 1 hours 59 minutes

### Texturing parameters

Mapping mode Generic  
Blending mode Mosaic  
Texture size 4,096  
Enable hole filling Yes  
Enable ghosting filter Yes  
UV mapping time 25 minutes 0 seconds  
Blending time 1 hours 5 minutes  
Software version 1.6.1.10009

## Tiled Model

Texture 3 bands, uint8

### Depth maps generation parameters

Quality High  
Filtering mode Mild  
Processing time 38 minutes 1 seconds

### Reconstruction parameters

Source data Dense cloud  
Tile size 256  
Face count High  
Enable ghosting filter Yes  
Processing time 1 days 12 hours  
Software version 1.6.1.10009

## System

Software name Agisoft Metashape Professional  
Software version 1.6.1 build 10009  
OS Windows 64 bit  
RAM 127.78 GB  
CPU Intel(R) Core(TM) i9-9900K CPU @ 3.60GHz  
GPU(s) GeForce RTX 2080