

# Agisoft Metashape

Processing Report  
15 December 2020



# Survey Data

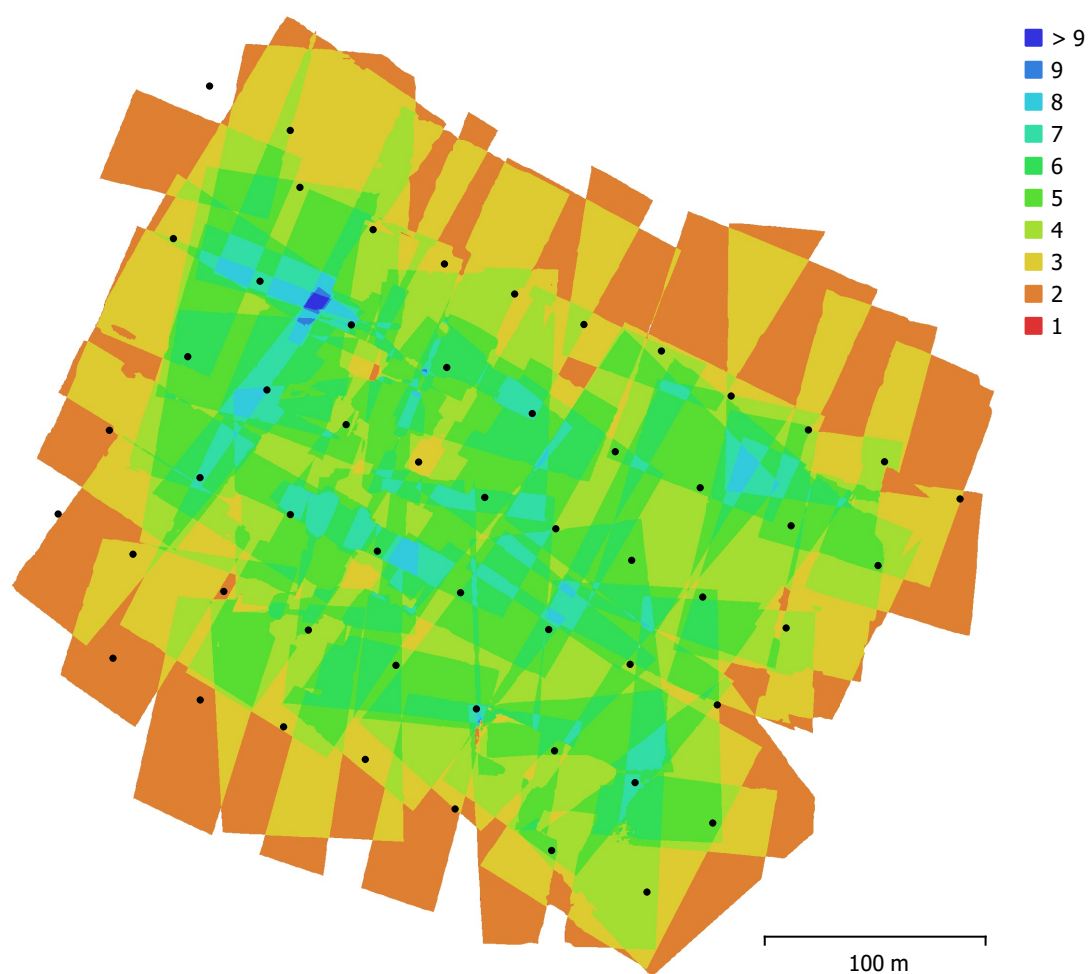


Fig. 1. Camera locations and image overlap.

Number of images:	54	Camera stations:	54
Flying altitude:	89 m	Tie points:	71,905
Ground resolution:	2.25 cm/pix	Projections:	191,869
Coverage area:	0.121 km <sup>2</sup>	Reprojection error:	0.881 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
DSC-WX220 (4.45mm)	4896 x 3672	25 mm	7.35 x 7.35 μm	No

Table 1. Cameras.

# Camera Calibration

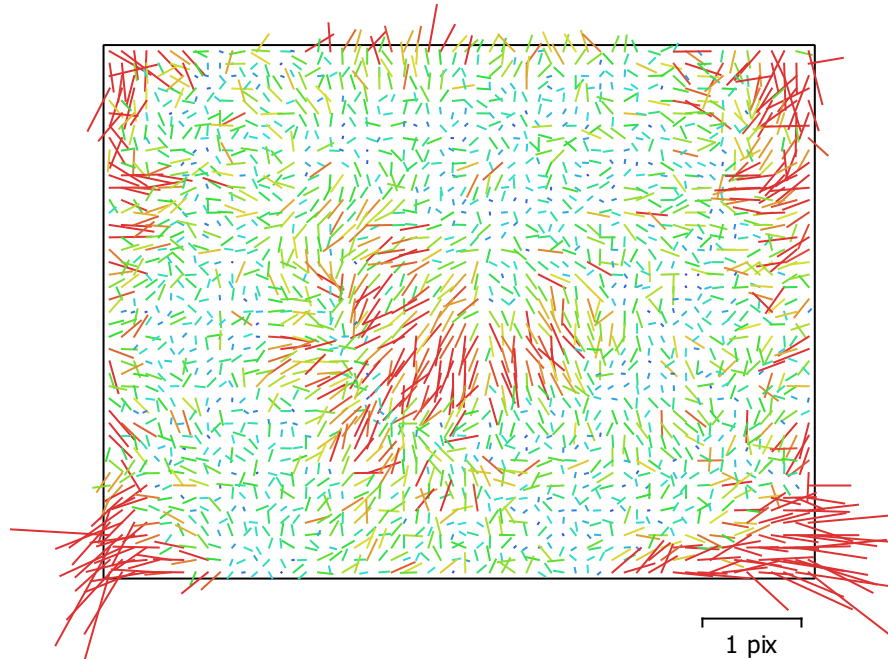


Fig. 2. Image residuals for DSC-WX220 (4.45mm).

## DSC-WX220 (4.45mm)

54 images

Type  
Frame

Resolution  
**4896 x 3672**

Focal Length  
**25 mm**

Pixel Size  
**7.35 x 7.35  $\mu\text{m}$**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	P1	P2
<b>F</b>	<b>3624.37</b>	0.16	1.00	0.34	-0.15	-0.03	0.11	-0.20	0.16	-0.13	0.05	-0.04
<b>Cx</b>	<b>30.147</b>	0.093		1.00	0.09	-0.10	0.18	-0.03	0.02	-0.01	0.58	-0.07
<b>Cy</b>	<b>30.645</b>	0.079			1.00	-0.20	-0.10	0.00	0.01	-0.02	-0.00	0.43
<b>B1</b>	<b>-0.376085</b>	0.022				1.00	0.02	-0.00	-0.01	0.01	0.17	-0.02
<b>B2</b>	<b>0.176667</b>	0.023					1.00	0.01	-0.01	0.01	0.08	0.15
<b>K1</b>	<b>-0.000261229</b>	0.00011						1.00	-0.97	0.92	-0.02	0.02
<b>K2</b>	<b>-0.0227203</b>	0.00039							1.00	-0.99	0.01	-0.02
<b>K3</b>	<b>0.0177815</b>	0.00041								1.00	0.01	0.01
<b>P1</b>	<b>0.00267974</b>	5.8e-06									1.00	-0.01
<b>P2</b>	<b>0.00298168</b>	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)
0.0104935	0.0137724	9.92967	0.0173145	9.92969

Table 3. Average camera location error.

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

# Ground Control Points

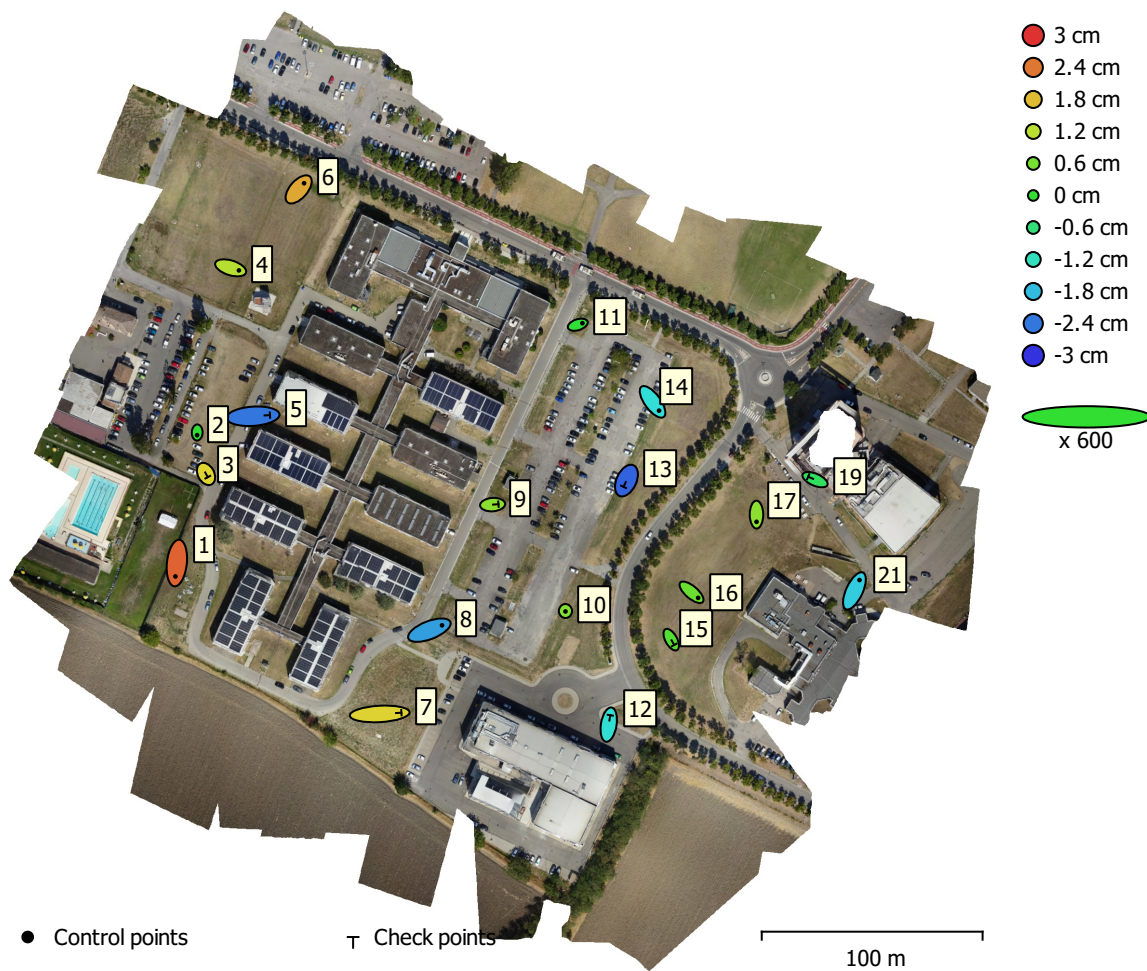


Fig. 4. GCP locations and error estimates.

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)
11	0.901686	1.05265	1.426	1.38604	1.98861

Table 4. Control points RMSE.

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

Count	X error (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
8	1.56689	0.712837	1.59476	1.72142	2.3466

Table 5. Check points RMSE.

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

<b>Label</b>	<b>X error (cm)</b>	<b>Y error (cm)</b>	<b>Z error (cm)</b>	<b>Total (cm)</b>	<b>Image (pix)</b>
1	-0.218593	-2.0239	2.58463	3.29003	0.194 (3)
2	-0.0134054	-0.404484	-0.0356084	0.40627	0.235 (6)
4	1.25228	-0.390391	1.15556	1.74813	0.115 (8)
6	0.814072	0.930441	1.9879	2.34098	0.077 (4)
8	1.90843	0.738404	-2.06139	2.90459	0.086 (4)
10	0.00381428	-0.0666447	0.692494	0.695704	0.195 (7)
11	0.701167	0.226782	-0.0659902	0.739878	0.072 (3)
14	0.978489	-1.32695	-1.42769	2.18095	0.232 (6)
16	0.994805	-0.846107	0.491858	1.39551	0.273 (6)
17	0.0079279	-1.08489	0.797772	1.34666	0.240 (4)
21	0.763958	1.62973	-1.65819	2.44729	0.108 (4)
<b>Total</b>	<b>0.901686</b>	<b>1.05265</b>	<b>1.426</b>	<b>1.98861</b>	<b>0.187</b>

Table 6. Control points.  
X - Easting, Y - Northing, Z - Altitude.

<b>Label</b>	<b>X error (cm)</b>	<b>Y error (cm)</b>	<b>Z error (cm)</b>	<b>Total (cm)</b>	<b>Image (pix)</b>
3	0.265218	-0.489253	1.58891	1.68355	0.183 (5)
5	2.55301	0.175709	-2.40738	3.51344	0.332 (6)
7	3.27916	0.182969	1.61218	3.65862	0.176 (5)
9	0.881502	0.0619168	0.764854	1.16871	0.142 (5)
12	0.230322	1.42077	-1.39278	2.00287	0.110 (5)
13	-0.441891	-0.946386	-2.58341	2.78656	0.292 (6)
15	0.447379	-0.802621	0.291091	0.963889	0.301 (5)
19	-1.0366	0.446207	-0.378422	1.19031	0.004 (2)
<b>Total</b>	<b>1.56689</b>	<b>0.712837</b>	<b>1.59476</b>	<b>2.3466</b>	<b>0.233</b>

Table 7. Check points.  
X - Easting, Y - Northing, Z - Altitude.

# Digital Elevation Model

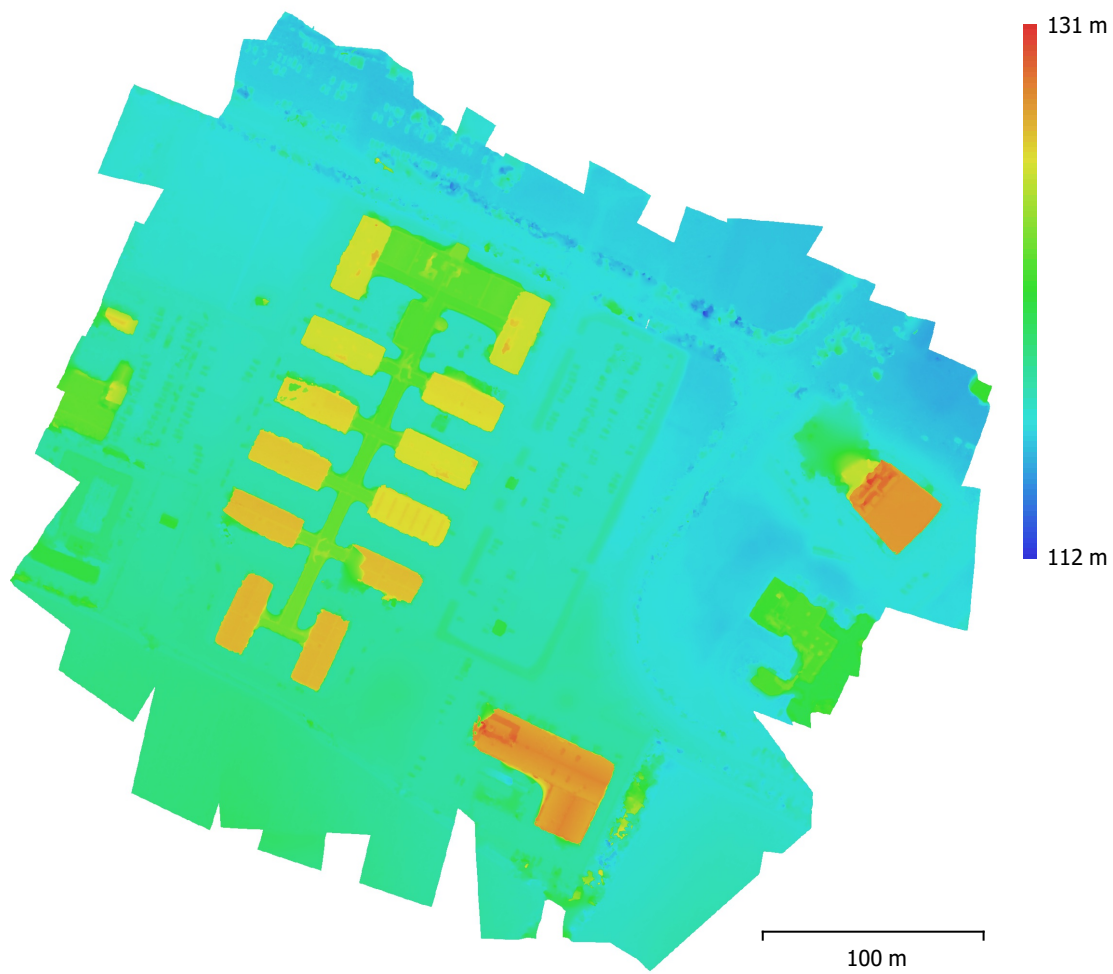


Fig. 5. Reconstructed digital elevation model.

Resolution: 10 cm/pix  
Point density: 100 points/m<sup>2</sup>

# Processing Parameters

## General

Cameras	54
Aligned cameras	54
Markers	19
Coordinate system	ETRS89 / UTM zone 32N (EPSG::25832)
Rotation angles	Yaw, Pitch, Roll

## Point Cloud

Points	71,905 of 74,707
RMS reprojection error	0.132773 (0.880603 pix)
Max reprojection error	0.69403 (18.4215 pix)
Mean key point size	6.75959 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	2.69724

## Alignment parameters

Accuracy	Medium
Generic preselection	Yes
Reference preselection	No
Key point limit	40,000
Tie point limit	4,000
Adaptive camera model fitting	No
Matching time	1 minutes 11 seconds
Alignment time	11 seconds

## Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	0 seconds
File size	4.94 MB

## Depth Maps

Count	54
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## Depth maps generation parameters

Quality	Medium
Filtering mode	Aggressive
Processing time	34 seconds
Memory usage	454.39 MB
Software version	1.6.5.11249
File size	64.69 MB

## Dense Point Cloud

Points	15,763,500
Point colors	3 bands, uint8

## Depth maps generation parameters

Quality	Medium
Filtering mode	Aggressive
Processing time	34 seconds
Memory usage	454.39 MB

## Dense cloud generation parameters

Processing time	35 seconds
Memory usage	4.04 GB
Software version	1.6.5.11249
File size	207.28 MB



## Model

Faces	3,152,700
Vertices	1,579,772
Vertex colors	3 bands, uint8

### Depth maps generation parameters

Quality	Medium
Filtering mode	Aggressive
Processing time	34 seconds
Memory usage	454.39 MB

### Reconstruction parameters

Surface type	Arbitrary
Source data	Dense cloud
Interpolation	Enabled
Strict volumetric masks	No
Processing time	6 minutes 14 seconds
Memory usage	7.87 GB
Software version	1.6.5.11249
File size	72.21 MB

## DEM

Size	6,565 x 6,076
Coordinate system	Monte Mario / Italy zone 1 (EPSG::3003)

### Reconstruction parameters

Source data	Mesh
Interpolation	Enabled
Processing time	19 seconds
Memory usage	260.66 MB
Software version	1.6.5.11249
File size	50.73 MB

## Orthomosaic

Size	8,935 x 8,759
Coordinate system	ETRS89 / UTM zone 32N (EPSG::25832)
Colors	3 bands, uint8

### Reconstruction parameters

Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Processing time	25 seconds
Memory usage	3.13 GB
Software version	1.6.5.11249
File size	302.32 MB

## System

Software name	Agisoft Metashape Professional
Software version	1.6.5 build 11249
OS	Windows 64 bit
RAM	31.69 GB
CPU	Intel(R) Core(TM) i9-10920X CPU @ 3.50GHz
GPU(s)	GeForce RTX 2060 SUPER