

# Avola

Processing Report  
31 May 2021



# Survey Data

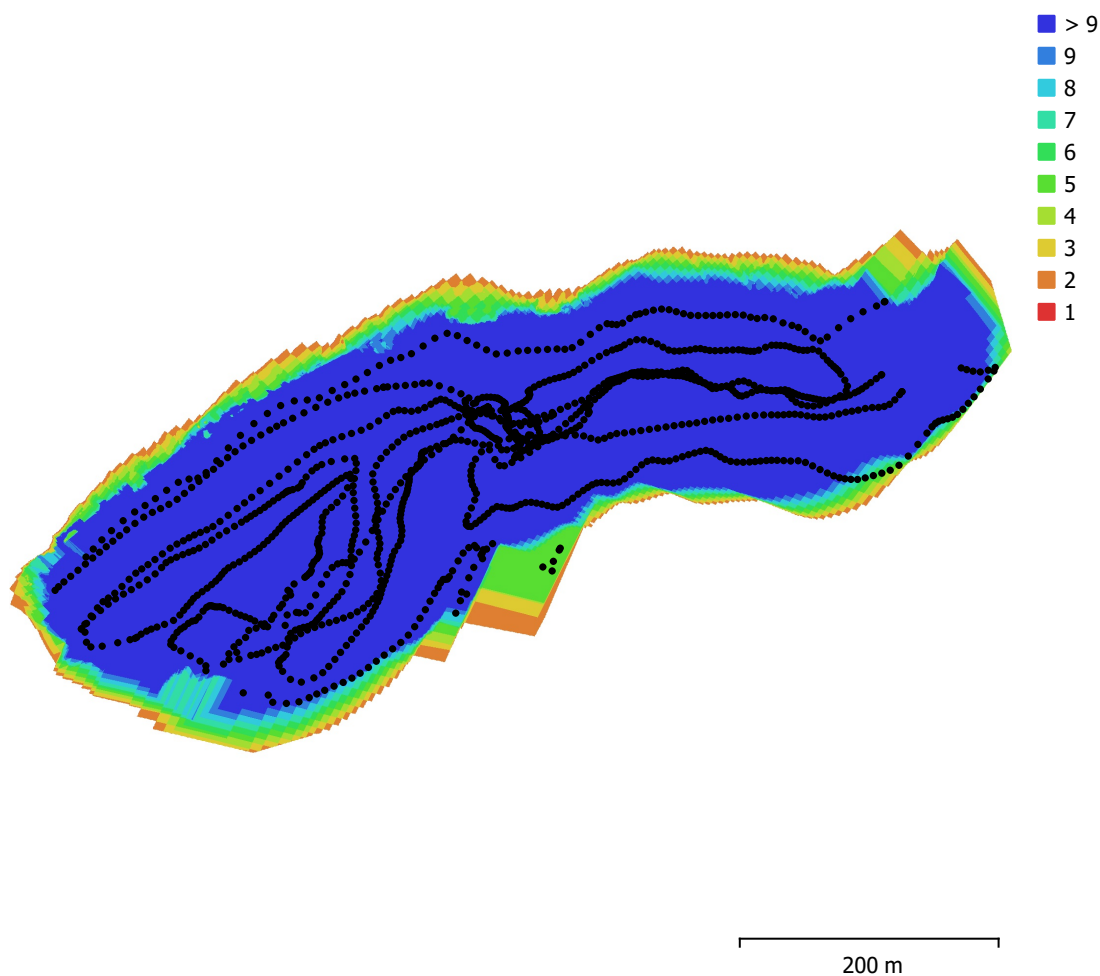


Fig. 1. Camera locations and image overlap.

Number of images:	1,221	Camera stations:	1,205
Flying altitude:	64.2 m	Tie points:	1,673,308
Ground resolution:	1.7 cm/pix	Projections:	6,298,933
Coverage area:	0.162 km <sup>2</sup>	Reprojection error:	0.503 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC7303 (4.49mm)	4000 x 3000	4.49 mm	1.62 x 1.62 $\mu$ m	No

Table 1. Cameras.

# Camera Calibration

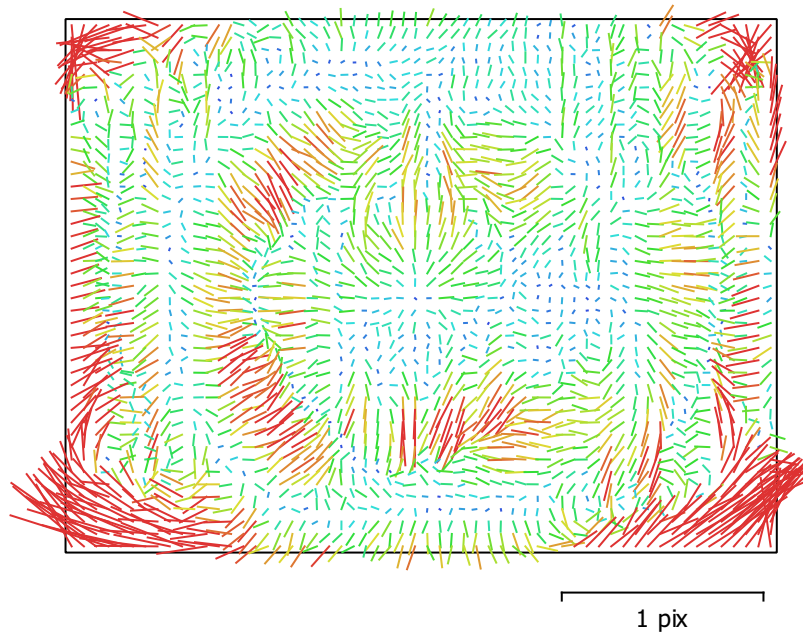


Fig. 2. Image residuals for FC7303 (4.49mm).

## FC7303 (4.49mm)

1221 images

Type	Resolution	Focal Length	Pixel Size
<b>Frame</b>	<b>4000 x 3000</b>	<b>4.49 mm</b>	<b>1.62 x 1.62 <math>\mu\text{m}</math></b>
F:	3041.33		
Cx:	-15.9834	B1:	-3.28756
Cy:	11.3228	B2:	0.918469
K1:	0.00844695	P1:	-0.000454236
K2:	-0.0812216	P2:	-2.84113e-05
K3:	0.193188	P3:	0
K4:	-0.154767	P4:	0

# Ground Control Points

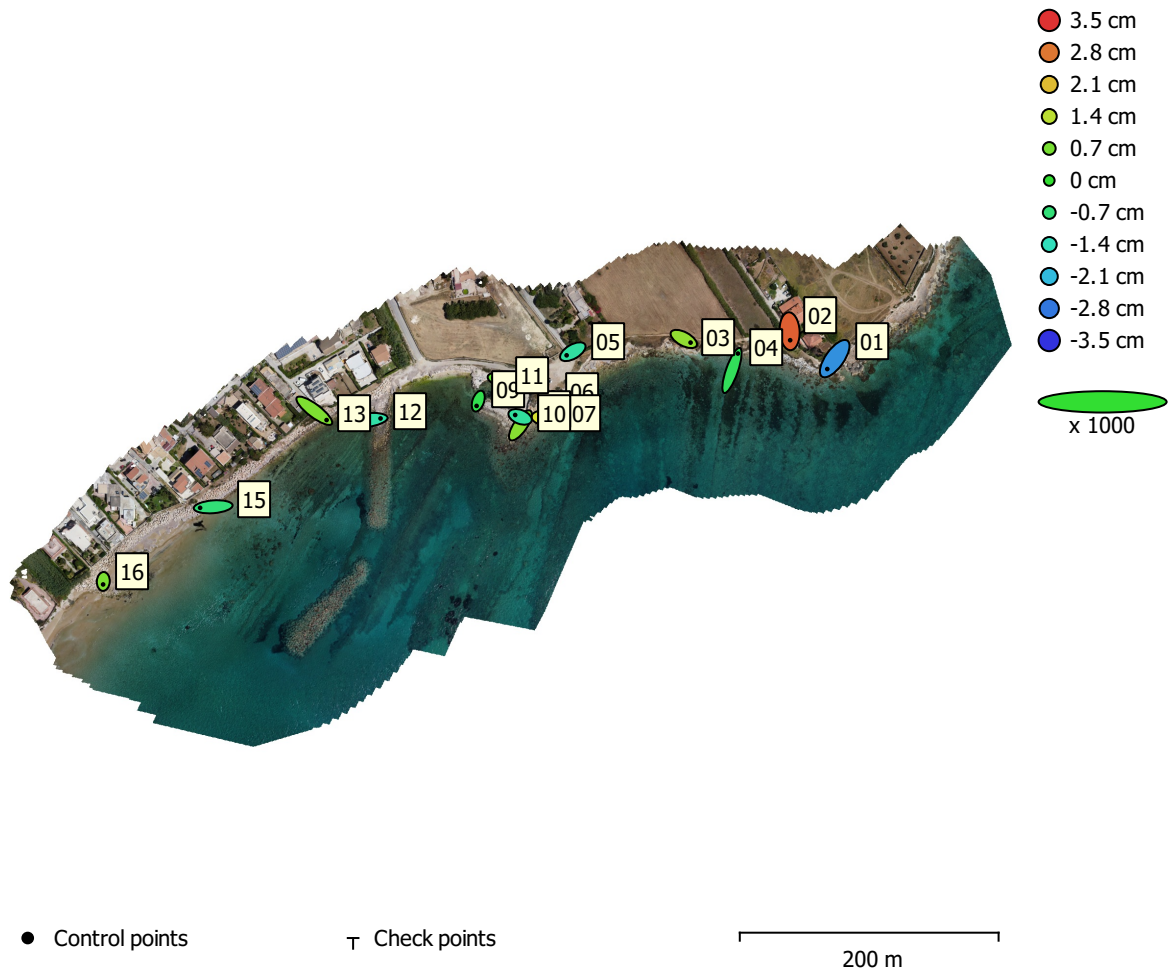


Fig. 3. GCP locations and error estimates.

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 (cm)	Y error (cm)	Z error (cm)	XY error (cm)	Total (cm)
15	1.21997	1.17181	1.35547	1.69159	2.16766

Table 2. Control 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>
01	-1.14857	-1.6084	-2.54424	3.2217	0.452 (60)
02	0.081412	-1.38927	3.04211	3.34532	0.469 (43)
03	1.04781	-0.561209	0.974123	1.5368	0.430 (49)
04	0.912317	2.61288	-0.400363	2.79639	0.360 (54)
05	-0.956985	-0.56069	-1.12043	1.57656	0.582 (39)
06	-0.337082	1.87945	-1.22409	2.26812	0.668 (83)
07	-1.15369	0.128587	1.64682	2.01484	0.720 (127)
08	0.971128	1.41079	0.866299	1.91935	0.678 (142)
09	-0.256804	-0.74094	-0.295928	0.838161	0.807 (139)
10	-0.760417	0.289848	-1.08007	1.35233	0.636 (175)
11	-0.851161	0.227659	0.474669	1.00081	0.521 (126)
12	2.58997	0.313462	-1.18341	2.86473	0.626 (83)
13	1.90123	-1.43546	0.768254	2.50309	0.389 (56)
15	-2.01824	-0.160359	-0.698533	2.14171	0.322 (45)
16	-0.0279494	-0.463525	0.740459	0.874023	0.365 (48)
<b>Total</b>	<b>1.21997</b>	<b>1.17181</b>	<b>1.35547</b>	<b>2.16766</b>	<b>0.607</b>

Table 3. Control points.  
X - Easting, Y - Northing, Z - Altitude.

# Digital Elevation Model

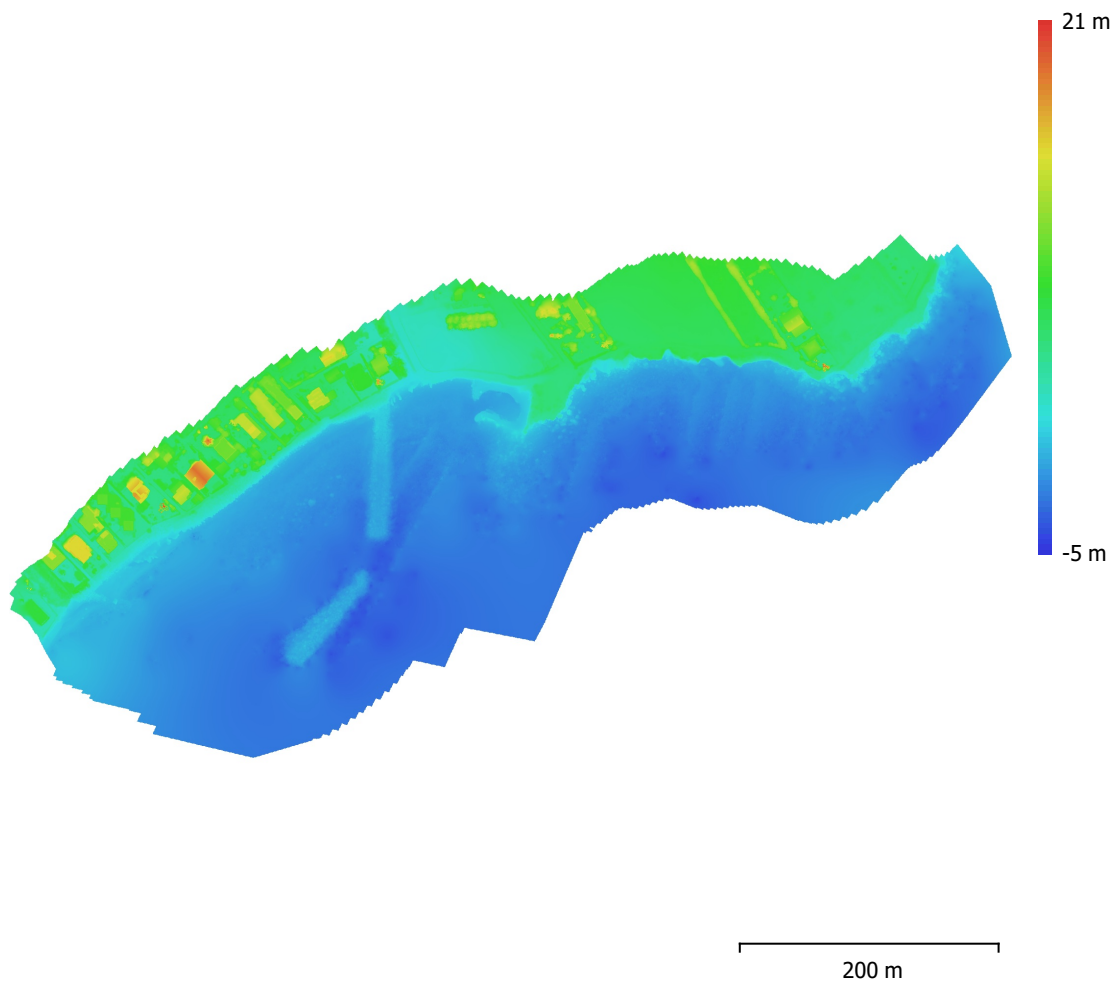


Fig. 4. Reconstructed digital elevation model.

Resolution: 3.4 cm/pix  
Point density: 863 points/m<sup>2</sup>

# Processing Parameters

## General

Cameras	1221
Aligned cameras	1205
Markers	15
Coordinate system	WGS 84 / UTM zone 33N (EPSG::32633)
Rotation angles	Yaw, Pitch, Roll

## Point Cloud

Points	1,673,308 of 2,496,845
RMS reprojection error	0.153606 (0.503443 pix)
Max reprojection error	0.561287 (6.95289 pix)
Mean key point size	3.14455 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	5.11757

## Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	Source
Key point limit	100,000
Tie point limit	18,000
Exclude stationary tie points	Yes
Guided image matching	No
Adaptive camera model fitting	Yes
Matching time	44 minutes 14 seconds
Matching memory usage	8.30 GB
Alignment time	1 hours 4 minutes
Alignment memory usage	1.62 GB

## Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1, p2
Adaptive camera model fitting	Yes
Optimization time	2 minutes 59 seconds
Software version	1.7.2.12040
File size	240.58 MB

## Depth Maps

Count	1113
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## Depth maps generation parameters

Quality	High
Filtering mode	Mild
Processing time	1 hours 37 minutes
Memory usage	4.14 GB
Software version	1.7.2.12040
File size	2.88 GB

## Dense Point Cloud

Points	60,279,724
Point colors	3 bands, uint8

## Depth maps generation parameters

Quality	High
Filtering mode	Mild
Processing time	1 hours 37 minutes
Memory usage	4.14 GB

## Dense cloud generation parameters

Processing time	2 hours 22 minutes
Memory usage	13.66 GB
<b>Points classification parameters</b>	
Confidence	0.5
Classification time	7 minutes 50 seconds
Classification memory usage	1.90 GB
Software version	1.7.2.12040
File size	1.72 GB
<b>Model</b>	
Faces	12,056,993
Vertices	6,056,899
Vertex colors	3 bands, uint8
<b>Depth maps generation parameters</b>	
Quality	High
Filtering mode	Mild
Processing time	1 hours 37 minutes
Memory usage	4.14 GB
<b>Reconstruction parameters</b>	
Surface type	Arbitrary
Source data	Dense cloud
Interpolation	Enabled
Strict volumetric masks	No
Processing time	38 minutes 6 seconds
Memory usage	24.56 GB
Software version	1.7.2.12040
File size	276.40 MB
<b>DEM</b>	
Size	25,861 x 16,157
Coordinate system	WGS 84 / UTM zone 33N (EPSG::32633)
<b>Reconstruction parameters</b>	
Source data	Dense cloud
Interpolation	Enabled
Processing time	2 minutes 48 seconds
Memory usage	308.07 MB
Software version	1.7.2.12040
File size	692.17 MB
<b>Orthomosaic</b>	
Size	45,541 x 23,773
Coordinate system	WGS 84 / UTM zone 33N (EPSG::32633)
Colors	3 bands, uint8
<b>Reconstruction parameters</b>	
Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Enable ghosting filter	Yes
Processing time	2 hours 48 minutes
Memory usage	9.55 GB
Software version	1.7.2.12040
File size	21.14 GB