

CastleRocks_Site1_Sept2021

Processing Report
Processing completed by Amethyst
Guidance from Anna and Andrii
05 February 2022



Survey Data

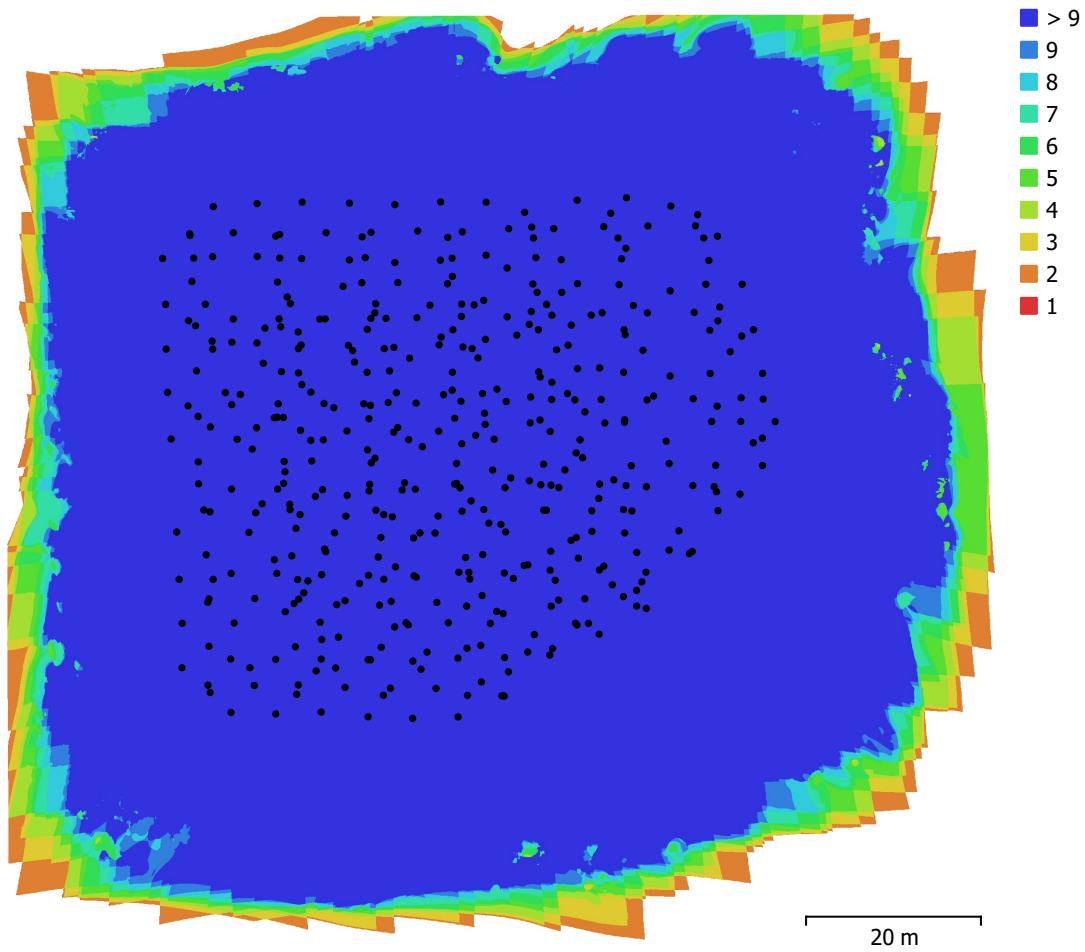


Fig. 1. Camera locations and image overlap.

Number of images:	427	Camera stations:	427
Flying altitude:	37 m	Tie points:	2,150,923
Ground resolution:	8.1 mm/pix	Projections:	8,917,084
Coverage area:	0.0106 km ²	Reprojection error:	0.731 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
Test_Pro (10.26mm)	5464 x 3640	10.26 mm	2.41 x 2.41 μ m	No

Table 1. Cameras.

Camera Calibration

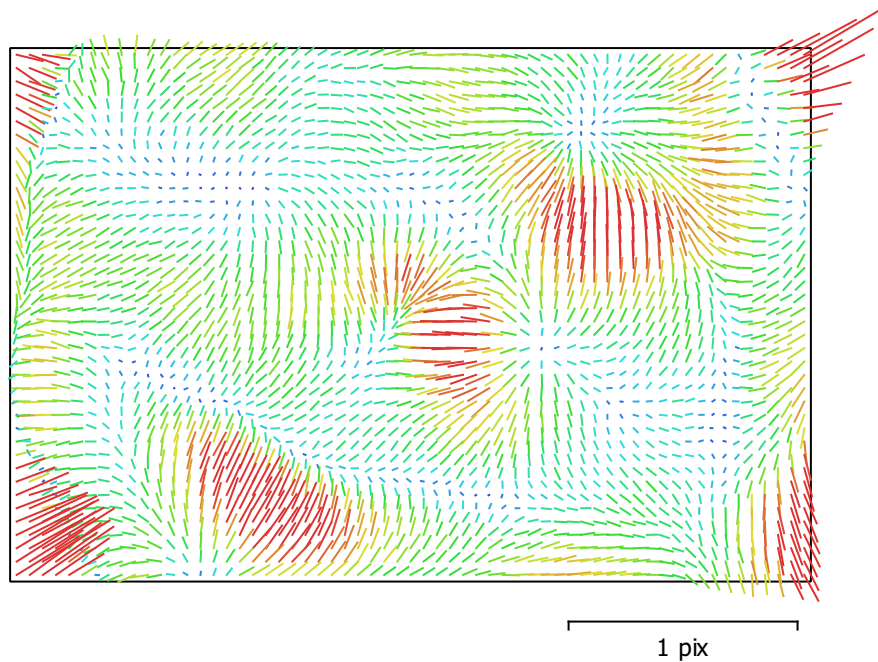


Fig. 2. Image residuals for Test_Pro (10.26mm).

Test_Pro (10.26mm)

427 images, rolling shutter

Type	Resolution	Focal Length	Pixel Size
Frame	5464 x 3640	10.26 mm	2.41 x 2.41 μm

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
F	4223.89	0.22	1.00	-0.86	-0.99	0.47	-0.71	-0.88	-0.00	0.02	0.16	0.91	0.97
Cx	-2.90816	0.0089		1.00	0.85	-0.39	0.68	0.75	0.01	-0.02	-0.13	-0.78	-0.83
Cy	0.711729	0.031			1.00	-0.48	0.71	0.87	0.01	-0.02	-0.15	-0.90	-0.97
B1	-5.89054	0.0015				1.00	-0.49	-0.43	-0.04	0.05	0.03	0.45	0.50
B2	-1.48623	0.0011					1.00	0.64	0.01	-0.02	-0.10	-0.71	-0.71
K1	-0.179592	2e-05						1.00	-0.42	0.38	-0.50	-0.82	-0.89
K2	0.00305206	4.6e-05							1.00	-0.98	0.94	-0.01	-0.00
K3	0.00347915	9.4e-05								1.00	-0.98	0.03	0.03
K4	0.0256234	6.5e-05									1.00	0.12	0.14
P1	0.00148362	4e-07										1.00	0.91
P2	0.000314335	1.2e-06											1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

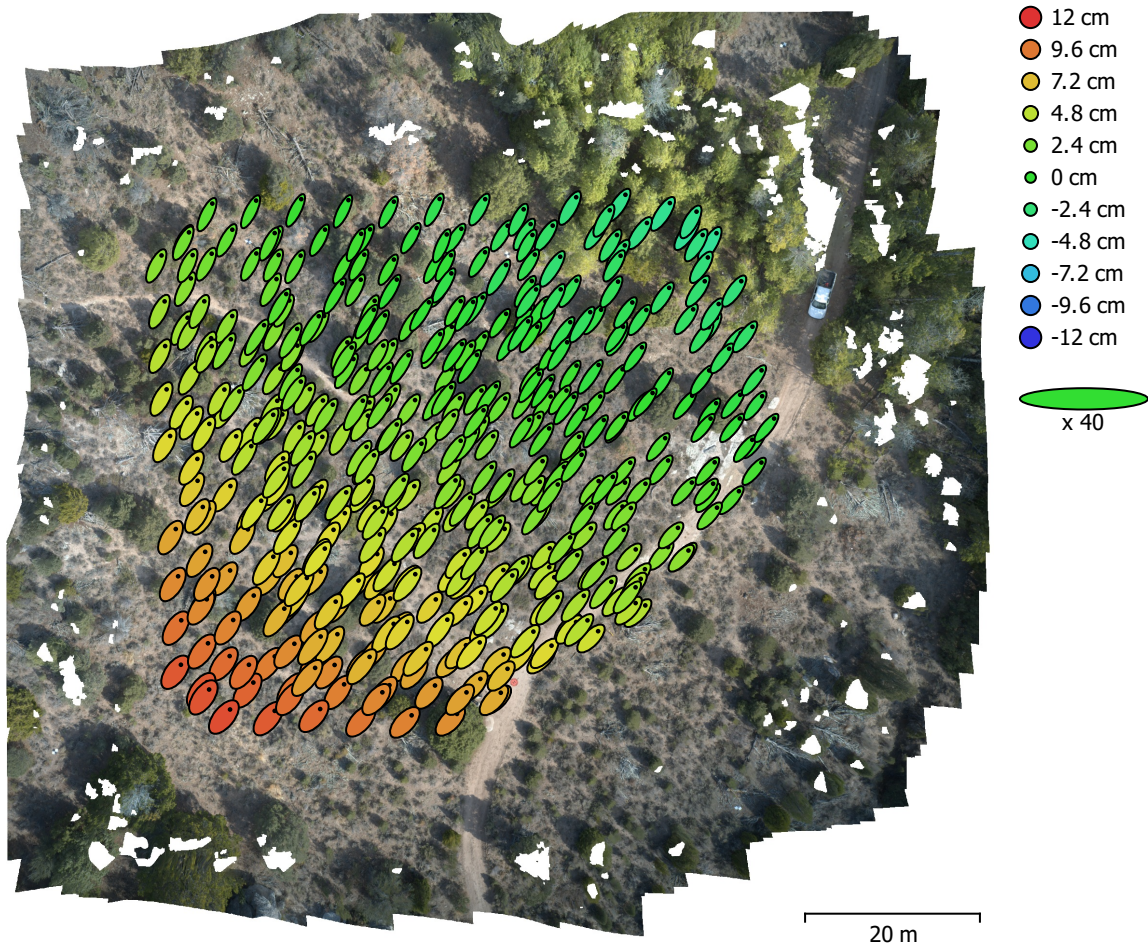


Fig. 3. Camera locations and error estimates.

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)
3.81778	5.59404	4.56864	6.77264	8.16953

Table 3. Average camera location error.

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

Ground Control Points

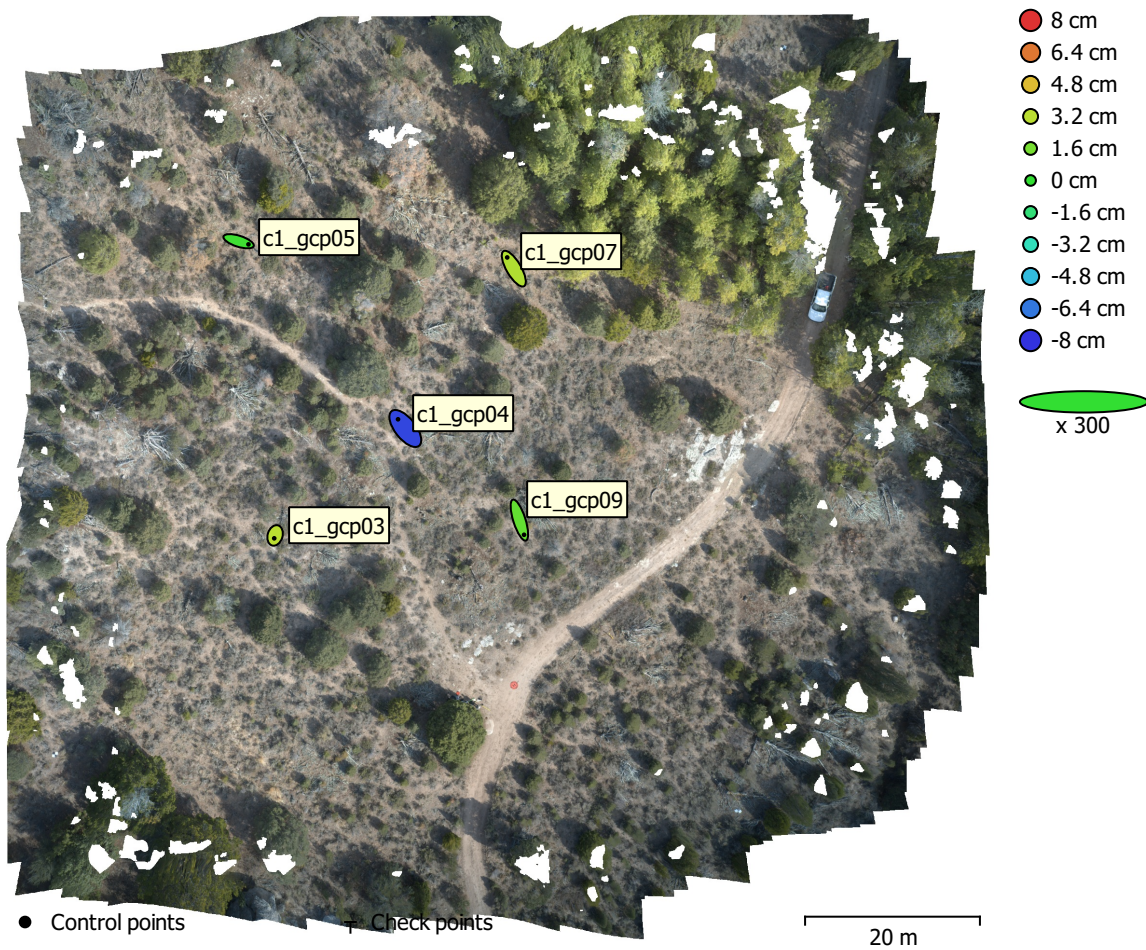


Fig. 4. GCP locations and error estimates.

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)
5	0.501027	0.719016	3.9284	0.876363	4.02497

Table 4. Control points RMSE.

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

Label	X error (cm)	Y error (cm)	Z error (cm)	Total (cm)	Image (pix)
c1_gcp03	-0.0666273	-0.220486	3.18647	3.19478	0.582 (131)
c1_gcp04	-0.554628	0.702053	-7.55154	7.60436	0.523 (172)
c1_gcp05	0.750582	-0.238712	0.283176	0.836986	0.606 (78)
c1_gcp07	-0.501689	0.855739	2.93518	3.09827	0.568 (140)
c1_gcp09	0.357802	-1.11989	1.13439	1.63371	0.522 (189)
Total	0.501027	0.719016	3.9284	4.02497	0.552

Table 5. Control points.
X - Longitude, Y - Latitude, Z - Altitude.

Digital Elevation Model

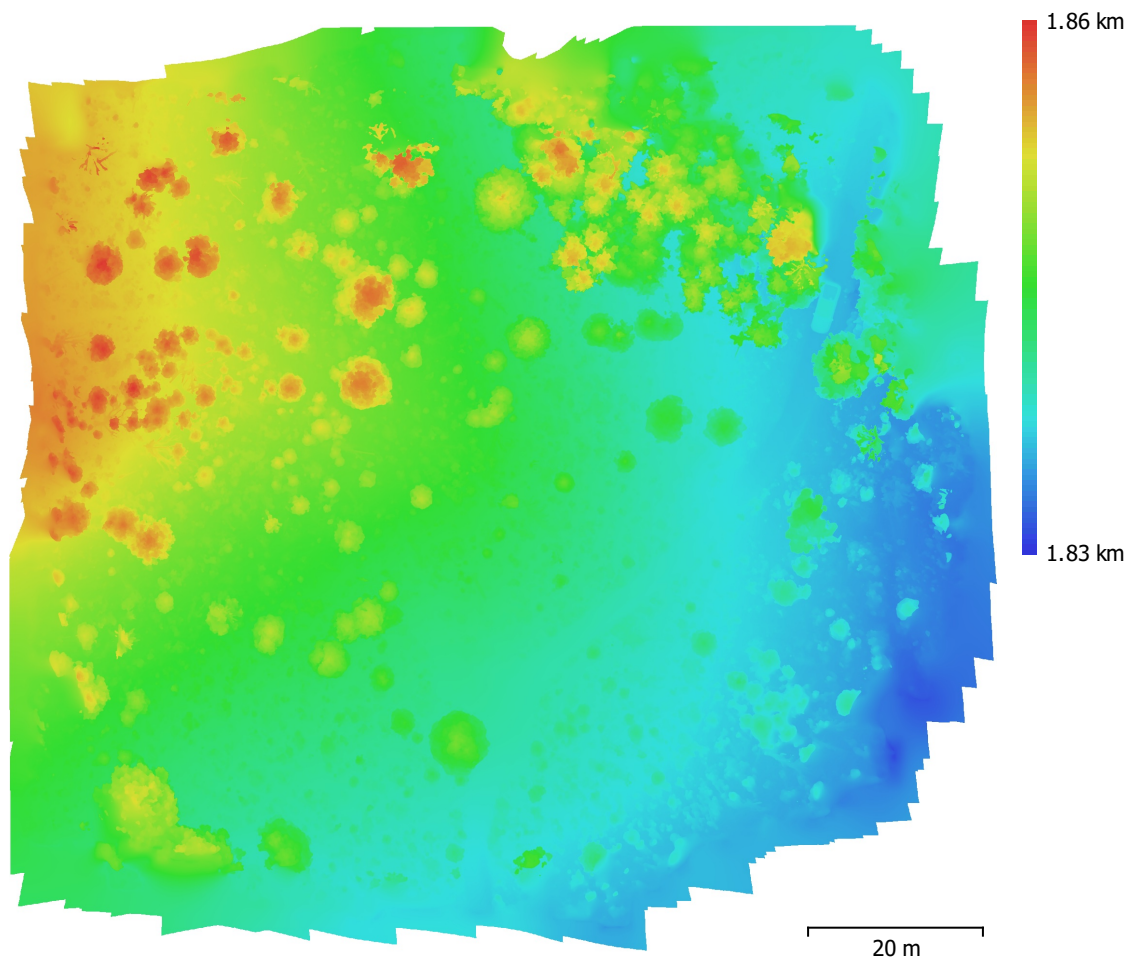


Fig. 5. Reconstructed digital elevation model.

Resolution: 10 mm/pix
Point density: 1 points/cm²

Processing Parameters

General

Cameras	427
Aligned cameras	427
Markers	5
Coordinate system	WGS 84 (EPSG::4326)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	2,150,923 of 2,402,522
RMS reprojection error	0.194511 (0.730838 pix)
Max reprojection error	0.693052 (33.7166 pix)
Mean key point size	2.66026 pix
Point colors	3 bands, uint16
Key points	No
Average tie point multiplicity	6.24132

Alignment parameters

Accuracy	Highest
Generic preselection	No
Reference preselection	Source
Key point limit	100,000
Key point limit per Mpx	1,000
Tie point limit	0
Exclude stationary tie points	No
Guided image matching	No
Adaptive camera model fitting	No
Matching time	1 hours 29 minutes
Matching memory usage	1.84 GB
Alignment time	27 minutes 6 seconds
Alignment memory usage	1.22 GB

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1, p2
Adaptive camera model fitting	No
Optimization time	1 minutes 10 seconds
Date created	2022:02:03 21:06:33
Software version	1.7.5.13229
File size	291.84 MB

Depth Maps

Count	427
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Depth maps generation parameters

Quality	High
Filtering mode	Disabled
Max neighbors	40
Processing time	1 hours 22 minutes
Memory usage	23.15 GB
Date created	2022:02:05 20:44:19
Software version	1.7.5.13229
File size	3.54 GB

Dense Point Cloud

Points	418,885,123
Point colors	3 bands, uint16

Depth maps generation parameters

Quality	Ultra High
Filtering mode	Disabled
Max neighbors	40
Processing time	2 hours 44 minutes
Memory usage	21.73 GB
Dense cloud generation parameters	
Processing time	6 hours 5 minutes
Memory usage	60.83 GB
Date created	2022:02:04 08:21:18
Software version	1.7.5.13229
File size	7.54 GB
Model	
Faces	20,458,173
Vertices	10,234,499
Vertex colors	3 bands, uint8
Texture	4,096 x 4,096, 4 bands, uint16
Depth maps generation parameters	
Quality	High
Filtering mode	Disabled
Max neighbors	40
Processing time	1 hours 22 minutes
Memory usage	23.15 GB
Reconstruction parameters	
Surface type	Arbitrary
Source data	Depth maps
Interpolation	Enabled
Strict volumetric masks	No
Processing time	19 minutes 0 seconds
Memory usage	9.99 GB
Texturing parameters	
Mapping mode	Generic
Blending mode	Mosaic
Texture size	4,096
Enable hole filling	Yes
Enable ghosting filter	Yes
UV mapping time	5 minutes 26 seconds
UV mapping memory usage	3.58 GB
Blending time	36 minutes 45 seconds
Blending memory usage	7.15 GB
Date created	2022:02:05 21:02:30
Software version	1.7.5.13229
File size	957.01 MB
DEM	
Size	11,484 x 10,797
Coordinate system	WGS 84 (EPSG::4326)
Reconstruction parameters	
Source data	Mesh
Interpolation	Enabled
Processing time	1 minutes 3 seconds
Memory usage	1.05 GB
Date created	2022:02:05 21:54:37
Software version	1.7.5.13229
File size	348.52 MB
Orthomosaic	
Size	22,579 x 21,157
Coordinate system	WGS 84 (EPSG::4326)

Colors 3 bands, uint16

Reconstruction parameters

Blending mode	Mosaic
Surface	DEM
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	47 minutes 23 seconds
Memory usage	21.83 GB
Date created	2022:02:05 22:25:29
Software version	1.7.5.13229
File size	222.27 GB

System

Software name	Agisoft Metashape Professional
Software version	1.7.5 build 13229
OS	Windows 64 bit
RAM	127.70 GB
CPU	Intel(R) Core(TM) i9-9940X CPU @ 3.30GHz
GPU(s)	NVIDIA GeForce RTX 2080