

CastleRocks Site3 June 2021

Processing Report
25 January 2022



Survey Data

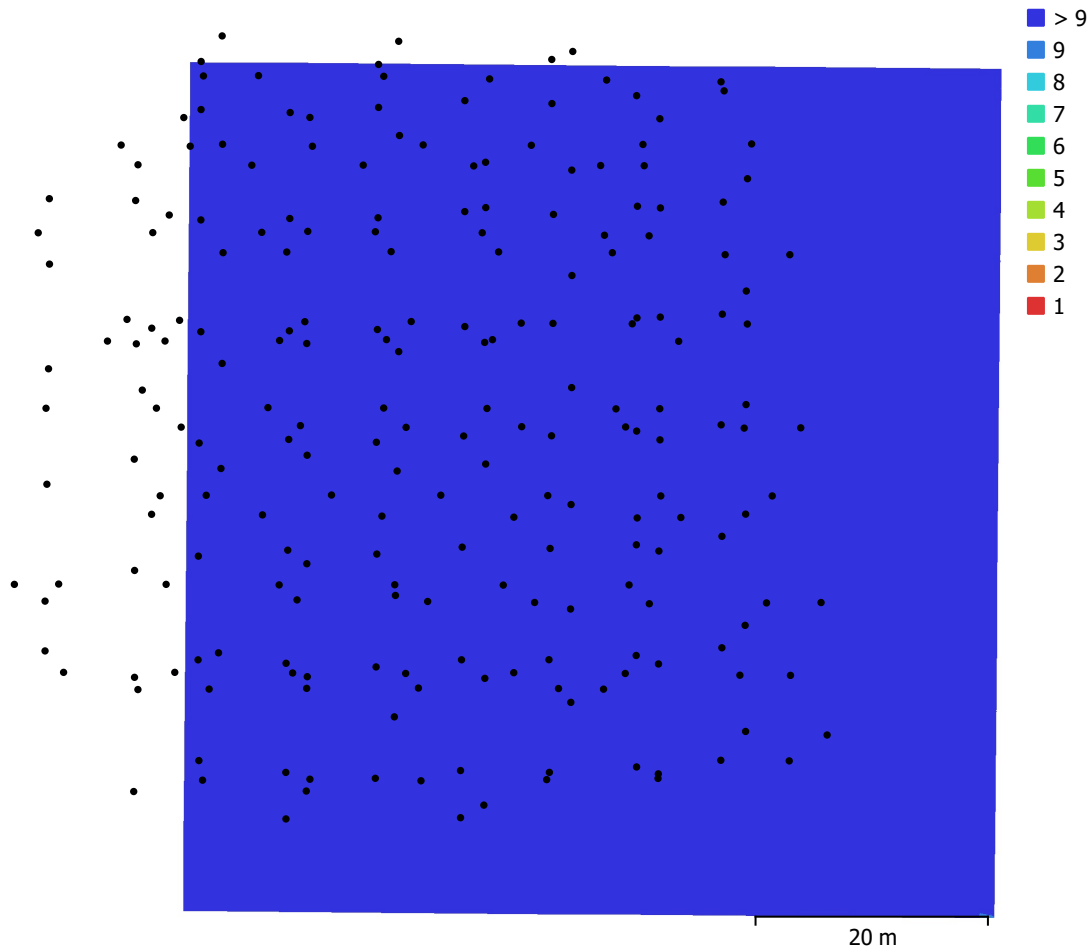


Fig. 1. Camera locations and image overlap.

Number of images:	221	Camera stations:	221
Flying altitude:	42.9 m	Tie points:	3,148,080
Ground resolution:	9.2 mm/pix	Projections:	9,613,138
Coverage area:	5.09e+03 m ²	Reprojection error:	0.755 pix

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

Table 1. Cameras.

Camera Calibration

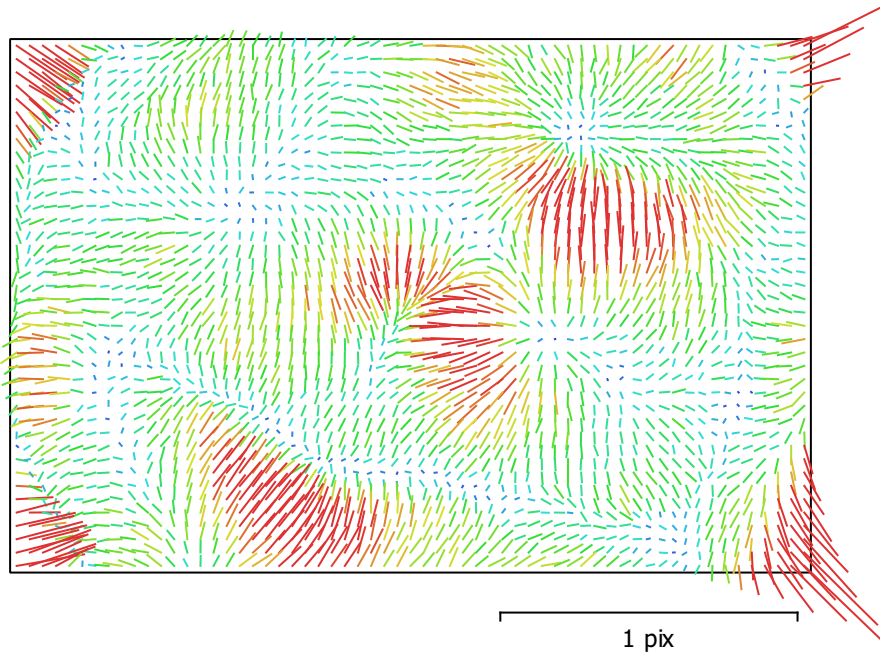


Fig. 2. Image residuals for Test_Pro (10.26mm).

Test_Pro (10.26mm)

221 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	4301.39	0.042	1.00	-0.14	-0.85	-0.26	-0.22	-0.30	0.07	-0.07	0.08	0.18	0.82
Cx	-6.6599	0.0091		1.00	0.10	0.12	0.36	0.03	-0.00	-0.00	-0.00	-0.19	-0.11
Cy	-10.8968	0.015			1.00	0.02	0.24	0.18	0.00	-0.00	-0.02	-0.16	-0.84
B1	-5.03942	0.0013				1.00	0.06	0.09	-0.04	0.04	-0.04	-0.12	0.00
B2	-2.22348	0.0013					1.00	0.05	-0.00	0.00	-0.01	-0.44	-0.24
K1	-0.186486	1.5e-05						1.00	-0.94	0.90	-0.85	-0.03	-0.21
K2	0.00495804	8.1e-05							1.00	-0.99	0.96	-0.02	0.01
K3	1.44202e-05	0.00017								1.00	-0.99	0.02	-0.00
K4	0.0323324	0.00012									1.00	-0.01	0.02
P1	0.00147486	3e-07										1.00	0.16
P2	0.000559964	6.1e-07											1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

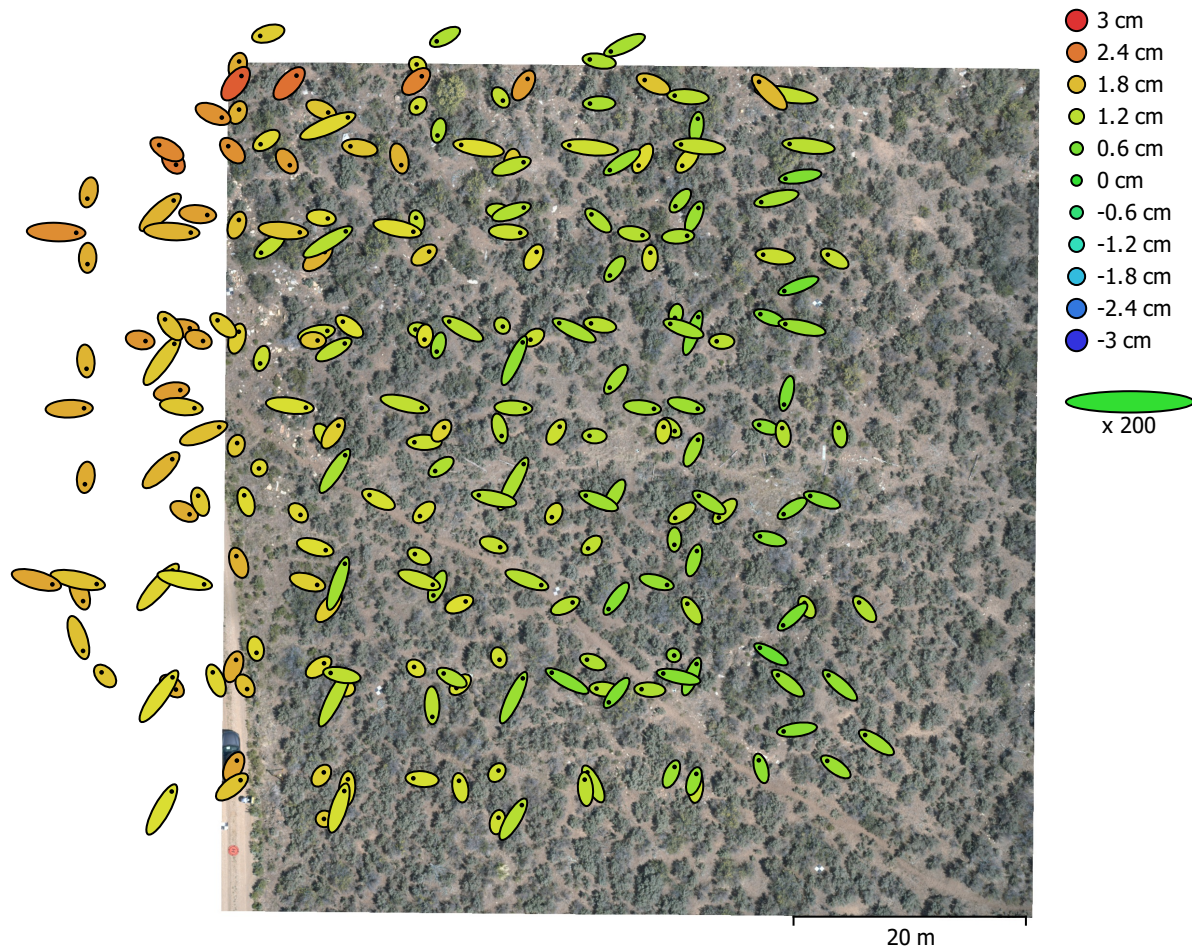


Fig. 3. Camera locations and error estimates.

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)
0.772171	0.590345	1.42482	0.971985	1.72478

Table 3. Average camera location error.

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

Ground Control Points

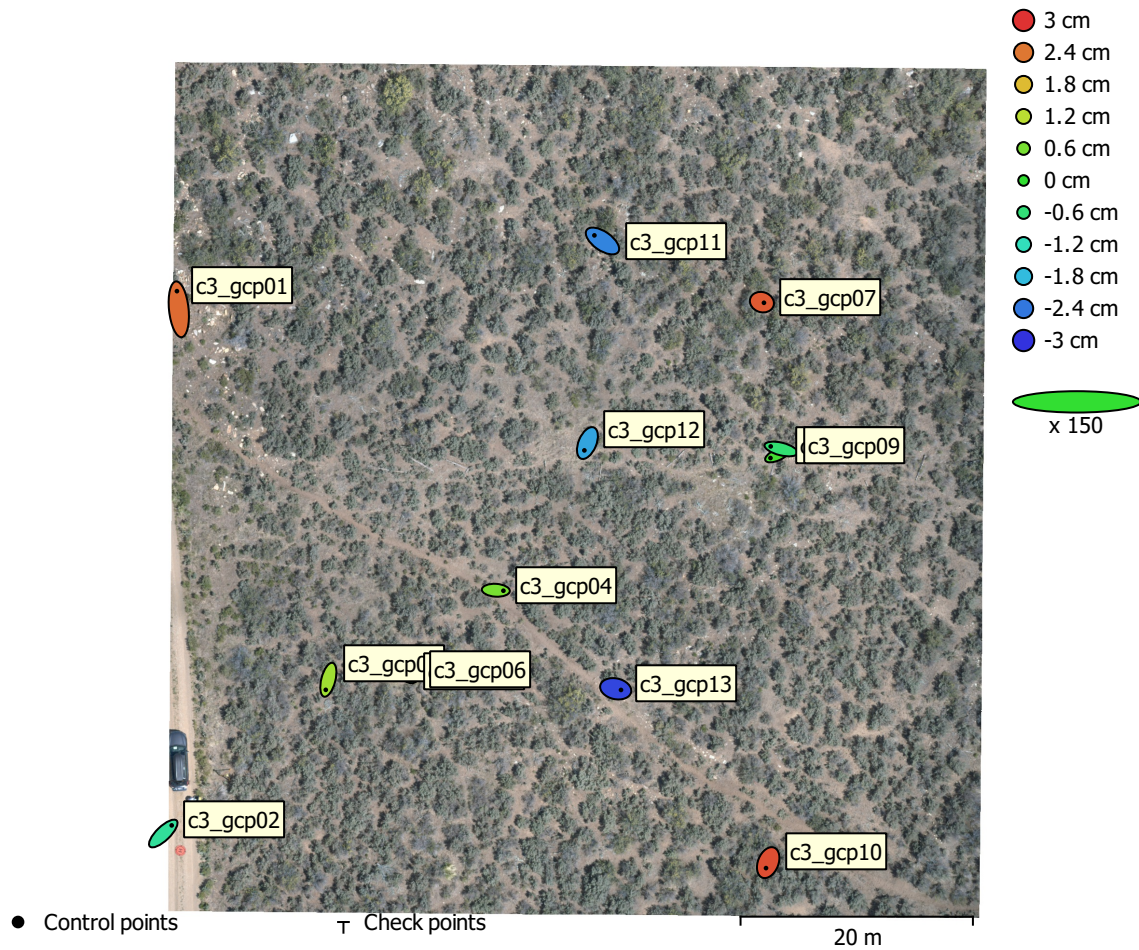


Fig. 4. GCP locations and error estimates.

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)
13	0.785037	0.837155	1.78078	1.14766	2.11856

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)
c3_gcp01	-0.211819	2.08285	2.50168	3.26214	0.534 (73)
c3_gcp02	0.966357	0.931525	-0.906554	1.6197	0.486 (35)
c3_gcp03	-0.295425	-1.15808	0.948832	1.52601	0.482 (63)
c3_gcp04	0.87001	-0.0536165	0.607958	1.06273	0.558 (92)
c3_gcp05	-0.250548	0.183402	-0.788801	0.847713	0.364 (73)
c3_gcp06	1.60649	-0.872802	-0.263316	1.84714	0.298 (68)
c3_gcp07	0.234514	-0.074131	2.65295	2.66433	0.629 (41)
c3_gcp08	-0.805963	-0.369472	0.154982	0.900059	0.310 (59)
c3_gcp09	-1.19445	0.294674	-0.548075	1.34682	0.362 (61)
c3_gcp10	-0.249782	-0.629004	2.75587	2.83776	0.623 (27)
c3_gcp11	-0.926169	0.641728	-2.28402	2.54684	0.559 (79)
c3_gcp12	-0.351154	-0.843145	-2.00211	2.2006	0.603 (89)
c3_gcp13	0.608616	-0.134659	-2.8286	2.89646	0.534 (63)
Total	0.785037	0.837155	1.78078	2.11856	0.497

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

Scale Bars

Label	Distance (m)	Error (m)
c3_gcp08_c3_gcp09	1.00112	0.00111652
c3_gcp05_c3_gcp06	1.00073	0.000732584
Total		0.000944272

Table 6. Control scale bars.

Digital Elevation Model

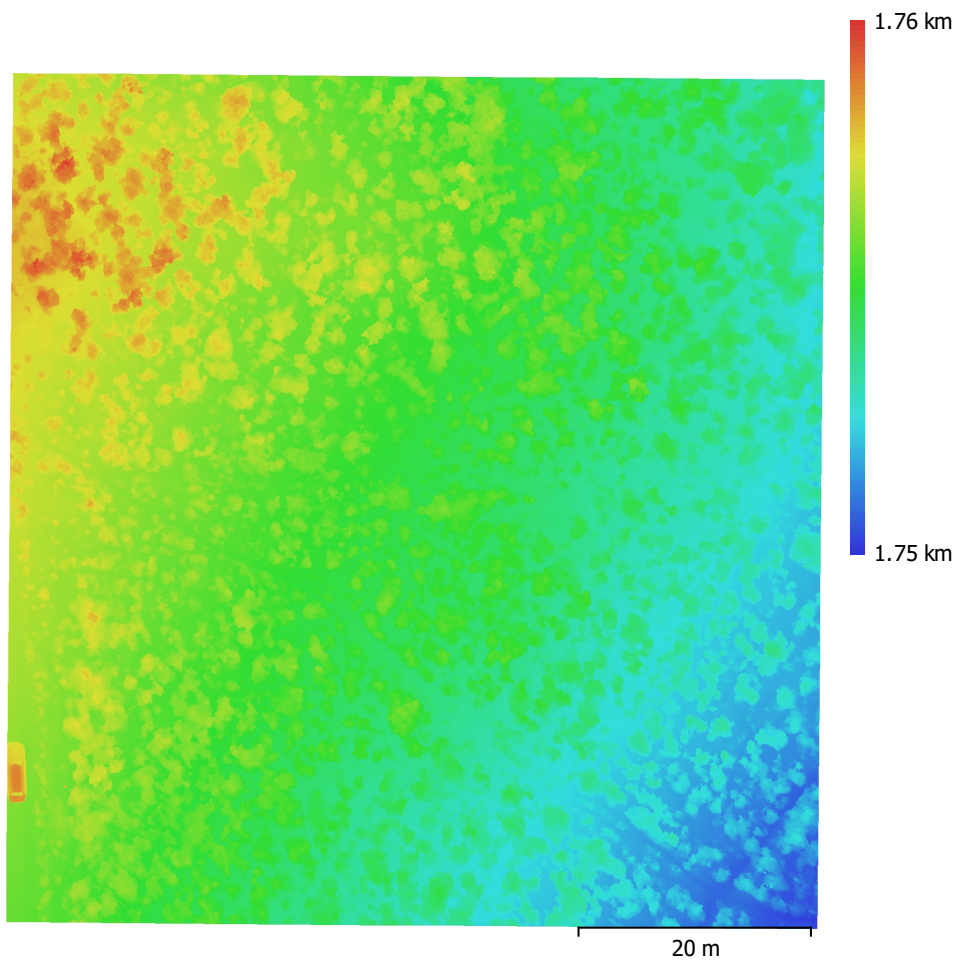


Fig. 5. Reconstructed digital elevation model.

Resolution: 1.84 cm/pix
Point density: 0.295 points/cm²

Processing Parameters

General

Cameras	221
Aligned cameras	221
Markers	13
Scale bars	2
Coordinate system	WGS 84 (EPSG::4326)
Rotation angles	Yaw, Pitch, Roll

Point Cloud

Points	3,148,080 of 3,413,463
RMS reprojection error	0.153148 (0.755261 pix)
Max reprojection error	0.836297 (25.9431 pix)
Mean key point size	3.79858 pix
Point colors	3 bands, uint16
Key points	No
Average tie point multiplicity	3.77643

Alignment parameters

Accuracy	High
Generic preselection	Yes
Reference preselection	Source
Key point limit	200,000
Key point limit per Mpx	1,000
Tie point limit	0
Exclude stationary tie points	Yes
Guided image matching	No
Adaptive camera model fitting	No
Matching time	9 minutes 54 seconds
Matching memory usage	2.51 GB
Alignment time	18 minutes 55 seconds
Alignment memory usage	1.18 GB

Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1, p2
Adaptive camera model fitting	No
Optimization time	1 minutes 15 seconds
Date created	2022:01:24 18:06:28
Software version	1.7.5.13229
File size	288.31 MB

Depth Maps

Count	216
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Depth maps generation parameters

Quality	High
Filtering mode	Disabled
Max neighbors	40
Processing time	48 minutes 14 seconds
Memory usage	14.32 GB
Date created	2022:01:24 19:32:04
Software version	1.7.5.13229
File size	1.83 GB

Dense Point Cloud

Points	31,059,212
Point colors	3 bands, uint16

Depth maps generation parameters	
Quality	High
Filtering mode	Disabled
Max neighbors	40
Processing time	48 minutes 14 seconds
Memory usage	14.32 GB
Dense cloud generation parameters	
Processing time	1 hours 10 minutes
Memory usage	15.27 GB
Date created	2022:01:24 20:42:13
Software version	1.7.5.13229
File size	565.29 MB
Model	
Faces	9,774,747
Vertices	4,895,391
Vertex colors	3 bands, uint8
Depth maps generation parameters	
Quality	High
Filtering mode	Disabled
Max neighbors	40
Processing time	48 minutes 14 seconds
Memory usage	14.32 GB
Reconstruction parameters	
Surface type	Arbitrary
Source data	Depth maps
Interpolation	Enabled
Strict volumetric masks	No
Processing time	12 minutes 45 seconds
Memory usage	9.15 GB
Date created	2022:01:24 21:09:58
Software version	1.7.5.13229
File size	223.85 MB
DEM	
Size	3,850 x 4,006
Coordinate system	WGS 84 (EPSG::4326)
Reconstruction parameters	
Source data	Dense cloud
Interpolation	Enabled
Processing time	17 seconds
Memory usage	294.11 MB
Date created	2022:01:24 22:51:41
Software version	1.7.5.13229
File size	47.17 MB
Orthomosaic	
Size	7,652 x 7,998
Coordinate system	WGS 84 (EPSG::4326)
Colors	3 bands, uint16
Reconstruction parameters	
Blending mode	Mosaic
Surface	Mesh
Enable hole filling	Yes
Enable ghosting filter	No
Processing time	24 minutes 19 seconds
Memory usage	5.65 GB
Date created	2022:01:24 23:08:22
Software version	1.7.5.13229

File size	33.23 GB
System	
Software name	Agisoft Metashape Professional
Software version	1.7.5 build 13229
OS	Windows 64 bit
RAM	63.82 GB
CPU	Intel(R) Core(TM) i9-9900K CPU @ 3.60GHz
GPU(s)	GeForce RTX 2080 GeForce RTX 2080