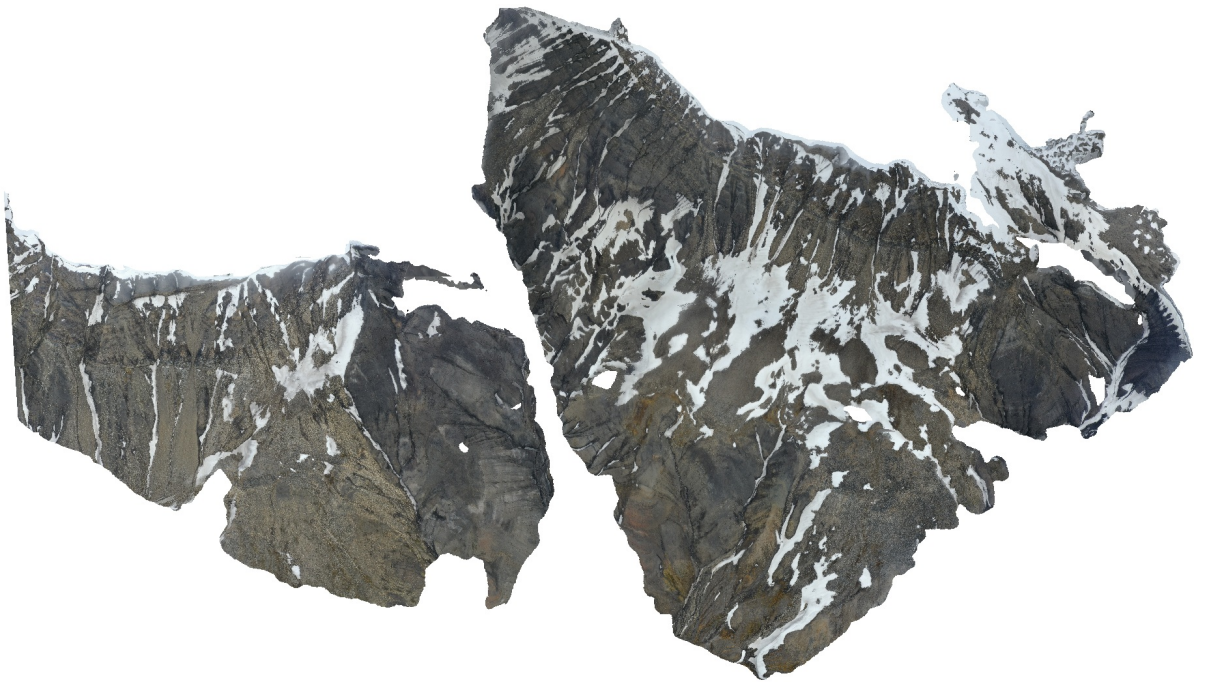


# Annaberget

Processing Report  
20 January 2022



# Survey Data



Fig. 1. Camera locations and image overlap.

Number of images:	545	Camera stations:	545
Flying altitude:	431 m	Tie points:	131,100
Ground resolution:	9.78 cm/pix	Projections:	1,278,086
Coverage area:	2.74 km <sup>2</sup>	Reprojection error:	1.33 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
L1D-20c (10.26mm)	5472 x 3648	10.26 mm	2.41 x 2.41 $\mu$ m	No
L1D-20c (10.26mm)	8192 x 4096	10.26 mm	unknown	No

Table 1. Cameras.

# Camera Calibration

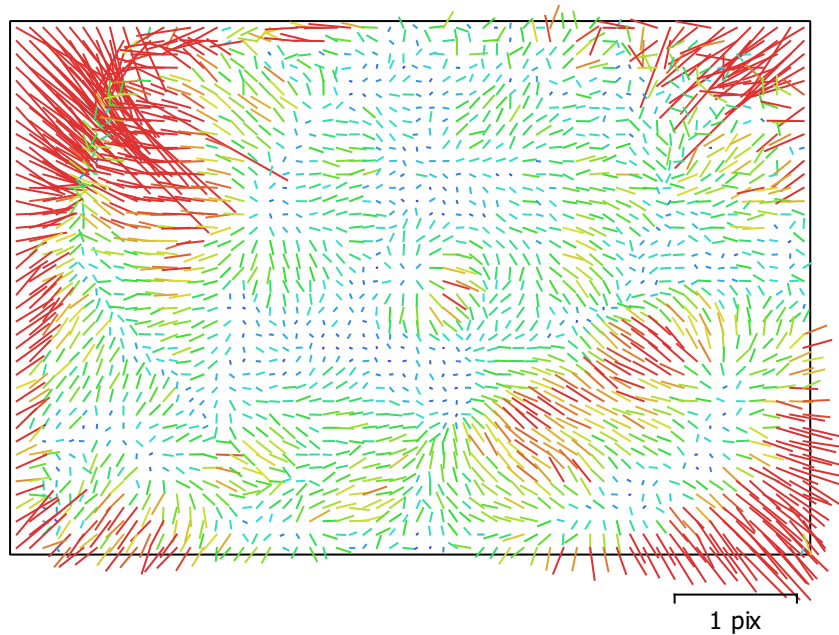


Fig. 2. Image residuals for L1D-20c (10.26mm).

## L1D-20c (10.26mm)

544 images

Type  
Frame

Resolution  
**5472 x 3648**

Focal Length  
**10.26 mm**

Pixel Size  
**2.41 x 2.41  $\mu\text{m}$**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
<b>F</b>	<b>4361.29</b>	0.08	1.00	0.03	0.21	-0.78	-0.02	-0.05	0.09	-0.09	0.09	0.02	0.02
<b>Cx</b>	<b>2.05002</b>	0.095		1.00	-0.04	0.00	0.43	0.00	-0.00	0.00	-0.01	0.94	0.02
<b>Cy</b>	<b>-37.4768</b>	0.11			1.00	-0.66	-0.07	-0.00	-0.03	0.03	-0.03	0.02	0.68
<b>B1</b>	<b>11.1508</b>	0.092				1.00	0.05	-0.04	0.03	-0.02	0.02	-0.02	-0.23
<b>B2</b>	<b>-7.19177</b>	0.066					1.00	-0.01	0.01	-0.01	0.00	0.20	-0.02
<b>K1</b>	<b>0.0107303</b>	6e-05						1.00	-0.97	0.92	-0.86	0.01	-0.04
<b>K2</b>	<b>0.0226784</b>	0.00044							1.00	-0.99	0.95	-0.01	-0.02
<b>K3</b>	<b>0.0344872</b>	0.0013								1.00	-0.99	0.01	0.02
<b>K4</b>	<b>-0.0958543</b>	0.0013									1.00	-0.01	-0.03
<b>P1</b>	<b>0.000554895</b>	6.6e-06										1.00	0.04
<b>P2</b>	<b>-0.00304866</b>	4.3e-06											1.00

Table 2. Calibration coefficients and correlation matrix.

# Camera Calibration

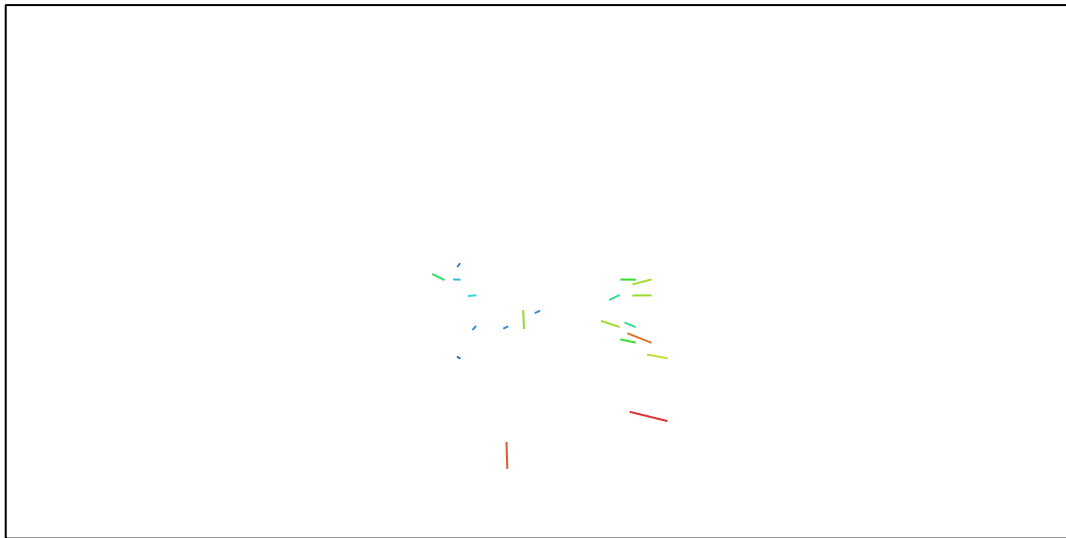


Fig. 3. Image residuals for L1D-20c (10.26mm).

26 pix

## L1D-20c (10.26mm)

1 images

Type  
Frame

Resolution  
**8192 x 4096**

Focal Length  
**10.26 mm**

Pixel Size  
**unknown**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	K4	P1	P2
<b>F</b>	<b>1523.32</b>	18	1.00	0.55	-0.35	-0.85	-0.59	-0.70	0.49	-0.43	0.42	0.76	0.61
<b>Cx</b>	<b>-441.999</b>	41		1.00	0.01	-0.38	-0.46	-0.79	0.87	-0.88	0.89	0.31	0.43
<b>Cy</b>	<b>107.075</b>	26			1.00	0.56	-0.09	0.17	0.19	-0.28	0.31	-0.70	-0.27
<b>B1</b>	<b>60.5425</b>	22				1.00	0.33	0.57	-0.25	0.18	-0.15	-0.91	-0.55
<b>B2</b>	<b>-37.4928</b>	7.8					1.00	0.79	-0.74	0.70	-0.67	-0.47	-0.69
<b>K1</b>	<b>-0.422031</b>	0.047						1.00	-0.91	0.85	-0.82	-0.66	-0.67
<b>K2</b>	<b>0.319461</b>	0.078							1.00	-0.99	0.98	0.29	0.48
<b>K3</b>	<b>-0.144834</b>	0.054								1.00	-1.00	-0.19	-0.43
<b>K4</b>	<b>0.0258</b>	0.013									1.00	0.15	0.41
<b>P1</b>	<b>-0.00587711</b>	0.006										1.00	0.71
<b>P2</b>	<b>0.00788339</b>	0.0015											1.00

Table 3. Calibration coefficients and correlation matrix.

# Camera Locations

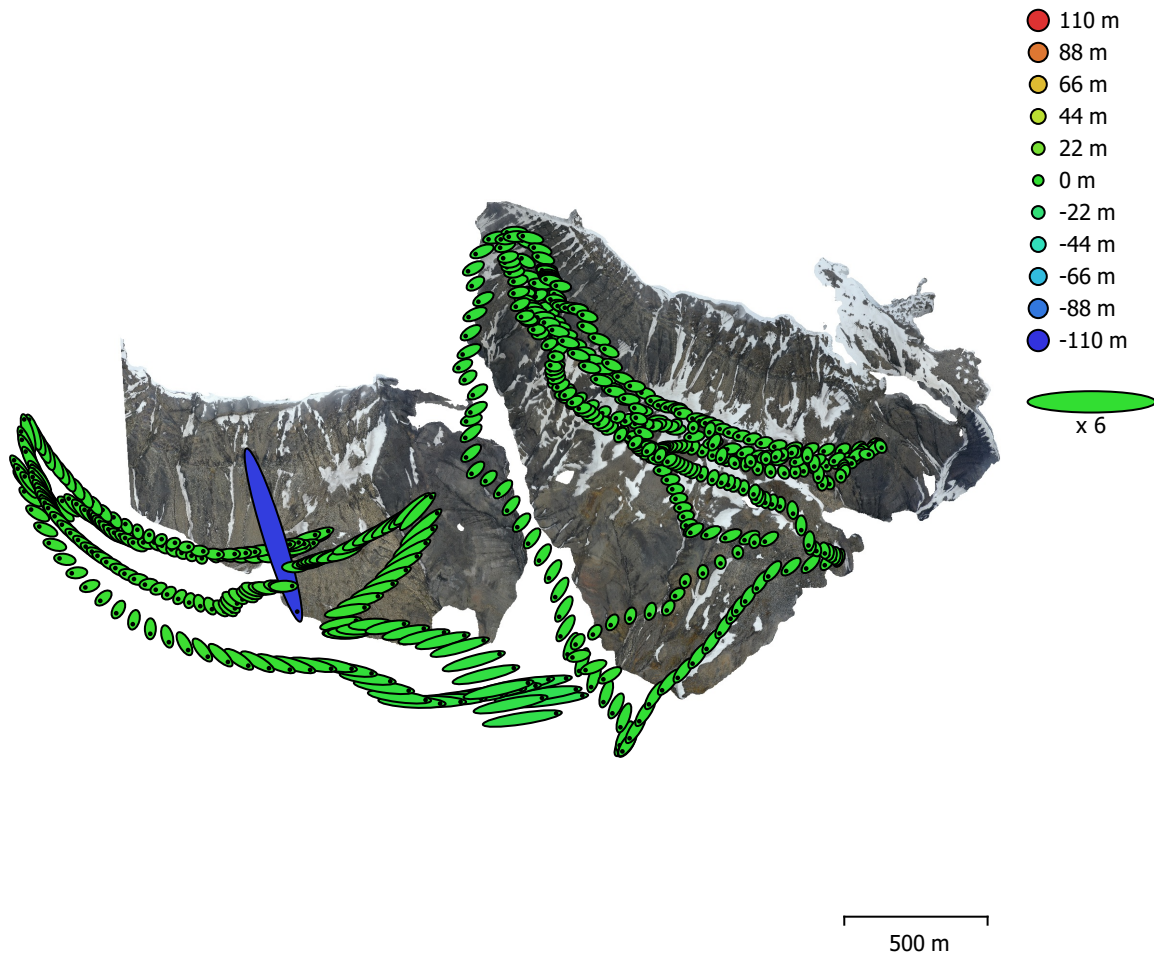


Fig. 4. Camera locations and error estimates.

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)
9.74802	6.12819	4.96413	11.5143	12.5388

Table 4. Average camera location error.

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

# Digital Elevation Model

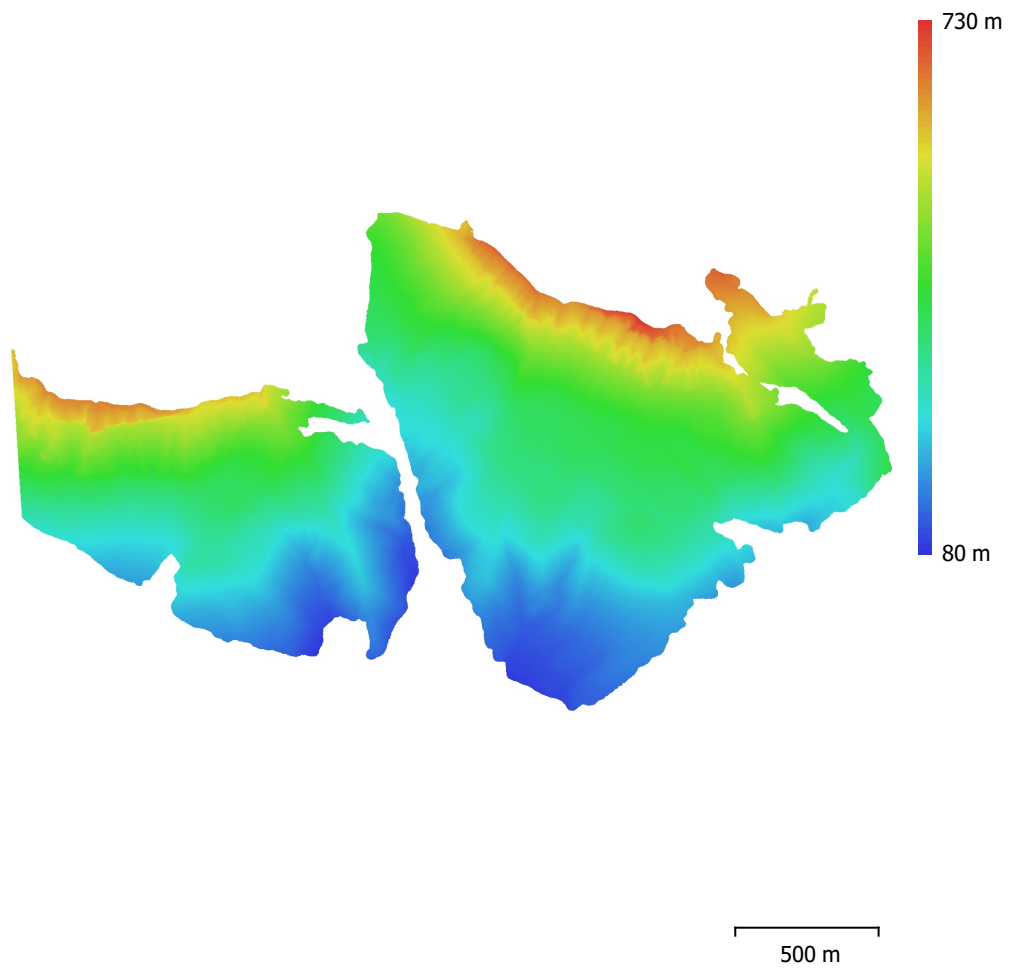


Fig. 5. Reconstructed digital elevation model.

Resolution: 39.1 cm/pix  
Point density: 6.54 points/m<sup>2</sup>

# Processing Parameters

## General

Cameras	545
Aligned cameras	545
Coordinate system	WGS 84 (EPSG::4326)
Rotation angles	Yaw, Pitch, Roll

## Point Cloud

Points	131,100 of 204,394
RMS reprojection error	0.44508 (1.32857 pix)
Max reprojection error	16.0546 (57.5841 pix)
Mean key point size	2.23092 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	16.3327

## Alignment parameters

Accuracy	Highest
Generic preselection	No
Reference preselection	No
Key point limit	40,000
Tie point limit	4,000
Exclude stationary tie points	No
Guided image matching	No
Adaptive camera model fitting	Yes
Matching time	9 hours 26 minutes
Matching memory usage	1.91 GB
Alignment time	14 minutes 46 seconds
Alignment memory usage	297.79 MB

## Optimization parameters

Parameters	f, b1, b2, cx, cy, k1-k4, p1, p2
Adaptive camera model fitting	No
Optimization time	1 minutes 9 seconds
Software version	1.7.2.12040
File size	79.99 MB

## Depth Maps

Count	544
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## Depth maps generation parameters

Quality	Medium
Filtering mode	Mild
Processing time	2 hours 10 minutes
Memory usage	2.01 GB
Software version	1.7.2.12040
File size	937.88 MB

## Dense Point Cloud

Points	21,335,998
Point colors	3 bands, uint8

## Depth maps generation parameters

Quality	Medium
Filtering mode	Mild
Processing time	2 hours 10 minutes
Memory usage	2.01 GB

## Dense cloud generation parameters

Processing time	1 hours 25 minutes
Memory usage	7.87 GB
Software version	1.7.2.12040
File size	442.20 MB
<b>Model</b>	
Faces	1,411,749
Vertices	711,526
Vertex colors	3 bands, uint8
Texture	4,096 x 4,096 x 10, 4 bands, uint8
<b>Depth maps generation parameters</b>	
Quality	Medium
Filtering mode	Mild
Processing time	2 hours 10 minutes
Memory usage	2.01 GB
<b>Reconstruction parameters</b>	
Surface type	Arbitrary
Source data	Dense cloud
Interpolation	Enabled
Strict volumetric masks	No
Processing time	9 minutes 0 seconds
Memory usage	11.04 GB
<b>Texturing parameters</b>	
Mapping mode	Generic
Blending mode	Mosaic
Texture size	4,096
Enable hole filling	Yes
Enable ghosting filter	Yes
UV mapping time	4 minutes 12 seconds
UV mapping memory usage	3.61 GB
Blending time	46 minutes 40 seconds
Blending memory usage	5.95 GB
Software version	1.7.2.12040
File size	290.77 MB
<b>Tiled Model</b>	
Texture	3 bands, uint8
<b>Depth maps generation parameters</b>	
Quality	Medium
Filtering mode	Mild
Processing time	2 hours 10 minutes
Memory usage	2.01 GB
<b>Reconstruction parameters</b>	
Source data	Dense cloud
Tile size	256
Face count	Medium
Enable ghosting filter	No
Processing time	2 hours 29 minutes
Memory usage	3.88 GB
Software version	1.7.2.12040
File size	492.46 MB
<b>System</b>	
Software name	Agisoft Metashape Professional
Software version	1.7.2 build 12040
OS	Windows 64 bit
RAM	127.78 GB
CPU	Intel(R) Core(TM) i9-9900K CPU @ 3.60GHz
GPU(s)	GeForce RTX 2080