

Photogrammetric model of the Kongur normal fault (Qimugan site), Pamir, northwestern China

Data acquisition date: 08/2018

Principal Investigator: Jianhong Xu

The Second Monitoring and Application Center, China Earthquake Administration

No. 316, Xiyang Road, Yanta District, Xi'an, China

Zip code: 710054

E-mail: jianhon2@gmail.com

Phone: +86 18740461518

Contents of this file

Collection Overview

Agisoft PhotoScan Processing Report

Collection Overview

This dataset (SfM point clouds and 0.2 m DEM) covers the terraces at the outlet of the Qimugan river (E 74.592°, N 39.089°), located in the Muji basin in Pamir, northwestern China. These terraces are offset by vertical motion along the frontal Kongur normal fault dipping west. We collected 4676 images (5472 × 3648 pixels) covering a ~1.9 km² of the research area using a consumer UAV DJI Phantom Professional V2.0. The Structure from Motion (SfM) point clouds was produced by using the commercial Photoscan Pro software (Photoscan). The SfM point cloud density was ~195 points/m² which could yield a ~7.16 cm resolution DEM. In this project, the Surfer software was utilized to build the 0.2 m resolution DEM from the dense point cloud. This project was funded by the China National Science Foundation (Grant Numbers: 41802229 and 41772221). The primary motivation for the acquisition of the data set was a study of young fluvial terrace riser degradation.

Before taking aerial photographs, 13 ground control points (GCPs) were distributed throughout the study area for georeferencing purposes. Then, 11 GCPs were implemented in the processing, removing the other two GCPs (marker 4 and 6) with big errors). We used self-spray paint to make GCPs which was composed a circle ~40 cm diameter with a spot about 10 cm diameter in the center on the surface. The survey of the markers was completed using a Trimble Geo 7X GNSS system that involves two units: fixed reference station and roving receiver. Each target center was recorded at least 15 times by the roving receiver with a 5 cm receiving accuracy. Then, precise positions of these markers were obtained by GPS post-processing software of Trimble Company. All points were acquired in WGS84/ UTM zone 43N.

Agisoft PhotoScan

Processing Report
29 January 2019



Survey Data

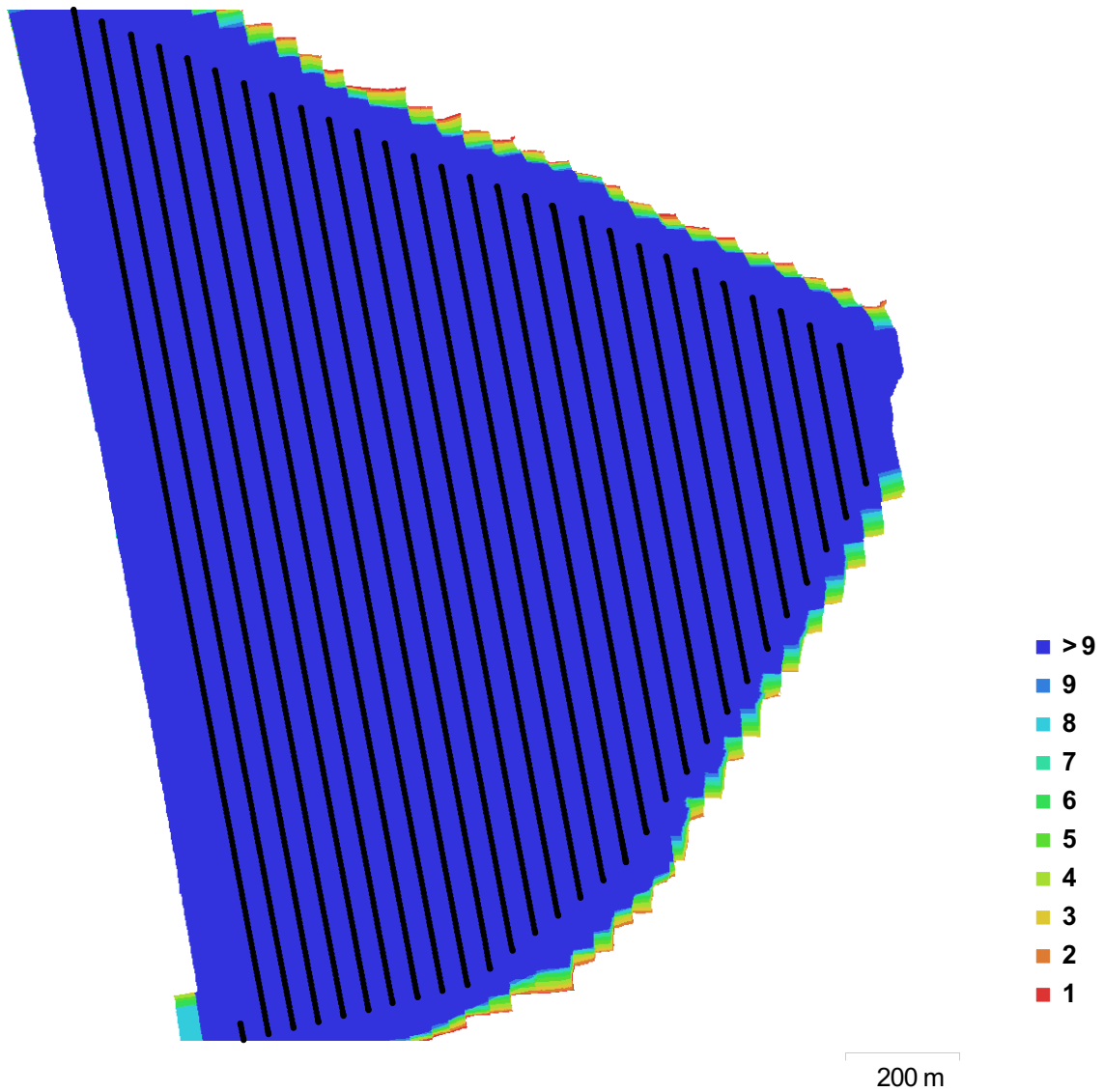


Fig. 1. Camera locations and image overlap.

Number of images:	4,676	Camera stations:	4,676
Flying altitude:	127 m	Tie points:	1,183,382
Ground resolution:	3.58 cm/pix	Projections:	32,731,523
Coverage area:	1.9 sq km	Reprojection error:	0.625 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
FC6310S (8.8 mm)	5472 x 3648	8.8 mm	2.41 x 2.41 um	No

Table 1. Cameras.

Camera Calibration

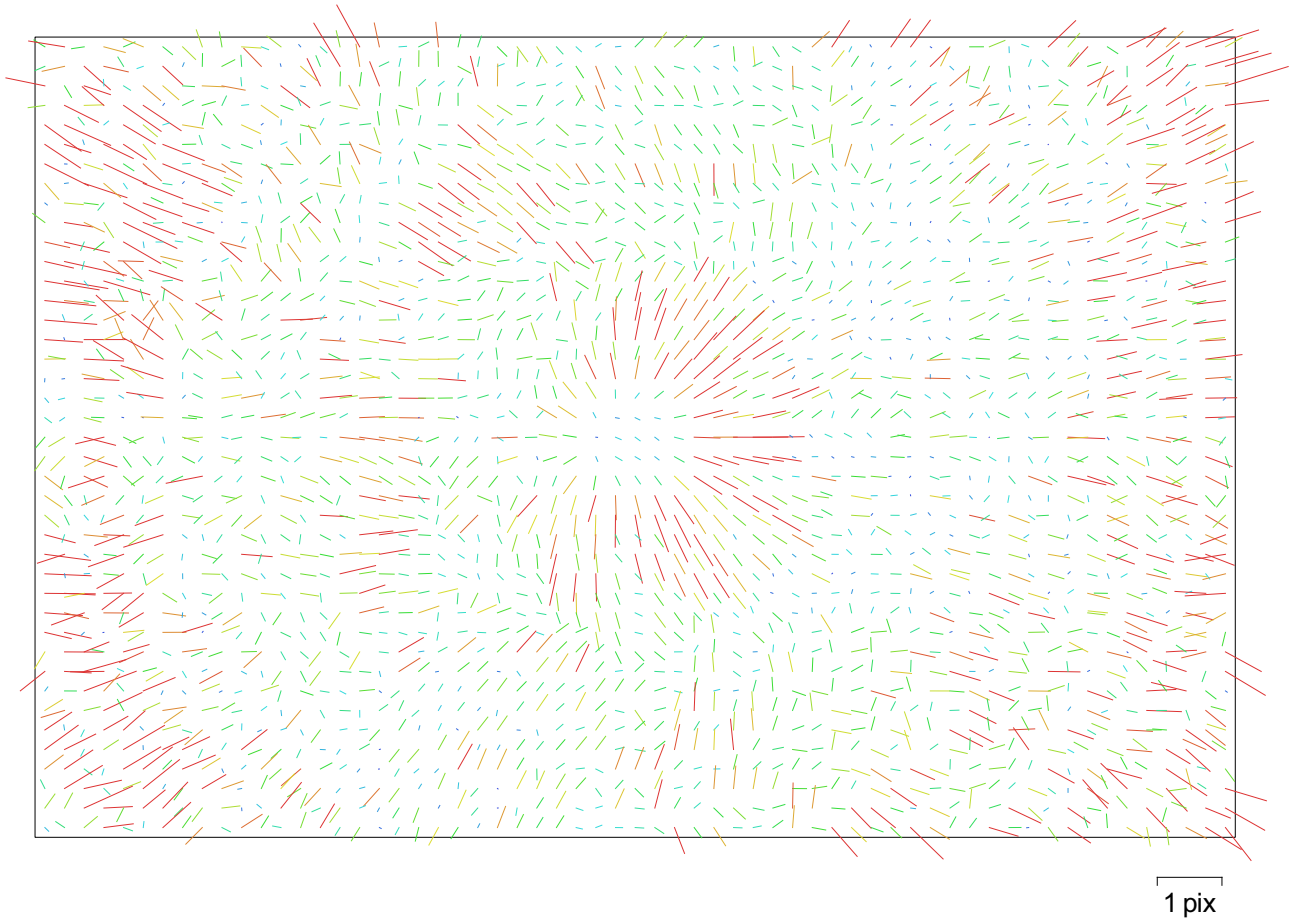


Fig. 2. Image residuals for FC6310S (8.8 mm).

FC6310S (8.8 mm)

4676 images

Resolution	Focal Length	Pixel Size	Precalibrated
5472 x 3648	8.8 mm	2.41 x 2.41 um	No
Type:	Frame	Skew:	0
Fx:	3122.83	Cx:	2734.82
Fy:	3122.83	Cy:	1867.53
K1:	0.00148586	P1:	0.00192796
K2:	-0.00355925	P2:	-0.000975103
K3:	0.00258141	P3:	0
K4:	0	P4:	0

Camera Locations

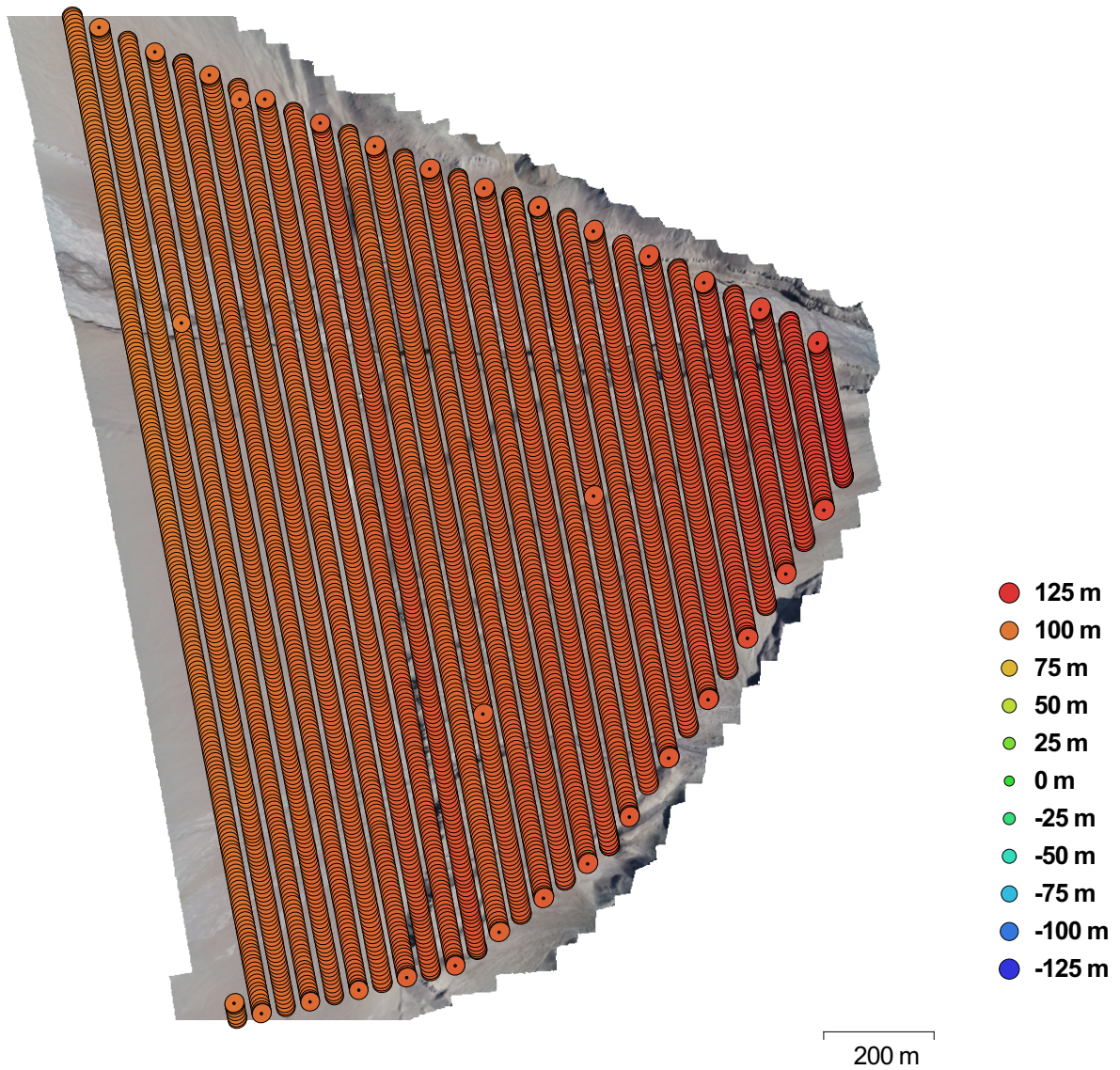


Fig. 3. Camera locations and error estimates.

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)	XY error (m)	Z error (m)	Total error (m)
1.14136	1.21295	1.66551	106.461	106.474

Table 2. Average camera location error.

Ground Control Points

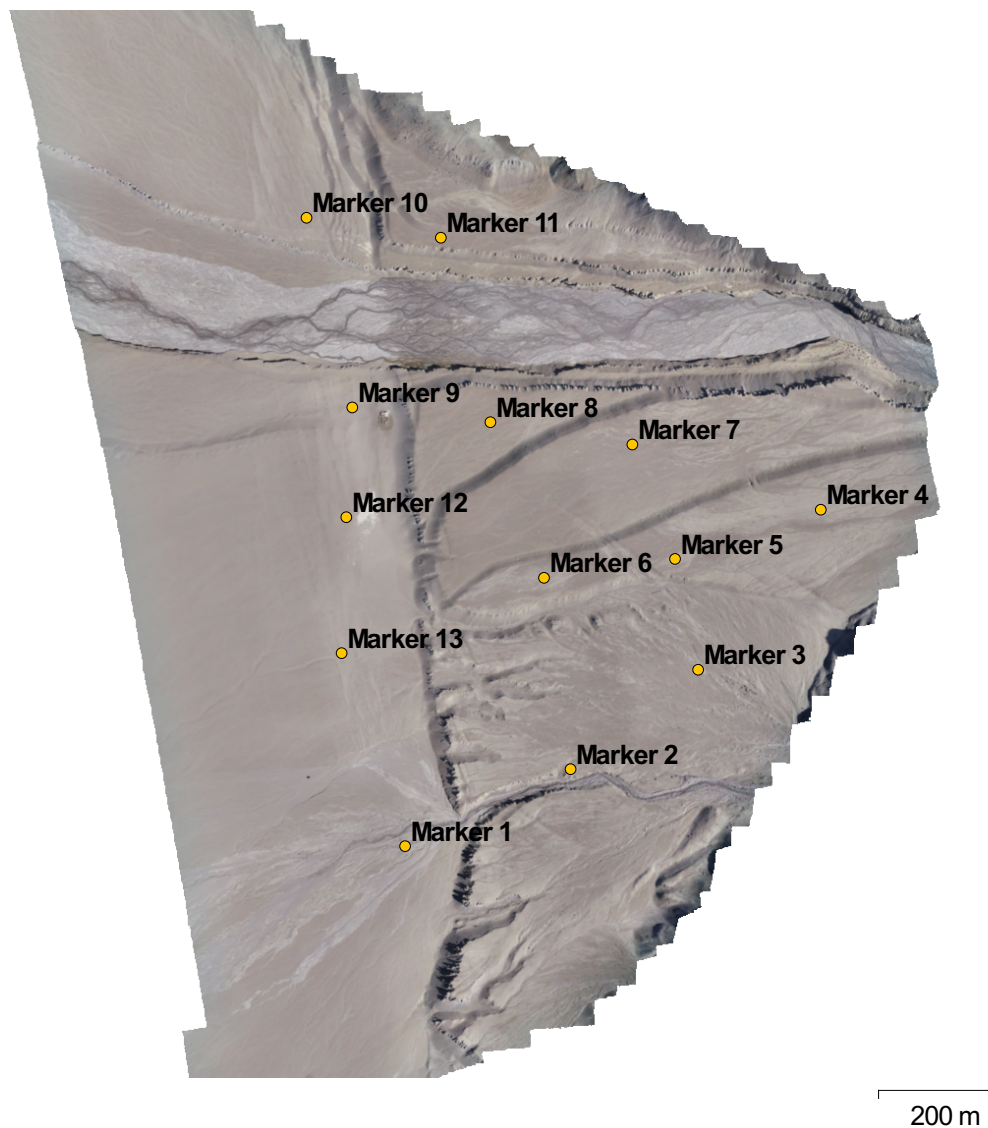


Fig. 4. GCP locations.

Label	XY error (m)	Z error (m)	Error (m)	Projections	Error (pix)
Marker 1	0.371331	0.541193	0.656336	36	0.256
Marker 2	0.270745	-0.947491	0.985415	45	0.317
Marker 3	0.484893	-0.52952	0.717992	46	0.349
Marker 5	0.301095	0.0166127	0.301553	38	0.340
Marker 7	0.246574	0.269699	0.365426	46	0.374
Marker 8	0.0595758	-0.00589329	0.0598666	66	0.291
Marker 9	0.325439	0.208837	0.386683	38	0.286
Marker 10	0.154564	-0.50235	0.525591	44	0.292
Marker 11	0.337773	-0.275937	0.436156	70	0.233

Label	XY error (m)	Z error (m)	Error (m)	Projections	Error (pix)
Marker 12	0.280604	-0.164021	0.325026	45	0.283
Marker 13	0.455561	-0.607137	0.759046	40	0.348
Total	0.320721	0.458426	0.559479		0.306

Table 3. Control points.

Label	XY error (m)	Z error (m)	Error (m)	Projections	Error (pix)
Marker 4	0.448627	3.31457	3.34479	31	0.379
Marker 6	0.137873	-1.25655	1.26409	50	0.347
Total	0.33187	2.50652	2.52839		0.359

Table 4. Check points.

Digital Elevation Model

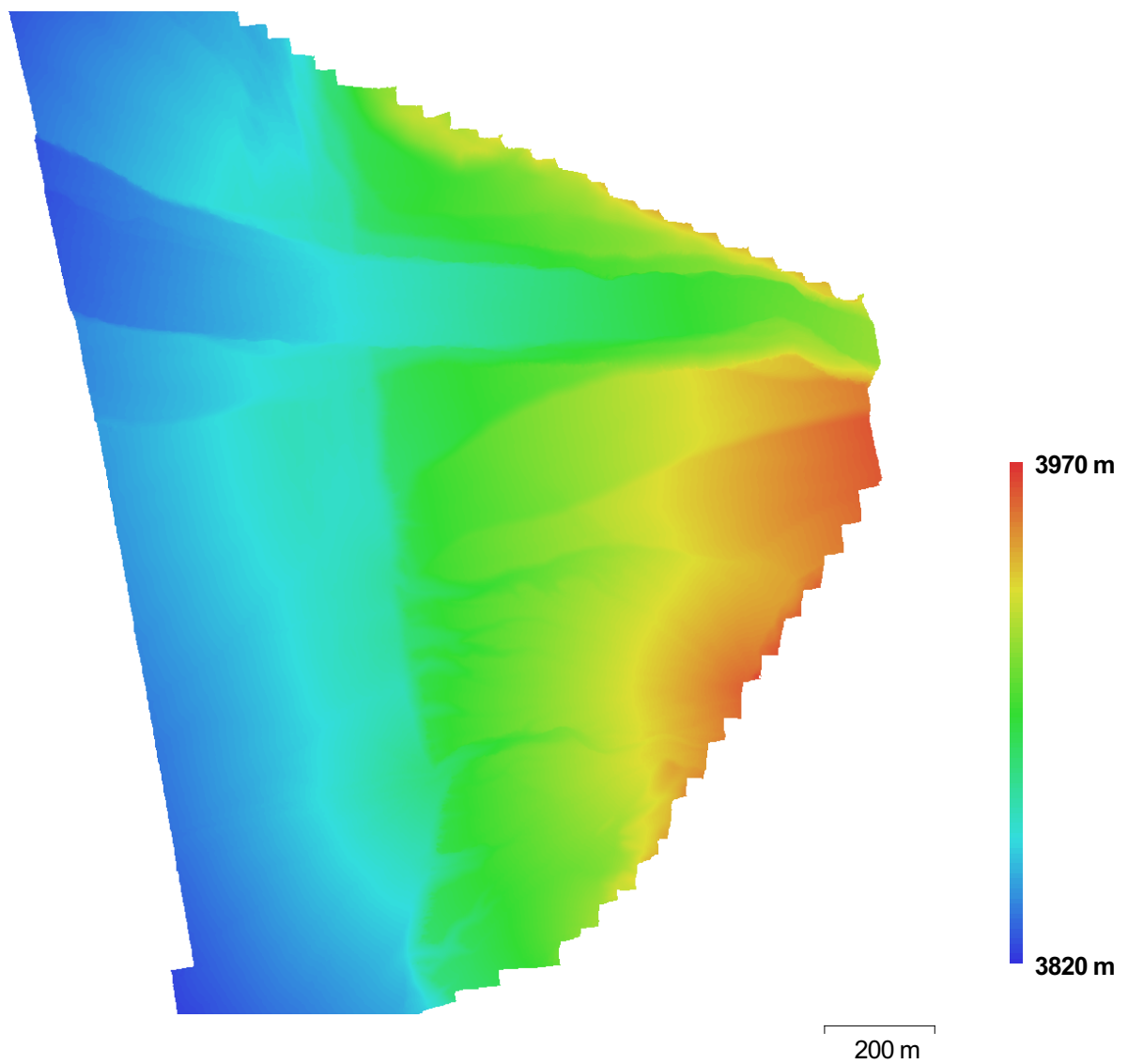


Fig. 5. Reconstructed digital elevation model.

Resolution: 7.16 cm/pix
Point density: 195.015 points per sq m

Processing Parameters

General

Cameras	4676
Aligned cameras	4676
Markers	13
Coordinate system	WGS 84 / UTMzone 43N (EPSG::32643)

Point Cloud

Points	1,183,382 of 1,599,266
RMS reprojection error	0.258936 (0.624734 pix)
Max reprojection error	1.51595 (29.9393 pix)
Mean key point size	2.44468 pix
Effective overlap	31.9514

Alignment parameters

Accuracy	High
Pair preselection	Reference
Keypoint limit	40,000
Tie point limit	10,000
Constrain features by mask	No
Matching time	1 days 4 hours
Alignment time	8 hours 26 minutes

Optimization parameters

Parameters	f, cx, cy, k1-k3, p1, p2
Optimization time	1 hours 34 minutes

Depth Maps

Count	4676
-------	------

Reconstruction parameters

Quality	High
Filtering mode	Moderate
Processing time	20 days 9 hours

Dense Point Cloud

Points	448,095,092
--------	-------------

Reconstruction parameters

Quality	High
Depth filtering	Moderate
Processing time	9 days 7 hours

DEM

Size	39,162 x 43,837
Coordinate system	WGS 84 / UTMzone 43N (EPSG::32643)

Reconstruction parameters

Source data	Dense cloud
Interpolation	Enabled

Orthomosaic

Size	40,714 x 50,965
Coordinate system	WGS 84 (EPSG::4326)
Channels	3, uint8
Blending mode	Mosaic

Reconstruction parameters

Surface	Mesh
Enable color correction	No