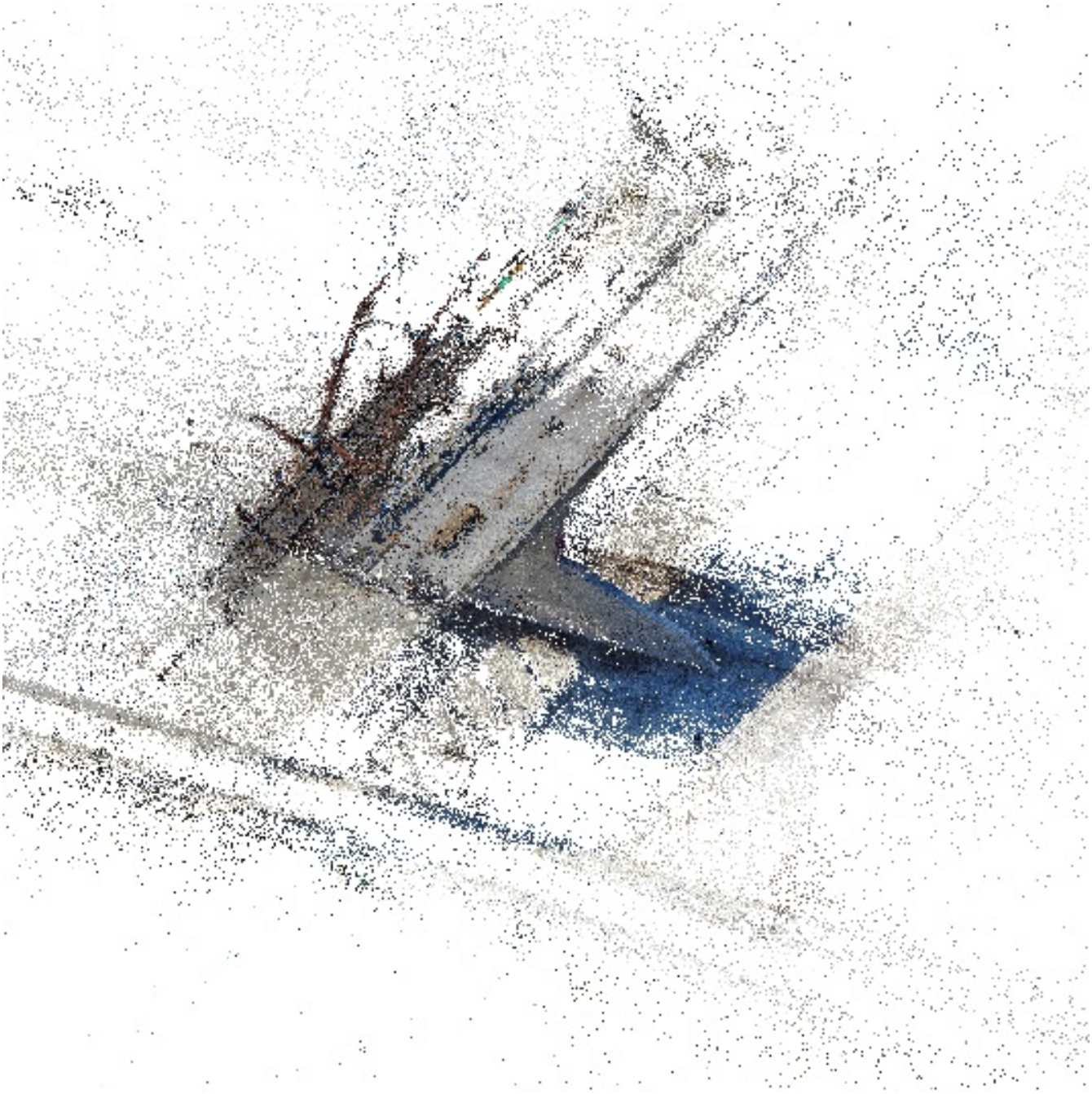
Skydio S2

R12i Control

04 November 2021



Survey Data

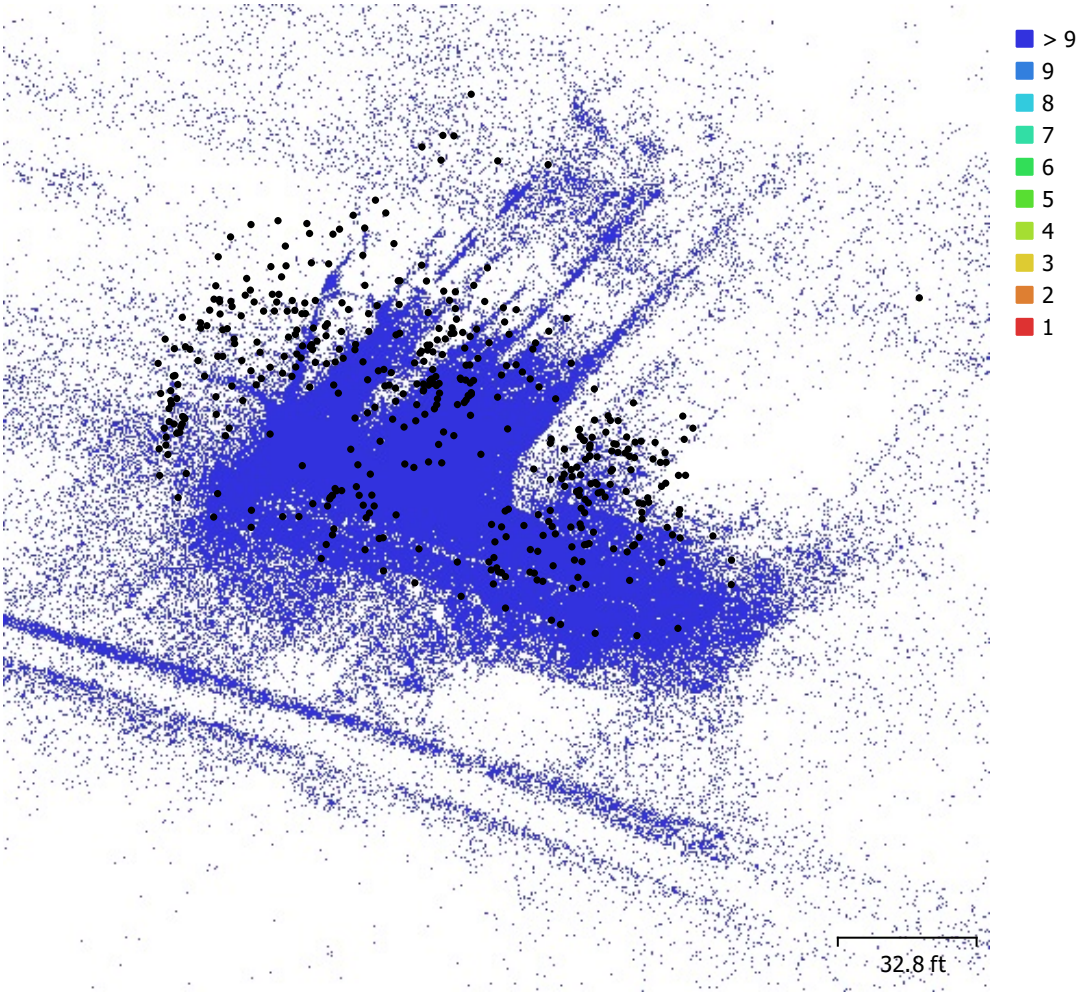


Fig. 1. Camera locations and image overlap.

Number of images:	453	Camera stations:	442
Flying altitude:	53 ft	Tie points:	284,667
Ground resolution:	0.0218 ft/pix	Projections:	898,218
Coverage area:	1.15e+04 ft²	Reprojection error:	2.28 pix

Camera Model	Resolution	Focal Length	Pixel Size	Precalibrated
2 (3.7mm)	4056 x 3040	3.7 mm	1.5 x 1.5 µm	No

Table 1. Cameras.

Camera Calibration

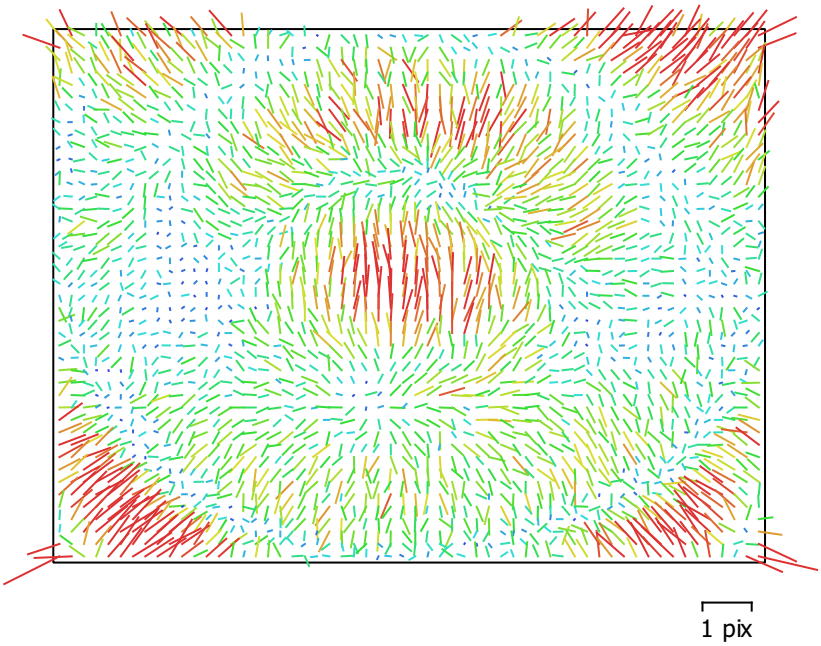


Fig. 2. Image residuals for 2 (3.7mm).

2 (3.7mm)
453 images

Type	Resolution	Focal Length	Pixel Size
Frame	**4056 x 3040**	**3.7 mm**	**1.5 x 1.5 µm**

	Value	Error	F	Cx	Cy	B1	B2	K1	K2	K3	P1	P2
F	**2436.14**	0.063	1.00	0.01	-0.23	-0.25	0.00	-0.35	0.38	-0.35	0.02	-0.15
Cx	**-6.67221**	0.07		1.00	-0.02	0.02	0.02	0.00	-0.00	-0.00	0.92	-0.00
Cy	**19.1821**	0.06			1.00	-0.02	-0.01	-0.04	0.00	0.00	-0.00	0.79
B1	**-32.358**	0.028				1.00	-0.01	0.01	-0.02	0.02	0.01	0.05
B2	**-0.257743**	0.024					1.00	0.00	-0.00	0.00	-0.01	-0.00
K1	**-0.0035408**	9e-05						1.00	-0.96	0.91	-0.00	-0.04
K2	**0.0187258**	0.0002							1.00	-0.98	0.00	0.00
K3	**-0.018324**	0.00013								1.00	-0.00	0.00
P1	**0.000396585**	9.5e-06									1.00	0.00
P2	**0.000904973**	7.5e-06										1.00

Table 2. Calibration coefficients and correlation matrix.

Camera Locations

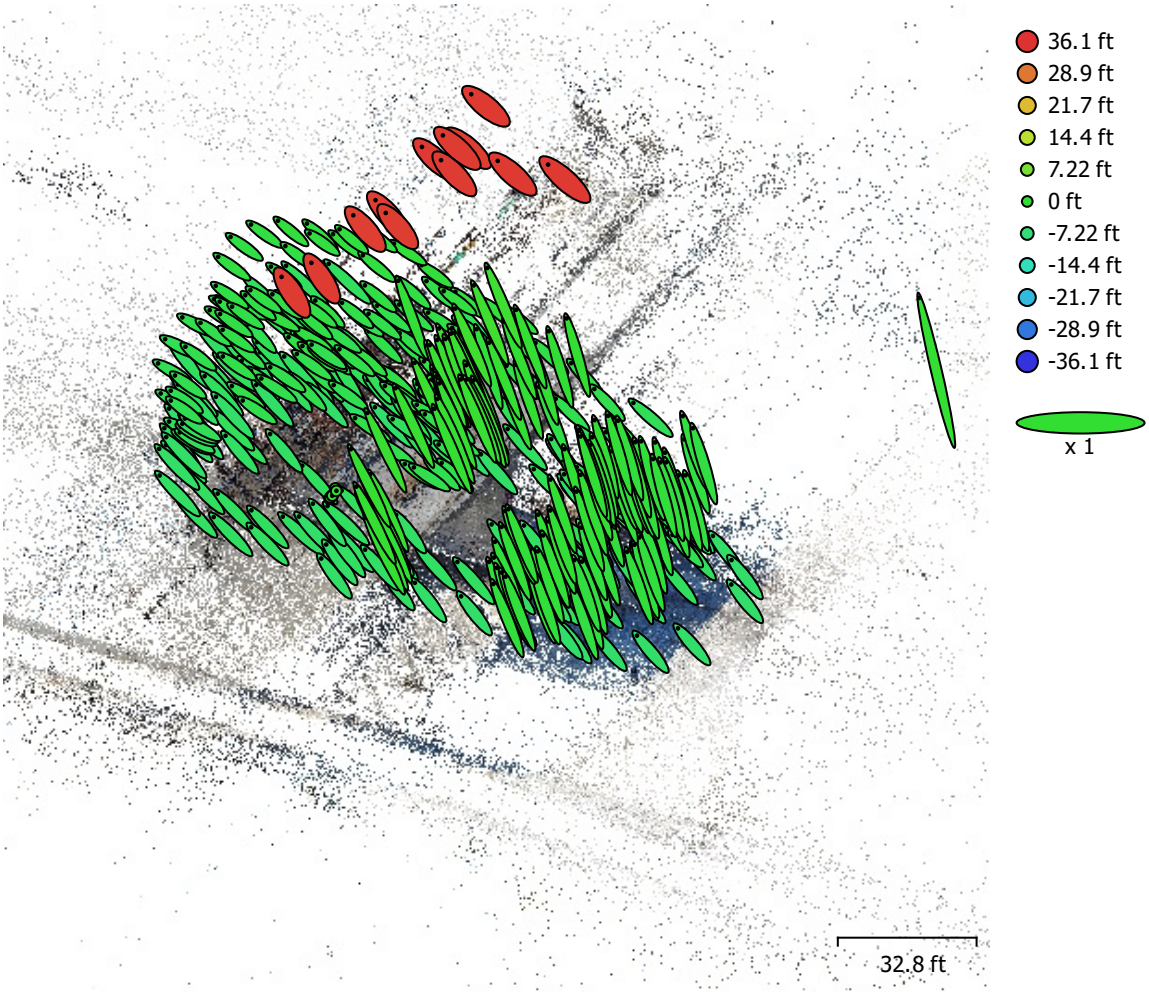


Fig. 3. Camera locations and error estimates.
Z error is represented by ellipse color. X,Y errors are represented by ellipse shape.
Estimated camera locations are marked with a black dot.

X error (ft)	Y error (ft)	Z error (ft)	XY error (ft)	Total error (ft)
6.73742	10.6145	6.66735	12.5722	14.2307

Table 3. Average camera location error.
X - Longitude, Y - Latitude, Z - Altitude.

Ground Control Points

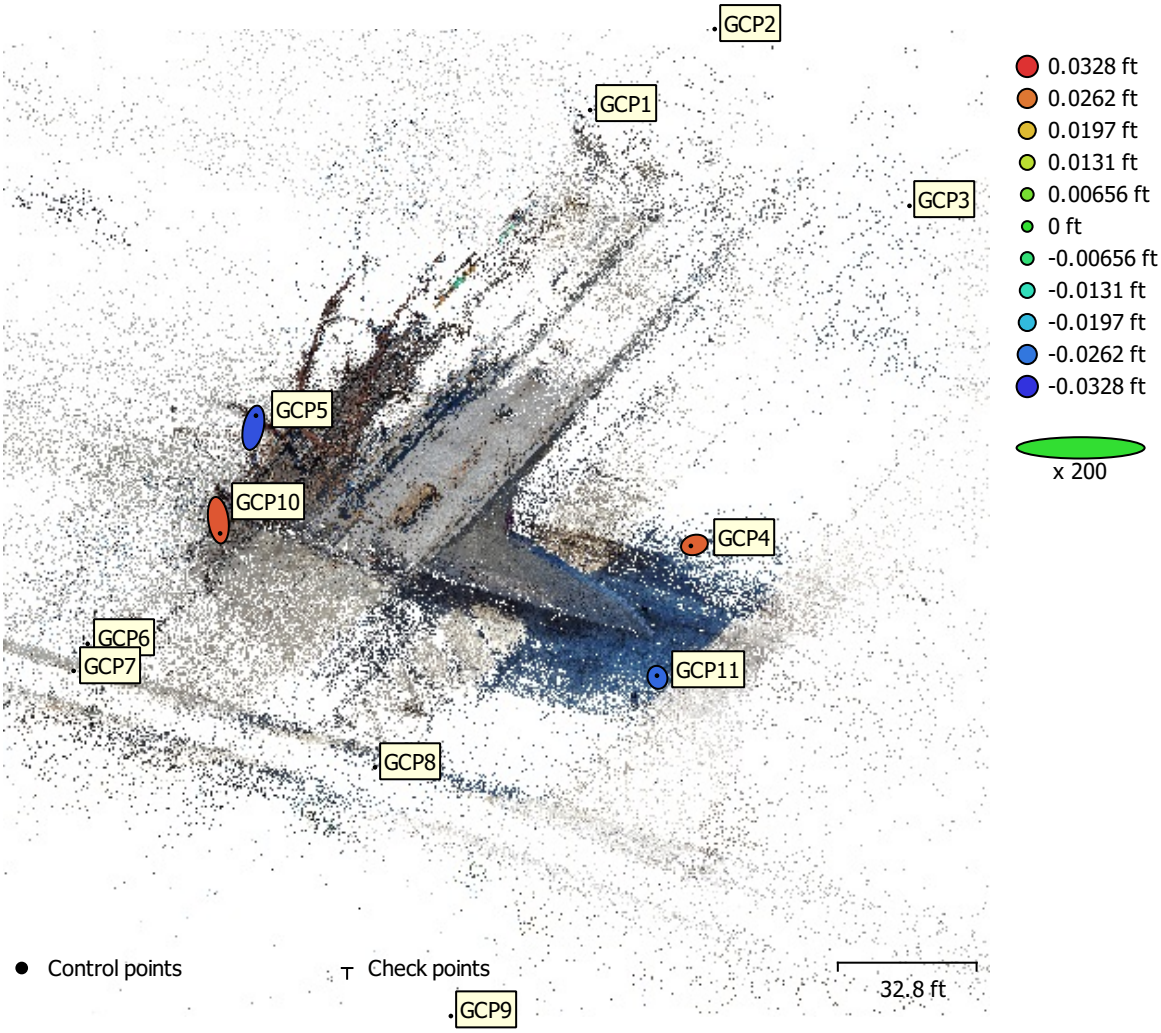


Fig. 4. GCP locations and error estimates.

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 (ft)	Y error (ft)	Z error (ft)	XY error (ft)	Total (ft)
4	0.00564781	0.0212779	0.0288707	0.0220147	0.0363066

Table 4. Control points RMSE.

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

Label	X error (ft)	Y error (ft)	Z error (ft)	Total (ft)	Image (pix)
GCP1					
GCP2					
GCP3					
GCP4	-0.00842828	-0.00240976	0.0283808	0.0297038	0.809 (8)
GCP5	0.00613892	0.0285615	-0.0299162	0.0418142	0.521 (8)
GCP6					
GCP7					
GCP8					
GCP9					
GCP10	0.00418212	-0.0311968	0.0294275	0.0430895	1.058 (8)
GCP11	-0.00117411	0.00402366	-0.0277065	0.0280218	0.833 (8)
Total	**0.00564781**	**0.0212779**	**0.0288707**	**0.0363066**	**0.828**

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

Digital Elevation Model

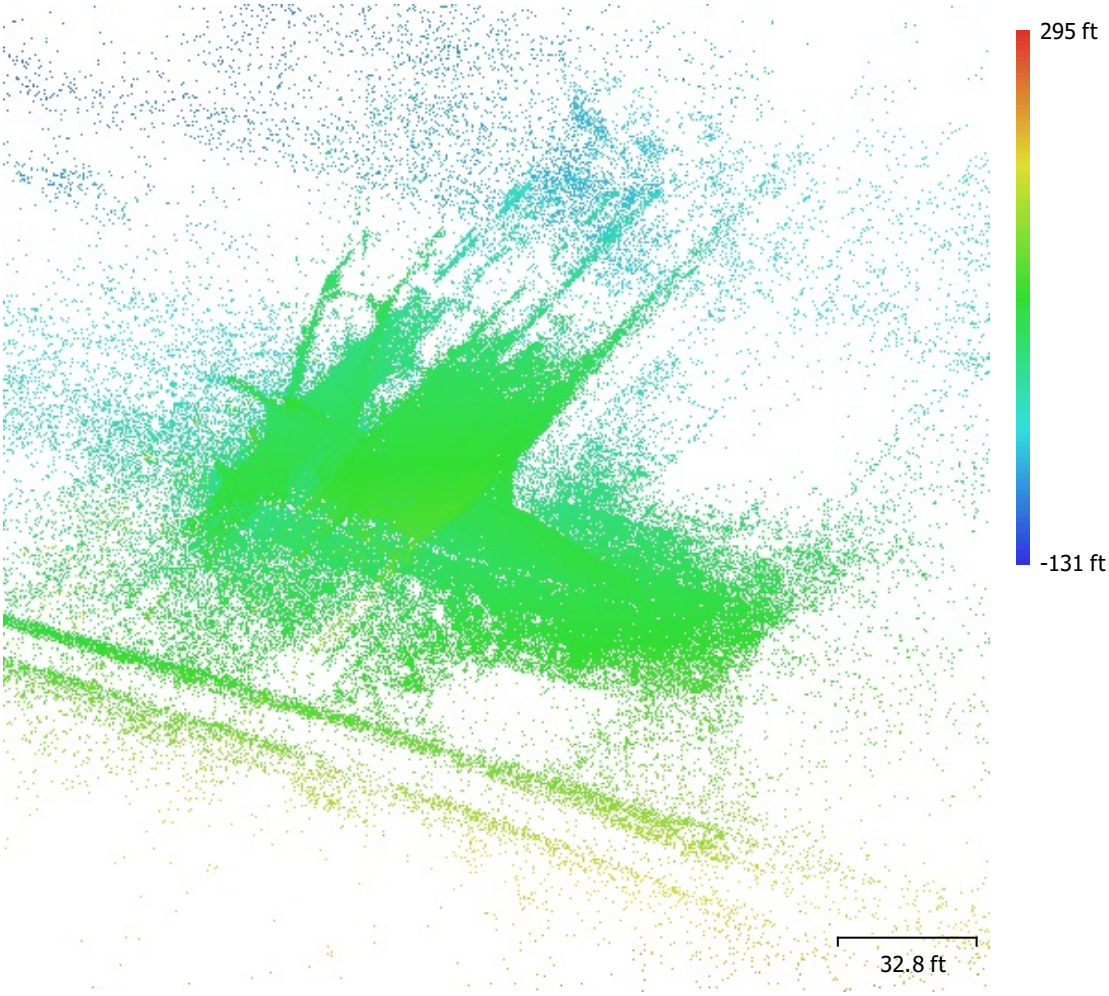


Fig. 5. Reconstructed digital elevation model.

Resolution:	unknown
Point density:	unknown

Processing Parameters

General	
Cameras	453
Aligned cameras	442
Markers	11
Coordinate system	WGS 84 (EPSG::4326)
Rotation angles	Yaw, Pitch, Roll
Point Cloud	
Points	284,667 of 338,011
RMS reprojection error	0.252298 (2.27677 pix)
Max reprojection error	1.00214 (99.3573 pix)
Mean key point size	8.5541 pix
Point colors	3 bands, uint8
Key points	No
Average tie point multiplicity	3.60104
Alignment parameters	
Accuracy	Medium
Generic preselection	Yes
Reference preselection	Source
Key point limit	40,000
Tie point limit	4,000
Exclude stationary tie points	Yes
Guided image matching	Yes
Adaptive camera model fitting	Yes
Matching time	5 minutes 45 seconds
Matching memory usage	277.43 MB
Alignment time	3 minutes 27 seconds
Alignment memory usage	398.55 MB
Optimization parameters	
Parameters	f, b1, b2, cx, cy, k1-k3, p1, p2
Adaptive camera model fitting	No
Optimization time	14 seconds
Software version	1.7.2.12070
File size	26.11 MB
System	
Software name	Agisoft Metashape Professional
Software version	1.7.2 build 12070
OS	Windows 64 bit
RAM	127.88 GB
CPU	AMD Ryzen Threadripper 2990WX 32-Core Processor
GPU(s)	Quadro RTX 5000