

# Quality Report



Generated with Pix4Dmapper version 4.6.4



**Important:** Click on the different icons for:



Help to analyze the results in the Quality Report



Additional information about the sections



Click [here](#) for additional tips to analyze the Quality Report

## Summary



Project	100%_ugeom_mgcp2
Processed	2021-05-05 07:16:01
Camera Model Name(s)	Insta360Pro_1.9_7680x3840 (RGB)
Average Ground Sampling Distance (GSD)	0.71 cm / 0.28 in
Time for Initial Processing (without report)	06h:07m:51s

## Quality Check



<b>Images</b>	median of 24911 keypoints per image	
<b>Dataset</b>	1074 out of 1074 images calibrated (100%), all images enabled	
<b>Camera Optimization</b>	0% relative difference between initial and optimized internal camera parameters	
<b>Matching</b>	median of 6949.27 matches per calibrated image	
<b>Georeferencing</b>	yes, 29 GCPs (29 3D), mean RMS error = 0.337 m	

## Calibration Details



Number of Calibrated Images	1074 out of 1074
Number of Geolocated Images	0 out of 1074



### Initial Image Positions



The preview is not generated for images without geolocation.



### Computed Image/GCPs/Manual Tie Points Positions



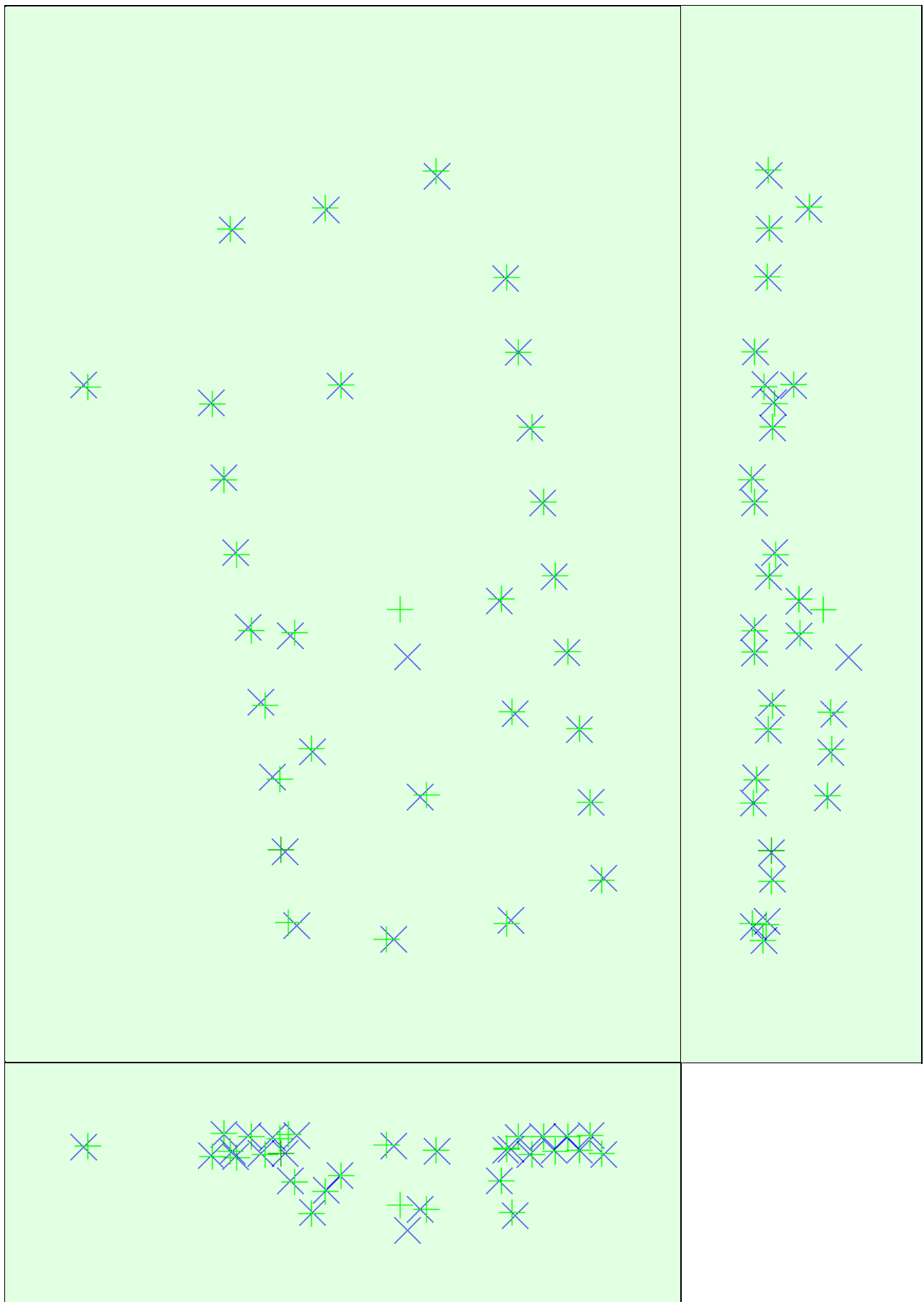


Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

## ? Absolute camera position and orientation uncertainties



	X[m]	Y[m]	Z[m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.004	0.004	0.004	0.113	0.014	0.058
Sigma	0.001	0.001	0.001	0.250	0.003	0.325

## Bundle Block Adjustment Details




Number of 2D Keypoint Observations for Bundle Block Adjustment	7232832
Number of 3D Points for Bundle Block Adjustment	3068533
Mean Reprojection Error [pixels]	0.487

## ? Internal Camera Parameters



EXIF ID: Insta360Pro\_1.9\_7680x3840

It is a spherical camera and it doesn't have internal parameters.



The number of Automatic Tie Points (ATPs) per pixel, averaged over all images of the camera model, is color coded between black and white. White indicates that, on average, more than 16 ATPs have been extracted at the pixel location. Black indicates that, on average, 0 ATPs have been extracted at the pixel location. Click on the image to see the average direction and magnitude of the re-projection error for each pixel. Note that the vectors are scaled for better visualization. The scale bar indicates the magnitude of 1 pixel error.

## ? 2D Keypoints Table



	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	24911	6949
Mn	15697	620
Max	30913	9578
Mean	24235	6734

## ? 3D Points from 2D Keypoint Matches



	Number of 3D Points Observed
In 2 Images	2686249
In 3 Images	224942
In 4 Images	68209
In 5 Images	30713
In 6 Images	16747
In 7 Images	9928
In 8 Images	6626
In 9 Images	4588
In 10 Images	3483
In 11 Images	2506
In 12 Images	1903
In 13 Images	1566
In 14 Images	1155
In 15 Images	1055
In 16 Images	861
In 17 Images	712
In 18 Images	625
In 19 Images	585

In 20 Images	471
In 21 Images	400
In 22 Images	348
In 23 Images	276
In 24 Images	275
In 25 Images	283
In 26 Images	236
In 27 Images	207
In 28 Images	189
In 29 Images	163
In 30 Images	165
In 31 Images	133
In 32 Images	132
In 33 Images	115
In 34 Images	128
In 35 Images	105
In 36 Images	102
In 37 Images	81
In 38 Images	101
In 39 Images	83
In 40 Images	80
In 41 Images	78
In 42 Images	65
In 43 Images	51
In 44 Images	55
In 45 Images	57
In 46 Images	44
In 47 Images	52
In 48 Images	54
In 49 Images	43
In 50 Images	42
In 51 Images	33
In 52 Images	34
In 53 Images	37
In 54 Images	47
In 55 Images	28
In 56 Images	39
In 57 Images	32
In 58 Images	28
In 59 Images	36
In 60 Images	22
In 61 Images	26
In 62 Images	26
In 63 Images	17
In 64 Images	26
In 65 Images	34
In 66 Images	22
In 67 Images	23
In 68 Images	17
In 69 Images	21
In 70 Images	18
In 71 Images	15
In 72 Images	17
In 73 Images	18
In 74 Images	18
In 75 Images	15
In 76 Images	12
In 77 Images	17
In 78 Images	17

In 79 Images	12
In 80 Images	8
In 81 Images	11
In 82 Images	14
In 83 Images	6
In 84 Images	10
In 85 Images	8
In 86 Images	12
In 87 Images	11
In 88 Images	14
In 89 Images	13
In 90 Images	14
In 91 Images	12
In 92 Images	13
In 93 Images	3
In 94 Images	11
In 95 Images	9
In 96 Images	8
In 97 Images	9
In 98 Images	6
In 99 Images	6
In 100 Images	10
In 101 Images	9
In 102 Images	6
In 103 Images	12
In 104 Images	9
In 105 Images	4
In 106 Images	3
In 107 Images	5
In 108 Images	2
In 109 Images	4
In 110 Images	6
In 111 Images	4
In 112 Images	2
In 113 Images	6
In 114 Images	7
In 115 Images	7
In 116 Images	9
In 117 Images	6
In 118 Images	3
In 119 Images	4
In 120 Images	3
In 121 Images	4
In 122 Images	3
In 123 Images	6
In 124 Images	5
In 125 Images	7
In 126 Images	10
In 127 Images	3
In 128 Images	3
In 129 Images	4
In 130 Images	1
In 131 Images	7
In 132 Images	3
In 133 Images	3
In 134 Images	3
In 135 Images	1
In 136 Images	1
In 137 Images	3

In 138 Images	7
In 139 Images	1
In 140 Images	6
In 141 Images	6
In 142 Images	2
In 143 Images	4
In 144 Images	3
In 145 Images	3
In 146 Images	5
In 147 Images	4
In 148 Images	6
In 149 Images	2
In 150 Images	4
In 151 Images	3
In 152 Images	1
In 154 Images	5
In 155 Images	2
In 156 Images	2
In 157 Images	1
In 158 Images	3
In 159 Images	4
In 160 Images	3
In 161 Images	1
In 162 Images	5
In 164 Images	4
In 165 Images	1
In 166 Images	1
In 167 Images	1
In 168 Images	1
In 169 Images	2
In 171 Images	1
In 172 Images	2
In 173 Images	3
In 174 Images	1
In 175 Images	2
In 176 Images	3
In 177 Images	1
In 178 Images	2
In 179 Images	3
In 180 Images	1
In 181 Images	5
In 182 Images	3
In 183 Images	1
In 184 Images	3
In 185 Images	1
In 186 Images	3
In 187 Images	2
In 188 Images	1
In 189 Images	3
In 190 Images	1
In 191 Images	1
In 192 Images	1
In 193 Images	3
In 194 Images	2
In 195 Images	3
In 196 Images	2
In 197 Images	1
In 198 Images	2
In 200 Images	2

In 201 Images	3
In 202 Images	2
In 203 Images	2
In 204 Images	1
In 205 Images	2
In 206 Images	3
In 207 Images	3
In 209 Images	2
In 210 Images	1
In 211 Images	1
In 212 Images	1
In 213 Images	6
In 214 Images	1
In 215 Images	1
In 216 Images	4
In 217 Images	1
In 218 Images	1
In 220 Images	2
In 221 Images	2
In 222 Images	3
In 223 Images	1
In 224 Images	1
In 225 Images	2
In 226 Images	2
In 227 Images	2
In 231 Images	1
In 233 Images	1
In 235 Images	2
In 236 Images	2
In 237 Images	2
In 239 Images	3
In 241 Images	1
In 242 Images	2
In 243 Images	1
In 245 Images	2
In 246 Images	1
In 248 Images	1
In 249 Images	1
In 251 Images	2
In 252 Images	3
In 253 Images	2
In 254 Images	2
In 256 Images	1
In 258 Images	2
In 259 Images	3
In 261 Images	2
In 262 Images	1
In 263 Images	3
In 264 Images	1
In 265 Images	1
In 267 Images	1
In 268 Images	2
In 269 Images	1
In 274 Images	2
In 275 Images	1
In 276 Images	1
In 277 Images	1
In 278 Images	1
In 279 Images	2

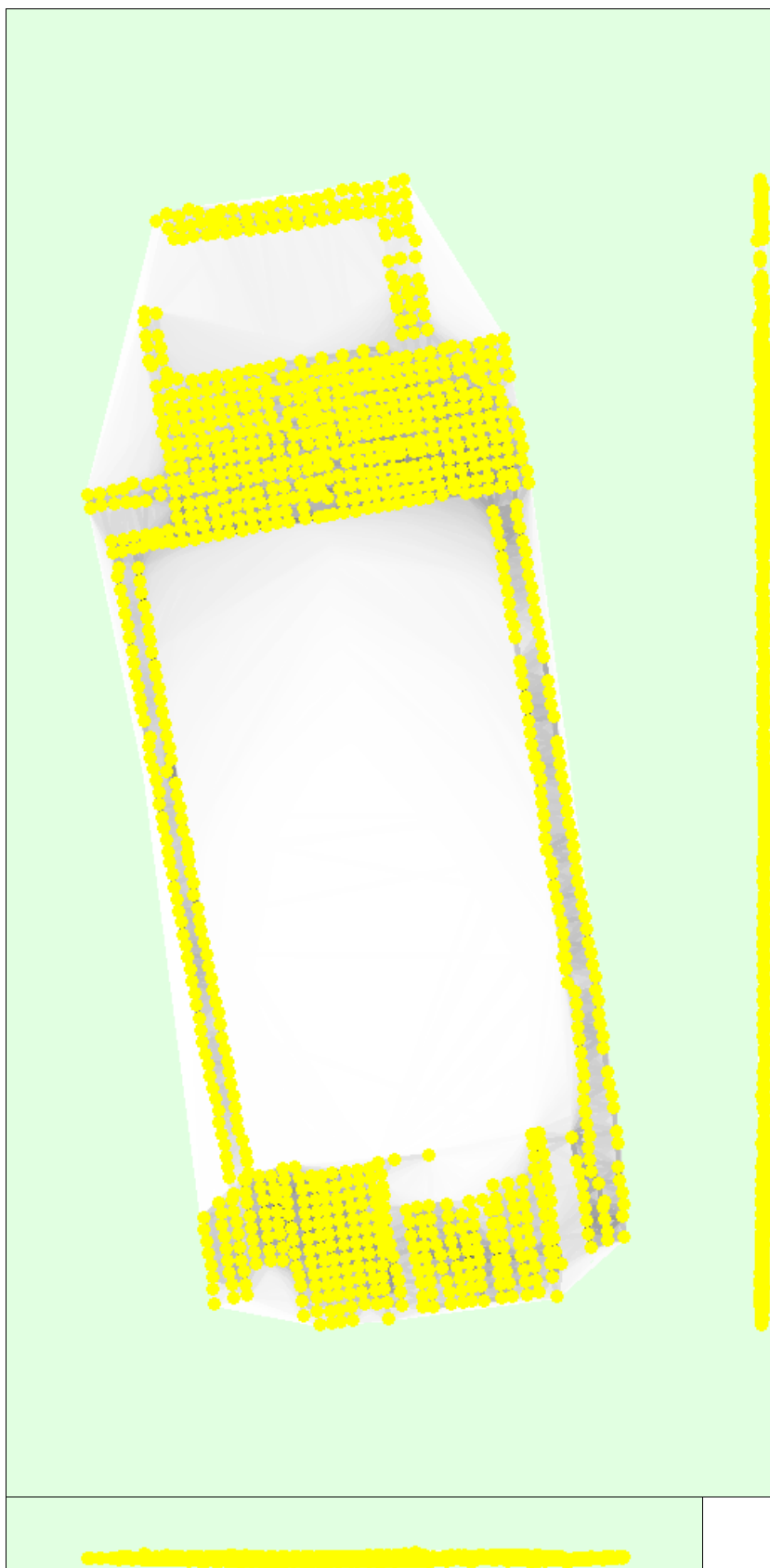
In 281 Images	3
In 285 Images	1
In 286 Images	1
In 287 Images	1
In 288 Images	2
In 290 Images	1
In 292 Images	1
In 293 Images	2
In 295 Images	4
In 296 Images	1
In 297 Images	2
In 298 Images	2
In 301 Images	1
In 304 Images	1
In 306 Images	2
In 310 Images	1
In 311 Images	1
In 313 Images	1
In 314 Images	2
In 315 Images	1
In 316 Images	1
In 317 Images	1
In 318 Images	1
In 320 Images	1
In 325 Images	1
In 326 Images	1
In 327 Images	3
In 328 Images	1
In 329 Images	1
In 330 Images	1
In 332 Images	1
In 333 Images	2
In 337 Images	1
In 338 Images	2
In 340 Images	2
In 347 Images	2
In 348 Images	1
In 350 Images	1
In 351 Images	2
In 352 Images	1
In 354 Images	2
In 355 Images	2
In 356 Images	1
In 360 Images	1
In 361 Images	1
In 363 Images	1
In 368 Images	1
In 370 Images	1
In 374 Images	3
In 375 Images	1
In 377 Images	1
In 380 Images	1
In 381 Images	1
In 383 Images	1
In 384 Images	1
In 386 Images	1
In 388 Images	2
In 389 Images	2
In 391 Images	1



In 393 Images	1
In 395 Images	1
In 397 Images	1
In 402 Images	1
In 404 Images	1
In 407 Images	2
In 420 Images	1
In 421 Images	1
In 424 Images	1
In 425 Images	1
In 427 Images	1
In 430 Images	1
In 435 Images	2
In 441 Images	1
In 443 Images	1
In 444 Images	1
In 445 Images	1
In 450 Images	1
In 454 Images	1
In 455 Images	2
In 459 Images	1
In 463 Images	1
In 464 Images	1
In 466 Images	1
In 473 Images	1
In 474 Images	1
In 483 Images	1
In 489 Images	1
In 574 Images	1
In 580 Images	1

## 2D Keypoint Matches





Number of matches

25	161	323	484	646	807	969	1130	1292	1454
Lightest gray	Light gray	Medium-light gray	Medium gray	Medium-dark gray	Dark gray	Very dark gray	Black	Black	Black

Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images.

## Geolocation Details





GCP Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
19 (3D)	0.020/ 0.020	-0.169	0.186	0.017	4.838	8 / 8
20 (3D)	0.020/ 0.020	-0.051	0.139	0.089	7.288	8 / 8
21 (3D)	0.020/ 0.020	0.017	0.124	-0.043	8.606	8 / 8
24 (3D)	0.020/ 0.020	-0.068	-0.031	0.016	1.840	8 / 8
6 (3D)	0.020/ 0.020	-0.077	-0.062	0.019	3.464	8 / 8
7 (3D)	0.020/ 0.020	-0.059	-0.065	0.023	2.756	8 / 8
8 (3D)	0.020/ 0.020	-0.063	-0.060	0.046	3.677	8 / 8
9 (3D)	0.020/ 0.020	-0.049	-0.047	-0.007	5.047	8 / 8
10 (3D)	0.020/ 0.020	-0.014	-0.026	0.037	4.788	8 / 8
26 (3D)	0.020/ 0.020	0.181	-0.131	-0.144	3.276	8 / 8
27 (3D)	0.020/ 0.020	-0.360	-0.171	0.003	1.834	8 / 8
14 (3D)	0.020/ 0.020	0.420	0.002	-0.036	6.117	8 / 8
16 (3D)	0.020/ 0.020	0.219	-0.167	0.016	9.579	4 / 8
28 (3D)	0.020/ 0.020	0.074	-0.182	0.015	2.210	8 / 8
17 (3D)	0.020/ 0.020	-0.459	0.139	0.098	4.081	8 / 8
18 (3D)	0.020/ 0.020	-0.279	0.187	0.088	10.507	8 / 8
4 (3D)	0.020/ 0.020	-0.035	-0.045	-0.065	2.612	8 / 8
5 (3D)	0.020/ 0.020	-0.022	-0.044	-0.037	4.194	8 / 8
22 (3D)	0.020/ 0.020	-0.047	0.064	0.051	2.150	8 / 8
1 (3D)	0.020/ 0.020	0.115	-0.117	-0.004	7.516	8 / 8
2 (3D)	0.020/ 0.020	0.054	-0.067	0.089	3.441	8 / 8
3 (3D)	0.020/ 0.020	0.064	-0.292	-0.034	8.379	8 / 8
13 (3D)	0.020/ 0.020	0.227	0.180	-0.067	13.270	8 / 8
30 (3D)	0.020/ 0.020	0.477	-2.777	-1.468	1.567	8 / 8
29 (3D)	0.020/ 0.020	-0.219	-0.150	0.027	1.618	8 / 8
23 (3D)	0.020/ 0.020	-0.239	0.156	-0.073	2.964	8 / 8
25 (3D)	0.020/ 0.020	-0.146	-0.144	0.014	0.927	8 / 8
11 (3D)	0.020/ 0.020	0.084	0.025	-0.015	4.071	8 / 8
12 (3D)	0.020/ 0.020	0.099	0.112	-0.036	2.777	8 / 8
15 (3D)	0.020/ 0.020	0.506	-0.188	-0.092	4.188	8 / 8
Mean [m]		-0.001226	-0.113369	-0.051279		
Sigma [m]		0.218687	0.519265	0.273545		
RMS Error [m]		0.218690	0.531496	0.278310		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of calibrated images where the GCP has been automatically verified v.s. manually marked.

## Initial Processing Details



### System Information



Hardware	CPU: Intel(R) Core(TM) i7-9700K CPU @ 3.60GHz RAM: 16GB GPU: Intel(R) UHD Graphics 630 (Driver: 27.20.100.8681), NVIDIA GeForce RTX2070 (Driver: 27.21.14.6611)
Operating System	Windows 10 Home, 64-bit

### Coordinate Systems



Ground Control Point (GCP) Coordinate System	Arbitrary (m)
Output Coordinate System	Arbitrary (m)

Processing Options



Detected Template	3D Models
Keypoints Image Scale	Full, Image Scale: 1
Advanced: Matching Image Pairs	Free Flight or Terrestrial
Advanced: Matching Strategy	Use Geometrically Verified Matching: no
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Standard Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, yes

Point Cloud Densification details



Processing Options



Image Scale	1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	yes
3D Textured Mesh Settings:	Resolution: Medium Resolution (default) Color Balancing: no
LOD	Generated: no
Advanced: 3D Textured Mesh Settings	Sample Density Divider: 1
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	47m:19s
Time for Point Cloud Classification	NA
Time for 3D Textured Mesh Generation	23m:35s

Results



Number of Processed Clusters	30
Number of Generated Tiles	1
Number of 3D Densified Points	5001910
Average Density (per m <sup>3</sup> )	4072.31