Quality Report

Generated with Pix4Dmapper version 4.3.31

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	Test PPK Hoogkerk V5
Processed	2019-03-04 10:52:31
Camera Model Name(s)	iXM-100_PhaseOneRSM80mmAF f/5.6_80.0_11664x8750 (RGB)
Average Ground Sampling Distance (GSD)	0.29 cm / 0.12 in
Time for Initial Processing (without report)	54m:41s

Quality Check

Images	median of 60061 keypoints per image	✓
Dataset	540 out of 540 images calibrated (100%), all images enabled	✓
Camera Optimization	0.01% relative difference between initial and optimized internal camera parameters	✓
Matching	median of 18466.8 matches per calibrated image	✓
Georeferencing	yes, no 3D GCP	⚠

Calibration Details

Number of Calibrated Images	540 out of 540
Number of Geolocated Images	540 out of 540

Initial Image Positions

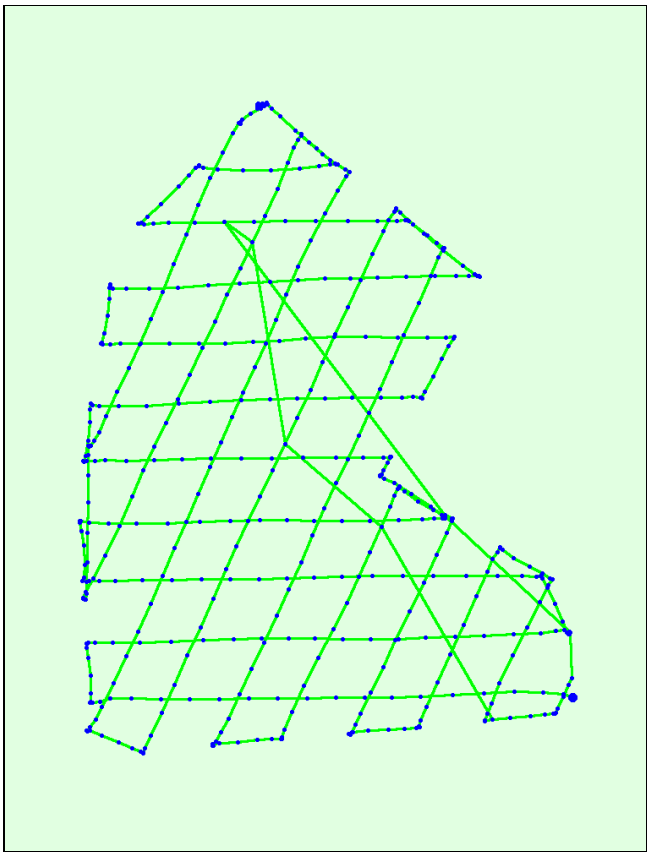
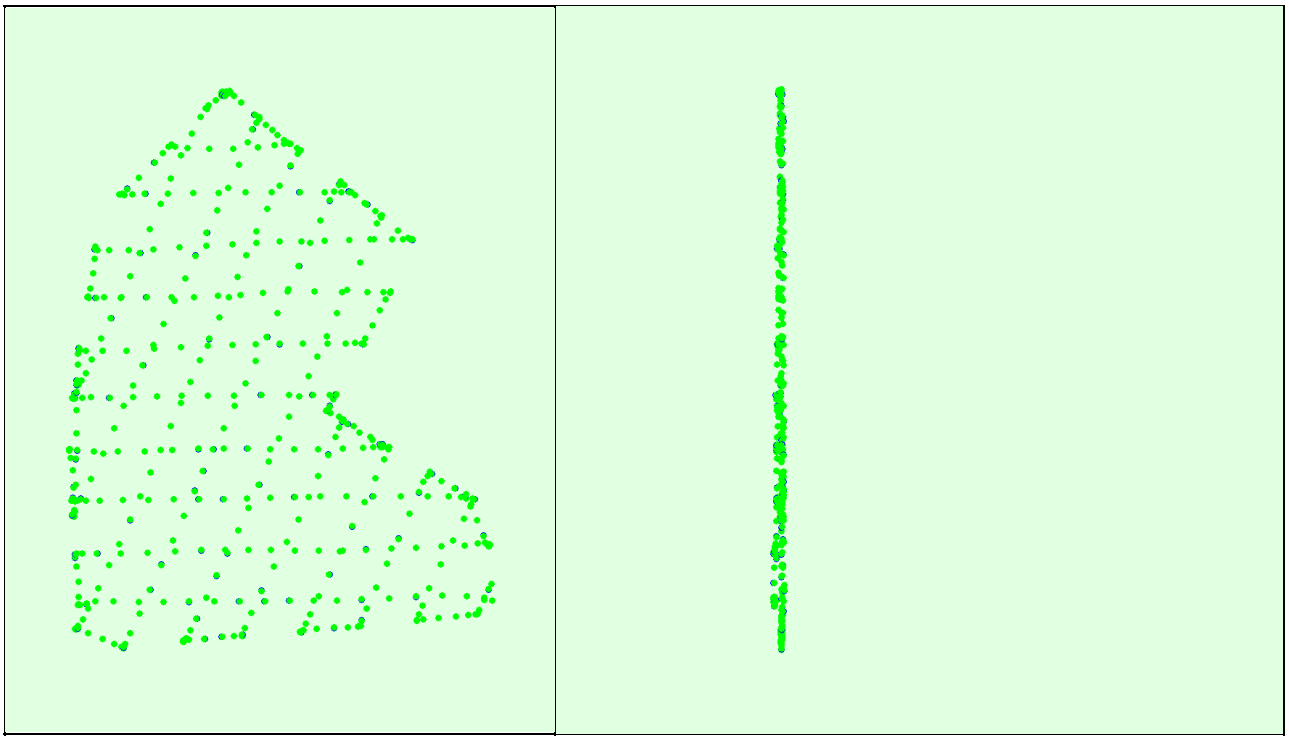
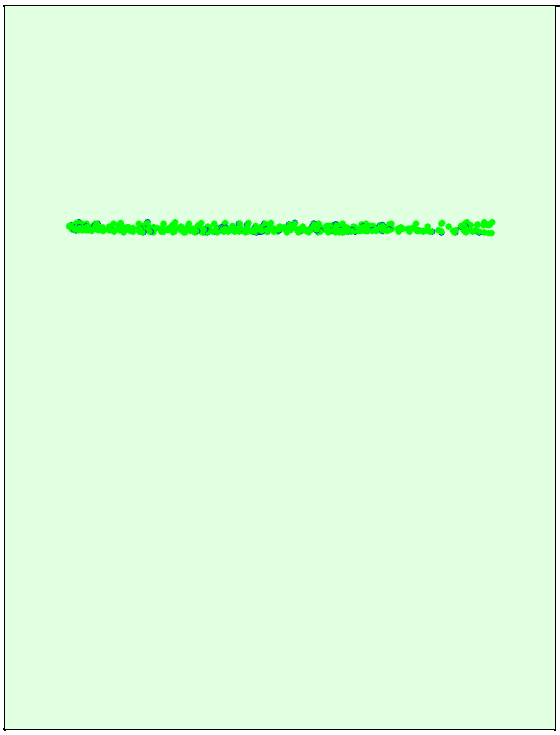


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 100x magnified

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	0.002	0.002	0.001	0.002	0.002	0.001
Sigma	0.000	0.000	0.000	0.000	0.000	0.000

Bundle Block Adjustment Details

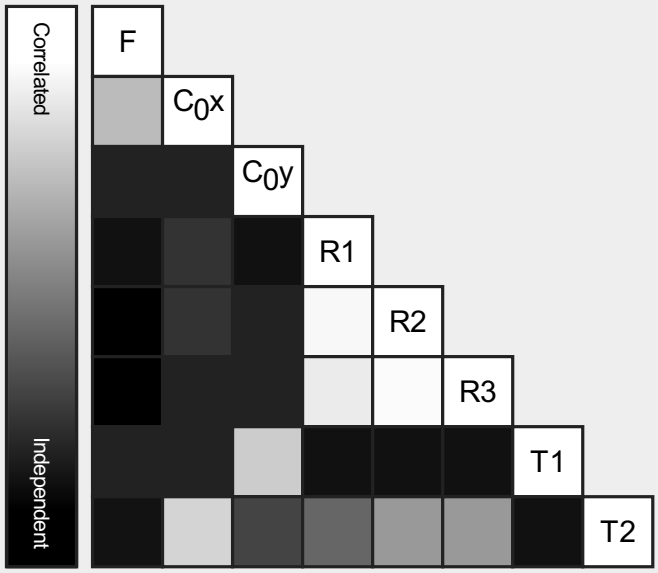
Number of 2D Keypoint Observations for Bundle Block Adjustment	10080392
Number of 3D Points for Bundle Block Adjustment	2513758
Mean Reprojection Error [pixels]	0.086

Internal Camera Parameters

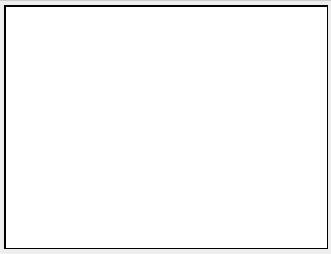
iXM-100_PhaseOneRSM80mmAFf/5.6_80.0_11664x8750 (RGB). Sensor Dimensions: 43.857 [mm] x 32.900 [mm]

EXIF ID: iXM-100_PhaseOneRSM80mmAFf/5.6_80.0_11664x8750

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	21276.596 [pixel] 80.000 [mm]	5832.000 [pixel] 21.928 [mm]	4375.000 [pixel] 16.450 [mm]	0.000	0.000	0.000	0.000	0.000
Optimized Values	21279.585 [pixel] 80.011 [mm]	5819.307 [pixel] 21.881 [mm]	4376.806 [pixel] 16.457 [mm]	0.079	-0.125	0.153	0.000	0.001
Uncertainties (Sigma)	0.158 [pixel] 0.001 [mm]	0.138 [pixel] 0.001 [mm]	0.128 [pixel] 0.000 [mm]	0.000	0.004	0.021	0.000	0.000



The correlation between camera internal parameters determined by the bundle adjustment. White indicates a full correlation between the parameters, ie. any change in one can be fully compensated by the other. Black indicates that the parameter is completely independent, and is not affected by other 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 the 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	60061	18467
Min	36193	4656
Max	80913	40749
Mean	60468	18667

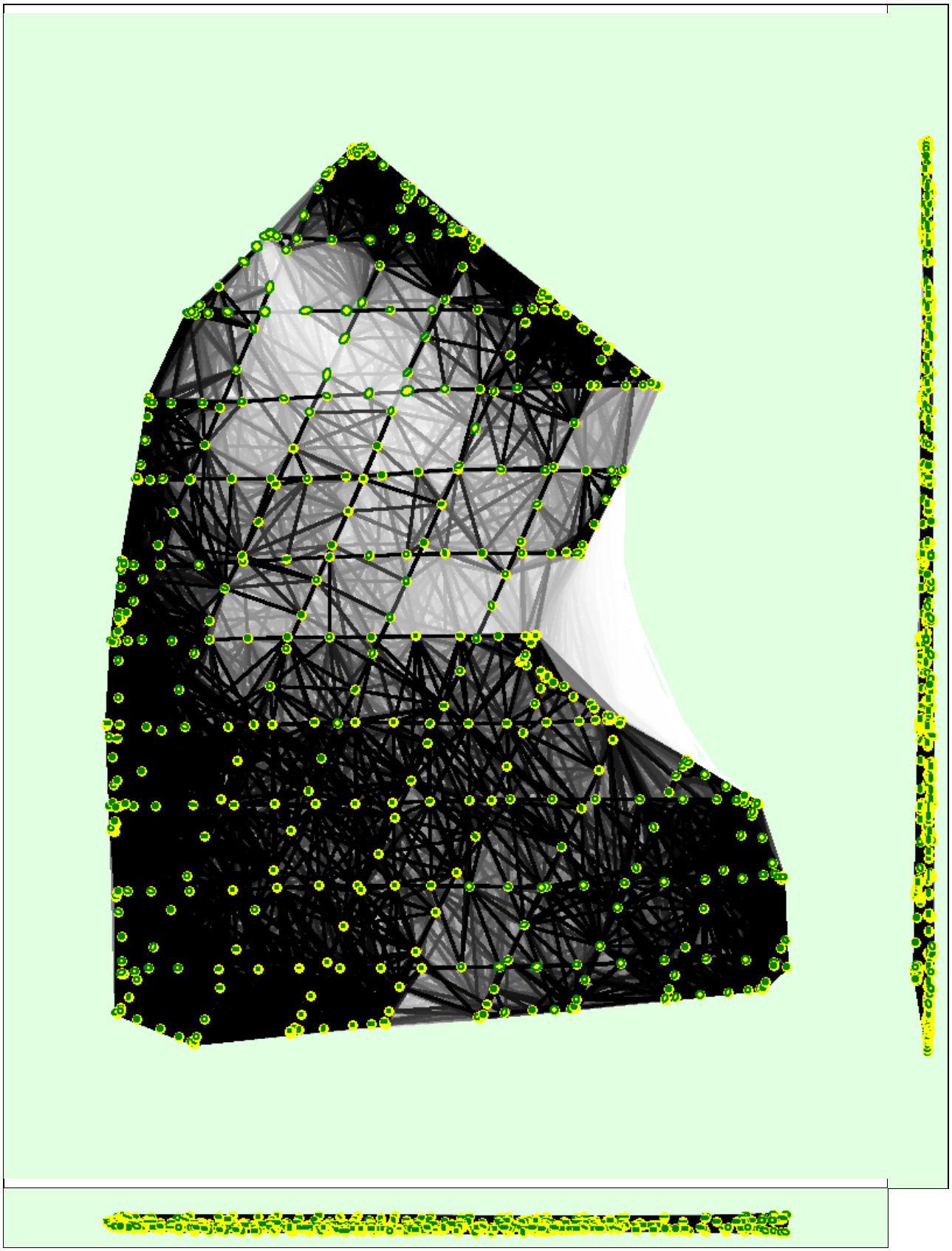
3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	1236262
In 3 Images	501366
In 4 Images	259192
In 5 Images	146529
In 6 Images	89914
In 7 Images	59065
In 8 Images	40248
In 9 Images	29066
In 10 Images	22052
In 11 Images	17626
In 12 Images	13724
In 13 Images	11586
In 14 Images	9348
In 15 Images	8039
In 16 Images	6896
In 17 Images	6058
In 18 Images	5352
In 19 Images	4642
In 20 Images	4230
In 21 Images	3746
In 22 Images	3294

In 23 Images	3057
In 24 Images	2658
In 25 Images	2553
In 26 Images	2409
In 27 Images	2175
In 28 Images	1989
In 29 Images	1833
In 30 Images	1670
In 31 Images	1592
In 32 Images	1425
In 33 Images	1300
In 34 Images	1205
In 35 Images	1073
In 36 Images	989
In 37 Images	886
In 38 Images	832
In 39 Images	798
In 40 Images	741
In 41 Images	654
In 42 Images	520
In 43 Images	559
In 44 Images	457
In 45 Images	357
In 46 Images	292
In 47 Images	241
In 48 Images	237
In 49 Images	222
In 50 Images	178
In 51 Images	173
In 52 Images	161
In 53 Images	143
In 54 Images	152
In 55 Images	141
In 56 Images	113
In 57 Images	105
In 58 Images	111
In 59 Images	85
In 60 Images	94
In 61 Images	87
In 62 Images	83
In 63 Images	101
In 64 Images	86
In 65 Images	93
In 66 Images	87
In 67 Images	83
In 68 Images	62
In 69 Images	68
In 70 Images	68
In 71 Images	63
In 72 Images	61
In 73 Images	78
In 74 Images	57
In 75 Images	70
In 76 Images	41
In 77 Images	36
In 78 Images	47
In 79 Images	15
In 80 Images	15
In 81 Images	13

In 82 Images	8
In 83 Images	5
In 84 Images	7
In 85 Images	4
In 86 Images	5

2D Keypoint Matches



Uncertainty ellipses 100x magnified

Number of matches

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. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties

	X [m]	Y [m]	Z [m]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.004	0.004	0.002	0.006	0.006	0.001
Sigma	0.001	0.001	0.001	0.002	0.002	0.000

Geolocation Details

Ground Control Points

1 out of 9 check points have been labeled as inaccurate.

Check Point Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
9001		-0.049	-0.101	-1.609	0.174	8 / 8
9002		-0.047	-0.119	-1.608	0.183	8 / 8
9003		-0.050	-0.133	-1.626	0.147	8 / 8
9004		-0.046	-0.120	-1.621	0.422	8 / 8
9005		-0.042	-0.120	-1.625	0.192	10 / 10
9006		-0.046	-0.117	-1.633	0.460	10 / 10
9008		-0.034	-0.114	-1.643	0.287	8 / 8
9009		-0.045	-0.112	-1.644	0.460	10 / 10
Mean [m]		-0.044654	-0.116902	-1.626316		
Sigma [m]		0.004656	0.008517	0.012765		
RMS Error [m]		0.044896	0.117211	1.626366		

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 vs. manually marked.

Absolute Geolocation Variance

Min Error [m]	Max Error [m]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.03	7.04	5.93	7.41
-0.03	-0.02	4.07	1.48	5.56
-0.02	-0.02	5.37	6.85	6.30
-0.02	-0.01	7.22	7.96	9.44
-0.01	-0.01	9.26	14.07	9.44
-0.01	0.00	13.70	16.30	11.48
0.00	0.01	13.89	16.11	10.19
0.01	0.01	12.04	10.00	11.85
0.01	0.02	11.11	7.41	9.44
0.02	0.02	6.30	3.52	8.70
0.02	0.03	4.07	2.04	4.81
0.03	-	5.93	8.33	5.37
Mean [m]		-0.000000	-0.000000	0.000000
Sigma [m]		0.022058	0.020351	0.022204
RMS Error [m]		0.022058	0.020351	0.022204

Min Error and Max Error represent geolocation error intervals between -1.5 and 1.5 times the maximum accuracy of all the images. Columns X, Y, Z show the percentage of images with geolocation errors within the predefined error intervals. The geolocation error is the difference between the initial and computed image

positions. Note that the image geolocation errors do not correspond to the accuracy of the observed 3D points.

Relative Geolocation Variance

Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	72.41	76.48	66.67
[-2.00, 2.00]	92.41	91.85	93.89
[-3.00, 3.00]	97.22	98.89	98.33
Mean of Geolocation Accuracy [m]	0.020000	0.020000	0.020000
Sigma of Geolocation Accuracy [m]	0.000000	0.000000	0.000000

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Initial Processing Details

System Information

Hardware	CPU: Intel(R) Core(TM) i9-7940X CPU @ 3.10GHz RAM: 128GB GPU: NVIDIA GeForce GTX 1080 Ti (Driver: 23.21.13.8859)
Operating System	Windows 10 Pro, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84 (EGM96 Geoid)
Output Coordinate System	Amersfoort / RD New (EGM96 Geoid)

Processing Options

Detected Template	No Template Available
Keypoints Image Scale	Full, Image Scale: 0.5
Advanced: Matching Image Pairs	Aerial Grid or Corridor
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 prior External Parameters Optimization: All Rematch: Auto, no