Calibration parameters after initialization:

Focal Length: fc = [ 786.45692 786.45692 ]

Principal point: cc = [ 639.50000 511.50000 ]

Skew: alpha\_c = [ 0.00000 ] => angle of pixel = 90.00000 degrees

Distortion: kc = [ 0.00000 0.00000 0.00000 0.00000 0.00000 ]

Main calibration optimization procedure - Number of images: 22

Gradient descent iterations: 1...2...3...4...5...6...7...8...9...10...11...12...13...14...15...16...17...18...19...20...done

Estimation of uncertainties...done

X30.1 Y30.07

Calibration results after optimization (with uncertainties):

Focal Length: fc = [ 829.78386 826.59341 ] ± [ 5.21366 5.67391 ]

Principal point: cc = [ 630.51817 524.96885 ] ± [ 10.06804 12.04916 ]

Skew: alpha\_c = [ 0.00000 ] ± [ 0.00000 ] => angle of pixel axes = 90.00000 ± 0.00000 degrees

Distortion: kc = [ -0.36287 0.20614 0.00348 -0.00277 0.00000 ] ± [ 0.02765 0.07984 0.00278 0.00201 0.00000 ]

Pixel error: err = [ 0.46507 0.78734 ]

fc\*.0048 = [3.9830, 3.9676]

Note: The numerical errors are approximately three times the standard deviations (for reference).

Old Extrinsic parameters:

Translation vector: Tc\_ext = [ -36.878058 -68.336429 640.669345 ]

Rotation vector: omc\_ext = [ -2.208846 -2.214383 -0.058079 ]

Rotation matrix: Rc\_ext = [ -0.002803 0.999856 0.016764

0.999360 0.002203 0.035714

0.035672 0.016853 -0.999221 ]

Pixel error: err = [ 0.13010 0.10138 ]

New Extrinsic parameters (revised after new camera alignment done 11/3/2016):

Translation vector: Tc\_ext = [ -32.103948 -68.275173 641.614316 ]

Rotation vector: omc\_ext = [ -2.195672 -2.206851 -0.031868 ]

Rotation matrix: Rc\_ext = [ -0.004981 0.999972 -0.005669

0.999391 0.005173 0.034513

0.034541 -0.005493 -0.999388 ]

Pixel error: err = [ 0.14396 0.11629 ]