

Calibration results

Normalized Residuals

Reprojection error (cam0): mean 0.23688834381601032, median 0.1902718928026876, std: 0.18899999405271717
Reprojection error (cam1): mean 0.2307568350381563, median 0.1843425642517743, std: 0.18608834916126626
Gyroscope error (imu0): mean 0.2835684899431159, median 0.23759473669760456, std: 0.19512571276982124
Accelerometer error (imu0): mean 0.24900021606315817, median 0.21012909887423464, std: 0.169224837556928

Residuals

Reprojection error (cam0) [px]: mean 0.23688834381601032, median 0.1902718928026876, std: 0.18899999405271717
Reprojection error (cam1) [px]: mean 0.2307568350381563, median 0.1843425642517743, std: 0.18608834916126626
Gyroscope error (imu0) [rad/s]: mean 0.00821944113664538, median 0.006886858102797217, std: 0.005655862224604884
Accelerometer error (imu0) [m/s²]: mean 0.07268827602527451, median 0.06134099874049257, std: 0.04940020493616838

Transformation (cam0):

T_ci: (imu0 to cam0):
[[0.99998905 0.0020743 -0.00419504 0.00553111]
[-0.0020974 0.99998262 -0.00551082 -0.00525489]
[0.00418353 0.00551956 0.99997602 -0.01741903]
[0. 0. 0. 1.]]

T_ic: (cam0 to imu0):
[[0.99998905 -0.0020974 0.00418353 -0.00546919]
[0.0020743 0.99998262 0.00551956 0.00533948]
[-0.00419504 -0.00551082 0.99997602 0.01741286]
[0. 0. 0. 1.]]

timeshift cam0 to imu0: [s] (t_imu = t_cam + shift)
0.004223937496377362

Transformation (cam1):

T_ci: (imu0 to cam1):
[[0.99998733 0.00251166 0.00436311 -0.0445127]
[-0.00248143 0.99997297 -0.00692088 -0.00524913]
[-0.00438038 0.00690997 0.99996653 -0.01744302]
[0. 0. 0. 1.]]

T_ic: (cam1 to imu0):
[[0.99998733 -0.00248143 -0.00438038 0.0444227]
[0.00251166 0.99997297 0.00690997 0.00548131]
[0.00436311 -0.00692088 0.99996653 0.01760032]
[0. 0. 0. 1.]]

timeshift cam1 to imu0: [s] (t_imu = t_cam + shift)
0.004295236799573359

Baselines:

Baseline (cam0 to cam1):
[[0.99996328 0.0003902 0.00856035 -0.04989244]
[-0.00037813 0.99999893 -0.00141169 -0.00001674]
[-0.00856089 0.0014084 0.99996236 0.00003011]
[0. 0. 0. 1.]]
baseline norm: 0.04989245167798856 [m]

Gravity vector in target coords: [m/s^2]
[0.18439908 -9.80419793 0.11010358]

Calibration configuration

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cam0

Camera model: pinhole
Focal length: [387.7393479643833, 387.90330084990177]
Principal point: [323.22455000335424, 239.99773535687646]
Distortion model: radtan
Distortion coefficients: [0.014940670767047744, -0.004839561248076046, -0.00100571189716475, 0.00282766468936359]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.0205 [m]
Spacing 0.00630006 [m]

cam1

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Camera model: pinhole
Focal length: [388.27546681632145, 388.0252070118324]
Principal point: [320.33991509347624, 240.6148273326411]
Distortion model: radtan
Distortion coefficients: [0.01839345204765405, -0.008529124596614946, -0.0009112556003527015, 0.0022168063306052042]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.0205 [m]
Spacing 0.00630006 [m]

IMU configuration

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IMU0:

Model: calibrated
Update rate: 200.0

Accelerometer:

Noise density: 0.02064189891192468

Noise density (discrete): 0.29192053394378314

Random walk: 0.0022919238444020808

Gyroscope:

Noise density: 0.002049600985797649

Noise density (discrete): 0.02898573511568301

Random walk: 3.199855545594742e-05

T_ib (imu0 to imu0)

[[1. 0. 0. 0.]

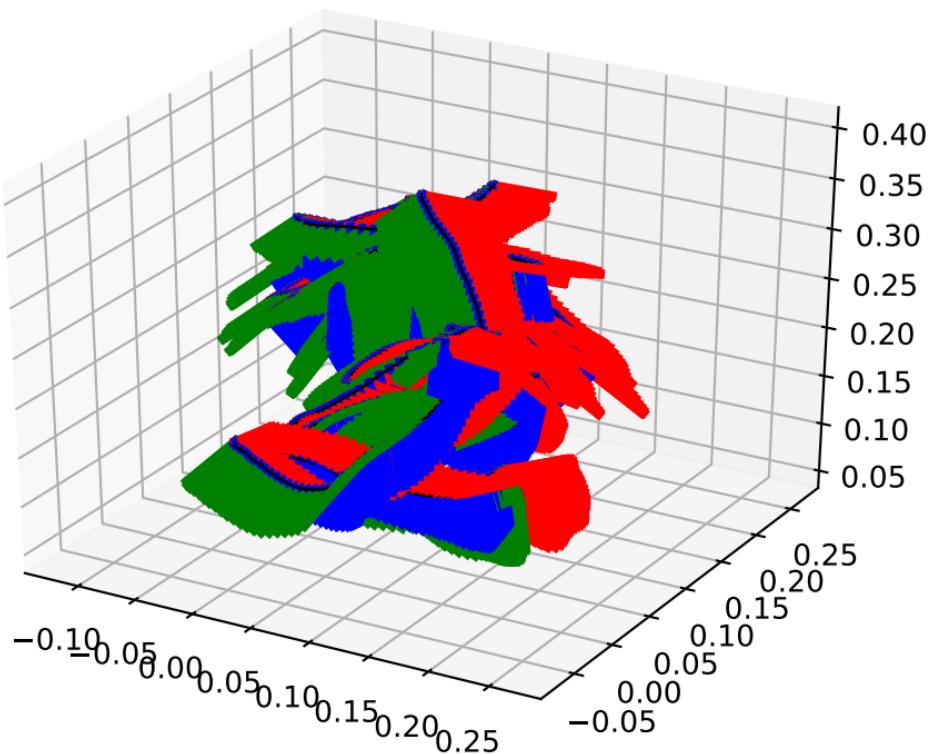
[0. 1. 0. 0.]

[0. 0. 1. 0.]

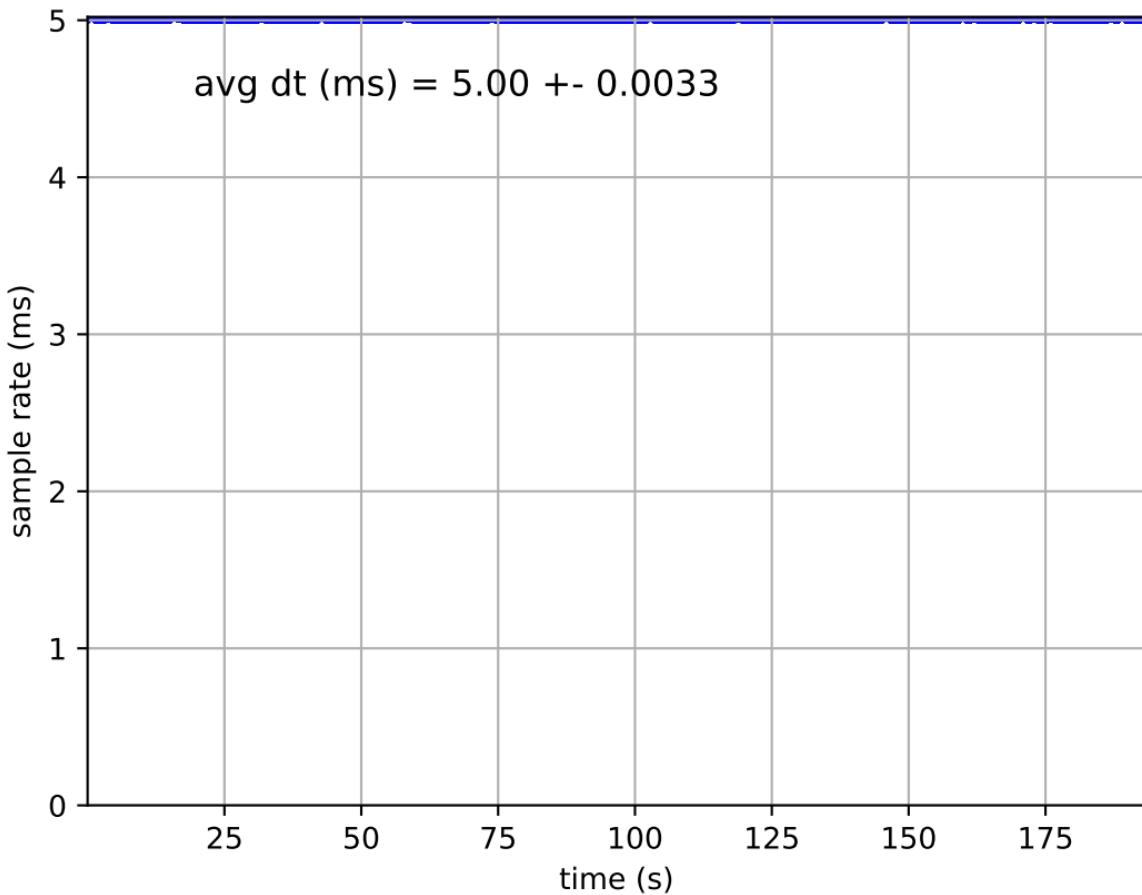
[0. 0. 0. 1.]]

time offset with respect to IMU0: 0.0 [s]

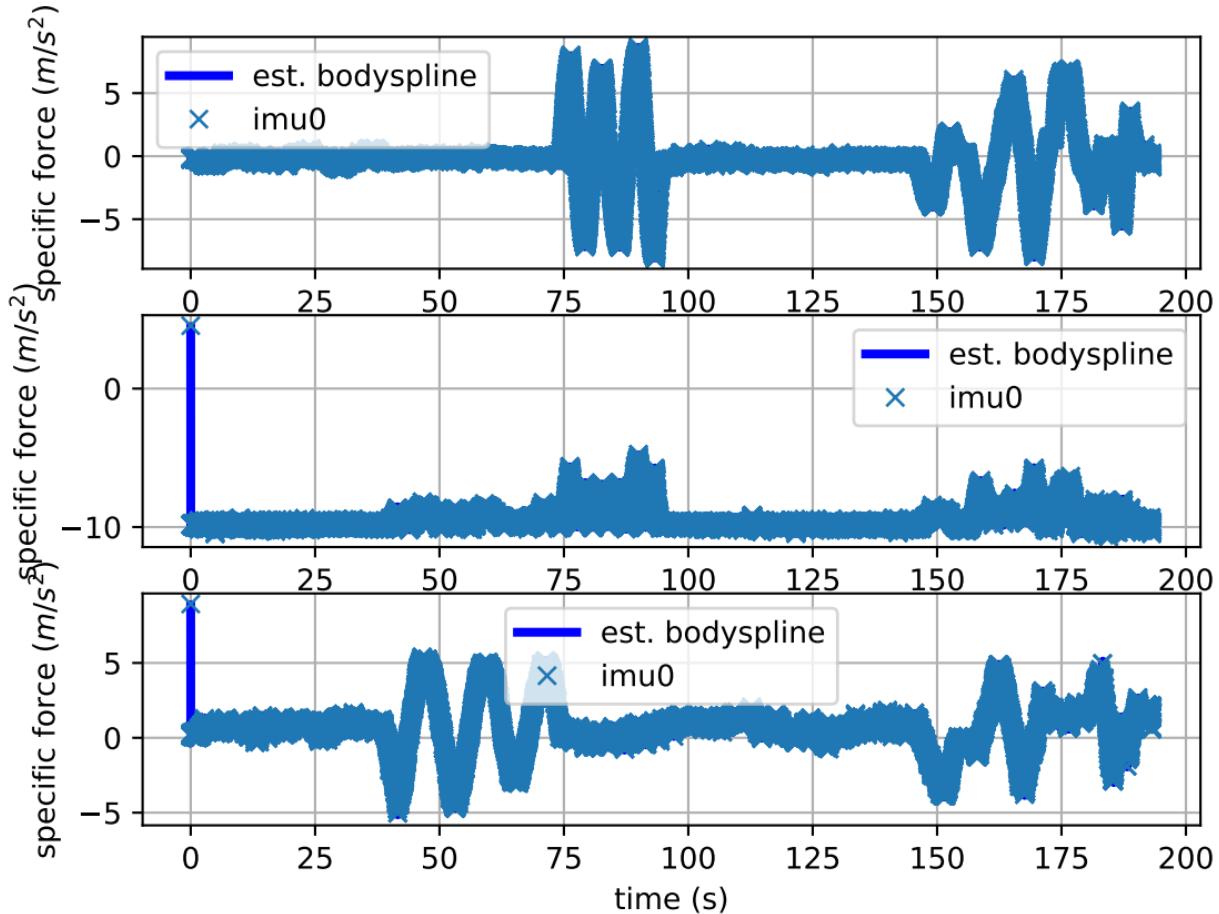
imu0: estimated poses



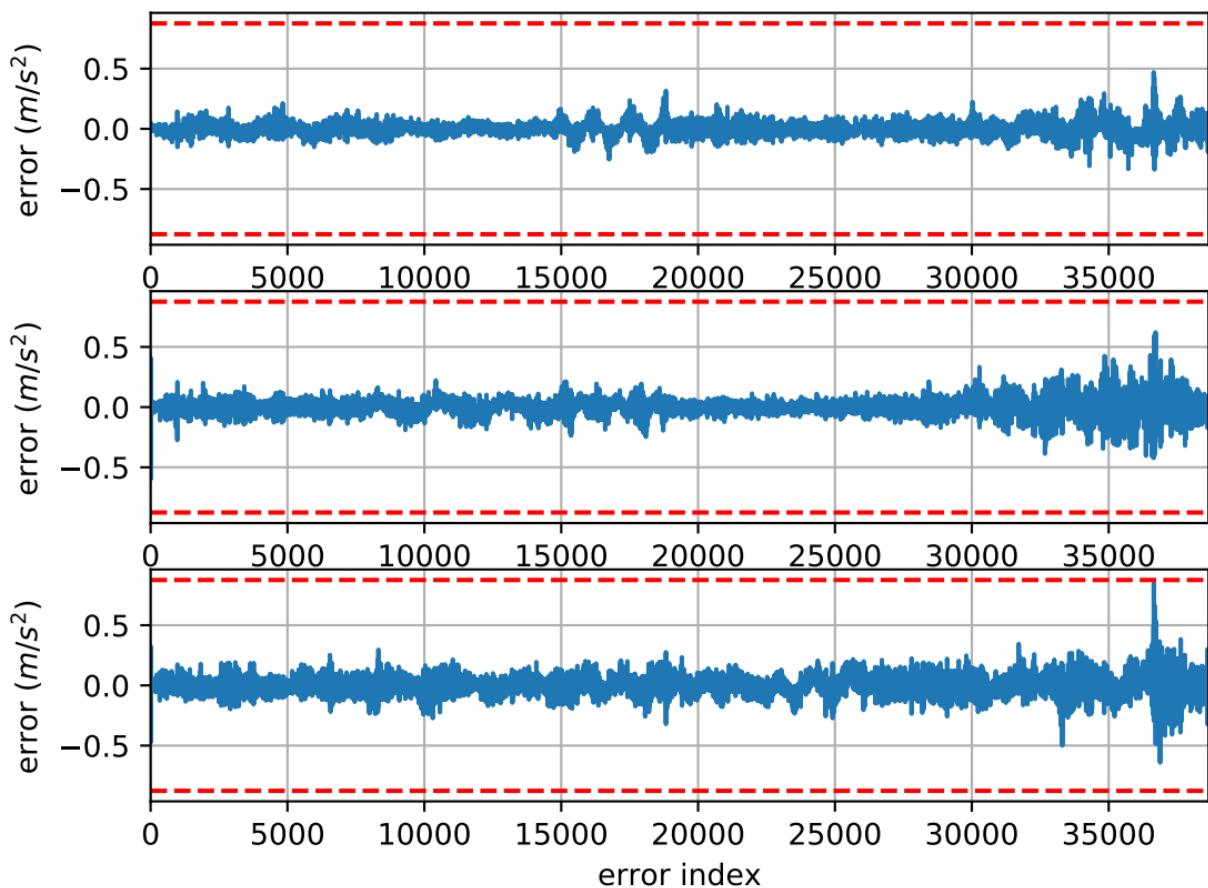
imu0: sample inertial rate



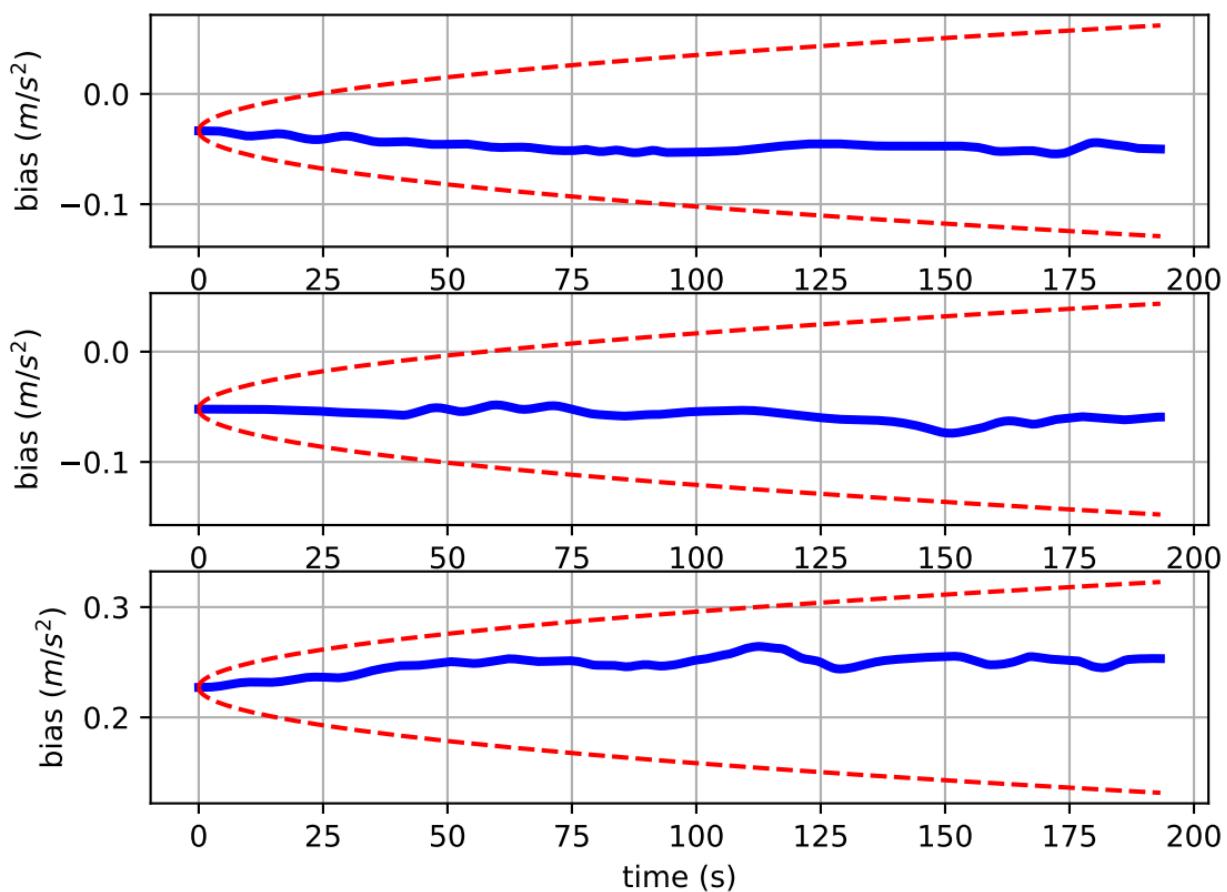
Comparison of predicted and measured specific force (imu0 frame)



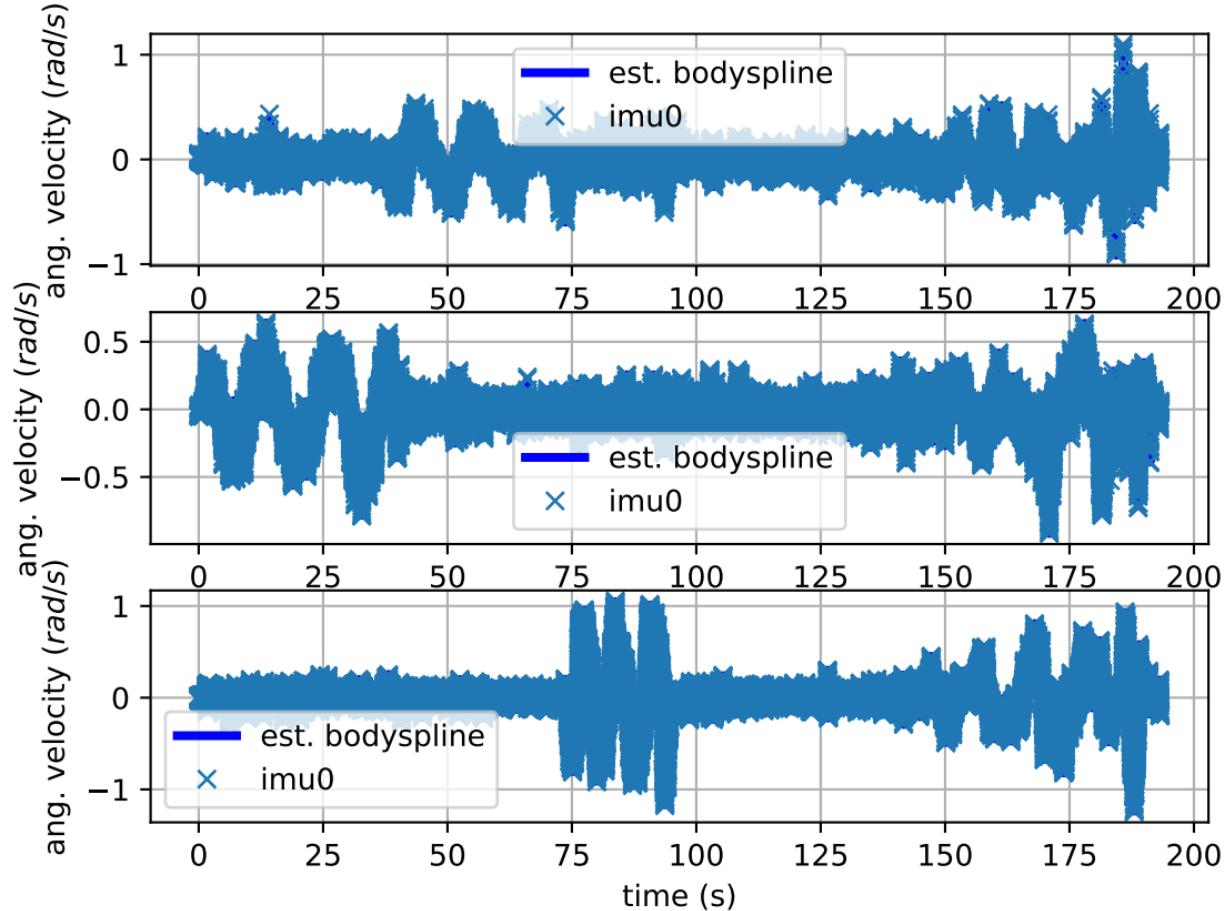
imu0: acceleration error



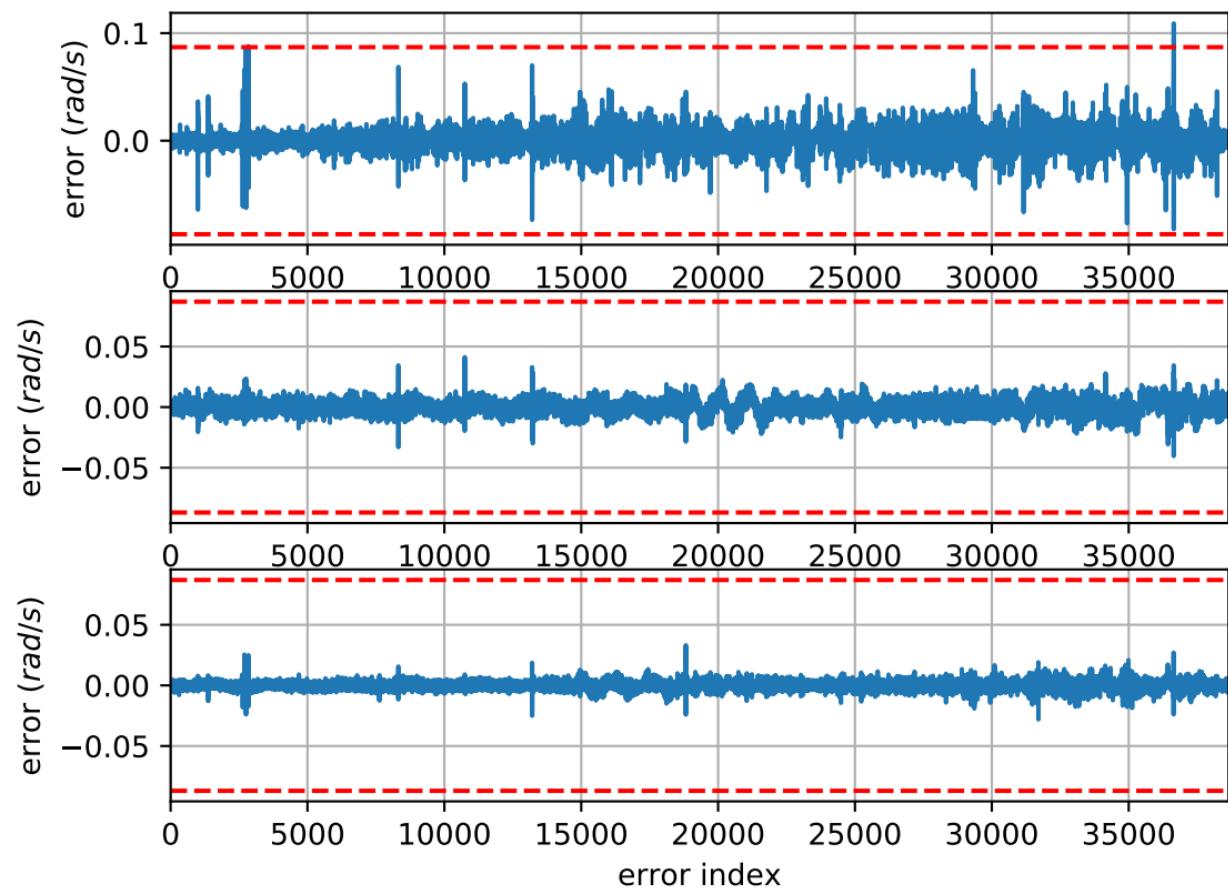
imu0: estimated accelerometer bias (imu frame)



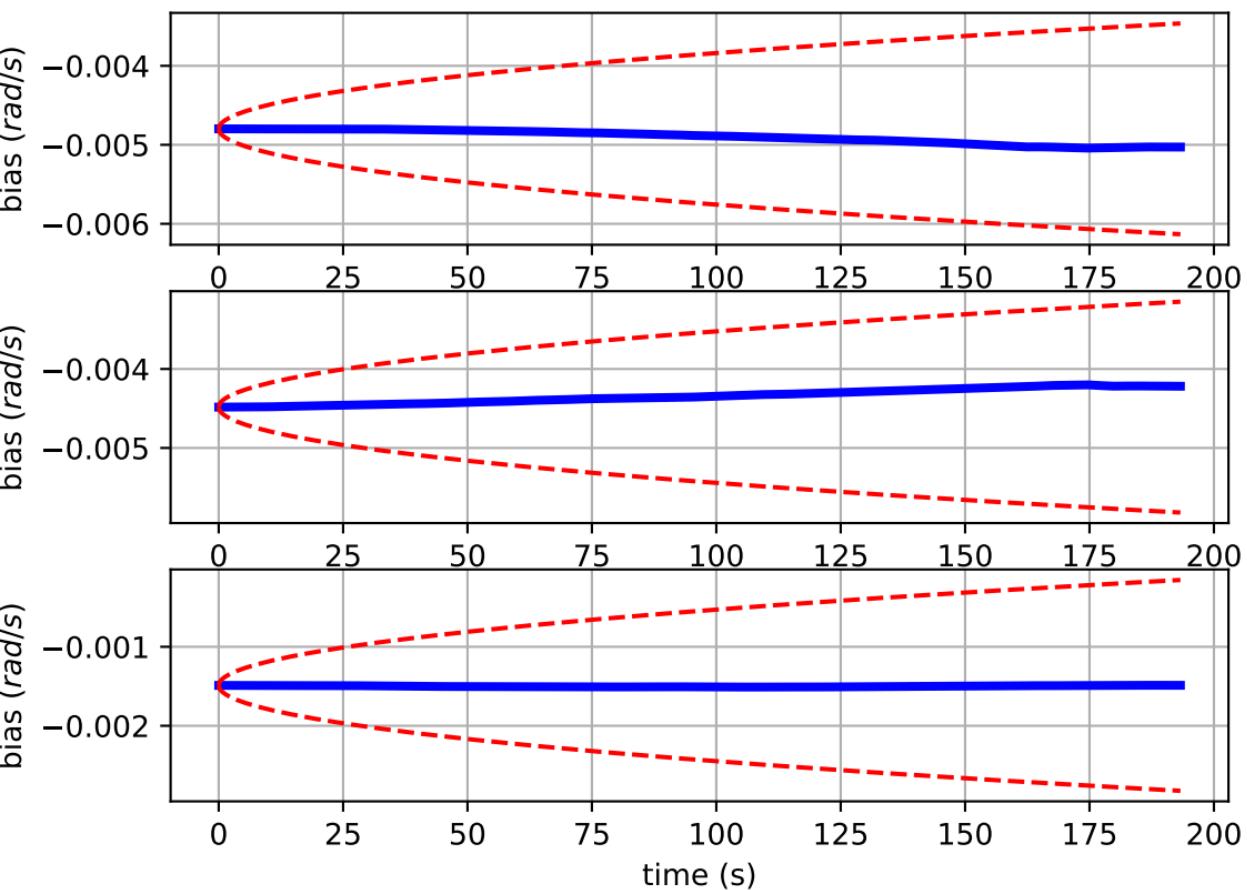
Comparison of predicted and measured angular velocities (body frame)



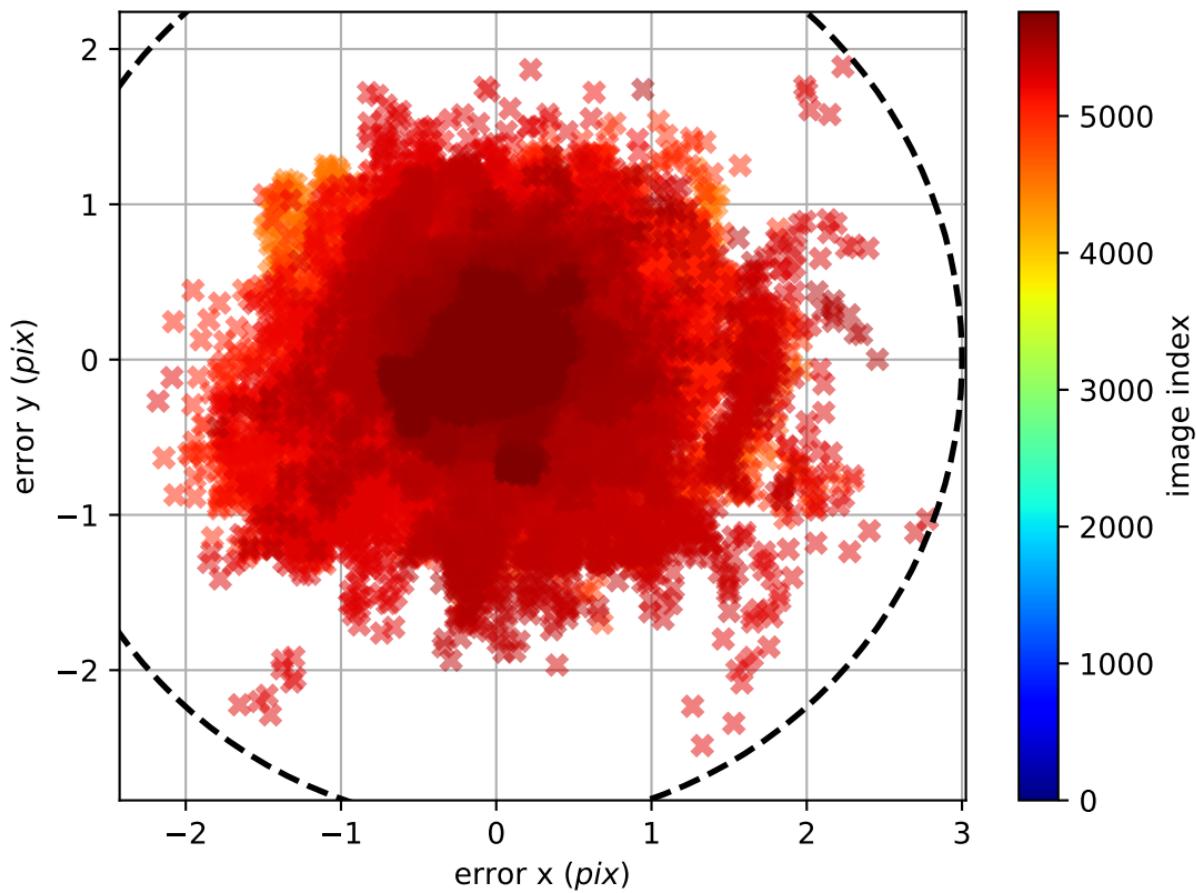
imu0: angular velocities error



imu0: estimated gyro bias (imu frame)



cam0: reprojection errors



cam1: reprojection errors

