

Calibration results

Normalized Residuals

Reprojection error (cam0): mean 0.34184654075262016, median 0.30207592490556257, std: 0.2235628586910237
Reprojection error (cam1): mean 0.32598814781043034, median 0.2877067189554109, std: 0.2435646643541267
Gyroscope error (imu0): mean 0.47424910224532996, median 0.4057837717863382, std: 0.30432951317669105
Accelerometer error (imu0): mean 0.379255275407486, median 0.2775870732921912, std: 0.3263196994784197

Residuals

Reprojection error (cam0) [px]: mean 0.34184654075262016, median 0.30207592490556257, std: 0.2235628586910237
Reprojection error (cam1) [px]: mean 0.32598814781043034, median 0.2877067189554109, std: 0.2435646643541267
Gyroscope error (imu0) [rad/s]: mean 0.002020987659160776, median 0.001729226246681794, std: 0.001296884248249636
Accelerometer error (imu0) [m/s^2]: mean 0.07587659234043377, median 0.05553610606084653, std: 0.06528591272296427

Transformation (cam0):

T_ci: (imu0 to cam0):
[[0.51356612 -0.85804845 0.00164403 0.04847843]
[0.00305803 -0.00008569 -0.99999532 -0.02269768]
[0.85804457 0.51356874 0.00257993 -0.05737305]
[0. 0. 0. 1.]]

T_ic: (cam0 to imu0):

[[0.51356612 0.00305803 0.85804457 0.02440117]
[-0.85804845 -0.00008569 0.51356874 0.0710599]
[0.00164403 -0.99999532 0.00257993 -0.02262926]
[0. 0. 0. 1.]]

timeshift cam0 to imu0: [s] (t_imu = t_cam + shift)
-0.0065033632674129736

Transformation (cam1):

T_ci: (imu0 to cam1):
[[-0.5225031 -0.85262566 0.00447069 -0.04215714]
[0.00649127 -0.00922106 -0.99993642 -0.02326244]
[0.85261267 -0.52244086 0.01035265 -0.05087947]
[0. 0. 0. 1.]]

T_ic: (cam1 to imu0):
[[-0.5225031 0.00649127 0.85261267 0.02150425]
[-0.85262566 -0.00922106 -0.52244086 -0.06274027]
[0.00447069 -0.99993642 0.01035265 -0.02254575]
[0. 0. 0. 1.]]

timeshift cam1 to imu0: [s] (t_imu = t_cam + shift)
-0.006169286615626142

Baselines:

Baseline (cam0 to cam1):
[[0.46326158 -0.00599544 -0.88620131 -0.11559549]
[0.0960188 0.99995238 -0.00174562 -0.00113147]
[0.88616957 -0.00770052 0.46329709 -0.06743359]
[0. 0. 0. 1.]]
baseline norm: 0.1338315566766952 [m]

Gravity vector in target coords: [m/s^2]
[0.01558945 -9.80647147 0.03601555]

Calibration configuration

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cam0

Camera model: pinhole
Focal length: [390.2060154022514, 395.24663009853367]
Principal point: [310.491848714209, 238.02716133642798]
Distortion model: radtan
Distortion coefficients: [-0.312301672337043, 0.07057178098208847, 0.0018492338710132529, 0.008018336283615833]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.088 [m]
Spacing 0.026399999999999996 [m]

cam1

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Camera model: pinhole
Focal length: [388.7577664315519, 395.6330495290041]
Principal point: [336.2011129197593, 234.25459097630343]
Distortion model: radtan
Distortion coefficients: [-0.3097449824046875, 0.06842377582678051, 0.001677201986316969, -0.009541678657139735]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.088 [m]
Spacing 0.026399999999999996 [m]

IMU configuration

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IMU0:

Model: calibrated
Update rate: 100

Accelerometer:

Noise density: 0.02000673352767714

Noise density (discrete): 0.2000673352767714

Random walk: 0.001224627431466927

Gyroscope:

Noise density: 0.0004261447516911305

Noise density (discrete): 0.004261447516911304

Random walk: 2.14534407581717e-05

T_{ib} (imu0 to imu0)

$\begin{bmatrix} 1. & 0. & 0. & 0. \end{bmatrix}$

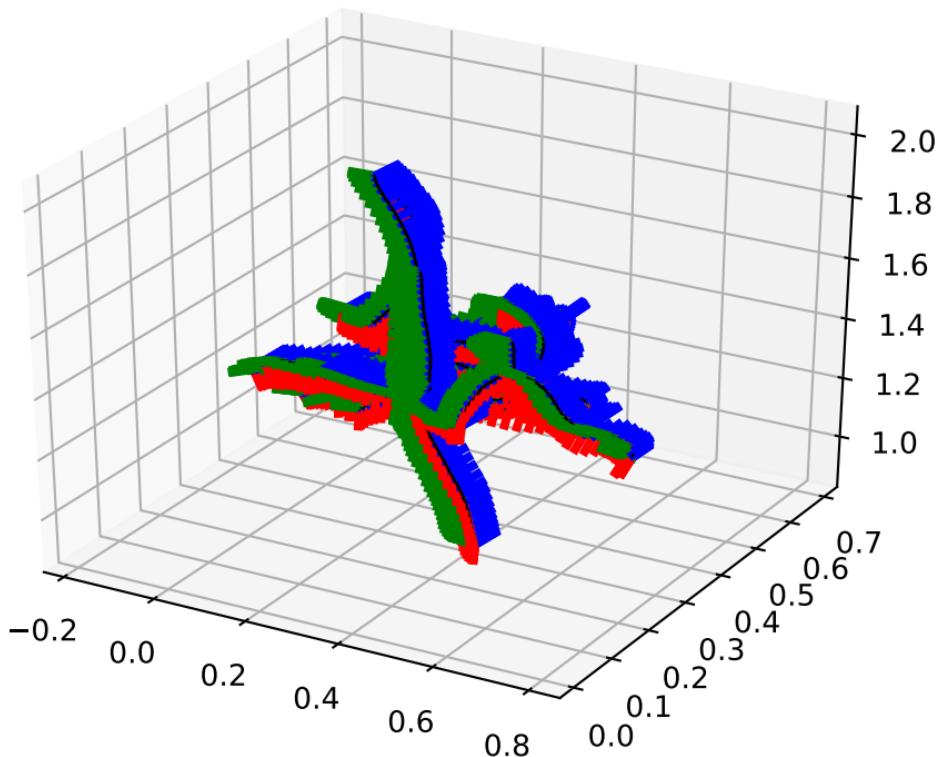
$\begin{bmatrix} 0. & 1. & 0. & 0. \end{bmatrix}$

$\begin{bmatrix} 0. & 0. & 1. & 0. \end{bmatrix}$

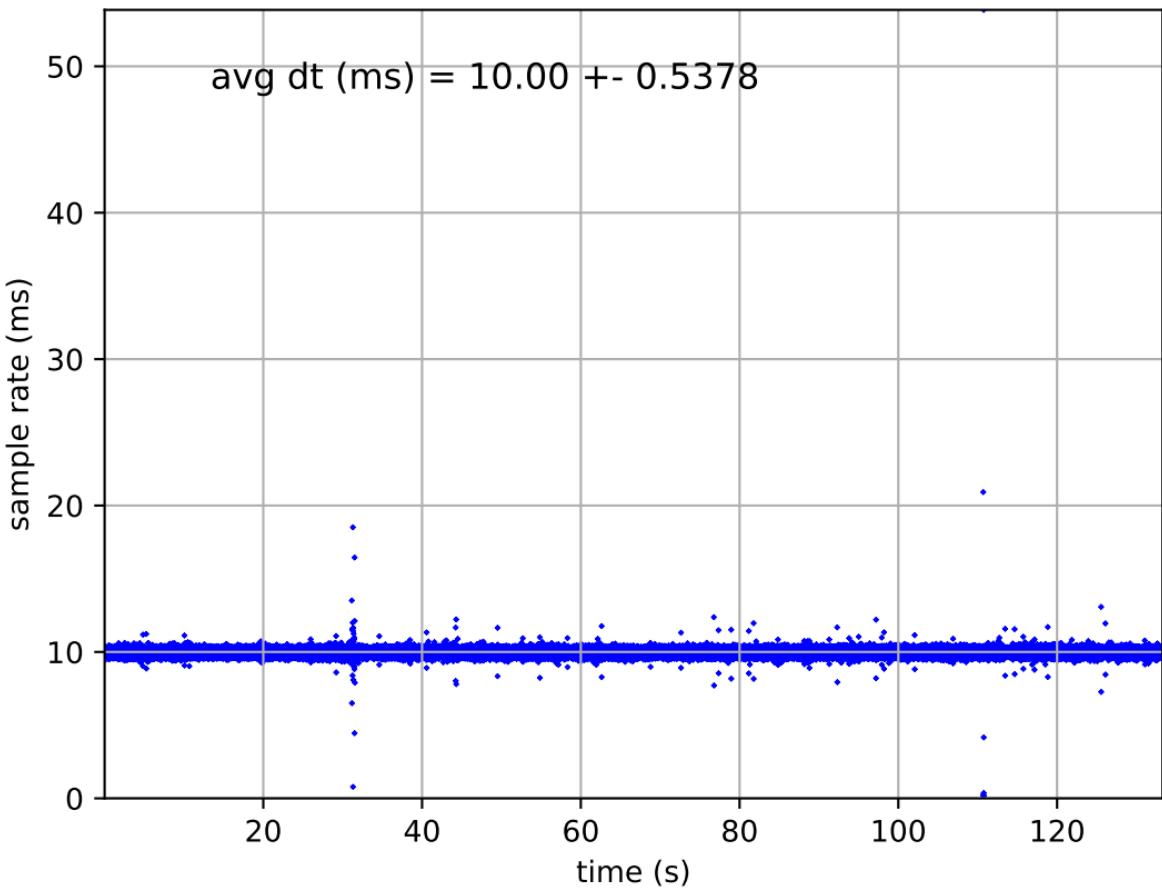
$\begin{bmatrix} 0. & 0. & 0. & 1. \end{bmatrix}$

time offset with respect to IMU0: 0.0 [s]

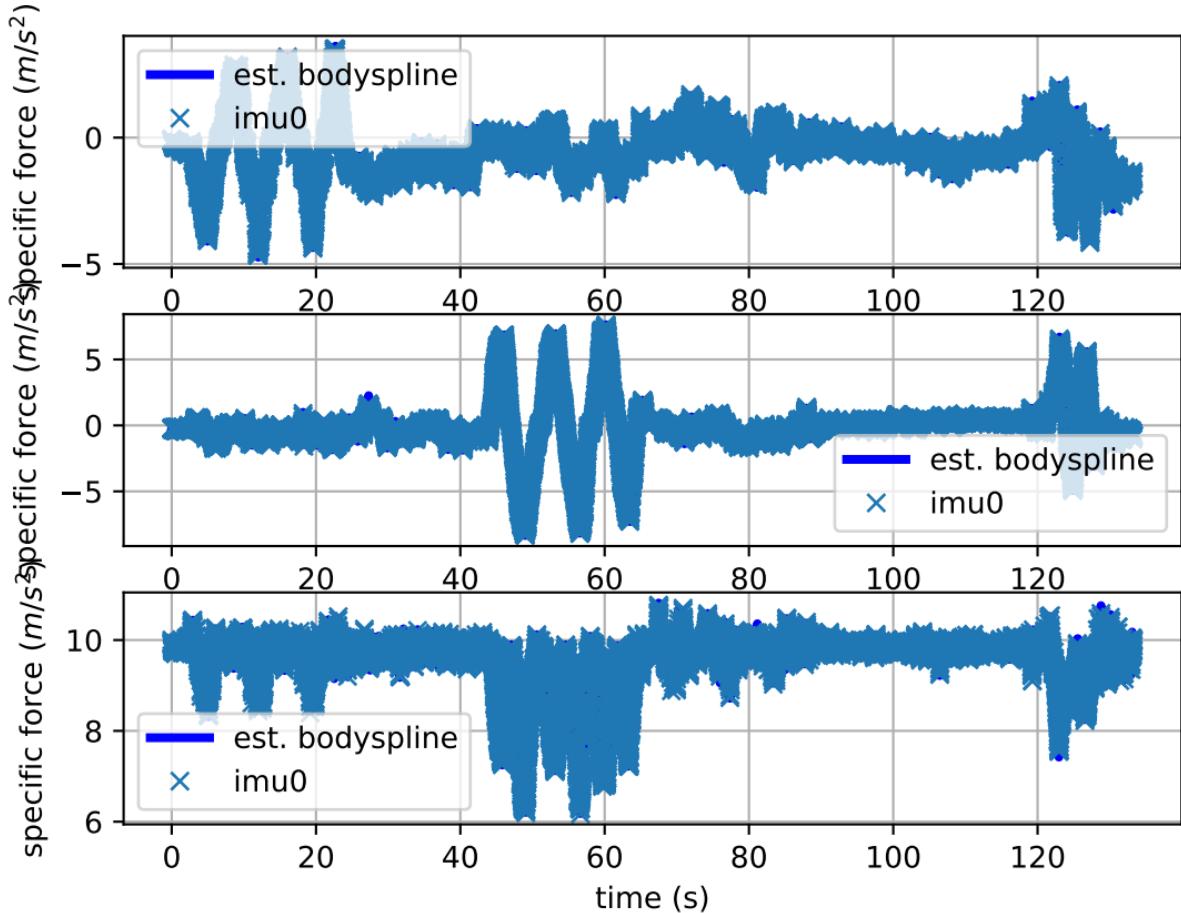
imu0: estimated poses



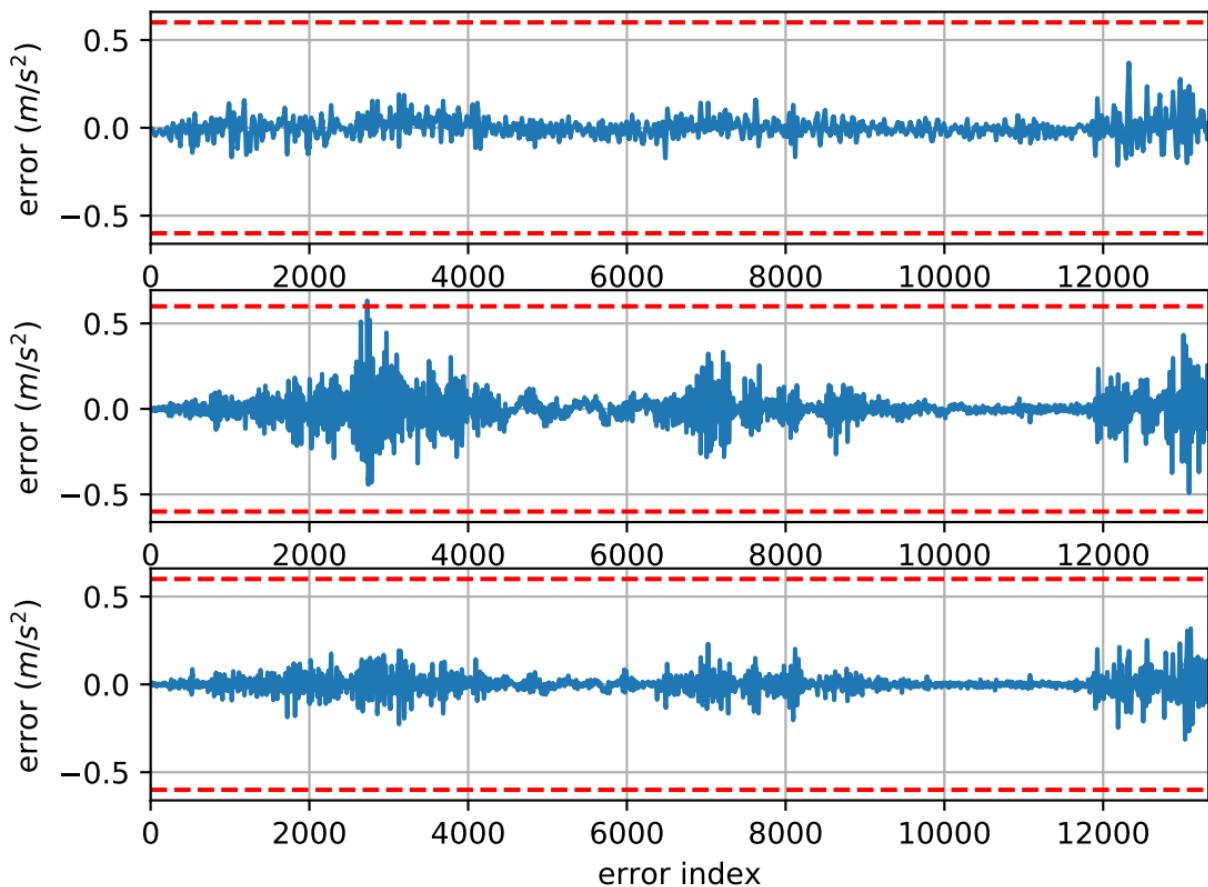
imu0: sample inertial rate



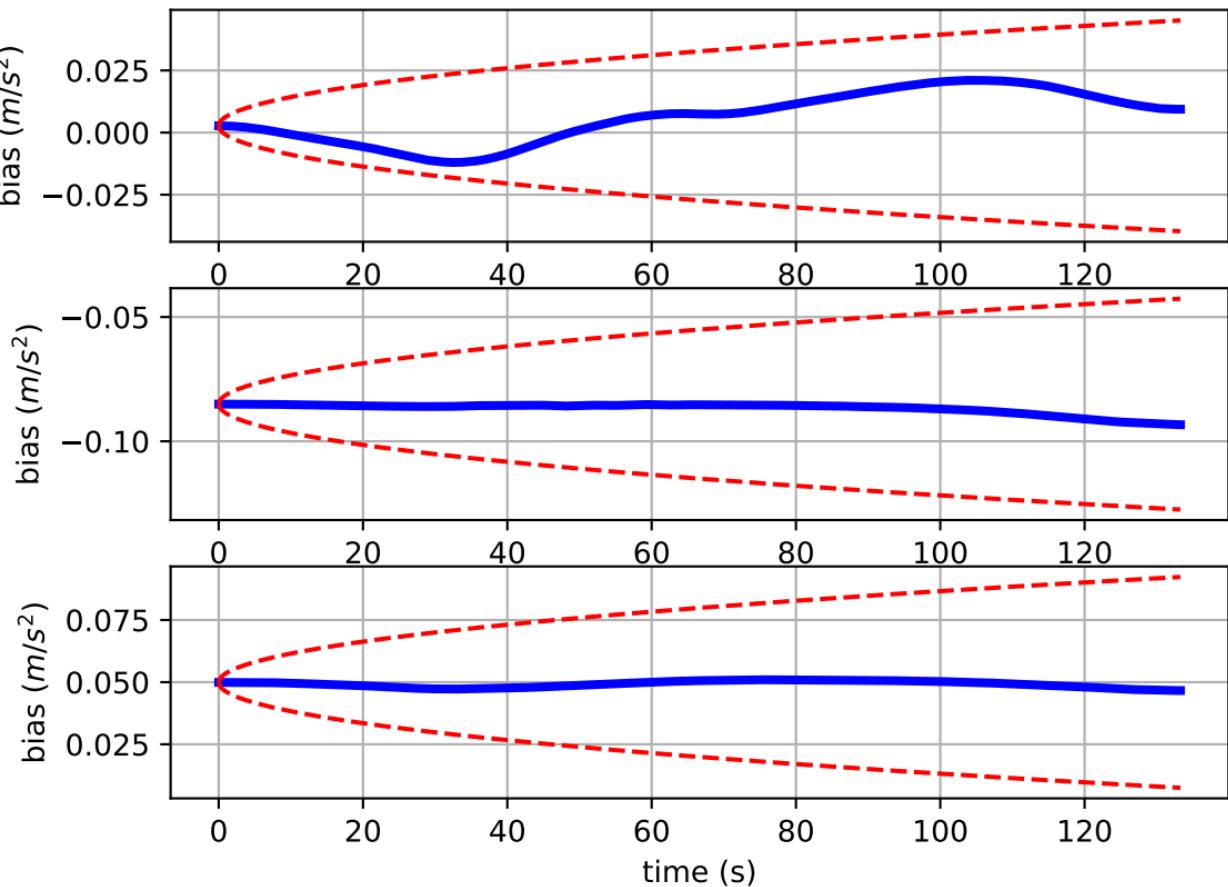
Comparison of predicted and measured specific force (imu0 frame)



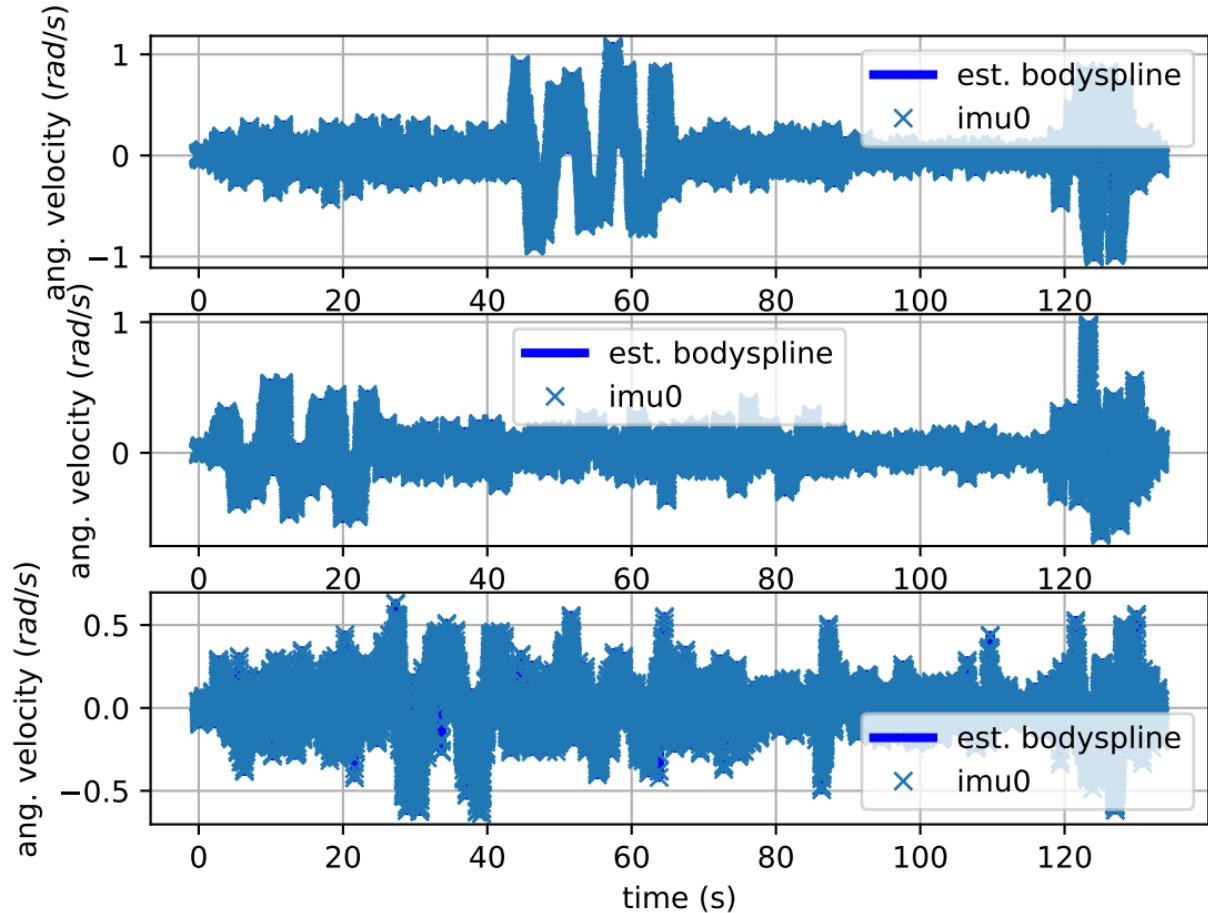
imu0: acceleration error



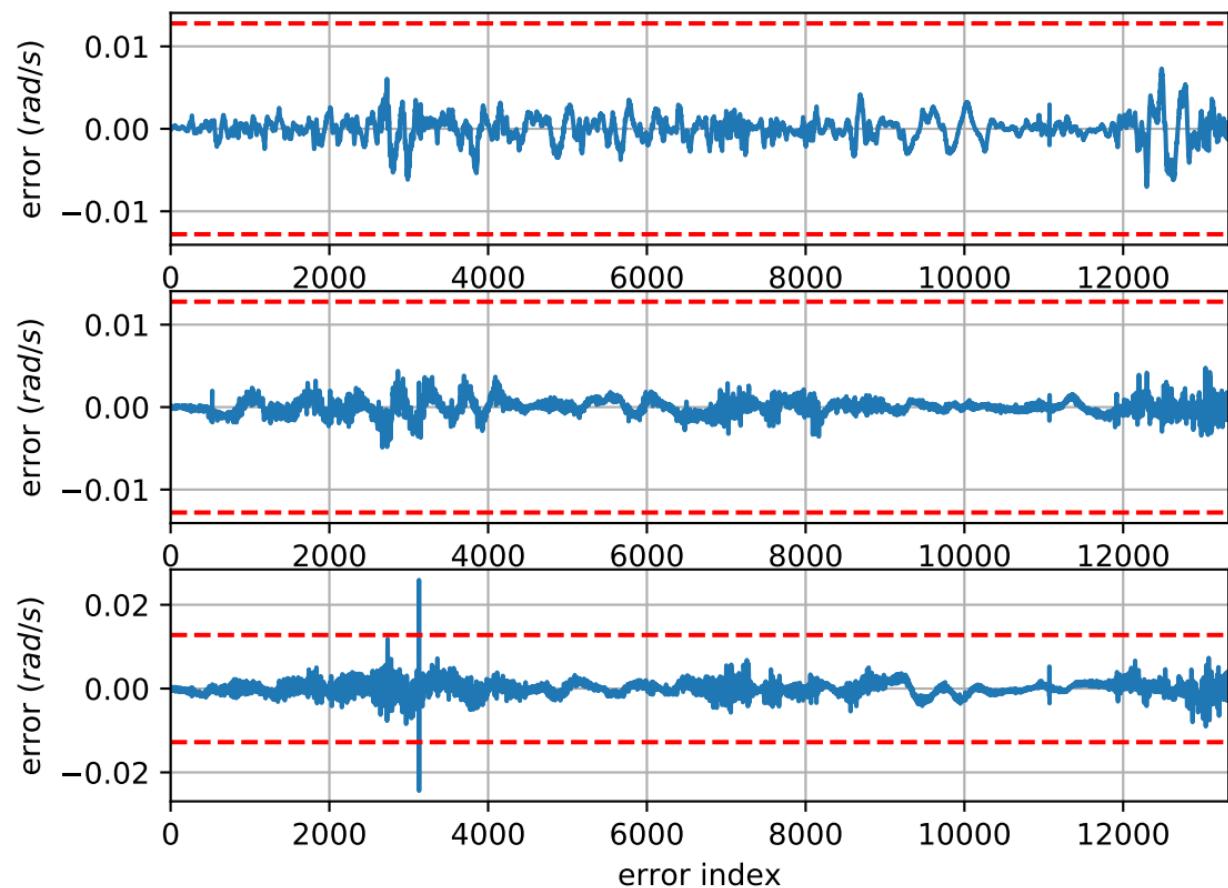
imu0: estimated accelerometer bias (imu frame)



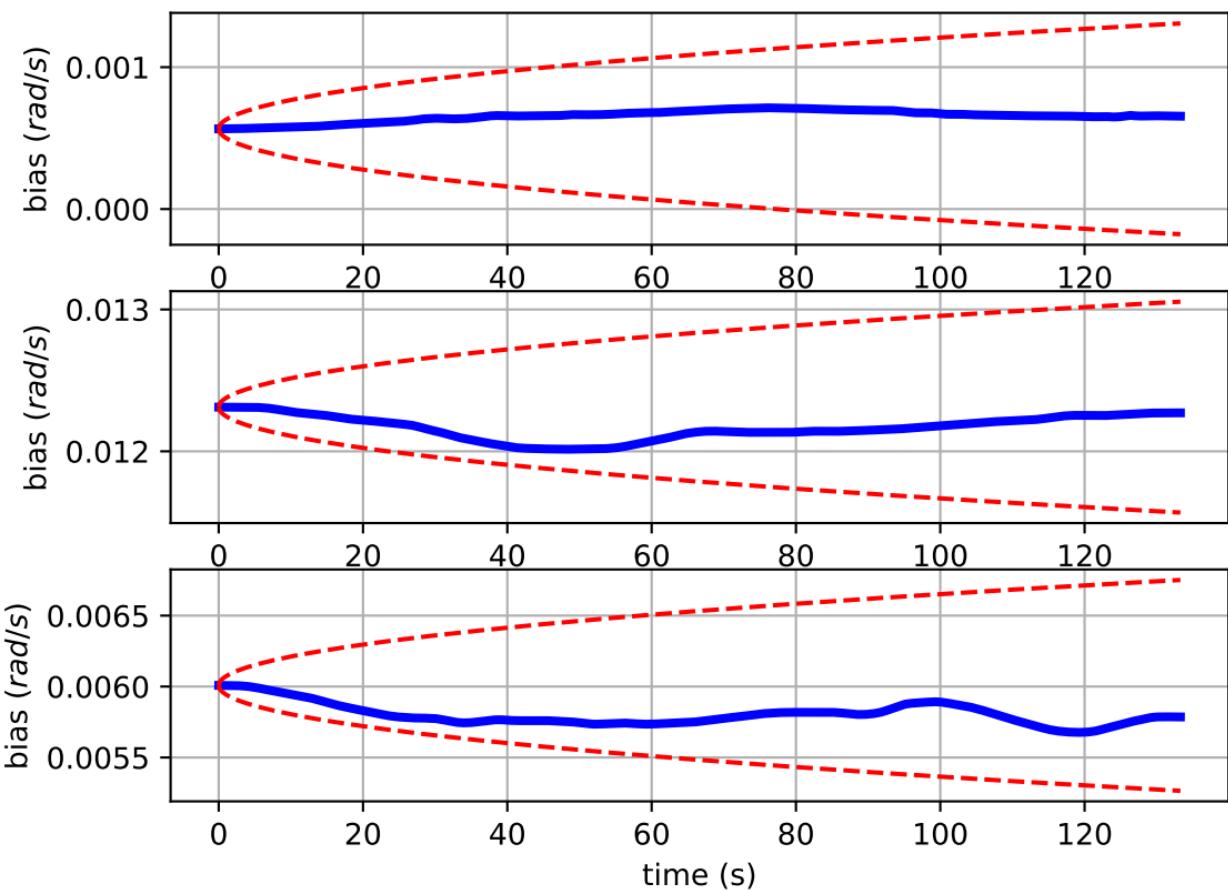
Comparison of predicted and measured angular velocities (body frame)



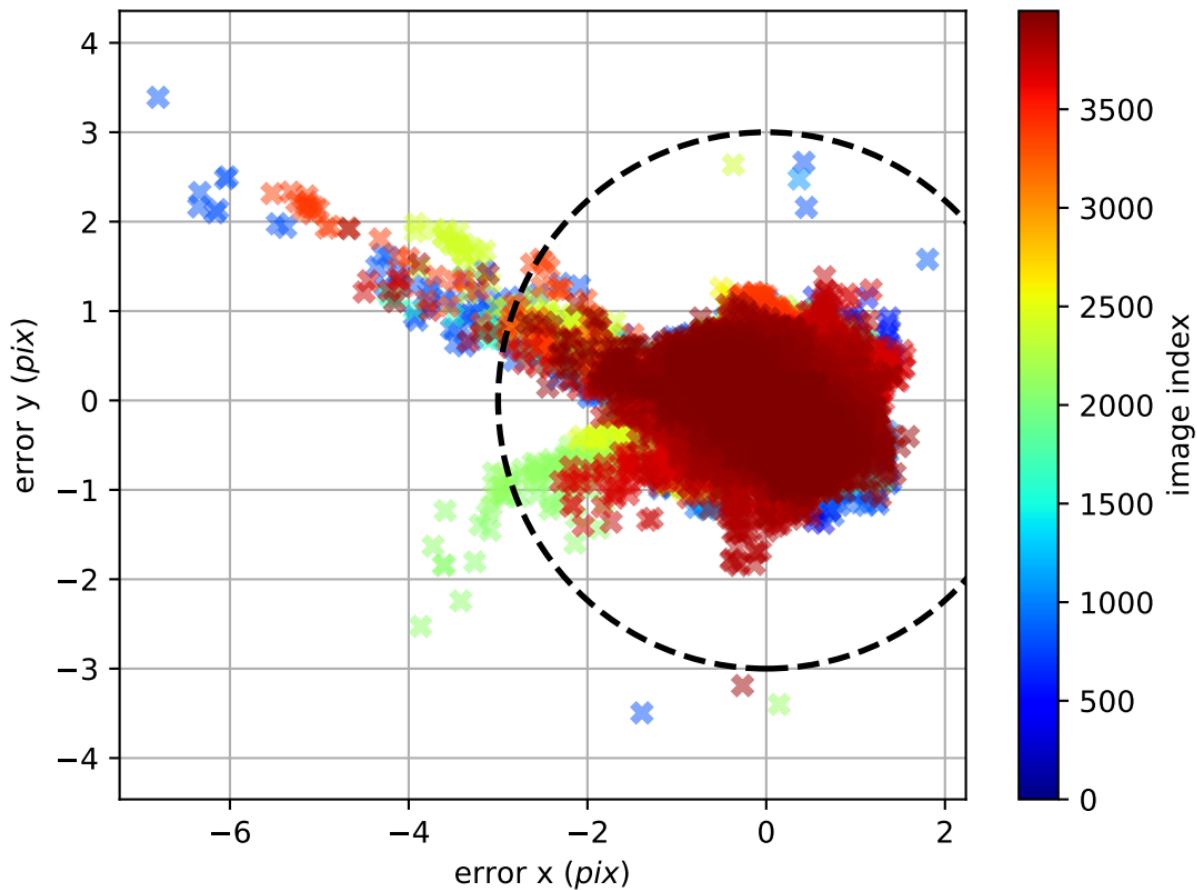
imu0: angular velocities error



imu0: estimated gyro bias (imu frame)



cam0: reprojection errors



cam1: reprojection errors

