

## Calibration results

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### Normalized Residuals

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Reprojection error (cam0): mean 0.34430798842955374, median 0.3066411391597025, std: 0.21419463490668486  
Reprojection error (cam1): mean 0.3482841718340586, median 0.3086693314541056, std: 0.22380674557245242  
Gyroscope error (imu0): mean 1.0607012463209173, median 1.0109537179729995, std: 0.49242633670115726  
Accelerometer error (imu0): mean 0.35875007431623823, median 0.30612868118854397, std: 0.23089906634085114

### Residuals

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Reprojection error (cam0) [px]: mean 0.34430798842955374, median 0.3066411391597025, std: 0.21419463490668486  
Reprojection error (cam1) [px]: mean 0.3482841718340586, median 0.3086693314541056, std: 0.22380674557245242  
Gyroscope error (imu0) [rad/s]: mean 0.0020950857293374377, median 0.001996824944716847, std: 0.0009726352206626631  
Accelerometer error (imu0) [m/s<sup>2</sup>]: mean 0.012741445383714882, median 0.010872532581872547, std: 0.008200661278022067

### Transformation (cam0):

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T\_ci: (imu0 to cam0):

```
[[-0.00296529 -0.99994857  0.00969839  0.02166605]
 [-0.00583907 -0.00971558 -0.99993575  0.00119963]
 [ 0.99997856  0.00290847 -0.00586758 -0.16174886]
 [ 0.          0.          1.          ]]]
```

T\_ic: (cam0 to imu0):

```
[[-0.00296529 -0.00583907  0.99997856  0.16168815]
 [-0.99994857 -0.00971558  0.00290847  0.02214703]
 [ 0.00969839 -0.99993575 -0.00586758  0.00004036]
 [ 0.          0.          1.          ]]]
```

timeshift cam0 to imu0: [s] (t\_imu = t\_cam + shift)  
0.003440906941720082

### Transformation (cam1):

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T\_ci: (imu0 to cam1):  
[[-0.00677701 -0.99993678 0.00897286 -0.09738592]  
[-0.00620732 -0.00893083 -0.99994085 0.0012047 ]  
[ 0.99995777 -0.00683231 -0.00614641 -0.16324785]  
[ 0. 0. 1. ]]

T\_ic: (cam1 to imu0):  
[[ -0.00677701 -0.00620732 0.99995777 0.16258845]  
[-0.99993678 -0.00893083 -0.00683231 -0.09848436]  
[ 0.00897286 -0.99994085 -0.00614641 0.00107507]  
[ 0. 0. 1. ]]

timeshift cam1 to imu0: [s] (t\_imu = t\_cam + shift)  
0.0035396161236427416

Baselines:

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Baseline (cam0 to cam1):  
[[ 0.99995228 0.00078225 -0.0097378 -0.12062695]  
[-0.00078585 0.99999962 -0.00036593 -0.00003709]  
[ 0.00973751 0.00037357 0.99995252 -0.00171809]  
[ 0. 0. 1. ]]  
baseline norm: 0.12063919241026975 [m]

Gravity vector in target coords: [m/s^2]  
[ 0.26296553 -9.78456473 -0.60130288]

Calibration configuration

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cam0

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Camera model: pinhole  
Focal length: [480.5215563761528, 480.9653955191699]  
Principal point: [639.2035047644844, 380.7532656975425]  
Distortion model: radtan  
Distortion coefficients: [-0.10995984323008134, 0.04856475794033177, 0.00045738477161912295,  
0.0013026524806697783]  
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: [479.6629321650424, 479.43698273521284]  
Principal point: [656.464796670947, 385.0423319174531]  
Distortion model: radtan  
Distortion coefficients: [-0.10509679187485506, 0.040559436708843925, 0.00012039055296636712,  
0.0004109171422233124]  
Type: aprilgrid  
Tags:  
Rows: 6  
Cols: 6  
Size: 0.088 [m]  
Spacing 0.026399999999999996 [m]

IMU configuration

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IMU0:

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Model: calibrated  
Update rate: 360.0

Accelerometer:

Noise density: 0.001871868977865804

Noise density (discrete): 0.035516216708803505

Random walk: 0.0001721600457155603

Gyroscope:

Noise density: 0.00010410161549574341

Noise density (discrete): 0.0019751892784177667

Random walk: 7.681520515598604e-07

T\_ib (imu0 to imu0)

[[1. 0. 0. 0.]

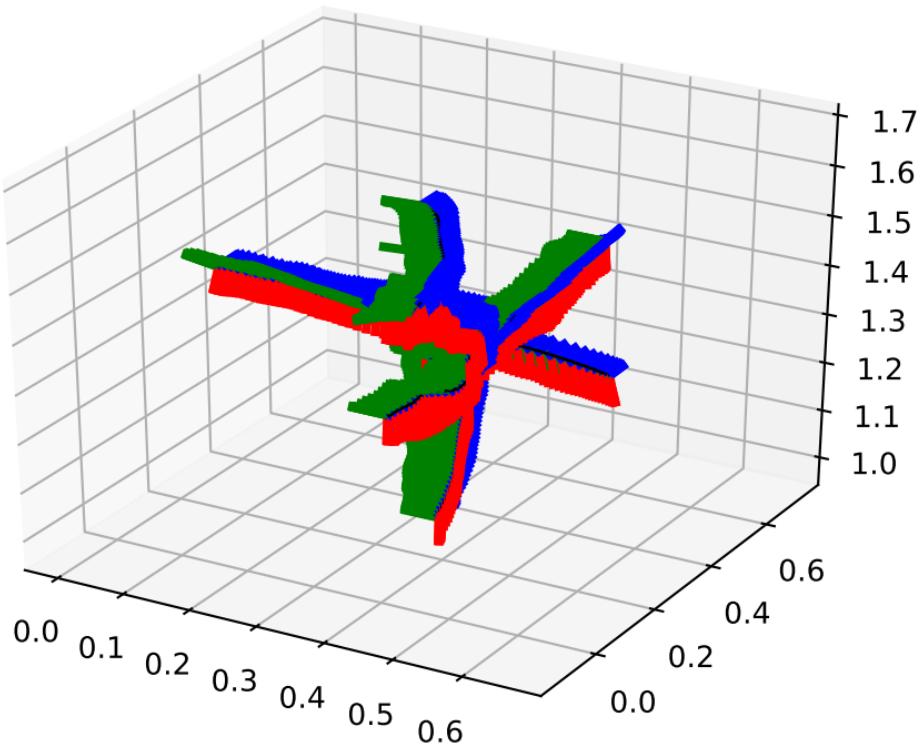
[0. 1. 0. 0.]

[0. 0. 1. 0.]

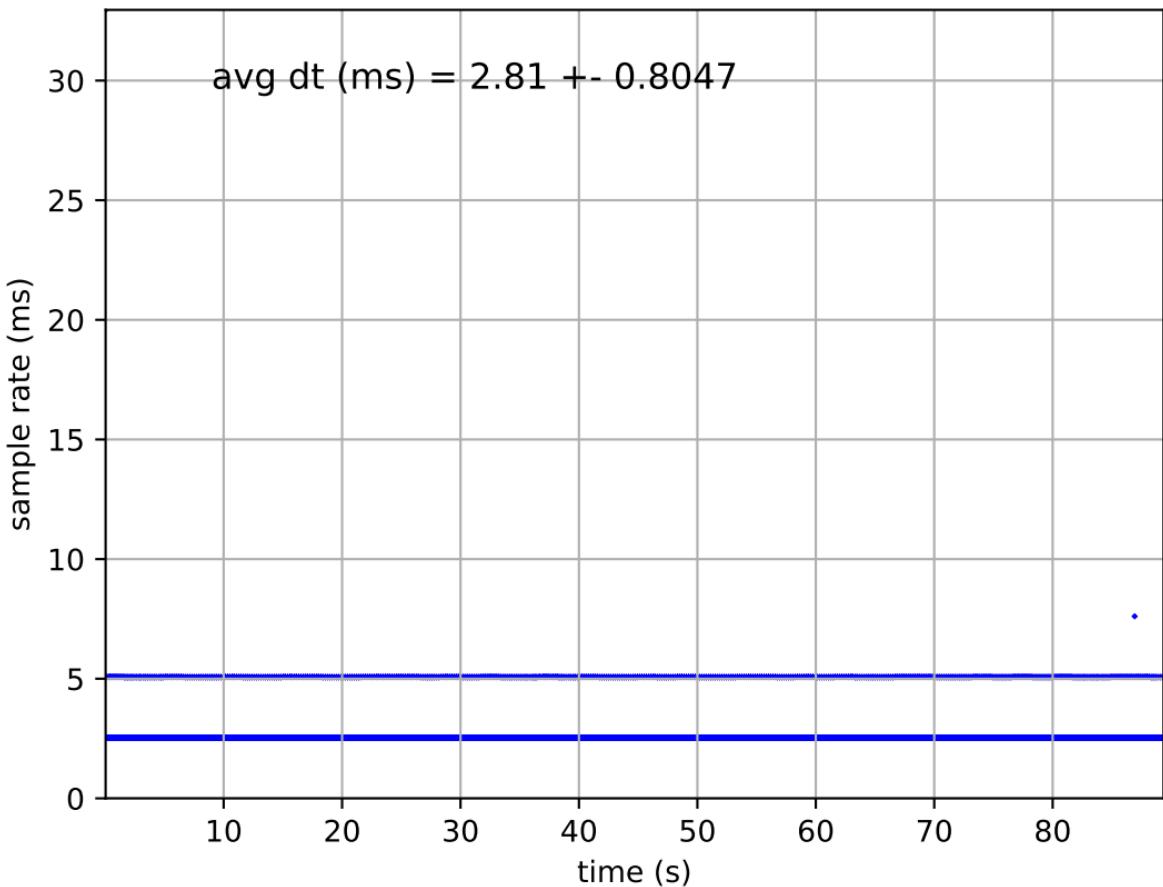
[0. 0. 0. 1.]]

time offset with respect to IMU0: 0.0 [s]

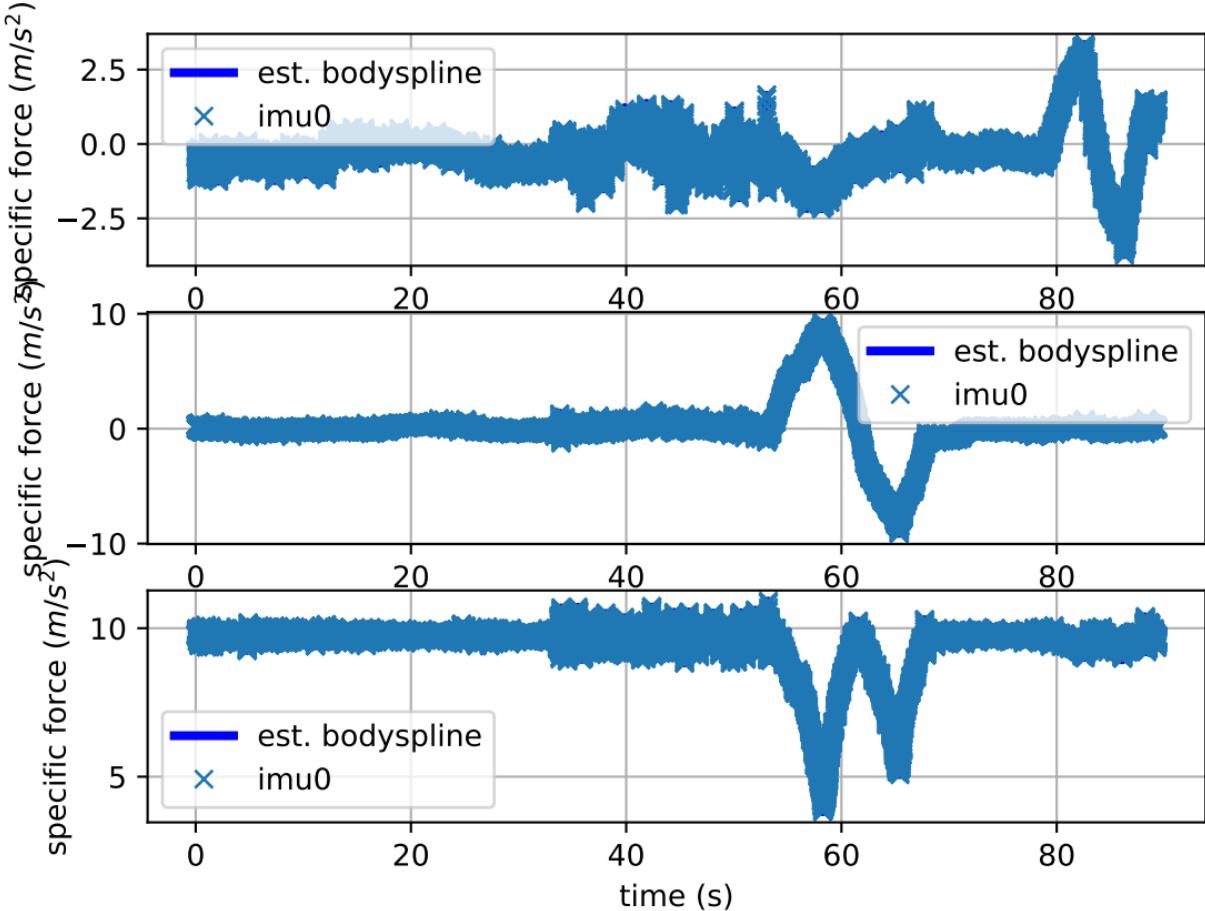
imu0: estimated poses



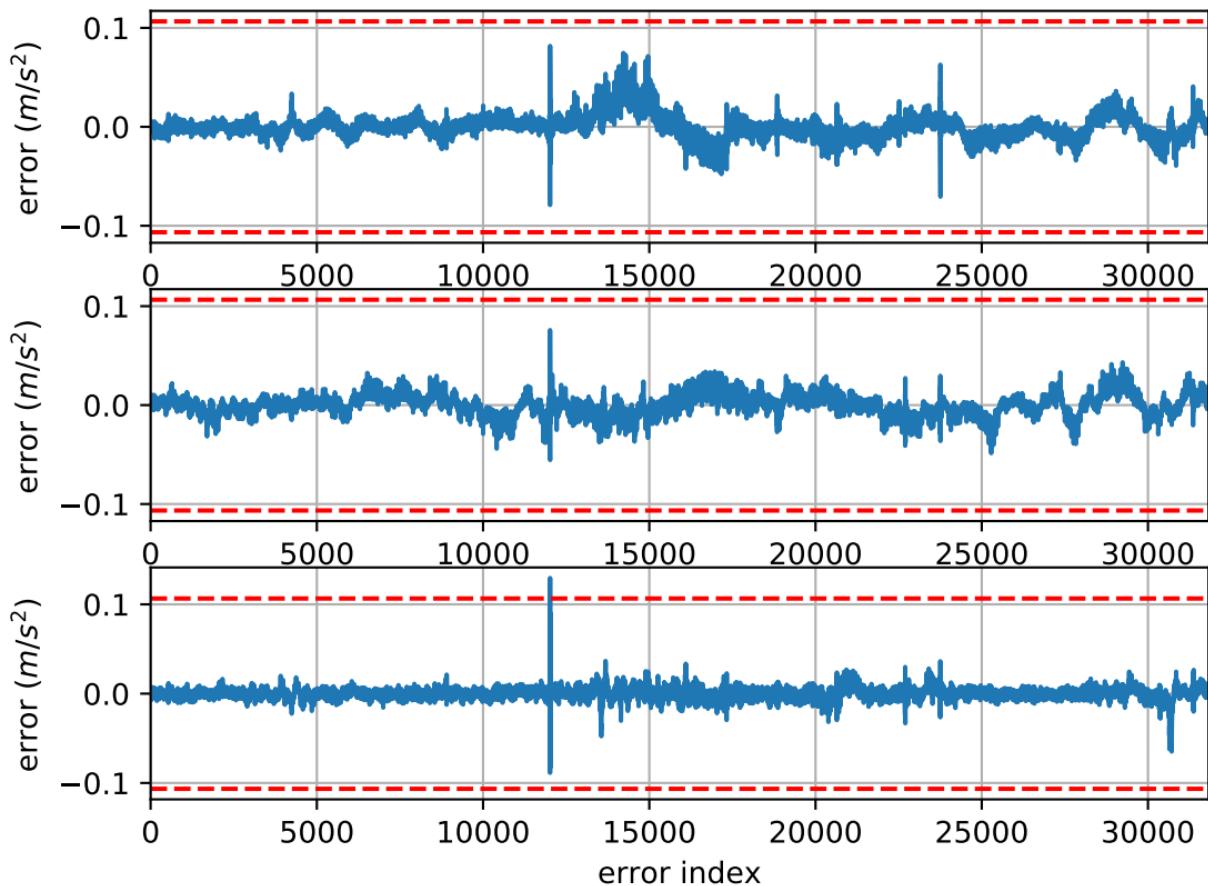
# imu0: sample inertial rate



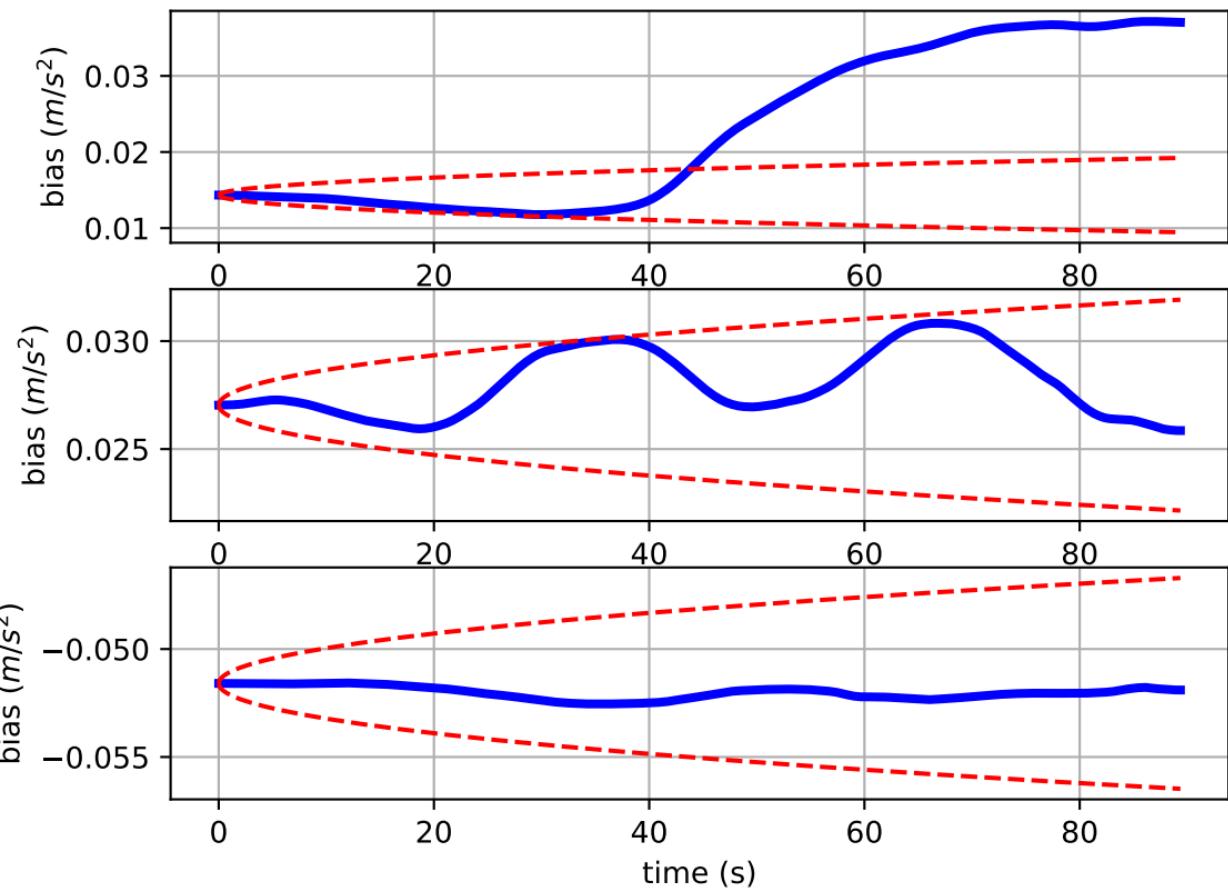
# Comparison of predicted and measured specific force (imu0 frame)



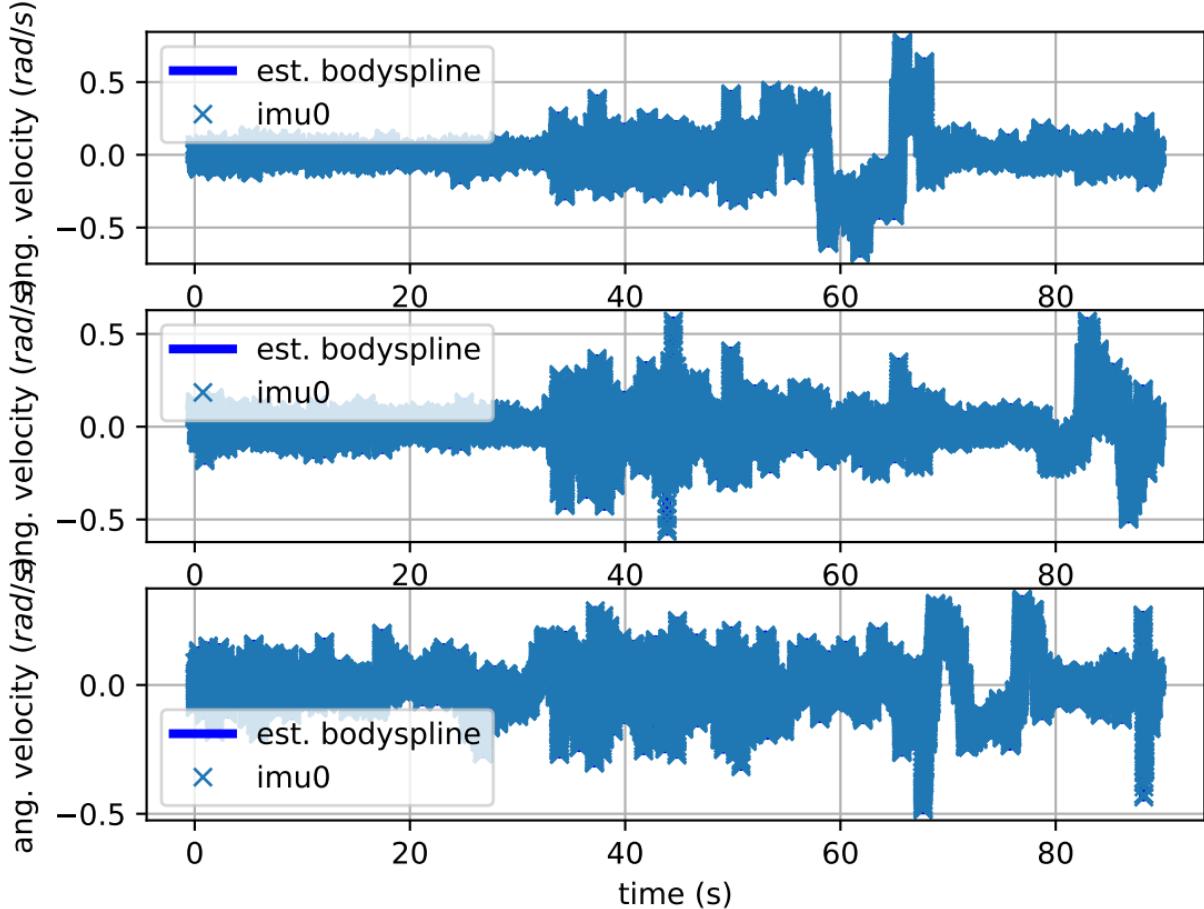
# imu0: acceleration error



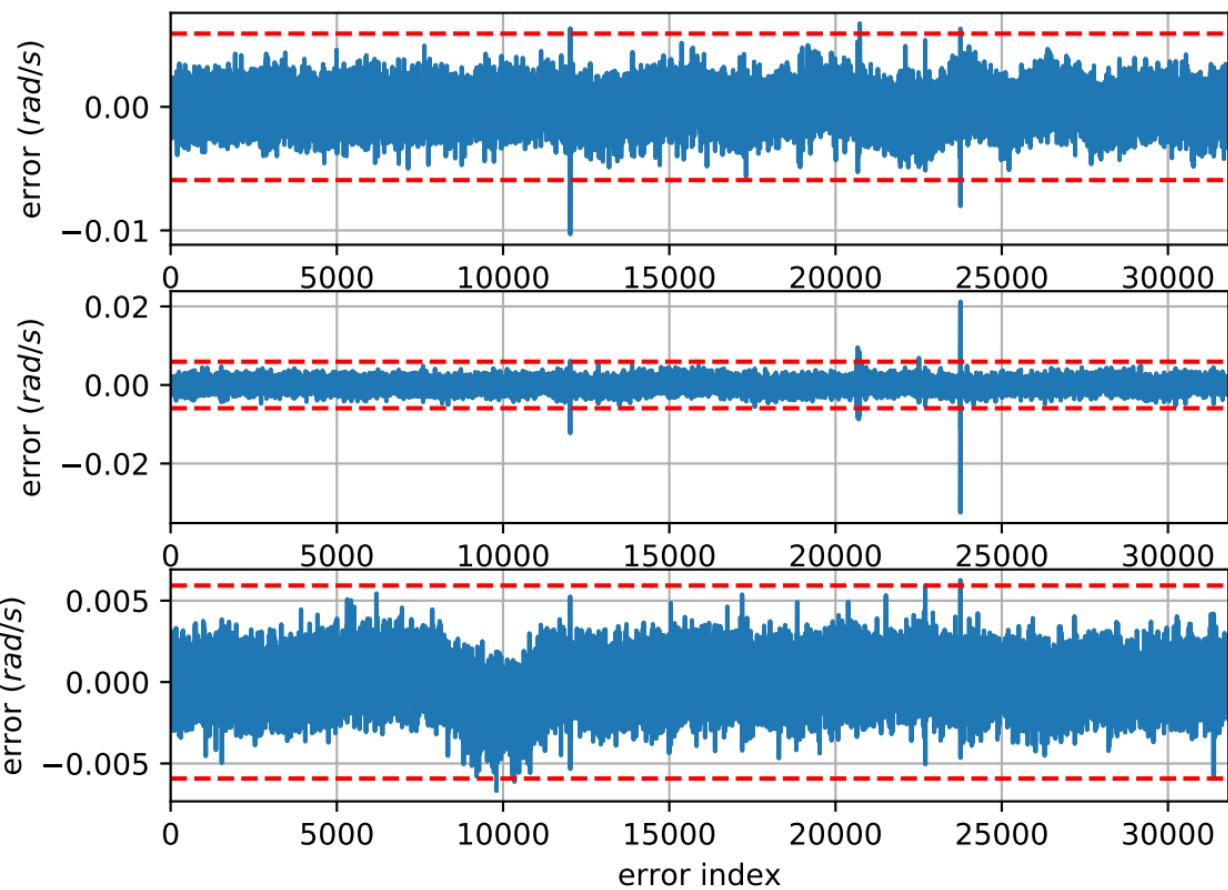
# imu0: estimated accelerometer bias (imu frame)



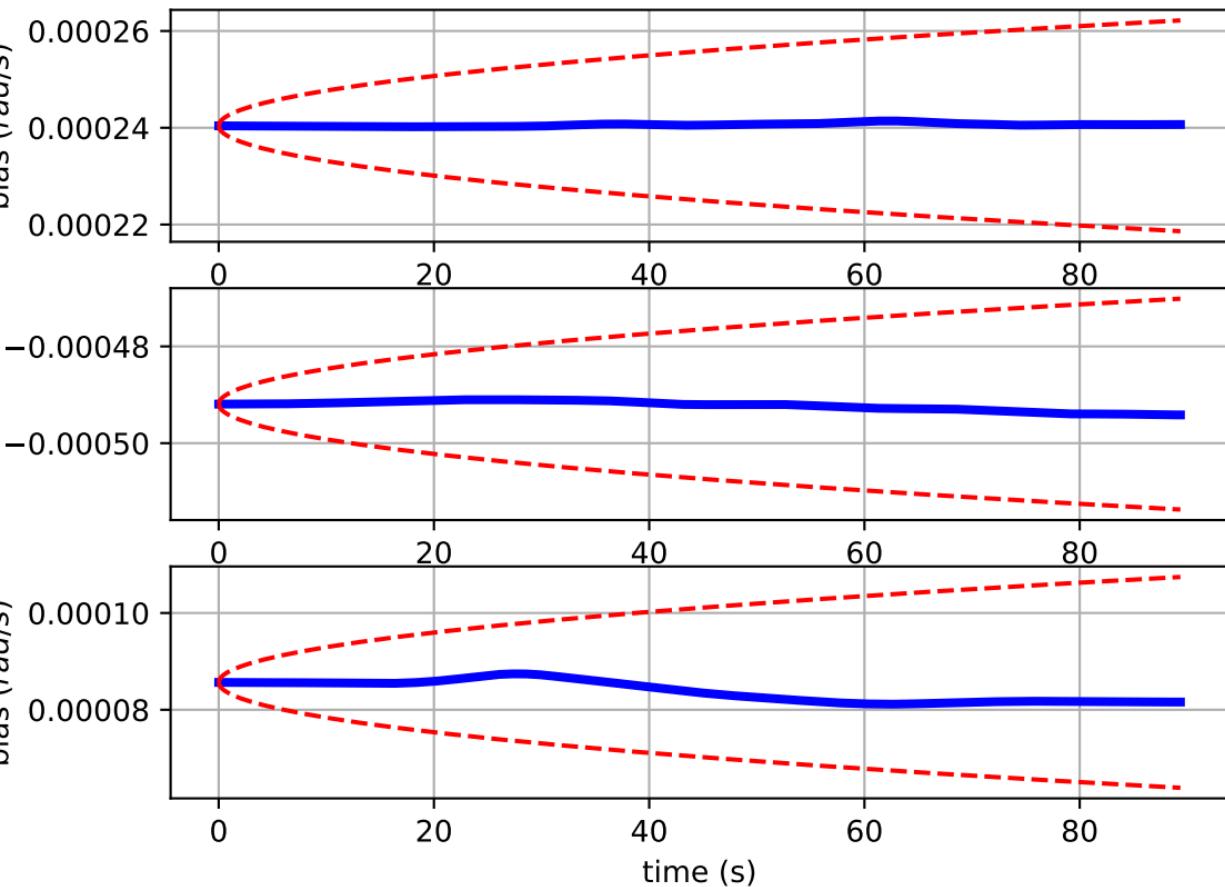
# Comparison of predicted and measured angular velocities (body frame)



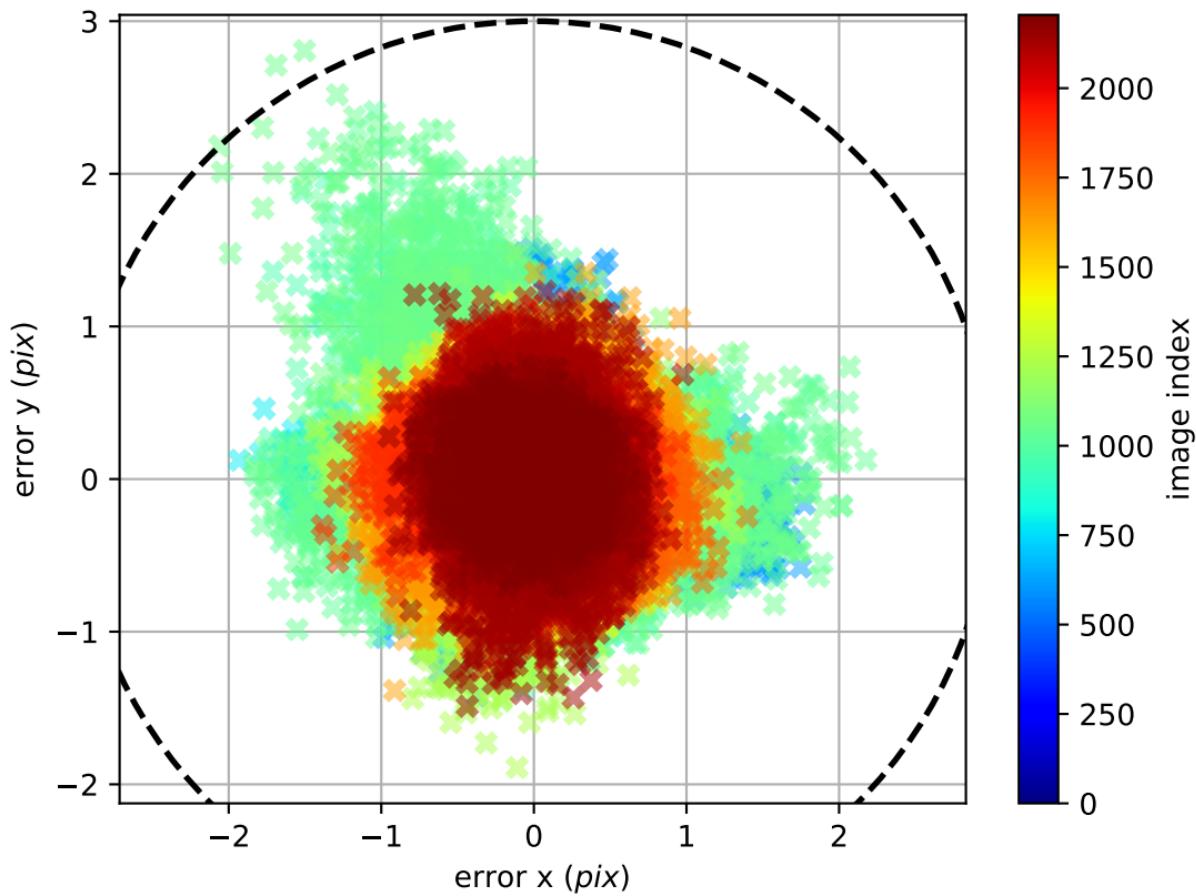
# imu0: angular velocities error



# imu0: estimated gyro bias (imu frame)



cam0: reprojection errors



cam1: reprojection errors

