

Calibration results

Normalized Residuals

Reprojection error (cam0): mean 53.10171435189673, median 16.845078887565897, std: 98.05907211764415
Reprojection error (cam1): mean 617.664916376458, median 581.1516169457485, std: 245.27356524860545
Reprojection error (cam2): mean 23.87991192716464, median 8.39613053035653, std: 37.68323954945816
Gyroscope error (imu0): mean 34.26296318894502, median 19.616334123118875, std: 36.605417082955725
Accelerometer error (imu0): mean 40.22807579501515, median 19.118715843261384, std: 51.117695312488365

Residuals

Reprojection error (cam0) [px]: mean 53.10171435189673, median 16.845078887565894, std: 98.05907211764415
Reprojection error (cam1) [px]: mean 617.664916376458, median 581.1516169457485, std: 245.27356524860545
Reprojection error (cam2) [px]: mean 23.87991192716464, median 8.39613053035653, std: 37.68323954945816
Gyroscope error (imu0) [rad/s]: mean 0.020788747191985403, median 0.011902035695809625, std:
0.02221001019083724
Accelerometer error (imu0) [m/s^2]: mean 0.7388004388243747, median 0.3511208372663532, std:
0.9387915027553174

Transformation (cam0):

T_ci: (imu0 to cam0):

```
[[-0.04235859  0.99817095 -0.04313367  0.03457845]
 [ 0.2884518   0.04437622  0.99859837 -0.02259944]
 [ 0.99868599  0.04105502 -0.03067213  0.01569388]
 [ 0.          0.          1.          ]]
```

T_ic: (cam0 to imu0):

```
[[-0.04235859  0.02884518  0.99868599 -0.01355668]
 [ 0.99817095  0.04437622  0.04105502 -0.03415664]
 [-0.04313367  0.99859837 -0.03067213  0.02454063]
 [ 0.          0.          1.          ]]
```

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

0.006708616602901941

Transformation (cam1):

T_ci: (imu0 to cam1):

```
[[-0.04666134 0.99537779 -0.08393915 -0.08473888]
 [ 0.02034198 0.08496011 0.99617668 -0.02456975]
 [ 0.99870362 0.04477545 -0.02421231 0.01606905]
 [ 0.          0.          1.          ]]
```

T_ic: (cam1 to imu0):

```
[[-0.04666134 0.02034198 0.99870362 -0.01950245]
 [ 0.99537779 0.08496011 0.04477545 0.08571515]
 [-0.08393915 0.99617668 -0.02421231 0.01775198]
 [ 0.          0.          1.          ]]
```

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

-17.441744732297384

Transformation (cam2):

T_ci: (imu0 to cam2):

```
[[-0.05091152 0.99605221 -0.07271874 -0.00245876]
 [ 0.03267665 0.07443554 0.99669032 -0.01163907]
 [ 0.99816845 0.04836681 -0.03633728 0.0029423 ]
 [ 0.          0.          1.          ]]
```

T_ic: (cam2 to imu0):

```
[[-0.05091152 0.03267665 0.99816845 -0.00268176]
 [ 0.99605221 0.07443554 0.04836681 0.00317311]
 [-0.07271874 0.99669032 -0.03633728 0.01152866]
 [ 0.          0.          1.          ]]
```

timeshift cam2 to imu0: [s] (t_imu = t_cam + shift)

-0.12436407047754516

Baselines:

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Baseline (cam0 to cam1):

```
[ [ 0.9991543 -0.04099635 -0.00316019 -0.12016498]
[ 0.0409743 0.99913739 -0.00675157 -0.00330067]
[ 0.00343425 0.00661638 0.99997221 0.00040638]
[ 0.          0.          1.          ]]
```

baseline norm: 0.12021099376822504 [m]

Baseline (cam1 to cam2):

```
[ [ 0.99992779 0.01114835 -0.00448614 0.08261999]
[ -0.01109459 0.99986841 0.011835 0.01179713]
[ 0.00461749 -0.01178437 0.9999199 -0.01302372]
[ 0.          0.          1.          ]]
```

baseline norm: 0.08446806036713274 [m]

Gravity vector in target coords: [m/s^2]

```
[ 0.50054845 9.79358753 -0.05930771]
```

Calibration configuration

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cam0

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Camera model: pinhole

Focal length: [3128.2231481209933, 3127.055612486281]

Principal point: [1230.3609442573918, 1055.979229631629]

Distortion model: radtan

Distortion coefficients: [-0.37079601167130954, 0.11937875167688575, 0.002024160231437216,
-0.0028750624067706257]

Type: aprilgrid

Tags:

Rows: 6

Cols: 6
Size: 0.026 [m]
Spacing 0.00800019999999999 [m]

cam1

Camera model: pinhole
Focal length: [3118.521672124142, 3126.1017174445287]
Principal point: [1280.1959237696515, 1016.252643080528]
Distortion model: radtan
Distortion coefficients: [-0.37636477420115316, 0.15533051454968927, 0.0012709266455232652,
-0.0008170020349034865]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.026 [m]
Spacing 0.00800019999999999 [m]

cam2

Camera model: pinhole
Focal length: [1069.5100005054346, 1074.489132614417]
Principal point: [281.24444875491724, 218.6235448939064]
Distortion model: radtan
Distortion coefficients: [-0.03604069001103331, -0.4257776965843562, 0.0008529077951766137,
0.0016979117683710507]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.026 [m]
Spacing 0.00800019999999999 [m]

IMU configuration

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IMU0:

Model: calibrated

Update rate: 150.0

Accelerometer:

Noise density: 0.0014995199754564308

Noise density (discrete): 0.01836529399489505

Random walk: 3.5724313972122524e-05

Gyroscope:

Noise density: 4.954020150102954e-05

Noise density (discrete): 0.0006067410771609183

Random walk: 4.2673013386940406e-07

T_ib (imu0 to imu0)

[[1. 0. 0. 0.]

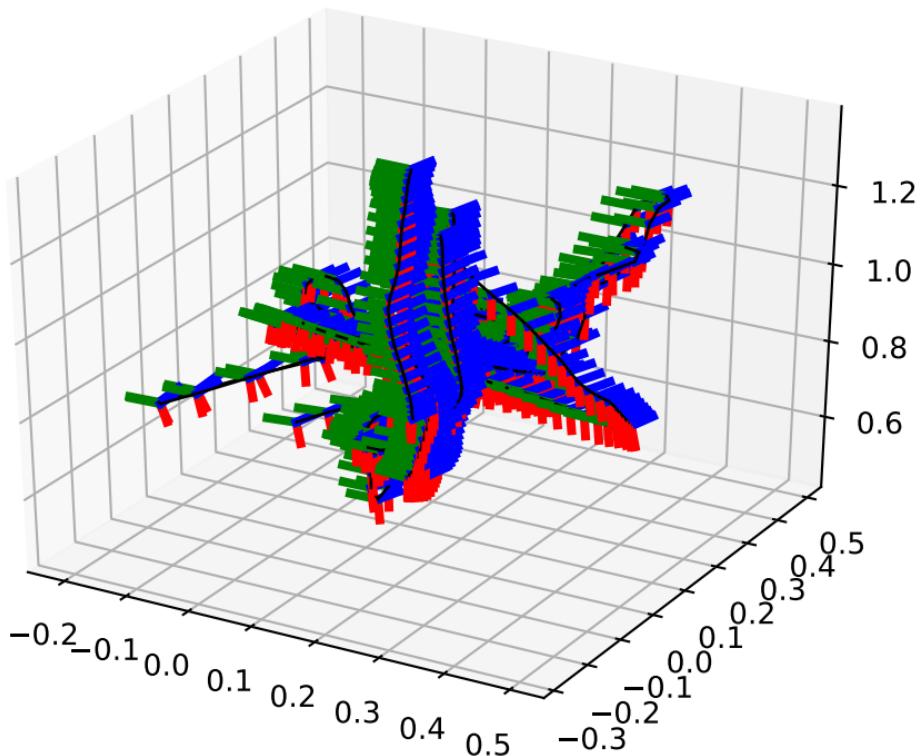
[0. 1. 0. 0.]

[0. 0. 1. 0.]

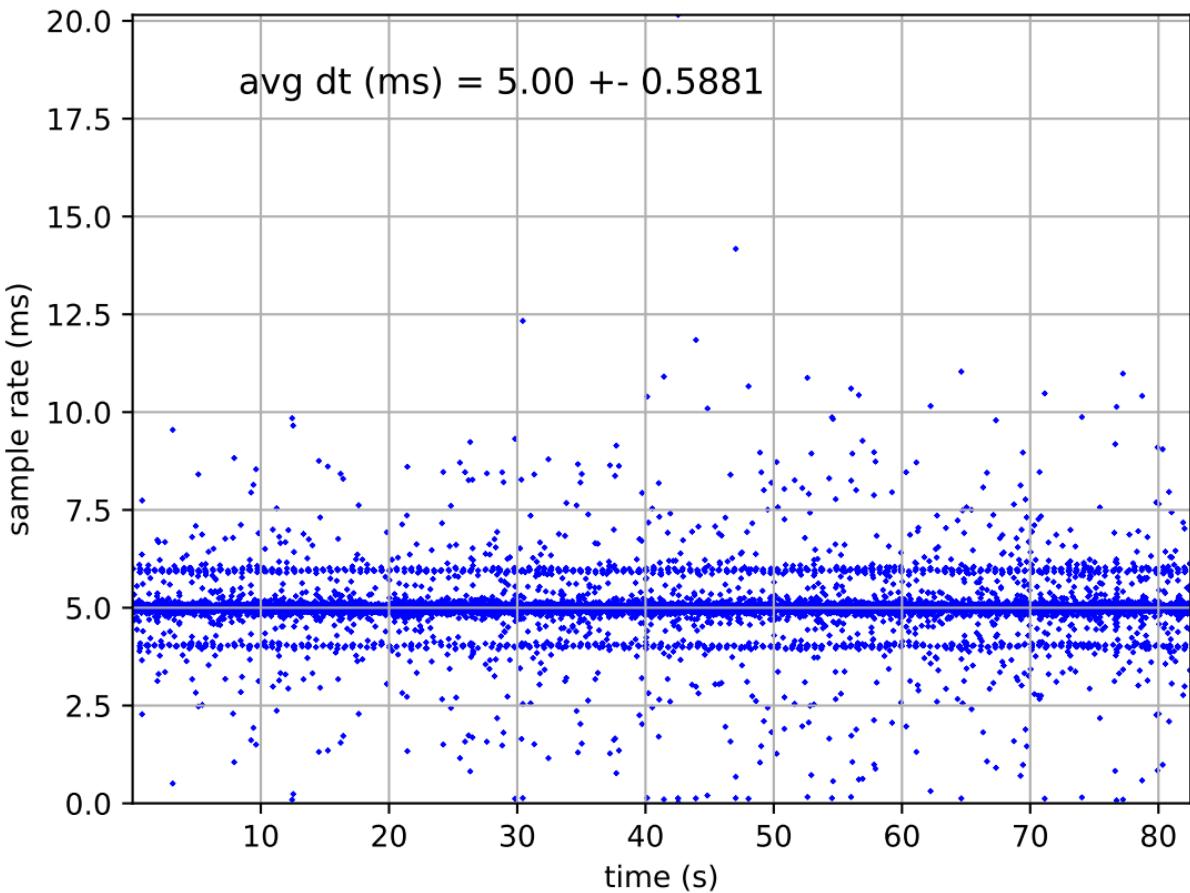
[0. 0. 0. 1.]]

time offset with respect to IMU0: 0.0 [s]

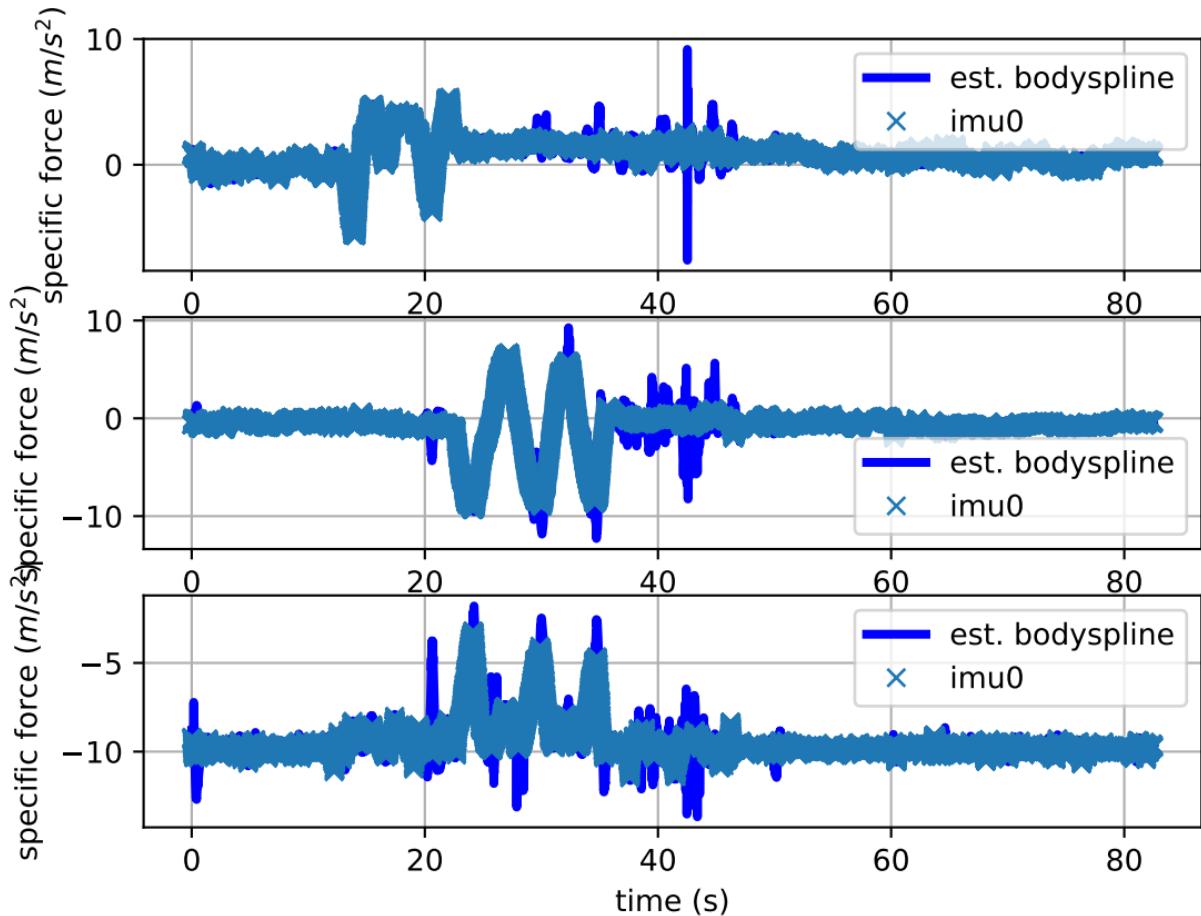
imu0: estimated poses



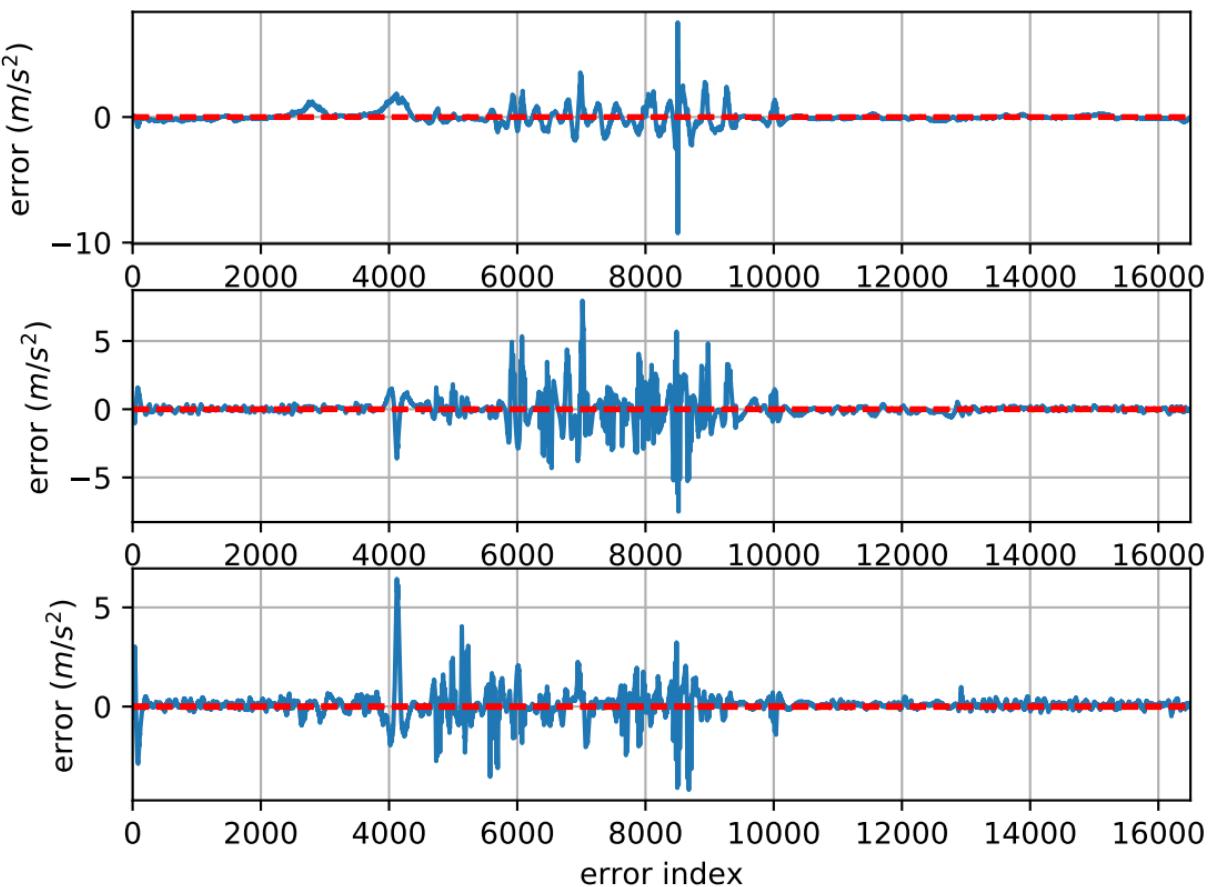
imu0: sample inertial rate



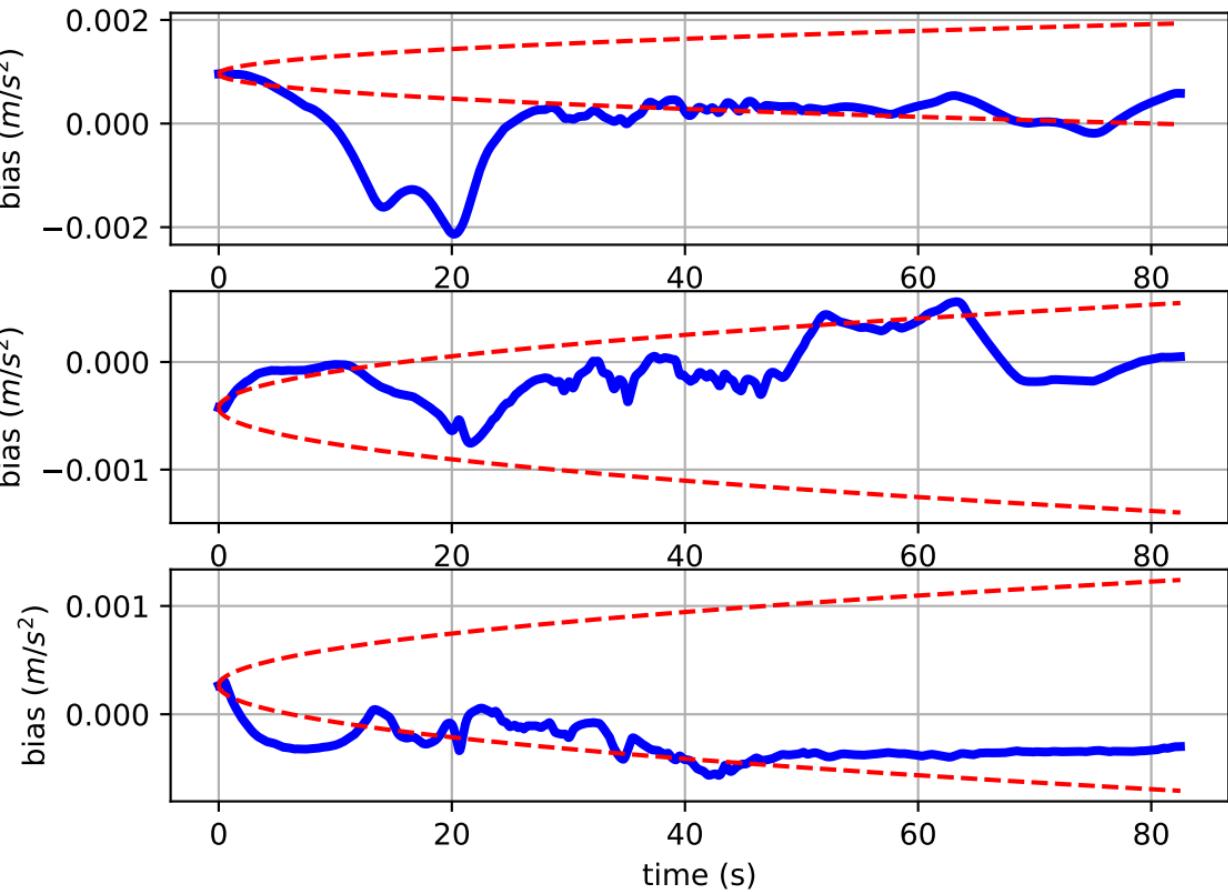
Comparison of predicted and measured specific force (imu0 frame)



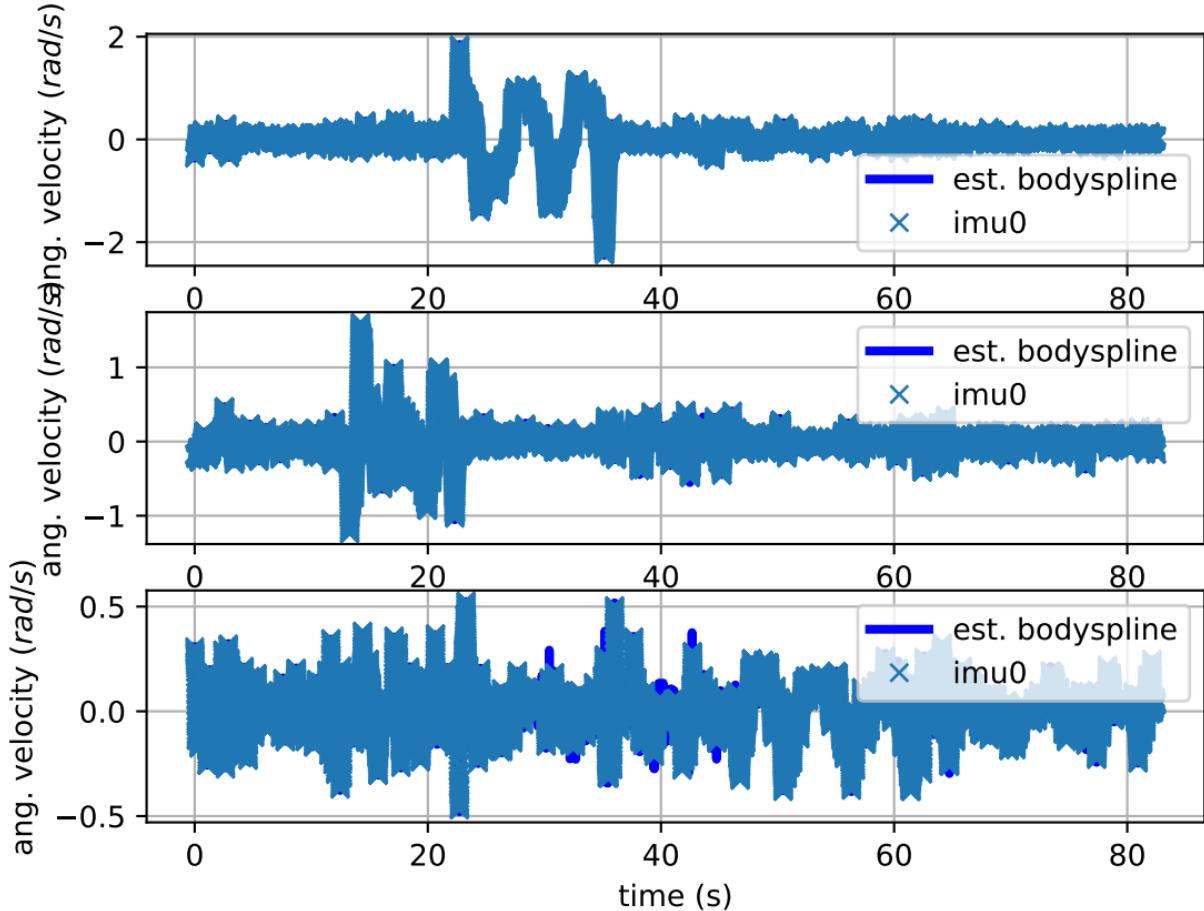
imu0: acceleration error



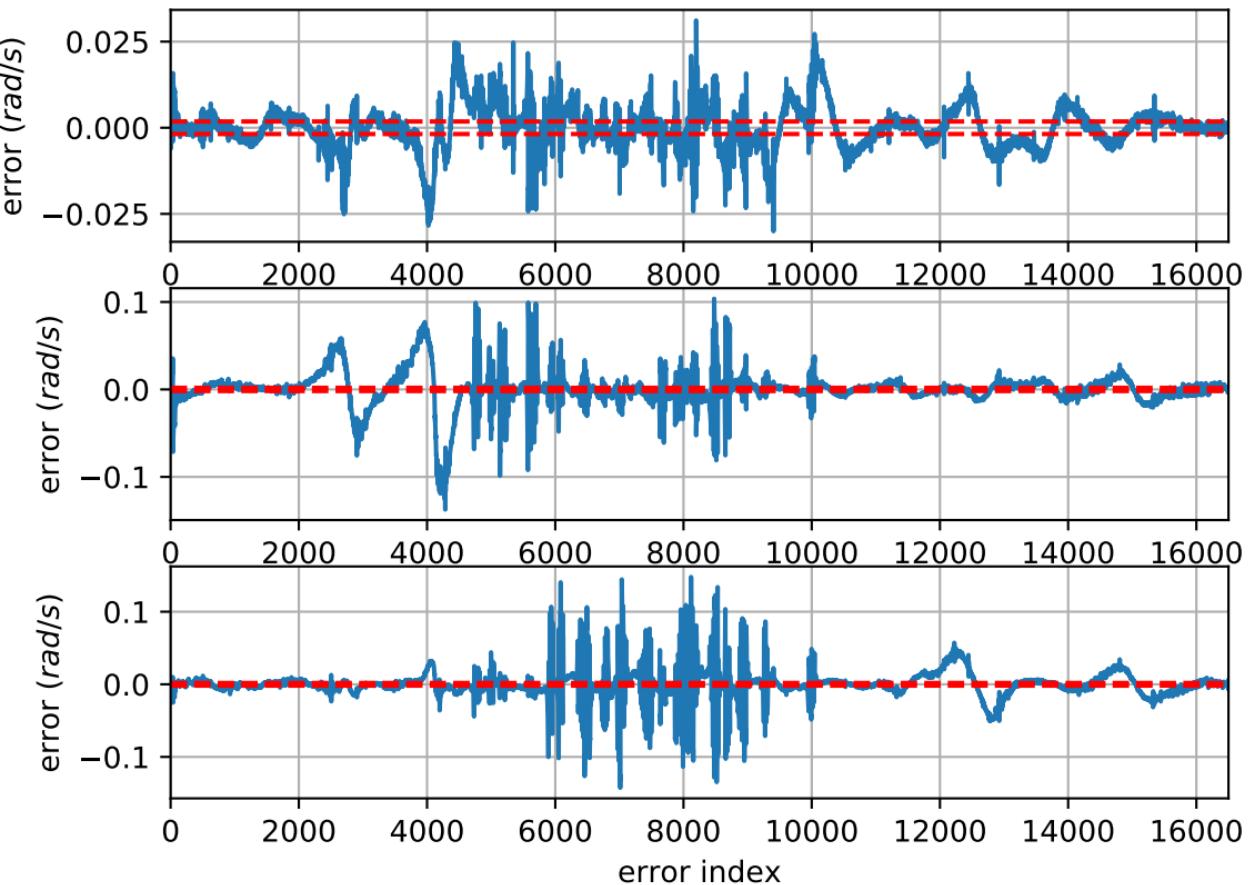
imu0: estimated accelerometer bias (imu frame)



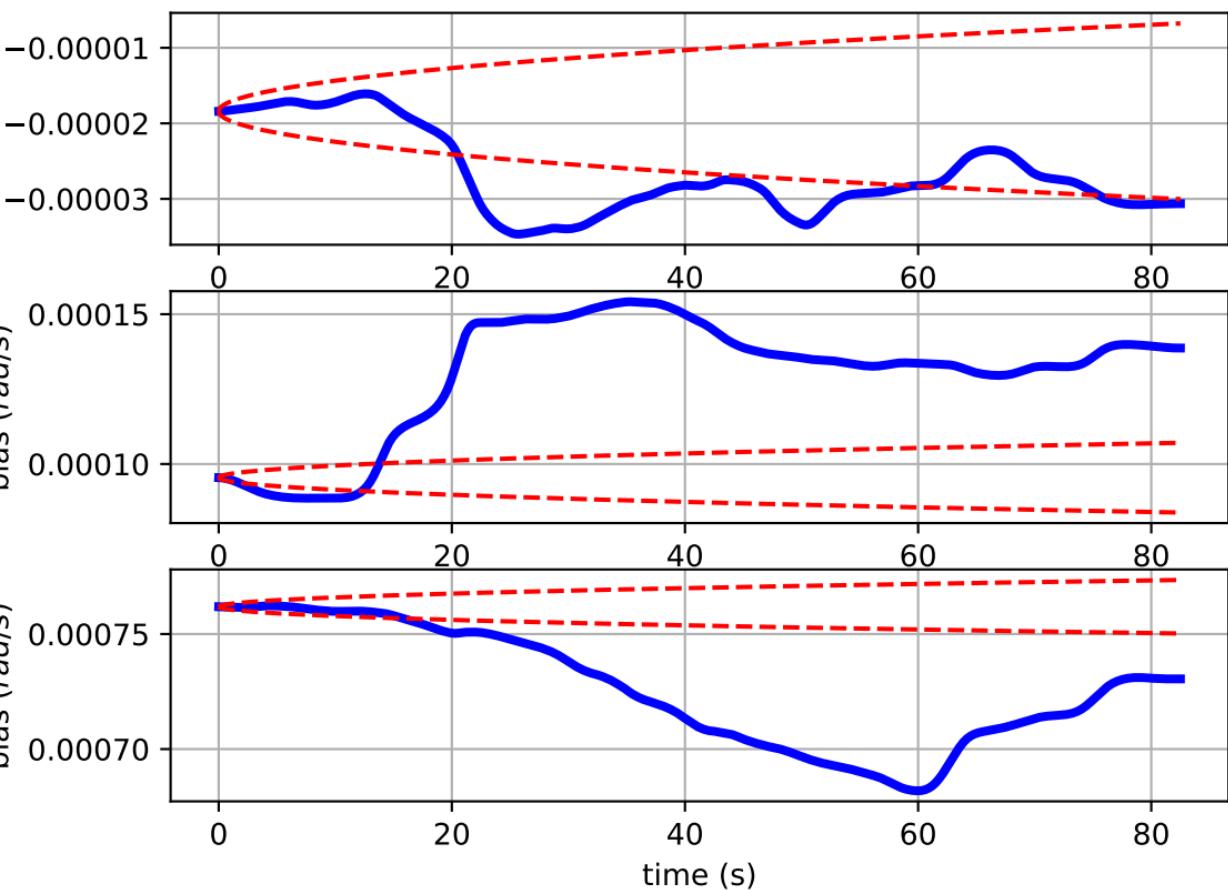
Comparison of predicted and measured angular velocities (body frame)



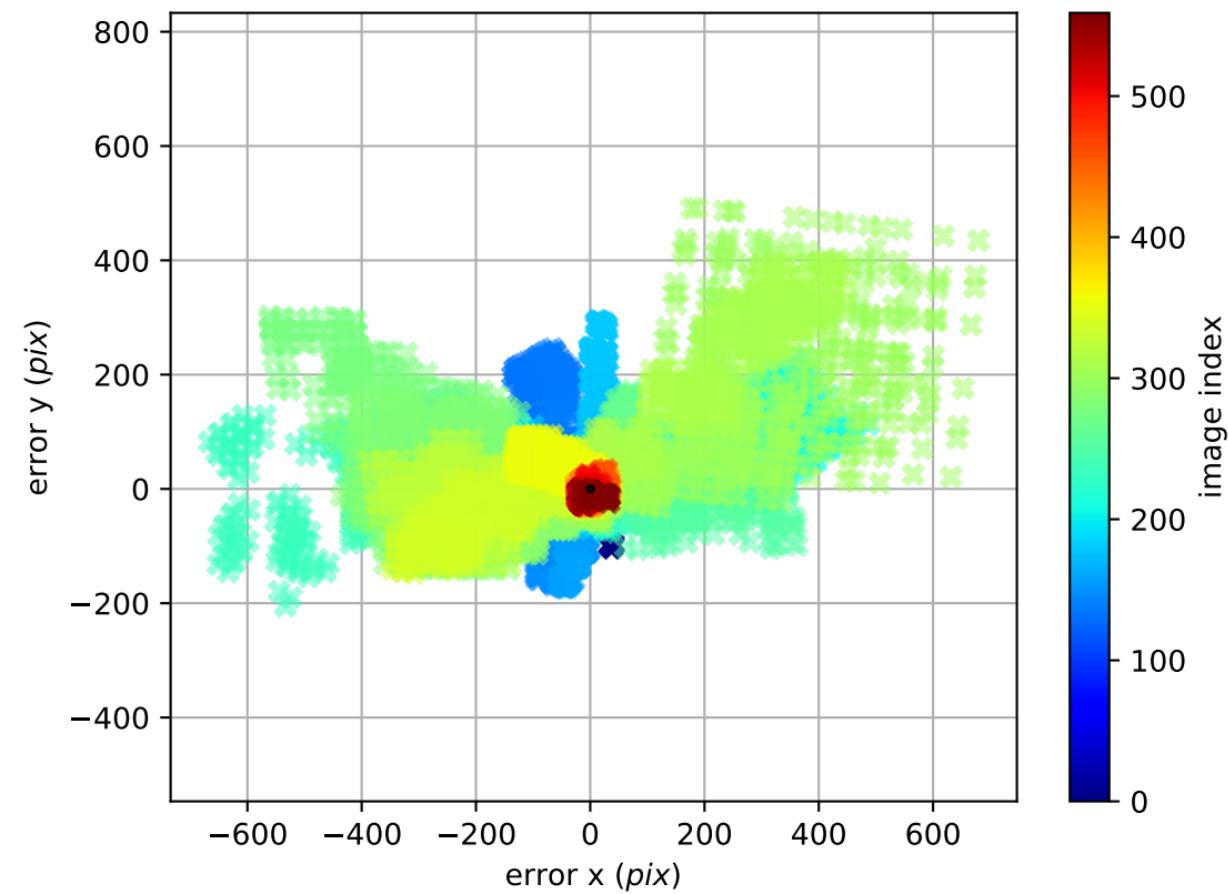
imu0: angular velocities error



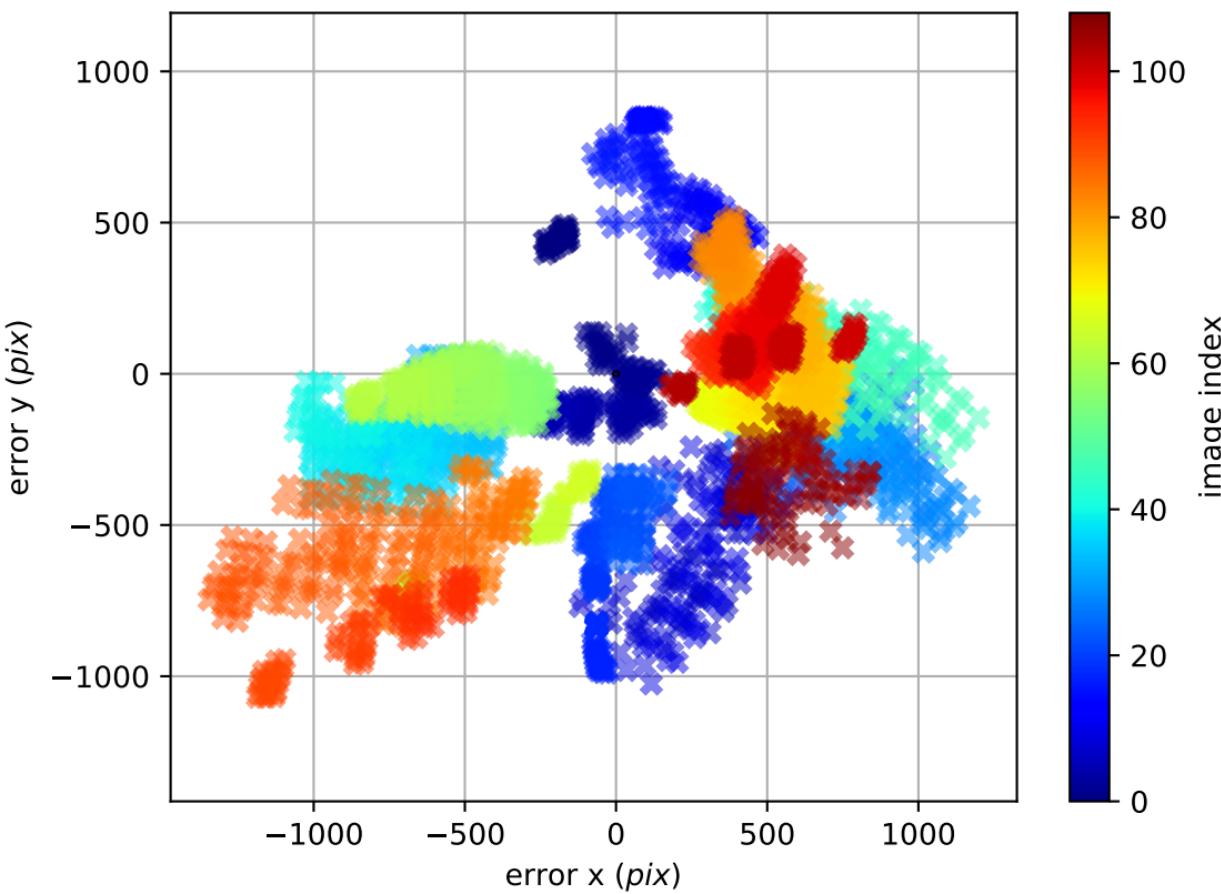
imu0: estimated gyro bias (imu frame)



cam0: reprojection errors



cam1: reprojection errors



cam2: reprojection errors

