

Calibration results

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Normalized Residuals

Reprojection error (cam0): mean 1.46973529963, median 1.31206689962, std: 0.956749242716

Gyroscope error (imu0): mean 3.1463273833, median 2.54110229934, std: 2.45034979935

Accelerometer error (imu0): mean 57.302855709, median 37.9096776163, std: 60.0080295005

Residuals

Reprojection error (cam0) [px]: mean 0.4940927871, median 0.441088127543, std: 0.321638120829

Gyroscope error (imu0) [rad/s]: mean 0.00452988497695, median 0.00365851983228, std: 0.00352786007053

Accelerometer error (imu0) [m/s^2]: mean 0.722743991695, median 0.47814356519, std: 0.756863549615

Transformation (cam0):

T_ci: (imu0 to cam0):

[[-0.00183986 -0.99998337 -0.00546621 -0.01176003]
[-0.99999394 0.00185598 -0.00294597 -0.01426107]
[0.00295607 0.00546076 -0.99998072 -0.00745392]
[0. 0. 0. 1.]]

T_ic: (cam0 to imu0):

[[-0.00183986 -0.99999394 0.00295607 -0.01426059]
[-0.99998337 0.00185598 0.00546076 -0.01169266]
[-0.00546621 -0.00294597 -0.99998072 -0.00756007]
[0. 0. 0. 1.]]

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

0.004881379722635481

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

[0.03271231 -9.78760604 -0.06317677]

Calibration configuration

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cam0

Camera model: pinhole
Focal length: [506.6641065964529, 506.58797086561026]
Principal point: [318.276777941914, 239.78473942934076]
Distortion model: radtan
Distortion coefficients: [0.03372367567425876, -0.057104149775425765, -2.5322798789003986e-05, 6.47471228357412e-05]
Type: aprilgrid
Tags:
Rows: 17
Cols: 23
Size: 0.025 [m]
Spacing 0.0075 [m]

IMU configuration

IMU0:

Model: scale-misalignment
Update rate: 208
Accelerometer:
Noise density: 0.000874533714449
Noise density (discrete): 0.0126127045983
Random walk: 0.000918493077118
Gyroscope:
Noise density: 9.98278222305e-05
Noise density (discrete): 0.00143973732708
Random walk: 0.000107933338285

$T_{i,b}$
[[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]

Gyroscope:

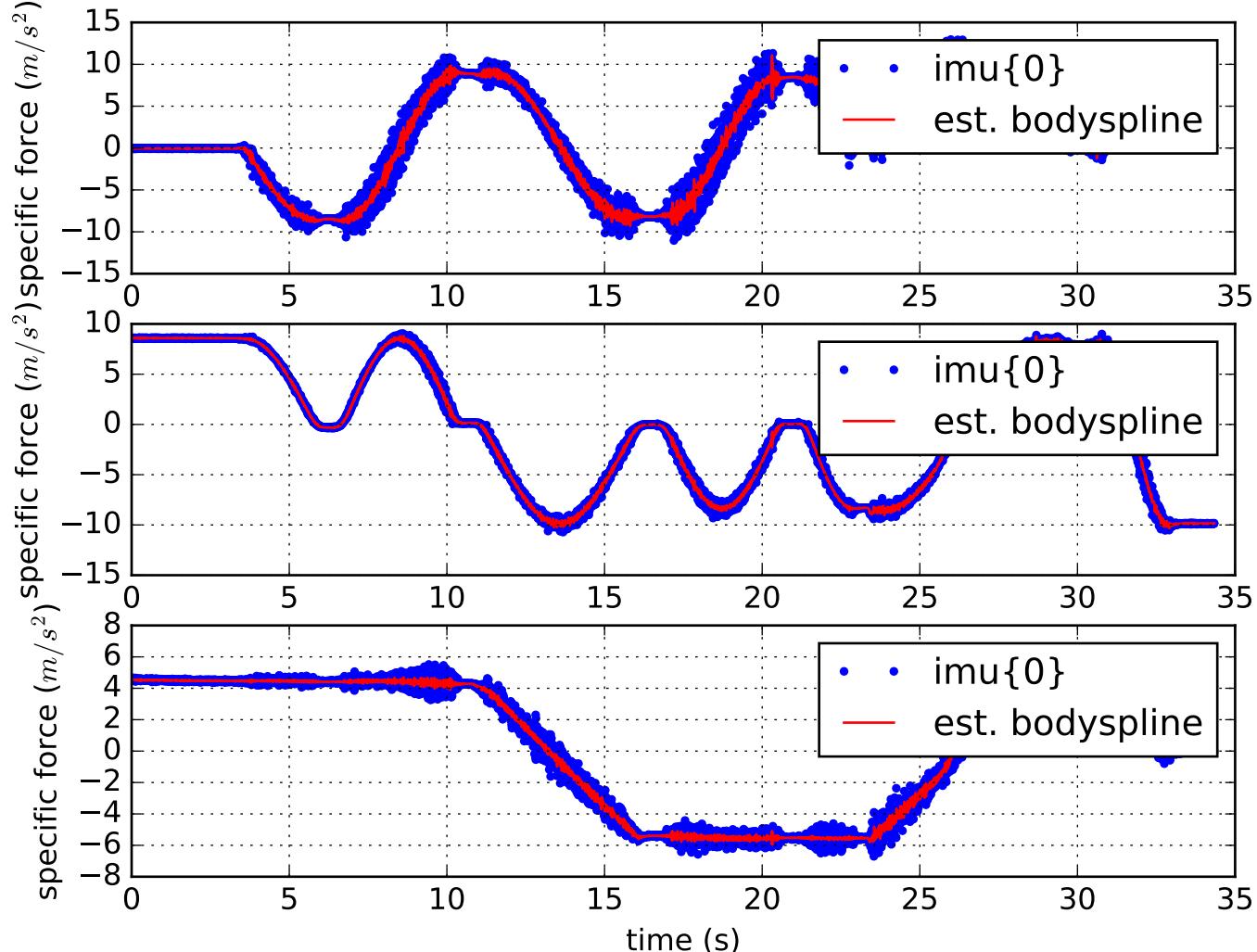
M:
[[0.99356252 0. 0.]
[0.00407253 1.01530704 0.]]

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[ 0.01216403 -0.01439952  1.01150889]]  
A [(rad/s)/(m/s^2)]:  
[[-0.00005383  0.00004687 -0.00001381]  
 [ 0.00002978  0.00004528  0.00002535]  
 [ 0.00001519  0.00004494 -0.0000035 ]]  
C_gyro_i:  
[[ 0.99991303  0.01156415  0.00634089]  
 [-0.01151665  0.99990573 -0.00747654]  
 [-0.00642675  0.00740287  0.99995195]]
```

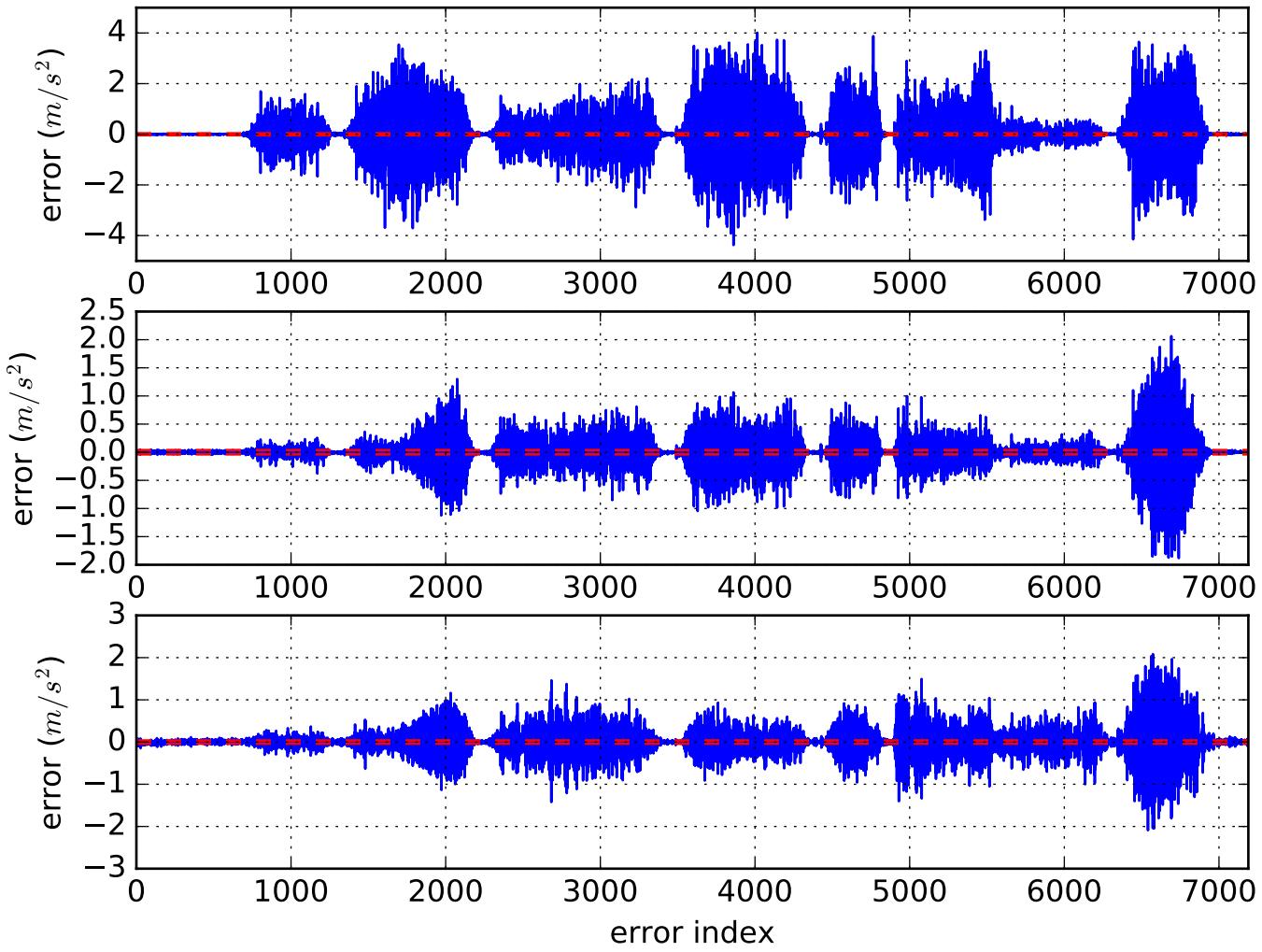
Accelerometer:

```
M:  
[[ 1.00332588  0.          0.          ]  
 [-0.00107203  1.00404513  0.          ]  
 [-0.00227313 -0.00224686  1.00859023]]
```

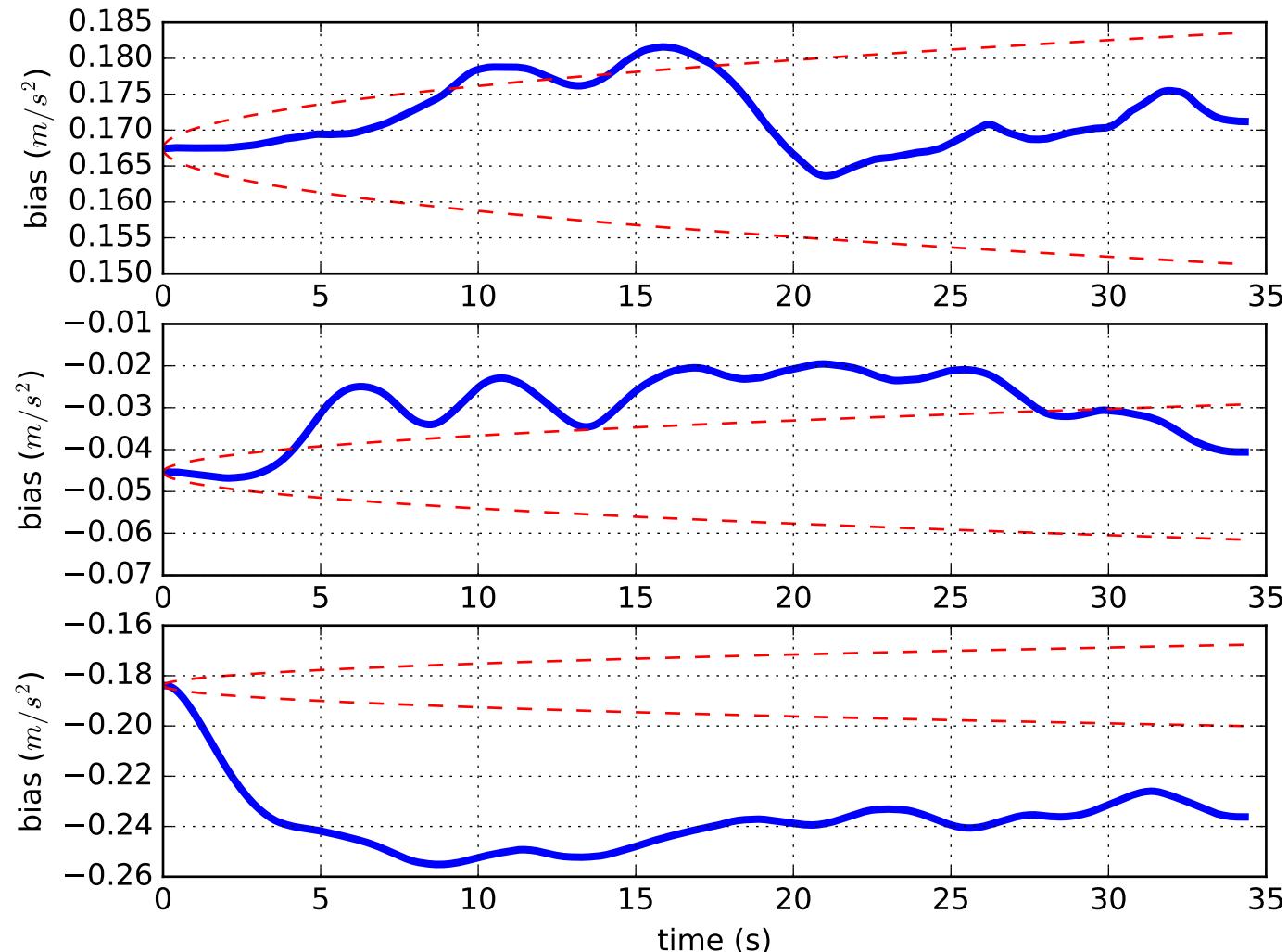
Comparison of predicted and measured specific force (imu0 frame)



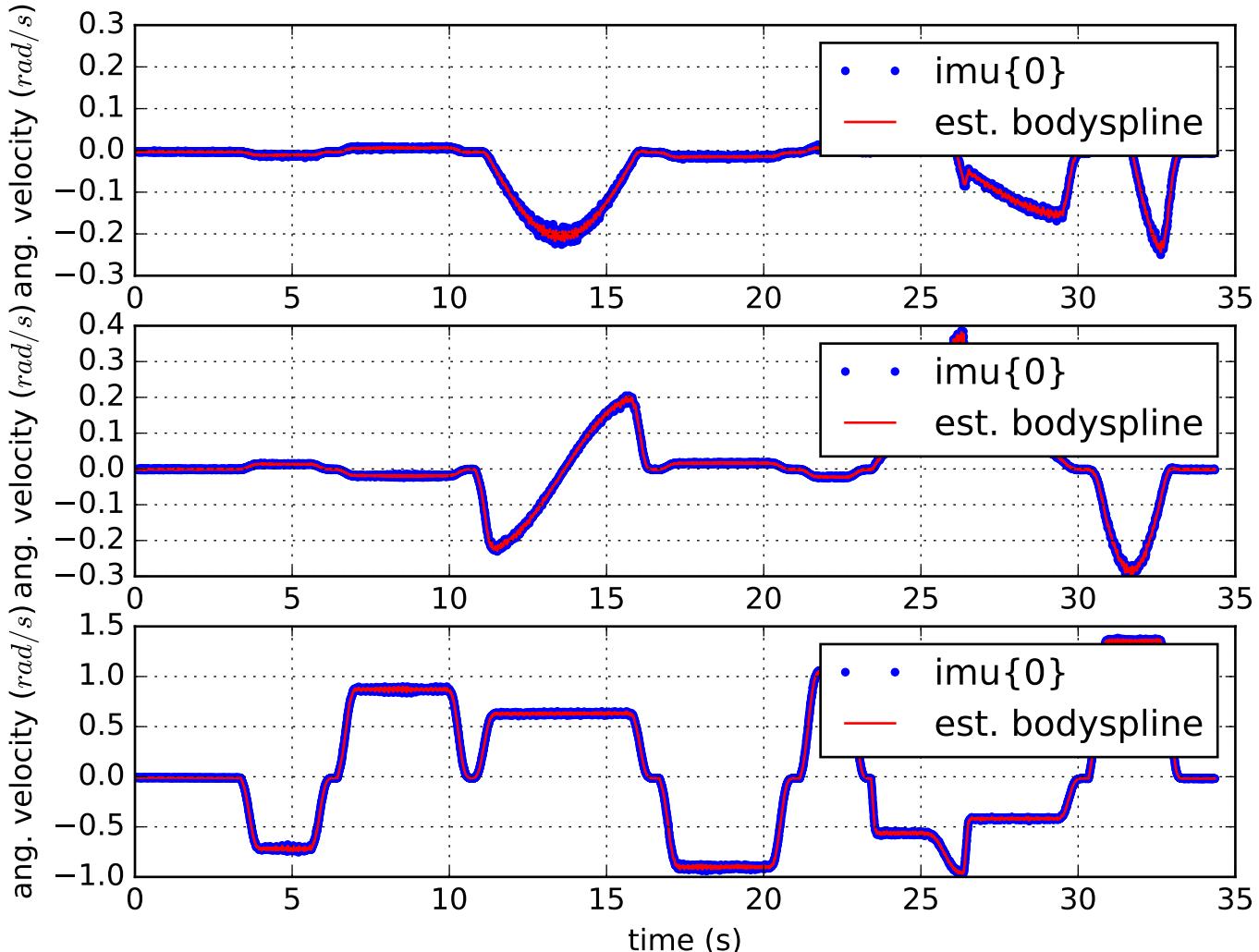
imu0: acceleration error



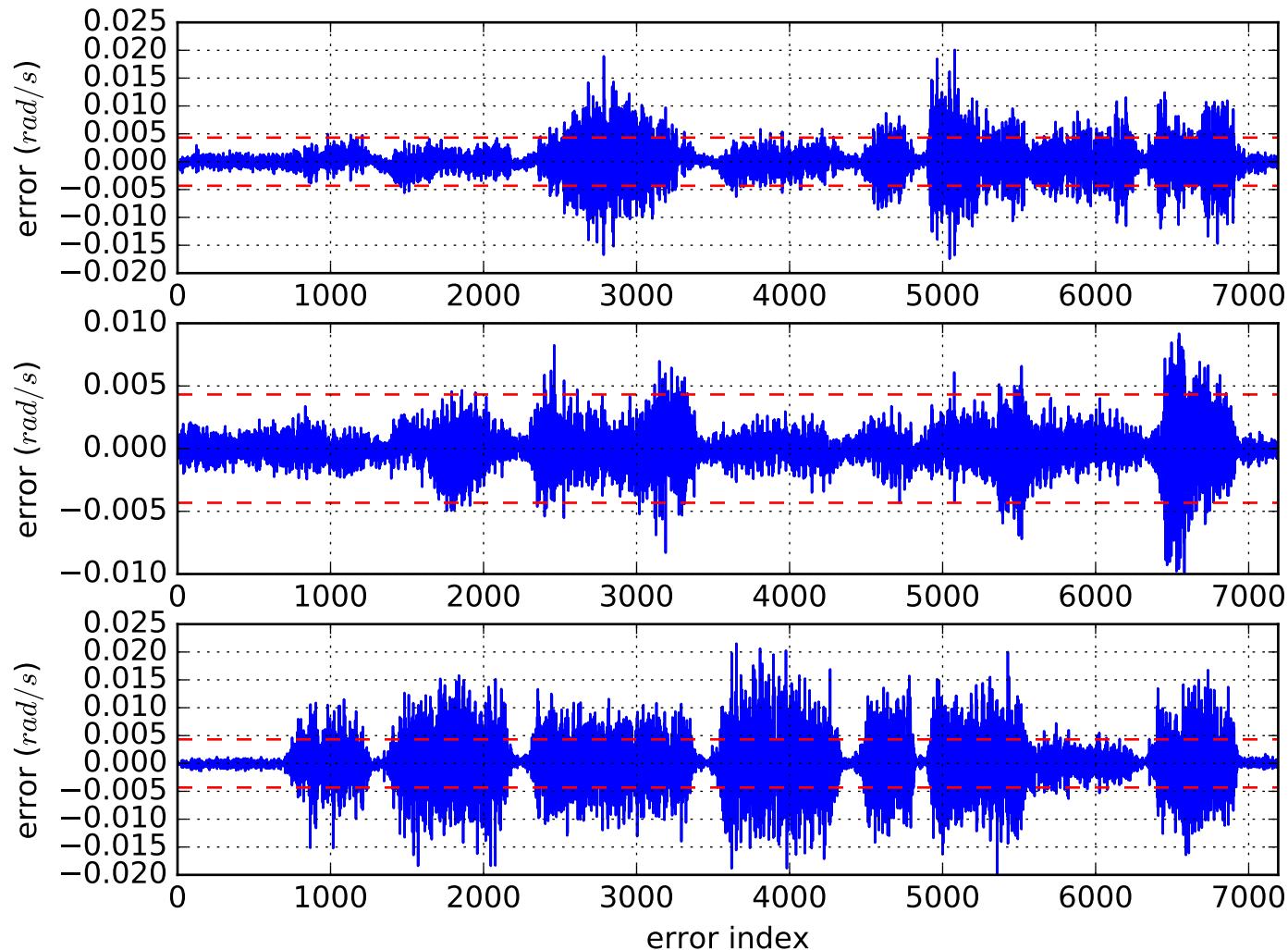
imu0: estimated accelerometer bias (imu frame)



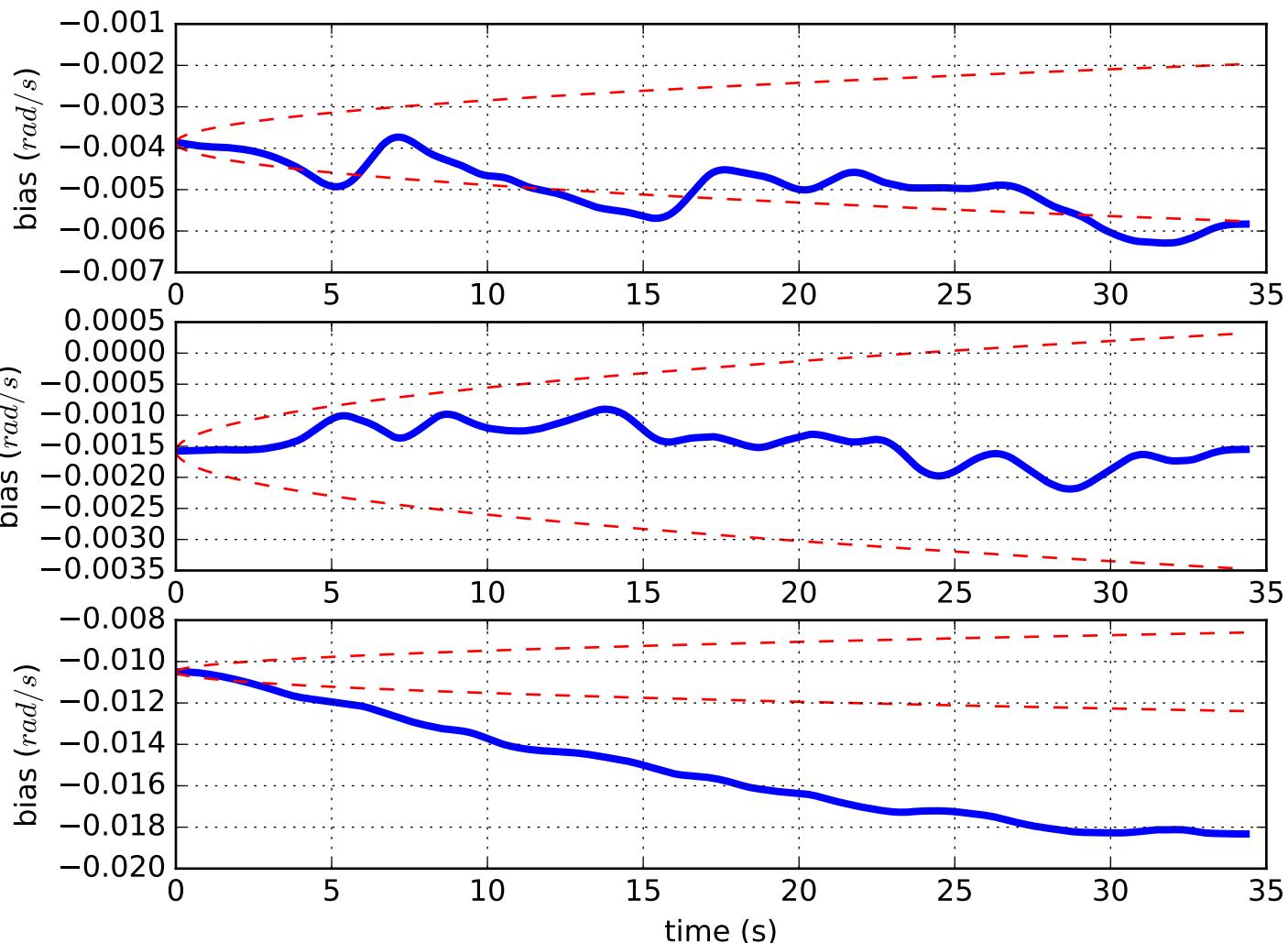
Comparison of predicted and measured angular velocities (body frame)



imu0: angular velocities error



imu0: estimated gyro bias (imu frame)



cam0: reprojection errors

