

## Calibration results

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### Normalized Residuals

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Reprojection error (cam0): mean 1.25092499662, median 1.08839629497, std: 0.850419115889  
Gyroscope error (imu0): mean 64.9848992691, median 45.8271822112, std: 62.8292263354  
Accelerometer error (imu0): mean 0.991050203492, median 0.823059396661, std: 0.697544903804

### Residuals

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Reprojection error (cam0) [px]: mean 1.25092499662, median 1.08839629497, std: 0.850419115889  
Gyroscope error (imu0) [rad/s]: mean 0.0551415155375, median 0.0388856535651, std: 0.0533123663981  
Accelerometer error (imu0) [m/s^2]: mean 0.192013259512, median 0.159465501311, std: 0.135147412475

### Transformation (cam0):

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T\_ci: (imu0 to cam0):

```
[[ 0.99998822  0.00483851 -0.00039609 -0.06229347]
 [-0.00484429  0.99985742 -0.01617637  0.00073187]
 [ 0.00031776  0.0161781  0.99986908 -0.05993304]
 [ 0.         0.         0.         1.        ]]
```

T\_ic: (cam0 to imu0):

```
[[ 0.99998822 -0.00484429  0.00031776  0.06231532]
 [ 0.00483851  0.99985742  0.0161781  0.00053924]
 [-0.00039609 -0.01617637  0.99986908  0.05991235]
 [ 0.         0.         0.         1.        ]]
```

timeshift cam0 to imu0: [s] ( $t_{imu} = t_{cam} + \text{shift}$ )  
0.475340042466

Gravity vector in target coords: [m/s^2]  
[ 0.03140387 -9.77866977 -0.73827785]

## Calibration configuration

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cam0

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Camera model: pinhole  
Focal length: [313.497102, 316.596985]  
Principal point: [159.2211455, 120.558304]  
Distortion model: equidistant  
Distortion coefficients: [-0.077133, 0.053167, -0.000144, 0.001798]  
Type: aprilgrid  
Tags:  
  Rows: 6  
  Cols: 6  
  Size: 0.088 [m]  
  Spacing 0.0264 [m]

#### IMU configuration

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#### IMU0:

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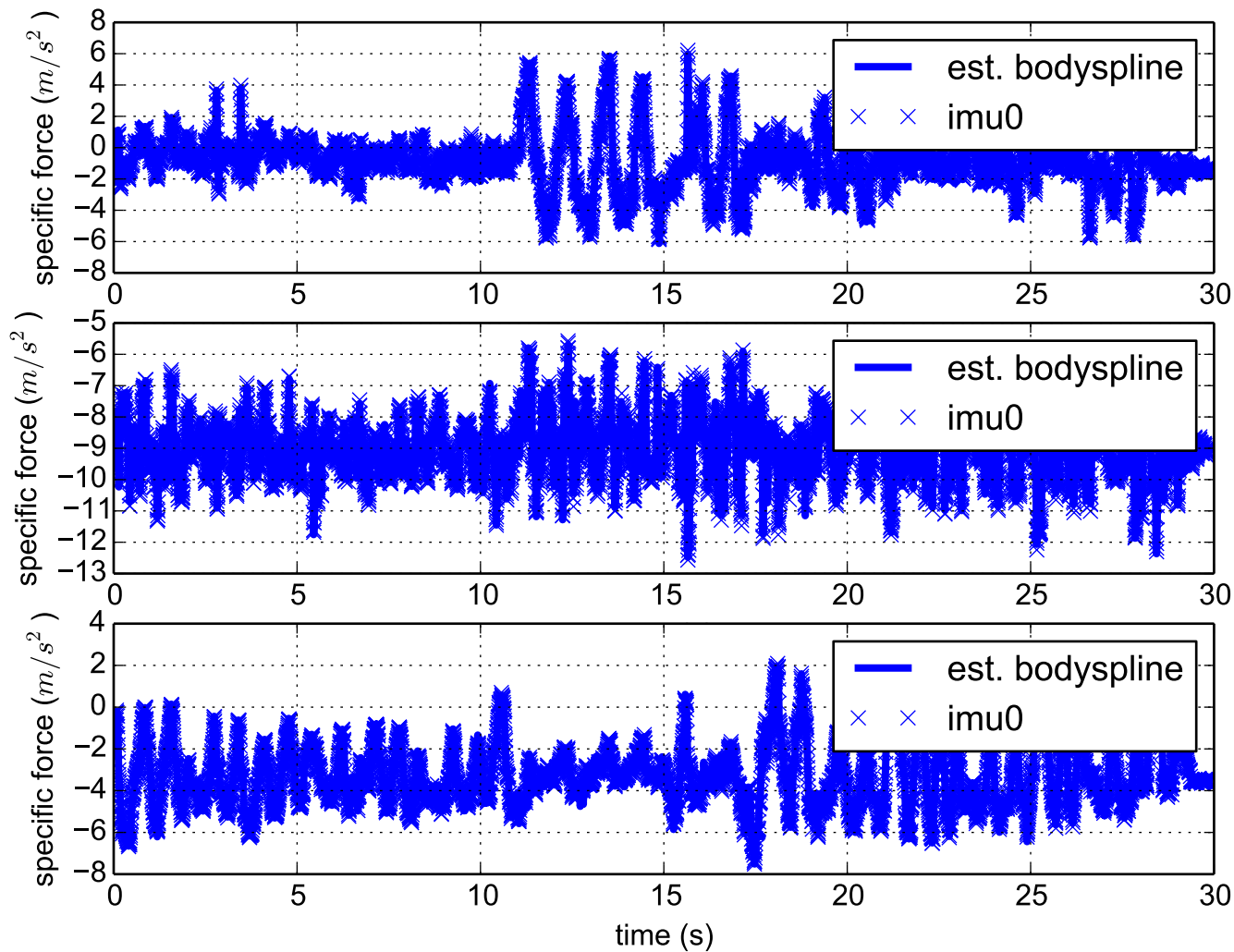
Model: calibrated  
Update rate: 200.0  
Accelerometer:  
  Noise density: 0.0137  
  Noise density (discrete): 0.193747258045  
  Random walk: 0.00039  
Gyroscope:  
  Noise density: 6e-05  
  Noise density (discrete): 0.000848528137424  
  Random walk: 4.8e-05

#### T\_i\_b

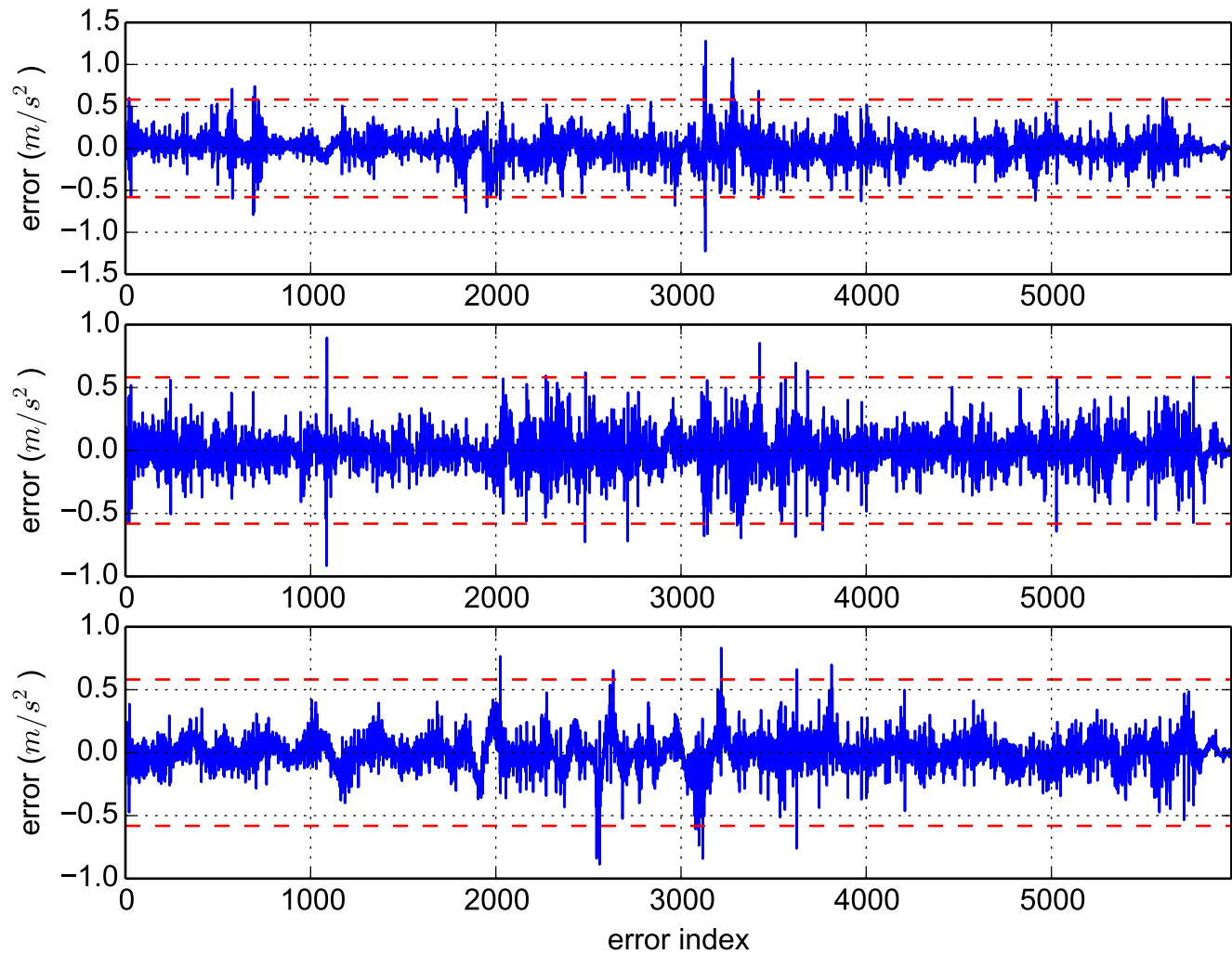
[[ 1. 0. 0. 0.]  
 [ 0. 1. 0. 0.]  
 [ 0. 0. 1. 0.]  
 [ 0. 0. 0. 1.]]

time offset with respect to IMU0: 0.0 [s]

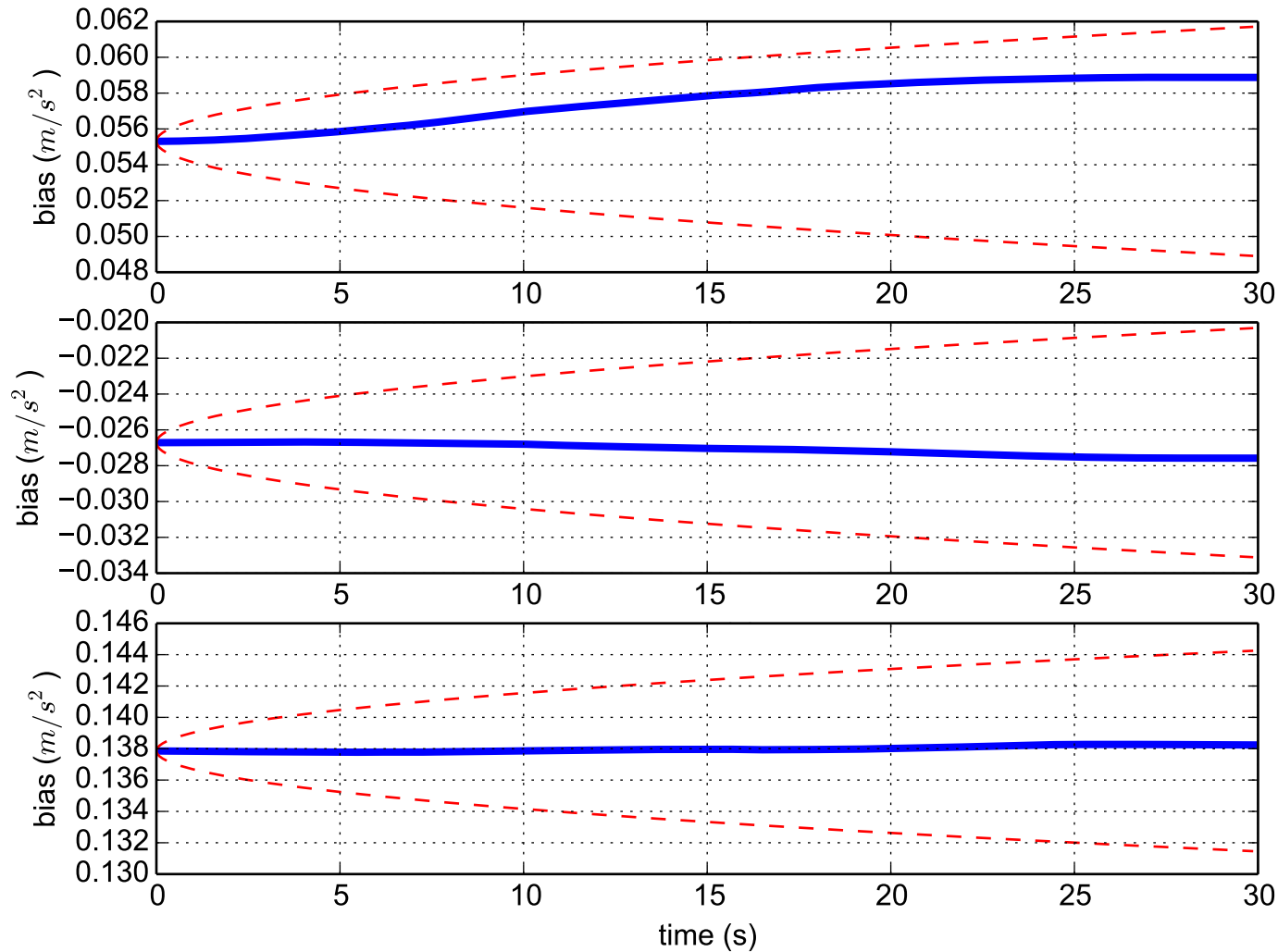
Comparison of predicted and measured specific force (imu0 frame)



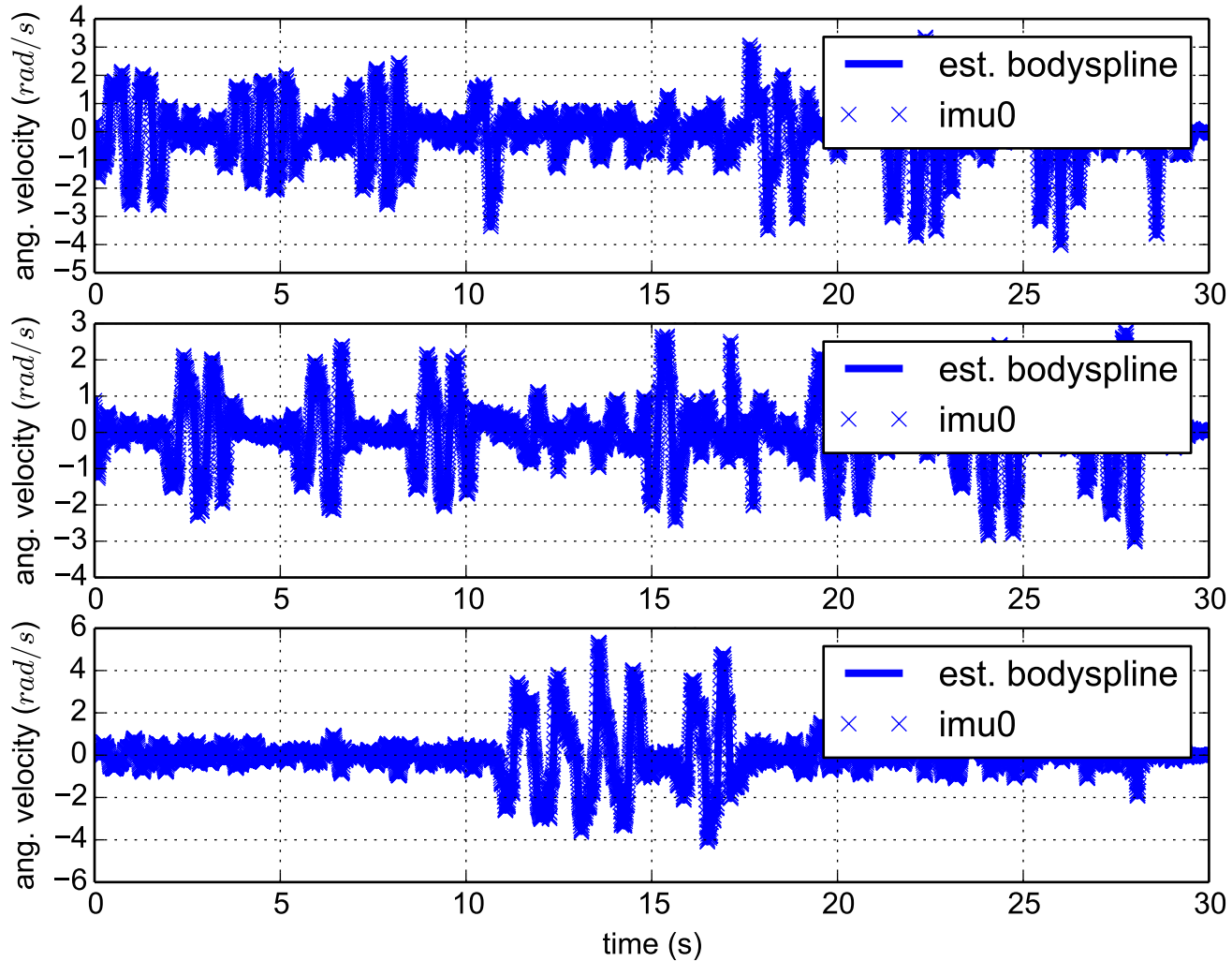
imu0: acceleration error



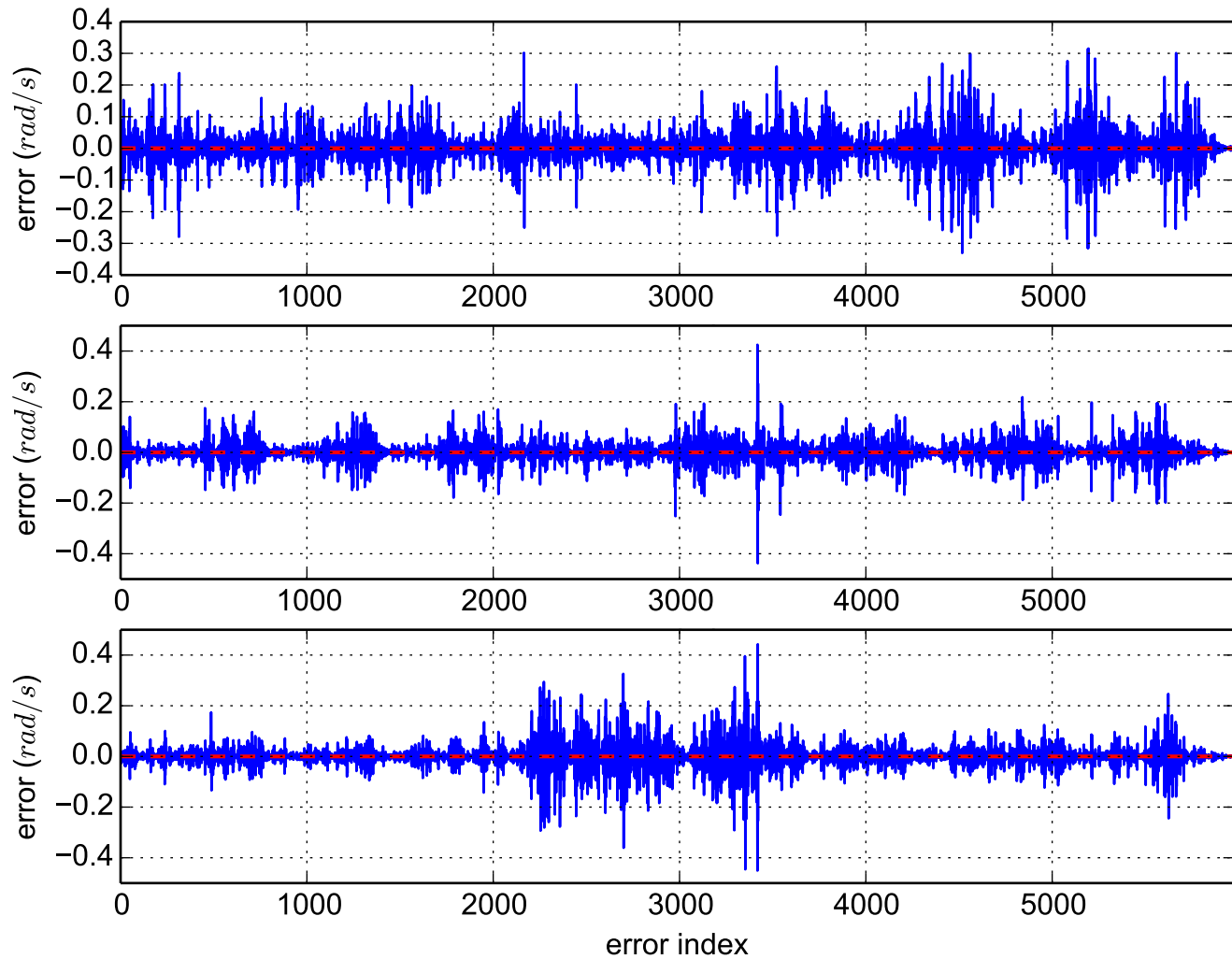
imu0: estimated accelerometer bias (imu frame)



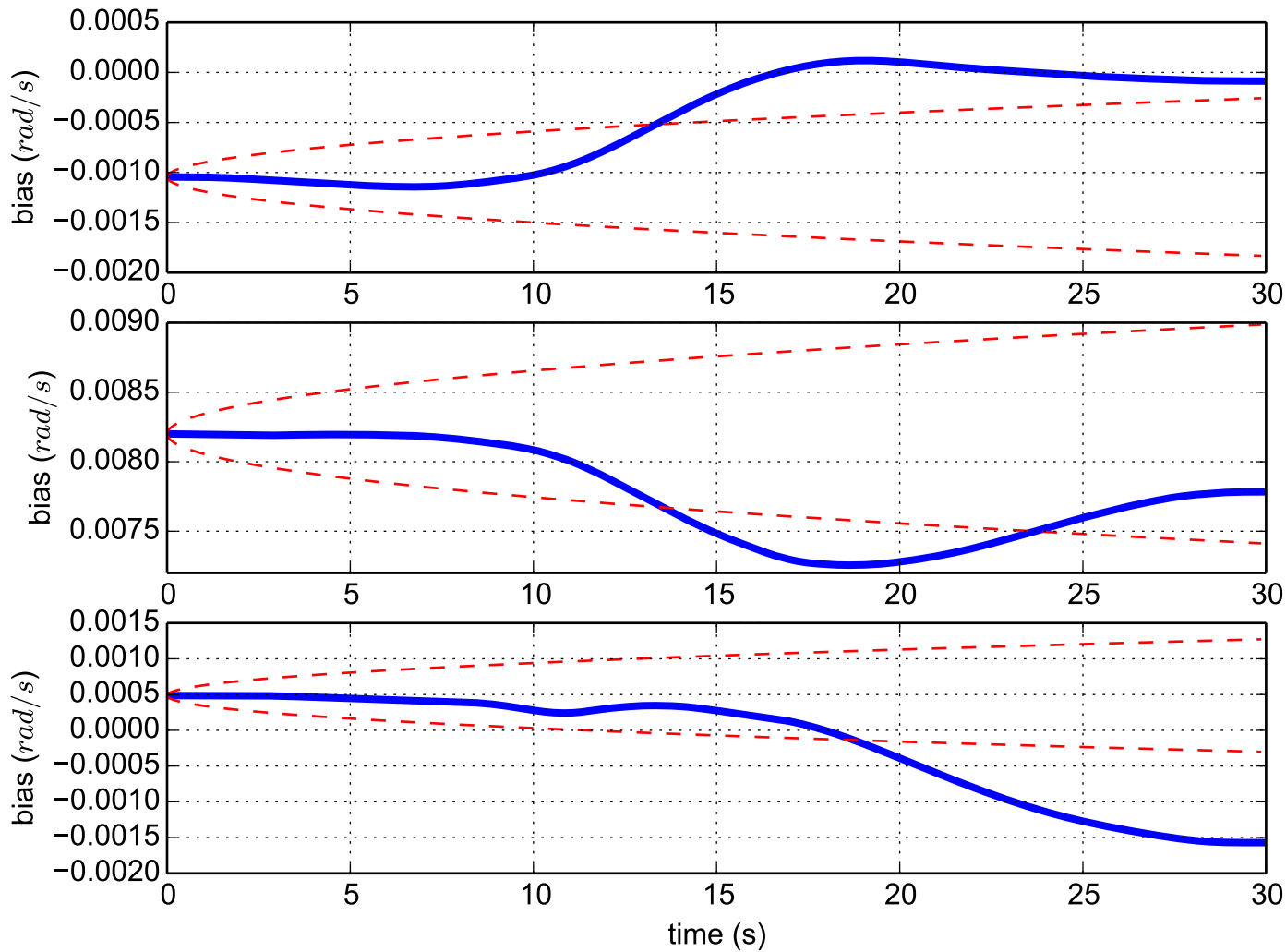
Comparison of predicted and measured angular velocities (body frame)



imu0: angular velocities error



imu0: estimated gyro bias (imu frame)





cam0: reprojection errors

