Calibration results
==========
Normalized Residuals

Reprojection error (cam0):   mean 0.473888653355, median 0.41805213546, std: 0.288053885183
Gyroscope error (imu0):   mean 0.18758841556, median 0.127020900427, std: 0.18782911944
Accelerometer error (imu0):   mean 0.162965708569, median 0.0976175354265, std: 0.150121539256

Residuals

Reprojection error (cam0) [px]:   mean 0.473888653355, median 0.41805213546, std: 0.288053885183
Gyroscope error (imu0) [rad/s]:   mean 0.0547413880776, median 0.0370667899907, std: 0.0548116294328
Accelerometer error (imu0) [m/s^2]: mean 0.0436658260676, median 0.0261561181215, std: 0.0402242967538

Transformation (cam0):

T_ci: (imu0 to cam0):
[[-0.01608282 -0.99958947 -0.02371158 -0.02114708]
 [-0.28770406 0.0273381 -0.9573291   0.03413578]
 [0.95758431 -0.00857464 -0.28802562 -0.17613134]
 [0.   0.   0.   1.   ]]

T_ic: (cam0 to imu0):
[[-0.01608282 -0.28770406 0.95758431 0.17814151]
 [-0.99958947 0.0273381 -0.00857464 -0.02358187]
 [-0.02371158 -0.9573291 -0.28802562 -0.01855259]
 [0.   0.   0.   1.   ]]

timeshift cam0 to imu0: [s] (t_imu = t_cam + shift)
0.0

Gravity vector in target coords: [m/s^2]
[-9.59794668 -0.02168269 -2.01180822]

Calibration configuration
==========

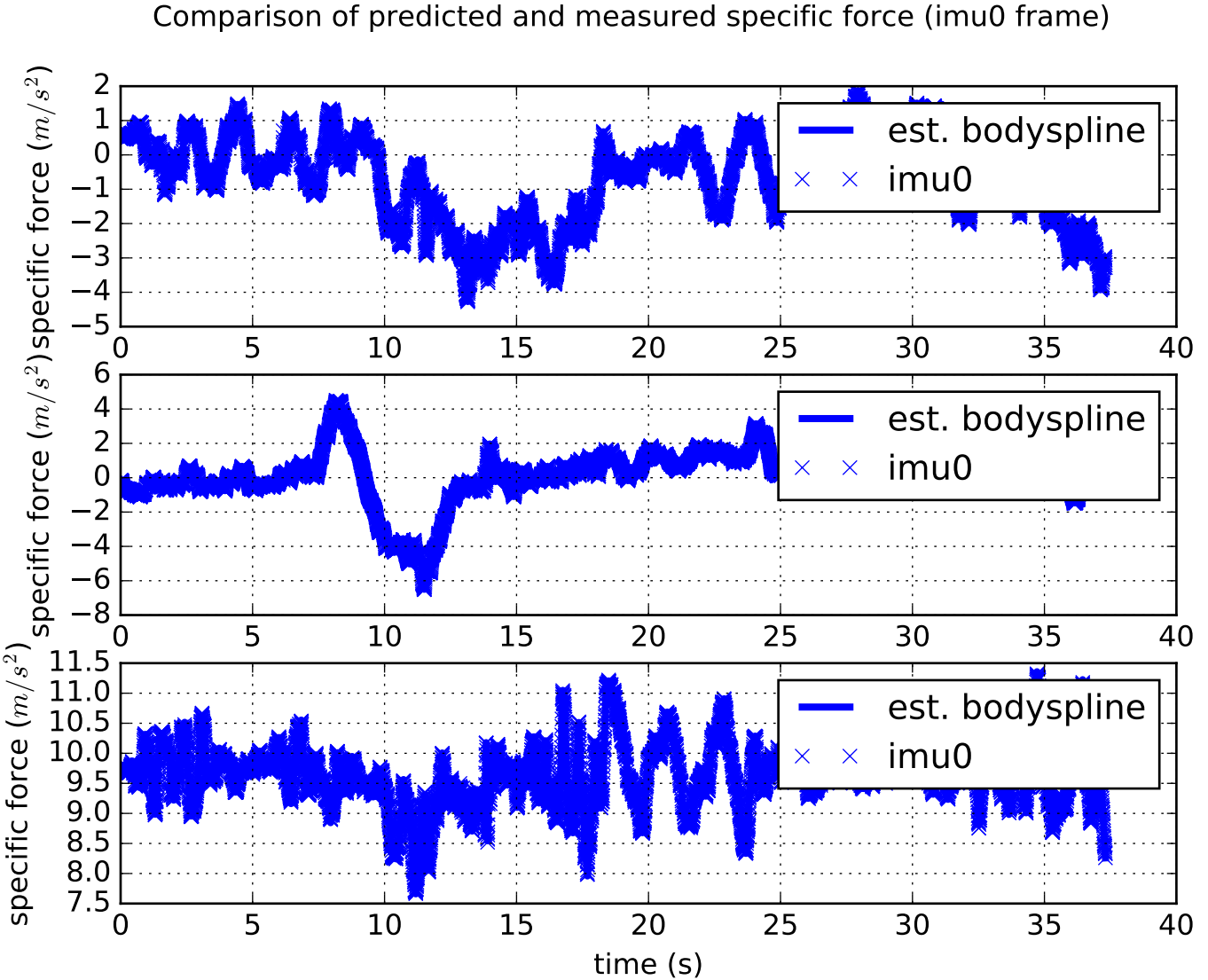
cam0

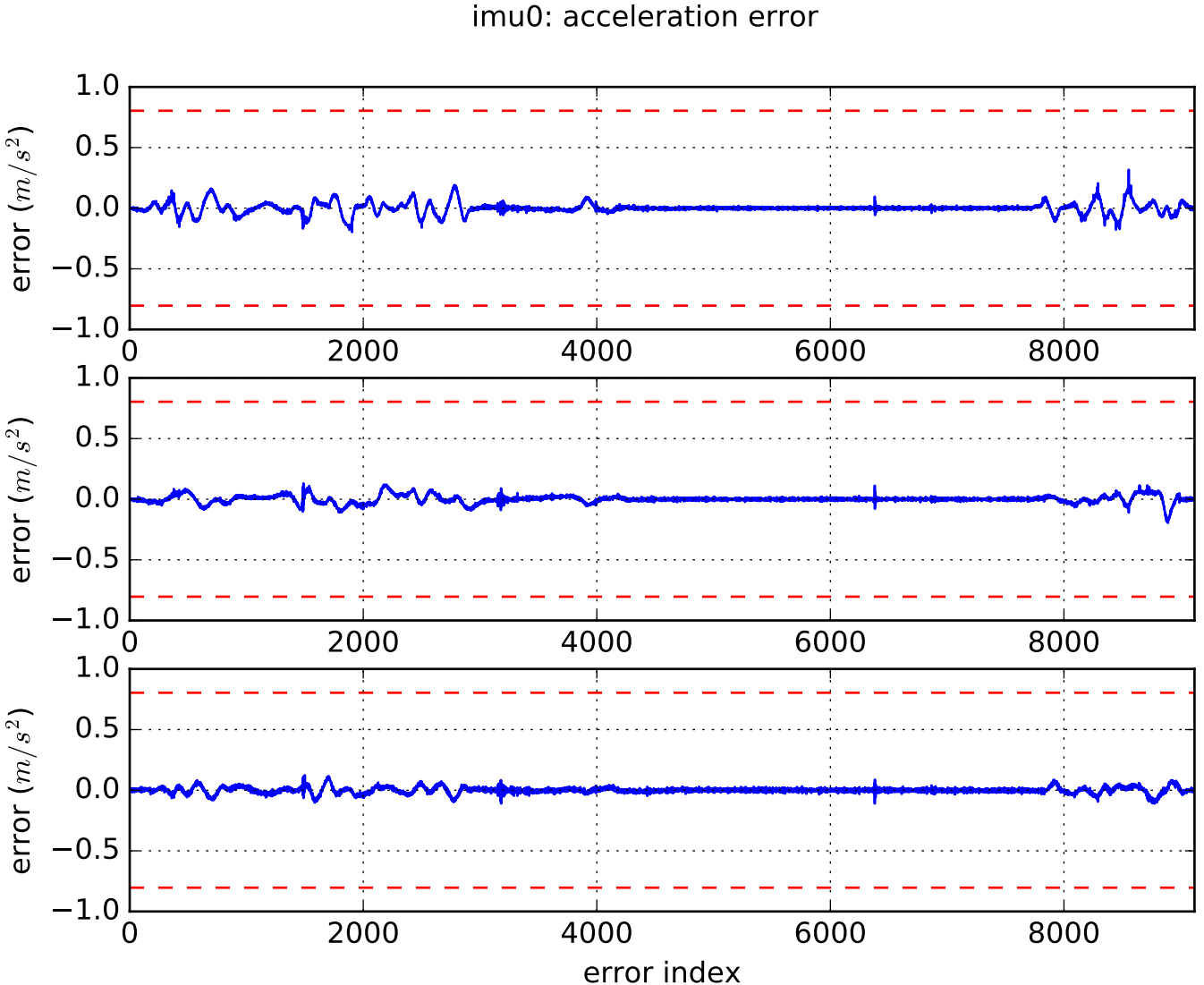
  Camera model: pinhole
  Focal length: [675.478751, 673.912826]
  Principal point: [354.223231, 227.602754]
  Distortion model: radtan
  Distortion coefficients: [-0.051739, 0.08476, -0.004262, 0.0042]
  Type: aprilgrid
  Tags:
    Rows: 6
    Cols: 6
    Size: 0.049 [m]
    Spacing 0.015000000001 [m]

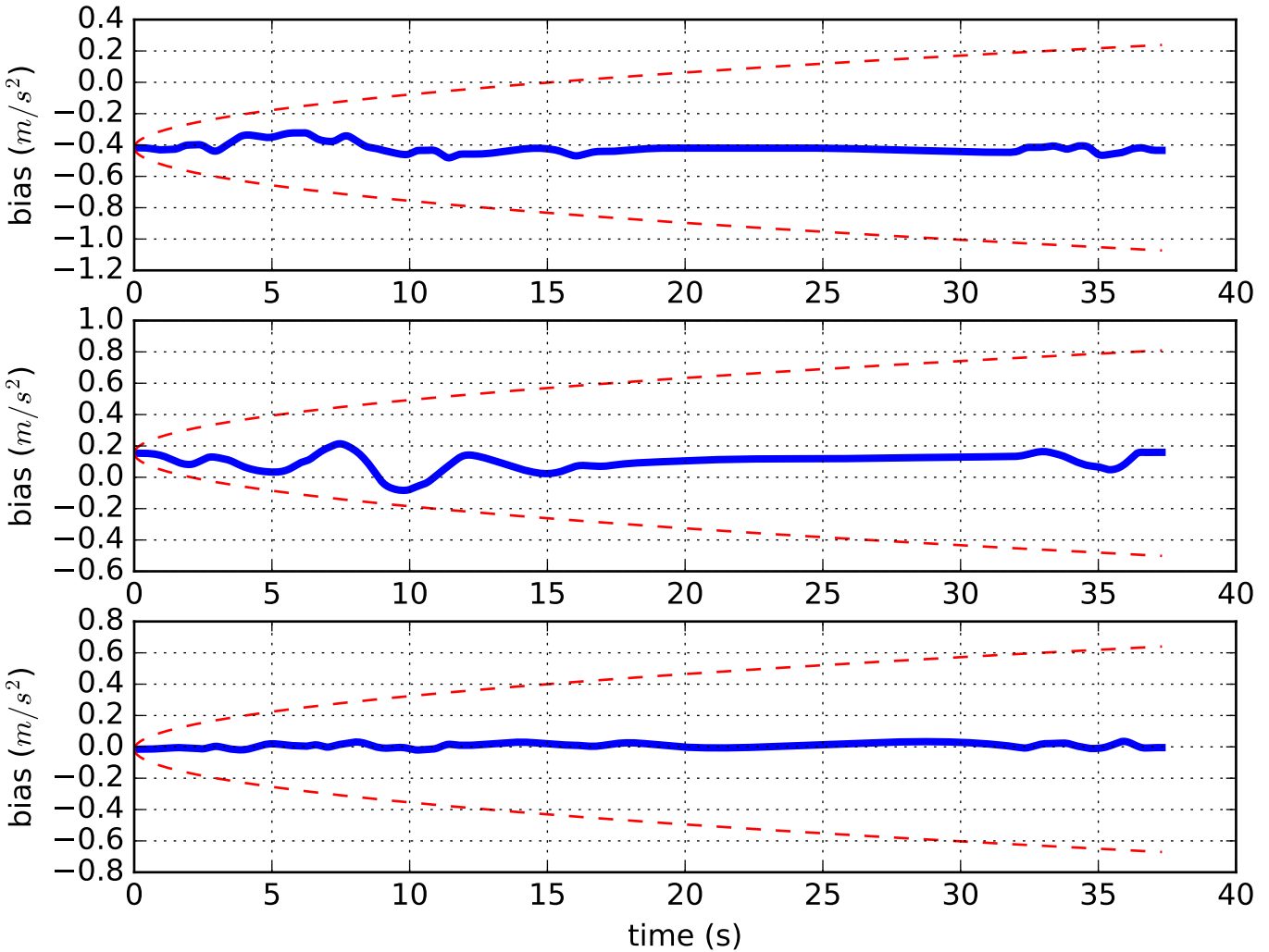
IMU configuration
==========

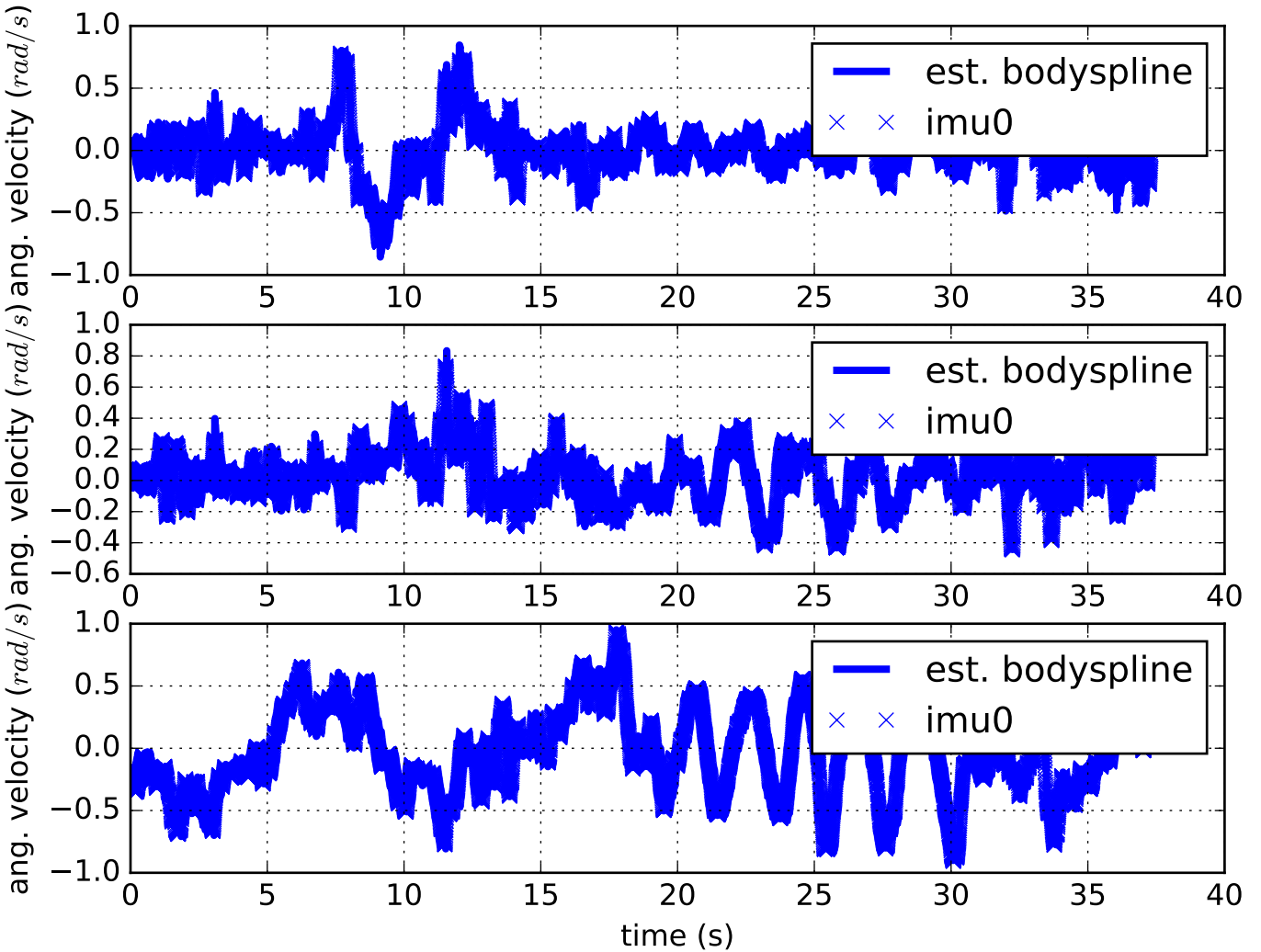
IMU0:

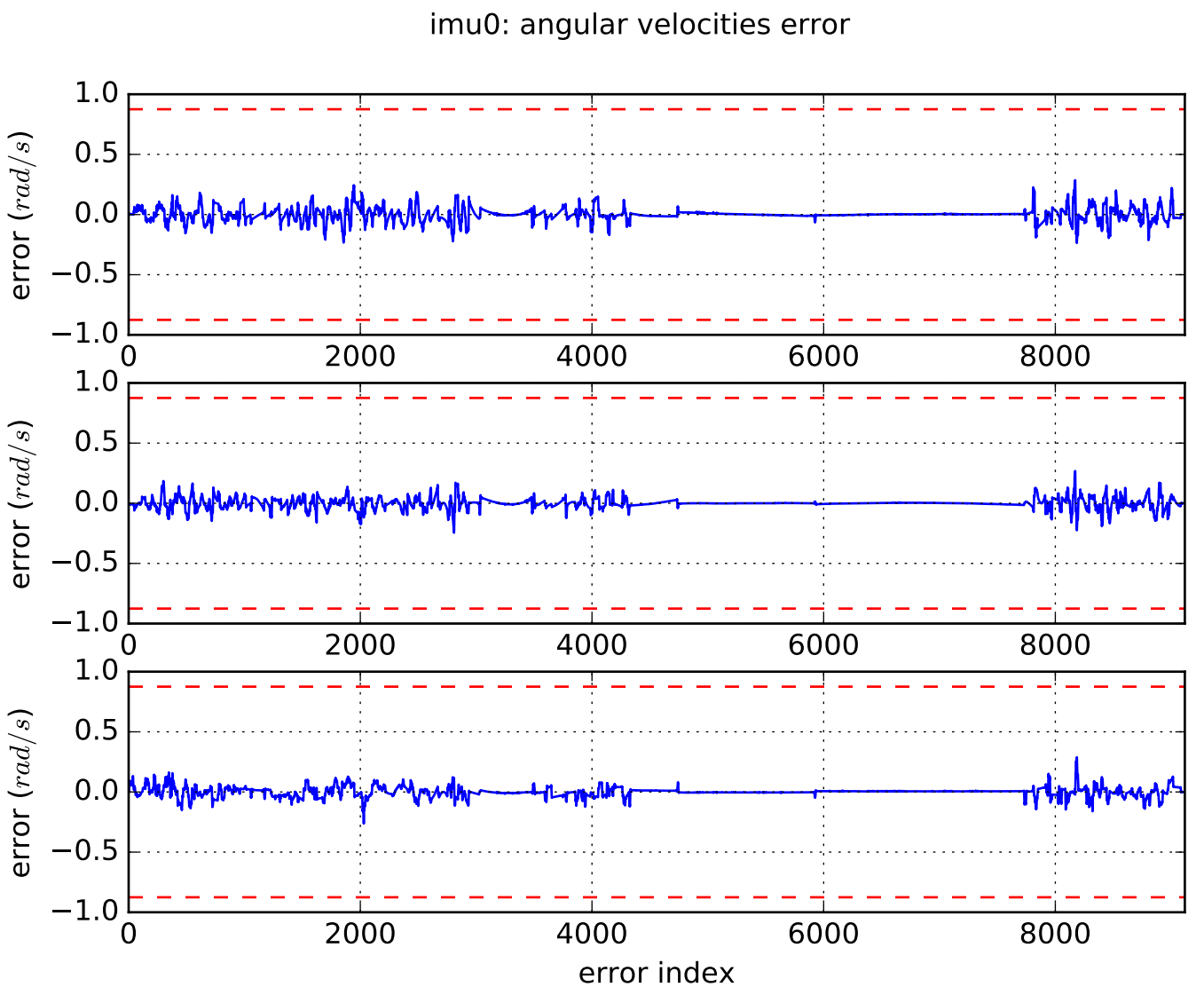
  Model: calibrated
  Update rate: 245.0
  Accelerometer:
    Noise density: 0.01711837
    Noise density (discrete): 0.267944872888
    Random walk: 0.03577208
  Gyroscope:
    Noise density: 0.01864347
    Noise density (discrete): 0.291816463795
    Random walk: 0.00012405
  T_i_b
    [[1. 0. 0. 0.]
     [0. 1. 0. 0.]
     [0. 0. 1. 0.]
     [0. 0. 0. 1.]]
  time offset with respect to IMU0: 0.0 [s]

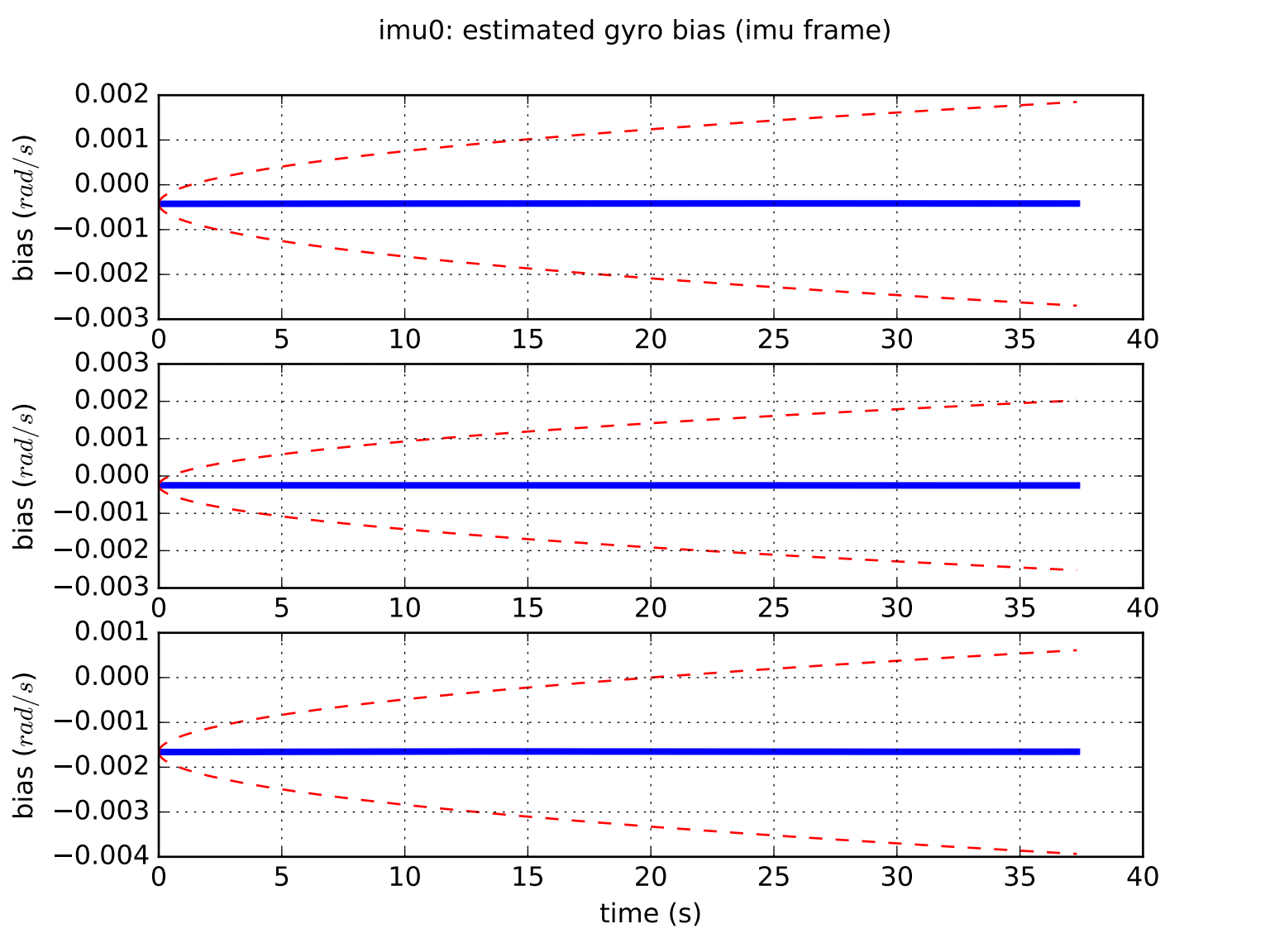

Comparison of predicted and measured specific force (imu0 frame)
specific force (m/s^2)
est. bodyspline
imu0
time (s)

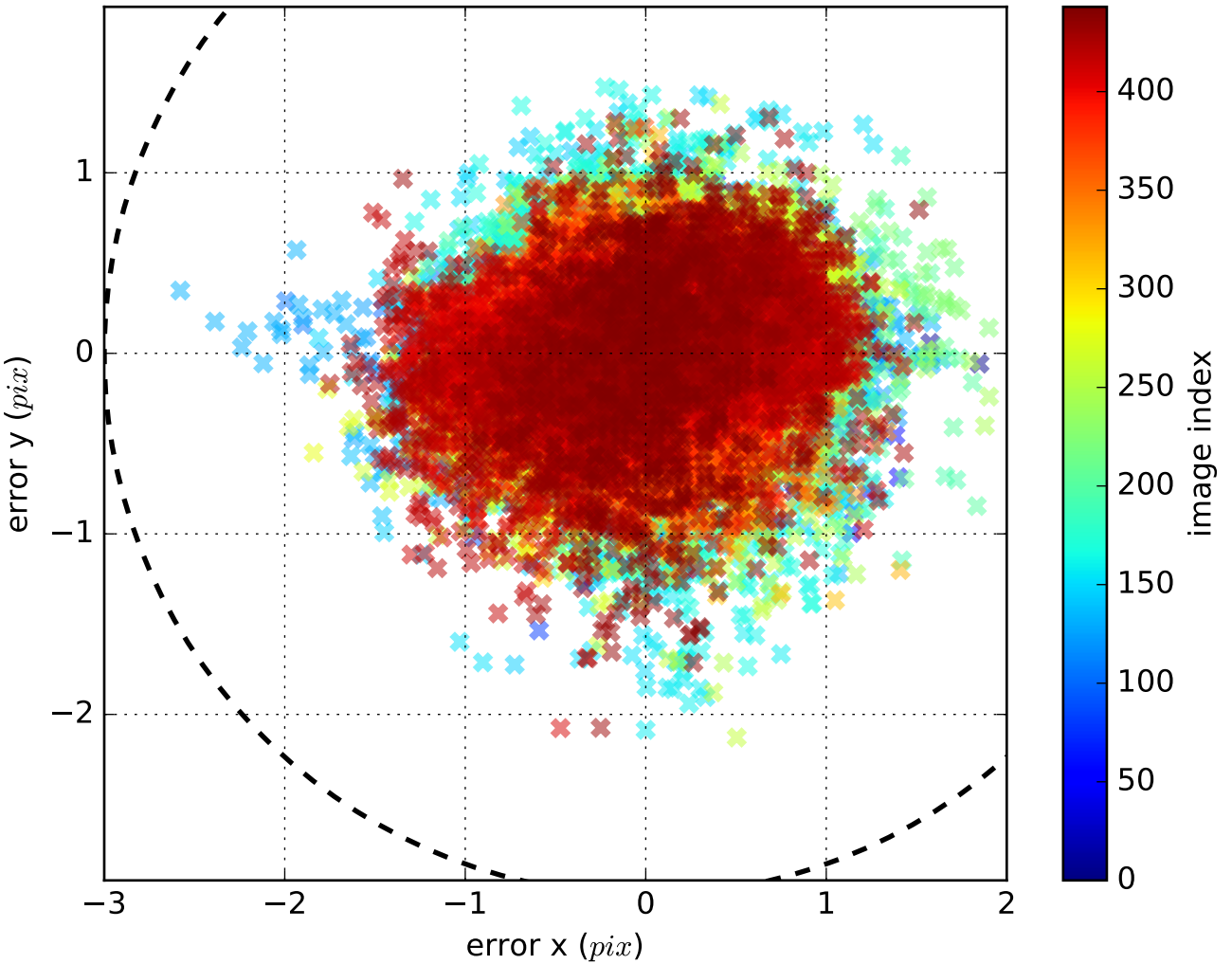

imu0: acceleration error
error (m/s^2)
1.0
0.5
0.0
−0.5
−1.0
0
2000
4000
6000
8000
error index


imu0: estimated accelerometer bias (imu frame)
bias (m/s^2)
bias (m/s^2)
bias (m/s^2)
time (s)


Comparison of predicted and measured angular velocities (body frame)
ang. velocity (rad/s)
ang. velocity (rad/s)
ang. velocity (rad/s)
time (s)
est. bodyspline
imu0
est. bodyspline
imu0
est. bodyspline
imu0


imu0: angular velocities error
error (rad/s)
1.0
0.5
0.0
−0.5
−1.0
0
2000
4000
6000
8000
error index


imu0: estimated gyro bias (imu frame)
bias (rad/s)
0.002
0.001
0.000
−0.001
−0.002
−0.003
0
5
10
15
20
25
30
35
40
bias (rad/s)
0.003
0.002
0.001
0.000
−0.001
−0.002
−0.003
bias (rad/s)
0.001
0.000
−0.001
−0.002
−0.003
−0.004
time (s)


cam0: reprojection errors
error x (pix)
error y (pix)
image index
−3
−2
−1
0
1
2
−2
−1
0
1
0
50
100
150
200
250
300
350
400