IMU evaluation
using arran variance

Overview

- We compared three MEMS IMU and evaluated.

- Each IMU are product of another company.

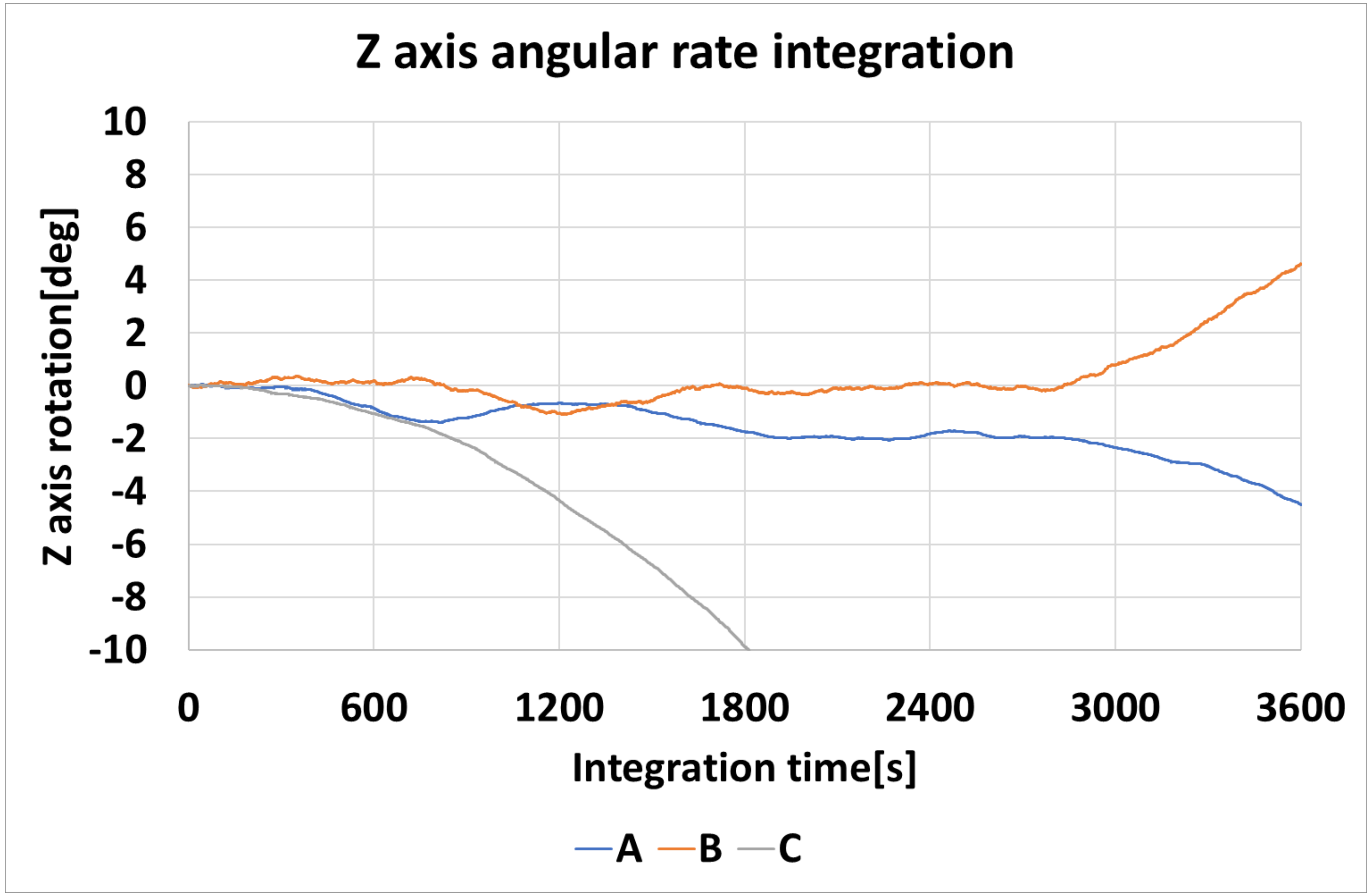
IMU A and B are medium price IMU.

IMU C is very cheap IMU.

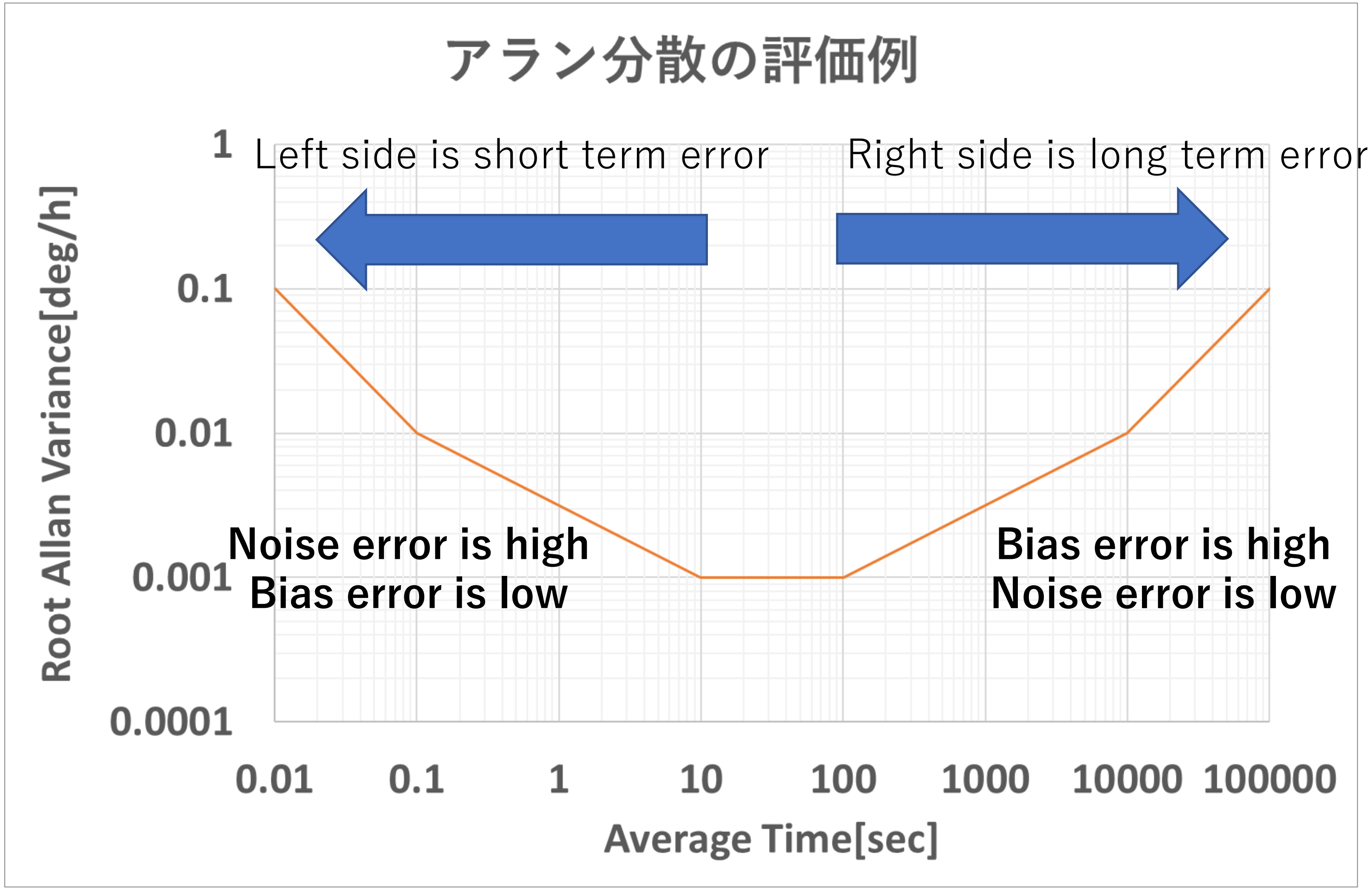
- Each IMU was installed on the lab’s desk and 2 hours data was acquired.

- We calculated **allan variance** from these data and evaluated the IMU performance.

Z axis angular rate integration



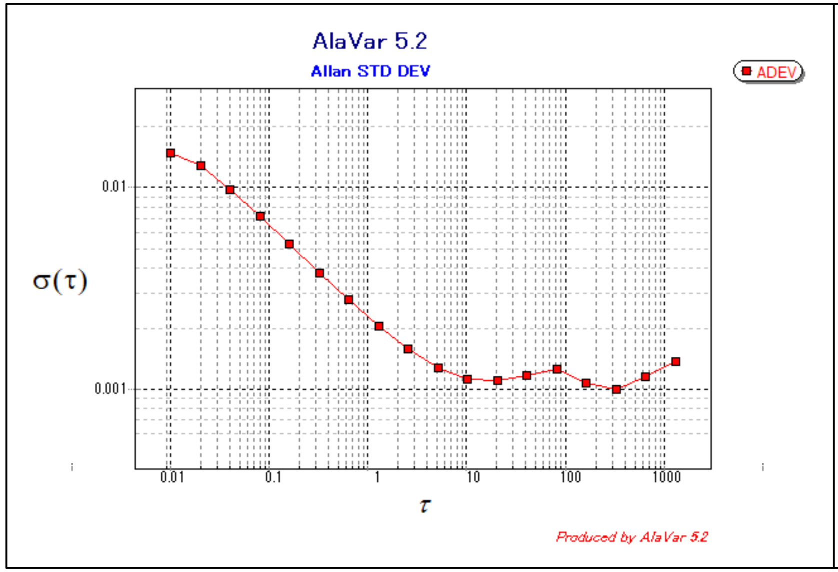
Allan Variance



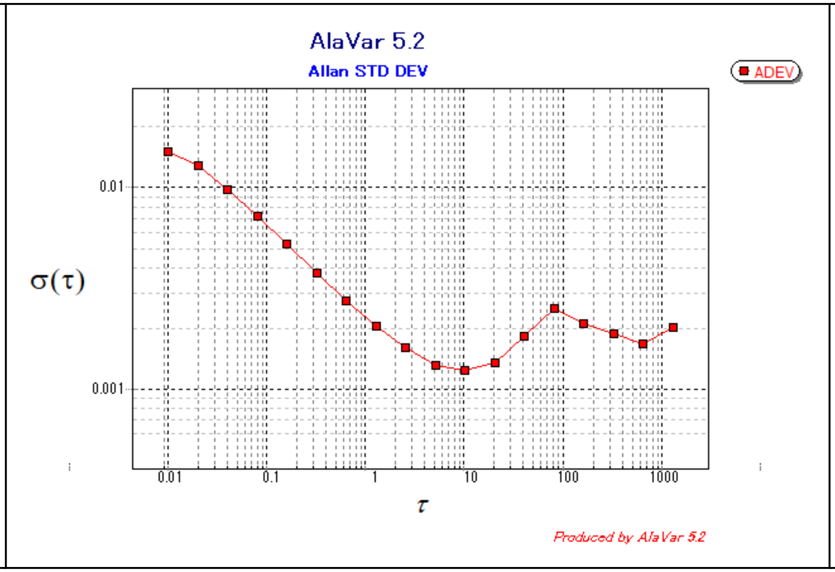
If the point of change from decrease to increase is on the left, the influence of the bias is large, and if it is on the right, the bias is small.

IMU A “medium price IMU”

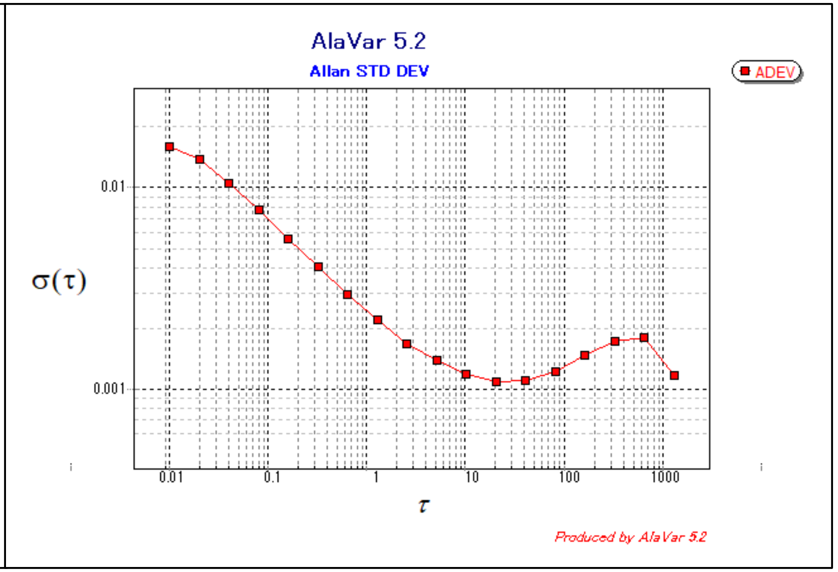
Gyro_x



Gyro_y



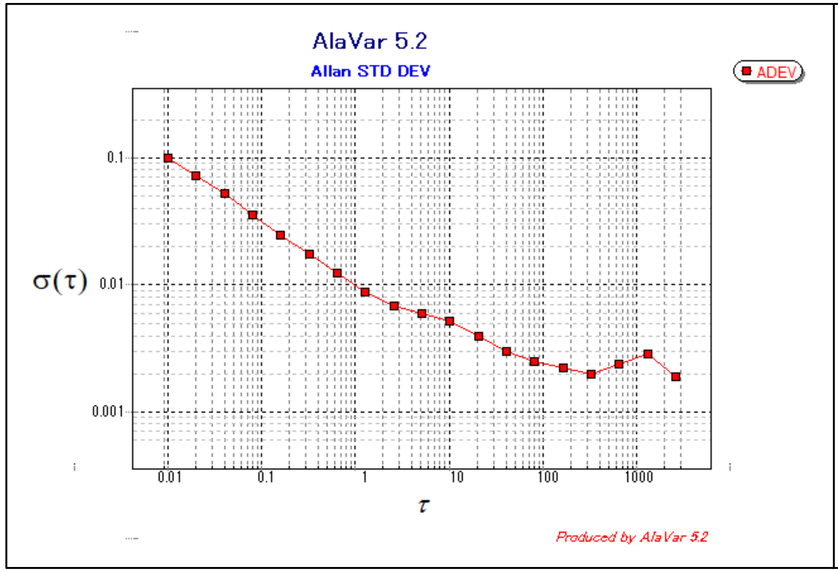
Gyro_z



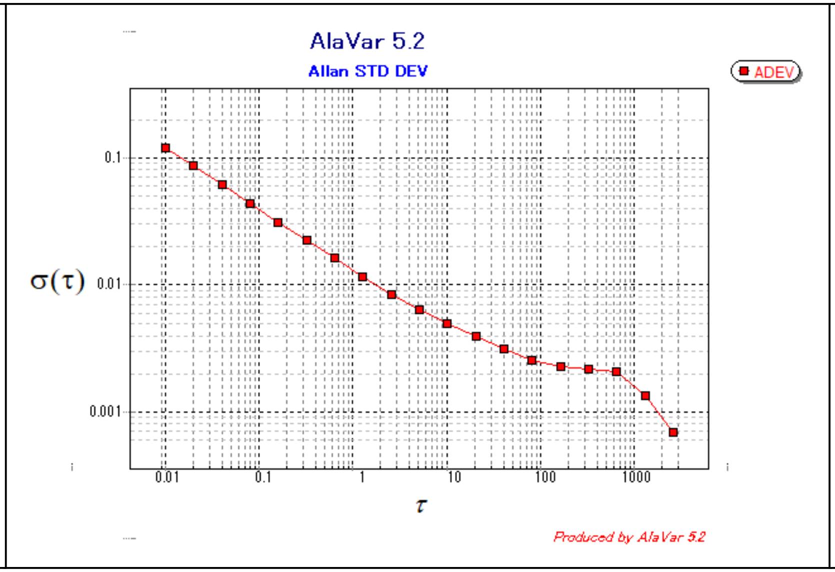
Stable at around $\tau = 10 \sim 20$s
Noise is most small
Bias is not so big.

IMU B “medium price IMU”

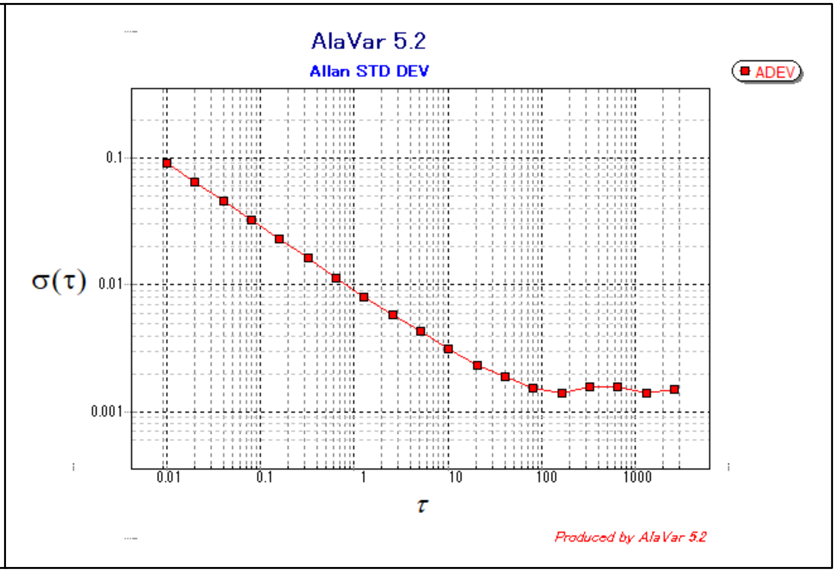
Gyro_x



Gyro_y



Gyro_z

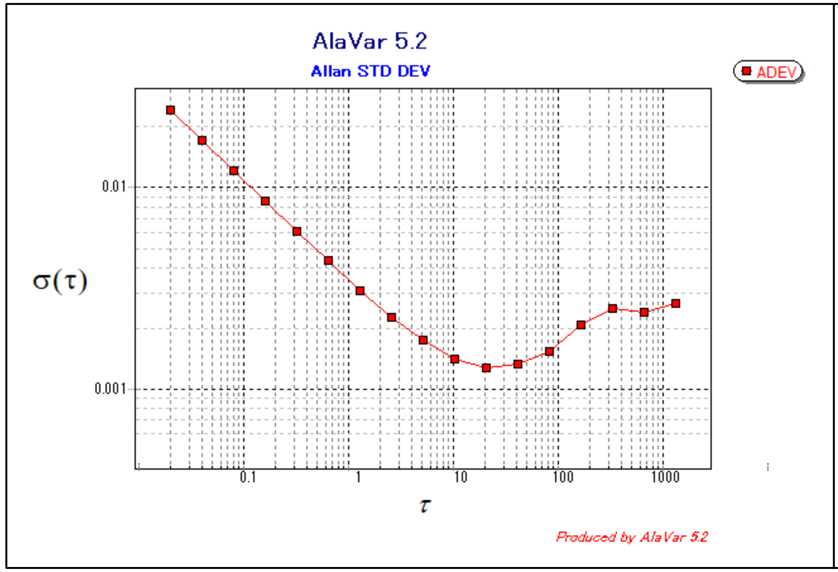


Stable at around τ = 100~200s

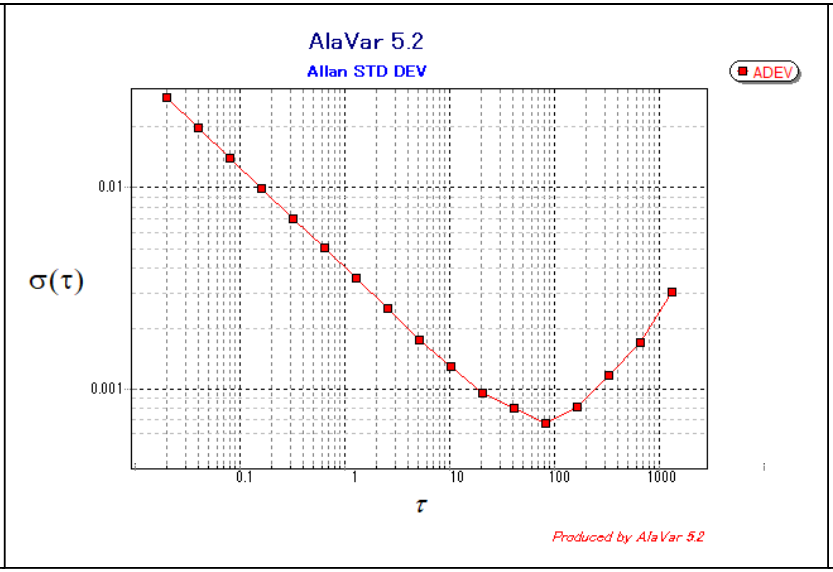
Noise is little big when compared to A and C

IMU C “low price IMU”

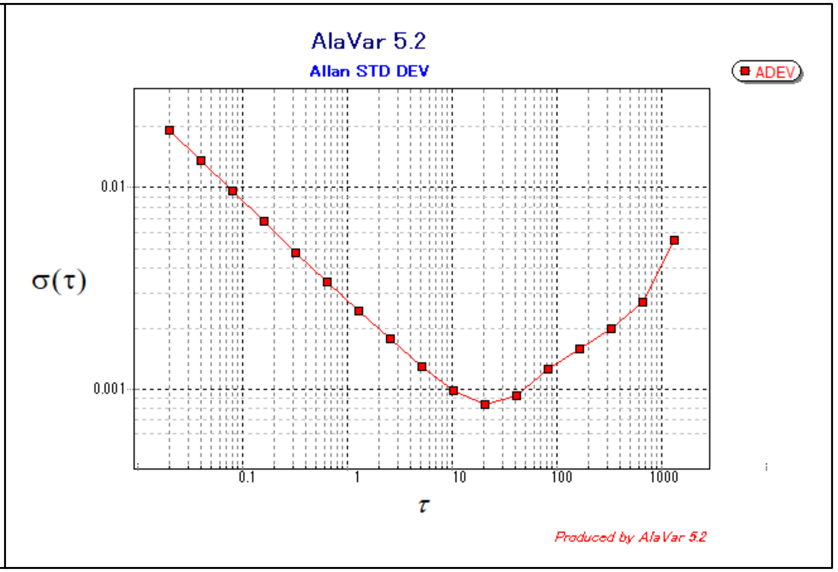
Gyro_x



Gyro_y



Gyro_z



τ = stable around 20~80s
Accuracy at stabilized is good
Bias is biggest

Summary

Price
A>B>C

Bias stability
B>A>C

Noise stability
A>B>C

The price of B is cheaper than A, but the performance is good.
The reason why IMU B bias stability is gooder than A.
I think the filter inside B may be processing angular velocity.