Reviewer#3

General comments:

The manuscript presents an analysis of the 3GM High Accuracy Accelerometer data collected during the JUICE Lunar–Earth Gravity Assist. The paper is generally well written, clearly structured, and provides valuable insights into the in-flight performance of the HAA instrument. Given the importance of non-gravitational force measurements for the JUICE mission and future scientific analyses, I believe the manuscript represents a useful contribution to the community. I have only a few comments and questions that may help improve the clarity and completeness of the paper.

We thank the reviewer for their careful reading of the manuscript and for the constructive comments, which improved the quality and clarity of the paper. Below, we address all the issues raised.

1. In Table 1, the measurement accuracy is reported as 10^{-8} m/s^2. It would be helpful if the authors could clarify whether this accuracy includes the effect of accelerometer bias at low frequencies, or if it refers solely to the high-frequency noise performance of the instrument. In my opinion, Table 1 could be further improved by including information on the expected and/or measured accelerometer bias and scale factor.

   The accuracy of $10^{-8}\ m/s^2$ is related to the bandwidth of the instrument $[10^{-4}\ -\ 10^{-1}]$ Hz. Outside the instrument bandwidth there is no requirement on the measurement accuracy.

   As per requirements the scale factor should be reconstructed within 1% of error thanks to the self-calibration, to be executed before each scientific observation. However, now is difficult to estimate this value in-flight, since the bias driven by the thermal distortion effects, with thermal control to be optimized, are superimposed on the scale factor error, which is way smaller.

   The expected measurement bias is not listed as an independent instrument performance, but it's considered to be included in the total instrument noise budget.

   Indeed, the total noise is function of the frequency and its density profile is expected to be below $8 \times 10^{-9} \frac{m}{s\sqrt{Hz}}$ between $[10^{-1}, 7 \times 10^{-4}]\ Hz$, and between $[7 \times 10^{-4}, 10^{-4}]\ Hz$ it increases linearly up to $3 \times 10^{-8} \frac{m}{s\sqrt{Hz}}$.

Also, this performance index couldn't be tested already due to the ongoing thermal control optimization activity.

The text has been updated accordingly.

2. In Table 1, the unit reported for the intrinsic noise floor appears to contain a typo.

   Text has been corrected accordingly.

3. In Section 3, it is stated that "to reduce the down-conversion of out-of-band high-frequency signals, the HAA is equipped with an out-of-band mechanical noise rejection algorithm." Additional clarification on this point would be appreciated. Does this mechanism only suppress high-frequency disturbances outside the measurement bandwidth, or can it also suppress noise components within or below the instrument bandwidth? Furthermore, a brief description of the working principle of this mechanism, together with an indication of the expected residual error level after the noise rejection, would help readers better understand its effectiveness and limitations.

   The out-of-band signal at frequency higher than $10^{-1} Hz$ can affect HAA measurements in two ways:

   - Causing saturation at some stage of the instrument acquisition measurements chain
   - Down-converting in band due to the non-linearity of the instrument characteristic transfer function

   The instrument saturation could be detected by direct data inspection and must be avoided in any case since this would cause scientific data loss.
   The down conversion has a more subtle effect, since it cannot be distinguished from a real acceleration. However, in this case is possible to remove the out-band down-converted noise from the data, thanks to the out-of-band mechanical noise rejection algorithm. This algorithm makes use of a polynomial filter which linearizes the instrument characteristic response.
   The coefficients of the polynomial function can be found by applying a square wave with the actuators when the disturbance is acting.
   Comparing the reading of each accelerometer sensor with the expected output, it's possible to find the coefficients with a simple least square estimation.
   The residual error after the correct use of the algorithm should be comparable with the instrument total noise.

The text has been updated accordingly, however avoiding details which are out of the scope of this article, since the out of band noise reaction algorithm was not used in the data post processing.

4. Lines 284 and 285 state that “Fig. 8 shows the comparison between HAA Acc0 calibrated data after the removal of the Moon’s gravity gradient signal and the expected thermal snap acceleration”. This sentence might need to be revised as both Figure 8 and its caption indicate that the computed thermal snap acceleration is explicitly shown (in red) in the figure.

   Text has been corrected accordingly.

5. In several figures, the caption text appears rather small and is difficult to read.

   Text has been corrected accordingly.

6. I would be interested to know whether the HAA measurements acquired during the Lunar–Earth Gravity Assist could be used to estimate the accelerometer bias. In particular, during the umbra passage, when radiation pressure effects are significantly reduced and gravity-gradient contributions are relatively small, it may be possible to identify constant or linear discrepancies between the measured and modeled accelerations. Such conditions could potentially provide an opportunity to characterize or constrain the instrument bias. A brief discussion of this possibility would be valuable.

   We thank the reviewer again for this valuable suggestion. However, as noted above, thermally induced bias is currently the dominant noise source, making it difficult to estimate the intrinsic instrument bias and its rate at this stage. Once the thermal control is optimized, we expect the instrument performance to be assessed more reliably.