Dear Referee #1,

We highly appreciate your comments and thank you very much for your time and for reading our manuscript. We hope that we could answer all your questions below.

Replies to Referee #1:

1. Are the water vapor corrections provided in this work applicable to other versions of the same instrument? Put another way, are the authors indicating that the type of characterization they perform in this work should be followed for each individual instrument? They cite previous literature (~line 249) that points to instrument-specific water vapor corrections, so I was left wondering whether this still holds for these new instruments. The discussion around line 410 related to observed differences in the MGA3 and DACOM readings, potentially related to an updated pressure regulator, makes me think this is the case. If so, this point should be highlighted in the conclusion.

   Answer: *The corrections provided in this work for the MGA3 are indeed instrument specific and the corrections should be derived for each instrument individually. Newer versions of the MGA provide an instrument specific water vapor correction applied by v2, which is characterized by the manufacturer for some species before shipping.*

   In the conclusion we highlighted now that the correction in this work is specific to our individual MGA3 model.

2. Figure 6. Is the difference (Delta N2O) repeatable with respect to H2O mole fraction? What if you put all the data on the same scatter plot? Is it consistent from flight to flight? If it is, that would be interesting.

   Answer:

   As far as the v2 is concerned it seems to be the same trend for all flights with higher humidity and the data overlap quite well in a scatter plot. However, only the Thailand flights can clearly show this, because only there we had sufficient data with high humidity. For the flights over the Philippines DACOM did not provide any N2O data yet. In South Korea the humidity was usually below 1% where clear differences could not be seen between the flights.

3. Section 4.1 The Allan precision analysis is based on laboratory measurement. Could you also assess the instrument's performance while airborne, as shown in Figure 9?

   Answer: *For the in-flight performance we only have the 8 min of data from the cabin pressure experiment in Figure 8, which we could use for the Allan precision calculation. Due to the limited availability of calibration gas during the campaign we were not able to conduct more and longer experiments with calibration gas only.*

   We have calculated the Allan precision for this 8 min period from the cabin pressure experiment and added it now to the manuscript in chapter 4.2. We have an optimal time of around 13s for the in-flight precision now, which is less than on ground. However, we might see an influence by the cabin pressure which we also cannot clearly distinguish from possible boundary effects in the calculation of the Allan precision for integration

times higher than 1-2min. All in all, we cannot make a clear statement with only those 8 min of data.

4. Section 4.3 Dependency on roll and pitch angle. Is there a quantitative analysis that could be done to compare instrument performance under stable flight conditions versus high-pitch or high-roll conditions? Perhaps even just comparing standard deviations during these different types of motion by the aircraft?

   Answer: *We have calculated separately the standard deviations for N2O, the roll angle, and the pitch angle for each calibration time window and included the results in chapter 4.3 in a scatter plot.*

5. Figure 10d. There are some relatively large discrepancies between the MGA3 and DACOM readings during this flight segment after 06:00. Is there a suspected cause of these?

   Answer: *These discrepancies are measurement artifacts by DACOM. DACOM had to change a detector specifically for the N2O measurements, which is why this flight is the first flight with any N2O data by DACOM. The DACOM setup was gradually adjusted flight by flight for better N2O measurements during the ASIA-AQ campaign with this new detector.*

   We added a short explanation to that in chapter 5.

6. Line 576: "In an already conducted study by Waldmann et al. (2026) at the GHGMon campaign 2023 in the Netherlands, our MGA3 was used for a N2O eddy covariance study, calculating N2O fluxes. For a comparison, we applied the same method for specific, representative flux legs across one research flight, once with the v1-β-off water correction and once with the v2 correction. In the comparison, we could find that the relative difference between the results was around 3% which is an order of magnitude smaller than the typical relative flux errors reported by Waldmann et al. (2026). Hence, for this instrument setup, we cannot find any significant difference in the influence of the water vapor correction approaches on the calculated eddy covariance fluxes." Is this statement supported by any figures in this paper? I think this might be missing a reference to 'Appendix B.'

   Answer: *Yes, there is a missing reference to Appendix B.*

   We have added the reference now.