

Response to comments from Roeland Van Malderen on manuscript egosphere2022-565: “Development of an automated pump efficiency measuring system for ozonesonde utilizing the airbag type flowmeter”

We appreciate your valuable comments on our paper.

the two reviewers provided excellent review reports, so I don't want to add too much on these. But I have one comment and one suggestion that you might take into account when updating your manuscript according to the comments of the reviewers. It relates to your choice of displaying in Fig. 12 only the average pump correction factors for serial numbers superior to 24000. In the text, lines 327-331, the following explanation is given: "The pump motor specifications were changed from the ozone sensor (serial number 24000 or later) delivered to JMA in 2013. As a result, air pressure dependence was seen in the motor speed, and the stability of the speed was not good. We thought that the effect was affecting the pump efficiency. Therefore, the measurement results of sensors with serial number 24000 and above are used to calculate the representative data of JMA." However, in Fig. 16, where the variation of the motor speed and pump stroke is shown as a function of serial number, the variability (standard deviations) of those measurements for serial numbers below 24000 seems to be lower than for serial numbers higher than 24000, which seems to contradict a lower stability of the speed for the lower serial numbers. Can you comment on that?

Ozone sensors after the serial number 24000 have worse stability in motor speed depending on the production lot than before 24000, but in order to express the characteristics of ozone sensors currently in circulation, we calculated the representative value using the value after 24000.

We will replace line 328-331 with

“As a result, air pressure dependence was seen in the motor speed, and the stability of the speed was not good depending on the production lot. We thought that the effect was affecting the pump efficiency. Therefore, since the characteristics of ozone sensors currently in circulation are different from those of sensors before the sensor serial number 24000, the measurement results of sensors after the serial number 24000 are used to calculate the representative data of JMA.”.

Also, as you referred to the paper by Stauffer et al. 2020 (and follow-up study available at <https://www.essoar.org/doi/10.1002/essoar.10511590.1>, accepted with doi 10.1029/2022EA002459), who noted a drop in total column ozone in a number of En-Sci ozonesonde sites around S/N 25500, you might provide an additional figure+table (similar to Fig. 12, can be e.g. in an appendix, or as supplementary material) in which you show the pump correction factors for (i) the entire time period, (ii) serial numbers lower than 24000, (iii) serial numbers higher than 24000. This would be very valuable information for the ozonesonde community.

Please take this comment and suggestion in consideration.

We will replace line 331-333 with

“Stauffer et al. (2020a) also presents the discovery of an apparent instrument artifact that has caused total ozone measurements from about a third of global stations to drop starting in 2014–2016, limiting their suitability for calculating ozone trends, and Stauffer et al. (2020b) notes a drop in total column ozone in a number of En-SCI ozonesonde sites around serial number 25250.”.

We will add reference as follows to Reference.

“Stauffer, R. M., Thompson, A. M., Kollonige, D. E., Tarasick, D. W., van Malderen, R., Smit, H. G. J., Vömel, H., Morris, G. A., Johnson, B. J., Cullis, P. D., Stübi, R., Davies, J., and Yan, M. M.: An Examination of the Recent Stability of Ozonesonde Global Network Data, Earth and Space Science, Accepted Articles, e2022EA002459. doi: 10.1029/2022EA002459, 2020b.”

We will remove the table of pump correction factors in Figure 12 and add Table 1 as follows after Figure 12, and we will add “For the evaluation of past observation data, we show also the statistical values before the serial number 24000 in Table X. The standard deviation is larger for sensors after the serial number 24000.” after line 330 -331.

Table X: The averaged pump correction factors measured by JMA for the sensor serial numbers after 24000, serial numbers before 24000, and the entire time period (2009 -2022).

Pump Correction Factor [JMA 2009 - 2022]			
Pressure (hPa)	Serial # \geq 24000 (821 samples)	Serial # < 24000 (566 samples)	ALL (1387 samples)
3	1.381 ± 0.047	1.330 ± 0.037	1.361 ± 0.050
4	1.307 ± 0.040	1.260 ± 0.026	1.288 ± 0.042
5	1.254 ± 0.034	1.216 ± 0.022	1.239 ± 0.035
7	1.191 ± 0.028	1.164 ± 0.018	1.180 ± 0.028
10	1.140 ± 0.023	1.122 ± 0.016	1.133 ± 0.022
20	1.078 ± 0.017	1.072 ± 0.013	1.076 ± 0.016
30	1.056 ± 0.015	1.054 ± 0.011	1.055 ± 0.014
50	1.038 ± 0.013	1.038 ± 0.009	1.038 ± 0.011
100	1.021 ± 0.010	1.024 ± 0.007	1.022 ± 0.009
200	1.011 ± 0.008	1.014 ± 0.005	1.012 ± 0.007