

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-408

Anonymous Referee #1

Referee comment on "A relaxed eddy accumulation (REA) LOPAP system for flux measurements of nitrous acid (HONO)" by Lisa von der Heyden et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-408-RC1>, 2022

General comments:

The authors of this manuscript set up a REA system for measuring the vertical fluxes of HONO based on development of a three-channel-LOPAP instrument for HONO measurements of the updraft, downdraft and chemical interferences as well as a software for controlling valves and measurement cycles. The system was well tested in both laboratory and field to be reliable for the measurements of HONO vertical fluxes. In general, this is a nice research work, which can direct researches to conduct field measurements of HONO vertical fluxes to comprehensively understand the atmospheric HONO sources in different areas.

Specific comments:

Are the fluxes measured through the REA method affected by the height above the ground? Which is the height proper for selection?

There are several prerequisites and assumptions for the REA method. How to verify the reliability of fluxes measured by the REA method?

How did you measure the sampling efficiency of 99.6% for HONO? Part of HONO signal from the Channel 2 might be attributed to breakthrough from the Channel 1, rather than the chemical interference.

Were the wind directions affected by the small cone at the inlet? Small turbulence of wind could occur around the cone, which may affect the vertical fluxes.

Technical corrections:

Line 292, I don't know why the time correction is about 3 times of the time response.

Line 293, “.” should be “,”.

Line 301, „P” should be “P”.

Line 315-316, I don't understand the meaning of this sentence. Why were the channels 1 and 2 divided by the half of the ratio, whereas channel 3 multiplied the ratio?

Line 329, the air flow rate of 3.7 l/min in here was inconsistent with that of 2.65 l/min mentioned in line 180.

Line 365, the dilution seemed to vary with time, e.g., the dilution between 13:00 and 14:00 was less than a factor of 4, which may result in significant uncertainty of fluxes.

Lines 368-374, I don't know why the different average ratios of channel 1 / channel 3 were present at different places for the same experiment despite of small difference. Line 369, “ratio (1/3)” should be “ratio (channel 1 / channel 3)”.

Lines 400-402, the detail information for maloperation of the instrument is not necessary.

Lines 429-431, Fig.5 seemed not support the conclusion.

Lines 431-433, the sentence is suggested to be moved before the sentence of "In addition.." for logical connection.

Lines 459-460, this sentence is suggested to be rephrased due to unclear description.

Line 466, the reasons for exclusion of the HONO sources other than the photosensitized conversion of NO₂ on organic surfaces are not very convincing, because the authors didn't consider the possible heterogeneous HONO formation in dew and ground surfaces during night, which may be high enough to explain the large difference between the negative flux at night and positive flux in daytime.