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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "A liquid nitrogen-free preconcentration unit for measurements of ambient $N_2O$ isotopomers by QCLAS" *by* J. Mohn et al.

**J. Mohn et al.**

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We are grateful to Reviewer #3 for taking time to comment on the manuscript. The comments have been addressed in a point-by-point manner, as detailed below.

General

1. Comment: This paper reports a sophisticated N2O preconcentration device which is applicable to laser spectroscopy and other concentration/isotope analytical system for trace gases. Although it is developed using not brand-new techniques, it would be useful for many scientists and therefore worth publishing. I hope the authors also present

supplemental information such as software codes together this paper or elsewhere, if they can.

Reply: The authors are willing to share additional information and anyone interested in hardware/software details should contact the corresponding author.

Detail

2. Comment: p. 3105: How did the authors remove less volatile components which could be trapped together with N2O? I think they could be retained on the adsorbent at -50°C and interfere with quantitative trapping of N2O or QCLAS analysis of later runs.

Reply: The authors agree that less volatile compounds could accumulate on the HayeSep D trap and thus could interfere with quantitative N2O trapping on the long run. Reproducible starting conditions should be established during phase I (p. 3104, l. 24-27), however, to assure complete desorption the trap temperature has to be increased. The following changes were made on p. 3104, l. 26-29: ... and heated to approx. 100°C (phase I). This phase assures the absence of residual trace gases on the preconcentration trap and reproducible starting conditions.

3. Comment: p.3106, l. 25-26: What kind of correction was applied?

Reply: The spectra were baseline corrected as mentioned on p. 3106, l. 25-28.

4. Comment: p. 3114, l. 3-5 and Fig. 5: Are "preconcentrated ambient air" and "gas matrix after preconcentration" the same? If N2O in ambient air is concentrated by the preconcentration device, it should of course contain N2O. I am confused whether the black curve in Fig. 5a shows perfect recovery of N2O (thus no N2O in the residual matrix) or amount of N2O in the ambient air is very small even if it is concentrated by the de-vice.

Reply: The authors agree that the terms "preconcentrated ambient air" and "gas matrix after preconcentration" are not correct in this context. The following changes were made on p. 3114, l. 1-5 and Fig. 5: A hypothetical absorption spectrum of spectro-



AMTD

2, C1360–C1362, 2010

scopically interfering components was generated, based on the analyzed output concentrations and typical conditions employed for QCLAS measurements (Sect. 2.1.3). To obtain a meaningful representation, the spectrum of interfering components after preconcentration of ambient air was multiplied by a factor of 1000 (Fig. 5), . . .

Fig. 5. (a) Simulated absorption spectra of N2O and spectroscopically interfering components after preconcentration of ambient air (magnified by a factor 1000). (b) . . .

5. Comment: p. 3122 Fig. 1: What is the function of "nafion 2"? Is it necessary?

Reply: The authors agree that the figure is not consistent wit the text. In fact, nafion 2 was not used in the experiments presented in the paper as water is already removed by the first nafion drier and a chemical trap filled with Ascarite and Mg(ClO4)2. Figure 1 was modified accordingly.

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Interactive comment on Atmos. Meas. Tech. Discuss., 2, 3099, 2009.