

General comments:

The manuscript of Sakae Toyoda and Naohiro Yoshida with the title “Development of automated preparation system for isotopocule analysis of N₂O in various air samples” describes the development, optimization and automation of a preparation system for subsequent analysis of N₂O isotopocules from ambient air by isotope-ratio mass-spectrometry. The manuscript gives technical details on the instrumentation and compares the final performance to state-of-the art instrumentation applied by other research groups.

The research area of N₂O isotope analysis is very active and the presented work is therefore of interest for a number of readers and potential future users of this technique. The manuscript is well-structured and written and is sufficiently detailed. Therefore, I suggest publication in Atmospheric Measurement Techniques with minor revisions, as detailed below.

Specific comments:

Page 1 Line 15: The term “... for gas samples with various amounts and various N₂O concentrations.” might be replaced by “... which offers flexibility with respect to the available gas volume, pressure and N₂O concentration.”

Page 1 Line 25 - 27: The correct definition for “N₂O concentration and units” should be given when used for the first time and both sentences could be combined: “Its globally averaged concentration, given as mole fraction, was about 324 nmol mol⁻¹ (10⁻⁹ moles per mole of dry air) in 2011 (Hartmann et al., 2013) and increases by 0.73 nmol mol⁻¹ a⁻¹ (Ciais et al., 2013).

Page 1 Line 29: The word “but” could be deleted.

Page 2 Line 4 - 5: The term “compounds” could be replaced by “substrates” or “educts”.

Page 2 Line 8: The following phrase could be added “... causes a progressive decrease in the ¹⁵N/¹⁴N isotope ratio of tropospheric N₂O.”

Page 2 Line 17 – 18: The reasoning for this argumentation might be added; e.g. higher precision for δ¹⁵N and δ¹⁸O, lower sample volume required.

Page 2 Line 26: A statement might be added, which gases are not separated sufficiently.

Page 2 Line 33: The term “... an automated sample preparation-mid-infrared quantum cascade laser spectroscopy system ...” is rather bulky and might be replaced by “... an automated sample preparation system has been reported, which can be coupled to a quantum cascade laser absorption spectrometer ...”.

Page 3 Line 3: The term “atmospheric” might be replaced by “ambient or subambient”.

Page 3 Line 3 – 5: As the flow and adsorption time of MFC based systems can be adjusted quite flexibly these systems can be applied for high concentrations as well, so this sentence might be deleted. In addition, the presented system is not suitable for concentrations above 10 μmol mol⁻¹.

Page 3 Line 6 – 8: The last section might be rephrased to: “... system that offers enhanced flexibility in terms of sample gas pressure and N₂O concentration. The novel system encloses a ...”.

Page 3 Line 12: The correct wording might be "... with wheels attached, and is connected to a gas ...".

Page Line 26: The term "flask inner pressure" might be replaced by "sample gas pressure in the flask".

Page 4 Line 7 – 9: The reader would benefit from information on the amounts of $\text{Mg}(\text{ClO}_4)_2$ and Ascarite in the chemical trap and how often (after which sample gas volume) you renew it.

Page 4 Line 28: The term "electric sheated heater" is unclear might be reformulated.

Page 5 Line 9: The word "was" might be replaced by "is".

Page 5 Line 25: The word "respectively" might be placed at the end of the sentence.

Page 6 Line 6: The sentence might be rephrased to "... to adapt the sampling procedure to the prevailing sample pressure and N_2O concentration"

Page 6 Line 8: The term "inner" should be replaced by "sample gas".

Page 6 Line 17: The term "sample" might be replaced by "sample volume".

Page 6 Line 20: The term "becomes greater" might be replaced by "increases".

Page 6 Line 21: The wording "using another flask" might be deleted.

Page 6 Line 24 – 25: The sentence might be rephrased to "... to ensure quantitative recovery of N_2O and thus also minimize contamination of subsequent analyses (blank values)."

Page 7 Line 4: What is the meaning of "It was not complete even at 50°C ...", was the separation not complete or the elution, please rephrase.

Page 7 Line 16: Please rephrase to "... To achieve a quantitative N_2O recovery the timing of the cryofocussing step was optimized to trap the eluent from the first column only while N_2O was released." or similar.

Page 11 Table 1: Please compare the performance additionally to the work of Wolf et al. (2015) doi:10.5194/bg-12-2517-2015.

Sample size: 8000 mL of ambient air; $\delta^{15}\text{N}^{\text{bulk}}$, $\delta^{15}\text{N}^{\alpha}$, $\delta^{15}\text{N}^{\beta}$, SP, $\delta^{18}\text{O}$: 0.12, 0.20, 0.12, 0.22, 0.10 ‰; analytical time ca. 30 minutes, fully automated system with QCLAS (n = 331).

Page 11 Table 1: The term "precision (1s)" might be replaced by "precision (1 standard deviation)" as 1s is often used for 1 second.