General comments:

The manuscript of Sakae Toyoda and Naohiro Yoshida with the title “Development of automated preparation system for isotopocule analysis of N$_2$O in various air samples” describes the development, optimization and automation of a preparation system for subsequent analysis of N$_2$O 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 N$_2$O 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 N$_2$O concentrations.” might be replaced by “… which offers flexibility with respect to the available gas volume, pressure and N$_2$O concentration.”

Page 1 Line 25 - 27: The correct definition for “N$_2$O 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 $^{15}$N/$^{14}$N isotope ratio of tropospheric N$_2$O.”

Page 2 Line 17 – 18: The reasoning for this argumentation might be added; e.g. higher precision for $\delta^{15}$N and $\delta^{18}$O, 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 $\mu$mol 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 N$_2$O 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 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 Mg(ClO₄)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 N₂O 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 N₂O 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 N₂O recovery the timing of the cryofocussing step was optimized to trap the eluent from the first column only while N₂O was released.” or similar.


Sample size: 8000 mL of ambient air; δ¹⁵N bulk, δ¹⁵NⅡ, δ¹⁵NⅢ, SP, δ¹⁸O: 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 replace by “precision (1 standard deviation)” as 1s is often used for 1 second.