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Atmospheric Measurement Techniques Discussions

Interactive comment on "Stratospheric Air Sub-sampler (SAS) and its application to analysis of $\triangle^{17}O(CO_2)$ from small air samples collected with an AirCore" *by* Dorota Janina Mrozek et al.

Anonymous Referee #1

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Mrozek et al. provide new devices for subsampling of the stratospheric air collected by AirCore and analysis of 17O excess of CO2 in the subsamples. The concept of these technology, which directs to easy and low-price observation of stratospheric chemistry, is quite important because rare opportunity to get stratospheric air has prevented us to understand physical transport and chemical reactions occurring there. The focus is suitable for publication on AMT. As I read, authors got successful results from their devices in general. Thus I recommend this manuscript for future publication on AMT, although there are two issues to be solved before the publication as followings.

Major 1: CO2-N2O separation. I consider the GC condition shown in the manuscript (4 mL/min and 40 oC for PoraPLOT Q 25mx0.53mm) is not sufficient for complete

separation between CO2 and N2O. Both the flow rate and oven temperature seem a bit high for suitable setting for the CO2-N2O separation. Actually authors declare only 30 sec separation, and Fig5 seems showing touch between tails of the peaks. I guess it makes worse accuracy and precision, particularly for preCO2. Zoom-up chromatogram of m/z 44-46 on preCO2 analysis is required to claim the complete separation. Or, reasons why authors chose such (strange, as I feel) GC condition should be described. Improvement to get further separation will bring more precise analysis and increase the value of this study.

Major 2: Contamination. Authors regarded serious contamination in 2 of 10 SAS subsamples and guess a procedure connecting SAS-IRMS system in laboratory as the source of contamination (P11L03-06). In addition, an other SAS subsample was lost due to "accidental instability in He flow." Because this is the manuscript for successful development of the SAS-IRMS system, it is serious defect and should be solved. Authors should improve the procedure to avoid the contamination and accident. And results of the test and the revised procedure will be required in the revised version of manuscript.

Minor points:

P03L02-28: These explanation really confused me. A schematic illustration for describing all the instruments and procedure, like flowchart, seems helpful to understand the whole system from AirCore sampling on the site to IRMS analysis in laboratory.

P04L14-16: I feel it is strange. As I read, SAS can get 10 subsamples by each 2m-long tubing. For easy understanding, the description "a 20m-long tubing divided by eleven valves" can be rephrased to "ten 2m-long tubings connected by eleven valves" or like it.

P06L13-15: Can be deleted.

P09L17-25: Section 3.2 is important for this study because authors first use CuO/Ni

system for oxygen exchanging. Results of the test should be shown in table or figure.

P10L07-07: Fig 6?

P10L12-14: Comparison of analytical errors with previous methods actually used for stratospheric air analysis is helpful for readers.

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