

## ***Interactive comment on “Stratospheric Air Sub-sampler (SAS) and its application to analysis of $\Delta^{17}\text{O}(\text{CO}_2)$ from small air samples collected with an AirCore” by Dorota Janina Mrozek et al.***

### **Anonymous Referee #2**

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The paper presents a new Stratospheric Air Sampler which can conserve air retrieved using the AirCore technique, which has already been analysed for CO<sub>2</sub> and CH<sub>4</sub>. This provides a new access route for measurements with analytical instruments that are slow and/or not field deployable. It is a significant advance as other stratospheric air collection techniques are substantially more expensive. The data from the lab experiments and the example flight is of high quality and analysis appears to have been carried out very thoroughly. Some specific and mostly minor comments can be found below.

page 1, line 12: should be “from the SAS”

page 5, line 4 to 5: Please provide quantitative evidence for the reduced peak broad-

ening.

page 5, line 21 to 22: Please provide evidence that the isotopic composition of the CO<sub>2</sub> inside the sample loop is not altered due to this exposure to outside air.

page 5, line 26: Please explain the differences to Mrozek et al. (2015). This would also help other sections such as 2.4.2 and 3.1.

page 6, line 12: Please state the purity of the O<sub>2</sub>. Also, how was the weekly interval determined and is there any evidence that the conversion is quantitative after reconditioning?

page 6, line 18 to 20: Should be “smooths”. Also, please explain the mechanism of this smoothing and the composition of the additional 1 ml volume. How much was the precision improved?

page 7, line 30: Should this be 100 s? It doesn't fit with the 80 and 90 s below.

page 8, line 25: Should this be “decrease”?

page 9, line 14: The test confirms the results of Kawagucci et al. (2005). Does it provide any additional evidence?

page 10, line 2: Is this an improvement compared to Mrozek et al. (2015)?

page 10, line 17 and 21: Please give the geographical coordinates.

page 10, line 31: If the balloon burst at 345 km, why does the SAS only contain air from 24.5 km and below?

page 11, line 20: Please provide details of the methane measurements including precisions and how these were translated into the x-axis uncertainties displayed in Figure 8. Also, how can a CH<sub>4</sub>-N<sub>2</sub>O correlation from balloon flights in 2009 and 2011 be applied to stratospheric measurements from 2014?

page 12, line 20: This should be CuO/Ni or similar. Please be more consistent through-

out the manuscript.

page 12, line 21 to 22: Please consider rewording.

page 12, line 28: Should be “the SAS”.

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Discussion paper

