

Interactive comment on “Continuous-flow IRMS technique for determining the ^{17}O excess of CO_2 using complete oxygen isotope exchange with cerium oxide” by D. J. Mrozek et al.

Anonymous Referee #2

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Mrozek et al report a new method to measure the complete isotopic composition of atmospheric CO_2 . Their method is a combination of two previous methods, one offline and one online. The advantage of this combination is the ability to obtain high enough analytical precision while not being so labor intensive since it is fully automated.

The method itself is well described, and sufficient enough so that one could at least get most of the way towards reproducing this method in another laboratory. The comments that I have to improve the paper are important, but should be easy to address and are mainly technical in nature.

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Abstract: The abstract needs to explicitly state that this method is suitable for stratospheric CO_2 . Although I'm sure one could also measure tropospheric CO_2 with this method, the precision for the ^{17}O -excess is not good enough to be meaningful for the small values in the troposphere. It would also be good to explicitly state in the abstract and again in the manuscript (such as section 4 and Figure 9) what the observed ^{17}O -excess values are for stratospheric CO_2 so the reader can immediately assess whether or not the stated precision is adequate for examining actual variability in the stratosphere.

It is not explicitly clear what a “repeated analysis means”. Since this is continuous flow and not dual inlet, I assume that the authors mean that they take multiple aliquots of the same sample. Later (line 426) the authors use the term “multiple measurements”. Again this could be made more clear with the phrase “multiple aliquots of the same sample”.

The authors report their sample quantities as volumes, but this is meaningless without information on the pressure of the sample containers. Information on the pressure is not given until the second to last line of the manuscript. I wondered right away in the abstract (line 22) how much air, or CO_2 , a certain volume represents, as I am not familiar with the collection methods of stratospheric CO_2 .

Also, when comparing with previous work (line 87), the authors state the sample quantity as the number of nanomoles of CO_2 . It's hard to know how this amount compares to what is measured in the present paper. I would prefer nmoles throughout, but perhaps this is my own bias. Either way, it is best to be consistent with units throughout the paper. If the authors choose to stick with volumes, also provide information on the pressure.

Line 411: What is an “in-depth analysis ion”?

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 6823, 2014.

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