



EGUsphere, referee comment RC2
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Comment on egusphere-2022-60

Anonymous Referee #2

Referee comment on "Improving continuous-flow analysis of triple oxygen isotopes in ice cores: insights from replicate measurements" by Lindsey Davidge et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-60-RC2>, 2022

The manuscript describes an analytical set-up to measure D17O of water by continuous flow analysis on ice core samples. The performances of the system are evaluated by comparing the results on parallel ice core barrels taken at the same depth. The authors also describe the different effects that influence the stability of the results and hence the final uncertainty on the D17O measurements. This technical paper is useful even if it is not clear how it can directly be applied to routine measurements of D17O by CFA because the measurement time would be very long and it seems that many adjustments (or cleaning) should be performed during the period of measurements.

I detail my comments below:

- I.71: You mention that diffusion and mixing should be reduced for D17O but it is not the case for all isotopes. Why is it more important for D17O ?
- Paragraph from I. 92: from this reading, it seems that the authors need to continuously adjust the system during measurements which makes it quite complicated and it is really difficult to understand what is done exactly. Could the authors be more precise on how they detect the problem and what action they take. Some concrete examples would be helpful. Also if these adjustments should be done continuously, how is it possible to make long runs with a good stability ?
- What is the difference between the experimental set-up presented here and the one used in the previous study (Steig et al., 2021) ?
- I.137: is there any mixing linked to the melting of the ice on the melt head ?
- "Uemera" should rather be "Uemura" (several occurrences)
- I.175: It is not clear how the system components are cleaned ? Which components ? How is the cleaning done ? It seems that the cleaning occurs very often and I am wondering how this can be done without affecting the continuity of the measurements. It is very important that the authors explain their cleaning procedure and especially how it is done while the measurements are being performed continuously.
- I.188: similarly, what is meant by "routinely clean" ? As this seems to be an essential aspect of the measurement technique, this should be detailed and explained to be able

to understand and evaluate this technique.

- I.210 and following paragraph: The sequence of measurements of reference waters is not given. When are these waters measured? How is the measurement of these waters organized with respect to the measurement of the ice cores? Do you measure the 3 waters every day? Every week? A table explaining the sequence of measurements (reference water, ice cores) over the 7 weeks should be given.
- I.221 and following paragraph: I understand that the authors did an alignment of the d18O seasonal cycles for this study to match parallel records but for real CFA measurements, when there is a need to have access to the real depth, this technique is not adapted and I do not see how you can avoid measuring the evolution of the height of the melting ice barrels. In this paragraph and in general in the manuscript, it should be made clear what is done specifically for this study with the aim to estimate uncertainty from compilation of record at the same depth (where absolute depth record is not needed) and what is done for a routine CFA measurement (where absolute depth record is needed).
- Section 2.6: again the calibration sequence is not clear. A table is needed to explain what is done every day and over the 7 week period. What is exactly done during the 3 hour measurements of reference water? Also the range of acceptable mixing ratios is very large (20,000 – 50,000 ppmv). Do you really observe so large variations in a short time? over what time period is estimated the σ_{18O} of 0.5 permil?
- Section 3.1: It would be very useful to see the raw data instead of only the average and envelopes of the records. This would help understanding the correlation ($r=0.52$) which I do actually not find as "high" as written by the authors. It would also help to understand the difference between the different sections of the core.
- I.292: it is impossible to understand exactly what you mean by "disproportionate drift in d17O and d18O" since no number is given nor any example. What amplitude of the drift? Over which period? What should be done to avoid this?
- Paragraph starting from I. 303: again this is very difficult to follow if we do not see the raw data.
- I.326 and following paragraph: Please show the raw data and then the different treatments + explain exactly what you mean by calibration so that the reader can understand what was done. Additional figures showing the different step as well as the measurements (raw data) of reference waters used are needed to understand what you mean by calibration.
- At the end, we expect clear recommendations on how to perform routine CFA measurements to achieve a good D17O signal. So we would need a recommended sequence of measurements and calibration with numbers given – a table is recommended. Also please explain how you suggest that calibration should be done. In the present state, the manuscript is not really useful for the reader who wants to repeat this set up.