

Dear editor,

We would like to once again thank the reviewer for the valuable comments.

We have addressed all the suggestions, which has allowed us to achieve what we believe is a much improved version of the manuscript. We are now looking forward to submitting the revised version. In this document, our responses are in **blue**, and the modifications to the manuscript in **red** in this response file.

On behalf of all the co-authors,
Agnese Petteni

Reviewer #1 (Remarks to the Author):

Review pt. 2 of “An International Intercomparison of Continuous Flow Analysis (CFA) Systems for High Resolution Water Isotope Measurements in Ice Cores” by Agnese Petteni et al.

General comments:

(A) ISP-UNIVE low humidity level:

- 1) Ok, I agree that the accuracy of the measurement (i.e. standard deviation) calculated via the Allan variances is fully comparable, ‘independently’ of the water vapor level. But I am still concerned by the mean value itself (as I mentioned in my first revision, the previous Fig.3 (now Fig.5) shows a clear trend towards higher mean values, showing well that the result will be different between 8000 and 20’000ppm)

The reviewer is absolutely right, it's important to evaluate the impact on the average isotopic composition with different humidity. We include the following text in the method and discussion sections:

Line 299: " Overall, we calculate an impact of humidity levels on the average isotopic composition of 0.015 ‰ per 1000 ppmv and 0.216 ‰ per 1,000 ppmv for $\delta^{18}\text{O}$ and δD , respectively. Consequently, we opted not to apply humidity-level correction to the data for the range within which the measurements were performed. "

Line 439: “The impact of humidity level on the measurements is around 0.015 ‰ per 1000 ppmv for $\delta^{18}\text{O}$ and 0.216 ‰ per 1,000 ppmv for δD . Although these values are well within the uncertainty of the Picarro instrument, it is crucial to keep the humidity variation within a maximum range of 6,000 ppmv during daily CFA analyses to ensure that this effect remains negligible.”

- 2) In section 3.4 “Discrete vs Continuous Data”, lines 360 to 362, the authors state removing data at 1200 ppm, and retaining them at 7850 ppm. I would suggest to remove these 2 intervals, and rephrase the section accordingly.

We agree. The sentence has been rephrased as follows, and the figure has been modified accordingly:

Line 214: “At ISP-UNIVE, humidity drops – well below the typical work condition – are manually selected using a MATLAB graphical user interface and substituted by linearly interpolated values or removed when the depth intervals exceeds 10 cm.”

Line 360: “Two data intervals, corresponding to depths of 13.85-13.96 m and 15.62-15.85 m are removed due to the drops of humidity at 1,200 ppmv and 7,850 ppmv, following the post-process procedure described in Sect. 2.5”

(B) A part from this remaining major concern, here are a few minor points:

Line 226: “This is because, at these...” please rephrase.

Taken into account

Lines 279 – 281: “ Picarro 2140 ... also conducted at lower humidity”. please also rephrase.

Taken into account

Line 300: “For IGE setup, we relied on above tests confirmed the findings of Gkinis”. Please rephrase

Taken into account

Lines 320, 326: If I get it right, Tab. B1 should be Table C1

Taken into account

Figure 6: On panel b), the change of slope is clearly occurring at 200s, normalized time. It would be good and consistent to have correspondence with panel a).

Taken into account

Line 357: please insert a reference for the Kruskal-Wallis non-parametric ANOVA test.

Taken into account

Line 362: 7850ppm, slightly below the typical working conditions. As the typical working conditions stated by the manufacturer are around 20'000ppm, this sentence made me smile, before raising my concerns again. cf comment (A).

Taken into account

Line 401: Gaussian kernel-based approach. This also requires a reference.

Taken into account

Line 504: “.. allowing the climate signal to be interpreted by reconstructing it at the highest retrievable resolution”

The highest retrievable resolution?? Higher than reconstructing climate signals by cutting/analyzing discrete samples at 1 mm resolution?? Please rephrase.

Taken into account

Line 503: “Finally, the outcomes of this work gave the basis for the analysis of four PALEO cores analysed at ISP-UNIVE, LSCE, and IGE as part of the EAIIST (Traversa et al., 2023), enabling the determination of the maximum reliable resolution achievable with CFA for interpreting the climatic signal in ice cores.”