

Interactive comment on “Technical Note: On the memory effects in the analysis of $\delta^2\text{H}$ and $\delta^{18}\text{O}$ water samples measured by different laser spectrometers” by D. Penna et al.

Anonymous Referee #2

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This paper investigates the memory effects commonly observed with laser spectroscopic isotope ratio measurements of depleted liquid water samples. A sequence of ten depleted snow water samples and several reference standards is analyzed using eighteen injections for each water. This is done for two CRDS and OA-ICOS instruments, respectively, with an IRMS serving as reference. Conclusions are then drawn regarding the magnitude of memory effects encountered as a function of the number of repetitive injections of individual waters and the isotopic separation of successive waters.

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The title of the manuscript is somewhat misleading in my opinion as it may imply a broader and more in-depth investigation of memory effects in laser spectroscopic isotope ratio measurements while the focus of the paper is quite narrow. The paper is generally well written and technically sound. The employed statistical and experimental techniques are not particularly innovative yet overall adequate and presented clearly. There is a need for systematic investigations of and guidance on the practical problems encountered in the field of laser spectrometric isotope ratio measurements. As such, the scope of the paper is commendable and a practical contribution to the field is made. A few shortcomings exist that should have been avoided to make the paper relevant to more users of laser spectrometers. Most of all, this refers to the use of older generation laser spectrometers only and a lack of directly transferable solutions.

Specific Comments:

P5299, L7-17: As noted by the other reviewers, testing of current generation laser spectrometers would have been important for the practical relevance of the paper. Also, given some variations between instruments and set ups, testing of several laser spectrometers of the same type could have been worthwhile. This could have helped to provide more reliable and transferable conclusions. Other users will likely need to conduct a similar analysis to the one presented in this work to derive suitable procedures for their labs (as suggested by the authors on P5306, L11-12).

P5300, L25-27: Why have they tried to minimize the isotopic differences between subsequent samples? A broader range of isotopic differences could have been interesting.

P5302, L7 et seq.: Rather than analyzing selected individual results, I believe it would be more informative to present more holistic plots or tables indicating the expected magnitude of memory effects and standard deviations as a function of the inter-vial range and of the part of injections considered. This could serve as a basis for practical decisions when the maximum inter-vial isotopic difference can be anticipated. Such basis is not provided when only results for some extreme cases are provided.

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P5303, LL20: Given the sequence of samples chosen, have the authors observed a dependency of memory effects on the direction of the gradient of isotope ratios of subsequent sample waters? That is, are the same memory effects observed for positive and negative isotopic differences of subsequent sample?

P5303, L25-27: I agree with reviewer#2 in that an evaluation of memory effects as a function of analysis time would be more meaningful in terms of instrument performance and could be included. However, from a standard user point of view the evaluation as a function of number of injections is still relevant.

P5306, L1-14: Although some useful arguments are made, the recommendations provided in this paragraph partially lack decidedness reflecting a lack of direct transferability of results. Particularly given the narrow scope of this technical work more definitive guidance should be offered. For example, the authors could have applied the cited post-analysis correction calculations.

Technical Corrections:

P5305, L3-5: The acronyms are already defined on P5298.

Figure 4: In the figure caption and on P5304, L8-9, it is stated that results are shown for two samples and one standard. This is in disagreement with the legend.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 5295, 2012.

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