

Author Response to hess-2013-422 - Referee 2 Comment

We thank the Anonymous Referee #2 for the thoughtful comments on the manuscript. To simplify communication, we split the referee's general comments into several parts and address them separately. We hope that this is in common interest. Please find below our replies to the comments.

Comment Part 1:

I fully appreciate the effort that goes into the experimental fieldwork and that outcome is produced based on subsets of a sampling campaign. However, this also comes at the expense that the results can not necessarily be generalized over longer time periods and or spatial scales. The authors do discuss limitations and further work but nevertheless state that the very short time period used for analysis shows the approach can be used to continuously (and unattended) measure pore water isotopes over different seasons and long time periods. The latter is slightly overstated and would require a demonstration of results obtained over several months with reference to a maintenance protocol (change of standards, cleaning of tubes, valves, etc.). My personal experience with laser spectrometers quite often showed temperature effects on the isotope analysis which can only be avoided in temperature-stable field laboratories.

Reply to Comment Part 1:

The authors appreciate this warranted comment regarding the system applicability over longer time periods and this aspect will be discussed more clearly in the paper. As outlined in reply to comments of referee #1, we do not see major technical issues prohibiting unattended application of the system over long time periods and a wide range of conditions. At the same time, we are aware and also discuss in the paper that a range of potential effects exist that could have an impact on the quality of measurements. Yet, it is our belief that these effects are either negligible or can be accounted for and will not severely impede the functionality of the system. A holistic assessment of potential sampling effects is, however, beyond the scope of this paper. As for every new sampling technique, this will require and also deserves continued laboratory experimentation and field application. Therefore, we are currently initiating a long term application at an experimental site with constant access to grid power, which was not provided at our previous site.

Temperature dependence of laser-spectroscopic instruments may pose an issue for long term operation across seasons that will be addressed in the revised paper and a sophisticated thermo-insulation of the vapor isotope analyzer may prove a beneficial addition to the system set-up. Please note, however, that no major temperature effects were observed during the course of our experiments, despite air temperature fluctuations of approximately 15°C, and that frequent calibration, as proposed with our approach, resolves

much of this problem. Also, newer generations of analyzers do demonstrate strongly reduced temperature effects compared to older models.

Nevertheless, the long term applicability of the system deserves a more clear discussion in this paper that will be included.

Comment Part 2:

Also, it is encouraging that both in-situ and destructive sampling gave comparable results I am somehow unsure about what pore water was and can be sampled. It may well be that other methods such as cryogenic extraction and centrifuge experiments show different results due to the inclusion of potentially tighter bound pore water.

Reply to Comment Part 2:

We appreciate this insightful comment and agree with the referee in that the part of the water-filled pore space actually represented by the sampled vapor should be investigated and we have also thought about this effect. An inter-method evaluation considering classical pore water extraction techniques and IRMS analysis would certainly be highly beneficial in this regard. Since this will help shaping our understanding of the presented method and interpreting the measurement results, we have planned to conduct such a comparison in the future. For the present manuscript, however, we believe that a discussion of this issue (please see the manuscript P 13316, LL 2) should be sufficient.

Comment Part 3:

Furthermore, the paper is very technical and could benefit from improving general readability by e.g. describing technical jargon to a wider audience and simply split long sentences. The authors could also consider shortening some parts (see examples below) or consider presenting this important piece of work as a technical note focusing on the analytical approach and technical development with an example application rather than the full paper.

Reply to Comment Part 3:

The referee makes some warranted suggestions here. Overall, we do believe that a coherent part of our research is presented in this paper including the system and processing set-up and an exemplary and evaluated demonstration of a field application. Without doubt, fairly technical jargon is used in this paper to describe the system set-up. This was done in the interest of a concise description of a complex multi-component set-up with high density of information. While certainly beneficial on the one hand, it is our concern that extensive explanation of technical details would expand this paper beyond an appropriate length on

the other hand. We will, however, be glad to accept the referee's suggestions and try to improve readability in terms of sentence structure and shorten the abstract and discussion section where possible.

Specific Comments:

Abstract: I think the abstract could be substantially shortened. Many of the technical aspects are not really needed at this point.

Abstract, Line 23: This is heavy jargon and a very long sentence. I suggest simplifying the expression "specific identical treatment onsite calibration approach" and split the sentence.

The sections 4.3 Assumptions and Limitations and 4.4 Outlook could be merged and shortened.

Reply to Specific Comments:

We thank the referee for these specific comments and will try to implement them in the interest of brevity and readability of the paper.