

Hydrol. Earth Syst. Sci. Discuss., author comment AC2
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Reply on RC2

Agathe Defourny et al.

Author comment on " $\delta^{13}\text{C}$, CO_2 □/□ ^3He and ^3He □/□ ^4He ratios reveal the presence of mantle gas in the CO_2 -rich groundwaters of the Ardennes massif (Spa, Belgium)" by Agathe Defourny et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-611-AC2>, 2022

Dear referee,

Thank you very much for the careful proofreading of our work. You raise several interesting points which will be adapted in the final version. The question of the volcanic origin of the gas was indeed raised by Ref1. This point was not clear to us when writing. New readings on the subject will allow us to refine it, by mentioning that the origin of the volcanism of the Eifel is still subject to debate and that this work does not allow to conclude between one or the other origin.

The question of the isotopic fractionation of the different gases has not been raised in this work because we are not yet in a position to present precise fractionation calculations for our samples. The discussion section could however be supplemented by some general mentions on the subject.

Similarly, the suggestion of representing the values of isotopic ratios as a function of the distance from the eifel has been considered. However, we do not believe that the gas transfer takes place homogeneously from the eifel, but rather in a localized way via faults. It is the representation of the ratios in relation to these faults that should be represented. The broader understanding of the system and the role played by these major faults will allow us to make such a representation. Moreover, the distance separating the Bru and Spa sites (20 km) is small compared to the distance to the Eifel (100 km) and it is probable that the variation in the ratio at this distance is no longer significant.

Adapting the title to make it more general to all relevant gases is a good suggestion, as is the ability to show the results in the summary. All minor comments will be edited.

Once again, thank you for your interest in this paper and for your constructive suggestions.

On behalf of all co-authors,

Agathe