

Interactive comment on “Isotopic fractionation during soil uptake of atmospheric hydrogen” by A. Rice et al.

Anonymous Referee #1

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This manuscript deals with estimation of the isotope effect associated with H₂ uptake by soils. Better estimate of this isotope effect is important for the calculation of the global fraction of hydrogen taken up by soils. This is an important goal. The manuscript is written very well and the conclusions are straightforward so my recommendation is to publish it basically "as is".

My only comment is that the authors might want to consider going a bit deeper in their discussion about the kinetic isotope effect (KIE). They state that they assume small fractionation due to microbial (I assume enzymatic) consumption. They either have to explain why they make this assumption or cite previous work where an explanation can be found. Regarding the dependence of KIE on soil moisture and rate of uptake, I believe it depends to some extent on interplay between effects of binary gas diffusion

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and Knudsen diffusion which, it turn, depend on the size of air filled passages among soil grains. They might want to go further and propose future experiments for testing these effects in sterilized soils where there is no microbial uptake. But as stated above, I would leave it up to them to decide whether to include my suggested addition in the discussion.

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