

Interactive comment on “Isotopic fractionation corrections for the radiocarbon composition of CO₂ in the soil gas environment must include diffusion and mixing” by Jocelyn E. Egan et al.

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Thanks to the referees and the editor for helpful comments that have led to a much-improved manuscript. Referee comments are listed below, and our responses follow each - line numbers refer to those in the revised version.

Sincerely, Jocelyn Egan (for all authors)

C1

The paper proposes new corrections for the radiocarbon composition of CO₂ in the soil gas environment. The paper describes in detail how the authors have derived these new corrections to include diffusion and mixing in their approach. The paper should revive and encourage further discussions on this important but somewhat under explored topic. The topic therefore up to now has remained only partly resolved. Even the new corrections proposed by in the current papers have certain limitations, which the authors rightly highlight in the discussion of the paper.

Response: Thanks for the positive comments.

Whereas, the isotope corrections are described in great detail, the field profile study is somewhat lacking in such details, especially the description of the site and soil used is rather scant. Please enhance this section.

Response: In this paper we did not intend to use the field data as validation for the method, but as an example of how the new theory could be applied. We prefer to avoid a greater emphasis on the field study than we have included. However, we have added a few more details about the soils (page 11 lines 21-23).

Furthermore, as the topic of the paper is rather specific, e.g. how and if the way the various formula's relate to each other is correct, some specific detailed isotope/radiocarbon expertise is needed to verify this.

Response: This comment is too vague for us to craft a response. The authors collectively have decades of experience with isotopes, and hopefully our perspective will be taken seriously.

In a more general sense the paper can be published with minor revision also in light in the perception that it creates a focal point for further discussion around this paper on such isotope fractionation correction for radiocarbon (¹⁴C) measurements.

Response: Thanks, we would also like to see it published.ĀĀĀ

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Please also note the supplement to this comment:
<https://www.biogeosciences-discuss.net/bg-2018-451/bg-2018-451-AC2-supplement.pdf>

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2018-451>, 2018.