

# ***Interactive comment on “Groundwater data improve modelling of headwater stream CO<sub>2</sub> outgassing with a stable DIC isotope approach” by Anne Marx et al.***

## **Anonymous Referee #1**

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General comments: The authors of this manuscript apply an already existing model to assess the CO<sub>2</sub> loss from a small silicate based watershed in Czech Republic. The novelty resides in the fact that their study is simplified by the fact that the watershed drains silicate rocks only and they use real data for the groundwater end-member instead of using literature values. The results from this manuscript are important since there are very few reliable data of CO<sub>2</sub> emissions from first order streams to estimate global CO<sub>2</sub> emissions from aquatic systems. I thus recommend the publication of this manuscript provided that the authors address the following specific comments.

Specific comments: P.6 L. 3-4. The authors mention that the d<sup>13</sup>C-DIC data have

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been normalized to the VPDB scale by assigning +1.95 to NBS19 and -46.6 to LSVEC. These are solid carbonate materials which are very difficult to dissolve in water. It is thus unlikely that the authors have used these materials to normalize the raw data and if they did, they have likely broken the “identical treatment” principle. Here, the internal reference materials with their values and uncertainties need to be stated. P.6 L.6. The same applies for the d13C of POC. Also, I am sceptical that the Aurora-IRMS system was used to measure d13C of POC. Unless the authors mean TOC, the usual method is to use an EA online with an IRMS. The authors should clarify. P.6 L.15. In Equation 2, HCO<sub>3</sub> was not measured. The authors should state how they have calculated HCO<sub>3</sub> from the measured data and propagate their uncertainties. P.6 L.21. Even though the authors explain in depth their choice of an R value of 14% later in the discussion, they should explain here their choice of this value since there is no uncertainty associated to this value in the original cited paper. P.6 L.24. The authors state that they use d13C of POC instead of the d13 of SOM. In soils, DOC is often more important than POC and CO<sub>2</sub> is more often linked to DOC than POC. Please explain why you use d13C of POC and not DOC or TOC. If d13C-POC = d13C-SOM, then explain. P.6 L.28. Why is the term R not part of the modelling with groundwater?

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