

Interactive comment on “Increased carbon capture by a silicate-treated forested watershed affected by acid deposition” by Lyla L. Taylor et al.

Anonymous Referee #1

Received and published: 21 August 2020

Summary: Taylor et al. present results from an enhanced rock weathering (ERW) field experiment in Hubbard Brook Experimental Forest in the northeastern United States. The authors show observational and modeling evidence in support of sustained carbon dioxide removal for 15 years following the application of silicate minerals to the the experimental plots in 1999. Overall, I find the observational and technical pieces of this manuscript to be very strong. I also found this manuscript difficult to read. I believe the authors could improve the readability, and likely the impact, of the manuscript by revising the structure and flow of the manuscript. Currently, there are an extensive number of equations, missing topic sentences, and redundant sections. These all need to be edited to improve the manuscript. I have tried to highlight some examples below.

General comments:

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Please streamline Secs. 2.2.3-2.2.5. After reading them many times, it is still very confusing which equations were used in the modeling, and which are there merely for background context.

Please use math fonts to better differentiate between text and equations. It is very hard to follow the train of logic in the manuscript, which employs 16 equations, without appropriate fonts.

This manuscript would benefit from a table listing all model variables presented in the manuscript with descriptions and units. It is too difficult to keep track of all variables, especially without the use of Math font currently. Also, all model variables need to be used consistently throughout the manuscript. For instance, “X” is used in Eq. 9 and “X_Ca” is used in Eq. 10.

Please embed figures and tables in the appropriate positions in the manuscript, not at the end. This greatly facilitates comprehension of the non-typeset document by reviewers.

Please make arrangements to make the Matlab scripts publicly available, via Github, as a series of supplemental files to the manuscript, or through some other appropriate means. Doing so improves the reproducibility of the science, and allows others to access them without needing to make a “request” (as indicated in the manuscript).

This manuscript is missing a study site figure (probably as Fig. 1) that orients readers to the HBEF and the study and control watersheds.

Please do not reference equations that have yet to be presented in the manuscript (e.g. Eq. 13, L128).

Specific comments:

There are two Sec 2.1.1: Site description and Treatment description. Please correct.

Sec 2.1.1 (Site description): Watershed W1 is never introduced. It needs to be intro-

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duced here prior to mention of its flow rates (L74)

I find the transition between Secs. 2.2 and 2.3 to be difficult to follow. Sec. 2.2 presents the modeling approach and the first sentence in Sec 2.3 begins talking about wood production. Please provide some introductory material in Sec. 2.3 prior to discussing the details of the GHG calculations

Inline calculations (e.g. L195) are very difficult to follow and hinder comprehension. Please consider alternative ways to deliver this information to readers.

Secs. 3.2 and 3.3 are essentially sensitivity analyses of the model to different assumptions or scenarios. As such, I think Figs. 2 and 3 could be placed in the SI in order to keep the main figures focused solely on the observational results of the ERW experiment (or model results of the observations)

Sec. 3.5 is identical to Sec. 3.3 (unless I am missing something). Please remove.

Sec 5: This section does not add any new information to the manuscript, especially since key findings were reviewed in Sec. 4. Please remove.

Figs. 1 and 2 are too small to be easily readable. Please enlarge.

Figs. 1-3: The dashed lines representing the treatment should be identified in the figure captions.

Fig. 4: Is time-integrated CO₂ flux shown on the y-axis (as implied by L 324)? If so, please correct the y-axis label accordingly.

Table 2/Fig. 5: I find the terminology and axis references incredibly confusing. Please use alternate language that more clearly indicates whether the total greenhouse gas budget has increased or decreased.

Fig. 5: missing panel captions (e.g., “a)”, “b)”, etc.). Also the caption is excessively long and needs to be shortened.

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Fig. 5: I could not find a reference to this figure in the text. Please add a reference.

Figure axis text needs to be enlarged across all figures.

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