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Earth Surface Dynamics Discussions

Interactive comment on "Impact of different fertilizers on the carbonate weathering in a typical karst area, Southwest China: a field column experiment" *by* Chao Song et al.

Anonymous Referee #2

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General comments

This paper is dealing with the role of the application of chemical and organic fertilizers on carbonate weathering in a karst area. Their approach was based on a laboratory experiment using a soil column including two carbonate rock tablets over one year on the field. The authors discussed the loss or gain of weight of each rock tablets in term of variability of carbonate weathering under various fertilizer treatments. The topic as such should be well suited for a publication in Earth Surface Dynamics, but this manuscript is not, at least in its present state. It needs some clarifications. I would suggest major revisions of the present manuscript.

Specific comments In its present form, I cannot recommend the publication of this

manuscript for different reasons.

1 - The authors did not present very well the process/method of weathering which has been used in this experiment: did the authors perform a leaching of the soil column? How are the fertilizers introduced in the soil column? Are spread mixed with soil or spread in solutions? The lack of explanation of the method used does not allow us to assess the results at their fair value. There is also a lack of discussion and comparison of numerical values obtained in other experiments and in natural and agricultural catchments. The carbonate weathering is only estimated based on the weight of each rock tablets. It is not checked by the geochemistry of both rock tablets and the potential weathering/soil solution. Indeed, it would have been interesting to have an estimation of the chemical weathering. 2 – To speed up the carbonate weathering, the fertilizers were introduced by increasing their amount by 30 times (Why 30 times?). It is a bit problematic, because the authors changed the soil/fertilizers ratio compared to "natural/anthropogenic" ratio? What is this ratio in the local agricultural catchments? What are the specificities these local catchments compared to national Chinese catchments and worldwide catchments? 3 – The variability of the experimental replicates should be shown (average and standard deviations), presented and discussed. This can be presented in Table 2. 4 – In general, the authors used limestone and dolostone tablets. They did not discuss the results of dolostone tablets, only those from limestone tablets. In the discussion, the difference or similarity between dolostone and limestone is erased as the authors discuss about carbonates. More attention, or at least an explanation about the use of the general term of "carbonates" instead of the difference between dolostone and limestone should be given.

Technical corrections

Here are some specific comments and suggestions. âĂŘ In several times in the manuscript (last sentence of the abstract, first paragraph of the results, 4.4. and the last sentence of the conclusion) the authors used the expression "can aid carbonate weathering": they should precise if the fertilizers enhance, increase, or decrease car-

bonate weathering. . .

âĂŘ Introduction: - L.43 - The authors should add references showing the relationship between carbonate weathering and climate in addition to Liu et al. (2010, 2011); for example Kump et al., 2000). - L.47 - The authors should precise that the disturbance of CO2 consumption disturbance may be overestimated at a local scale by taking into account Ca2+ and Mg2+ produced by a natural carbonate weathering and those produced indirectly by anthropogenic activities in the watershed. And what about this disturbance at a global scale?

âĂŘ 2.2. Soil properties : - At which depth did the authors sample their soils? - Should precise pH(H2O) - Precise what OM means: organic matter I suppose. - Precise what ASI method means. - What is the soil typology?

âĂŘ 2.3. Soil column - What is the filter material? - What kind of carbonate rocks did the authors use for their experiment? Are they reference rocks or rocks from karst area of HuaXi district? - How did the authors deposit each fertilizer in the column? In liquid or solid form? - At which temperature has the experiment been performed? - Did you leach the soil column with a solution? If yes, with which solution? - In figure 2: the authors draw 3 rock tablets, while the authors put only 2 rock tablets at the bottom of the column. Should change it. - Did the authors perform the same experiment without rock tablets if they leach their column in order to observe the leaching solution of the column? - Did the authors put the 2 different rock tablets (calcite and dolomite) in the same column? - The authors should explain the reason of the fertilizer weight use in the experiment.

âĂŘ 3. Results - L.164-165: Do not repeat Table 2 and Fig. 3. You may write: “The results are presented in Table 2 and in Figure 3.”

âĂŘ 4. Discussion - 4.1.: the first paragraph (L. 182-197) is quite general and it would be worthy to move it either in the introduction, or at least in the Materials and Methods section. - 4.1. L.213-219: It is exactly the same text as in the introduction (L. 48-54).

The authors may express their idea at least a little bit differently. - Information about soils and soil solutions are needed in order to understand their chemical evolution during the carbonate weathering. - Would it be possible to present the chemistry of each fertilizer used in this experiment? This can be added in supplementary information.

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