

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.

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Referee 1 Comment 1: Could authors provide the ratio of the nitrate fertilizer vs. total nitrogen fertilizers in studied area, or China, or whole world? It is important for the significance of the manuscript and the experiment. Answer: Yes, it is very important, but we can't find the specific published data about it. Only one figure we can calculate according to a reference published in 2008 is that the global production of NH_4NO_3 accounts for 10% of the total N fertilizers, and about 4% in China. But we think this figure is not fit to be cited in this manuscript. We think that this study only focused on the relative potential mechanism, and the study on the estimation of the impacts will be considered in the future. Comment 2: Could authors compare results with data by

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Prof. Yuan DX's group paper ? Answer: We have cited the relative result from Prof. Yuan Dx's group in this study, such as the papers from Jiang Z., et al.; Liu Z., et al. and Jiang Y., et al.. In fact, we are familiar with them and their study focuses, we know that their studies are a little bit different from ours so far. Comment 3: The manuscript need more detail for the experiment. L134-L139: Please give a detail introduction for the added amount of fertilizers in these treatments. It seems that the added amount of nitrogen is slight difference. (1) What's the proportion of these eleven fertilization treatments in local practical use? Answer: The added amounts of these 11 fertilizers were designed only by the average amount of N, P and K fertilizer in the local practical use. Changed in the manuscript: We have added the amount of N, P and K fertilizer in local practical use in this manuscript like this: N fertilizer: 160 kg $\text{N} \cdot \text{ha}^{-1}$; P fertilizer: 150 kg $\text{P}_2\text{O}_5 \cdot \text{ha}^{-1}$; K fertilizer: 50 kg $\text{K} \cdot \text{ha}^{-1}$ (2) Why choose the added amount of fertilizers are 30 times than its local practical amount? The application fertilizers in local practical may change two or three times to use. Do you think the added fertilizers by one time may affect the result? Answer: Because the added amount of fertilizer can magnify and quicken the fertilization effect in the short-term according to another experiment from us, and can't affect the phenomenon we want to observe in this study. Another paper of ours (in preparation) about a series of different amount of fertilizer addition will discuss this issue. (3) Why don't authors set different height for this experiment, which might be more interesting? Answer: Thank you for your good suggestion. This study is conducted as a simply start. The suggestion on different height must be interesting. We are considering that in further study. (4) Does author consider that the land use influences the carbonate weathering in the experiment? Answer: In fact, there are some good studies to be published about that around the world. But most of them are conducted by the search and evaluation of riverine hydro-geochemical data. Because of this, we did this study from another angle, and hope to connect them in the future. Comment 4: The authors made three replications. So please show the data errors for each average value. Answer: Fig.3 has showed these error bars. We will add them in Table 2. Changed in the manuscript: The error data have been added in

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Table 2. Comment 5: Could you assess the variation of nitrate fertilizer change in the column. Then understand the balance between acid producing and carbonate weathering together. Answer: We tried our best to explain the chemical process of N fertilizer in section 4.3 with relative chemical reactions. Comment 6: Line 15-17, the sentence has too many “different”s. Please revise it. Changed in the manuscript: We use “these discrepancies” instead of “their differences”. Comment 7: In section 2.2, could authors provide details about abbreviation of OM, ASI method and others when you write that at the first time. Please check that in whole manuscript. Changed in the manuscript: We have changed this. Comment 8: L162-166 It seems Table 2 and Fig3 are repeated. Changed in the manuscript: We deleted the relative data in Table 2, and leave the Fig. 3 because the figure is easier to see. And we also changed corresponding texts. Comment 9: L182-L197 This paragraph can be removed to the introduction. Changed in the manuscript: We moved them to the introduction. Comment 10: L213-L219 It is repeated the introduction (L49-L54). Answer: Because they are for elaborating different problem, we think we should put one of them another way. Changed in the manuscript: We changed the statements in section 4.2. Comment 11: Major conclusion might be revised. Ammonium fertilizer mainly includes NH_4NO_3 , NH_4Cl , $(\text{NH}_4)_2\text{CO}_3$ fertilizers, not includes urea fertilizer. I suggest reductive nitrogenous fertilizer could enhance carbonate weathering via nitrification. Changed in the manuscript: Yes, the statement that nitrogenous fertilizer can aid carbonate weathering should be replaced by ammonium fertilizer” in this manuscript is not precise. We deleted it.

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