

Comment on soil-2021-78

Anonymous Referee #1

Referee comment on "Modelling the effect of catena position and hydrology on soil chemical weathering" by Vanesa García-Gamero et al., SOIL Discuss.,
<https://doi.org/10.5194/soil-2021-78-RC1>, 2021

After reading this manuscript, I question whether the term "catena" is the proper description here. A true catena will have differences in parent materials, vegetation, etc. across the catena. This location appear to have largely uniform parent materials and vegetation. I believe "toposequence" would be a more accurate depiction of the study site than "catena".

Line 27 – The 5 soil forming factors should not be capitalized.

Lines 74-77 – It is nice that Brantley et al. (2017) developed a conceptual model in three different parent materials, but what is the application/advantage of this model. Why is it important to bring this model up in the introduction? More to the point, what did they conclude as the relationship between reaction fronts and catena position?

Line 109 – The introduction gives a rather abrupt transition from discussing previous works to presenting the objectives of this study. A better transition would be beneficial. And, the objectives should be in a paragraph of their own.

Lines 132-133 – The scientific names of the most common vegetation species should be supplied here.

Table 1 – The latitude in this table isn't meaningful, because it isn't different for any of the profiles. Just say the study site is at about 38 degrees N in the site description in materials and methods. Same comment with the downwind bearing.

Figure 2 – It appears that climate and vegetation were varied from 12,000 years BP to present, but were considered constant from 20,000 BP to 12,000 BP. There are not any studies from this area that could provide climate and vegetation data for the 20,000 to 12,000 BP period? This is a definite weakness of the study.

Lines 180-185 – Were any known samples analyzed as a quality check on the data generated?

Table 3 shows chemical composition values for the profiles. However, with the exception of Zr, there is no explanation regarding where this data came from. This needs to be supplied. If the data was generated as a part of this study, how it was generated needs to be explained in the materials and methods. If it was generated as part of a previous published study, that needs to be referenced.

Line 220 – What statistical technique was used to determine that the slope of the line was

significantly different than 1?

Table 4 is not needed. Almost all of these values were already given in the manuscript in line 224. Tables should not simply repeat what is in the manuscript (or vice versa).

Line 264 – There are established models with defined topographic positions published in the literature. I do not recognize the model you are using, please provide a reference for it and briefly describe it in the materials and methods. If you are not using an established model, you should either 1) use an established model, or 2) give a complete explanation of your topographic position model in the materials and methods along with an explanation as to why you are using it and not an established, published model.

Lines 318-320 – Is it possible that the deeper weathering profile on the north facing slope is because there is less evapotranspiration, leading to either 1) more water for chemical weathering to take place, 2) more water to allow for vegetative growth, thus affecting chemical weathering, or 3) both 1 and 2?

Line 340 – Are the rainfall amounts in the Betic Cordillera similar to those simulated here? If so, in what way (e.g., are they similar to the mid-level rainfall amounts modelled, the higher rainfall amounts modelled, etc.)? Are there other places that can fill in the missing rainfall amounts (e.g., if the Betic Cordillera amounts are similar to the greatest rainfall levels modelled, are there other studies that can fill in the intermediate rainfall levels modelled)? Right now this modelling in section 3.3 seems weak, in that there is little to no validation. Figure 9 for CDF provides the type of information I would like to see to validate the modeling shown in Figure 8.