Biogeosciences Discussions

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Comment on bg-2021-295

Xavier Dupla (Referee)

Referee comment on "Soil geochemistry as a driver of soil organic matter composition: insights from a soil chronosequence" by Moritz Mainka et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-295-RC1, 2021

An overall excellent paper. Informative, concise and very well written. I am confident that the scientific community will welcome it warmly. Please find, some minor comments below:

line 58: remove thereby which is misleading with the previous sentence

line 61: oxide do not "become" positively charged at low pH values, they are positively charged on the whole pH range of almost all soils (check pzc values). If you want to open the pandora box of variable charges, it is difficult to speak about the protonation of surfaces without saying that several OM functional groups too protonates when pH becomes acidic. Furthermore, if you want to maintain this sentence about acidic soils, then you could more explicitly mention that soil acidification is a key process behind soil weathering.

line 79: this section contradicts what you say from line 47 onwards. Rephrasing either the upper section (lines 47-52) of this one (lines 79-85) might help

Discussion section: overall excellent. However, you did not notice any significant decrease in base saturation along your chrono-sequence which contradicts general description of soil weathering sequences. This aspect is extremely interesting and should be discussed.

Non-binding suggestion : your discussion sticks very closely to the parameters. I was expecting your paper to zoom out at some point in order to 1) discuss how the climate and geomorphological changes that happened in your 3 million-year sequence may have impacted your results 2) discuss the general impact of your findings on our understanding of soil weathering, 2) outline the limits of your study and what should be done to go

further.