

Biogeosciences Discuss., referee comment RC1  
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## Comment on bg-2022-41

Anonymous Referee #1

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Referee comment on "Climate and geology overwrite land use effects on soil organic nitrogen cycling on a continental scale" by Lisa Noll et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-41-RC1>, 2022

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This study studied the factors of land use and bedrock on protein depolymerization across a 4000-km transect in Europe, and highlighted the important role of climate and soil properties on N cycling at large scales. The sampling scheme is attractive, and many interesting biochemical indicators are measured. This study stated N cycling was controlled by substrate availability. This conclusion is not novel, actually which has been widely acknowledged for a long time. Generally, I think this paper fits the scope of this Journal, however, more should be added to highlight the novelty of this study. Some conclusions are confusing, the author had clarified the importance of substrate availability, which was related with OM input or vegetation, however, it also declared that the land use effect was insignificant. Those ideas are not consistent. It's better to clarify them. Besides, the writing should be improved. For instance, some paragraphs lack the key points, and some sentences are confusing or too long to understand. See the details as follows.

Line40: The key point of this paragraph is not clear, clarify it. And since land use is your main sampling scheme, you can introduce more about it.

Line 50. This reference was in contrast with your contents, discuss it later.

Line 64, add reference.

Line96, what's the depth of the 'organic layers'?

Line 180: This sentence is confusing, please rephrase it.

Line 340: Simplify the sentences

Lin 320-335: It's confusing in 4.1. 'land use had no effect on the response of depolymerization rates', however, above discussion was talking about the differences in different land use, and even attributed the difference to soil pH.

Line 343: pH was the main predictor in results, but the contribution of texture, mineral assemblage, how are they related to N cycling? □

Line 360: I don't think this indicate that 'stabilized compounds are available for microbial utilization'

Line 365: Add reference

Line 376-378: this sentence is confusing, please simplify it

Line 390: add support for this opinion

Line 405-420: Do you mean that the climate factors influence soil pH and then regulate the depolymerization rates? However, your data doesn't seem to support this, please explain it.

Line 450: can you compared the contributions in the combined model including land use, soil properties, climate together?

Line 462: It's confusing, 'peptidase activity is a proxy of microbial N or N limitation'?

Fig 5: 'black arrows' are missing in the figure. And how to identify the direct and indirect effects?

