

Interactive comment on “Agropedogenesis: Humankind as the 6th soil-forming factor and attractors of agrogenic soil degradation” by Yakov Kuzyakov and Kazem Zamanian

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Anonymous Referee #1

This review paper addresses humankind impacts on soil development. The authors highlight the importance of humankind impact as new soil formation factor and distinguish it from natural soil formation factor due to the impact that it has on the soil development. As the authors pointed out in their text the importance of humankind impacts on soil formation has been acknowledged by some researchers but what makes the view of authors special here is the way they take into account its contribution in soil development. They argue that the natural soil processes result in soils with diverse

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functions and properties, while the humankind interferences in the ecosystem result in soils with uniform and similar functions and properties. In this sense, the impact of humankind on soil development is introduced as a convergence factor and neutral soil formation factors as a divergence factor.

The authors' opinion here is mainly supported by some examples at which different land uses (mainly forest) were converted to agricultural use. I found the view of authors interesting and considered it as an emerging topic in the field of fundamental soil science. In general, I do not have any fundamental comments on the concept presented here and believe that this review should be published as a review paper in the journal of Biogeosciences Discussion.

- We are very thankful to the Reviewer for his very positive assessment and suggested improvements. Please see our improvements and answers below.

Given that all the authors are very experienced scientists with a substantial track record, this is a pity, and I cannot refrain from emphasizing that the text and figures need some careful revisions. Some examples are listed below:

Fig.1 is an interesting figure showing the main concept presented in this review. However, it was hard for me to follow its context and would suggest some modifications to this figure as follows: 2) place the legend on the right side of the figure. In its current location is confusing and the readers may relate it to the time, 2) Does the red arrow on x-axis show start of cultivation decades? if yes remove its label out of the figure that one can read it. otherwise, it looks like two different labelings,3) it is not clear what does it show the label " duration/intensity of cultivation. Do you mean a time period between the start of cultivation till now? If yes, show it with an arrows bellow the x-axis, 4) move the label of x-axis more to the bottom and make some space with indicated time.

- Many thanks – we can understand well that these points are not clear. We improved the Fig 1 as suggested by the Reviewer and hope that it is easier to follow now. We

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added legend, removed Millenia and Decades, added additional x axis for agropedogenesis.

In fig. 2, what does it mean 'Soil genesis based on the development of concepts' in the caption of figure? I would recommend the authors to rearrange this figure and improve its readability. In the current version, it is hard to follow its context and message. Found a better way of relating this information together, for instance, the factors and parental materials, climate, etc. Here and elsewhere in the figures, I found it annoying for readers to follow a diagram with varying font sizes and styles.

- We completely rewrote the caption. We have unified better the font sizes within each Fig. We still left some various fonts to show the importance of processes.

In Fig. 4: It is hard to understand the message of this figure. What does it mean factors 2: 38% and 1: 48% in the label of x-axis and y-axis. Do you mean a relative increase of 38% and 48%? Where does the 1 start?

- This is the results of a principal component analysis on various parameters measured in the abandoned agricultural soils with increasing abandonment periods. We improved the Figure and also add more details to the legend for better understanding. 75% of variation in soil properties is explained by factor 1 and 19% by factor 2. If the Reviewer mean that this is superfluous Fig., we will move it to Supplementary Materials.

Fig. 5: rephrase the caption, it is a confusing sentence and hard to read. In Fig. 5a and 5b, explain in the legend what do show the solid lines. The legend of Fig. 5c and 5d are confusing. Use a separate legend for every four cases.

- The fig. caption has been modified.

Fig. 6: This is an interesting figure. State that this is a hypothetical trend. How do the authors argue on the proposed time? It looked to me that the authors aimed to show here the relative responses of each process with time and the selection of time is not based on any experimental evidence. If that is true I suggest using a normalized time

between 0 and 1 to avoid giving a weak impression.

- The fig. is actually based on the real values stated for each soil property in various studies (including that presented in the Fig. 3 and 4). Nonetheless, the values written on each curve are our suggestion for the attractor of each soil property over long-term cultivation. See also line 380-385.

Fig. 9: how did the authors generate these figures? Are they hypothetical figures? If yes mention it in the caption. What does it mean stage in these figures? Stage of what?

- The figures are conceptual phase diagrams as it is mentioned in the caption. These phase diagrams were made based on the curves in the Fig 6 (now 5), which are experimentally based. The stages show the changing trend in a given soil property over the degradation processes. The stages are time laps to reach a threshold for a given soil property when after that the trend may slow down or become reversed. See line 291-292 for definition of stages of degradation. The fig. caption has been modified.

Some minor typos: Line 220: Replace “decreases “ with “decrease “

- Decreases in Line 234 has revised

Line 33: replace ‘fulfils’ with ‘fulfills’

- It is revised in Line 35

Line 378: replace because with become

- The sentence has been modified

Line 279: replace “independent of” with “independency of”

- “Independent of” looks grammatically correct here.

Line 149: Do the author mean the function rather than production?

- No, the (crop) production is one of the soil functions. So, when only one function can

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be increased at a time the other functions (other than production) will be decreased.

Line 138: Replace “ develops” with “ develop.”

- The sentence has been modified

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