Topical Editor Decision: Reconsider after major revisions (15 Jul 2019) by Karsten Kalbitz

Thanks a lot for your comments in our manuscript. We did not upload a marked-up manuscript version in the plateform as there too many changes. Specific answers to your comment are listed below. Editor's comment in black, answers in blue.

1/ According to WRB there are 3 diagnostic criteria for andic properties (an Alox + ½Feox value of ≥ 2%; and a bulk density of ≤ 0.9 kg dm-3; and a phosphate retention of ≥ 85%.). The authors should comment on that. Furthermore, they have to develop a convincing strategy for using proper terms. The replacement of andic properties by andic soil materials is not the best option because the latter is not really defined. The alternative provided in the response letter "short-range-order constituents" might be used consistently and throughout the manuscript. However, please replace "constituents" by "minerals".

As we did not have data for phosphate retention, we did not especially comment on the 3 diagnostic criteria proposed. We used the term *allophanic* soil material for the soil material which have Alo + 0.5 Feo >> 2% (L. 240-248) bulk densities < 0.8 (L.389) and the term halloysitic soil material for the soil material which have Alo+0.5 Feo ≤2% (L. 240-248) and bulk densities > 0.8 (L.389).

Modifications in the text : L. 240-248 : *"Allophanic* soil materials, corresponding to the soils in the *allophanic* spectral cluster, rich in organo-Al complexes (0.42 ± 0.12 g Al_p 100 g^{-1} soil), and SRO minerals: allophane (15.8 ± 4.4 g allophane 100 g^{-1} soil), Al_o+0.5 Fe_o (5.3 ± 1.2 g 100g^{-1} soil) and amorphous Al, Si and Fe (4.5 ± 1.1 g Al_o 100 g^{-1} soil, 1.6 ± 0.4 g Si_o 100 g^{-1} soil, 1.5 ± 0.2 g Fe_o 100 g^{-1} soil). These soils have Al_p:Al_o ratios of about 1.0 ± 0.4, and Al:Si ratios of about 2.6 ± 0.2. In contrast, *halloysitic* soil materials, corresponding to the soils in the *halloysitic* spectral cluster are poor in organo-Al complexes (0.18 ± 0.11 g Al_p 100 g^{-1} soil), and SRO minerals: allophane (5.3 ± 2.9 g allophane 100 g^{-1} soil), Al_o+0.5 Fe_o (1.9 ± 0.9 g 100g^{-1} soil), and amorphous Al, Si and Fe (1.5 ± 0.8 g Al_o 100 g^{-1} soil, 0.7 ± 0.3 g Si_o 100 g^{-1} soil, 0.9 ± 0.3 g Fe_o kg^{-1} soil). Their Al_p:Al_o ratios are highly variable (about 1.7 ± 1.5), and their Al:Si ratios are about 1.7 ± 0.6. In a given cluster, the Al_p and the Fe_o content, the Al_p:Al_o ratio decrease with depth, but not the allophane content, Al:Si ratio, nor the quantity Al_o+0.5 Fe_o. "

We replaced "constituents" by "minerals" as proposed and used more consistently as previously "SRO minerals".

2/ The whole manuscript is by far too long. Particularly the discussion is sometimes very broad and not all the time focused on the main hypotheses of the paper. One reason for that might be the combined "Results and Discussion" section. The authors should think about the advantages to change the whole structure of the manuscript (separated results and discussion sections).
I give you some examples in the manuscript where the need for reduction is very obvious to me: lines 277-285, 328-339, 353-378, 401-415, 436-467, second part of the section 468-490

We did not separate results and discussion in two parts, but we shortened the discussion to focus on the main hypotheses of the paper. The number of lines were not dramatically smaller in that new version because of more extended abstract and material and methods sections as requested by the two previous reviewers.

4/ The acronyms for the two mineral clusters are not very straightforward. Using ALL for allophanic but also for all samples is misleading and a potential source of confusion. Do you really need an acronym? I would suggest to use the full names or more appropriate acronyms. There is no need to use these acronyms in tables – there is sufficient space for the full name.

We deleted the acronyms and replace by the full name *allophanic*, *halloysitic* and *allophanic-halloysitic* (the latter for the soil profile type ALL-H) in the masnuscript, figure, table and supplementary materials.

5/ In the Introduction (line 61), andic properties were used to explain high SOC stocks. I would skip "andic properties" here because the processes responsible for high SOC stocks are given.

OK we have skipped "andic properties".

6/Material and Methods: Estimation of andic properties: I would suggest to start with the most important criteria according to soil classification (e.g. Alo + 0.5 Feo)
Line 433-434: oxalate extractable Fe is not equal to ferrihydrite

We have modified the section presenting "andic properties" as requested (L.178-188). As oxalate extractable Fe is not equal to ferrihydrite, we modified the discussion on Fe_o:

Modifications in the text: L.357-340 "In our study, we did not explicitly analyse the form of Fe extractable by oxalate, whether ferrihydrite dominated Fe forms or not, but the preservation of SOC related to Fe_o, even in relatively small amounts (0.9-1.3 g Fe_o $100g^{-1}$ soil), seemed to be the major factor explaining SOC-content variations at the surface and at depth (Fig. 5 and Fig. 6)."

7/I suggest to reduce the number of tables and figures of the main manuscript. Please transfer some information into the electronic appendix (e.g. table 2?, table 3?, ??). There is no need for 11 figures in the main manuscript.

We reduced the number of tables from 8 to 6 and the number of figures from 11 to 8.