

Interactive comment on “Iron and aluminum association with microbially processed organic matter via meso-density aggregate formation across soils: organo-metallic glue hypothesis” by Rota Wagai et al.

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Anonymous Referee #2 Thank you for the thorough review and positive comments. Below we show how we plan to address the points raised.

Rota Wagai, on behalf of the authors

Abstract: I think that the term “density fraction locations” (Line 12) and the sentence in lines 17-18 are hard to understand before the article is read. Please consider alternative phrases.

C1

*** We agree that “density fraction locations” is not a familiar term but we think it is reasonable because it is logically the same as “size fraction locations”. *** We will modify the sentence in line 17-18 to make it easier to understand for readers. The new sentence proposed is as follows.

“The concentrations of Fe and Al (per fraction) extracted by each of the three reagents able Fe and Al concentrations were (per fraction) generally higher in meso-density fractions (1.8-2.4 g cm⁻³) than in the lower- or higher-density fractions, showing unique unimodal pattern distribution along particle density gradient for each soil and each extractable metal phase. “

Line 21: Please include that the assumption of having microbial processed OM is based on C/N ratios

*** Yes, we will add the information on C:N ratio.

Line 27: why is the OM supposed to be stable?

*** We agree that it was arbitrary. We will remove the word “stable”.

Manuscript: Line 141: Why were the fractions dried using different methods?

*** We plan to explain the reason and the assumption behind as follows in Method section.

“The lowest-density fractions (<1.6 g cm⁻³) were oven-dried at 80 oC instead of freeze-drying for a logistical reason. Due to the concentration of the extractable metals in this fraction, we assumed little effect of the difference in the drying method on our result interpretation.

Line 291; Figure 6: I wonder why all SEM images look so similar. Everything seems to be aggregated. Is that also the case for the original soils? Or is it possible that the polytungstate treatment promotes aggregation? Figure caption: where do you see clay coatings? Can you add arrows?

C2

*** We were also somewhat surprised by the well-aggregated appearance of all these fractions. But the aggregate nature observed by SEM is fairly consistent with the results of other experiments (unpublished) that show that most materials in the meso-density fractions are dispersible only after much stronger energy (by sonication). That was done right after the density fractionation without drying fractionated samples. So we don't think the aggregated nature is an artifact. Clay coatings are the plate-like features you see on most of these aggregates. We will try preparing higher-resolution images for the revision.

Line 428: delete "extractable"?

*** Thank you for pointing out. It will be deleted.

Line 506: correct "understanding"

***We will correct.

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