

## ***Interactive comment on “Particles under stress: Ultrasonication causes size and recovery rate artifacts with soil derived POM, but not with microplastics” by Frederick Büks et al.***

### **Anonymous Referee #1**

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**General Comments** The paper analyses the effects of ultrasonication on the particle size distribution of soil organic particles and microplastics. Both is highly relevant for communities dealing with soil organic matter fractionation and with separation and analyses of microplastics in soil, which is an emerging “hot topic” in soil science. However, the methodological approach needs much more justification, the chosen parameters are just stated and appear randomly selected. If this paper wants to set the tone and serve as a cornerstone in microplastic separation from soil, which is a crucial step for their further analytics and quantification, the reader deserves detailed explanation and justification about, for example, the chosen energy levels, the composition of the artificial soil, or the different particle sizes of organic particles, pyrochar, and plastics.

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I detailed several issues in my specific comments that need to be addressed. The discussion lacks in large parts to put the experimental settings and findings into soil ecological context. At several places, the authors formulate very general statements within the discussion, which are, from my perspective, less sufficiently backed up by the data. Please see my specific comments. Furthermore, in the light of only 1.5 pages of discussion, which is about one page in print, the manuscript seems to be less suitable to be published as a full research paper. Instead, I recommend resubmitting a revised version of the manuscript as a technical note or short communication.

Specific Comments Introduction Line 11: delete “some” Line 36: ultrasound is applied to a soil slurry by using a sonotrode Lines 36-37: “light” and “heavy” needs to be explained here Lines 38-42: split into two sentences Line 45: define “extractive performance” and give more reasoning why research in the field of soil contamination with microplastic is crucial Line 49: “Büks et al., in review” is not a valid reference Line 50: sentence is missing that connects this paragraph with the paragraph before Line 63: punctuation mark is not at the correct spot Lines 91-93: Why do you assume this? You need to justify your assumption; otherwise, it is not a hypothesis. The phrase “we were curious” is a weak justification for doing research, provide here a solid hypotheses driven reasoning and provide prove for your claim that this has not studied before, based on what research (literature search?) you conclude this?

Materials and Methods Lines 114-119: hy did you use different particle sizes for soil POM, char POM, and plastic POM, please justify because different particle sizes might affect the outcome Lines 119-121: the weathering approach is not clear to me, justify and explain in more detail, and according to Table 1 and 2 only microplastic samples were weathered, please clarify this here Line 125: why this stress levels, please justify your selection and why do you use J/ml and not the more common J/cm<sup>3</sup> unit? Line 126: why 1% and 0.5%, please justify these amounts Line 127: if you want to simulate the soil matrix, why did you used only fine sand and not a more heterogeneous mixture?

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Results Line 171: two times 100 J/ml

Figure 1 and Table 1 present the same data, so they are redundant, please remove Figure 1

For Table 1 and 2, from my prospective, a paired t-test requires independent samples but your samples are not independent (POM forest is from one soil, LD-PE from one plastic film, for example) based on that you can just state an increase or a decrease or you go for mean values (per energy amount) from farm POM, arable POM, and pyrochar ("natural POM", n = 3) and mean values (per energy amount) from all plastic samples ("microplastic POM", n = 6, this group could be further subdivided into weathered or not weathered), then energy amount or energy amount/ size ditribution can serve as factors in an ANOVA analysis,

Captions for Figures 2 and b: A, B, and C as well as mv need to be explained

Discussion Lines 181-195: this needs to be discussed in the light of the experimental settings, the artificial soil just contained POM and fine sand, how can these findings be applied to soils with much more clay or iron oxides? what would be a step forward to avoid such effects? Line 197: I do not really see a causal relationship here, please clarify Line 199: this would mean that the fine sand particles form associations with small organic particles but I do not see any evidence for this or a paper cited that describes such phenomena, a reason might be that the density of natural POM is changing because of stronger solubilization processes of smaller particles in density solutions Line 200: needs to be "specific surface area in cm<sup>2</sup>/g" Line 203: again, you only have mineral surface of fine sand particles, which are usually less involved in organic matter-mineral associations, this needs to be clarified on a mechanistic level using appropriate literature if no own data can be used Lines 206-207: why that? please provide more detailed explanations on potential effects on fPOM without any stress from sonication Lines 208-217: again, this is a very general statements but need to be seen in the perspective of your specific experimental settings, and what experiments

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would be necessary to get more general information Line 222: define “phenomenal influence” Lines 218-225: again, any recommendations how such effects could be minimized during fractionation Line 226: again, very general statement, define “plastic” Line 227: what about above 500 J/ml? and I recommend to avoid statements like “no carry-over”, for such a bold statement the data are not sufficient

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