Biogeosciences Discussions

Biogeosciences Discuss., referee comment RC2
https://doi.org/10.5194/bg-2021-186-RC2, 2021

Comment on bg-2021-186

Eva Lehndorff (Referee)

Referee comment on "Human and livestock faecal biomarkers at the prehistorical encampment site of Ullafelsen in the Fotsch Valley, Stubai Alps, Austria – potential and limitations" by Marcel Lerch et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-186-RC2, 2021

Dear Marcel and Michael,

thanks for this interesting manuscript. It´s good to increase the number of high quality analyses in the field of faecal biomarkers. I have two major comments and a few minor ones.

The aim of your study was presented in the abstract of the manuscript as " study the importance of human and/or animals for occupation ... of this ... site" . I suggest to simplify this aim to, e.g. " evaluate human and livestock biomarker signals at an archeological site". It doesn´t seem possible to evaluate an importance. Meaning of importance is not clear, if you maybe aimed at evaluating land use and settlements intensities, you should have other data sets to compare with. I hope that if such studies as yours continue we will come closer to such an evaluation.

My second point is the selection of the sample set. You analyzed podsols of which the E horizon was found to be the former landscape surface by containing archeological artefacts. I wonder, why did you analyze the other soil horizons. Please provide a motivation for this. I cannot agree with your statement about water solubilty and transport mechanisms of steroids in soils (line 81). Podsols have low pH (in your case <4). This enables transport of water insoluble organic substances via complexation with metals in soil. I suggest that you include this mechanism as a second aim in your study. You can then make perfect use of the depth resolved analyses and show whether complexation and leaching may affect the ratios of faecal markers or whether all the relevant marker substances are leached in the same way.

My minor comments:

line line 20 - 22: modern faeces analyses can be embedded more clearly. Maybe think of an hypothesis connecting to the transport and leaching propblem, such as "inputs of modern livestock have been investigated for there potential to leach and mask acinet feacl marker signals". Better omit "... agreement to literature data ... " in the abstract.

line 29: a conclusion on plant-derived steroids and root inputs doesn´t seem to be relevant and may be excluded from the abstract to focus on the central hypotheses.

line 30 to 32: Shift Anthrosols and Amazonian Dark Earths to beginning of sentence. I like this comparison and it is more clear then how you evaluatetd the "strength of the faecal input" at your site. Still, it later has to be mentioned that you compare completely different soils from completely different climates.

line 37: delete "accordingly"

line 64-65: I cannot follow the reference to anthropozoology Zech et al 2021. There seems to be no evidence for grazing.

line 79: delete "which have also been detected in"

lines 101 ff: re-consider your aims, include a reason for the analyses and report of all soil horizons. For archeological purposes the E horizon should be sufficient. Add a motivation or hypothesis for modern faeces sampling. Otherwise this part of sampling remains unexplaiend in lines 132 and finds its first explanation only in line 161.

line 149 ff: better use past tense "ranged" etc for presentation of analytical results.

line 259: change to e.g. "biomarker patterns for modern livestock"

line 295: change to e.g. "ancient faecal markers in soil"

line 385: your conclusion for the use of some parts of the site as "toilet". This is rather speculative without discussion in a literature context. I suggest to add a brief chapter 3.4 "faecal marker intensities in context of previous archeological findings" (or include it in 3.3). You can try for a first and very careful comparison of faecal markers in archeological soil relicts and have a word on the comparability of signals. I think that this will be highly difficult for amounts and even faecal marker ratios may have much larger variability then we hope due to difference in climate, degradation of organic matter, input of differrent kinds of organic matter (plants, microbes, animals...).

Best regards,

Eva