

Response to the Reviewer

PAPER:#essd-2024-294

TITLE: Century Long Reconstruction of Gridded Phosphorus Surplus Across Europe (1850–2019)

We appreciate constructive feedback of reviewer on our manuscript. We have carefully considered each comment and revised our manuscript accordingly. A point-by-point response to the reviewers' comments is provided below. All line numbers refer to the revised manuscript file. We hope that we have addressed all the comments satisfactorily.

Reviewer 1

I recently read your preprint in Earth System Science Data titled “Century Long Reconstruction of Gridded Phosphorus Surplus Across Europe (1850 – 2019)”. Nice topic of research. I wanted to request a few specific corrections regarding the citation of a paper.

Reply: We thank the Reviewer for their positive comments to the manuscript. We reply below to the points raised by the Reviewer.

1.1 — Ensure that Muntwyler et al. (2024) is consistently cited as Muntwyler et al. (2024) in line 39 and Table 3, where currently 2023 is referenced.

Reply: Thank you for this remark. We have updated the citation in the revised manuscript as “... Muntwyler et al. (2024)” in line 39 and Table 3.

1.2 — Please add “Crop residues” to the description of paper (Muntwyler et al. (2024) in Table 3 to accurately reflect the removal of P from the budget with crop residues (you might also want to merge indices a and e in the same table to maintain consistency).

Reply: We have revised the Table 3 by adding “Crop residues” to the “Other” columns for the study Muntwyler et al. (2024) to reflect the removal of P from the budget with crop residues. As suggested, we also have merged indices (a) and (e) in Table 3, which were otherwise repeated.

1.3 — Distinguish more clearly between the studies by Panagos et al. (2022a) and Einarsson et al. (2020) and Muntwyler et al. (2024). The methodologies of Muntwyler et al. (2024) and the purposes of the P budgets differ significantly; Muntwyler et al. (2024) is derived from a process-based model, whereas other two studies are empirical.

Reply: Thank you for this suggestion. We have updated the sentence to make the differences between the studies clearer. In particular, we have revised the information on Muntwyler et al.

(2024). In this context, we have changed the text in line 39 of the revised manuscript, which now reads as follows:

“At the European scale, Muntwyler et al. (2024) provide current (average 2011-2019) and future projections (2020-2029 and 2040-2049) of the P budget in agricultural soils at a higher spatial resolution of 1 km² using a process-based biogeochemical model (DayCent)”.

We also mentioned that the other two studies (Panagos et al. (2022a) and Einarsson et al. (2020)) are based on empirical methods (line 44).

1.4 — Note that the scale of Panagos’ phosphorus budget is at the NUTS2 level, only the soil stock resolution is 500m.

Reply: Thank you for this comment. We have updated the “Spatial feature” (i.e. instead of 500m we have replaced it with NUTS 2) of Panagos et al. (2022b) in Table 2.