

Final answer to the reviewers:

We thank both reviewers for their insightful and constructive comments. We greatly appreciate your recognition of the manuscript's overall quality and welcome the opportunity to further improve our work.

Three main concerns were raised during the review process:

- Inconsistencies regarding the assumption of congruent versus incongruent dissolution (Reviewer 1).
- The assumption that all primary minerals share the same $\delta^{30}\text{Si}$ and Ge/Si signatures (Reviewer 1).
- Insufficient discussion and figure support for the results presented in Section 5.1 (Reviewer 2).

We have revised the manuscript to consistently assume incongruent dissolution, treating quartz as inert. This required correcting the Si isotope composition ($\delta^{30}\text{Si}$) and Ge/Si ratio of the solubilized solution following mineral dissolution and thus incorporating mineral-specific isotopic and elemental signatures.

Because the bedrock in our catchment is composed of fine-grained siltstone, we were unable to physically separate individual minerals for direct analysis. Therefore, we compiled a dataset of mineral-specific $\delta^{30}\text{Si}$ and Ge/Si values from the literature, which will be included in the Supplementary Material. These values were used to correct the isotopic signatures of secondary clays in the clay-sized fraction, to estimate the composition of the initial solution after rock dissolution and were consistently applied in both the elemental and isotopic mass balance calculations. We have also conducted a sensitivity analysis to evaluate how the selection of mineral signatures affects flux estimates, which will be provided in the Appendix.

While our primary objective is to quantify the agricultural footprint on the Si cycle, we agree with Reviewer 2 that Section 5.1 would benefit from further clarification. To maintain the overall conciseness of the main text, we will revise Section 5.1 to include additional context and precision regarding the Si isotopic signatures and their relevance. However, to avoid an overly lengthy manuscript, we will address the more detailed discussion—including pathways of plant uptake, isotopic fractionation, and the observed vertical gradients—in the Appendix. These aspects will be illustrated with the supporting figures (e.g., Appendix C, Fig. C1). Additionally Figure 3 will also be improved to include Critical Zone endmembers for clarity.

The revised manuscript shows that although the fraction of Si exported via harvesting has decreased in both the isotopic model and the riverine Si flux approach—and remained stable in the regolith-based approach—harvesting is no longer the dominant flux but now closely competes with erosion. Nonetheless, it still exceeds the dissolved Si flux and remains a key contributor to the Si cycle, highlighting the persistent and significant anthropogenic influence on the silicon budget in this agricultural catchment.