

RC1: '[Comment on egusphere-2024-3101](#)', Anonymous Referee #1, 28 Nov 2024 [reply](#)

The manuscript addresses the review of an interesting topic, however, it lacks the necessary depth to warrant publication.

- **We thank the reviewer for acknowledging the significance of our review topic. We understand the concern regarding the current depth. To address this, we will enhance the manuscript by adding additional analyses, clarifications, and detailed data summaries (as requested in the subsequent comments), which will substantially deepen the discussion and provide the necessary depth for publication.**

While the title and objectives clearly indicate a focus on urban soils, the manuscript does not provide a sufficient justification for limiting the review exclusively to urban soils. Why is the method under review only applicable to urban soils, and would it also be suitable for agricultural soils? The rationale for restricting the review to XRF studies conducted in urban soils is not clearly explained.

- **We agree that the rationale behind limiting our review specifically to urban soils needs clearer articulation. Urban soils present distinct challenges compared to agricultural or natural soils, primarily due to their high heterogeneity, complex land-use history, and diverse contamination sources (e.g., industrial residues, traffic emissions, urban waste). These factors significantly affect analytical precision and accuracy when using portable XRF. Given that urban soils are frequently repurposed for agriculture, recreation, or residential use, the rapid, cost-effective identification of contamination hotspots provided by PXRF becomes especially relevant in urban contexts. We will clarify and expand upon this rationale explicitly in the introduction.**

The introduction sets up expectations for the reader, but the conclusion essentially restates what can already be found in the individual studies reviewed.

- **To address this issue, the revised manuscript will include clearer synthesis statements highlighting novel insights from comparative analyses of the PXRF versus traditional methods. Specific recommendations and limitations derived from recent studies will be more explicitly articulated to underscore practical insights and actionable guidance. Additionally, we will emphasize newly identified gaps and opportunities for future research, providing original insights into PXRF application in urban environments.**

Therefore, as it is currently presented, the manuscript does not offer significant new insights into the limitations and advantages of the method.

The information in Section 2 could be better organized and presented in a more reader-friendly format, such as tables or graphs, to enhance the clarity and accessibility of the bibliographic review results.

- **We acknowledge the importance of clear data visualization and readability highlighted by the reviewer. To improve Section 2, we will provide tables clearly summarizing**

**frequency, accuracy, reliable concentration range, and optimal conditions for PXRF measurements by element.**

To make the review more engaging and to strengthen its case for publication, I suggest the inclusion of the following:

1. A list of the chemical elements analyzed in the reviewed studies, along with their frequency of occurrence.
2. A systematic presentation of  $R^2$  values, along with estimates of the accuracy for each element.
3. The detection limits for each element, as reported in the reviewed studies.

- **We agree with this suggestion and will add the following structured information:**

- **A comprehensive table summarizing the correlation coefficients ( $R^2$ ) clearly comparing PXRF and laboratory methods (ICP-MS, ICP-OES, ICP-AES) across reviewed studies, categorized by element.**
- **A dedicated table outlining reported detection limits (LOD) of PXRF instruments for key elements (Pb, As, Cu, Zn, Ni, etc.) based on data explicitly provided in the reviewed literature.**
- **A summarized analysis of PXRF measurements across different studies, highlighting which elements consistently exhibit reliable measurements and under which conditions accuracy significantly decreases.**

Including these details would make the review more informative and comprehensive, offering additional value to the scientific community.

- **Thank you very much for your thoughtful review. The manuscript will be revised according to your suggestions, providing a more substantial rationale, improved clarity, and comprehensive insights that align closely with the manuscript's objectives.**