Response to the comments on the manuscript (HESS-2024-387) **"Mapping mining-affected water pollution in China: Status, patterns, risks, and implications"** by Ziyue Yin, Jian Song, Dianguang Liu, Jianfeng Wu*, Yun Yang, Yuanyuan Sun, and Jichun Wu.

Note that the following text in Arial Narrow font denotes Editor's comments and in Times New Roman font denotes our response to the comments in the review. In our resubmission, the marked PDF file (hess-2024-387_ATC2.pdf) has clearly indicated all changes to the original manuscript, tables and figures. Also, in our marked PDF file, marked in ~~a green strikethrough font~~ is the text that should be removed from the original manuscript and marked in a red font is the text that has been added to the current revision. In addition, Line number(s) mentioned below can be referred to as that line numbering in the marked revised manuscript.

Response to Gabriel Rau's Comments

Dear authors, thank you for thoroughly revising this manuscript. The reviewers agree that you have done an excellent job. However, I do have a few minor issues that I would like to see addressed before I can accept the manuscript for publication in HESS.

[Response] Dear Prof. Gabriel Rau, we sincerely thank you for your positive feedback and the opportunity to further improve our manuscript. We have fully incorporated and addressed all the comments in the revised manuscript and given a point-by-point response as below. In addition, following the editorial support team's recommendations, we have revised the reference list to align with the journal's manuscript preparation guidelines. We believe that the constructive and conscientious comments have led to significant improvement of the revised manuscript.

All figure and table captions (except for Figure 1?) need to be expanded so that they describe to the reader what is being shown. This is to help speed readers digest the materials. For example, Figure 2 should read: "Statistical summary (minimum, median, average and maximum) of the main species aggregated from all samples measured in mining-affected water in China (Units are mg/L except pH)."

[Response] Thank you for your constructive suggestions. As you suggested, we have expanded captions to all the figures and tables in both the main manuscript and the supplement to enhance clarity and facilitate reader comprehension. For your convenience, the expanded captions in the revised manuscript are successively listed below:

Figure Captions

Figure 2. Statistical summary (minimum, median, average, and maximum) of the main species aggregated from all samples measured in mining-affected water in China (Units are mg/L except pH).

Figure 3. The relationship between pH and the respective concentrations including (a) SO_4^{2-}, (b) Fe, (c) Mn, and (d) Al, in coal and metal mines. The binned frequency distribution of the samples is shown along the x and y axes.

Figure 4. The spatial distribution of (a) pH; and the mean concentration of individual components (mg/L) showing (b) SO_4^{2-}, (c) Fe, and (d) Mn, respectively, in mining-affected water on the 0.5° grid. The classification thresholds for the main components are based on the distribution of all collected data, as well as regulatory benchmarks from GB 3838-2002 and GB/T 14848-2017 in China.

Figure 5. The carcinogenic risk (CR) values of Cr, As, and Cd in mining-affected water. T1 category includes mine drainage, mine water, and leachate water, while T2 category indicates mining-affected surface water and groundwater.

Figure 6. The hazard quotient (HQ) values of Fe, Mn, Cr, Ni, Cu, Zn, As, Cd, and Pb in mining-affected water for (a) T1-Adult, (b) T1-Children, (c) T2-Adult, and (d) T2-Children, respectively. T1 category includes mine drainage, mine water, and leachate water, while T2 category indicates mining-affected surface water and groundwater.

Figure 7. Conceptual model illustrating the pollution pathways and environmental impacts of mining-affected water across four key subsystems: (i) groundwater, (ii) surface water, (iii) soil, and (iv) human health, during both active mining and abandoned phases.

Table Caption

Table 1. Statistical summary (minimum, median, average, and maximum) of the main species aggregated from all samples measured in acid or non-acid mining-affected water in China (Units are mg/L except pH).

The abstract needs to be tweaked to include a few words that you have calculated quantitative indicators as described in Section 2.4.

[Response] Comment accepted. We have revised the abstract to explicitly include the quantitative risk assessment results from Section 2.4 (**Line 24**), as follows:

"The risk assessment reveals that the unacceptable carcinogenic risks caused by poor-quality surface water and groundwater are observed in 51.52% (for adults) and 29.29% (for children) of the mining areas.

Moreover, severe non-carcinogenic risks are also identified in 68.07% and 80.67% of mining areas for adults and children, respectively."

Figure 2: Could you please place the SO4- plot on the right side and add y-axis labels to all sub-plots.

[Response] We sincerely thank you for your insightful suggestions. We have moved the SO_4^{2-} plot to the right side of Figure 2. Additionally, clear y-axis labels have been added to all subplots to improve readability.

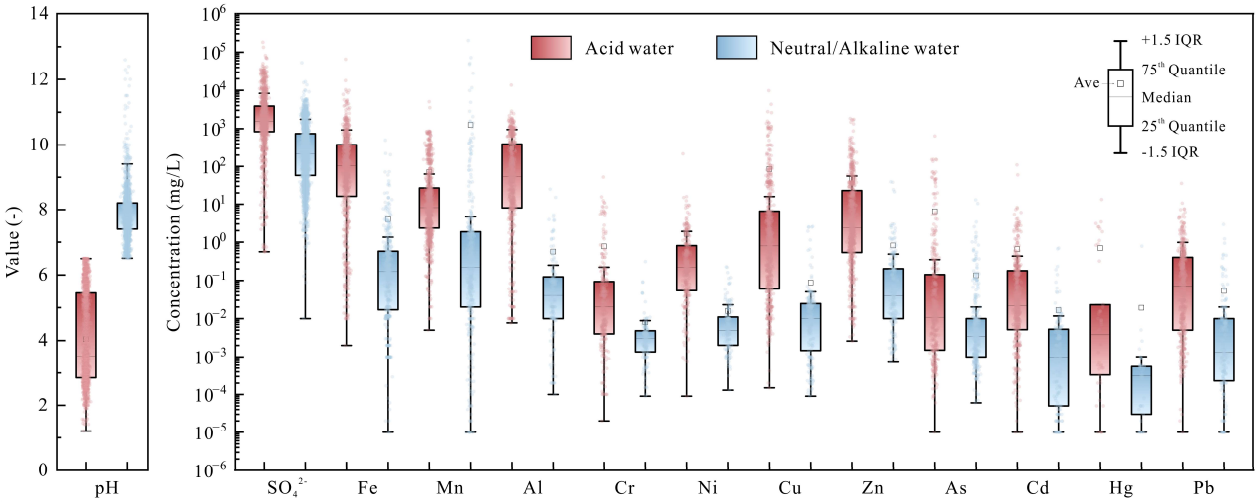

Figure 2. Statistical summary (minimum, median, average, and maximum) of the main species aggregated from all samples measured in mining-affected water in China (Units are mg/L except pH).

Table 1: Please make sure that the reported digits for concentrations (mg/L) represent what can realistically be measured. For example, there are a lot of trailing zeros that could be rounded.

[Response] We appreciate your comment regarding the number of reported digits for concentration values (mg/L). We confirm that the reported concentrations can realistically be measured. In our study, the composite database integrates mining-affected water (surface water and groundwater) quality parameters systematically extracted from 293 peer-reviewed studies published over the past decades. Due to inconsistencies in the original reporting units (some sources used mg/L, while others used μg/L), we standardized all concentration values to mg/L to ensure comparability across the dataset. As a result of this unit conversion, particularly for trace elements originally reported in μg/L, some values contain up to four decimal places. To address your concern, we have rounded the mean and maximum values of heavy metal concentrations to two significant figures. However, the minimum and median values are still presented with up to four decimal places to preserve the resolution of trace-level concentrations, particularly for values close to the detection limit.

Figure 3: Add a note to the caption to state that the binned frequency distribution (?) of samples is shown along the x and y axes.

[Response] Comment accepted. The caption of Figure 3 has been revised to "The respective relationship between pH and the concentrations of (a) SO_4^{2-}, (b) Fe, (c) Mn, and (d) Al in coal and metal mines. The binned frequency distribution of the samples is shown along the x and y axes"

Figure 4: Could you please at some longitude and latitude tick marks and labels to this map.

[Response] Comment accepted. Following your valuable suggestions, we have added longitude and latitude tick marks with corresponding labels to Figure 4. For consistency, we have also incorporated these geographic coordinates in Figure 1 and supplementary Figures S1, S3, S4, S8, S10, and S11.

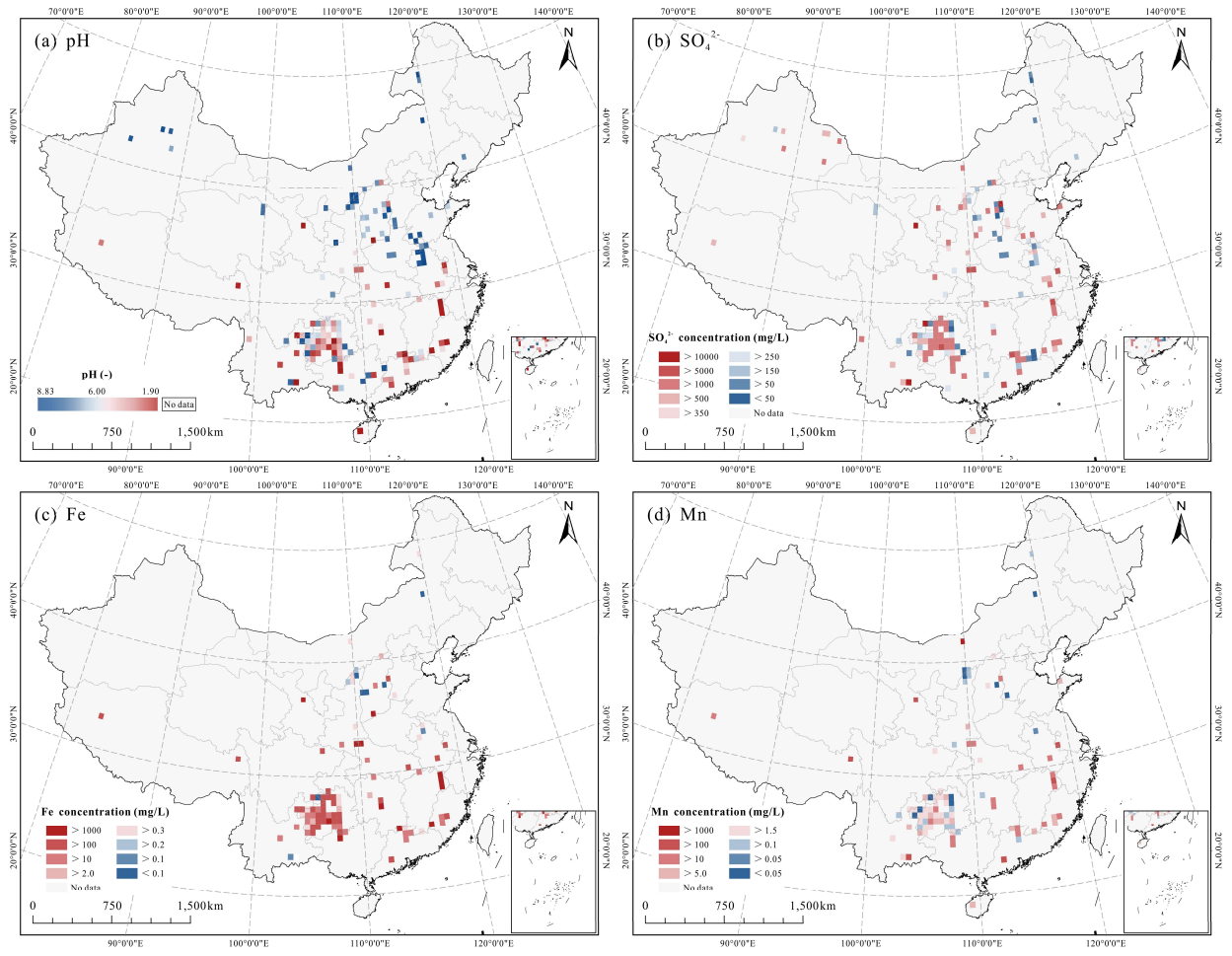

Figure 4. The spatial distribution of (a) pH; and the mean concentration of individual components (mg/L) showing respective (b) SO_4^{2-}, (c) Fe, and (d) Mn in mining-affected water on the 0.5° grid. The classification thresholds for the main components are based on the distribution of all collected data, as well as regulatory benchmarks from GB 3838-2002 and GB/T 14848-2017 in China.

Figure 5: Spell out the y axis label as "Carcinogenic Risk (CR)". This helps speed readers immediately understand without having to dig into the text.

[Response] Comment accepted. To improve the readability of the manuscript, we have modified the y-axis label from the abbreviated form "CR" to the full designation "Carcinogenic Risk (CR)" in Figure 5.

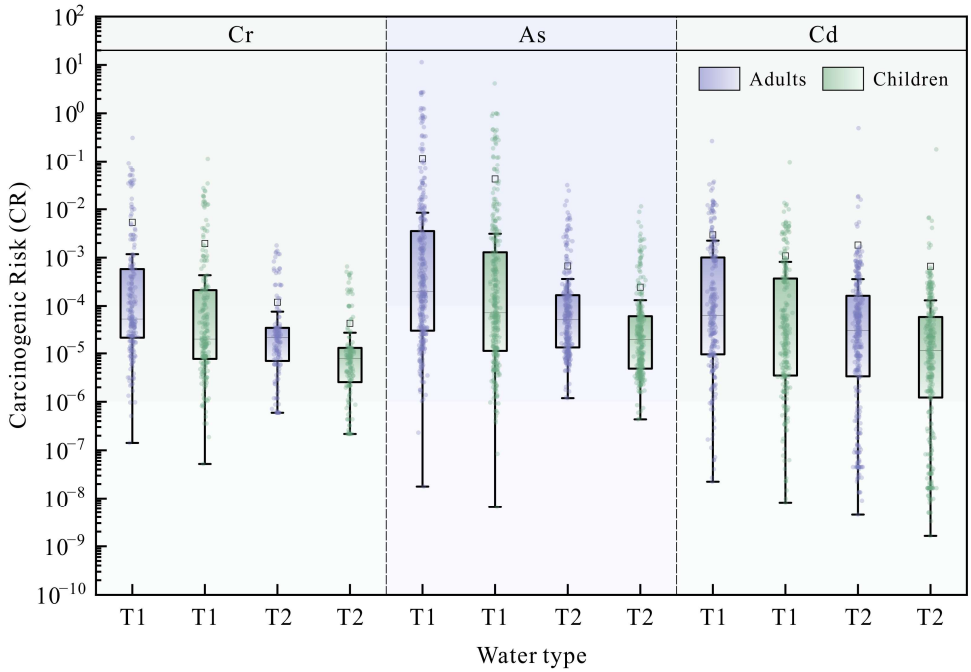

Figure 5. The carcinogenic risk (CR) values of Cr, As, and Cd in mining-affected water. T1 category includes mine drainage, mine water, and leachate water, while T2 category indicates mining-affected surface water and groundwater.

Same with Figure 6, spell out HQ for each of the axes.

[Response] Similarly, we have modified the x-axis label from the abbreviated form "HQ" to the full designation "Hazard Quotient (HQ)" in Figure 6.

Could you please spell out abbreviations upon first use in the Conclusions. Again, this helps speed readers obtain the gist of the study without having to delve into the text.

[Response] Thank you for your constructive suggestions. We have revised the abbreviated form "HMs" to the full designation "heavy metals" in the **Conclusions** to help readers obtain the gist of the study (**Lines 630 and 637**).

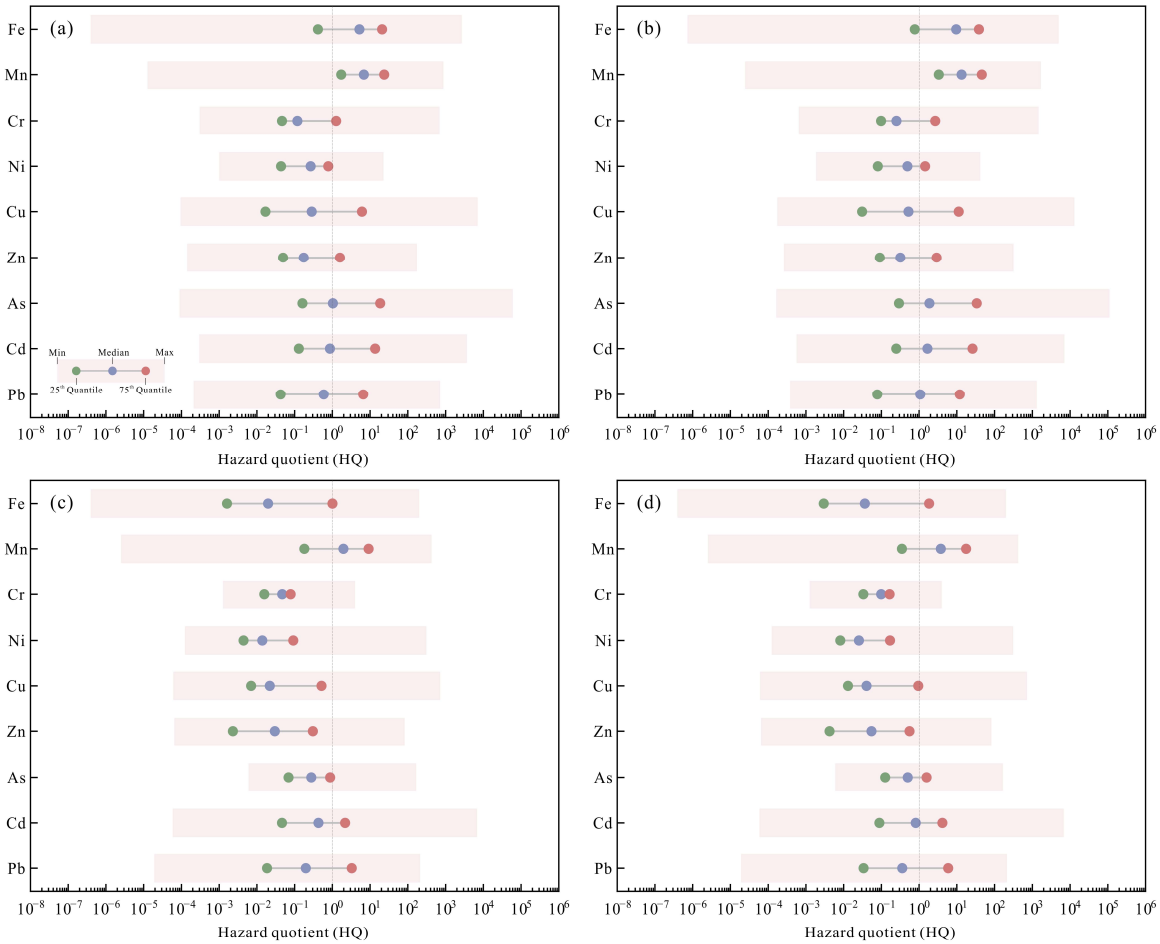

Figure 6. The hazard quotient (HQ) values of Fe, Mn, Cr, Ni, Cu, Zn, As, Cd, and Pb in mining-affected water for (a) T1-Adult, (b) T1-Children, (c) T2-Adult, and (d) T2-Children, respectively. T1 category includes mine drainage, mine water, and leachate water, while T2 category indicates mining-affected surface water and groundwater.