

**Supplementary Materials for**

**Contamination and Risk of Heavy Metals in  
Sediments from Zhuzhou, Xiangtan and Changsha  
Sections of the Xiangjiang River, Hunan Province  
of China**

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**Table S1. Classification of heavy metal pollution in sediment.**

	$I_{geo} < 0$	$0 < I_{geo} \leq 1$	$1 < I_{geo} \leq 2$	$2 < I_{geo} \leq 3$	$3 < I_{geo} \leq 4$	$4 < I_{geo} \leq 5$	$I_{geo} > 5$
Polluted level	0	1	2	3	4	5	6
Polluted degree	Clean	Light pollution	Slightly moderate pollution	Moderate pollution	Slightly severe pollution	Heavy pollution	Severe pollution

**Table S2. Toxicity coefficient of heavy metals.**

Heavy metals	T <sub>r</sub> <sup>i</sup>	Heavy metals	T <sub>r</sub> <sup>i</sup>	Heavy metals	T <sub>r</sub> <sup>i</sup>
Sc	/	V	2	Cr	2
Mn	1	Co	5	Ni	5
Cu	5	Zn	1	Pb	5
Ba	/	Th	/	U	/

**Table S3. The dividing standard of ecological risk of heavy metals.**

$E_r^i$ (For a single heavy metal)	Risk level	RI (For multiple heavy metals)	Potential ecological hazard
$E_r^i < 40$	Weak	$RI < 150$	Weak
$40 \leq E_r^i < 80$	Medium	$150 \leq RI < 300$	Medium
$80 \leq E_r^i < 160$	Strong	$300 \leq RI < 600$	Strong
$160 \leq E_r^i < 320$	Very strong	$RI \geq 600$	Very strong
$E_r^i \geq 320$	Extremely strong	/	/

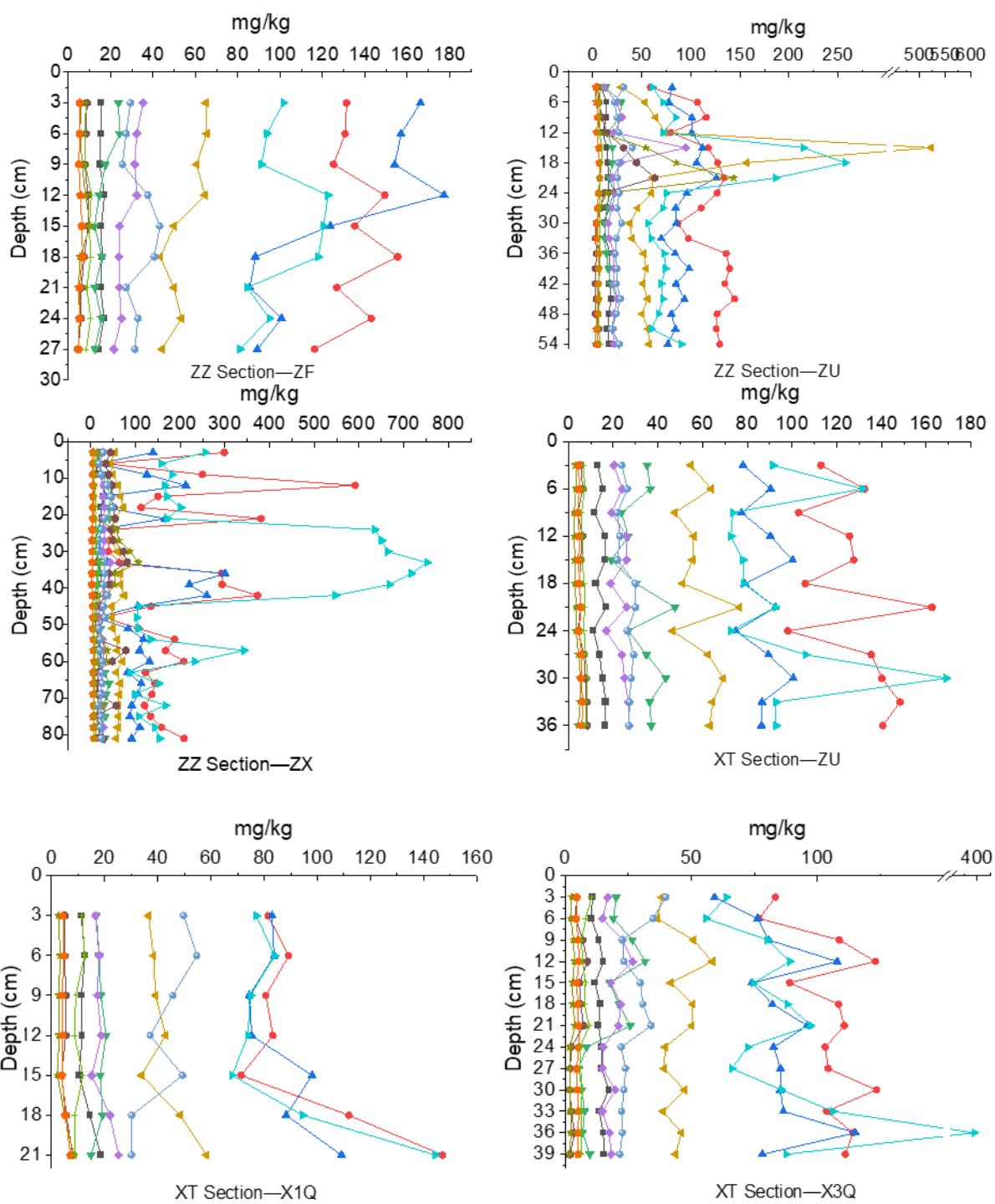
**Table S4. Proportion of different ecological risk early warning levels of heavy metals in sediments.**

I <sub>ER</sub>	Risk level	Warning level	Risk degree
I <sub>ER</sub> ≤0	1	No warning	Ecological service system: Complete. Ecosystem structure: Complete. System recovery capacity: Strong. Natural environment: Basically not threatened. Ecological problems: Not prominent. Natural disasters: Few.
0< I <sub>ER</sub> ≤1	2	Early warning	Ecological service system: Relatively complete. Ecosystem structure: Relatively complete. System recovery capacity: Relatively strong. Natural environment: Less threatened. Ecological problems: Not prominent. Natural disasters: Few.
1< I <sub>ER</sub> ≤3	3	Light warning	Ecological service system: Damaged. Ecosystem structure: Shaken. System recovery capacity: Sustainable, but prone to deterioration after damage. Ecological problems: Obvious, Natural disasters: Frequency.
3< I <sub>ER</sub> ≤5	4	Moderate warning	Ecological service system: Near collapse. Ecosystem structure: Destruction. System recovery capacity: Failure. Ecological problems: Large. Natural disasters: Prone.
I <sub>ER</sub> >5	5	Severe warning	Ecological service system: Completely loss. Ecosystem structure: Destruction. System recovery capacity: Almost no. Ecological problems: Large. Natural disasters: Prone.



YZ	61.60	0.92	12.30	5.50	0.11	2.20	4.00	2.20	1.20	0.15	3.91	0.55	5.01	0.18	2.50
SSW	55.34	0.73	16.48	8.31	0.22	2.09	3.62	2.04	0.96	0.46	4.91	0.47	3.36	0.12	4.08

LOI: Loss on ignition, mainly including organic matter, crystalline water, sulfide, etc., approximately represents the content of organic matter.  
CV: Coefficient of variation. UCC: Average upper continental crust from eastern China [34]. GR: Hunan Granites [36]. ACS=China soils [37].  
WRS: World River Average Sediments [38]. YZ=Yangtze River sediments [37]. SSW: Suspended sediments of the World River [39].



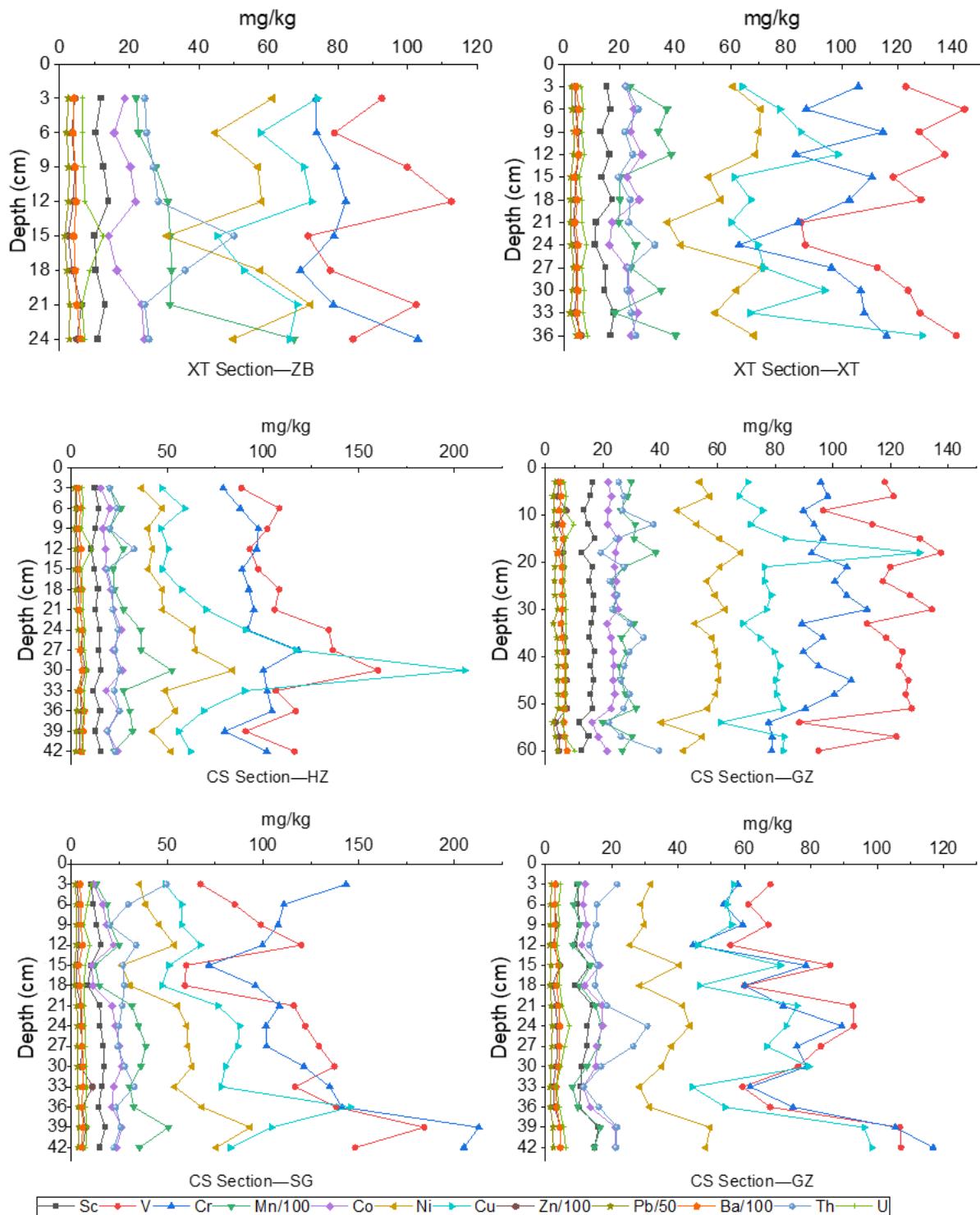


Figure S1. Vertical distribution of heavy metals in the riverbed sediments in CS-ZZ-XT sections of the Xiangjiang River.

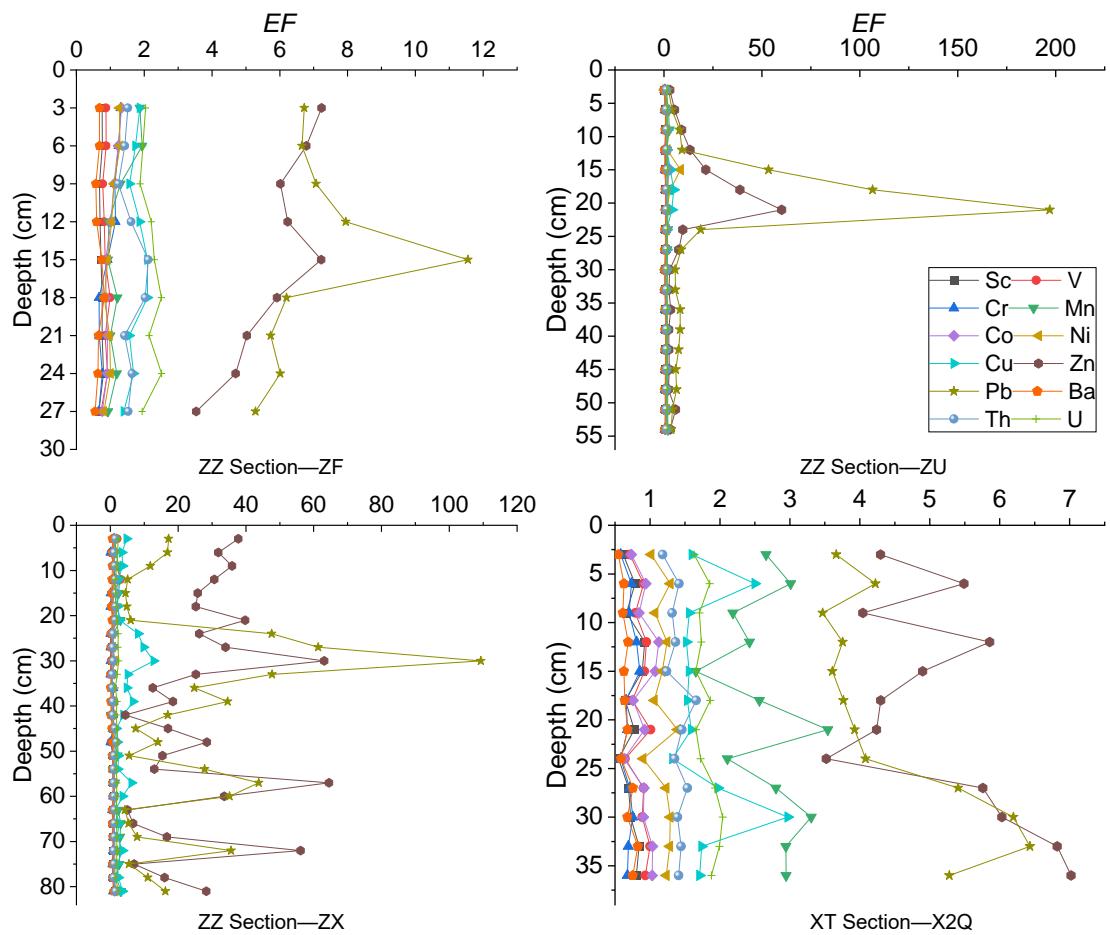


Figure S2. Vertical distribution of heavy metal content in the riverbed sediments in ZZ section and X2Q sediment column in XT section of the Xiangjiang River.

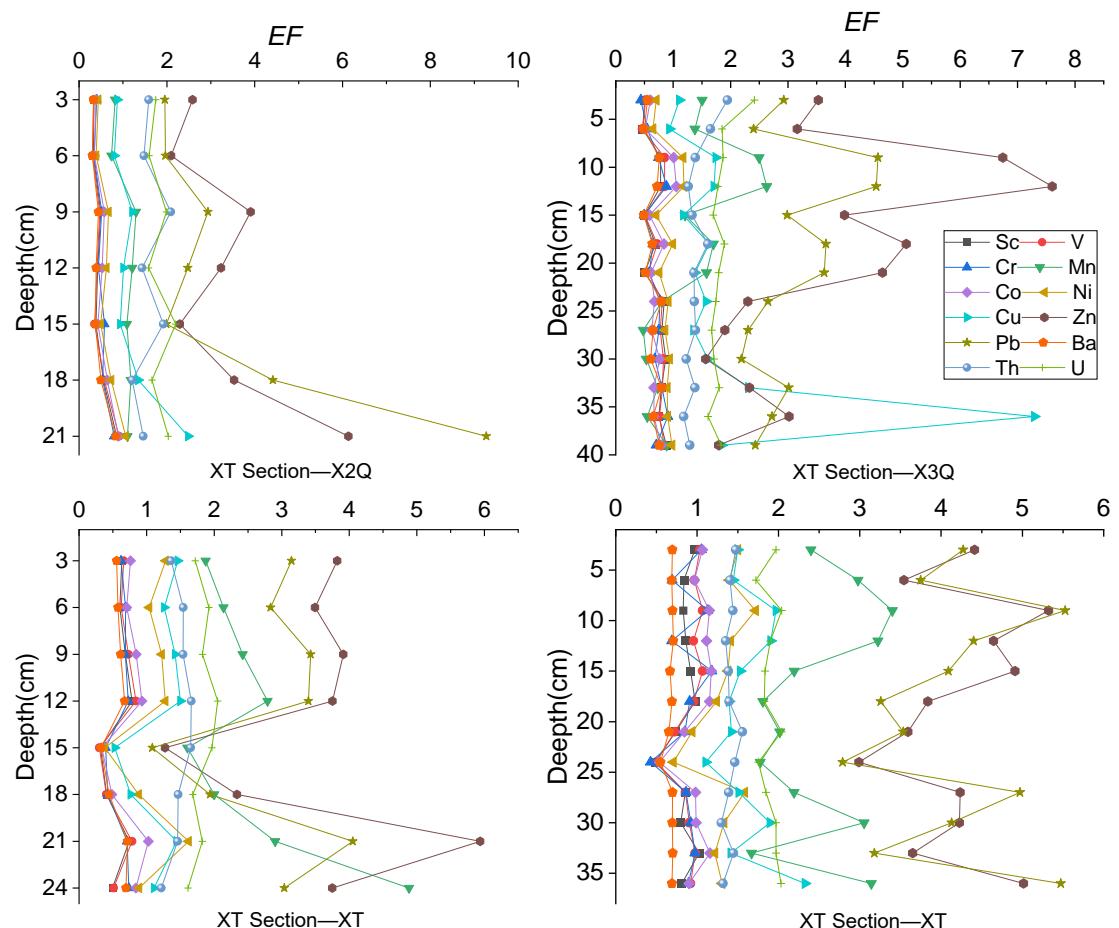
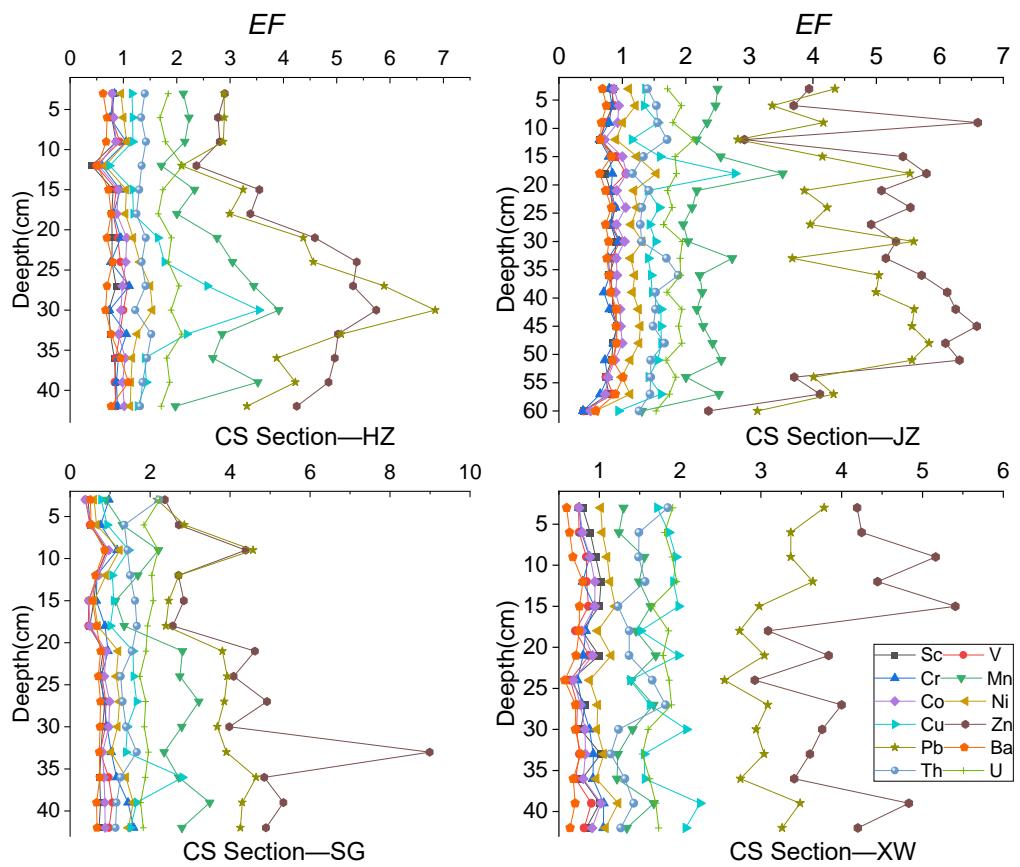


Figure S3. Vertical distribution of heavy metal content in the riverbed sediments in XT section.



**Figure S4.** Vertical distribution of heavy metal content in the riverbed sediments in CS section.