

Appendix

The geo-accumulation Index

$$I_{geo} = 1 + \log \frac{C_n}{1.5 B_n} \quad (1)$$

where C_n is the measured concentration of n in atmospheric sedimentation samples, and B_n is the geochemical background value of n in the earth's crust. A factor of 1.5 is used to compensate for changes that may be caused by changes in sediment lithology, and it takes into account the difference in background values.

Enrichment factor

$$EF = \frac{C_n(\text{sample})/C_{ref}(\text{sample})}{B_n(\text{baseline})/B_{ref}(\text{baseline})} \quad (2)$$

where C_n is the sample concentration of the researched element, and B_n is the reference concentration of the researched element. C_{ref} and B_{ref} are the sample concentration and reference concentration of the referenced element.

The Potential Ecological Risk Index

$$F_i = \frac{c_i}{B_i} \quad (3)$$

$$E_r = T_i \times F_i \quad (4)$$

$$RI = \sum E_r \quad (5)$$

F_i is the single metal pollution coefficient, B_i is the metal background value, C_i is the metal concentration in the dust, E_r is the single element potential ecological risk index, RI is the multi-element comprehensive potential ecological risk index and T_i is the metal toxicity factor.

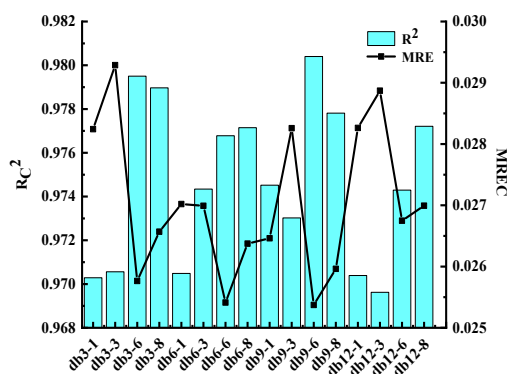


Fig S1 Influence of different wavelet basis function and decomposition layer on predictive performance of RF calibration model of I_{geo}

Table S1 Standard of contamination degree by Geo-accumulation index

I_{geo}	Class	Pollution level
$I_{geo} < 0$	0	unpolluted
$0 \leq I_{geo} < 1$	1	Unpolluted to moderately polluted
$1 \leq I_{geo} < 2$	2	Moderately polluted
$2 \leq I_{geo} < 3$	3	Moderately to strongly polluted
$3 \leq I_{geo} < 4$	4	strongly polluted
$4 \leq I_{geo} < 5$	5	strongly to extremely polluted
$I_{geo} > 5$	6	Extremely polluted

Table S2 Contamination categories based on EF values

EF	Class	Pollution level
$EF < 2$	1	Minimal pollution
$2 \leq EF < 5$	2	Moderate pollution
$5 \leq EF < 20$	3	Significant pollution
$20 \leq EF < 40$	4	Very high pollution
$EF \geq 40$	5	Extremely high pollution

Table S3 Toxicity coefficient standard of heavy metals

Element	Al	Cu	Cd	Pb	Cr	Zn
Toxicity factor	1	5	30	5	2	1

(Hakanson)

Table S4 Pollution categories based on E_r and RI

E_r	RI	Class	Pollution level
$E_r < 40$	$RI < 150$	1	Low potential ecological risk
$40 \leq E_r < 80$	$150 \leq RI < 300$	2	Moderate potential ecological risk
$80 \leq E_r < 160$	$300 \leq RI < 600$	3	Considerable potential ecological risk
$160 \leq E_r < 320$	$RI \geq 600$	4	High potential ecological risk
$E_r \geq 320$		5	Very high ecological risk