Supplementary material

(a)Supplementary Figure

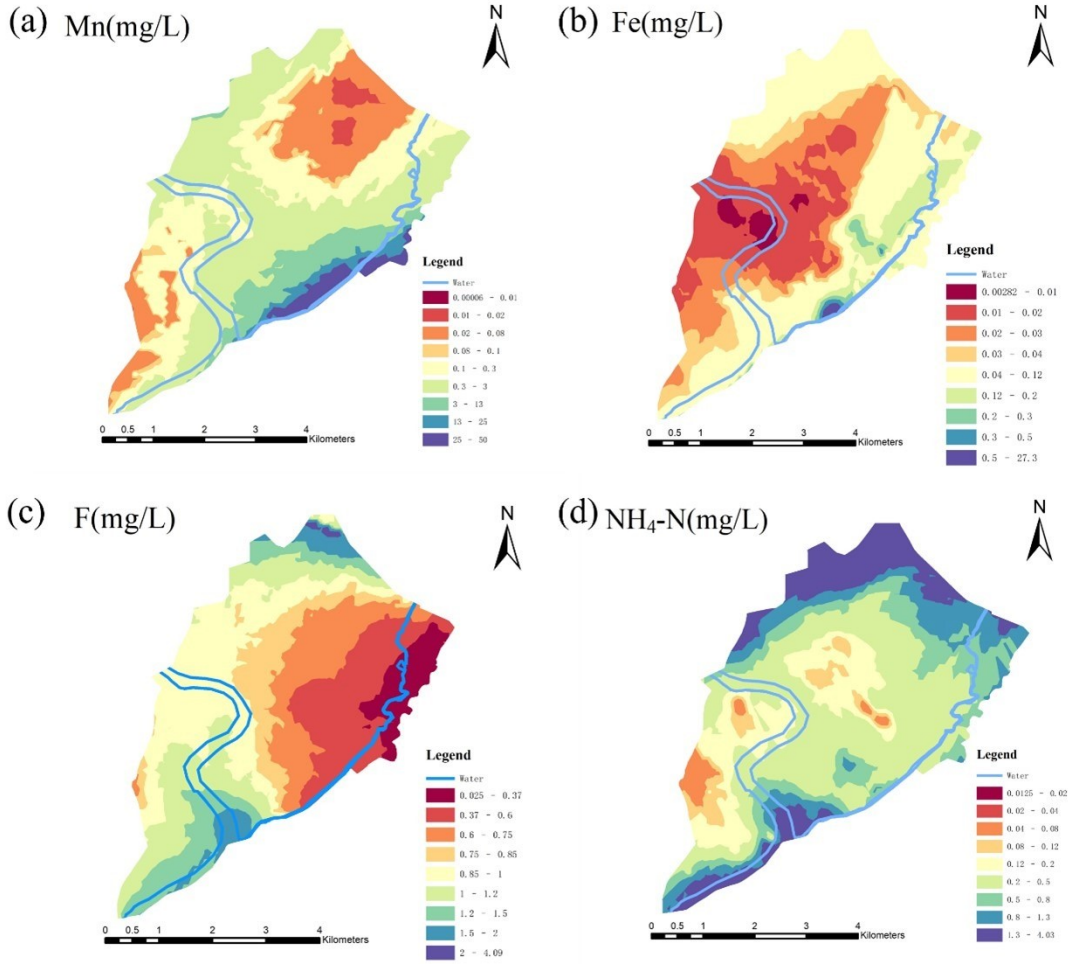

Fig.S1.Spatial distribution maps of(a)Mn, (b)Fe, (c)F, and (d)NH4-N concentrations in groundwater in the study region.

(b)Supplementary Table

Table S1

Summary of Regional Stratigraphy and Lithology

Erathem	System	Series	Group	Formation (Subgroup)	Code	Thickness (m)	Lithological Description
Cenozoic	Quaternary	—	—	—	Q	<50	Sand, clay, gravel.
Mesozoic	Jurassic	Upper Series	Douling Group	Upper Subgroup	J_3dl^2	>365	Tuff lava.
				Lower Subgroup	J_3dl^1	>897	Tuffaceous siltstone, feldspathic quartz sandstone.
		Lower Series	Lishan Group	Upper Formation	J_1ls^2	86–461	Conglomerate, quartz sandstone, siltstone, shale.
				Lower Formation	J_1ls^1	101–288	Conglomerate, siltstone, quartz sandstone.
Lower Paleozoic	Ordovician	—	Luofengxi Group	—	Pz_1lf	>1166	Metasandstone, siltstone, phyllite.
Proterozoic	Sinian	—	—	—	Z	>2454	Leptynite intercalated with quartz schist.
□	Presinian	—	Jian'ou Group	Upper Subgroup	$AnZjn^2$	>3916	Schist, leptynite.

Table S2

Sampling point information and sampling depth in the study area

Point	Longitude	Latitude	Sampling Depth(m)	Point	Longitude	Latitude	Sampling Depth(m)
BP1	117.634386	27.29031	1.51	CDP22	117.6147	27.26194	6.82
CDP1	117.599408	27.23288	10.2	CDP23	117.603	27.26205	0.75
CDP2	117.597369	27.2355	9.23	CDP24	117.592	27.22224	6.15
CDP3	117.602836	27.23497	7.14	IMP1	117.6101	27.25344	4.98
CDP4	117.621558	27.24568	2.9	IMP2	117.619	27.25068	3.51
CDP5	117.618828	27.24549	3.25	IMP3	117.6025	27.25267	5.78
CDP6	117.615453	27.24406	3.33	IMP4	117.6074	27.24169	2.43
CDP7	117.614058	27.24969	4.45	IMP5	117.603	27.24409	0.75
CDP8	117.615275	27.24448	3.12	IMP6	117.6054	27.23924	2.75
CDP9	117.626814	27.24653	7.14	IMP7	117.6248	27.25454	3.29
CDP10	117.634844	27.26085	7.95	IMP8	117.6278	27.25619	9.22
CDP11	117.628114	27.26133	6.98	IMP9	117.6319	27.26145	6.2
CDP12	117.636014	27.25002	2.58	IMP10	117.6316	27.26279	10.41
CDP13	117.649258	27.28191	2.47	IMP11	117.6298	27.26475	6.25

CDP14	117.644956	27.27967	6.04	IMP12	117.6303	27.26154	1.5
CDP15	117.648353	27.27973	3.45	IMP13	117.6284	27.26349	4.31
CDP16	117.608669	27.27003	5.34	IMP14	117.6281	27.26426	9.66
CDP17	117.615203	27.27174	1.52	IMP15	117.6237	27.27521	3.11
CDP18	117.605725	27.27332	7.14	IMP16	117.6114	27.27522	2.08
CDP19	117.609522	27.24464	12.52	IMP17	117.6293	27.27676	2.32
CDP20	117.610831	27.24001	6.32	IMP18	117.6061	27.26463	11.68
CDP21	117.611669	27.24153	7.35	IMP19	117.6224	27.27967	5.43
□	□	□	□	IMP20	117.6061	27.26402	12.55

Table S3

Statistical analysis of hydrochemical parameters of groundwater samples (units of all parameters are mg/L, except pH).

Index	Min	Max	Mean	CV	SD	E (%)
pH	6.30	8.00	7.03	0.06	0.45	13.64
TH	3.00	536.00	72.34	1.29	93.61	2.27
TDS	33.00	729.00	215.75	0.89	192.66	0.00
HCO_3	12.20	758.00	172.67	1.07	185.17	/
Fe	0.00	27.30	0.69	5.99	4.11	11.36
Mn	0.00	50.00	1.84	4.20	7.71	38.64
Al	0.00	2.57	0.09	4.40	0.40	4.55
Cu	0.00	0.02	0.00	2.95	0.00	0.00
Zn	0.00	0.05	0.04	2.47	0.09	0.00
NO_3-N	0.01	4.77	0.56	1.79	1.00	0.00
K	0.22	22.80	4.32	1.14	4.94	/
Mg	0.07	25.00	2.53	1.51	3.81	/
Cl	1.25	57.00	10.36	1.19	12.36	0.00
F	0.03	4.09	0.96	0.67	0.64	34.09
As	0.00	0.01	0.00	1.47	0.00	0.00
NH_4-N	0.01	4.03	0.46	1.71	0.78	25.00
NO_2-N	0.00	2.70	0.17	3.16	0.53	6.82
COD	0.48	6.09	1.91	0.80	1.54	25.00
Ca	0.91	174.00	25.06	1.28	32.09	/
Na	0.75	354.00	49.43	1.75	86.30	9.09
SO_4	1.00	87.00	22.30	1.00	22.39	0.00

TDS: total dissolve solid; TH: total hardness; Max: maximum; Min: minimum; SD: standard deviation; CV (%): coefficient of variation; E(%): excess rate, which is evaluated based on the limit of the III type water stipulated by the Standard for Groundwater Quality of China (GB/T 14848-2017).