

Integrated Magnetic Analyses for the Discrimination of Urban and Industrial Dusts

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Supplementary material

Table S1. Results of the IRM decomposition for representative samples from the iron works. Abbreviations: SIRM—saturation isothermal remanent magnetization; B1/2—mean coercivity; DP—dispersion parameter; the percentage of remanence contribution; SD—standard deviation.

	ID sample	Component 1					Component 2					Component 3				
		contribution	SIRM	log(B _{1/2})	B _{1/2}	DP	contribution	SIRM	log(B _{1/2})	B _{1/2}	DP	contribution	SIRM	log(B _{1/2})	B _{1/2}	DP
		%	A/m	mT	mT	mT	%	A/m	mT	mT	mT	%	A/m	mT	mT	mT
Iron work Třinec (IW-1)	1	89.25	4.650	1.66	45.71	0.33	4.99	0.26	2.60	398.11	0.38	5.76	0.30	1.28	19.05	0.18
	2	86.06	5.620	1.66	45.71	0.33	7.35	0.48	2.45	281.84	0.45	6.58	0.43	1.25	17.78	0.15
	3	91.78	6.480	1.65	44.67	0.35	3.97	0.28	2.30	199.53	0.45	4.25	0.30	1.25	17.78	0.19
	4	89.32	3.680	1.68	47.86	0.33	6.07	0.25	2.00	100.00	0.70	4.61	0.19	1.23	16.98	0.15
	5	92.69	5.450	1.64	43.65	0.35	4.25	0.25	2.20	158.49	0.41	3.06	0.18	1.25	17.78	0.15
	6	92.07	6.500	1.66	45.71	0.34	5.10	0.36	2.70	501.19	0.60	2.83	0.20	1.26	18.20	0.17
	10	87.38	2.770	1.63	42.66	0.32	9.46	0.3	2.15	141.25	0.50	3.15	0.10	1.23	16.98	0.12
	11	88.82	4.050	1.63	42.66	0.33	6.58	0.3	2.15	141.25	0.50	4.61	0.21	1.23	16.98	0.13
	12	73.74	2.050	1.66	45.71	0.32	17.27	0.48	2.20	158.49	0.65	8.99	0.25	1.15	14.13	0.20
	13	82.67	4.150	1.65	44.67	0.32	9.56	0.48	2.20	158.49	0.70	7.77	0.39	1.23	16.98	0.18
	14	88.44	6.500	1.63	42.17	0.35	7.48	0.55	2.15	141.25	0.70	4.08	0.30	1.24	17.38	0.17
	15	86.79	5.255	1.64	43.65	0.33	9.91	0.6	2.15	141.25	0.70	3.30	0.20	1.23	16.98	0.15
	16	88.39	6.550	1.66	45.71	0.34	7.56	0.56	2.15	141.25	0.70	4.05	0.30	1.23	16.98	0.15
	17	73.63	2.290	1.67	46.77	0.30	16.72	0.52	2.00	100.00	0.75	9.65	0.30	1.23	16.98	0.15
	18	82.95	4.720	1.67	46.77	0.32	10.19	0.58	2.00	100.00	0.69	6.85	0.39	1.25	17.78	0.16
Statistics	min	73,63	2,05	1,63	42,17	0,30	3,97	0,25	2,00	100,00	0,38	2,83	0,10	1,15	14,13	0,12
	max	92,69	6,55	1,68	47,86	0,35	17,27	0,60	2,70	501,19	0,75	9,65	0,43	1,28	19,05	0,20
	mean	86,27	4,71	1,65	44,94	0,33	8,43	0,42	2,23	160,03	0,59	5,30	0,27	1,24	17,25	0,16
	sd	5,86	1,54	0,02	1,69	0,01	4,02	0,13	0,21	80,01	0,13	2,20	0,09	0,03	1,05	0,02

Iron work Ostrowiec (IW-2)	19	92.19	2.360	1.70	50.12	0.32	4.30	0.1100	1.90	79.43	0.65
	20	96.28	0.078	1.67	46.77	0.34	3.72	0.0030	2.85	707.95	0.71
	21	88.97	1.250	1.69	48.98	0.33	6.05	0.0850	2.80	630.96	0.70
	22	95.90	0.152	1.66	45.71	0.33	4.10	0.0065	2.20	158.49	0.90
	23	93.87	0.306	1.69	48.98	0.32	6.13	0.0200	2.77	588.84	0.75
	24	91.88	0.215	1.66	45.71	0.33	8.12	0.0190	2.65	446.68	0.78
	25	93.70	0.119	1.69	48.98	0.31	6.30	0.0080	3.14	1380.38	0.70
	26	94.15	0.161	1.70	50.12	0.31	5.85	0.0100	2.55	354.81	0.79
	27	94.74	0.270	1.70	50.12	0.31	5.26	0.0150	2.50	316.23	0.79
	28	95.89	0.280	1.70	50.12	0.32	4.11	0.0120	2.50	316.23	0.75
	29	94.48	0.308	1.71	51.29	0.32	5.52	0.0180	2.65	446.68	0.75
	30	96.69	0.585	1.73	53.70	0.31	3.31	0.0200	2.80	630.96	0.70
	31	96.21	0.127	1.71	51.29	0.33	3.79	0.0050	2.10	125.89	0.78
Statistic	min	88.97	0.08	1.66	45.71	0.31	3.31	0.00	1.90	79.43	0.65
	max	96.69	2.36	1.73	53.70	0.34	8.12	0.11	3.14	1380.38	0.90
	mean	94.23	0.48	1.69	49.38	0.32	5.12	0.03	2.57	400.26	0.75
	sd	2.20	0.64	0.02	2.02	0.01	1.38	0.03	0.34	200.08	0.06
Iron work Katowice (IW-3)	32	85.85	0.182	1.69	48.98	0.32	14.15	0.0300	2.00	100.00	0.76
	33	87.84	0.289	1.68	47.86	0.31	12.16	0.0400	2.50	316.23	0.75
	34	86.47	0.179	1.68	47.86	0.32	13.53	0.0280	2.45	281.84	0.75
	35	90.23	0.194	1.78	60.26	0.32	9.77	0.0210	2.40	251.19	0.75
	36	88.57	0.124	1.70	50.12	0.31	11.43	0.0160	2.28	190.55	0.75
	37	88.24	0.120	1.70	50.12	0.32	11.76	0.0160	2.27	186.21	0.75
	38	86.00	0.098	1.70	50.10	0.32	14.00	0.0160	2.27	186.20	0.75
	39	88.69	0.122	1.69	48.98	0.32	11.31	0.0155	2.29	194.98	0.75
	40	90.96	0.156	1.71	51.29	0.31	9.04	0.0155	2.80	630.96	0.75
	41	90.52	0.148	1.71	51.29	0.32	9.48	0.0155	2.80	630.96	0.75
	42	94.29	0.289	1.70	50.12	0.35	5.71	0.0175	2.75	562.34	0.75
	43	91.20	0.171	1.70	50.12	0.33	8.80	0.0165	2.99	977.24	0.70
	44	91.85	0.186	1.70	50.12	0.33	8.15	0.0165	2.99	977.24	0.70
	45	91.91	0.159	1.70	50.12	0.33	8.09	0.0140	3.05	1122.02	0.75
	46	94.46	2.900	1.71	51.29	0.32	5.54	0.1700	2.75	562.34	0.80
	47	90.48	0.133	1.70	50.12	0.32	9.52	0.0140	2.75	562.34	0.80

Statistics	min	85.85	0.10	1.68	47.86	0.31	5.54	0.01	2.00	100.00	0.70
	max	94.46	2.90	1.78	60.26	0.35	14.15	0.17	3.05	1122.02	0.80
	mean	89.66	0.33	1.70	50.41	0.32	10.03	0.03	2.61	440.17	0.75
	sd	2.67	0.66	0.02	2.74	0.01	2.61	0.04	0.33	285.05	0.03
PM	ap-253	100	0.00225	1.82	66.07	0.28					
	ap-258	100	0.0177	1.85	70.79	0.29					
	ap-259	100	0.00777	1.82	66.07	0.30					
	ap-261	100	0.0277	1.82	66.07	0.30					
Street dust	sd-3	100	0.8	1.65	44.67	0.37					
	sd-15	100	1.65	1.65	44.67	0.35					
	sd-16	100	0.499	1.62	41.69	0.40					
	sd-19	100	0.342	1.71	51.29	0.36					
	sd-20	94.48	15.4	1.63	42.66	0.35	5.52	0.9	2.55	354.81	0.69
	sd-21	100	1.95	1.35	22.39	0.44					
	sd-23	100	0.715	1.66	45.71	0.38					
	sd-25	100	0.425	1.83	67.61	0.35					
	sd-27	95.12	0.37	1.63	42.66	0.35	4.88	0.019	2.45	281.84	0.75
	sd-29	75.00	0.105	1.7	50.12	0.37	25.00	0.035	2.46	288.40	0.76
	sd-30	86.49	0.096	1.7	50.12	0.37	13.51	0.015	2.46	288.40	0.76
	sd-31	100	0.14	1.69	48.98	0.38					
	sd-32	81.97	0.45	1.74	54.95	0.35	18.03	0.099	2.44	275.42	0.75
	sd-33	95.93	0.259	1.62	41.69	0.37	4.07	0.011	2.40	251.19	0.76
	sd-35	100	1.259	1.62	41.69	0.35					
	sd-37	100	0.25	1.59	38.90	0.42					
	sd-42	100	0.21	1.54	34.67	0.45					
	sd-43	100	0.345	1.7	50.12	0.37					
	sd-45	100	0.325	1.8	63.10	0.4					
	sd-46	100	0.74	1.63	42.66	0.34					
	sd-48	88.02	0.588	1.53	33.88	0.39	11.98	0.08	2.40	251.19	0.80

Table S2. Data of magnetic parameters for studied samples: topsoil, street dust and PM. X mass-specific magnetic susceptibility, Mrs—remanent magnetization, Ms—Saturation magnetization, Bc—coercivity, Bcr—remanece coercivity, X_{ARM}—anhysteretic magnetic susceptibility, S-ratio calculated by dividing the value of the -IRM_{L300mT} by SIRM, SIRM—saturation isothermal remanent magnetization.

Sample	Sampling Site	X 10 ⁻⁸	Mrs	Ms	Bc	Bcr	Mrs/Ms	Bcr/Bc	X _{ARM} 10 ⁻⁸	S-ratio	SIRM/X
		m ³ /kg	mAm ² /kg	mAm ² /kg	mT	mT			m ³ /kg		kA/m
1	Iron work Třinec (IW-1)	282.53	28.50	245.00	9.4	26.8	0.116	2.85	599.37	0.943	12.433
2		303.61	33.22	243.00	9.9	26.4	0.137	2.67	582.02	0.940	11.156
3		283.53	32.14	264.90	9.7	27.0	0.121	2.78	603.24	0.930	12.639
4		225.94	22.40	220.40	8.4	27.3	0.102	3.25	465.18	0.935	11.084
5		222.51	25.14	251.00	8.5	25.9	0.100	3.05	473.64	0.925	11.974
6		212.20	27.24	249.10	9.3	27.4	0.109	2.95	455.91	0.921	11.744
10		194.03	20.95	218.80	8.0	25.9	0.096	3.24	420.53	0.951	10.671
11		191.21	18.82	171.60	8.7	24.5	0.110	2.83	377.70	0.934	11.230
12		194.44	19.05	216.20	7.3	27.4	0.088	3.76	450.26	0.936	11.427
13		206.77	22.36	201.10	8.7	24.9	0.111	2.86	629.15	0.929	11.074
14		213.86	23.63	209.20	8.9	25.0	0.113	2.81	614.66	0.917	10.651
15		209.97	25.62	240.70	8.1	25.3	0.106	3.10	649.57	0.940	10.725
16		277.11	34.82	301.90	9.5	26.8	0.115	2.83	613.75	0.935	12.015
17		279.70	26.60	263.60	8.7	25.4	0.101	2.92	622.11	0.946	11.988
18		279.91	28.04	293.40	8.3	26.1	0.096	3.14	612.50	0.924	11.844
19	Iron work Ostrowiec (IW-2)	180.83	20.27	310.60	7.3	28.6	0.065	3.91	170.43	0.971	6.198
20		181.72	6.79	89.95	8.0	28.1	0.075	3.51	133.73	0.955	4.888
21		95.79	7.55	120.80	7.1	29.8	0.062	4.22	64.91	0.975	3.952
22		76.92	11.12	168.30	7.2	27.9	0.066	3.86	76.04	0.983	6.071
23		319.78	16.50	232.20	7.9	29.3	0.071	3.72	235.82	0.989	5.090
24		331.29	15.75	196.80	8.3	28.2	0.080	3.41	206.12	0.989	4.470
25		155.53	10.49	137.90	7.9	29.3	0.076	3.71	110.82	0.988	4.992
26		160.01	8.54	111.10	7.7	29.0	0.077	3.76	119.53	0.992	4.967
27		246.92	14.80	183.60	8.1	30.0	0.081	3.70	174.73	0.985	5.201
28		255.60	15.41	203.20	7.9	30.6	0.076	3.90	178.33	0.995	5.357
29		277.87	11.99	143.70	8.5	31.2	0.083	3.67	194.40	0.990	6.416
30		299.89	23.77	277.20	8.8	32.1	0.086	3.63	225.47	0.991	6.684
31		162.37	7.20	98.07	7.6	29.8	0.073	3.91	182.62	0.986	6.188

32	Iron work Katowice (IW-3)	169.23	11.53	124.60	9.2	31.2	0.093	3.40	177.61	0.945	9.212
33		174.26	20.14	207.30	9.3	30.4	0.097	3.27	209.17	0.954	9.335
34		151.88	10.93	120.10	9.2	31.5	0.091	3.43	175.81	0.951	7.803
35		130.54	9.94	92.62	10.7	37.9	0.107	3.54	127.95	0.948	6.867
36		135.10	12.03	115.60	10.4	32.1	0.104	3.07	151.90	0.950	7.881
37		96.05	10.60	125.80	8.8	30.4	0.084	3.45	110.23	0.945	7.918
38		190.53	8.50	73.04	10.5	31.1	0.116	2.95	358.33	0.996	18.307
39		118.60	10.51	115.70	8.8	30.4	0.091	3.46	277.62	0.982	22.307
40		185.89	15.27	155.10	9.9	31.8	0.098	3.22	184.36	0.959	7.874
41		176.33	13.12	172.30	8.5	32.2	0.076	3.81	166.51	0.962	7.322
42		140.48	11.59	128.00	8.9	30.4	0.091	3.41	141.45	0.936	7.687
43		128.75	9.45	94.17	9.8	31.4	0.100	3.21	164.27	0.973	10.356
44		136.20	8.45	99.45	8.6	30.8	0.085	3.57	175.74	0.949	9.205
45		136.05	6.76	68.94	9.2	31.3	0.098	3.42	180.18	0.950	9.720
46		178.01	15.68	202.60	9.0	30.9	0.077	3.43	199.93	0.998	10.152
47		157.59	7.24	77.16	9.2	30.9	0.094	3.35	148.76	0.928	6.497

ap252	Particulate matter PM	1180.72	113.36	1067.92	10.57	46.06	0.106	4.36	2224.93
ap255		1521.06	137.14	1295.39	11.12	50.23	0.106	4.52	13492.48
ap256		1481.90	153.29	1454.11	11.31	50.23	0.105	4.44	8964.62
ap257		473.78	41.79	416.40	9.57	46.26	0.100	4.83	1092.12
ap258		1100.80	89.94	894.31	10.14	48.93	0.101	4.83	3605.05
ap259		1479.36	138.15	1242.24	10.97	47.10	0.111	4.29	4421.68
ap260		1806.72	179.06	1697.30	10.77	49.59	0.105	4.60	
ap261		1429.10	177.97	1684.00	11.29	49.67	0.106	4.40	2869.36
ap262		587.96	45.89	494.37	8.61	42.86	0.093	4.98	9448.53
ap263		2143.03	205.15	2139.93	9.97	49.69	0.096	4.98	
ap1		284.75	44.81	393.21	10.22	45.13	0.114	4.42	
ap2		609.82	90.06	825.39	9.95	42.98	0.109	4.32	
ap3		400.22	63.10	586.64	10.21	42.05	0.108	4.12	
ap4		371.42	56.90	517.40	10.33	47.44	0.110	4.59	
ap5		415.33	67.79	640.71	9.70	45.17	0.106	4.66	
ap6		510.94	71.50	689.98	10.12	46.67	0.104	4.61	
ap7		443.93	71.09	675.64	9.85	46.65	0.105	4.74	
ap8		211.25	28.83	256.25	9.83	37.84	0.113	3.85	
ap9		355.48	61.42	561.29	10.29	42.04	0.109	4.09	
ap10		420.31	77.21	690.00	10.52	44.85	0.112	4.27	
ap11		470.77	66.94	702.23	9.22	46.89	0.095	5.08	
ap12		460.62	93.58	796.45	11.58	48.60	0.117	4.20	
ap13		157.73	26.22	243.40	8.80	33.80	0.108	3.84	
ap14		655.29	88.86	883.30	9.01	44.53	0.101	4.94	
ap15		484.04	56.63	621.00	8.74	47.33	0.091	5.41	
ap16		222.73	31.96	304.65	9.79	42.99	0.105	4.39	
ap17		676.74	103.04	964.30	9.37	38.69	0.107	4.13	
ap18		262.00	35.73	375.99	9.34	42.13	0.095	4.51	

sd1	Street dust	182.8	249.9	25.8	6.2	22	0,103	3,55	759.2
sd2		224	343.4	26	5.8	22.1	0,076	3,81	759.2
sd3		240.4	417.3	33.2	3.5	16.6	0,079	4,74	701.1
sd4		156.3	128.7	10.6	7.1	27.2	0,082	3,83	608.9
sd5		470.7	732.9	93	12.1	36.8	0,127	3,04	608.9
sd6		320	272.9	28.2	8.8	29.8	0,103	3,39	796.1
sd7		203.2	166.4	11.7	6.1	20.9	0,070	3,43	675.9
sd8		262.6	456.0	38.2	5.0	23.2	0,084	4,64	961.9
sd9		244.2	199.7	21.2	9.2	29.1	0,106	3,16	388.1
sd10		193.5	212.4	34.3	8.5	16.3	0,162	1,92	558.7
sd11		335.0	144.2	18.2	7.1	19.6	0,126	2,76	558.7
sd12		155.5	331.8	50.6	9.7	20.5	0,153	2,11	423.2
sd13		157.5	63.7	6.3	8.5	24.5	0,098	2,88	423.2
sd14		136.2	56.3	7.3	10.3	30.1	0,130	2,92	357.9
sd15		327.7	418.0	36.5	8.8	33.1	0,087	3,76	445.1
sd16		204.3	220.0	16.1	6.8	22.9	0,073	3,37	364.8
sd17		119.5	109.7	8.9	7.8	33.8	0,081	4,33	188.7
sd18		166	207.6	15.2	6.9	24.3	0,073	3,52	368.4
sd19		174.2	246.4	19.2	5.4	27.2	0,078	5,04	437.0
sd20		231.6	210.7	32.2	10.3	29.4	0,153	2,85	437.0
sd21		215.0	176.3	17.6	8.5	29.2	0,100	3,44	472.9
sd22		236.8	96.6	14	9.4	24.5	0,145	2,61	472.9
sd23		352.9	600.6	55.9	8.1	32.4	0,093	4,00	472.9
sd24		176.3	244.1	21.4	8.2	27.8	0,088	3,39	266.1
sd25		160.4	81.9	7.9	8.9	37.3	0,097	4,19	379.6
sd26		105.4	108.3	16.4	13.6	47.4	0,152	3,49	622.7
sd27		87.3	87.7	8.1	7.2	32.6	0,092	4,53	280.2
sd28		304.1	141.2	14.5	10.2	44.2	0,103	4,33	621.4
sd29		191.3	169.5	18.9	9.3	27.4	0,112	2,95	640.6
sd30		101.1	170.3	22.6					313.4
sd31		199.0	87.6	9	9.3	35.6	0,103	3,83	243.5
sd32		162.5	109.4	13.1	9.1	33.3	0,119	3,66	372.5
sd33		72.9	219.8	39.6	14.5	31.9	0,180	2,20	550.1
sd34		237.8	295	33.1	9.4	27.2	0,112	2,89	471.3
sd35		518.5	179	23	12.3	37.1	0,128	3,02	1058.3
sd36		249.7	154.3	16	8.6	27.8	0,104	3,23	642.7

sd37	109.8	20.5	2.6	11.0	26.4	0,129	2,40	596.0
sd38	158.2	746.1	26.7	3.5	47.7	0,036	13,63	369.1
sd39	175.8	140.1	15	6.3	54.9	0,107	8,71	369.1
sd40	234.2	53.3	7.4	9.0	22.6	0,139	2,51	369.1
sd41	239.9	165	25.5	10.9	23.5	0,155	2,16	593.0
sd42	140.9	60.5	9.6	13.9	26.6	0,159	1,91	492.5
sd43	228.7	492.6	48.1	8.1	30.9	0,098	3,81	592.5
sd44	128.1	261.8	38.5	6.5	11.4	0,147	1,75	457.0
sd45	296.4	217.4	18.4	7.7	27.9	0,085	3,62	973.5
sd46	211.9	115.7	7.2	5.9	24.4	0,062	4,14	386.8
sd47	259.5	230.1	19.3	6.1	23.0	0,084	3,77	487.3
sd48	169.4	56.8	4.5	7.7	32.5	0,079	4,22	332.1
sd49	168.6	107	12.5	6.9	19.4	0,117	2,81	328.9
sd50	228.2	148.4	20.6	10.3	23.9	0,139	2,32	631.8
sd51	261.2	65.9	8.8	9.7	24.3	0,133	2,51	631.8
sd52	77.9	26.5	3	7.9	24.6	0,112	3,11	163.7
sd53	162.8	150	16.9	9.0	25.7	0,113	2,86	403.4
sd54	177.6	236.9	24.1	8.2	33.6	0,102	4,10	681.2
sd55	134.8	87.6	9.3	7.2	28.4	0,106	3,94	564.2
sd56	267.2	207.1	23.6	10.7	39.5	0,114	3,69	621.4
sd57	365.6	573.7	53.1	5.0	18.7	0,093	3,74	540.6
sd58	133.2	176.7	18.7	7.5	25.0	0,106	3,33	313.4
sd59	273.8	28.2	2.9	8.5	32.0	0,103	3,76	243.5
sd60	211.0	388	38.6	6.5	24.0	0,100	3,69	372.5
sd61	201,2	239	22.5	6.5	25.5	0,094	3,92	471.3
sd63	351,4	451.4	52.5	7.5	24.5	0,116	3,27	642.7
sd64	175,7	244	23.4	7.5	28.0	0,096	3,73	596.0
sd65	238,6	553.9	50.8	6.5	23.0	0,092	3,54	369.1
sd66	221,1	377.4	35.6	6.5	21.5	0,094	3,31	369.1
sd67	168,3	303	23.4	7.0	23.5	0,077	3,36	369.1
sd68	269,4	88.1	29.4	8.0	25.0	0,333	3,13	593.0
sd70	179,8	94.1	10.9	6.5	17.5	0,116	2,69	492.5
sd71	278,7	440.3	39.4	8.5	28.5	0,090	3,35	492.5
sd72	257,3	419.5	31.3	4.0	15.0	0,075	3,75	457.0

Figure S1. Vertical distribution of volume magnetic susceptibility(κ) for soil cores collected in the area affected by ironwork Třinec (IW-1) (a), ironwork Ostrowiec (IW-2)(b) and (c) ironwork Katowice (IW-3). There is marked the topsoil layer from which the material (called topsoil samples) was taken for magnetic studies.

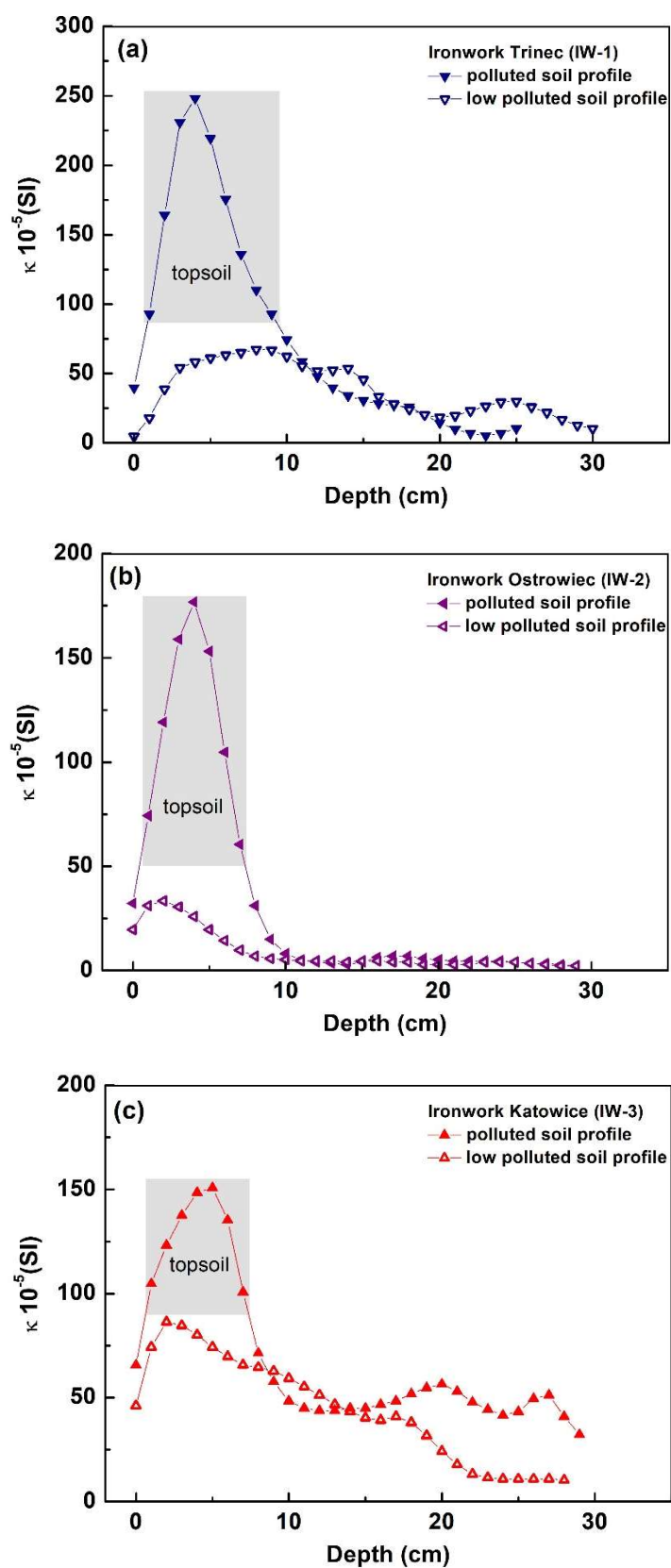


Figure S2. One-component (a,b) and two-component (c,d) fit of the same sample of street dust. Linear acquisition plot (left) and gradual acquisition plot (right).

