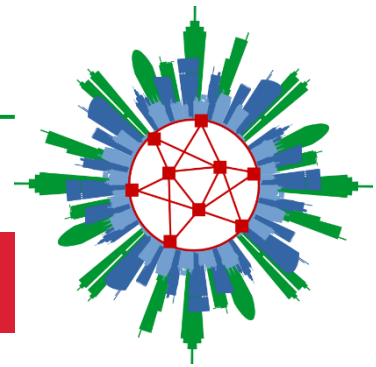




Institute of Geography-Geoecology,
Mongolian Academy of Sciences

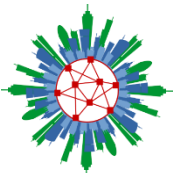
SuMoCoS

Sustainability and Mobility
in the Context of Smart Cities



Air pollution study in Ulaanbaatar city of Mongolia

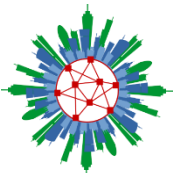
**Amarsaikhan Damdinsuren, Jargaldalai Enkhtuya, Enkhzul
Natsagdorj, Tsogzol Gurjav**



Background

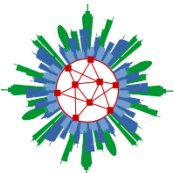


- Air pollution is killing more people every year than all war and violence in the world. More than AIDS and malaria.
- In the Ulaanbaatar city, 10-15 percent of all the deaths were caused by polluted air.



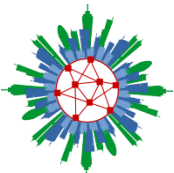
Introduction



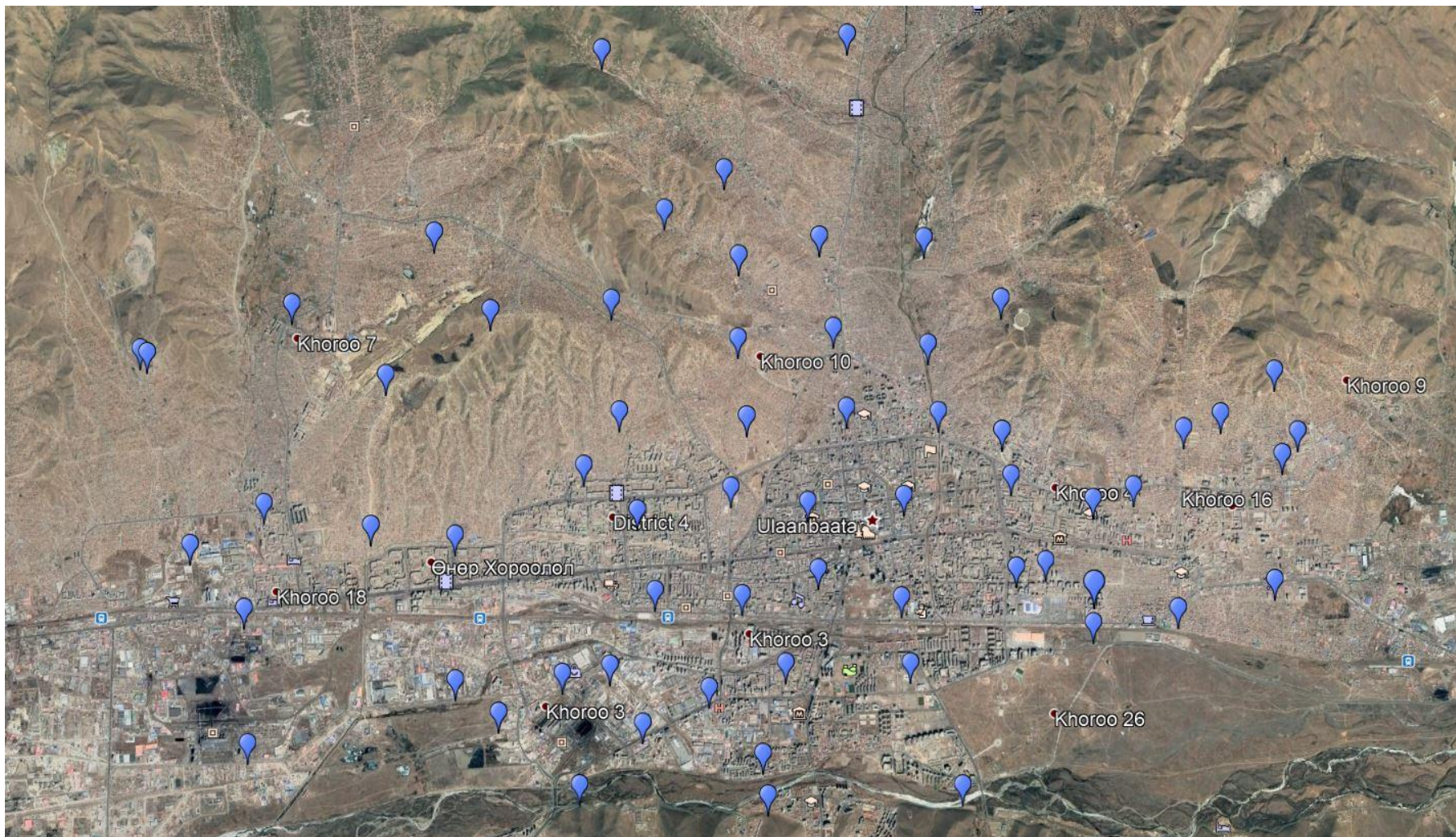


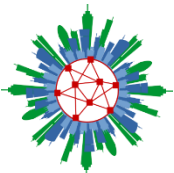
Data sources





Data sources



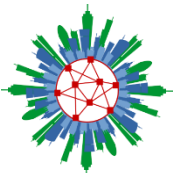


Result

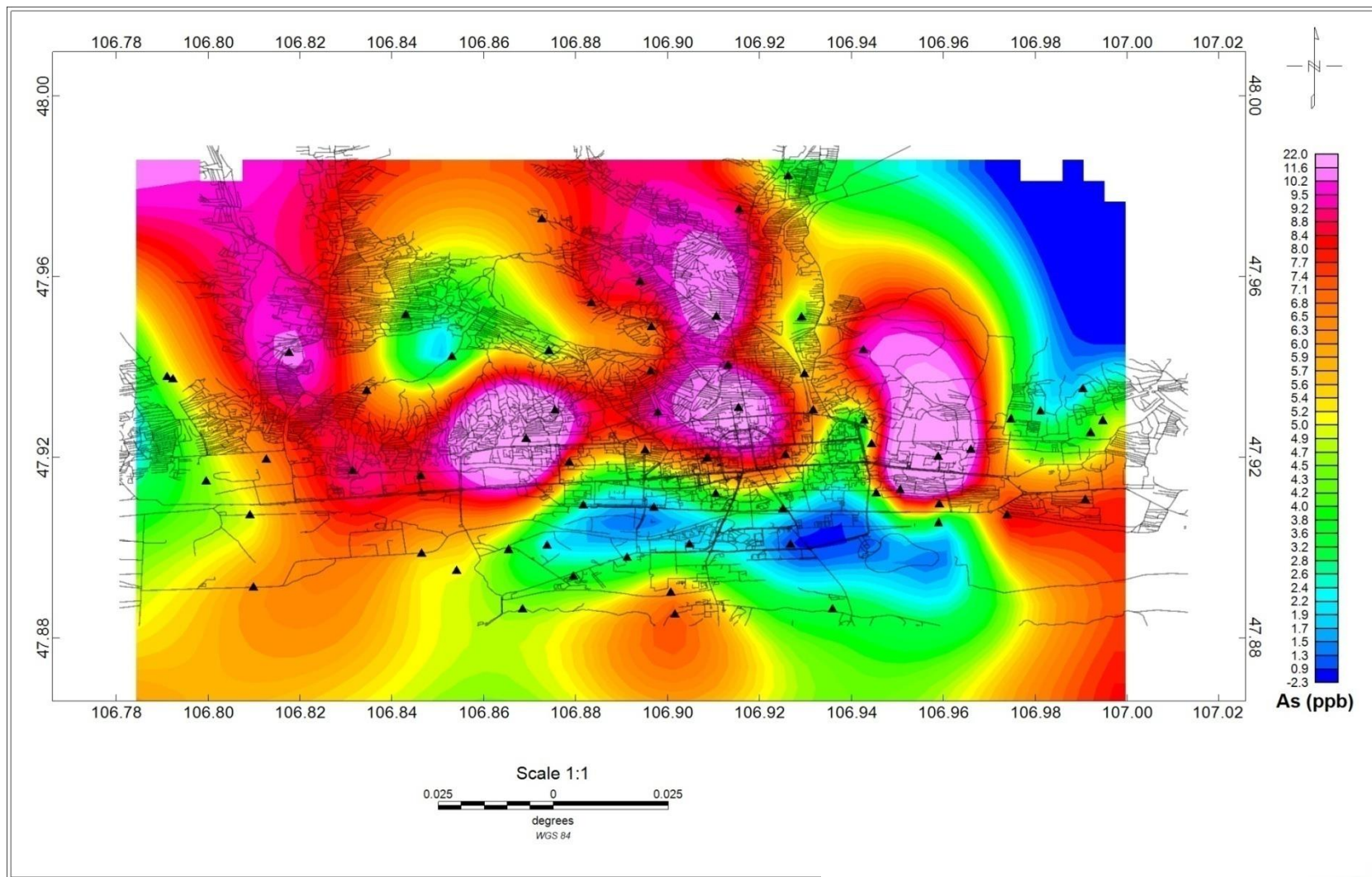


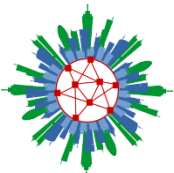
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	
1	Sample	latitude	longitude	1	2	3	4	5	6	ph	EC	52 Cr	He55 Mn	He56 Fe	He59 Co	He60 Ni	He63 Cu	He66 Zn	[He]66 Zn.X	He75 As	[He]82 Se	[He]82 Se.X
2	T-1-0	47.7588056	106.995028	47	45	32	106	59	42.1	7.02	35	0.614	20.749	75.305	0.237	0.386	0.606	11.062	11.062	0.958	0.0	
3	T-1-1	47.5358049	106.865306	47	53	58	106	51	55.1	6.92	19	0.994	31.389	81.358	0.154	0.373	2.096	5.553	5.553	4.128	1.9	
4	T-1-2	47.8863611	106.868417	47	53	11	106	52	6.3	6.8	17	0.821	60.242	75.297	0.661	0.636	2.198	6.796	6.796	4.602	1.9	
5	T-1-3	47.8948611	106.854056	47	53	42	106	51	14.6	6.96	23	1.612	41.461	75.136	0.187	0.306	1.242	4.928	4.928	5.234	3.0	
6	T-1-4	47.8986944	106.846417	47	53	55	106	50	47.1	6.67	9.3	0.966	55.841	80.238	0.298	0.673	2.991	4.516	4.516	5.444	2.5	
7	T-1-5	47.8911389	106.809806	47	53	28	106	48	35.3	6.63	20	1.169	151.580	76.892	0.496	0.916	3.126	5.672	5.672	6.220	9.3	
8	T-1-6	47.9071111	106.809056	47	54	26	106	48	32.6	6.83	11	0.869	33.657	79.913	0.199	0.494	2.125	3.904	3.904	4.850	5.0	
9	T-1-7	47.9146667	106.7995	47	54	53	106	47	58.2	7.22	12	0.833	27.750	86.435	0.169	0.287	1.447	3.997	3.997	4.523	1.0	
10	T-1-8a	47.9373056	106.792306	47	56	14	106	47	32.3	7.29	8.4	0.887	48.852	74.891	0.271	0.694	2.983	2.829	2.829	5.674	2.5	
11	T-1-8b	47.93775	106.791083	47	56	16	106	47	27.9	7.07	11	0.929	92.728	91.556	0.386	0.657	3.507	3.367	3.367	3.945	2.6	
12	T-1-9	47.9195278	106.812583	47	55	10	106	48	45.3	6.75	24	0.875	99.261	85.030	0.512	0.773	4.462	0.000	-2.898	6.531	3.6	
13	T-1-10	47.9431389	106.817583	47	56	35	106	49	3.3	7.6	32	0.948	36.464	69.396	0.427	0.816	2.483	0.000	-4.810	10.878	3.5	
14	T-1-11	47.9514722	106.842944	47	57	5.3	106	50	34.6	7	12	0.777	123.965	64.930	0.639	0.704	1.674	0.000	-1.759	4.062	2.4	
15	T-1-12	47.9422778	106.853056	47	56	32	106	51	11	6.78	8.4	0.675	47.275	103.196	0.511	0.156	0.908	7.032	7.032	1.818	1.2	
16	T-1-13	47.9347222	106.834444	47	56	5	106	50	4	6.59	14	1.151	75.631	61.798	0.278	0.349	2.301	6.683	6.683	6.799	3.4	
17	T-1-14	47.9169444	106.831472	47	55	1	106	49	53.3	6.69	53	1.582	223.440	66.753	0.969	2.549	14.246	11.705	11.705	9.398	13.3	
18	T-1-15	47.9158056	106.846333	47	54	57	106	50	46.8	7.41	20	0.937	98.401	59.851	0.677	1.272	7.489	1.892	1.892	8.572	5.1	
19	T-1-16	47.9240556	106.869139	47	55	27	106	52	8.9	7.15	17	1.545	26.447	129.796	0.271	0.702	1.551	6.270	6.270	19.193	4.5	
20	16-2-1	47.9437222	106.942556	47	56	37	106	56	33.2	7.83	49	1.355	131.421	94.522	0.745	1.862	5.225	1.558	1.558	10.352	4.5	
21	16-2-2	47.9281667	106.942778	47	55	41	106	56	34	7.49	140	6.137	922.047	132.779	9.635	15.757	20.707	815.361	815.361	3.766	14.0	
22	16-2-3	47.9127778	106.950528	47	54	46	106	57	1.9	7.76	54	1.663	92.899	82.401	0.820	2.719	10.896	3.699	3.699	13.054	6.8	
23	16-2-4	47.9054444	106.958917	47	54	20	106	57	32.1	7.86	24	1.478	171.565	81.401	1.439	2.658	7.247	33.374	33.374	2.280	4.7	
24	16-2-6	47.9229167	106.944389	47	55	23	106	56	39.8	7.66	35	1.527	251.956	140.845	2.574	3.306	6.216	107.908	107.908	4.030	4.4	
25	16-2-7	47.9201389	106.958833	47	55	13	106	57	31.8	7.1	113	1.939	125.541	93.563	1.794	4.522	31.096	3.994	3.994	26.462	16.1	

Cr, Mn, Fe, Co, Ni, Cu, Zn, Zn.X, As, Se, Se.X, Cd, Sn, Sn.X, Sb, Pb, Cl, NO, SO3, PO4, Na, NH4, K, MG and Ca

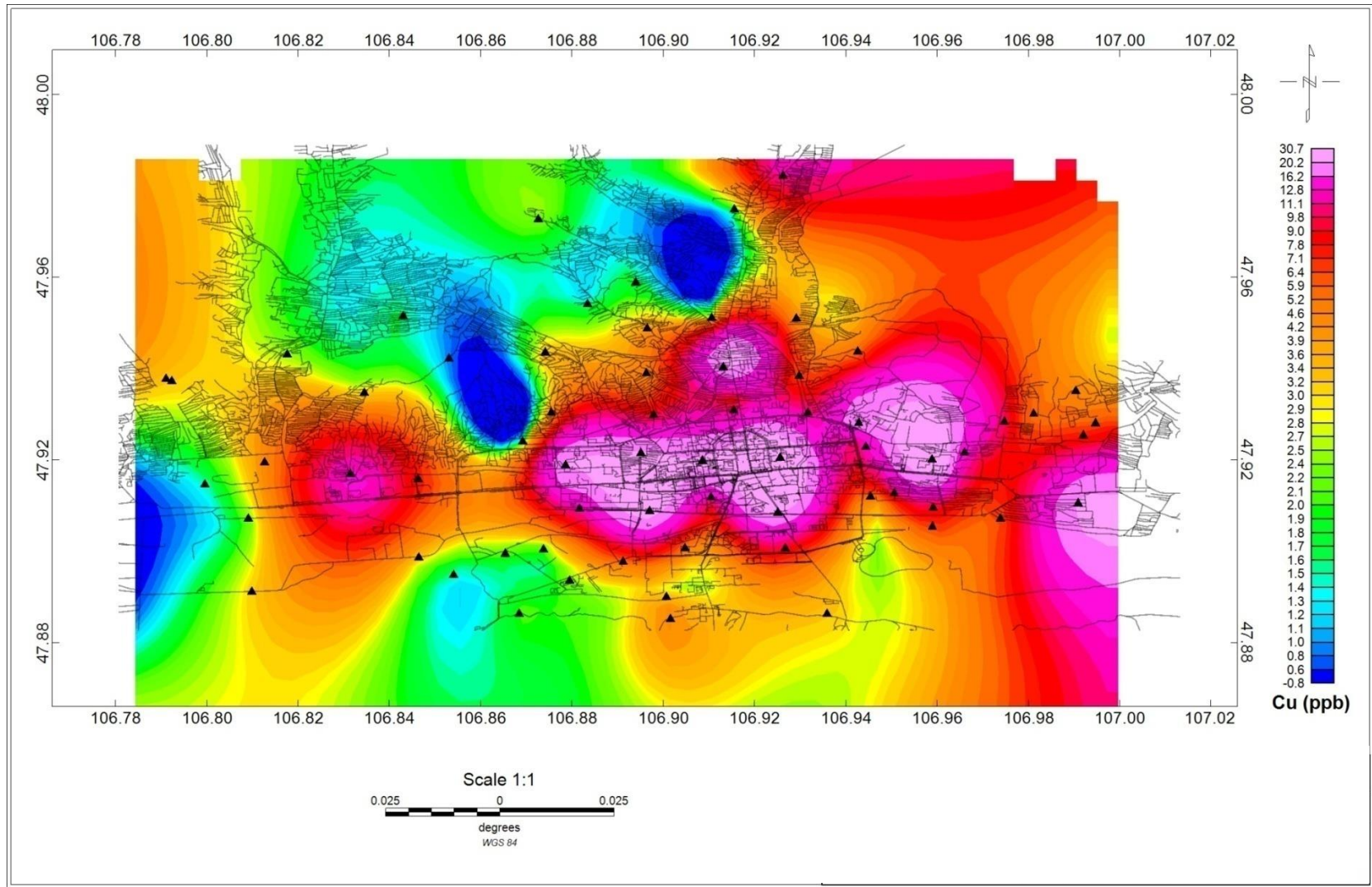


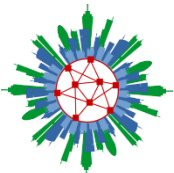
Spatial mapping of Arsenic dispersion



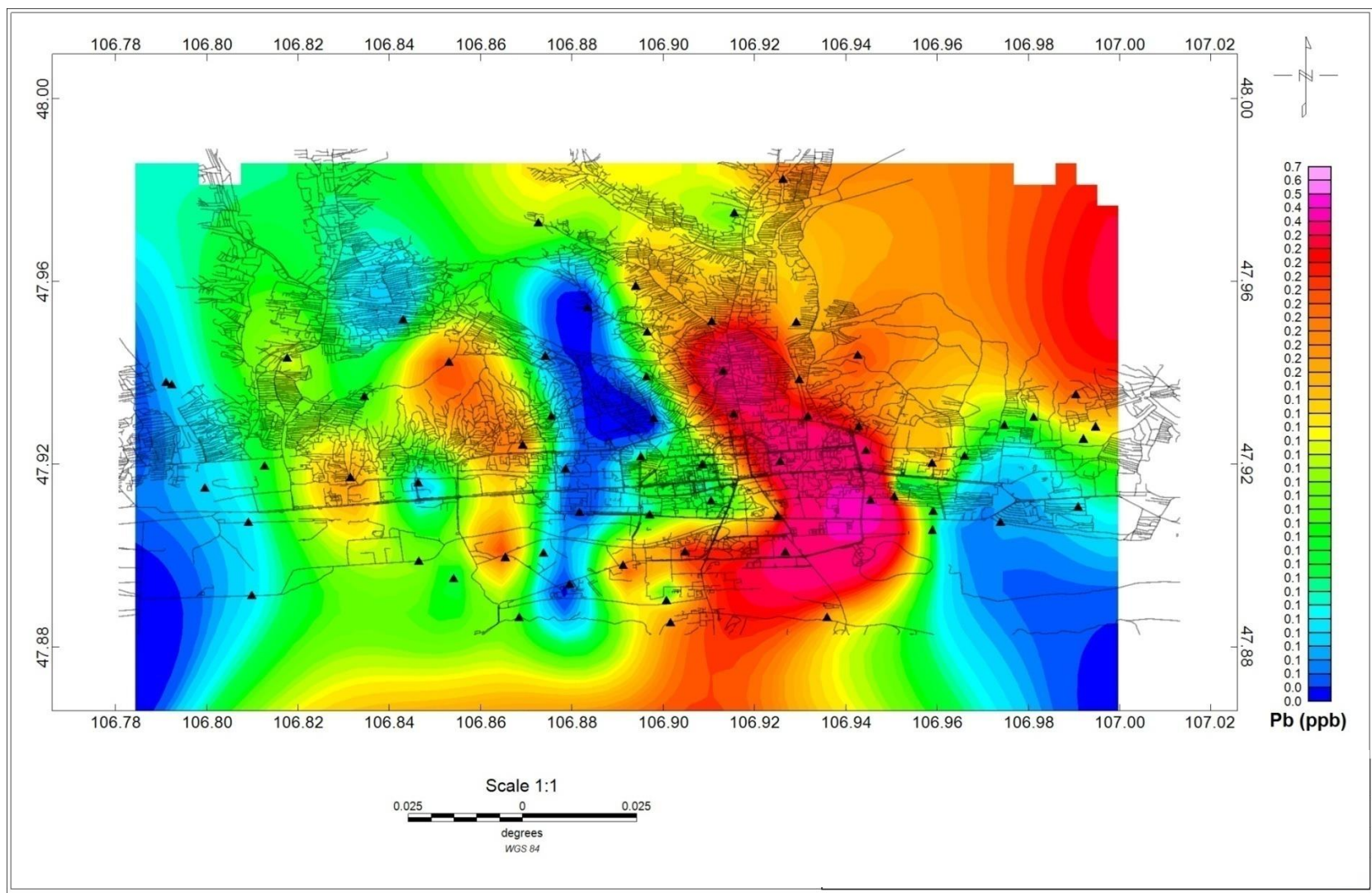


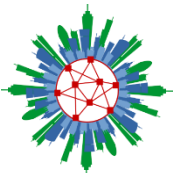
Spatial mapping of Copper dispersion



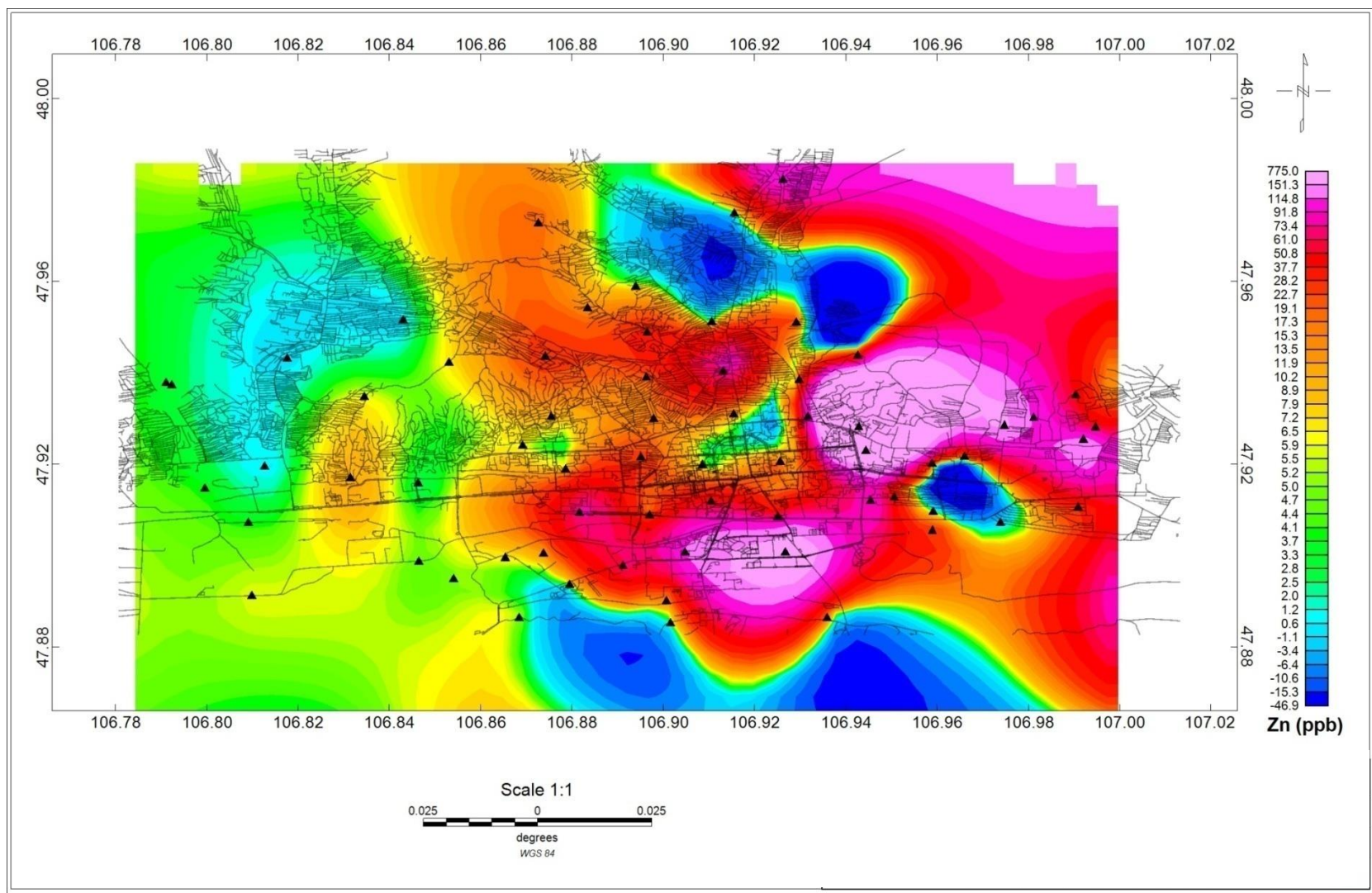


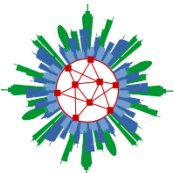
Spatial mapping of Lead dispersion



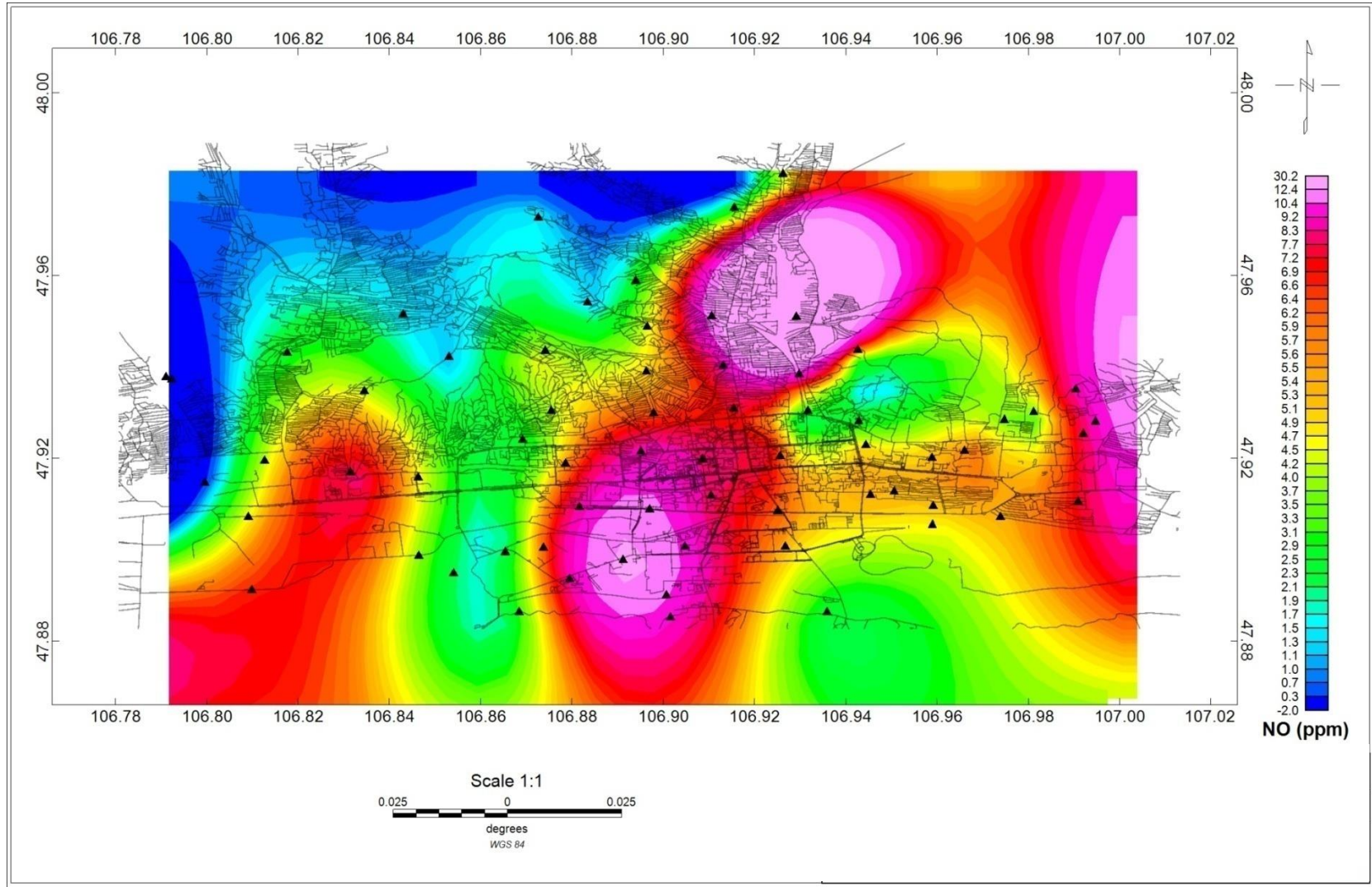


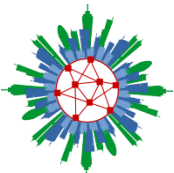
Spatial mapping of Zinc dispersion



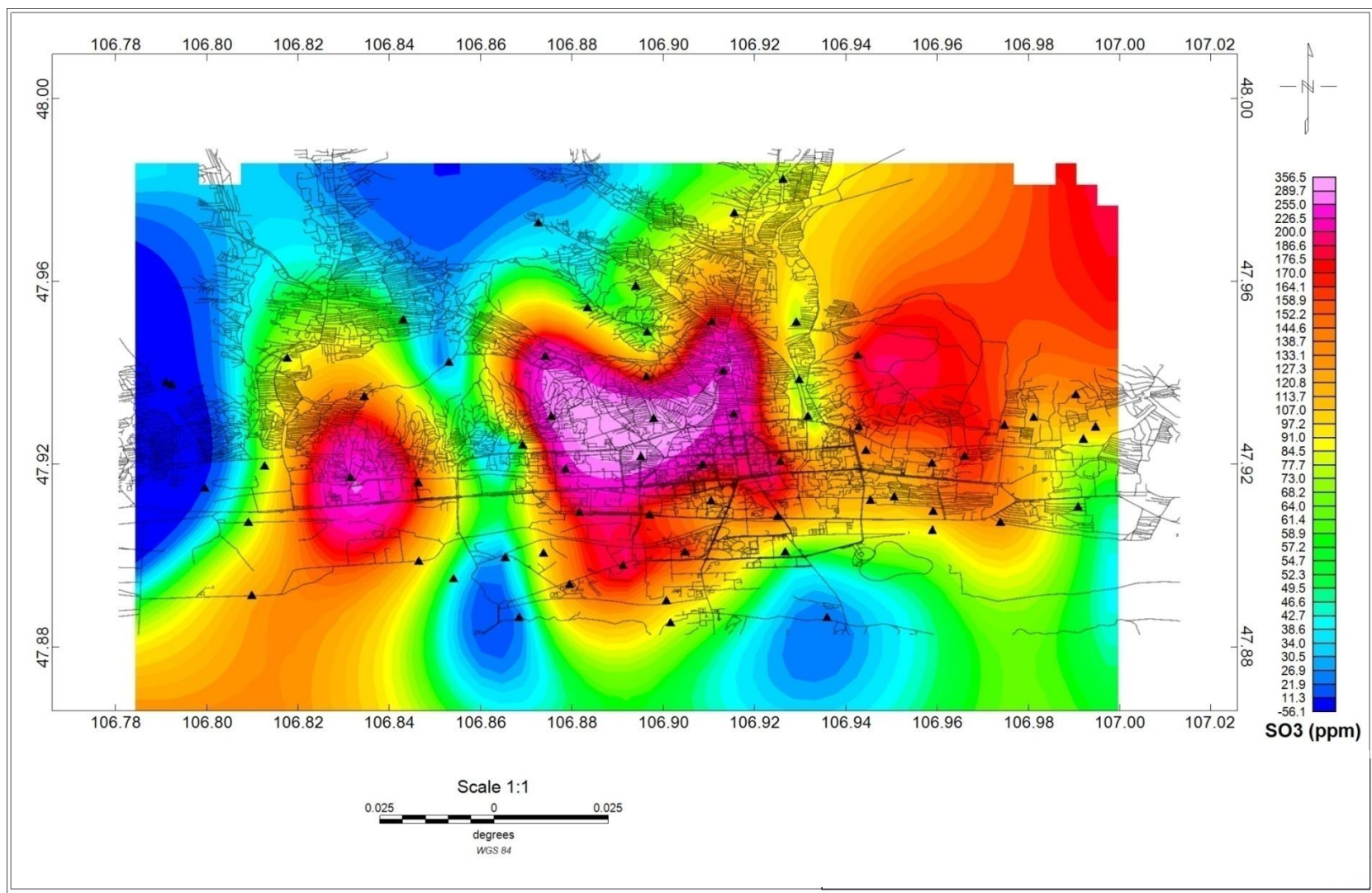


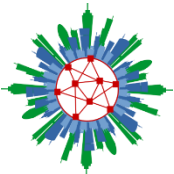
Spatial mapping of Nitrogen Monoxide dispersion





Spatial mapping of Sulfur dioxide dispersion





Conclusion



Test results showed that the concentrations of dust heavy metals Pb, Cr, Cu and Zn in the urban areas were significantly higher than those in the suburbs. Air pollution revealed that the degrees of ecological harm of dust heavy metals were very strong in both urban and suburban areas, but especially in urban areas. Overall, the study indicated that the air pollution in Ulaanbaatar city is a very serious problem and for its reduction, rapid and thorough measures should be taken.

Thank you for your attention



Jargaldalai Enkhtuya M.Sc.

Institute of Geography and Geoecology

Division of Remote Sensing and Spatial Model

+976 99168776

Jargaldalaie@mas.ac.mn