Supplementary Material

Table S1: Concentrations of Trace and Macro Elements in Tree Components, Litter, and Soil (mg/kg)

	Bark				1-Yr needle				2-Yr needle			
	Industrial		Background		Industrial		Background		Industrial		Background	
	AVG	SD	AVG	SD	AVG	SD	AVG	SD	AVG	SD	AVG	SD
Ag	0.077	0.120	0.010	0.009	0.027	0.016	0.034	0.022	0.032	0.020	0.031	0.011
Al	654	413	601	294	98	22.2	184.8	56.0	183	83	426	98.7
Be	0.027	0.018	0.018	0.009	0.002	0.003	0.003	0.0021	0.011	0.025	0.011	0.004
Bi	0.15	0.18	0.0043	0.004	0.32	0.25	0.41	0.15	0.30	0.27	0.35	0.10
Ce	1.0	0.58	0.67	0.29	0.14	0.03	0.21	0.08	0.26	0.10	0.53	0.13
Co	1.04	0.62	0.40	0.179	0.19	0.05	0.19	0.10	0.31	0.12	0.34	0.07
Cr	10.8	11.3	1.83	1.06	2.2	0.7	1.33	0.52	2.8	1.1	2.16	1.09
Dy	0.069	0.042	0.053	0.029	0.009	0.003	0.014	0.005	0.023	0.022	0.039	0.012
Er	0.036	0.021	0.029	0.017	0.005	0.002	0.007	0.003	0.015	0.024	0.020	0.007
Eu	0.021	0.013	0.015	0.008	0.002	0.001	0.004	0.002	0.010	0.019	0.011	0.003
Fe	2936	3056	570	257	350	209	221.5	104.0	652	421	495	163.8
Ga	4.1	3.3	1.4	0.61	0.9	0.4	0.68	0.48	1.3	0.7	1.0	0.7
Gd	0.092	0.054	0.068	0.034	0.012	0.003	0.019	0.008	0.029	0.023	0.051	0.015
Ho	0.013	0.008	0.010	0.006	0.002	0.001	0.003	0.001	0.009	0.023	0.007	0.002
La	0.506	0.307	0.347	0.154	0.07	0.016	0.109	0.044	0.13	0.05	0.26	0.065
Li	0.562	0.384	0.340	0.139	0.21	0.1	0.27	0.394	0.4	0.3	0.53	0.42
Lu	0.004	0.003	0.003	0.002	0.0006	0.0016	0.0005	0.0002	0.0067	0.0242	0.0017	0.0009
Mg	1343	834	597	113.7	2703	764	2524	614	2778	1071	2975	1087
Mn	112.9	120	18.4	4.7	45.0	18.9	52.9	23.1	43.9	26.0	61	38
Mo	0.372	0.481	0.063	0.032	0.36	0.30	0.11	0.06	0.25	0.20	0.11	0.07
Nd	0.47	0.28	0.33	0.15	0.064	0.017	0.098	0.039	0.12	0.05	0.25	0.063
Ni	12.3	8.3	3.2	1.88	3.1	1.4	2.5	2.4	3.0	1.1	2.6	1.58
P	114	65	145	77	891	209	920	192	762	335	815	232
Pr	0.111	0.066	0.079	0.036	0.015	0.004	0.022	0.009	0.033	0.021	0.058	0.015
Rb	0.944	0.418	0.702	0.320	3.5	1.4	5.0	6.2	2.1	1.3	1.8	1.33
Sb	0.336	0.479	0.051	0.029	0.09	0.03	0.065	0.039	0.15	0.10	0.094	0.051
Se	0.057	0.045	0.037	0.029	0.010	0.010	Nd	Nd	0.02	0.022	0.013	0.008
Sm	0.092	0.054	0.068	0.032	0.013	0.003	0.018	0.008	0.029	0.022	0.050	0.014
Sn	0.580	0.936	0.038	0.020	0.20	0.08	0.12	0.05	0.35	0.34	0.13	0.058
Sr	21.8	9.6	20.6	20.5	13.9	7.3	16.3	23.6	18.8	10.7	24.1	27.3
Tb	0.012	0.007	0.009	0.005	0.001	0.001	0.002	0.001	0.008	0.021	0.006	0.002
Th	0.103	0.055	0.066	0.031	0.011	0.004	0.026	0.011	0.029	0.015	0.067	0.020
Tl	0.125	0.187	0.018	0.011	0.008	0.006	0.007	0.0063	0.033	0.040	0.036	0.041
U	0.063	0.046	0.022	0.010	0.010	0.007	0.009	0.004	0.023	0.021	0.021	0.007
Y	0.388	0.240	0.298	0.165	0.050	0.012	0.084	0.031	0.10	0.041	0.219	0.077
Yb	0.030	0.018	0.023	0.014	0.004	0.001	0.006	0.002	0.013	0.024	0.017	0.006

Table S1: Continued

	Branch				Stem				Litter			
	Industrial		Background		Industrial		Background		Industrial		Background	
	AVG	SD	AVG	SD	AVG	SD	AVG	SD	AVG	SD	AVG	SD
Ag	0.020	0.014	0.012	0.014	0.028	0.014	0.017	0.015	0.07	0.06	0.05	0.05
Al	83.1	29.7	71	46.5	14.5	12.0	7.8	5.8	1219	1703	1414	1077
Be	0.003	0.002	0.002	0.002	0.00037	0.00059	0.00003	0.00002	0.051	0.054	0.051	0.054
Bi	0.032	0.037	0.023	0.019	0.28	0.25	0.29	0.18	0.193	0.164	0.074	0.036
Ce	0.207	0.091	0.14	0.094	0.011	0.011	0.009	0.007	1.4	1.9	1.20	1.22
Co	0.280	0.199	0.20	0.087	0.044	0.034	0.034	0.013	3.3	3.9	1.75	1.80
Cr	0.76	0.68	Nd	Nd	3.45	9.12	0.89	1.110	19.9	30.8	8.56	13.47
Dy	0.013	0.005	0.009	0.006	0.0005	0.0007	0.0004	0.0003	0.094	0.143	0.095	0.099
Er	0.007	0.003	0.004	0.003	0.0003	0.0006	0.0001	0.00004	0.047	0.070	0.050	0.052
Eu	0.006	0.004	0.005	0.003	0.0003	0.0005	0.0001	0.00005	0.053	0.068	0.039	0.038
Fe	296	220	75.2	53.4	112.0	157.4	41.8	14.5	3813	3929	1650	1720
Ga	1.70	1.2	0.7	0.60	0.48	0.20	0.41	0.54	8.7	9.2	4.2	3.67
Gd	0.018	0.007	0.012	0.009	0.0006	0.0008	0.0004	0.0004	0.129	0.189	0.120	0.128
Ho	0.002	0.001	0.002	0.001	0.00035	0.00049	0.00004	0.00001	0.017	0.026	0.018	0.019
La	0.123	0.063	0.094	0.065	0.007	0.007	0.006	0.003	0.9	1.3	0.86	0.98
Li	1.33	2.47	7.85	2.598	0.039	0.030	0.04301	0.03984	159.5	168.0	189.73	185.40
Lu	0.0007	0.0004	0.0006	0.0006	0.00038	0.00052	0.00001	0.000004	0.008	0.012	0.009	0.009
Mg	790	255	671	127	198	96.8	237	79.1	3786	3407	2242	484
Mn	15.2	6.3	12.2	8.4	3.7	2.2	4.1	1.6	135	121	71	44.2
Mo	0.057	0.042	0.019	0.006	0.556	1.851	0.083	0.086	0.5	0.3	0.22	0.262
Nd	0.111	0.051	0.078	0.054	0.005	0.005	0.006	0.002	0.8	1.1	0.72	0.79
Ni	2.31	1.8	1.02	0.89	0.57	0.44	0.37	0.052	33.9	47.9	14.05	19.28
P	441	128	352	101	47.0	10.9	57.7	14.6	460	193	431	152
Pr	0.027	0.014	0.020	0.014	0.0008	0.0010	0.0006	0.0009	0.20	0.27	0.18	0.20
Rb	1.2	0.5	0.94	0.88	0.242	0.079	0.337	0.298	2.0	1.9	1.9	2.08
Sb	0.051	0.054	0.010	0.010	0.0083	0.0068	0.0041	0.0040	0.29	0.3	0.073	0.099
Se	0.249	0.303	0.671	0.087	0.0090	0.0074	0.0081	0.0035	8.67	18.96	1.98	2.61
Sm	0.021	0.010	0.016	0.010	0.0007	0.0013	0.0004	0.0005	0.16	0.23	0.14	0.15
Sn	0.12	0.17	0.01	0.01	0.023	0.021	0.013	0.014	0.8	0.8	0.17	0.19
Sr	18.0	7.9	19.2	27.2	4.4	2.0	5.2	5.7	41.4	19.2	42.5	39.3
Tb	0.002	0.001	0.002	0.001	0.00029	0.00047	0.00009	0.000001	0.019	0.028	0.018	0.019
Th	0.015	0.006	0.012	0.009	0.0010	0.0017	0.0002	0.0002	0.16	0.2	0.19	0.189
Tl	0.031	0.017	0.042	0.074	0.0013	0.0013	0.0049	0.0061	0.076	0.053	0.036	0.043
U	0.010	0.004	0.005	0.003	0.0007	0.0010	0.0002	0.00002	0.09	0.07	0.057	0.057
Y	0.064	0.022	0.052	0.040	0.0020	0.0029	0.0017	0.0015	0.68	1.00	0.85	0.98
Yb	0.005	0.002	0.003	0.002	0.0003	0.0006	0.0001	0.00004	0.034	0.051	0.037	0.039

Table S1: Continued

	Soil			
	Industrial		Background	
	AVG	SD	AVG	SD
Ag	0.17	0.13	0.05	0.06
Al	12460	7410	21406	6663
Be	0.44	0.28	0.26	0.32
Bi	0.43	0.29	0.08	0.09
Ce	15.2	9.1	9.0	10.7
Co	54.7	20.2	18.5	11.67
Cr	502.5	251.8	94.5	70.3
Dy	1.0	0.62	1.0	0.76
Er	0.5	0.30	0.55	0.41
Eu	0.40	0.24	0.33	0.26
Fe	37796	11201	17841	6297
Ga	32.5	20.1	25.8	15.2
Gd	1.3	0.8	1.0	1.03
Ho	0.18	0.11	0.19	0.15
La	9.7	5.8	6.7	9.2
Li	2406	1168	1349	1564
Lu	0.085	0.052	0.103	0.073
Mg	41838	17879	7771	1995
Mn	817	285	290	161
Mo	1.3	0.9	0.62	1.04
Nd	8.3	5.4	5.5	6.6
Ni	757.0	342.9	117.3	148.15
P	476	410	220	114
Pr	2.1	1.4	1.4	1.79
Rb	16.1	10.9	10.2	14.0
Sb	1.3	1.7	0.27	0.42
Se	5.8	6.3	1.2	0.78
Sm	1.7	1.0	1.2	1.26
Sn	2.8	2.7	0.4	0.42
Sr	79	48.0	90.6	45.6
Tb	0.19	0.12	0.17	0.15
Th	2.3	1.6	1.7	2.2
Tl	0.31	0.21	0.10	0.15
U	0.9	0.5	0.2	0.3
Y	7.3	4.5	9.1	8.18
Yb	0.35	0.22	0.43	0.30

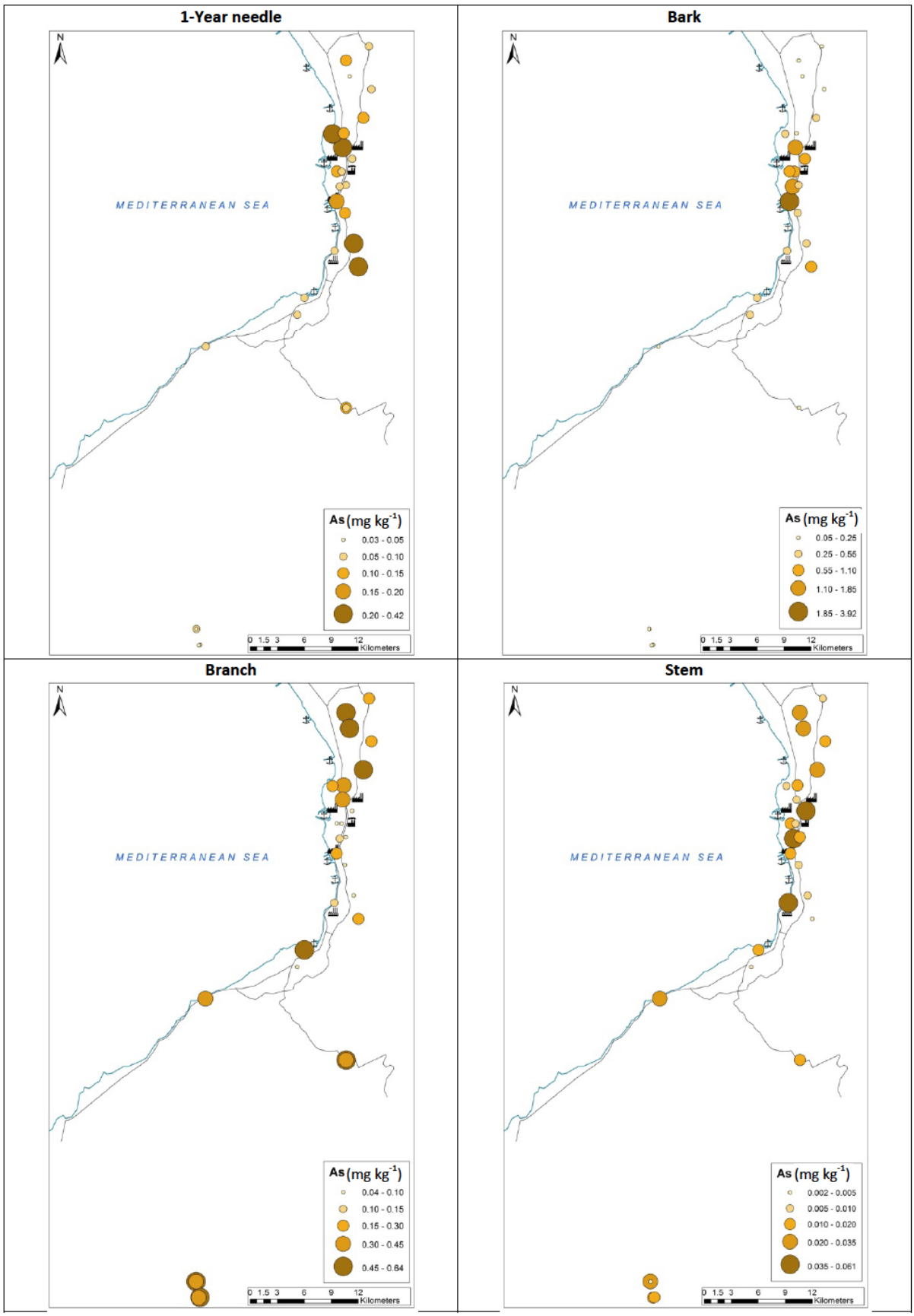

Figure S1: Spatial variations of As concentrations.

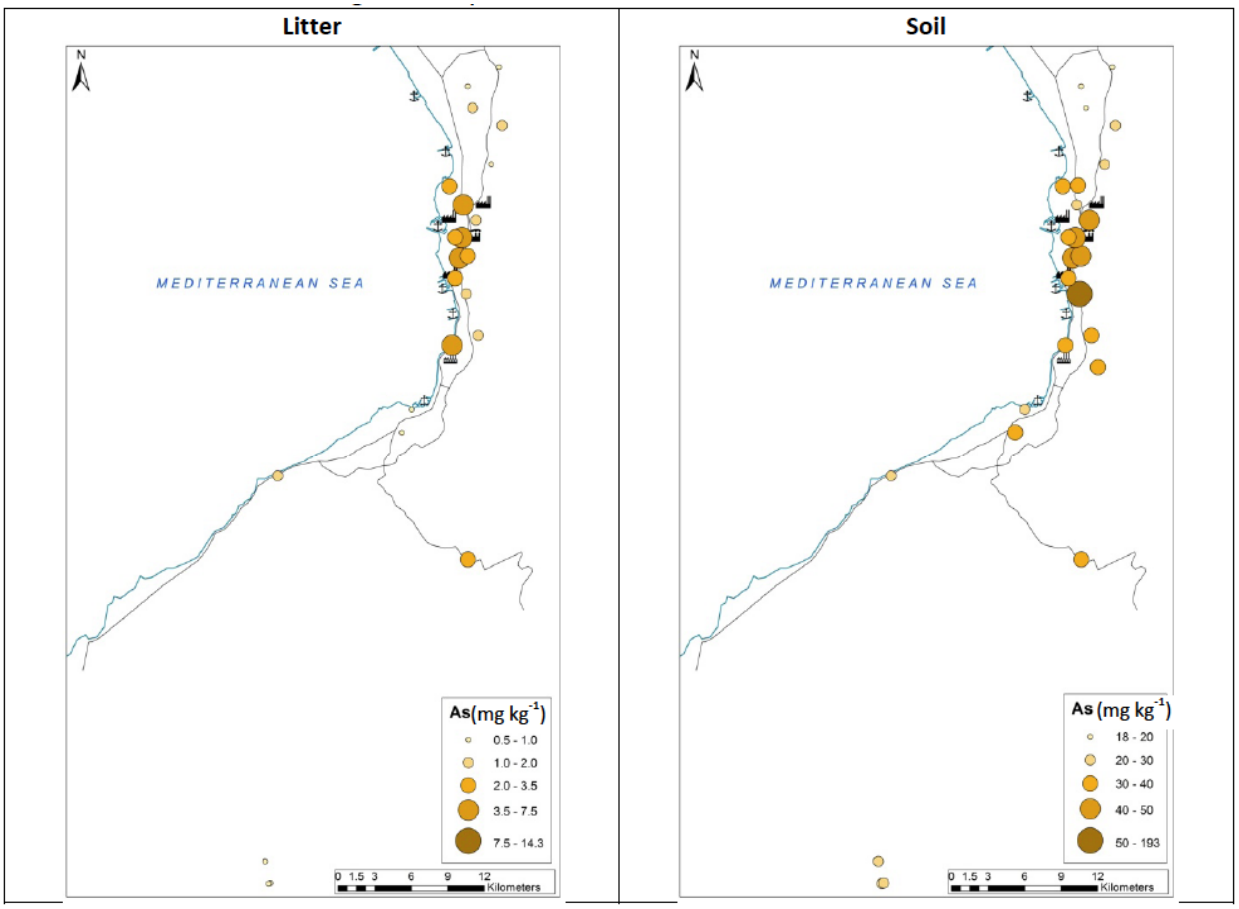

Figure S1: Continued.

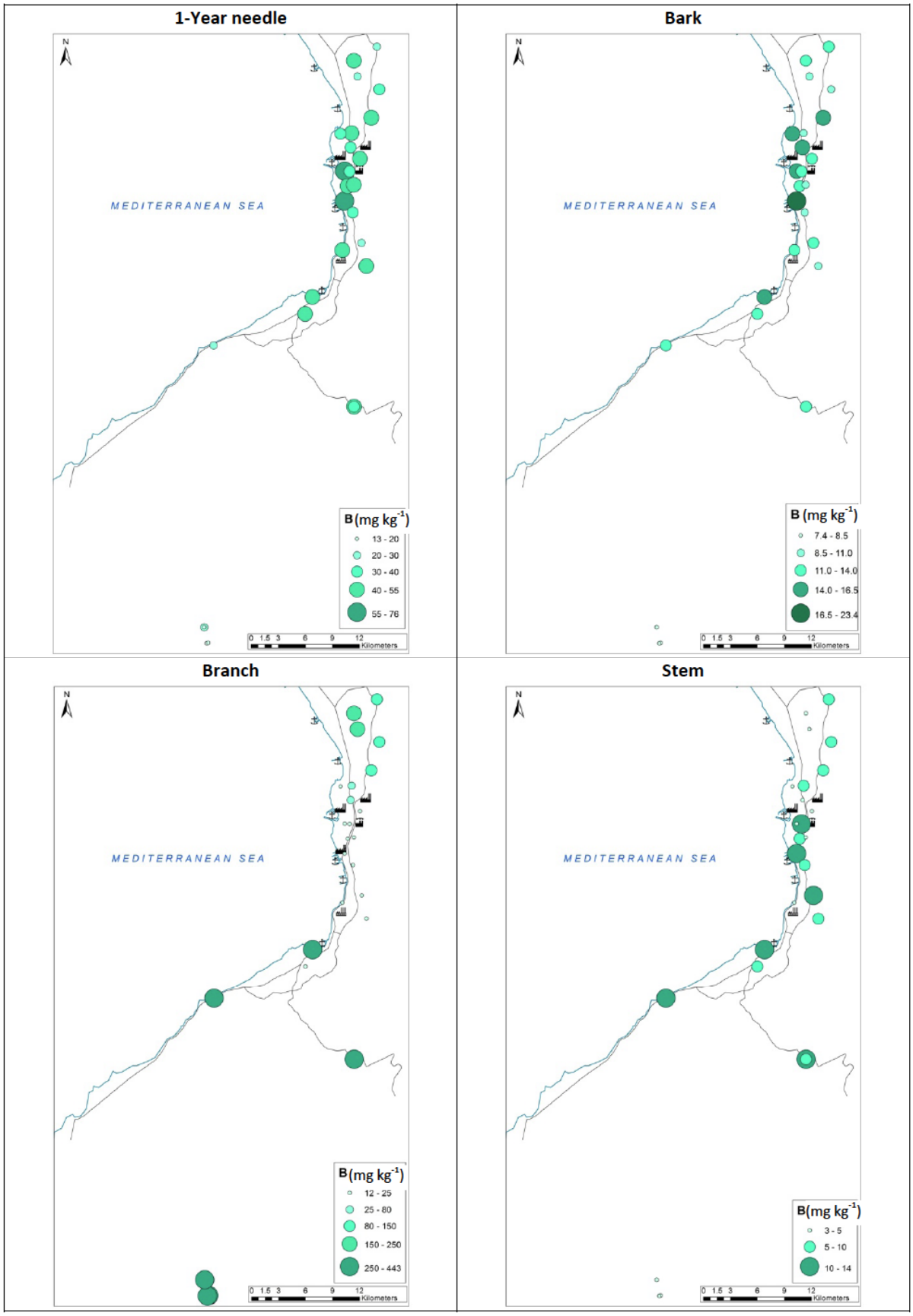

Figure S2: Spatial variations of B concentrations.

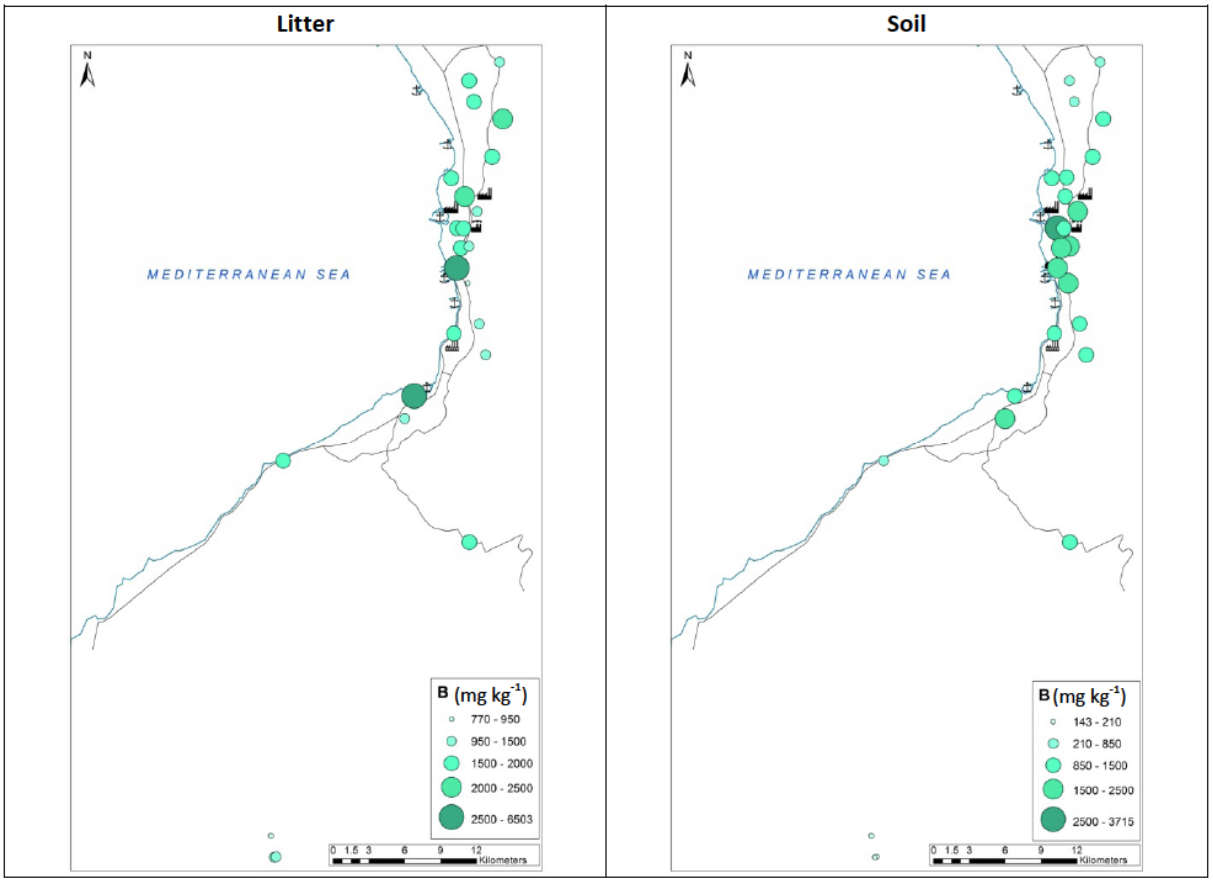

Figure S2: Continued.

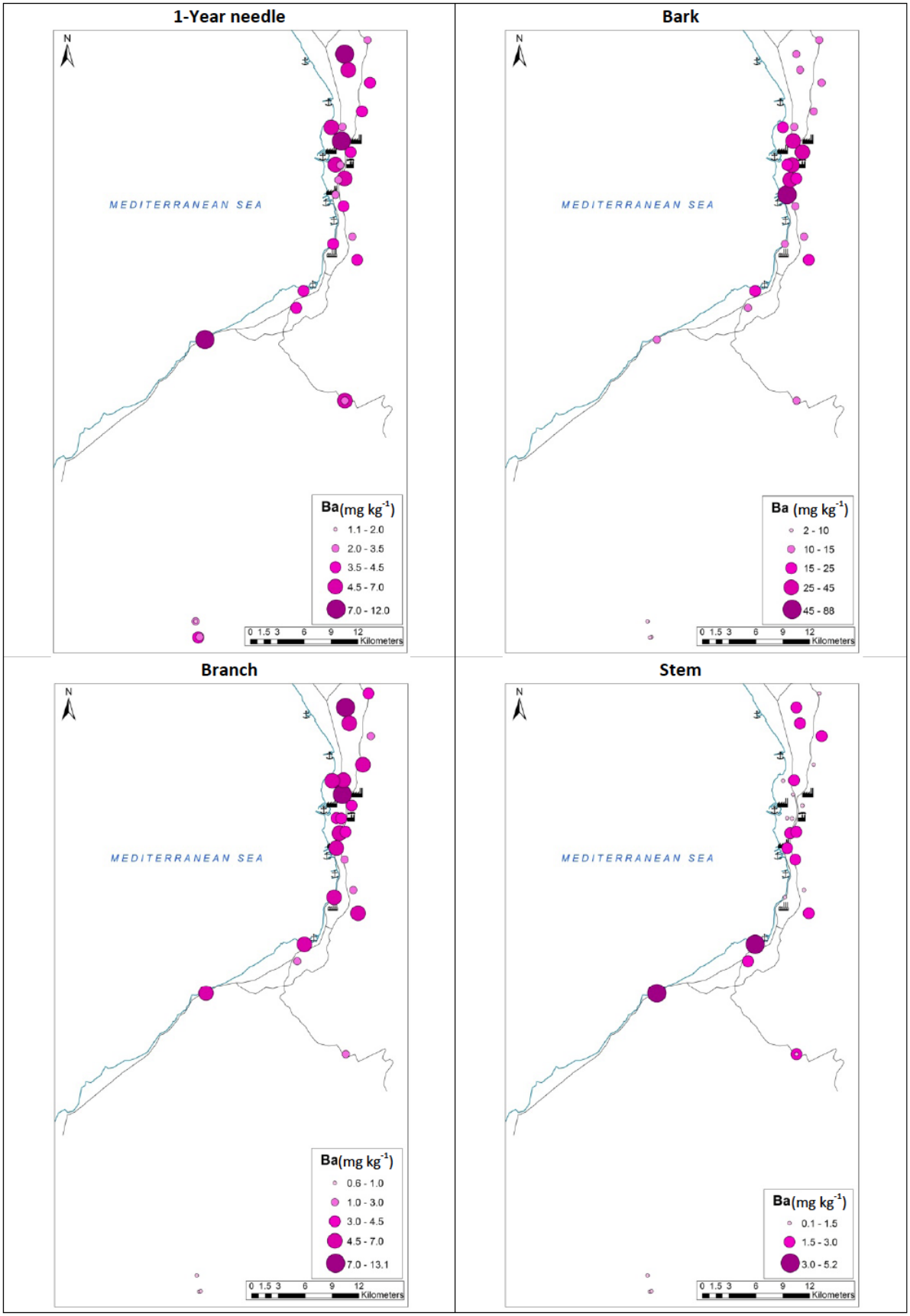

Figure S3: Spatial variations of Ba concentrations.

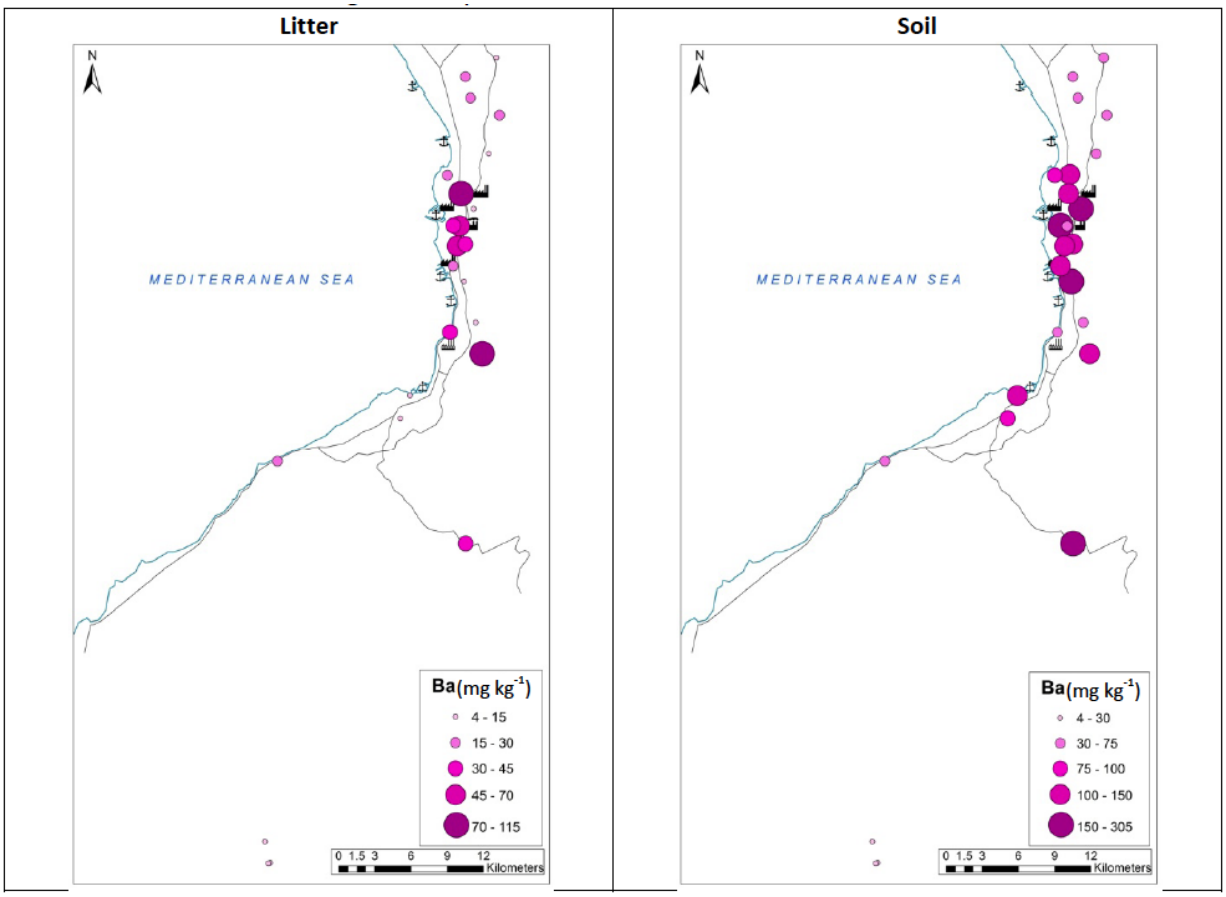

Figure S3: Continued.

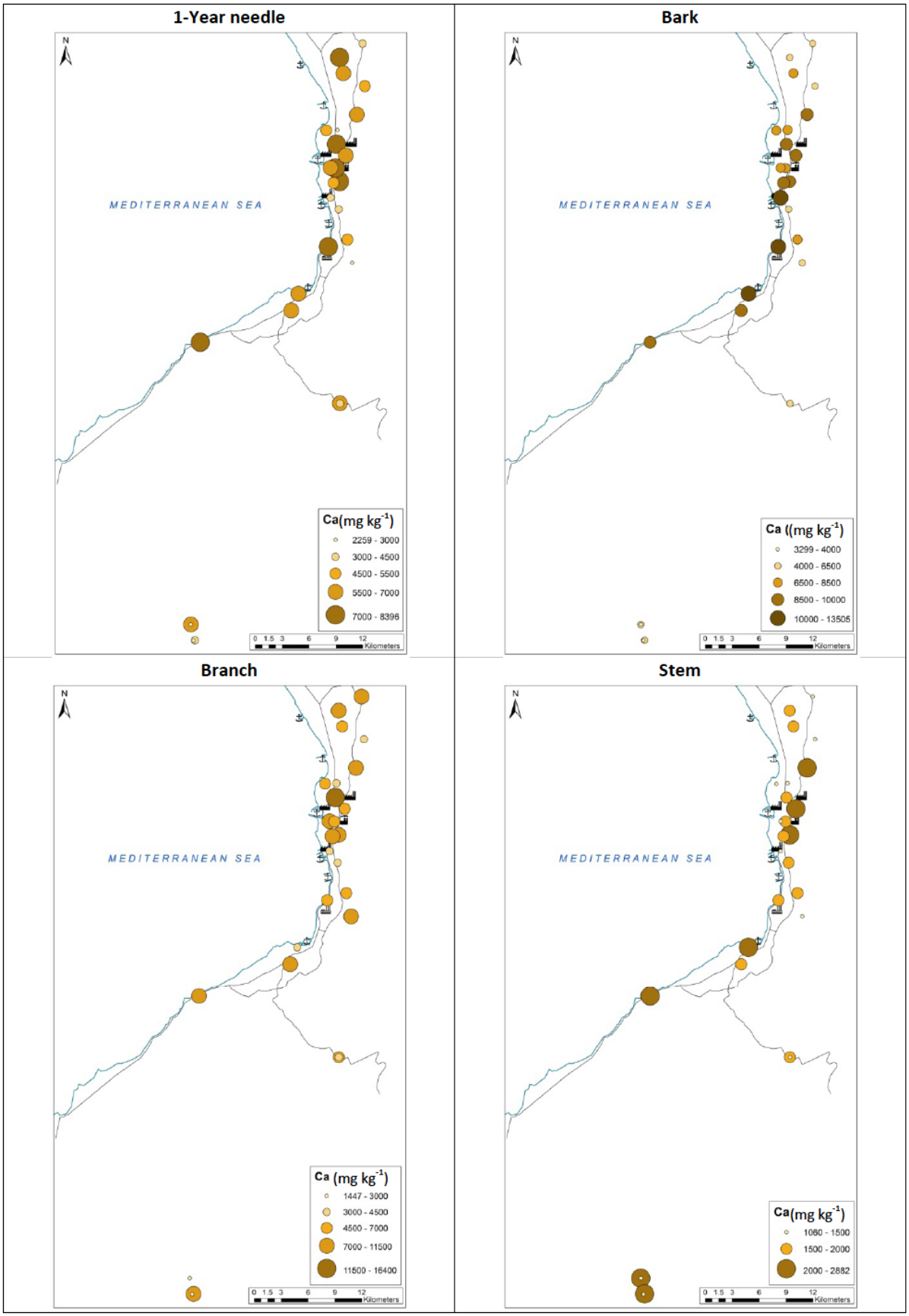

Figure S4: Spatial variations of Ca concentrations.

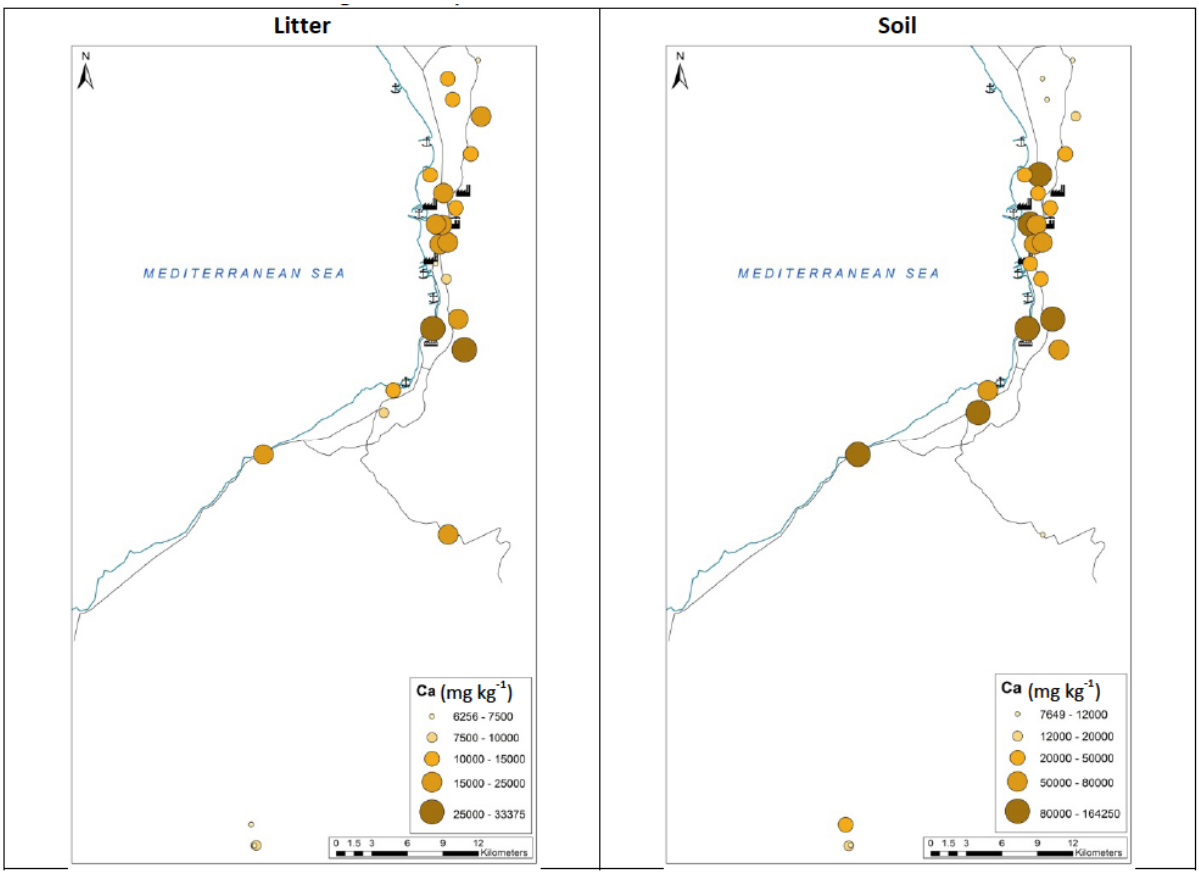

Figure S4: Continued.

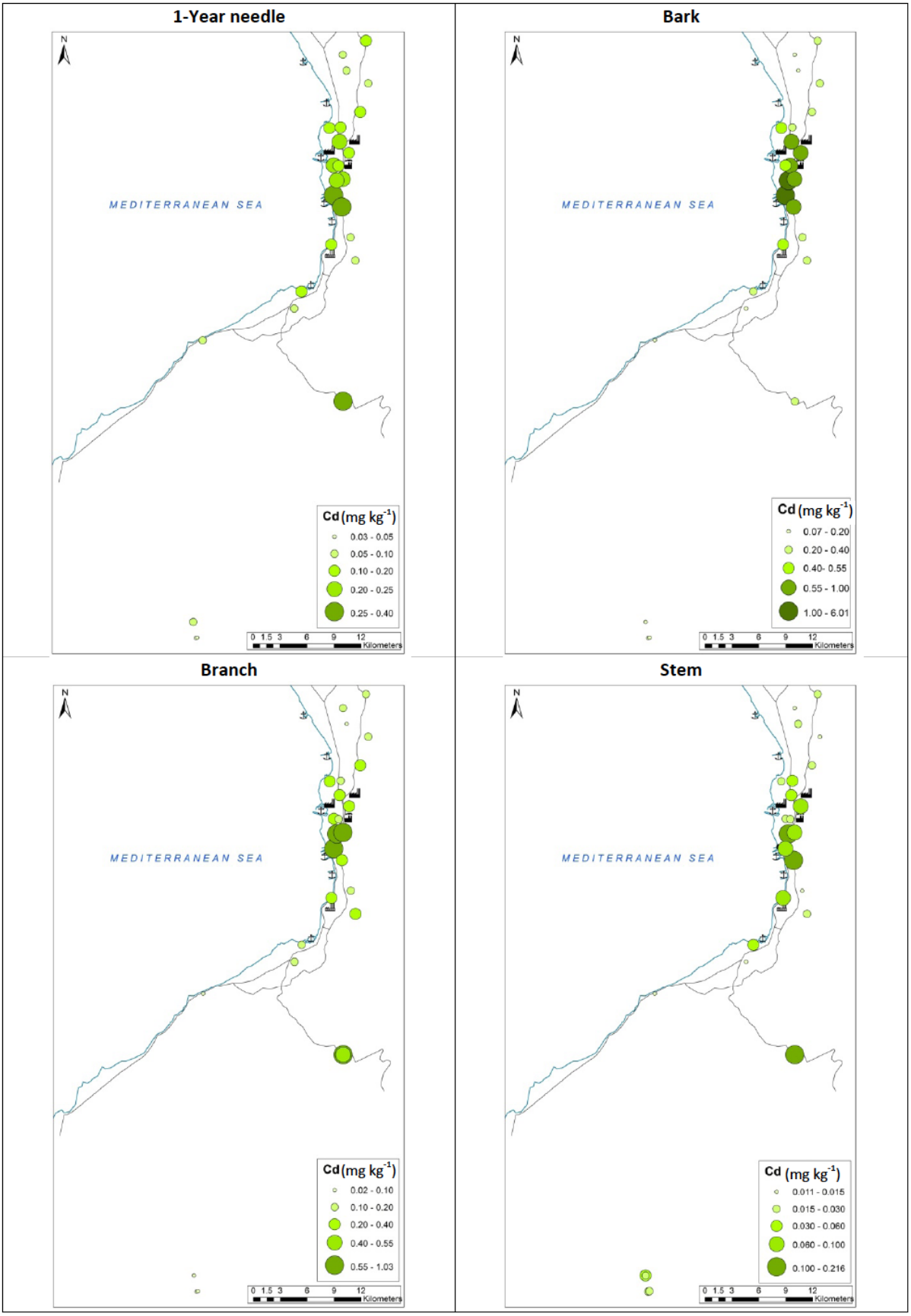

Figure S5: Spatial variations of Cd concentrations.

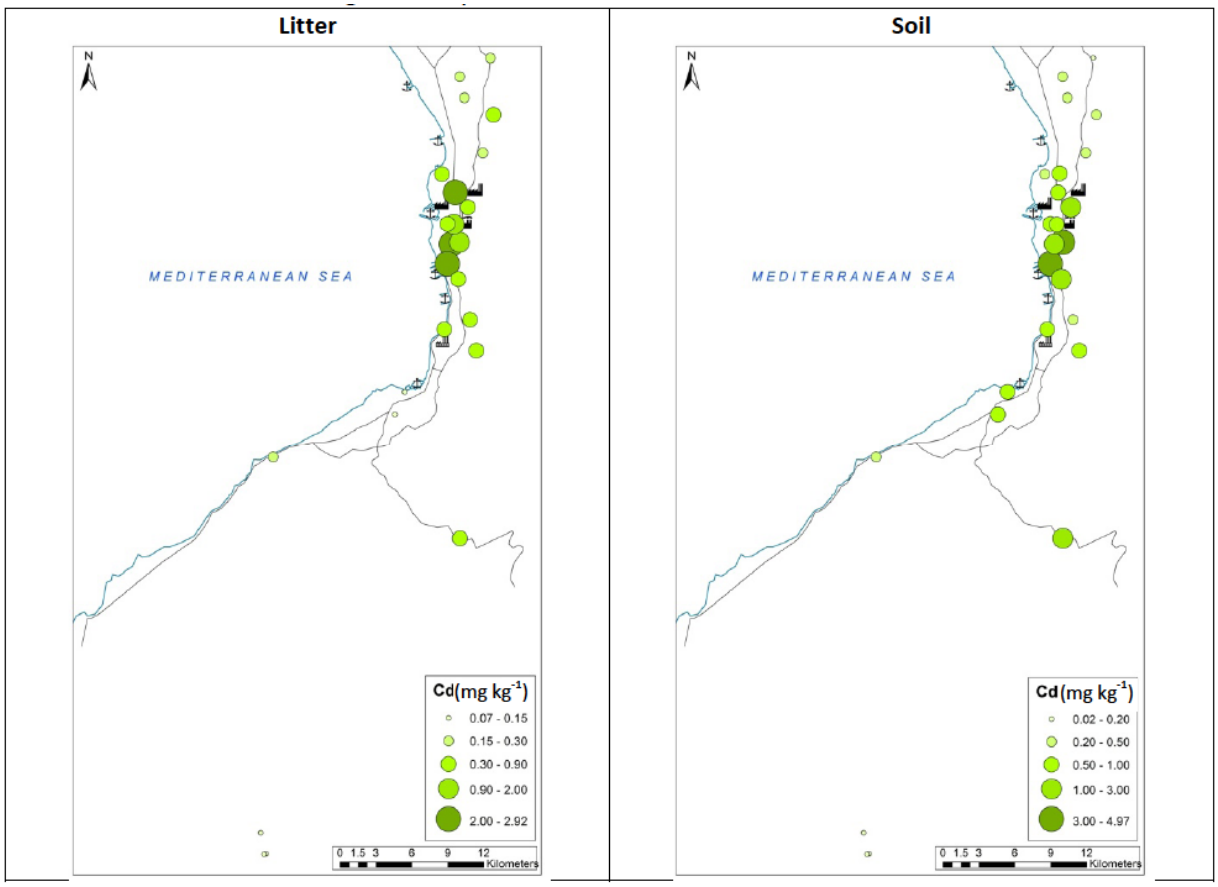

Figure S5: Continued.

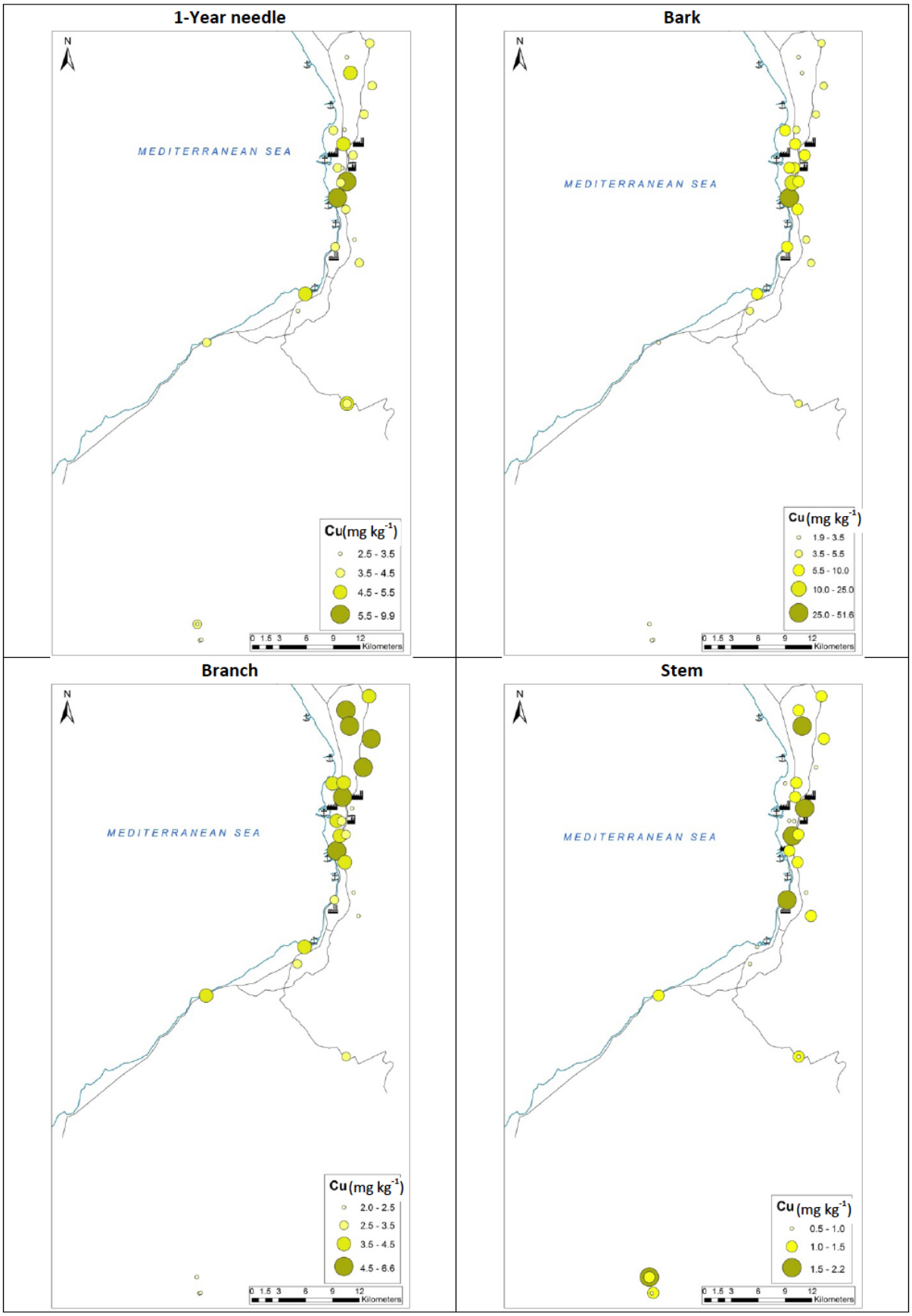

Figure S6: Spatial variations of Cu concentrations.

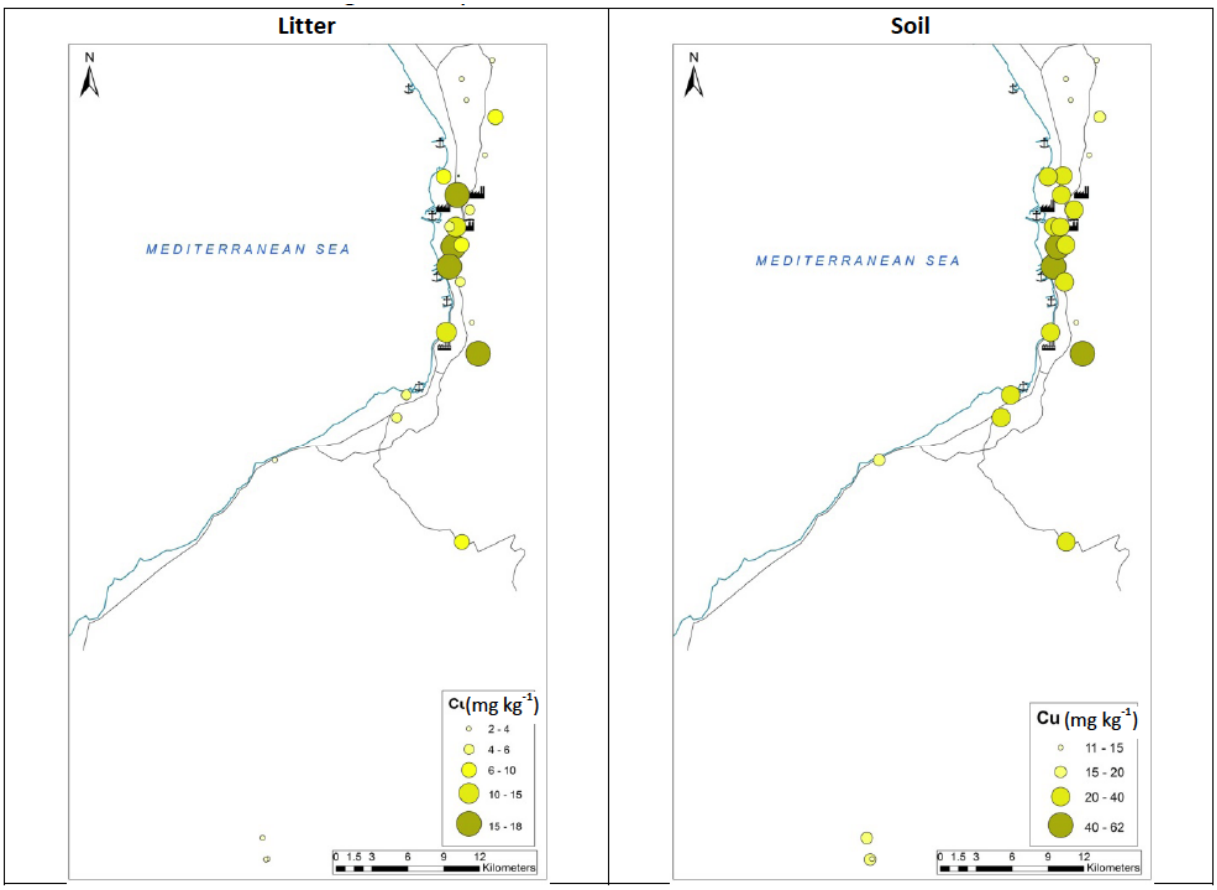

Figure S6: Continued.

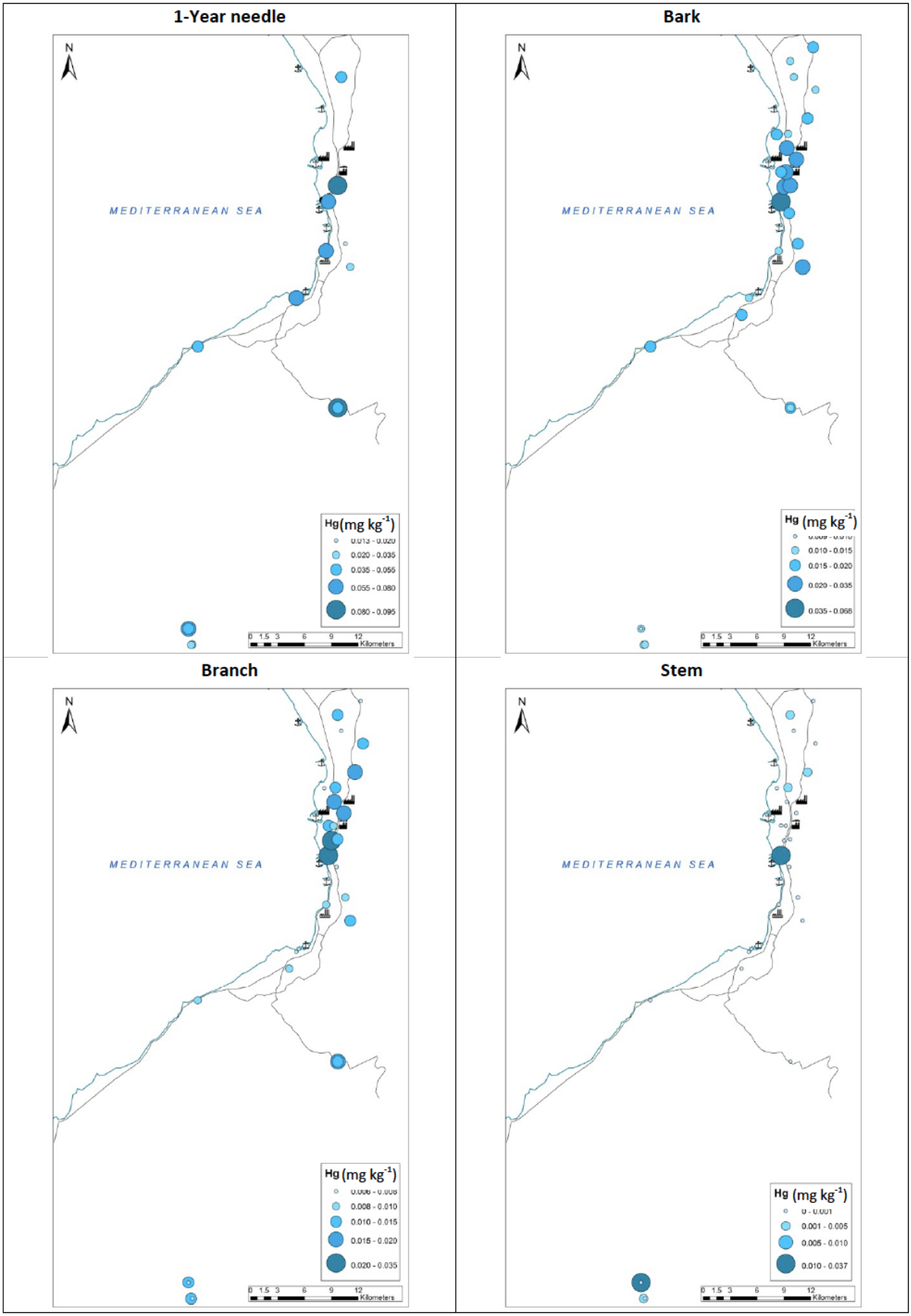

Figure S7: Spatial variations of Hg concentrations.

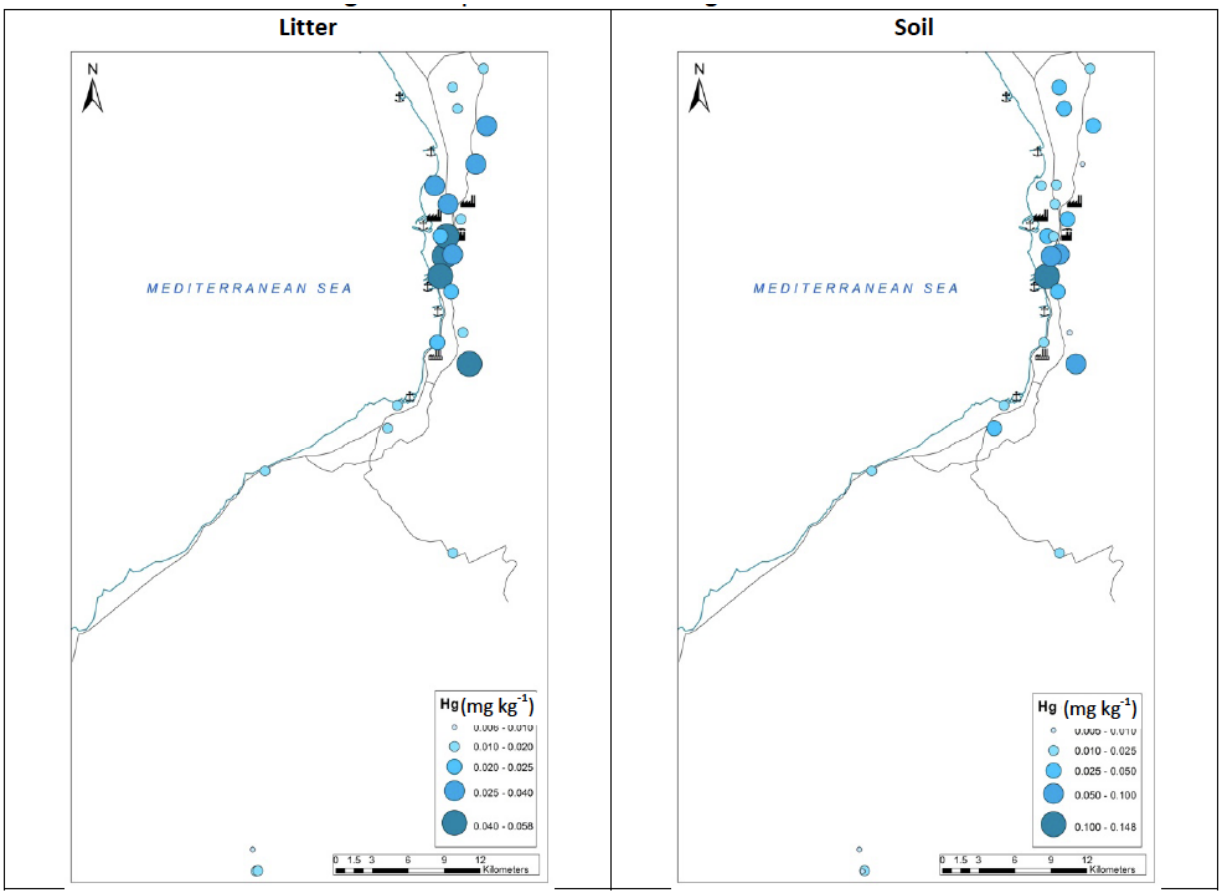

Figure S7: Continued.

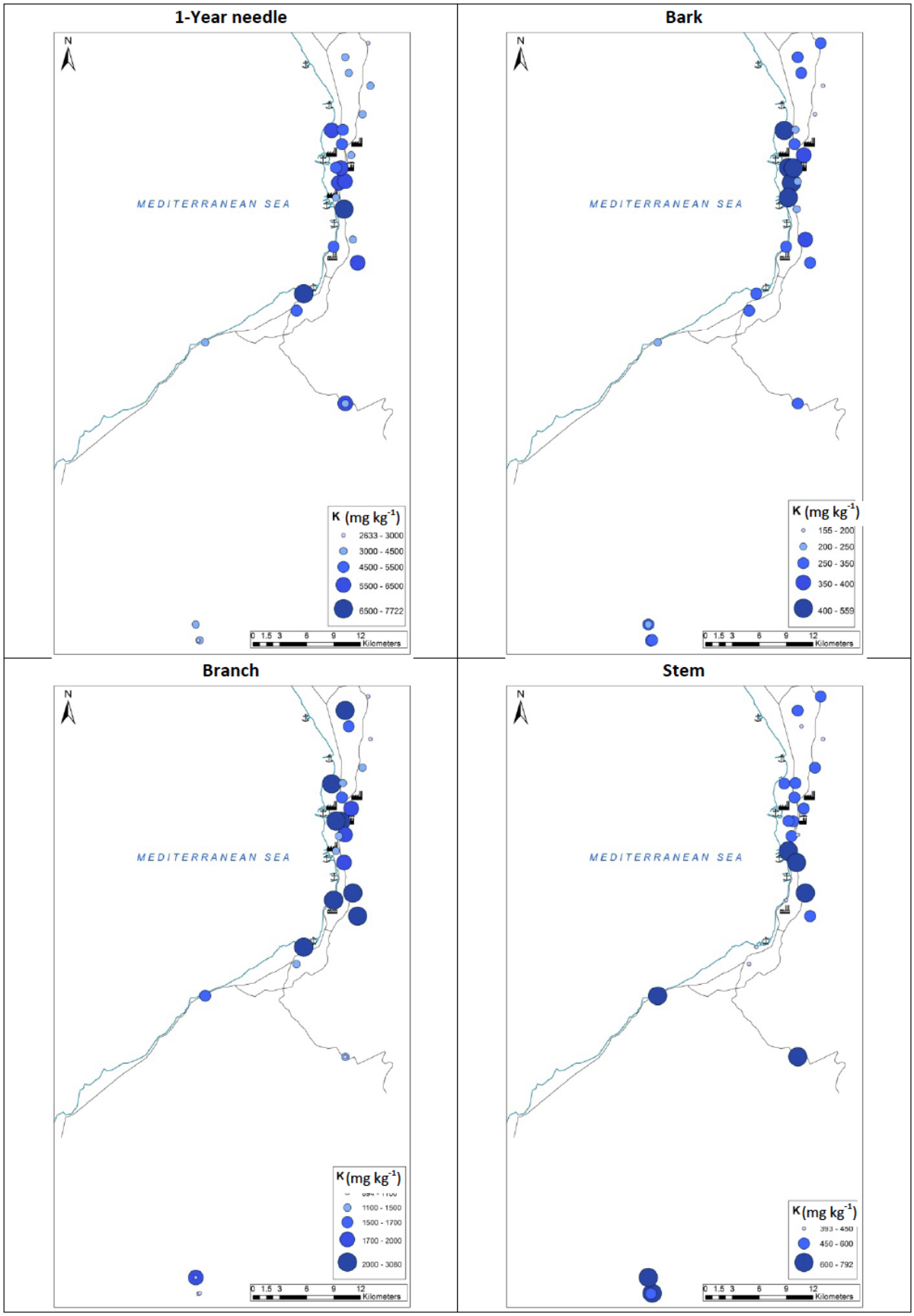

Figure S8: Spatial variations of K concentrations.

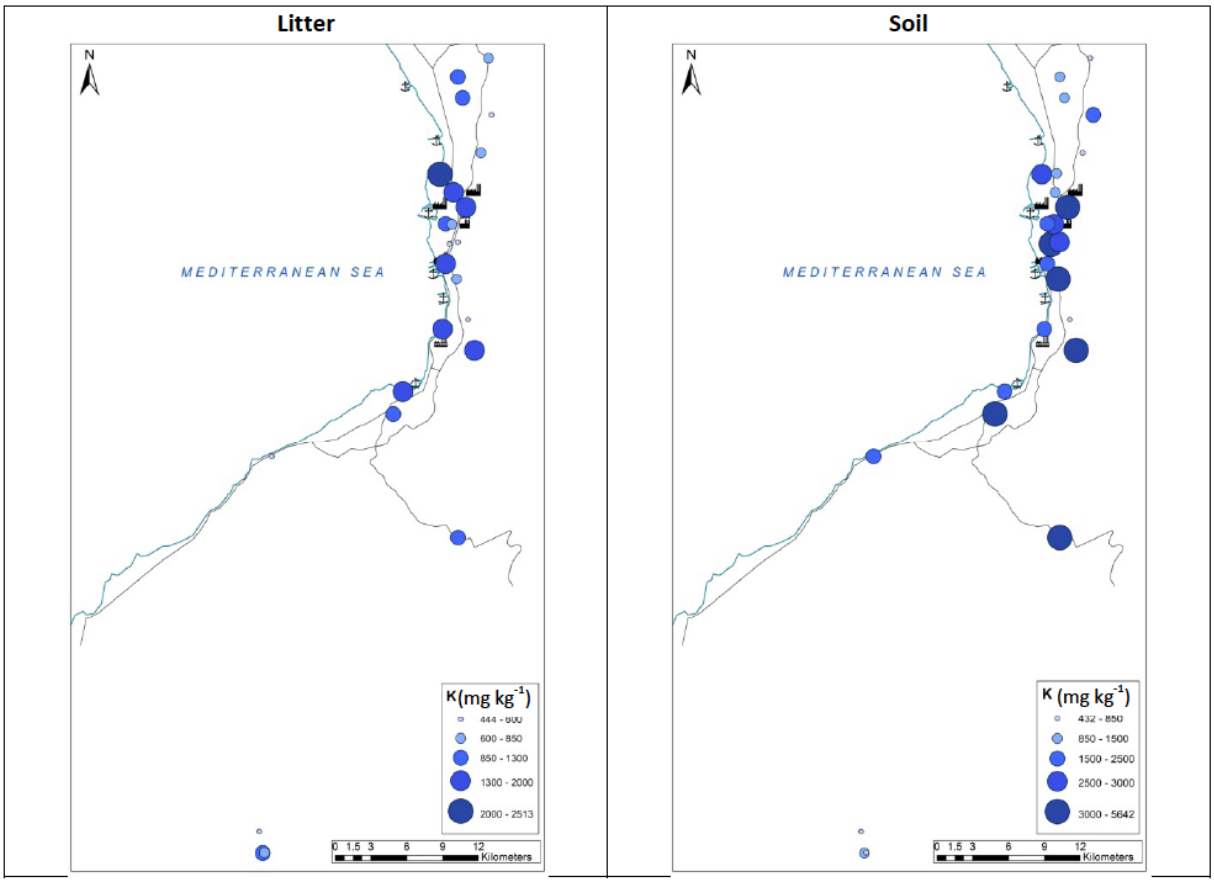

Figure S8: Continued.

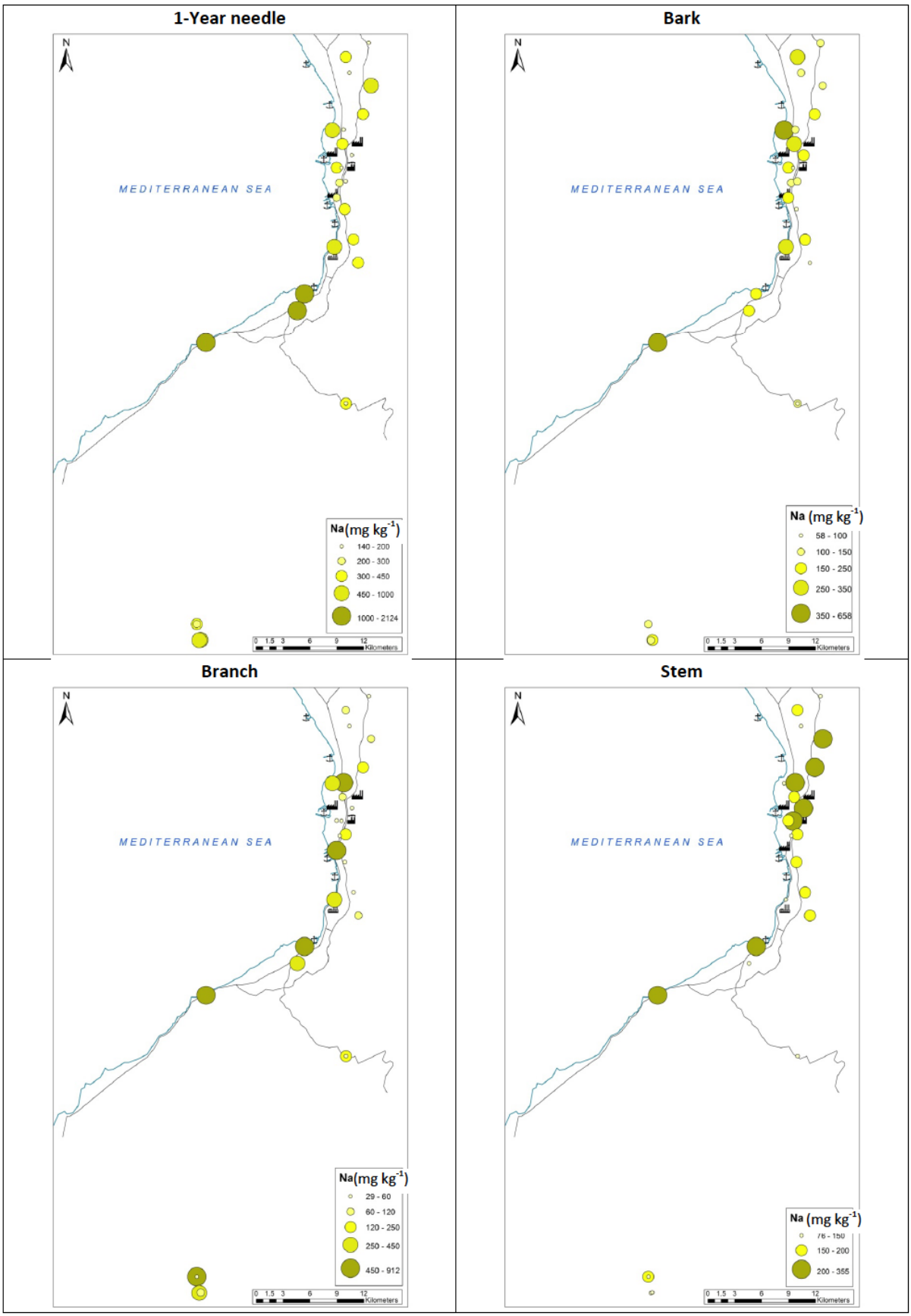

Figure S9: Spatial variations of Na concentrations.

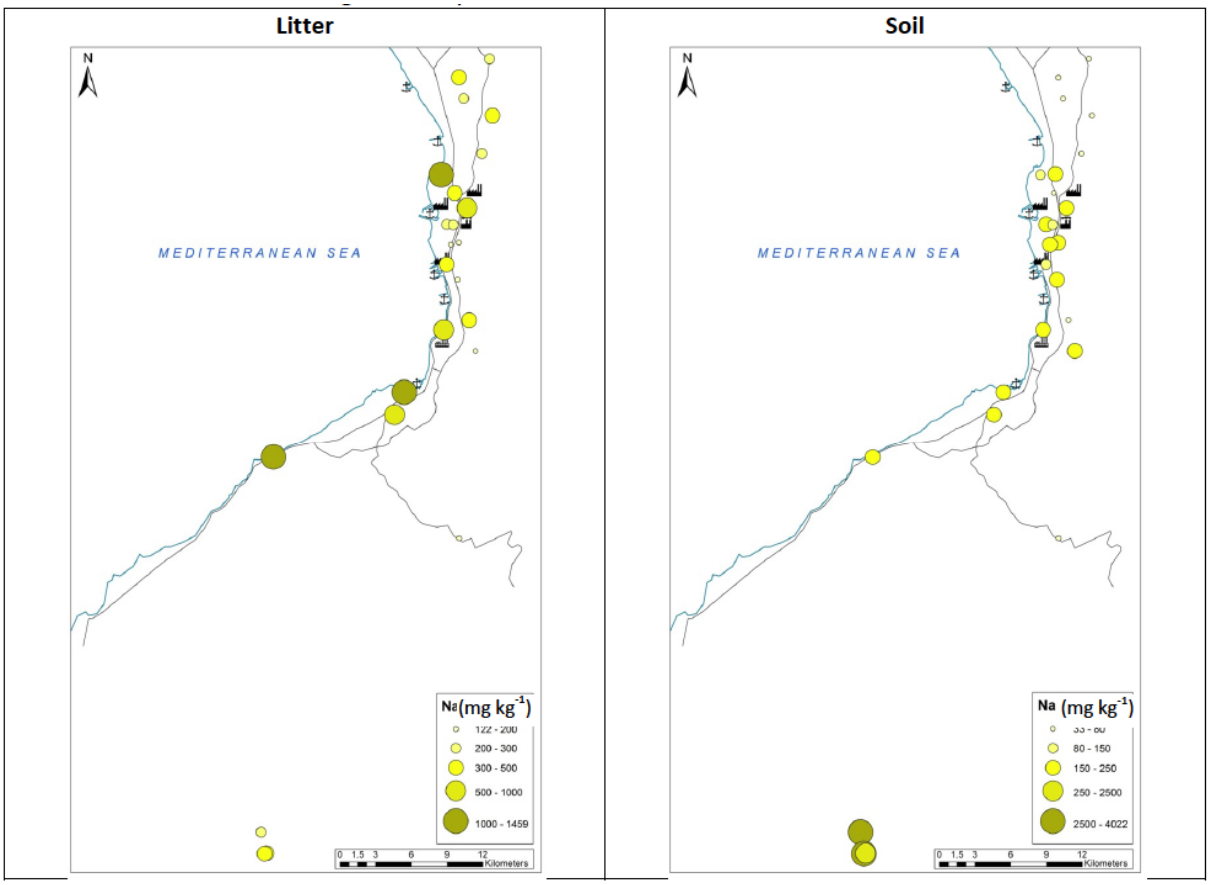

Figure S9: Continued.

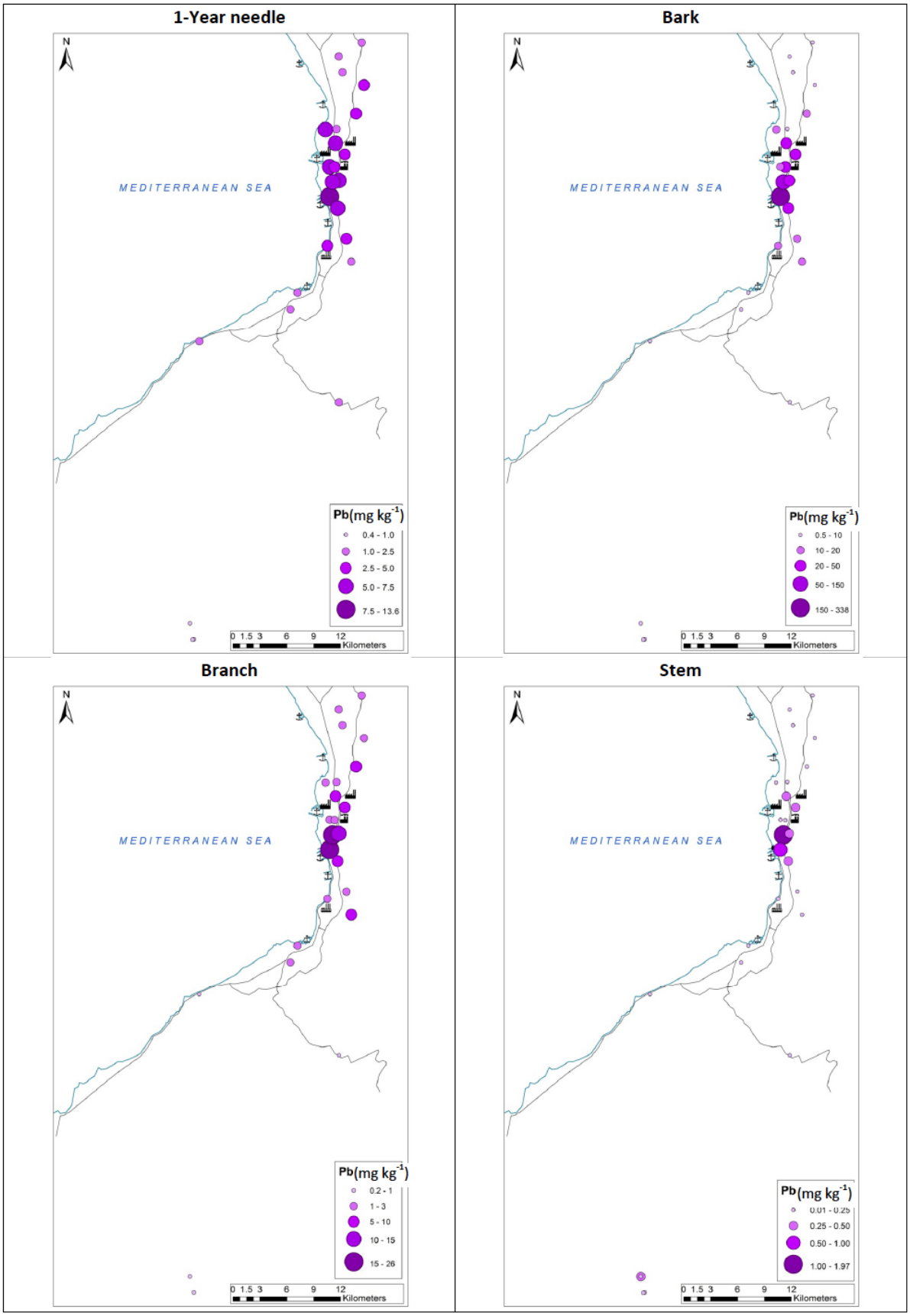

Figure S10: Spatial variations of Pb concentrations.

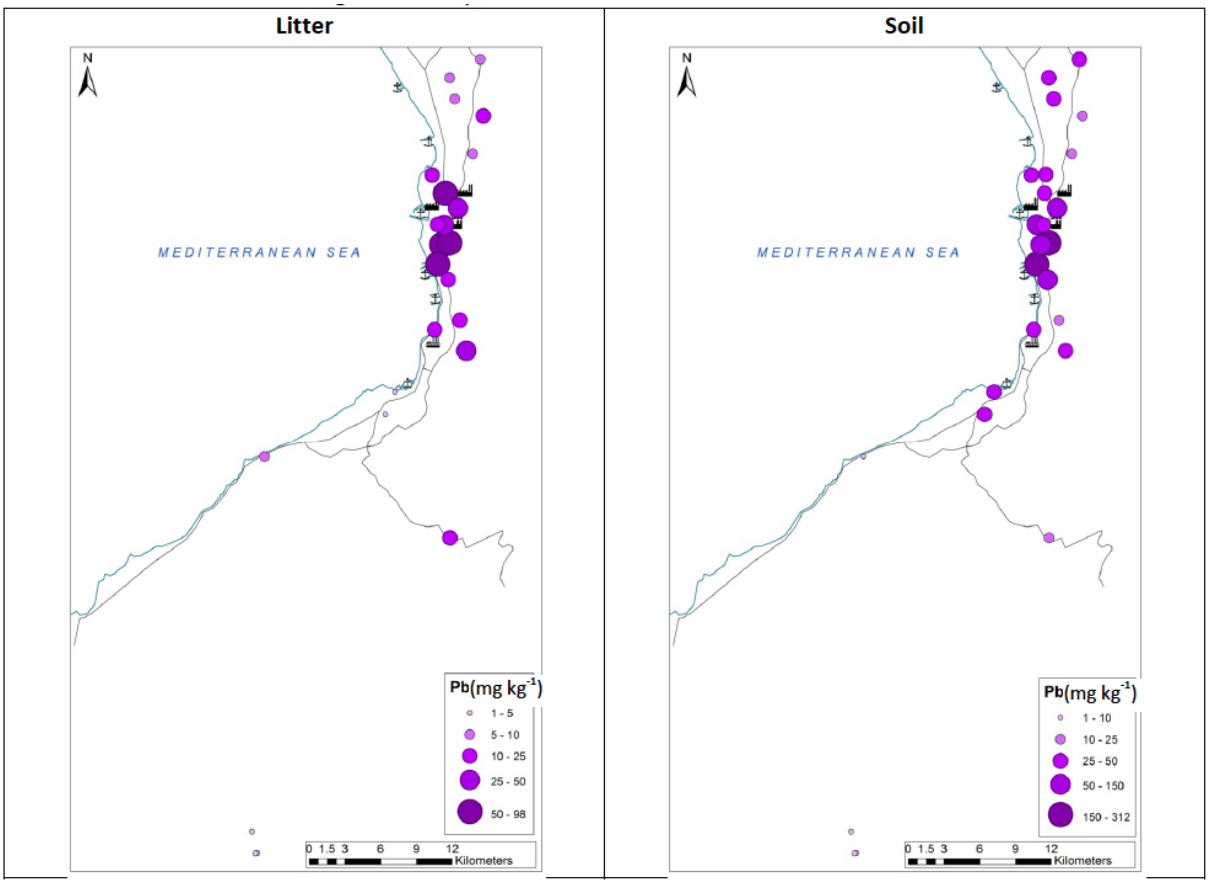

Figure S10: Continued.

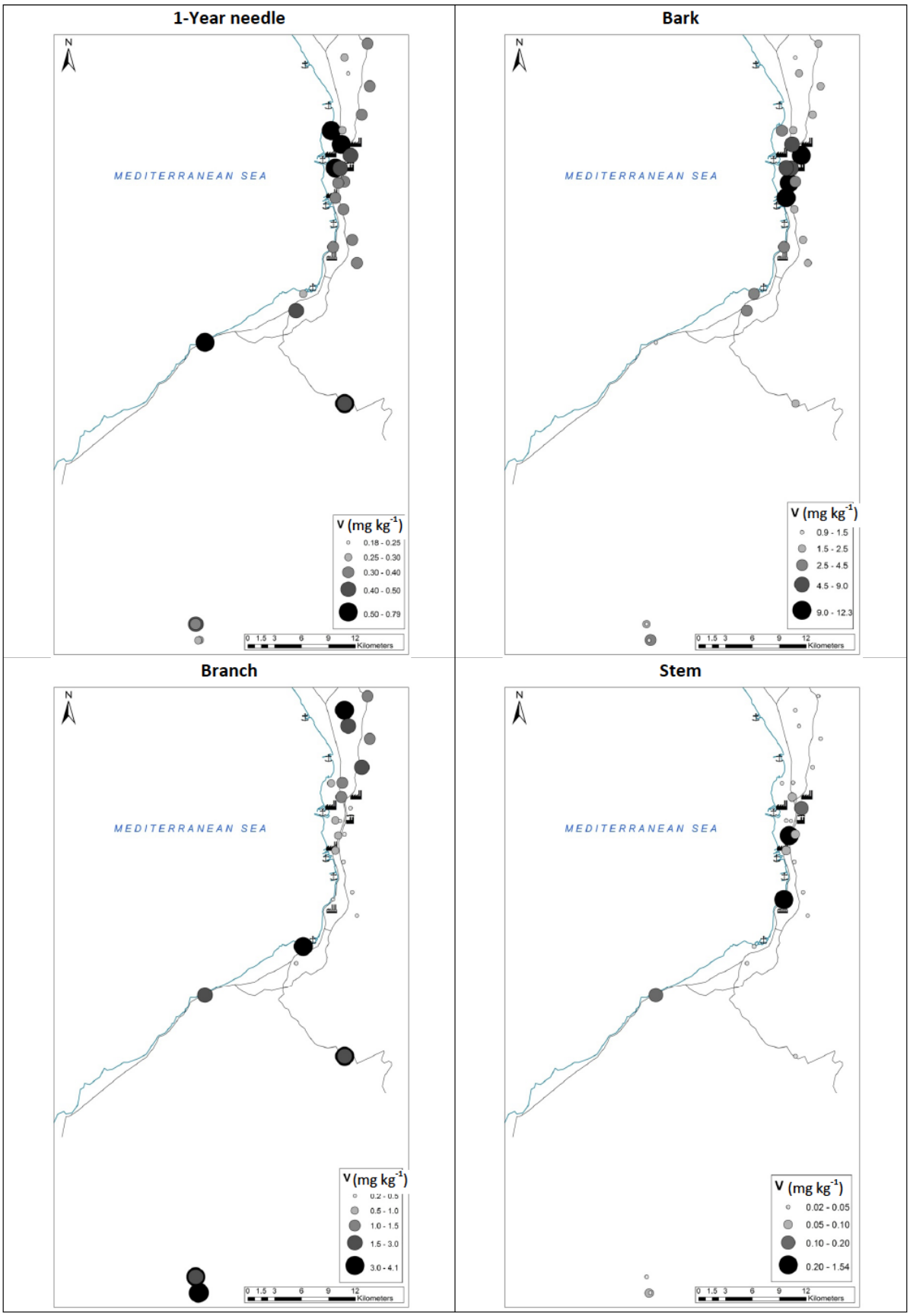

Figure S11: Spatial variations of V concentrations.

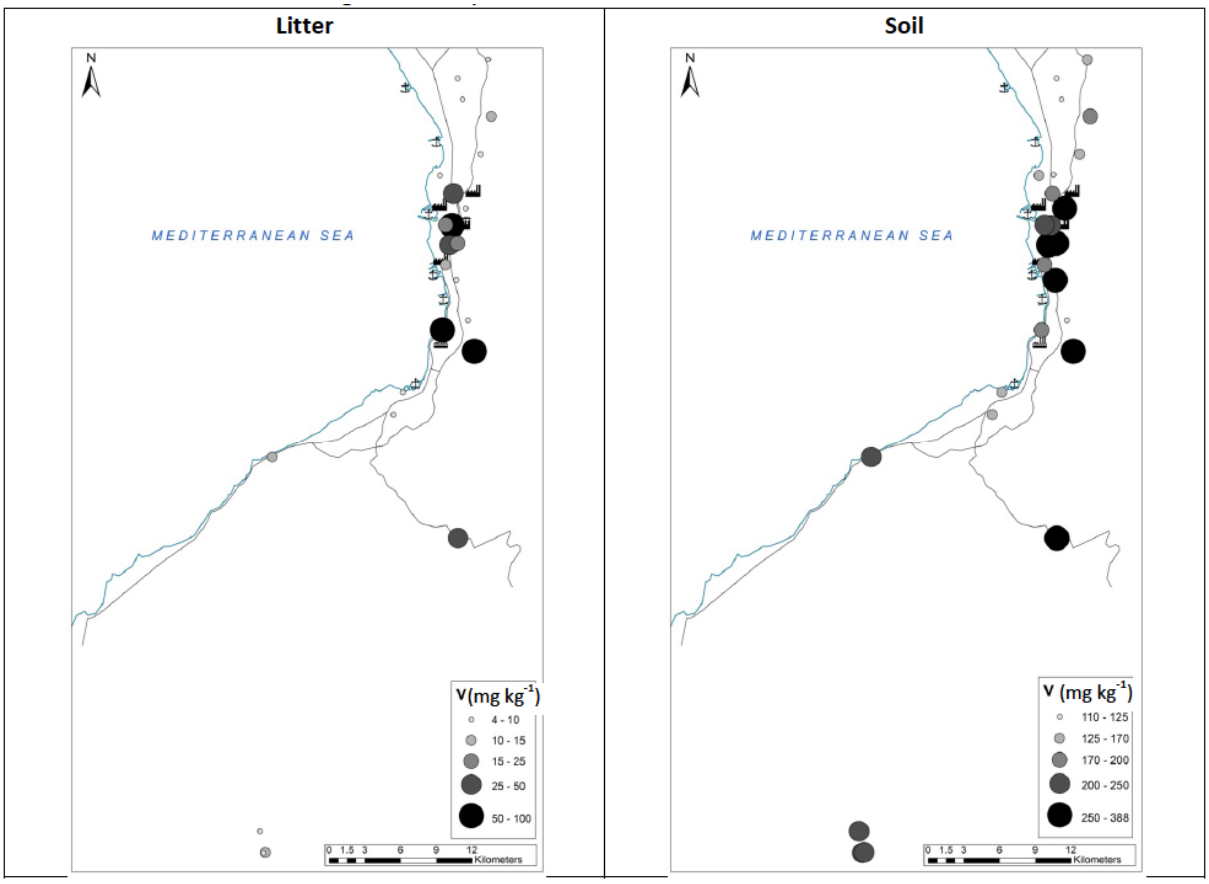

Figure S11: Continued.

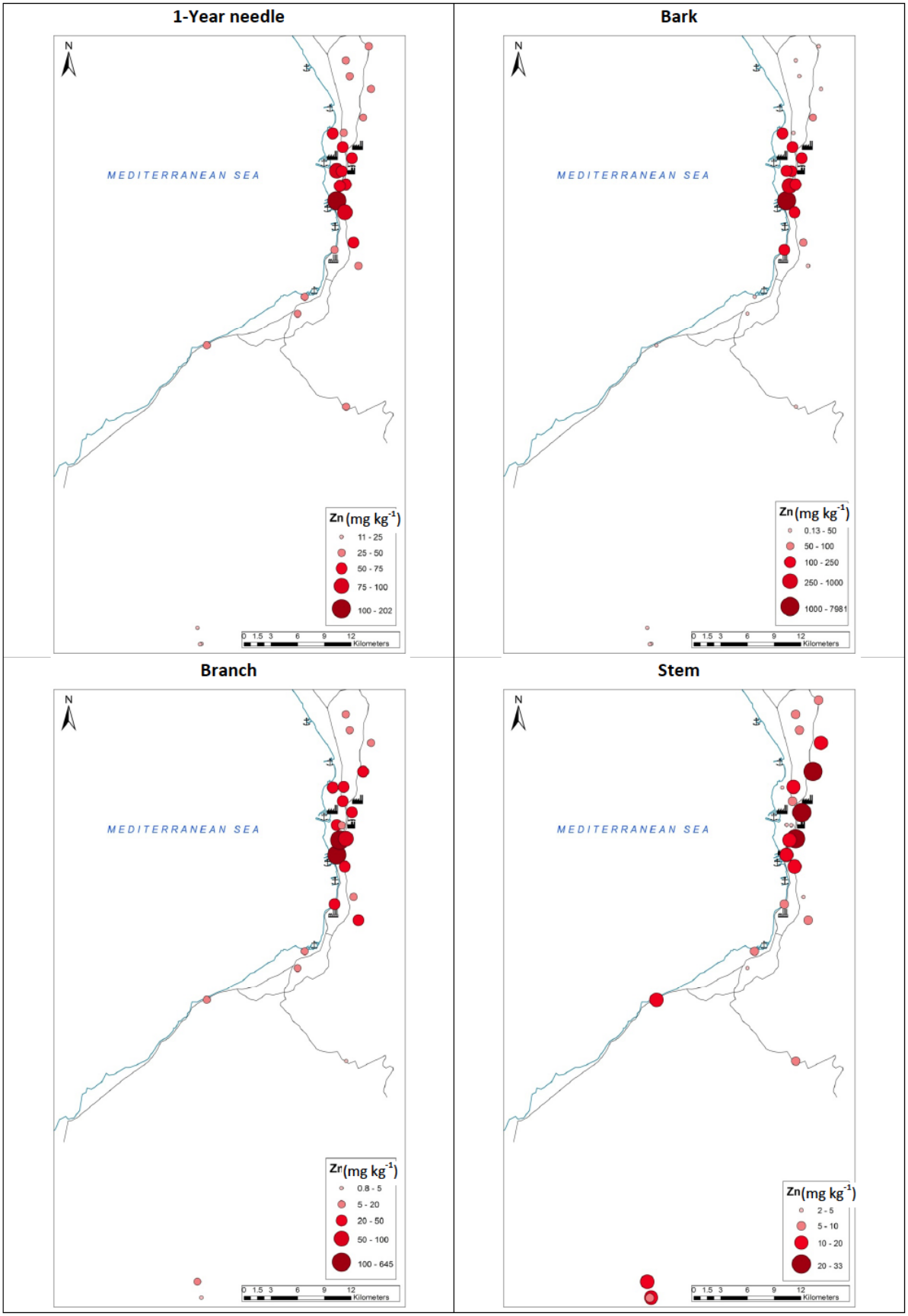

Figure S12: Spatial variations of Zn concentrations.

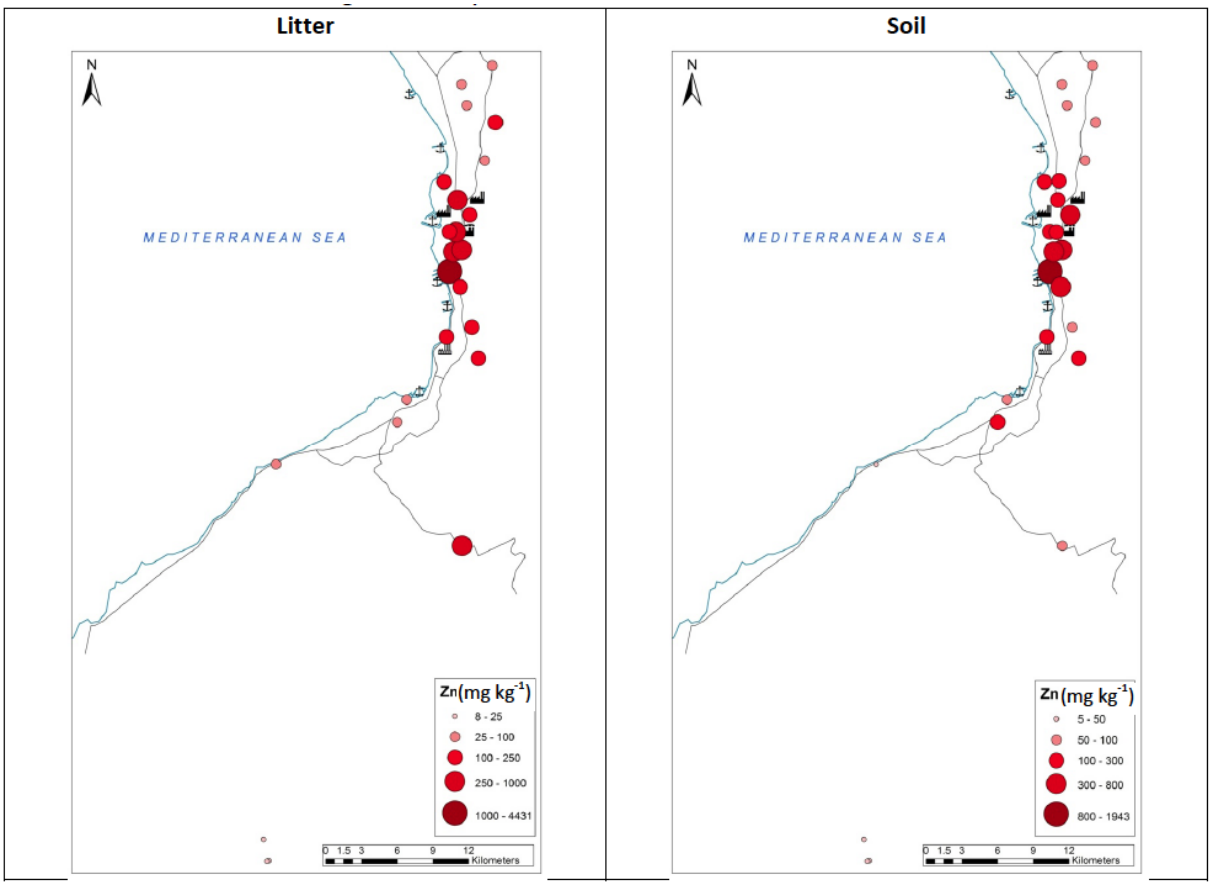

Figure S12: Continued.

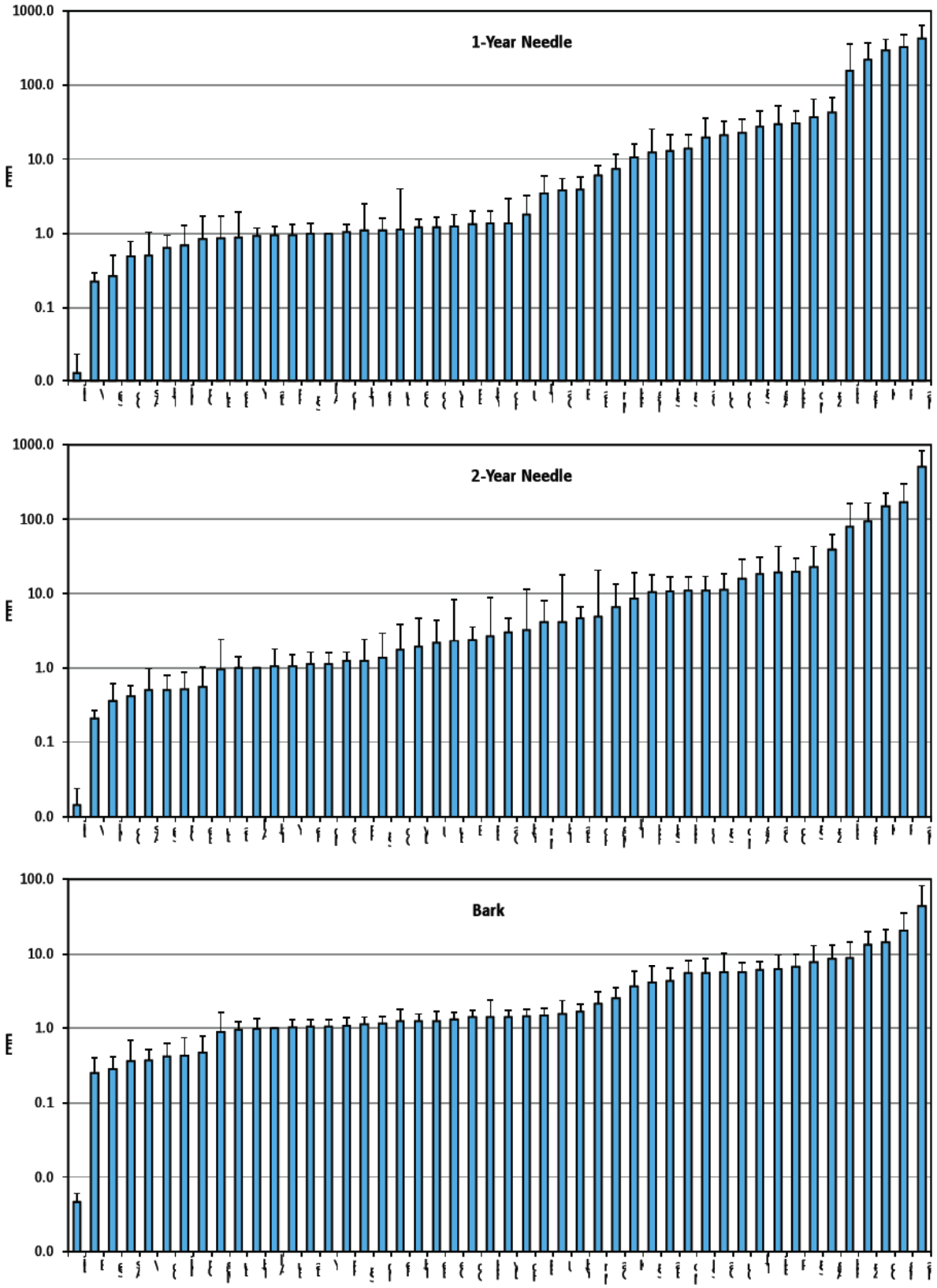

Figure S13: Elemental enrichment factors for different sample types.

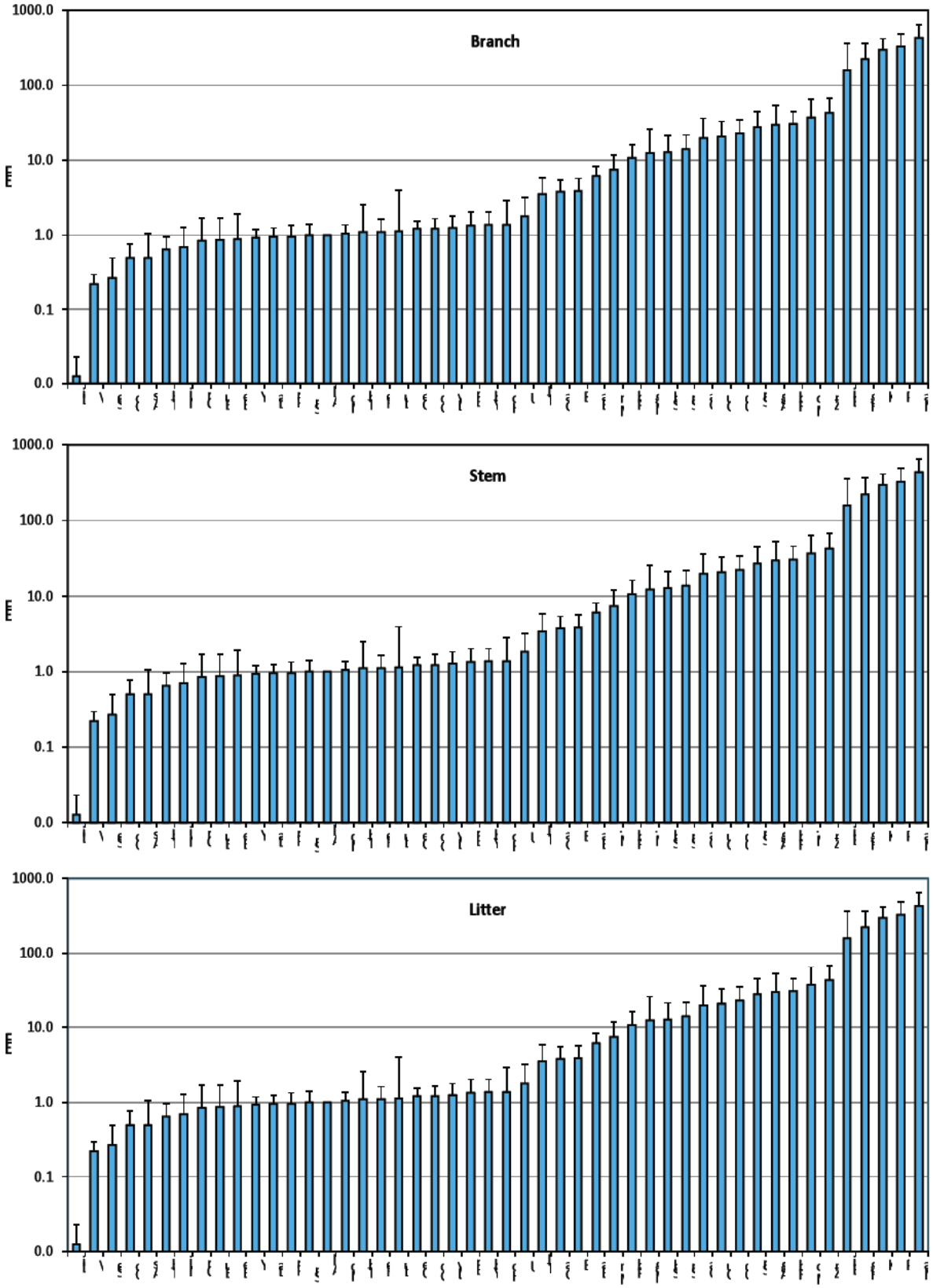

Figure S13: Continued.

Table S2: Results of Factor Analysis for Elements

	Component (2-Yr needle)				Component (Bark)				Component (Branch)			
	1	2	3	4	1	2	3	4	1	2	3	4
Ag			0.77			0.89				0.60		
Al		0.98			0.84				0.51			
As						0.81					0.86	
B						0.60	0.64				0.88	
Ba				0.79	0.54	0.76						0.67
Be	0.99				0.88				0.53			
Bi					0.57	0.78				0.83		
Ca							0.76					
Cd			0.94			0.84				0.78		
Ce		0.99			0.86				0.92			
Co					0.57	0.61						0.65
Cr			0.52			0.77				0.81		
Cu			0.91			0.87						0.53
Dy	0.88				0.91				0.96			
Er	0.98				0.92				0.94			
Eu	0.99				0.88				0.71			0.54
Fe			0.63		0.55	0.79				0.86		
Ga				0.78	0.55	0.76						0.69
Gd	0.81	0.57			0.90				0.96			
Hg						0.84				0.83		
Ho	0.99				0.92				0.94			
K					0.50			0.48			-0.57	
La		0.97			0.86				0.91			
Li				0.74	0.67	0.59					0.86	
Lu	0.98				0.91				0.80			
Mg						0.53	0.58					
Mn				-0.55	0.58	0.74				0.66		
Mo						0.87				0.82		
Na				0.56			0.74					
Nd		0.97			0.87				0.94			
Ni						0.63	0.50					0.76
P						0.54		0.60				
Pb			0.94			0.89				0.82		
Pr	0.72	0.69			0.88				0.93			
Rb					0.86							
Sb			0.83			0.89				0.94		
Se	0.79				0.78	0.57					0.89	
Sm	0.81	0.58			0.89				0.95			
Sn			0.91			0.90				0.92		
Sr				0.61			0.80					
Tb	0.99				0.91				0.96			

Th		0.88			0.90				0.62			
Tl	0.85				0.51	0.83						
U	0.89				0.66	0.66			0.53	0.75		
V		0.77			0.79						0.93	
Y		0.90			0.89				0.87			
Yb	0.99				0.91				0.89			
Zn			0.80			0.93				0.95		
% of Variance	25.48	17.64	15.11	9.59	44.30	37.42	8.64	2.97	31.43	22.33	12.62	11.02
Cumulative %	25.48	43.12	58.23	67.82	44.30	81.72	90.37	93.34	31.43	53.76	66.38	77.40

Table S2: Continued

	Component (Litter)				**Component (Soil)**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Ag		0.94				0.83		
Al	0.96				0.61		-0.52	
As	0.84				0.70			
B				0.68		0.54		0.58
Ba	0.62	0.58			0.54			
Be	0.94				0.91			
Bi		0.93				0.71		
Ca	0.56		0.69					0.84
Cd		0.97				0.96		
Ce	0.98				0.96			
Co	0.74		0.59				0.93	
Cr	0.54		0.72				0.91	
Cu		0.84				0.83		
Dy	0.99				0.98			
Er	0.98				0.97			
Eu	0.96				0.96			
Fe	0.65	0.51					0.71	
Ga	0.79				0.80			
Gd	0.99				0.98			
Hg		0.85				0.92		
Ho	0.98				0.97			
K				0.72	0.84			
La	0.98				0.97			
Li	0.94				0.72			
Lu	0.98				0.97			
Mg			0.67				0.80	
Mn		0.68				0.63		
Mo		0.80				0.63		
Na				0.81			-0.67	
Nd	0.98				0.97			
Ni	0.51		0.74				0.96	

P								0.70
Pb		0.96				0.98		
Pr	0.98				0.97			
Rb	0.95				0.92			
Sb		0.97			0.66			
Se		0.72				0.98		
Sm	0.99				0.97			
Sn		0.92				0.77		
Sr			0.60					0.73
Tb	0.99				0.98			
Th	0.90				0.90			
Tl		0.75			0.53	0.75		
U	0.57	0.55	0.54					0.62
V	0.87				0.81			
Y	0.97				0.95			
Yb	0.98				0.97			
Zn		0.72				0.98		
% of Variance	48.89	23.48	10.29	5.77	44.59	21.15	12.07	7.93
Cumulative %	48.89	72.37	82.67	88.43	44.59	65.74	77.81	85.73