Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts.

Supplementary materials

Composition and sources of PM2.5 across urban and rural sites in the Midwestern United States

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Table S1. Statistical significance (p-value) of the non-parametric tests of U of Mann-Whitney (upper matrix) and Z of Kolmogorov-Smirnov (lower matrix) tests for secondary inorganic tracers and bulk organic carbon (OC and EC). Results in bold correspond to significant differences between the two sites (the null hypothesis is rejected) with $p > 0.05$.

Secondary Inorganic Tracers

Sites	Cedar Rapids			Des Moines			Davenport			Montgomery		Van Buren	
	NH_4^+	SO_4^{2-}	NO_3^-	NH_4^+	SO_4^{2-}	NO_3^-	NH_4^+	SO_4^{2-}	NO_3^-	SO_4^{2-}	NO_3^-	SO_4^{2-}	NO_3^-
Cedar Rapids				0.430	0.521	0.100	0.368	0.154	0.906	0.066	0.062	0.424	0.072
Des Moines	0.504	0.699	0.069				0.073	**0.027**	0.163	0.255	0.710	0.919	0.946
Davenport	0.699	0.336	0.979	0.336	0.069	0.336				**0.002**	0.128	**0.034**	0.117
Montgomery	-	0.151	0.211	-	0.384	0.211	-	**0.005**	0.336			0.352	0.892
Van Buren	-	0.699	0.211	-	0.878	0.699	-	0.124	0.336	0.568	0.699		

Organic and Elemental Carbon

Sites	Cedar Rapids		Des Moines		Davenport		Montgomery		Van Buren	
	OC	EC	OC	EC	OC	EC	OC	EC	OC	EC
Cedar Rapids			0.890	0.443	0.359	0.058	**0.001**	**0.001**	**0.001**	**0.001**
Des Moines	1.000	0.841			0.359	0.279	**0.001**	**0.001**	**0.001**	**0.001**
Davenport	0.591	0.194	0.591	0.194			**0.001**	**0.001**	**0.001**	**0.001**
Montgomery	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**			0.392	0.855
Van Buren	**0.001**	**0.001**	**0.001**	**0.001**	**0.002**	**0.001**	0.358	0.697		

Table S2. Statistical significance (p-value) of the non-parametric tests of U of Mann-Whitney (upper matrix) and Z of Kolmogorov-Smirnov (lower matrix). Results in bold correspond to significant differences between the two sites (the null hypothesis is rejected) with $p > 0.05$.

Crustal tracers

Sites	Cedar Rapids			Des Moines			Davenport			Montgomery			Van Buren		
	Al	Ca	Si	Al	Ca	Si	Al	Ca	Si	Al	Ca	Si	Al	Ca	Si
Cedar Rapids				0.517	0.853	0.302	0.322	0.154	0.955	**0.001**	**0.027**	**0.001**	**0.002**	0.928	**0.001**
Des Moines	0.878	0.878	0.504				0.566	0.123	0.295	**0.001**	**0.020**	**0.001**	**0.008**	0.946	**0.001**
Davenport	0.504	0.336	1.000	0.878	0.336	0.504				**0.004**	**0.001**	**0.001**	**0.031**	0.207	**0.031**
Montgomery	**0.001**	0.053	**0.001**	**0.004**	0.058	**0.001**	**0.002**	**0.003**	**0.001**				0.356	**0.031**	**0.039**
Van Buren	**0.018**	0.979	**0.001**	**0.018**	0.979	**0.004**	**0.009**	0.504	0.069	0.504	0.144	0.080			

Anthropogenic tracers

Sites	Cedar Rapids			Des Moines			Davenport			Montgomery			Van Buren		
	Fe	Zn	Pb	Fe	Zn	Pb	Fe	Zn	Pb	Fe	Zn	Pb	Fe	Zn	Pb
Cedar Rapids				0.308	0.127	0.982	**0.001**	**0.001**	**0.001**	0.362	**0.007**	0.099	**0.004**	**0.031**	0.813
Des Moines	0.336	0.211	0.878				**0.001**	**0.001**	**0.001**	0.919	0.323	0.108	**0.001**	0.835	0.928
Davenport	**0.001**	**0.009**	**0.001**	**0.002**	**0.001**	**0.001**				**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
Montgomery	0.878	**0.011**	0.124	0.979	0.366	0.124	**0.001**	**0.001**	**0.001**				**0.001**	0.309	0.110
Van Buren	**0.004**	**0.018**	0.878	**0.001**	0.699	0.699	**0.001**	**0.001**	**0.001**	**0.001**	**0.408**	**0.124**			

Figure S1. A representative set of PMF factors deduced from $PM_{2.5}$ speciation data from the Van Buren site. The left axis shows the log-transformed $PM_{2.5}$ mass fraction of each species, whereas the right axis shows the percent of species attributed to that factor. The error bar shows the model uncertainty as one standard deviation.