Supplementary File

Manuscript title: New Homogeneous Spatial Areas Identified Using Case-Crossover Spatial Lag Grid Differences between Aerosol Optical Depth-$PM_{2.5}$ and Respiratory-Cardiovascular Emergency Department Visits and Inpatient Hospitalizations

Journal name: *Atmosphere*

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Four Figures and Two Tables

Figure S1: ED asthma ORs (95% CIs) for the four AOD-$PM_{2.5}$ and baseline PMB fused surfaces during the warm and cold seasons at lag grids 0 (a), 1 (b), 01 (c), and 04 (d).

Figure S2: IP asthma ORs (95% CIs) for the four AOD-$PM_{2.5}$ and baseline PMB fused surfaces during the warm and cold seasons at lag grids 0 (a), 1 (b), 01 (c), and 04, (d).

Figure S3: IP MI ORs (95% CIs) for the four AOD-$PM_{2.5}$ and baseline PMB fused surfaces during the warm and cold seasons at lag grids 0 (a), 1 (b), 01 (c), and 04 (d).

Figure S4: IP HF ORs (95% CIs) for the four AOD-$PM_{2.5}$ and baseline PMB fused surfaces during the warm and cold seasons at lag grids 0 (a), 1 (b), 01 (c), and 04 (d).

Table S1: No monitor - Monitor OR Difference Percent (ΔOR%) for the Four AOD-$PM_{2.5}$ and Baseline PMB Fused Surfaces and the Four Respiratory-Cardiovascular ED Visits and IP Hospitalizations Spatial Lag Grid and Temporal Lag Day Analyses in the Baltimore Study Area.

Table S2: Warm - Cold Season OR Difference Percent (ΔOR%) for the Four AOD-$PM_{2.5}$ and Baseline PMB Fused Surfaces and the Four Respiratory-Cardiovascular ED Visits and IP Hospitalizations Spatial Lag Grid and Temporal Lag Day Analyses in the Baltimore Study Area.

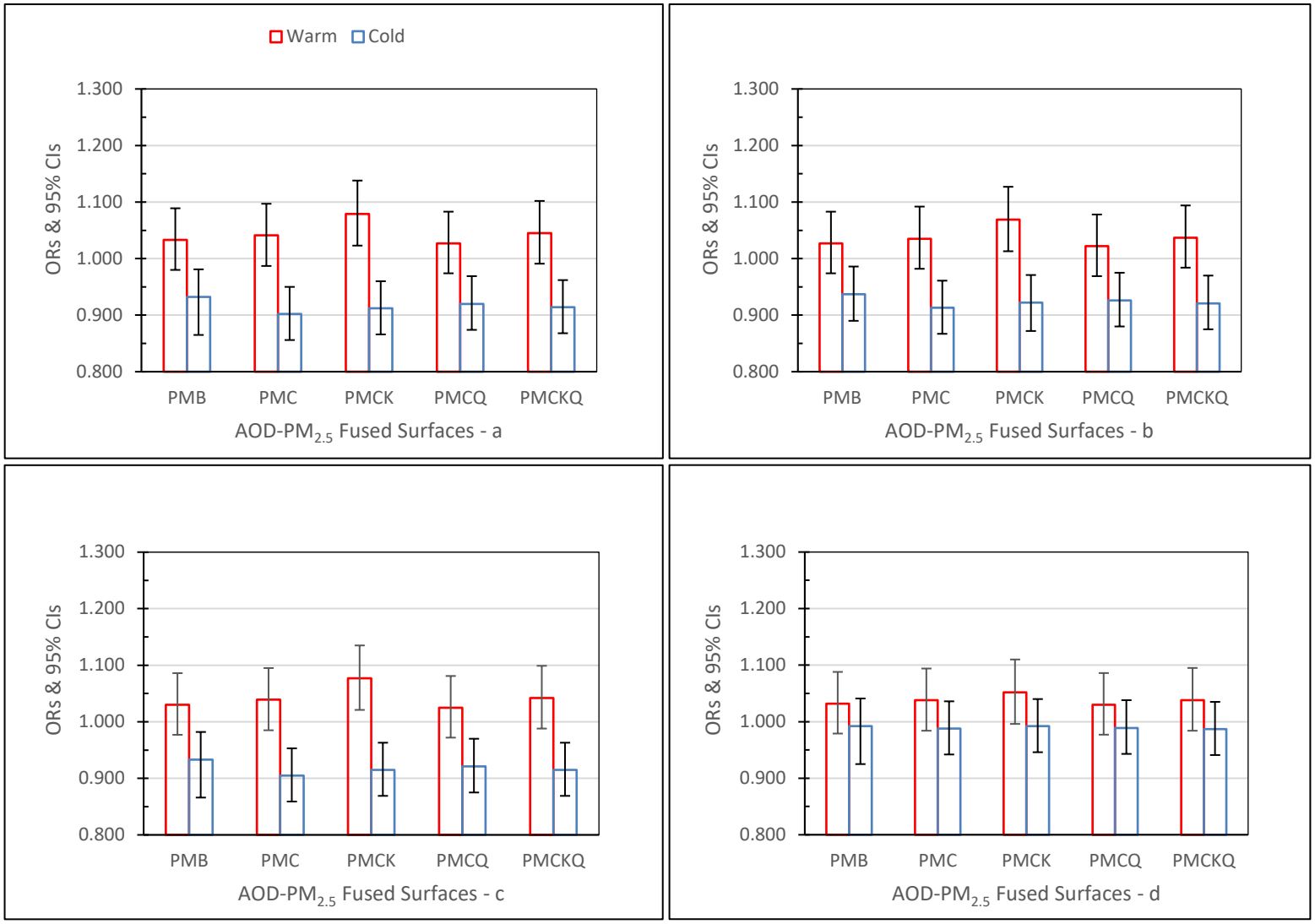

Figure S1: ED asthma ORs (95% CIs) for the four AOD-$PM_{2.5}$ and baseline PMB fused surfaces during the warm and cold seasons at lag grids 0 (a), 1 (b), 01 (c), and 04 (d).

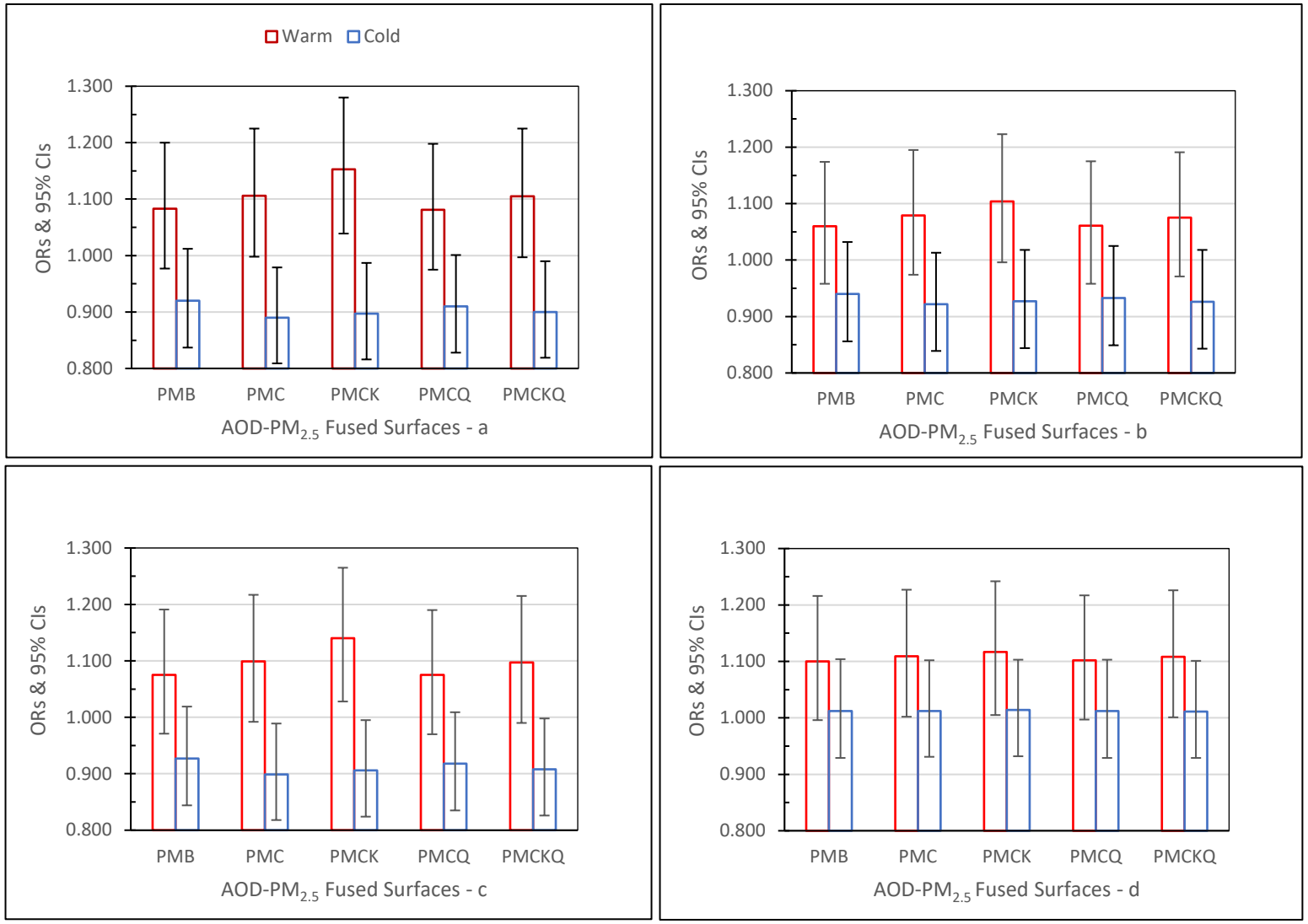

Figure S2: IP asthma ORs (95% CIs) for the four AOD-$PM_{2.5}$ and baseline PMB fused surfaces during the warm and cold seasons at lag grids 0 (a), 1 (b), 01, (c), and 04 (d).

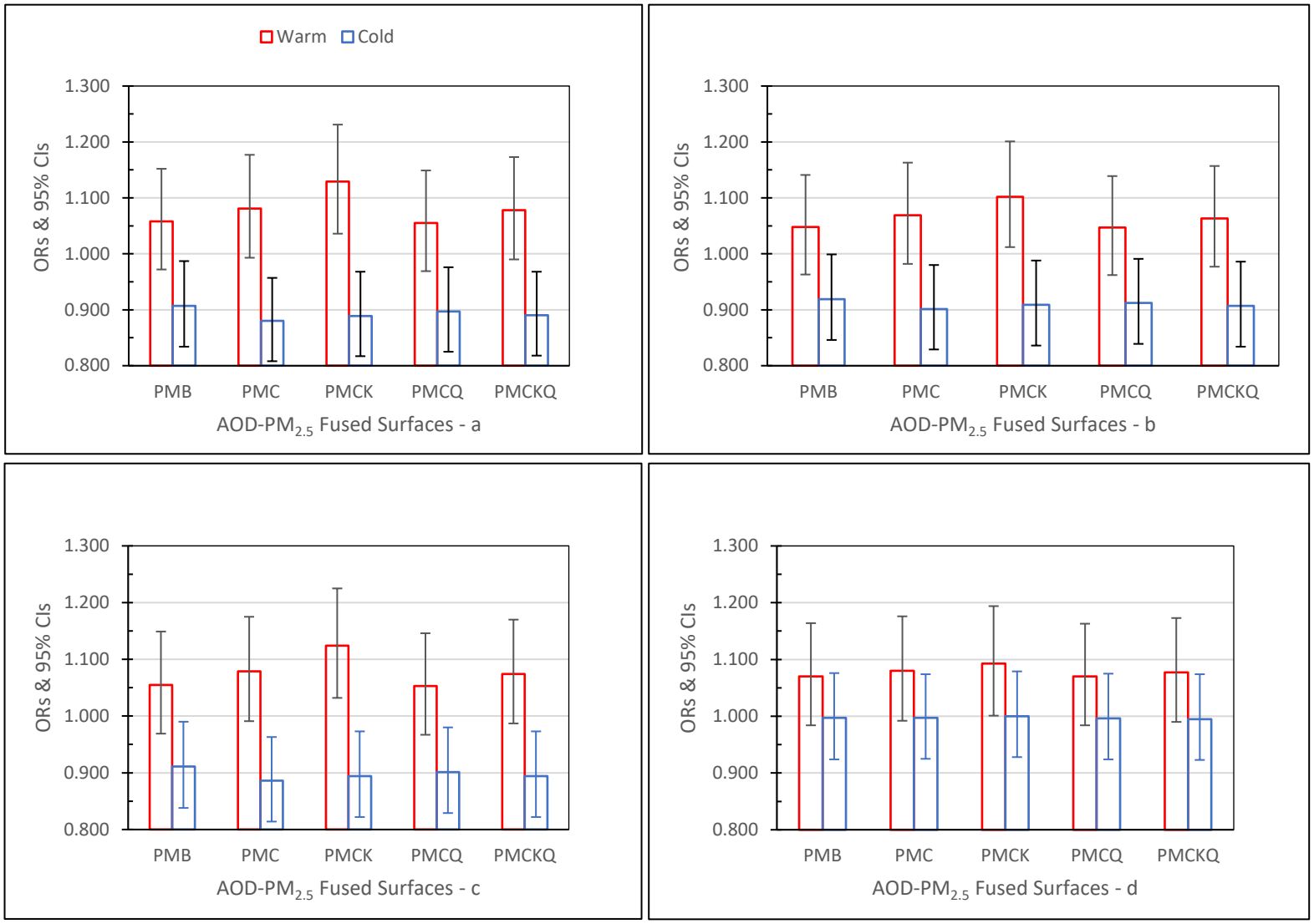

Figure S3: IP MI ORs (95% CIs) for the four AOD-$PM_{2.5}$ and baseline PMB fused surfaces during the warm and cold seasons at lag grids 0 (a), 1 (b), 01 (c), and 04 (d).

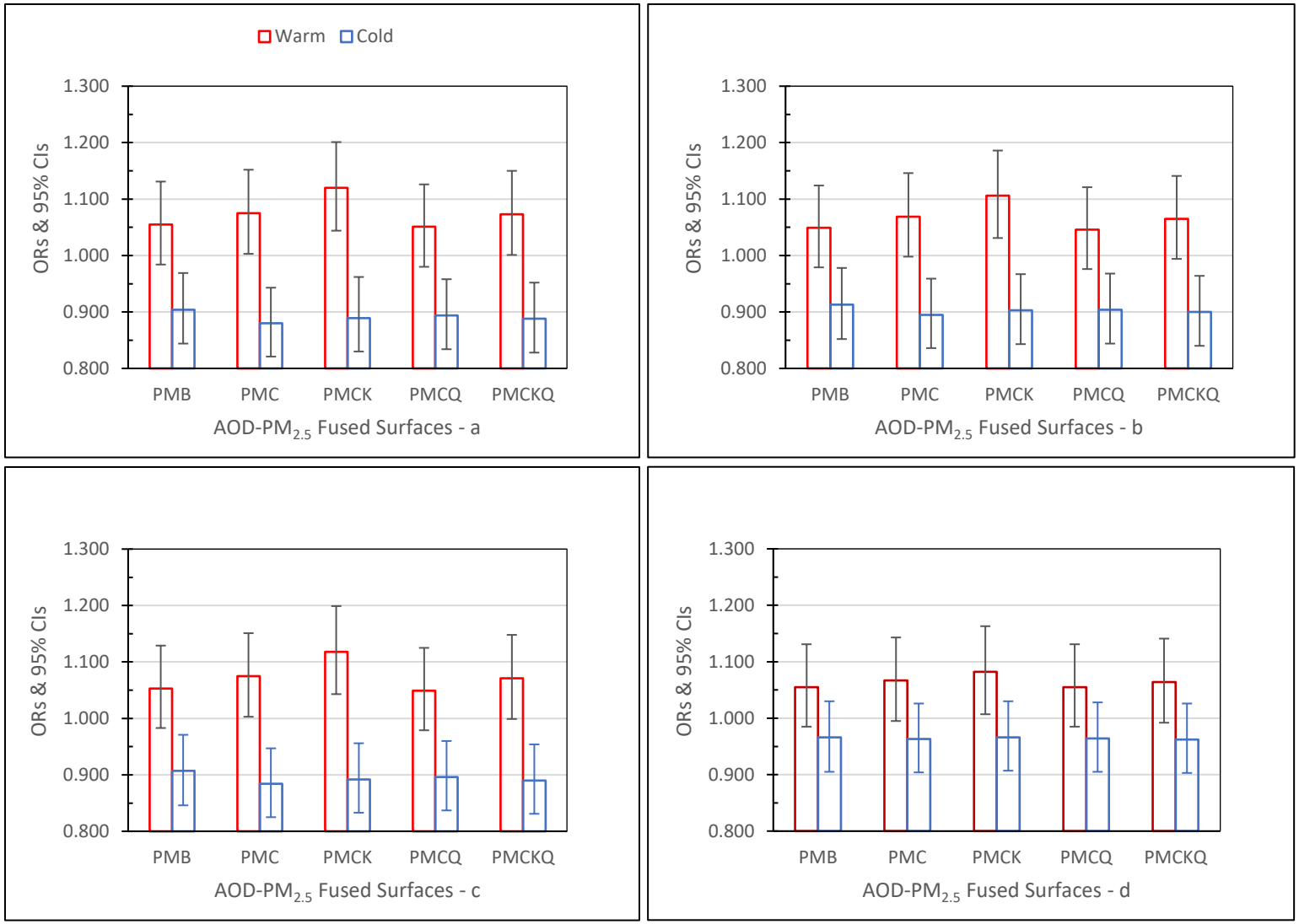

Figure S4: IP HF ORs (95% CIs) for the four AOD-$PM_{2.5}$ and baseline PMB fused surfaces during the warm and cold seasons at lag grids 0 (a), 1 (b), 01 (c), and 04 (d).

Table S1: No Monitor - Monitor OR Difference Percent (ΔOR%) for the Four AOD-$PM_{2.5}$ and Baseline PMB Fused Surfaces and the Four Respiratory-Cardiovascular ED Visits and IP Hospitalizations Spatial Lag Grid and Temporal Lag Day Analyses in the Baltimore Study Area.

Case-Crossover Lag Grid or Lag Day Analyses[1-4]									
Lag Value	Fused Surfaces	Grids				Days			
		ED AS	IP AS	IP MI	IP HF	ED AS	IP AS	IP MI	IP HF
0	PMB	-0.7†,‡	-0.9†,‡	-0.7†,‡	-0.6†,‡	-0.7†,‡	-0.9†,‡	-0.7†,‡	-0.6†,‡
	PMC	2.0†,†	1.7†,‡	2.2†,‡	2.0†,‡	2.0†,‡	1.7†,‡	2.2†,‡	2.0†,‡
	PMCK	2.3†,‡	2.5†,‡	2.5†,‡	2.3†,‡	2.3†,‡	2.5†,‡	2.5†,‡	2.3†,‡
	PMCQ	0.0†,‡	-0.4†,‡	0.0†,‡	-0.1†,‡	0.0†,‡	-0.4†,‡	0.0†,‡	-0.1†,‡
	PMCKQ	0.7†,‡	0.5†,‡	0.7†,‡	0.7†,+	0.7†,‡	0.5†,‡	0.7†,‡	0.7†,‡
1	PMB	-0.5†,‡	-0.6†,‡	-0.5†,‡	-0.5†,‡	-0.7†,‡	-1.0†,‡	-0.7†,‡	-0.6†,‡
	PMC	1.9†,‡	1.1†,‡	1.8†,‡	1.8†,‡	2.1†,‡	1.6†,‡	2.1†,‡	1.9†,‡
	PMCK	2.1†,‡	1.6†,‡	2.0†,‡	2.1†,‡	2.2†,‡	2.4†,‡	2.4†,‡	2.3†,‡
	PMCQ	0.0†,‡	-0.2†,‡	0.0†,‡	0.1†,‡	0.0†,‡	-0.4†,‡	0.0†,‡	-0.1†,‡
	PMCKQ	0.7†,‡	0.3†,‡	0.6†,‡	0.7†,‡	0.6†,‡	0.4*,‡	0.6†,‡	0.7†,‡
01	PMB	-0.6†,‡	-0.8†,‡	-0.5†,‡	-0.5†,‡	-0.9†,‡	-1.4†,‡	-1.2†,‡	-1.1†,‡
	PMC	2.2†,‡	1.7†,‡	2.3†,‡	2.1†,‡	4.5†,‡	4.3†,‡	5.0†,‡	4.3†,‡
	PMCK	2.5†,‡	2.6†,‡	2.7†,‡	2.6†,‡	4.7†,‡	5.7†,‡	5.6†,‡	4.8†,‡
	PMCQ	0.0†,‡	-0.3†,‡	0.1†,‡	0.1†,‡	0.2†,‡	-0.4†,‡	0.0†,‡	0.1†,‡
	PMCKQ	0.9†,‡	0.7†,‡	0.8†,‡	0.9†,‡	1.4†,‡	1.0†,‡	1.1†,‡	1.2†,‡
04	PMB	-0.6‡	-0.5	-0.6‡	-0.3†,‡				
	PMC	0.1†,‡	0.0†	0.3†,‡	0.5†,‡				
	PMCK	0.2†,‡	0.3†	0.5†,‡	0.5†,‡				
	PMCQ	-0.4†,‡	-0.4	-0.4†,‡	-0.2†,‡				
	PMCKQ	-0.3†,‡	-0.2	-0.2†,‡	-0.1†,‡				

[1]Each cell includes no monitor - monitor ΔOR% values. [2]Significance of ORs for monitor grid conditions (grids without [no] or with [yes] air monitors), $p \leq 0.05$: † = no, ‡ = yes. [3]Red hue indicates higher lag day value than lag grid value, while blue hue represents lower lag day value than lag grid value. [4]Underlined cell value identifies a difference between the significance of the outcome for a lag grid OR and a lag day OR.

Table S2: Warm - Cold Season OR Difference Percent (ΔOR%) for the four AOD-$PM_{2.5}$ and Baseline PMB Fused Surfaces and the Four Respiratory-Cardiovascular ED Visits and IP Hospitalizations Spatial Lag Grid and Temporal Lag Day Analyses in the Baltimore Study Area.

Case-Crossover Lag Grid or Lag Day Analyses[1-4]									
Lag Value	Fused Surfaces	Grids				Days			
		ED AS	IP AS	IP MI	IP HF	ED AS	IP AS	IP MI	IP HF
0	PMB	10.8‡	17.7	16.6‡	16.7‡	10.8‡	17.7	16.6‡	16.7‡
	PMC	15.4‡	24.3‡	22.8‡	22.2†,‡	15.4‡	24.3‡	22.8‡	22.2†,‡
	PMCK	18.3†,‡	28.5†,‡	27.0†,‡	26.0†,‡	18.3†,‡	28.5†,‡	27.0†,‡	26.0†,‡
	PMCQ	11.6‡	18.8	17.6‡	17.6‡	11.6‡	18.8	17.6‡	17.6‡
	PMCKQ	14.3‡	22.8‡	21.1‡	20.8†,‡	14.3‡	22.8‡	21.1‡	20.8†,‡
1	PMB	9.6‡	12.8	14.0‡	14.9‡	10.6‡	16.1	16.2‡	16.3‡
	PMC	13.4‡	17.0	18.6‡	19.4‡	14.7‡	21.9‡	21.9‡	21.5†,‡
	PMCK	15.9†,‡	19.1	21.2†,‡	22.5†,‡	17.5†,‡	25.4†,‡	25.6†,‡	24.9†,‡
	PMCQ	10.4‡	13.7	14.8‡	15.7‡	11.4‡	17.0	17.0‡	17.2‡
	PMCKQ	12.6‡	16.1	17.2‡	18.3‡	13.9‡	20.7‡	20.4‡	20.3‡
01	PMB	10.4‡	16.0	15.8‡	16.1‡	17.4‡	26.8‡	26.2‡	25.1‡
	PMC	14.8‡	22.2‡	21.8‡	21.6†,‡	24.6‡	38.1†,‡	36.7†,‡	33.9†,‡
	PMCK	17.7†,‡	25.8†,‡	25.7†,‡	25.3†,‡	28.4†,‡	45.2†,‡	44.1†,‡	40.5†,‡
	PMCQ	11.3‡	17.1‡	16.9‡	17.1‡	18.7‡	28.6‡	27.8+	26.6‡
	PMCKQ	11.3‡	20.8‡	20.1‡	20.3‡	23.1‡	33.1†,‡	33.9†,‡	32.2†,‡
04	PMB	4.0	8.7	7.3	9.2				
	PMC	5.1	9.6	8.3	10.8				
	PMCK	6.0	10.2†	9.3†	12.0†				
	PMCQ	4.1	8.9	7.4	9.4				
	PMCKQ	5.2	9.6	8.2	10.6				

[1]Each cell includes warm - cold season ΔOR% values. [2]Significance of warm-cold season ORs, $p \leq 0.05$: † = warm; ‡ = cold. [3]Red hue indicates a higher lag day OR value than a lag grid OR value. [4]Underlined cell value identified a difference in the significance of the outcome for a lag grid OR and a lag day OR.