Supplementary Information for

Hyperfine-Resolution Mapping of On-Road Vehicle Emissions with Comprehensive Traffic Monitoring and Intelligent Transportation System

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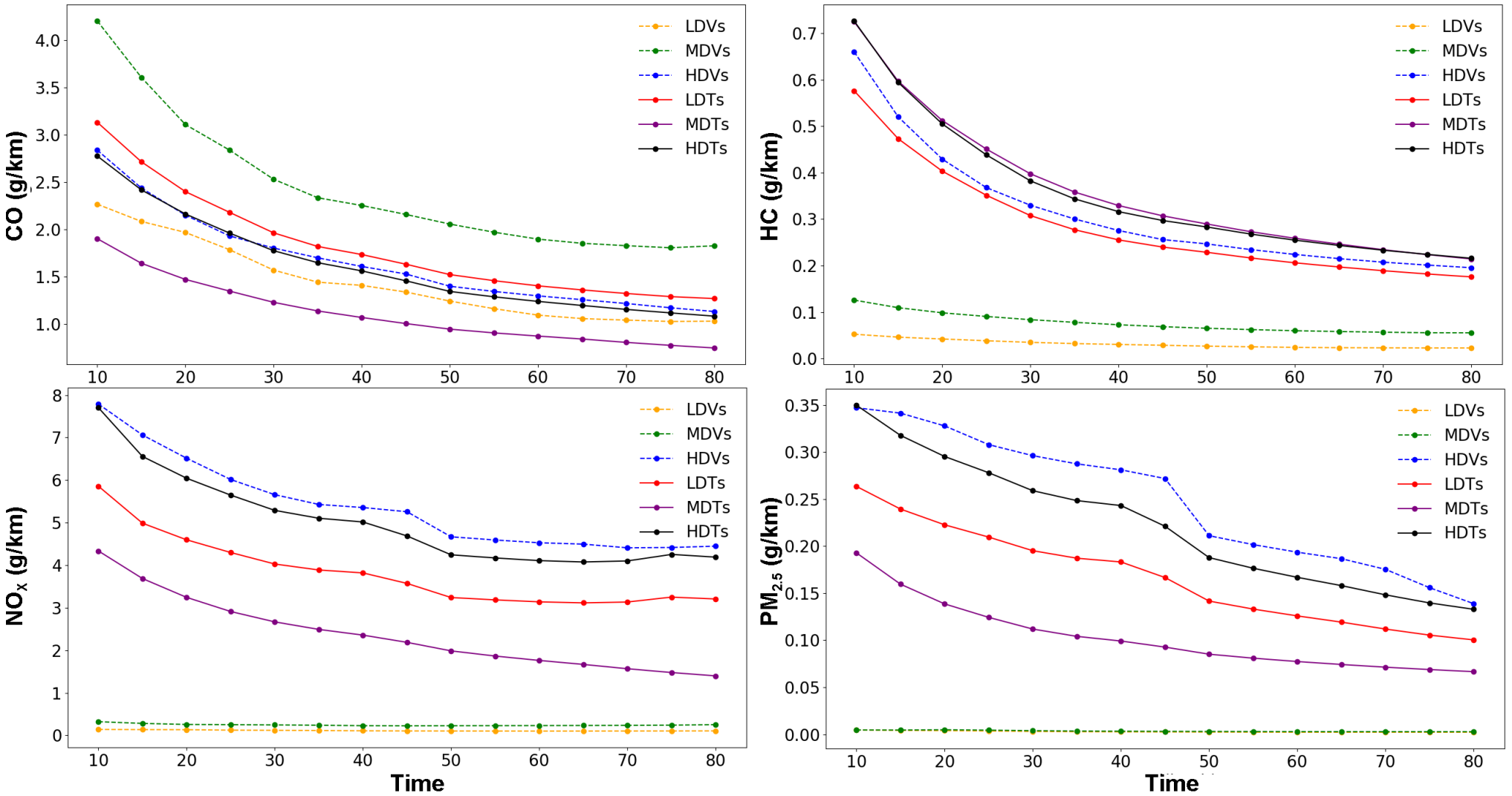

Figure S1. Vehicle-category- and speed-dependent emission factors of CO, NO_x, HC, and $PM_{2.5}$. Vehicle categories include light duty vehicles (LDVs), middle duty vehicles (MDVs), heavy duty vehicles (HDVs), light duty trucks (LDTs), middle duty trucks (MDTs), heavy duty trucks (HDTs).

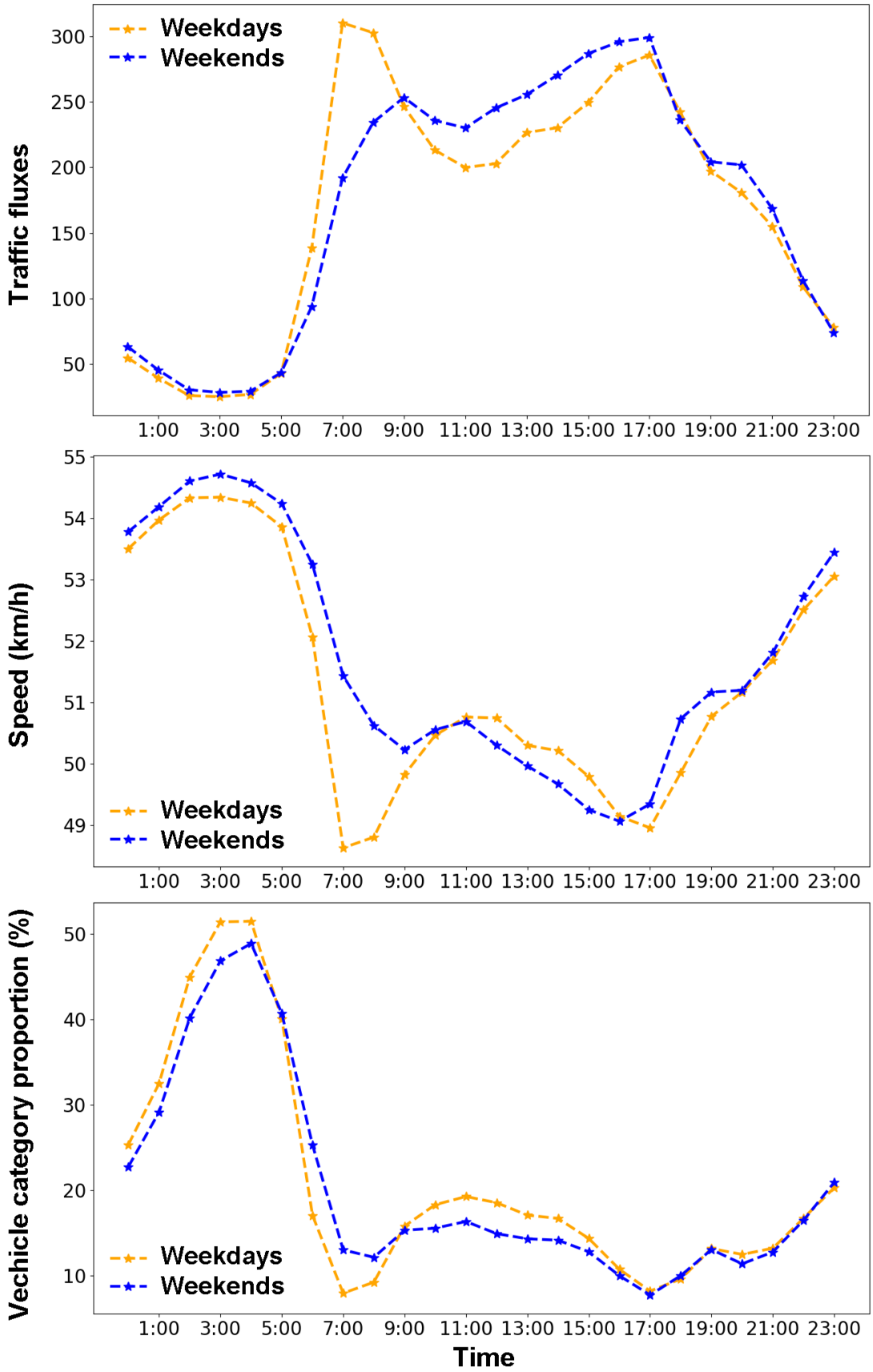

Figure S2. Hourly variations of traffic fluxes, speeds, and proportions of HDVs and HDTs on weekdays and weekends.

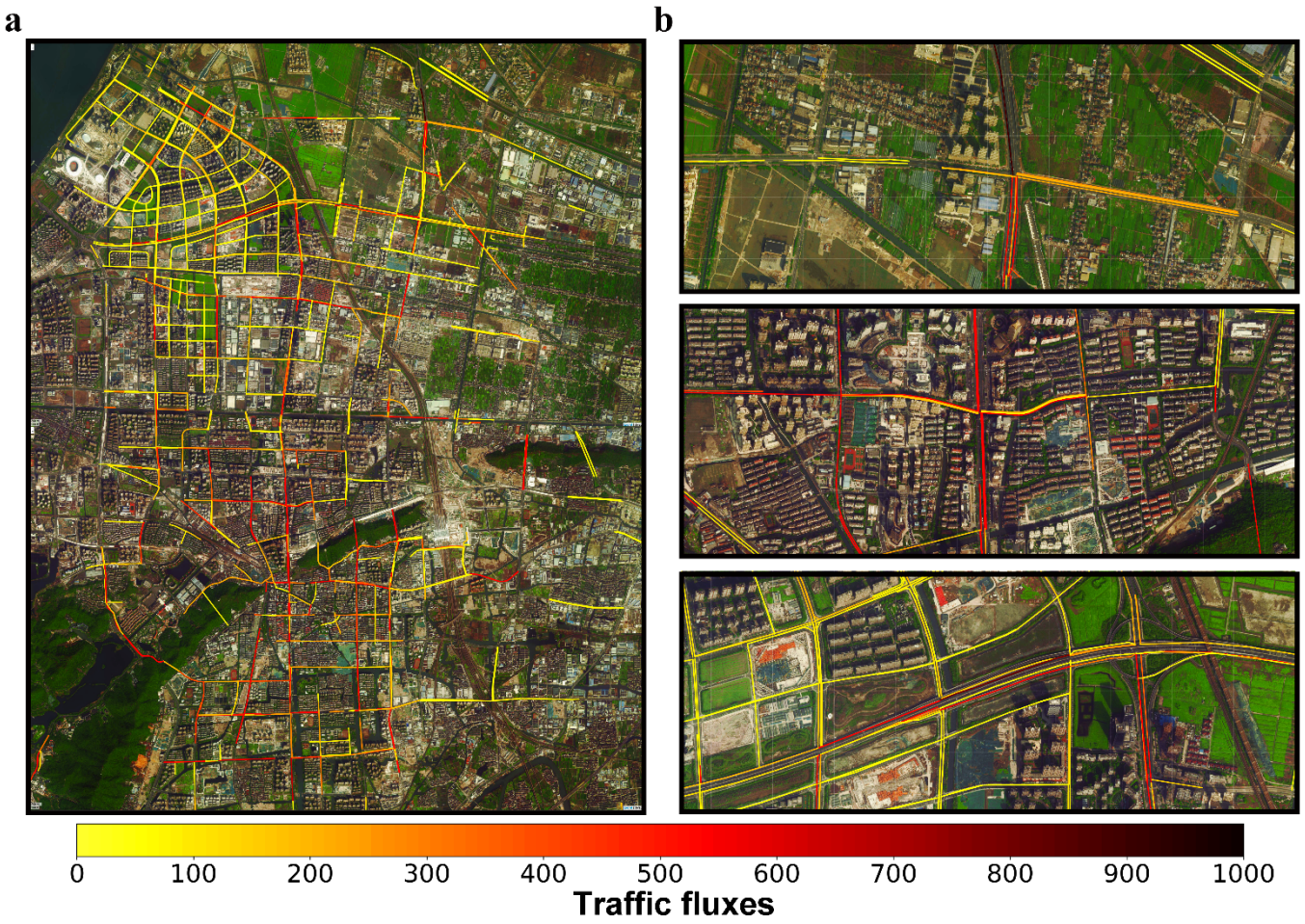

Figure S3. Hyperfine-resolution mapping of observed traffic fluxes on weekends over the Xiaoshan District. The same as Figs. 3a and 3b but for weekends. Map data © 2021, Gaode Map.

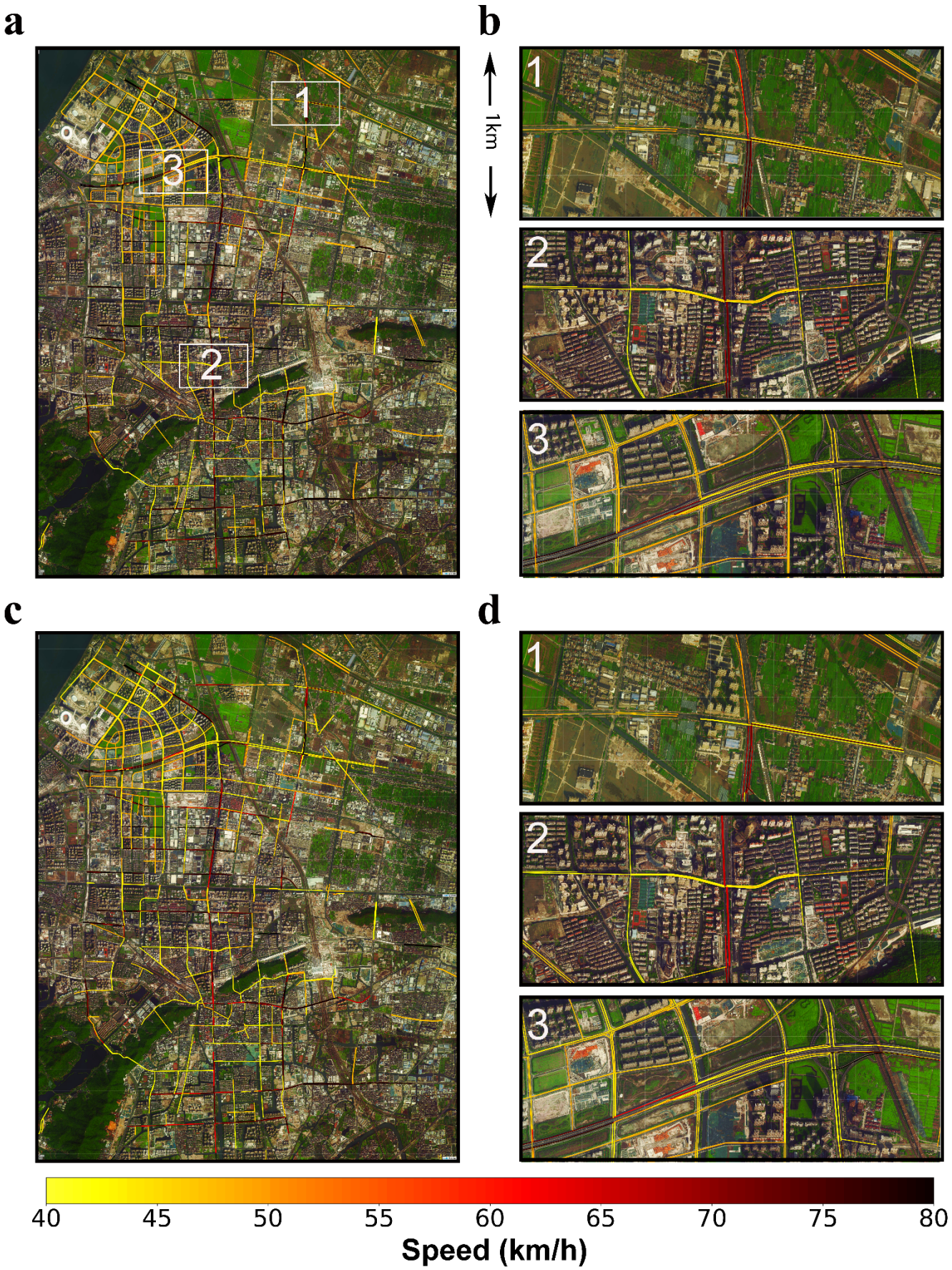

Figure S4. The same as Figs. 3a ~ 3d but for vehicle-specific speeds. Map data © 2021, Gaode Map.

Figure S5. Hyperfine-resolution mapping of different proportions of vehicle categories over the Xiaoshan District, including light duty vehicles (LDVs), middle duty vehicles (MDVs), light duty trucks (LDTs), middle duty trucks (MDTs). Map data © 2021, Gaode Map.

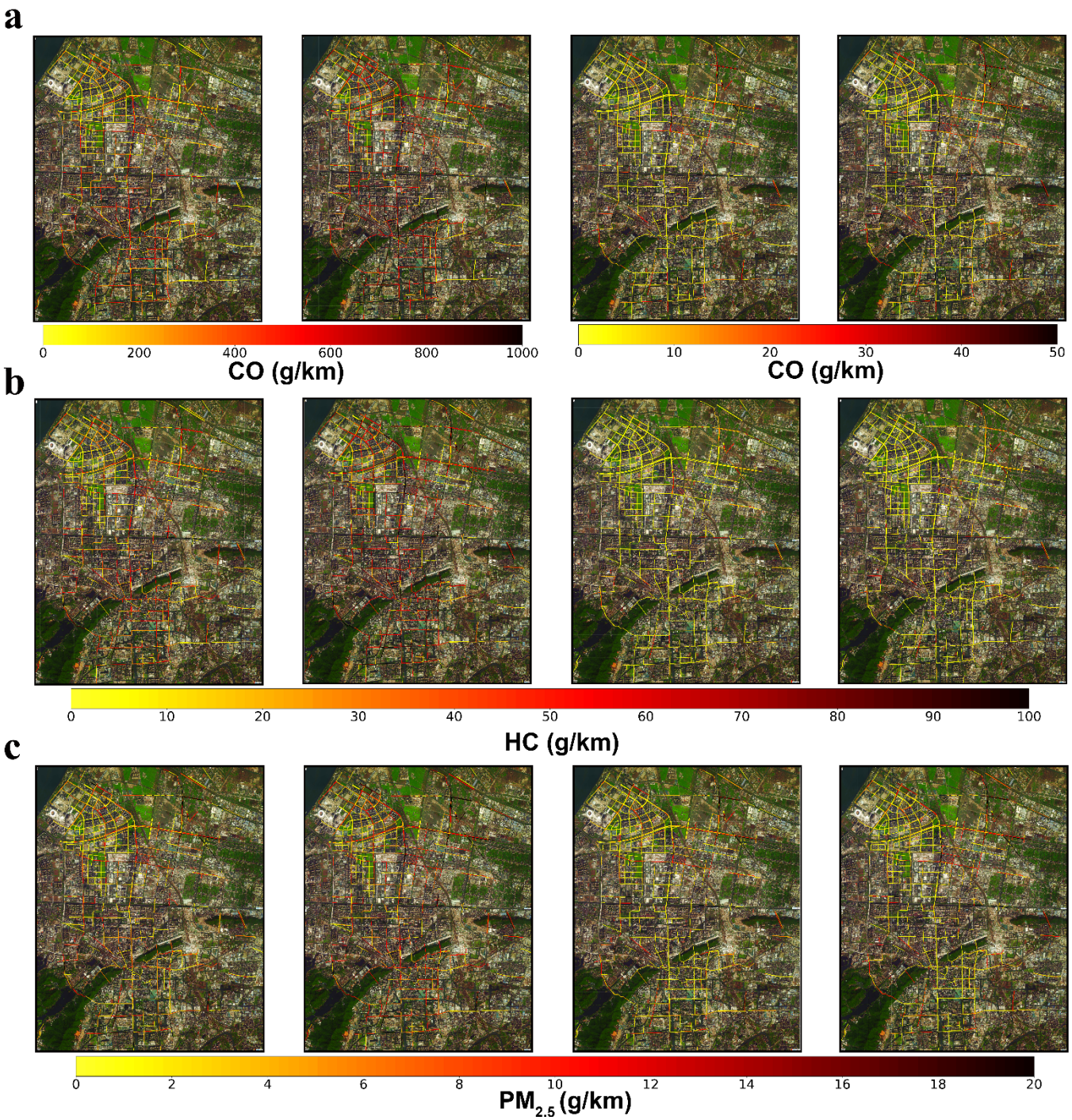

Figure S6. The same as Fig. 5a but for (a) CO, (b) HC, and (c) $PM_{2.5}$. Map data © 2021, Gaode Map.

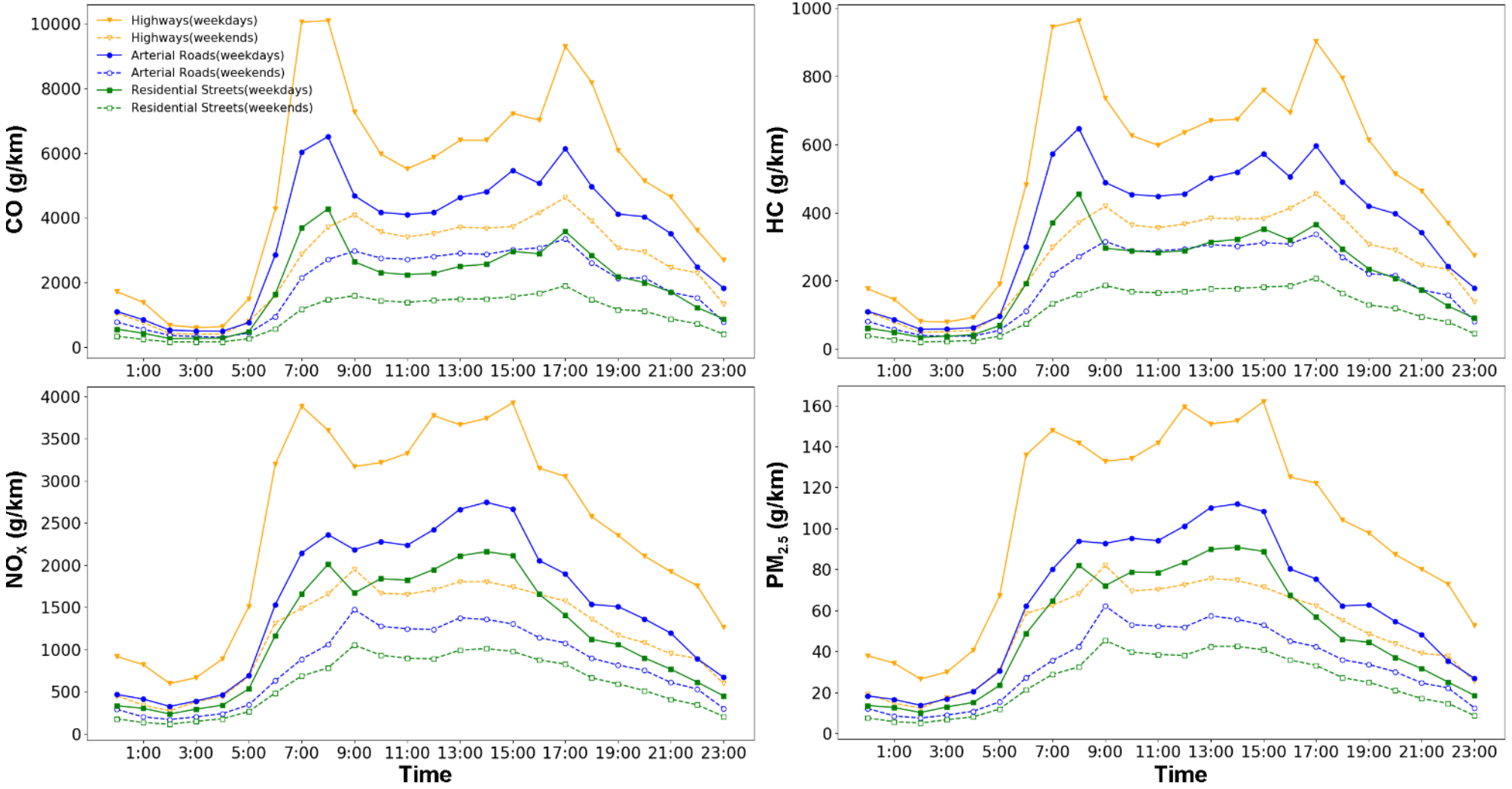

Figure S7. Hourly variations of CO, HC, NO_x, and $PM_{2.5}$ by road types on weekdays and weekends.

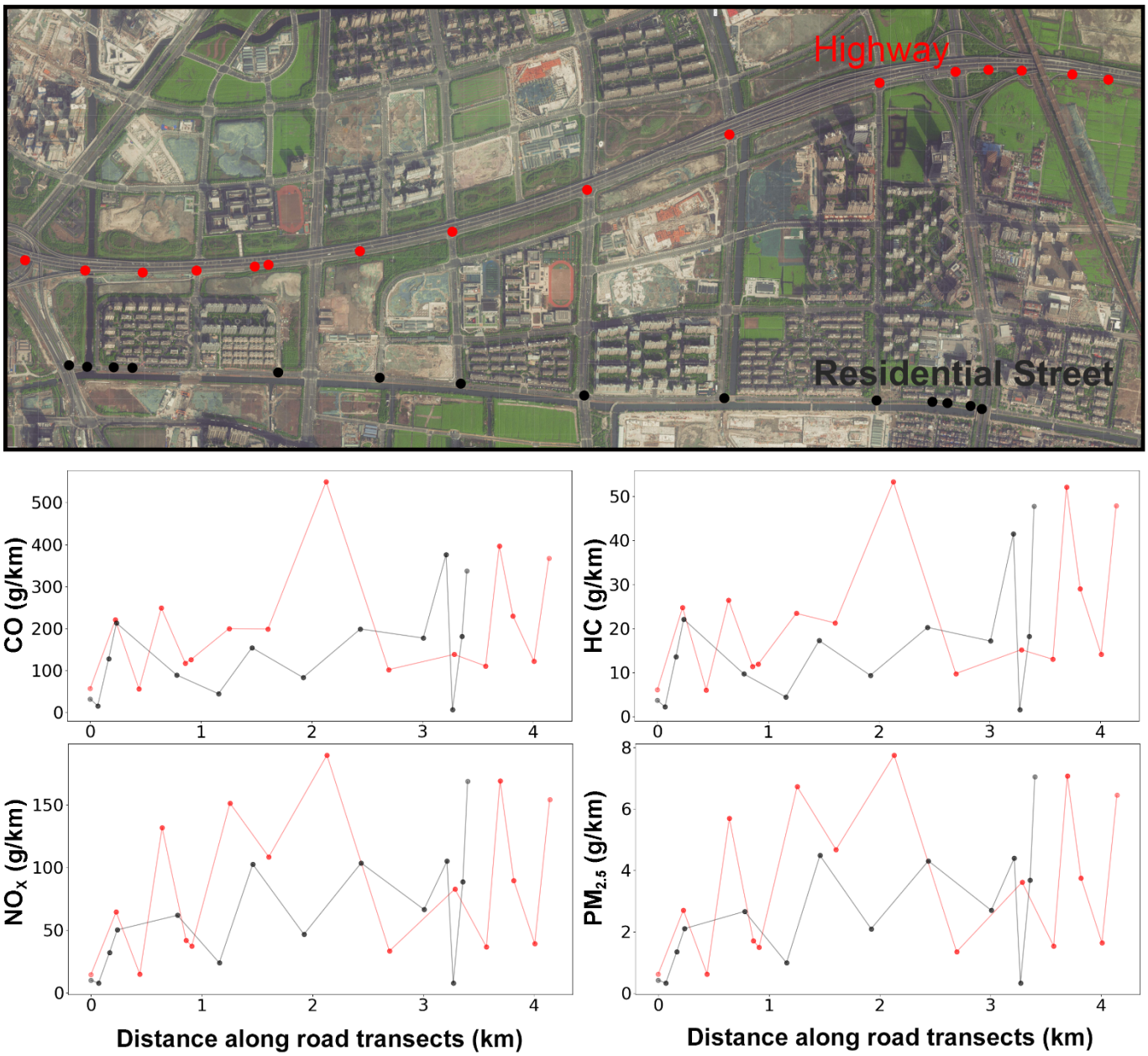

Figure S8. Comparison of on-road vehicle emissions between a highway (i.e., Airport Road) and a residential street (i.e., Wenming Road). Emissions are plotted as a function of cumulative distance along each road route. The road transects correspond to the locations of traffic monitoring (Top panel). Map data © 2021, Gaode Map.

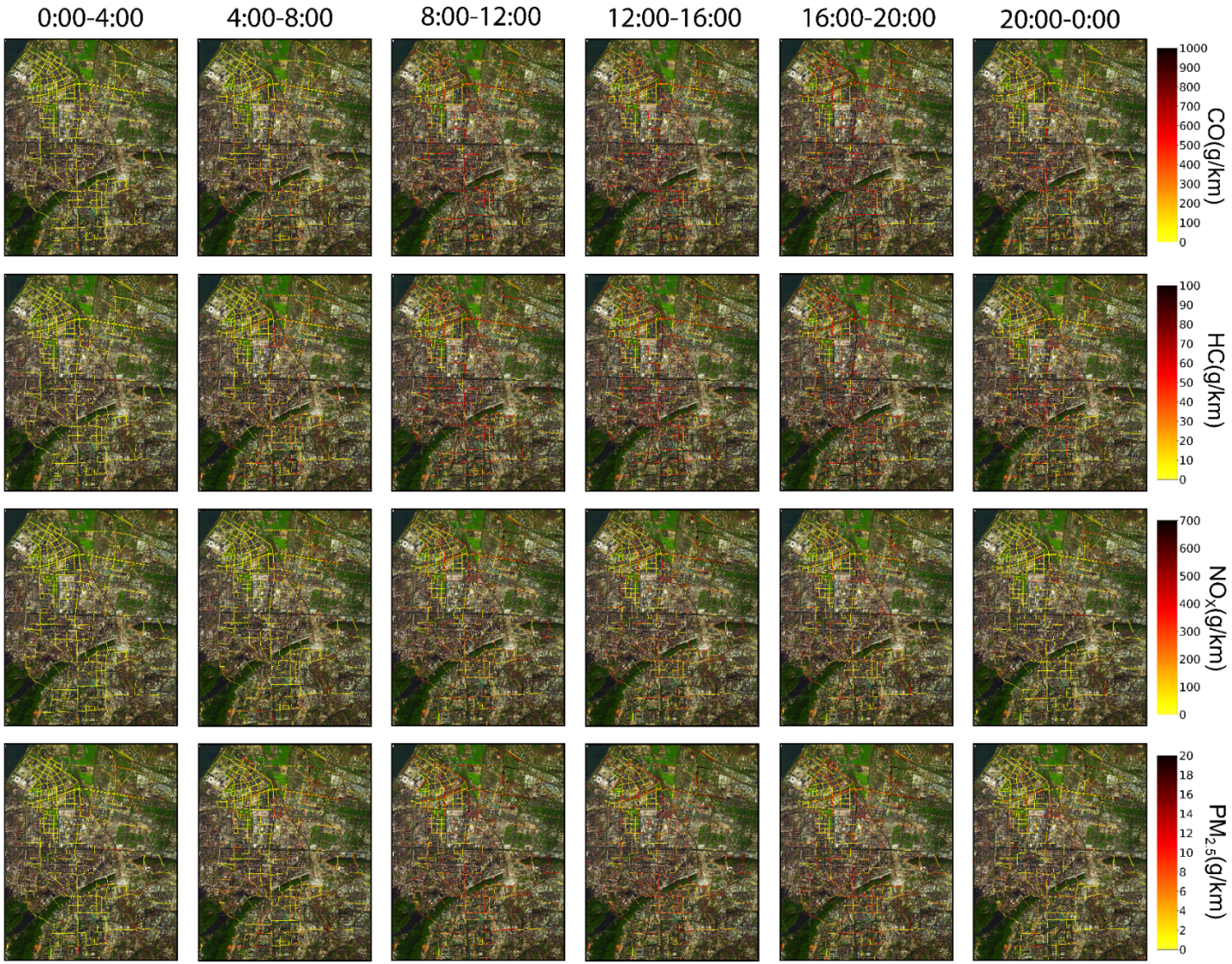

Figure S9. Hyperfine-resolution mapping of hourly on-road vehicle emissions over the Xiaoshan District. Hourly averages (every four hours) of on-road vehicle emissions for each road segment. Map data © 2021, Gaode Map.

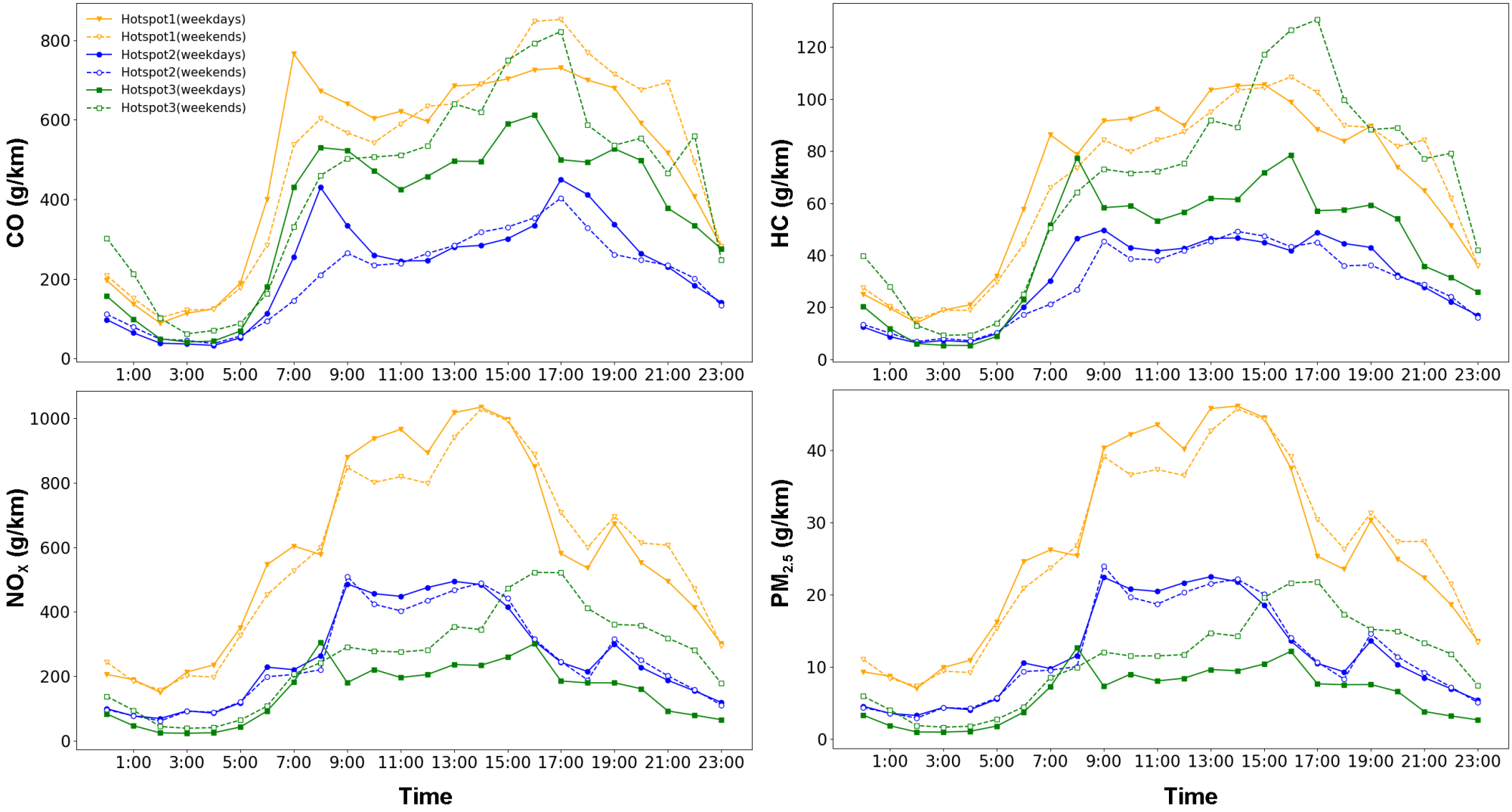

Figure S10. Hourly variations of on-road vehicle emission hotspot intensities. The hotspots are presented in Fig. 2.

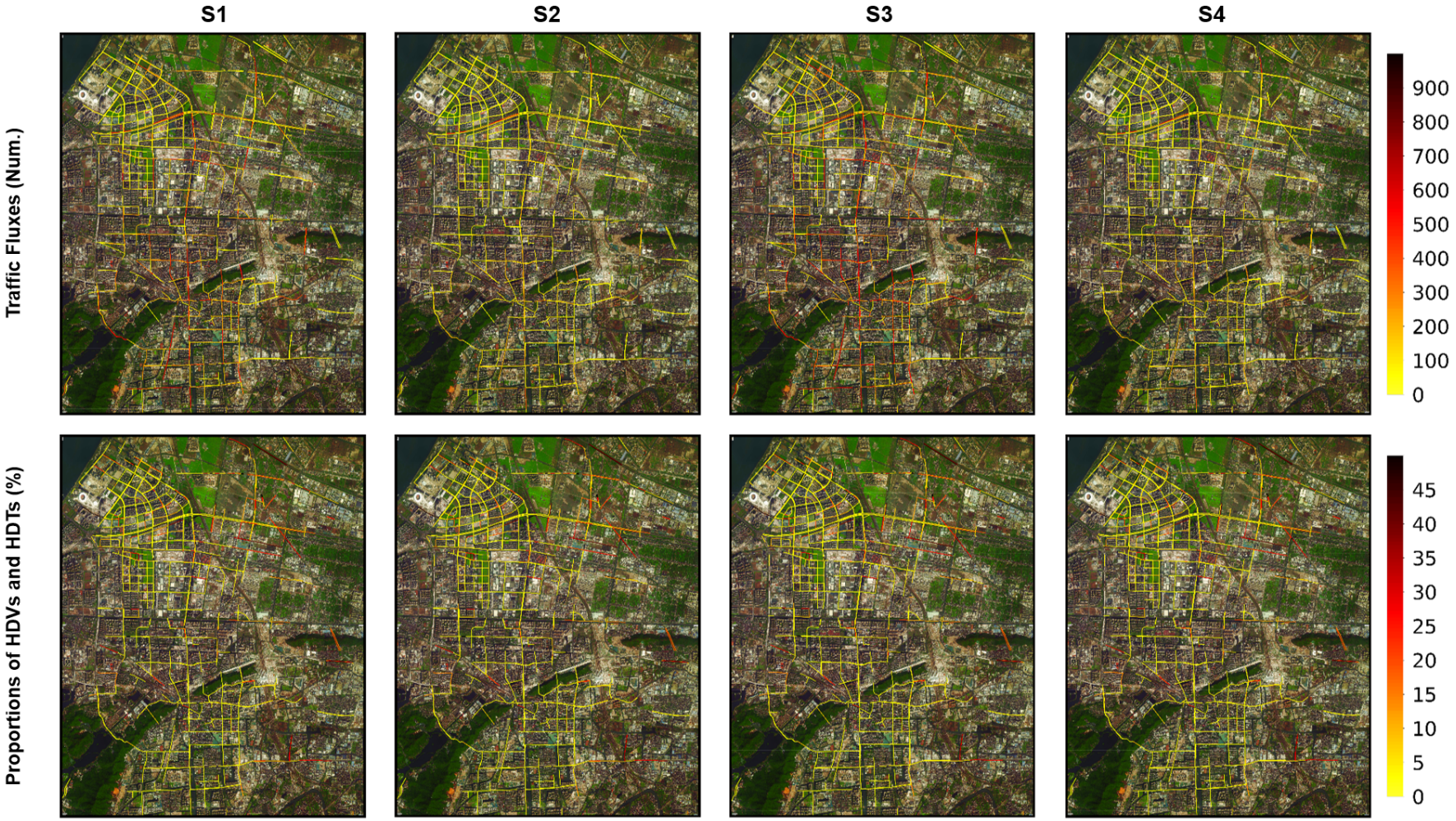

Figure S11. Impacts of traffic control strategies, including the (a) S1, (b) S2, (c) S3, and (d) S4 scenarios, on the traffic fluxes and fleet composition (HDVs and HDTs). Map data © 2021, Gaode Map.

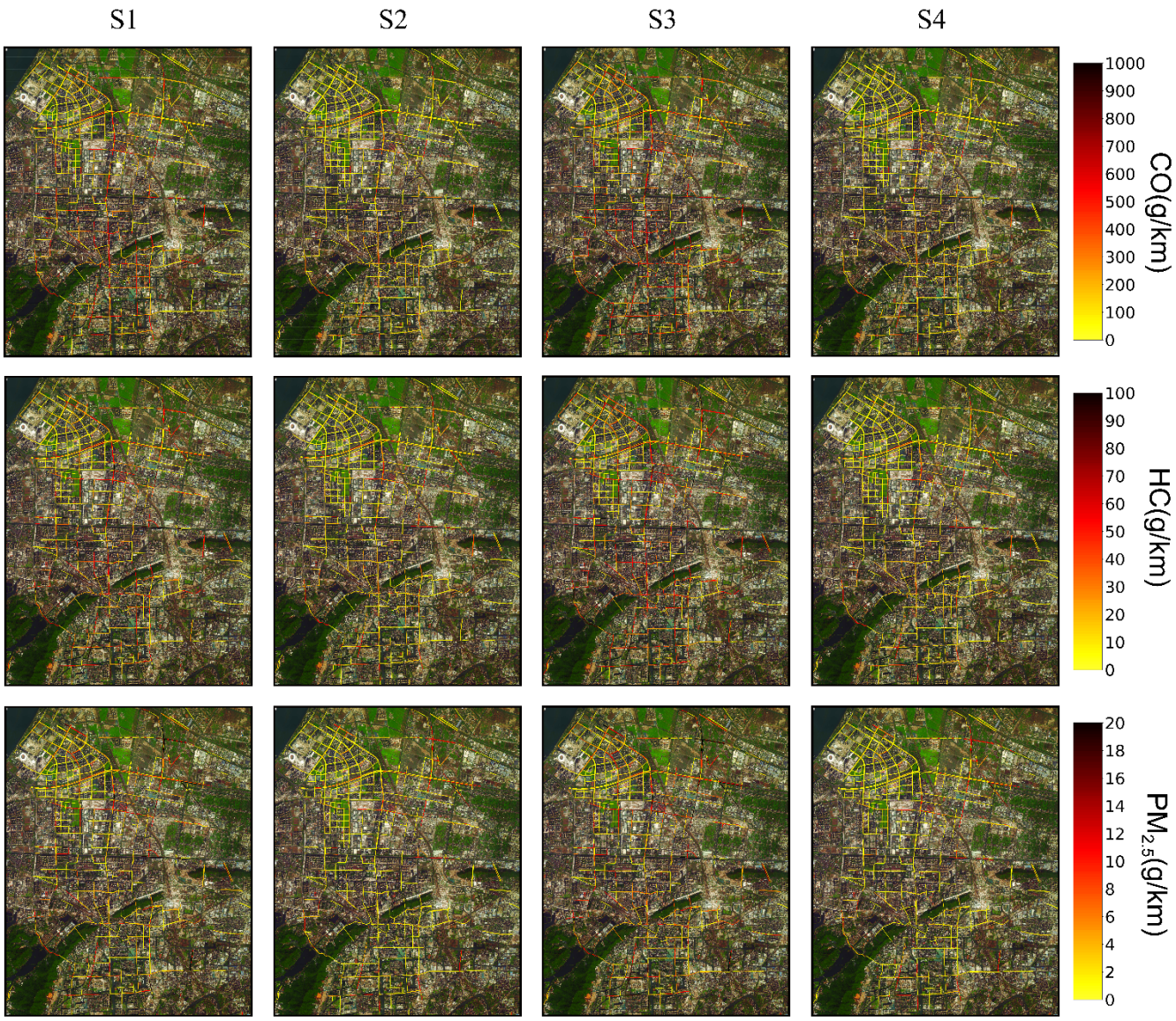

Figure S12. Impacts of traffic control strategies on daily average on-road vehicle emissions. Map data © 2021, Gaode Map.

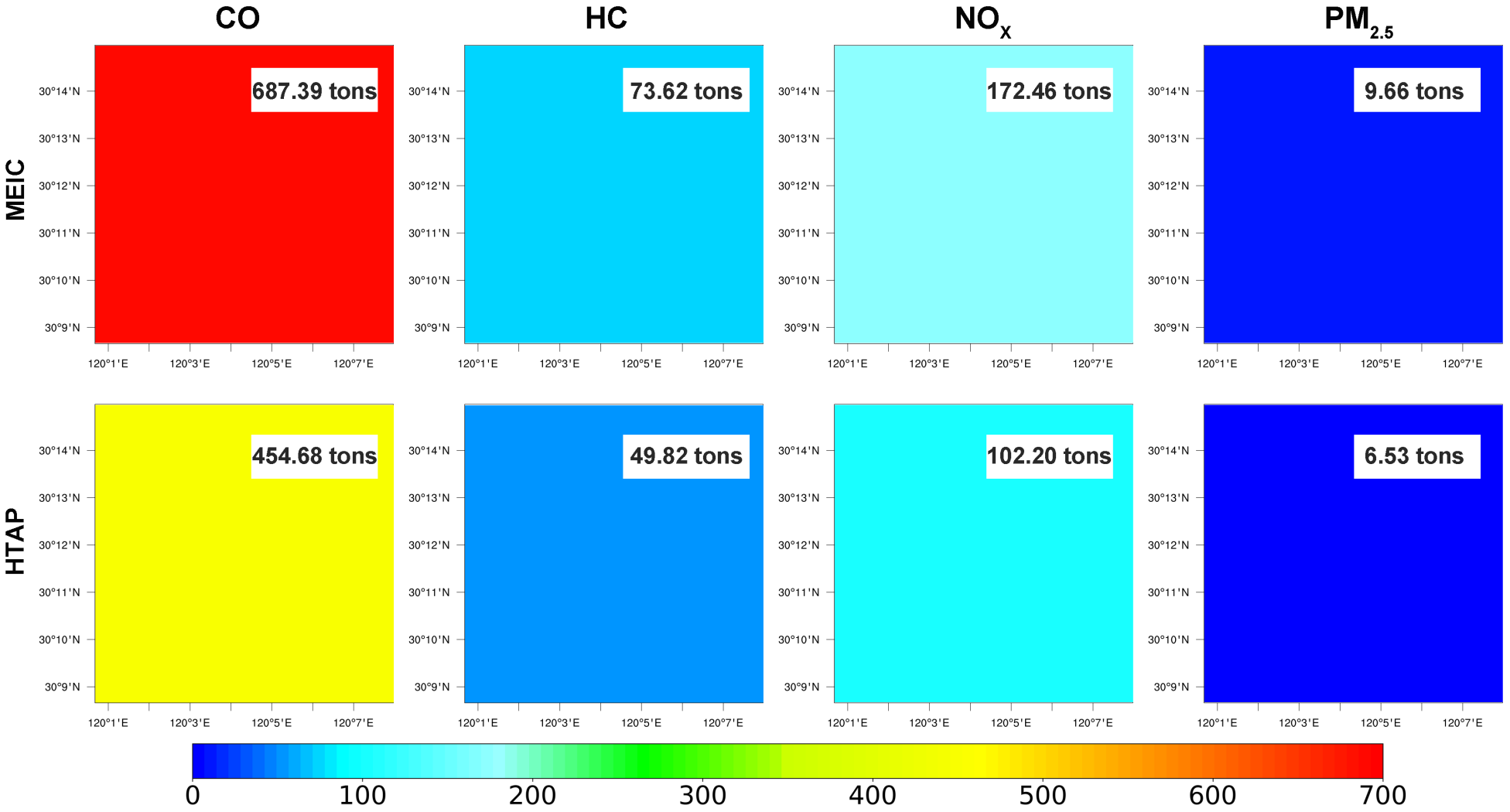

Figure S13. Spatial distributions of monthly transportation emissions in MEICv1.3 and HTAPv2.2.

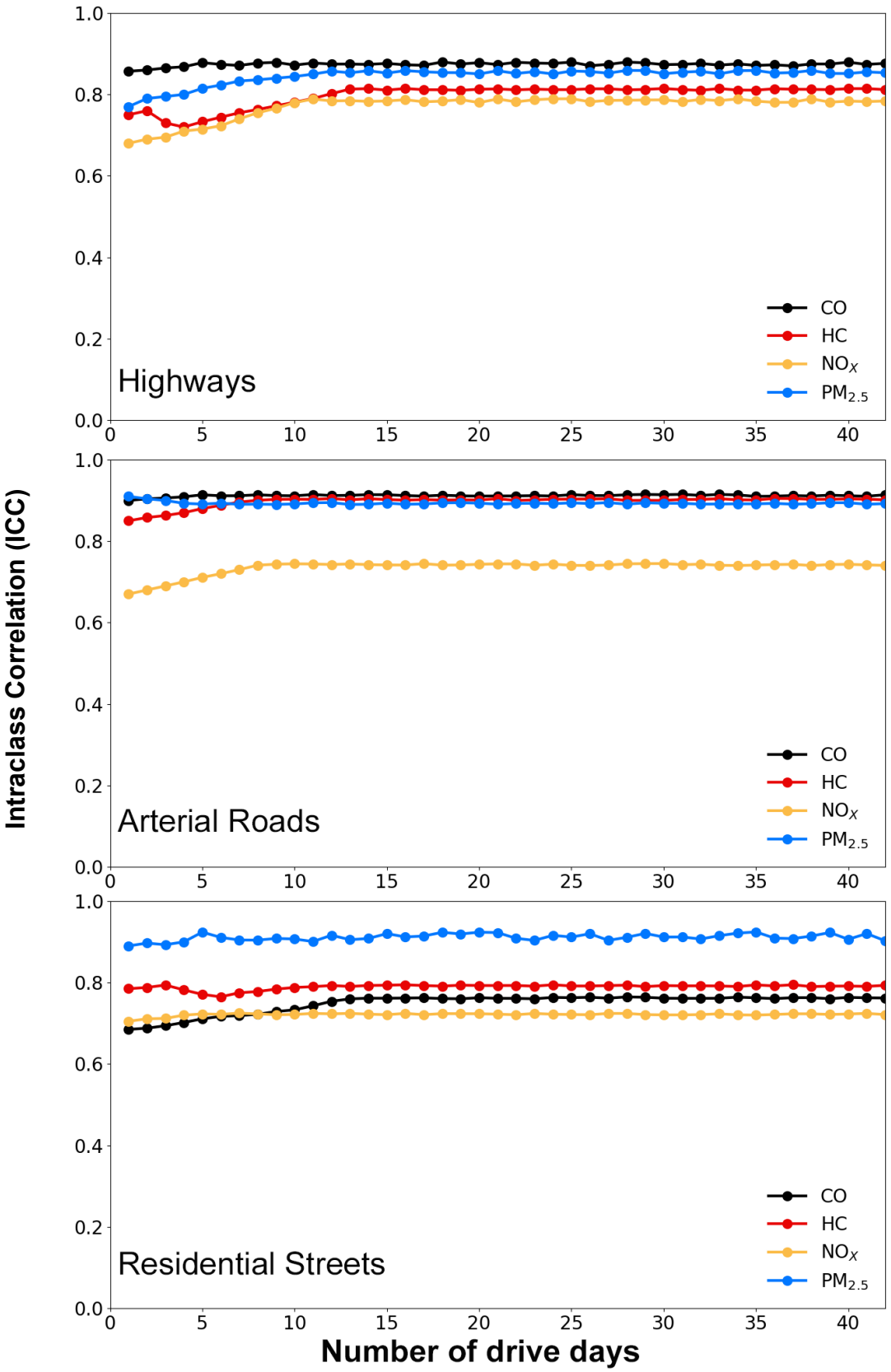

Figure S14. Systematic subsampling and Intraclass Correlation (ICC). Intraclass correlation (ICC) for CO, HC, NO_x, and $PM_{2.5}$ as a function of the number of weekdays, presented separately for highways, arterial roads, and residential streets.

Table S1. The summary of on-road vehicle emissions.

Road	Length	Vehicle category	Emission (g) / Emission intensity (g/km)			
			CO	HC	NO_x	$PM_{2.5}$
Arterial roads	140.08km	Total	46310.45/330.60	5495.34/39.23	22099.02/157.76	927.33/6.62
		HDVs and HDTs	1285.93/9.18	1312.55/9.37	13310.40/95.02	598.14/4.27
Residential streets	536km	Total	91848.96/171.36	14236.16/26.56	72477.92/135.22	3044.48/5.68
		HDVs and HDTs	5772.72/10.77	6507.04/12.14	56280/105.00	2454.88/4.58
Highways	14.16km	Total	3556.43/251.16	386.71/27.31	1526.87/107.83	64.29/4.54
		HDVs and HDTs	86.09/6.08	77.03/5.44	942.49/66.56	43.19/3.05

Table S2. Intraclass correlation (ICC) by road type and pollutant.

Pollutant	Arterial roads	Residential streets	Highways
CO	0.91	0.76	0.78
HC	0.90	0.79	0.85
NO_x	0.74	0.72	0.87
$PM_{2.5}$	0.89	0.90	0.81