

Operational Data-Driven Intelligent Modelling and Visualization System for Real-World, On-Road Vehicle Emissions: A Case Study in Hangzhou City, China

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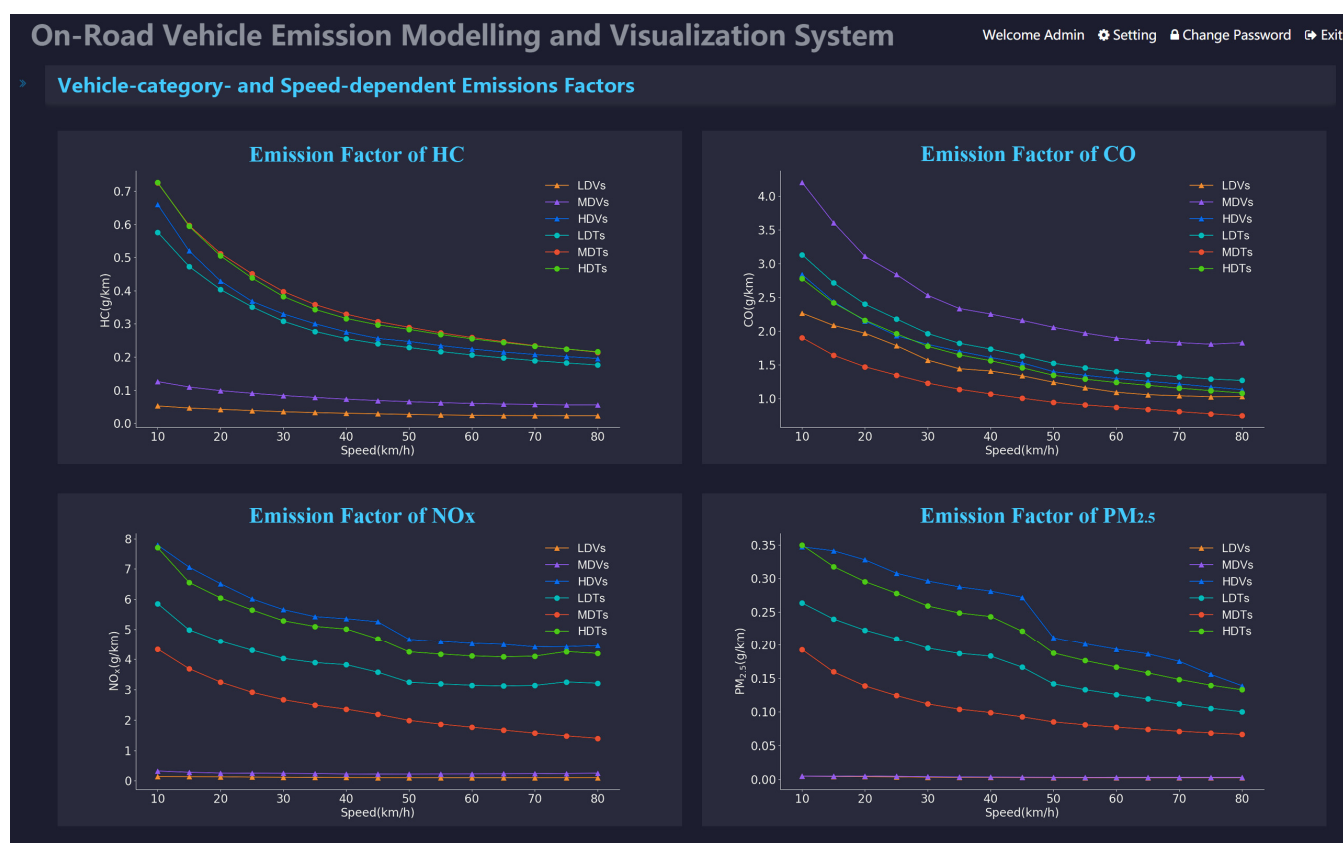


Figure S1. Vehicle-category- and speed-dependent emissions factors of HC, CO, NO_x, and PM_{2.5}. Vehicle categories involve light duty vehicles (LDVs), middle duty vehicle (MDVs), heavy duty vehicle (HDVs), light duty truck (LDTs), middle duty truck (MDTs), and heavy duty truck (HDTs).

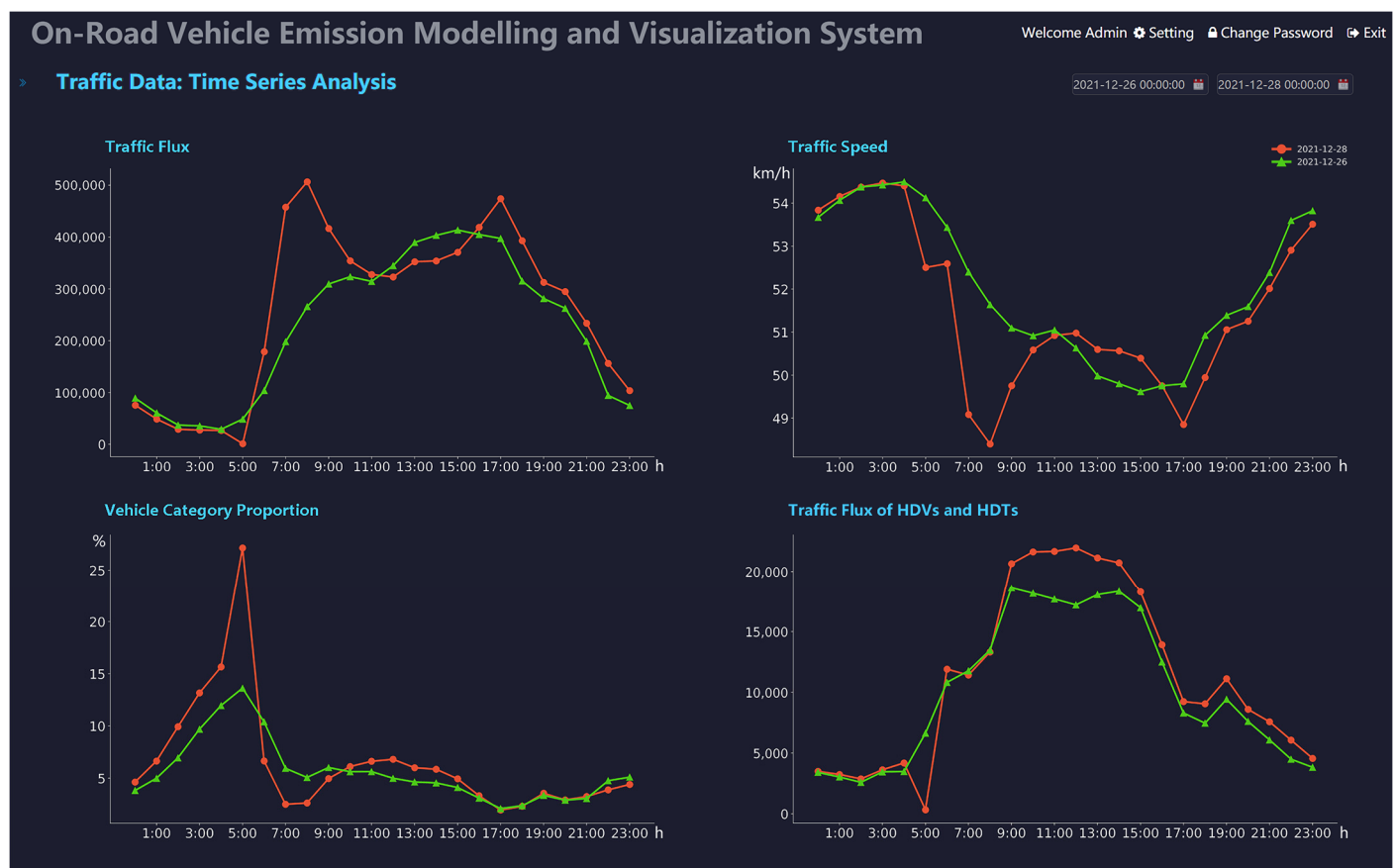


Figure S2. Hourly data of traffic fluxes, speed, vehicle category proportion, and traffic fluxes and proportion of HDVs and HDTs on weekdays and weekends. We took December 28 2021 and December 26 2021 as the examples of the weekdays and weekends, respectively.



Figure S3. The same as Figures 4d,e but for the morning (8:00) rush hour on weekends (December 26 2021).

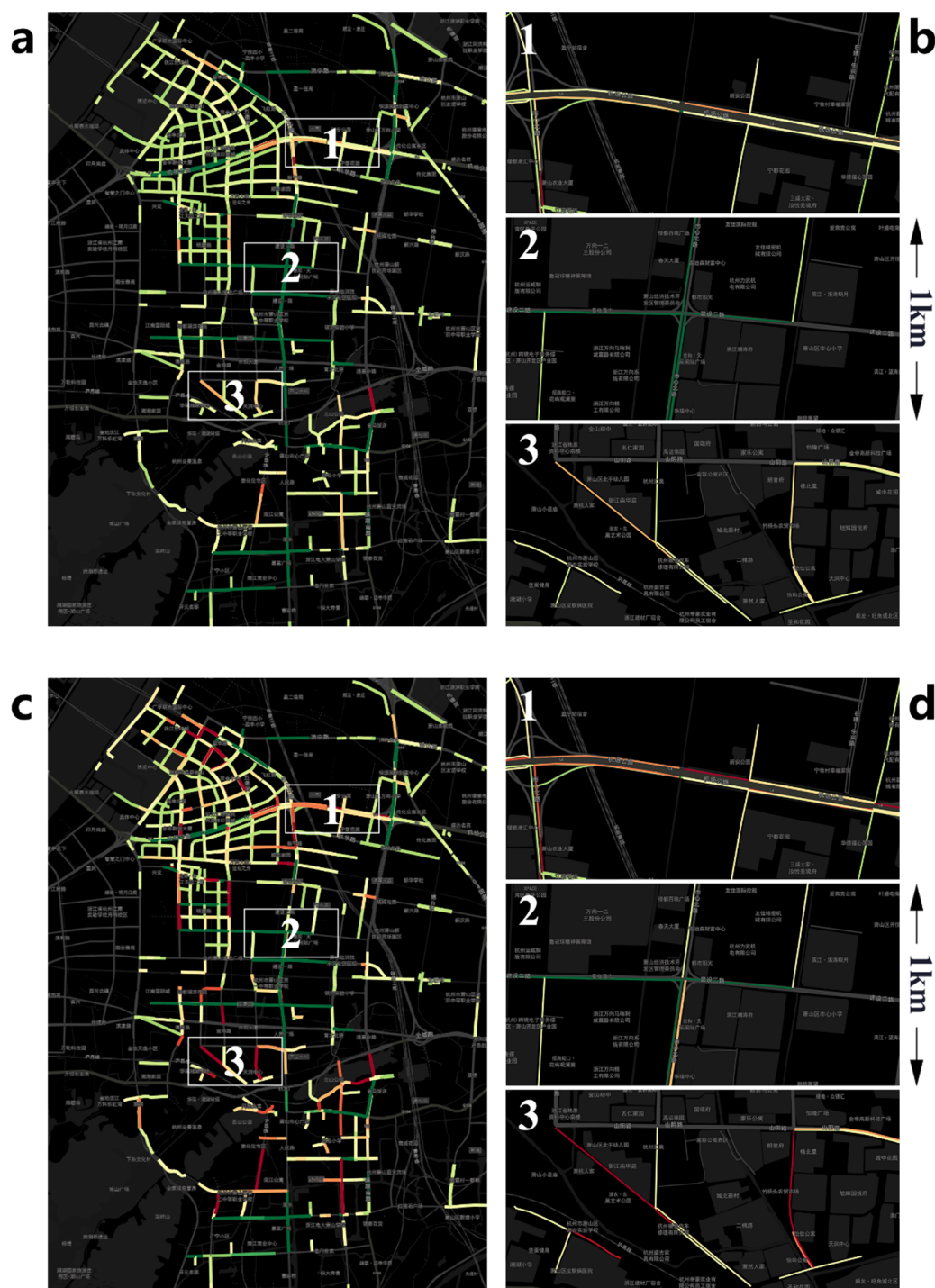


Figure S4. The same as Figures 4b,e but for vehicle-specific speeds on weekdays (December 28, 2021).

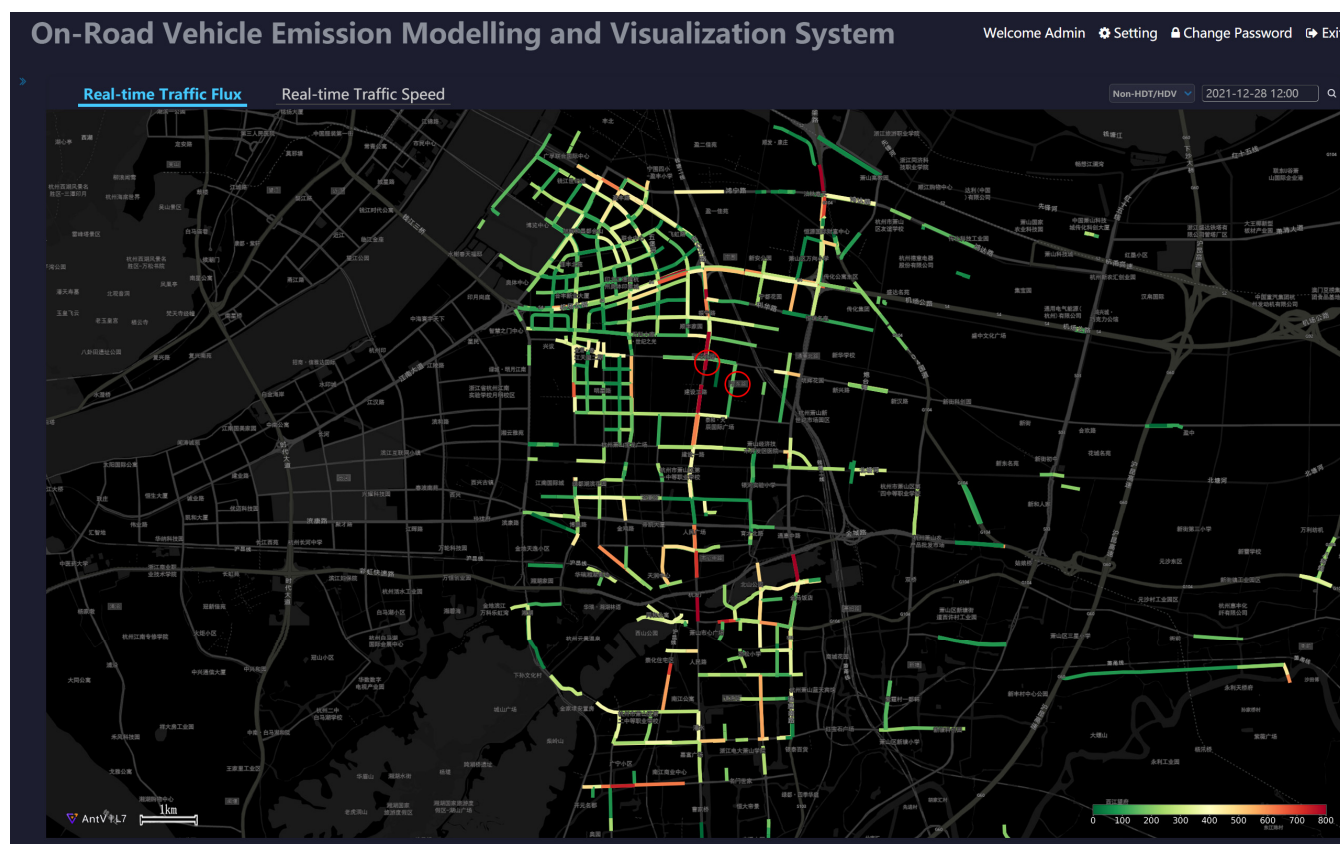
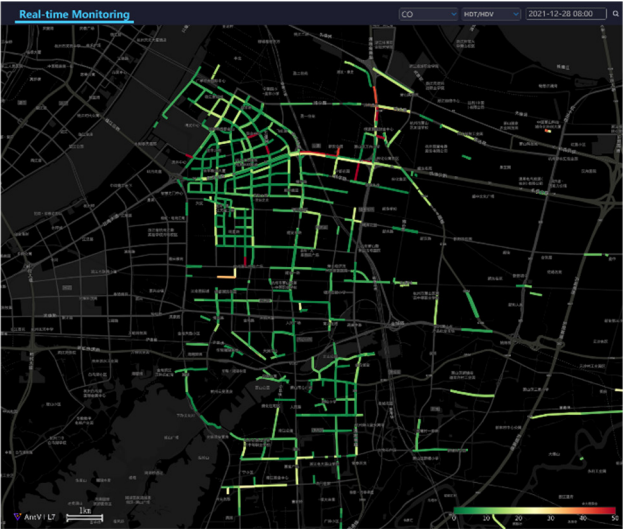
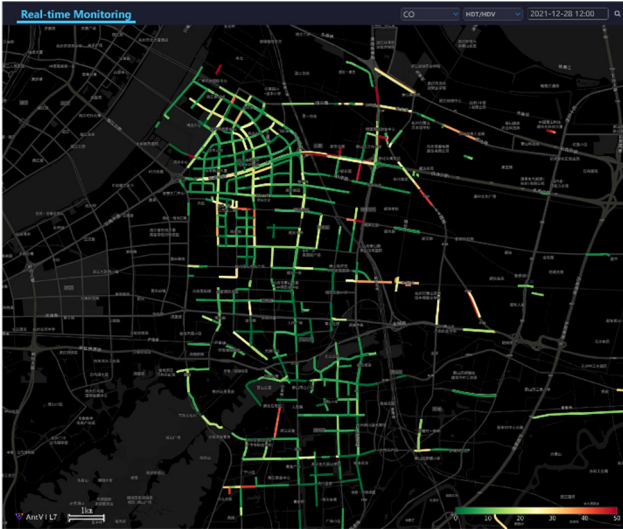
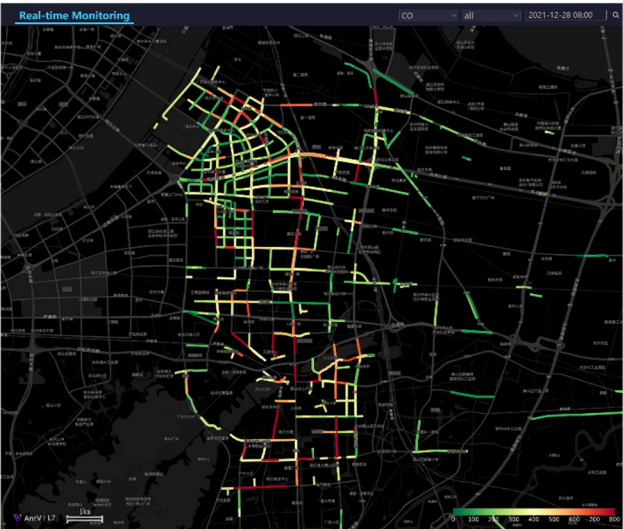
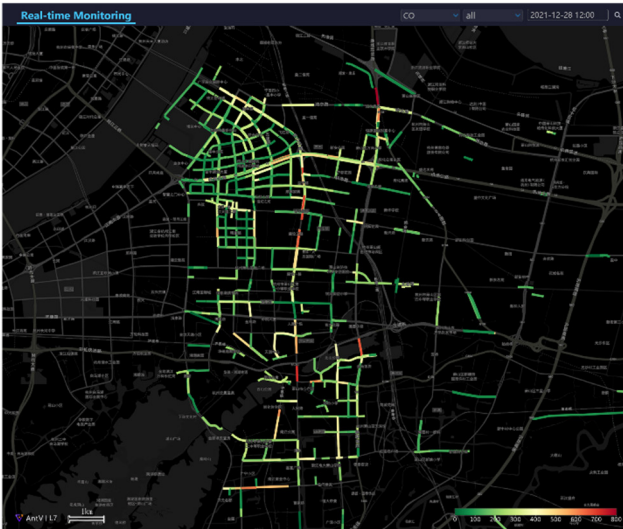
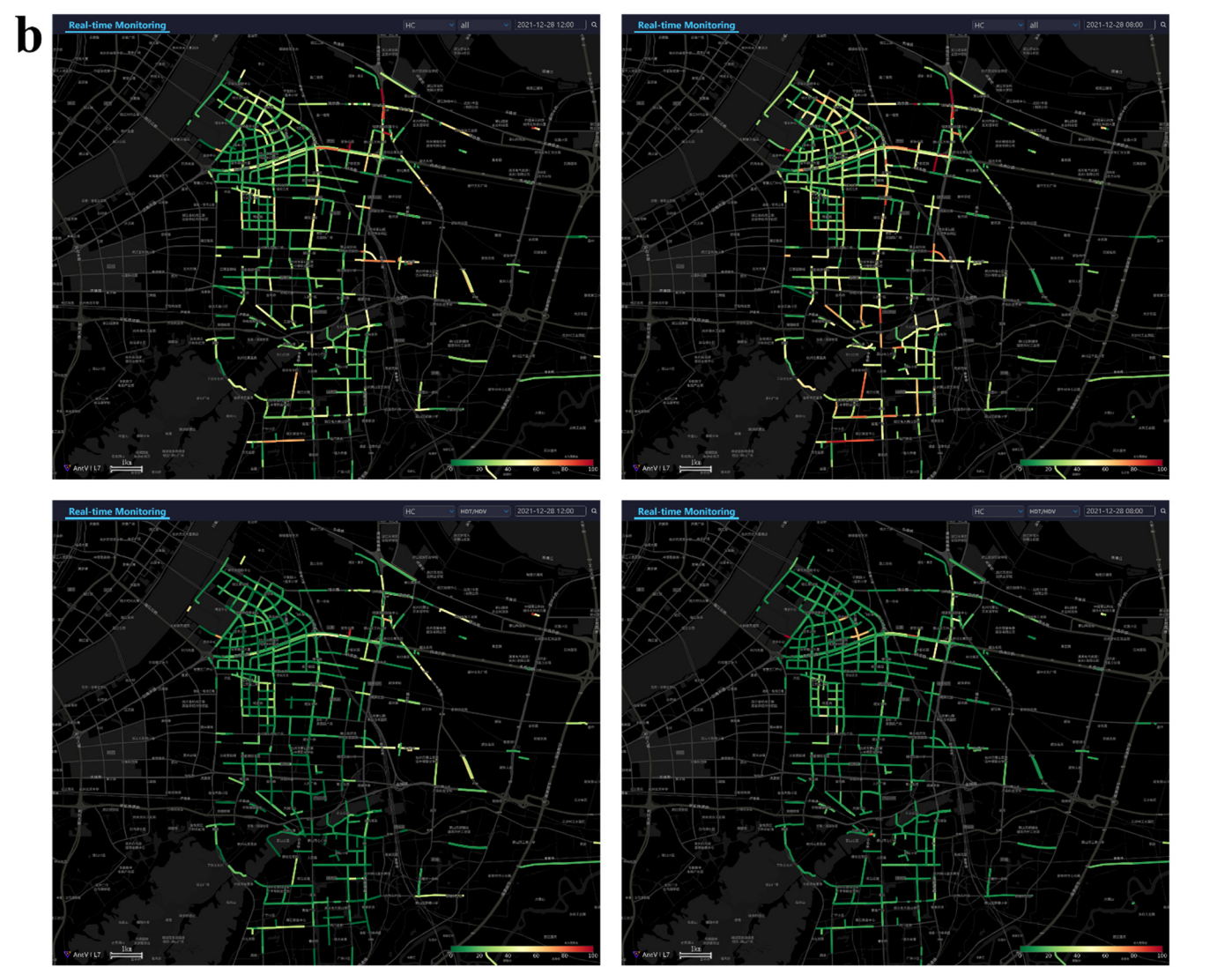


Figure S5. A hyperfine map of different proportions of vehicle categories over the Xiaoshan District, involving light duty vehicles (LDVs), middle duty vehicle (MDVs), light duty truck (LDTs), and middle duty truck (MDTs). Illustrative roads (red circles) are also annotated, including the Ningdong Road and the Shixin North–Jianshe Fourth Road.

a





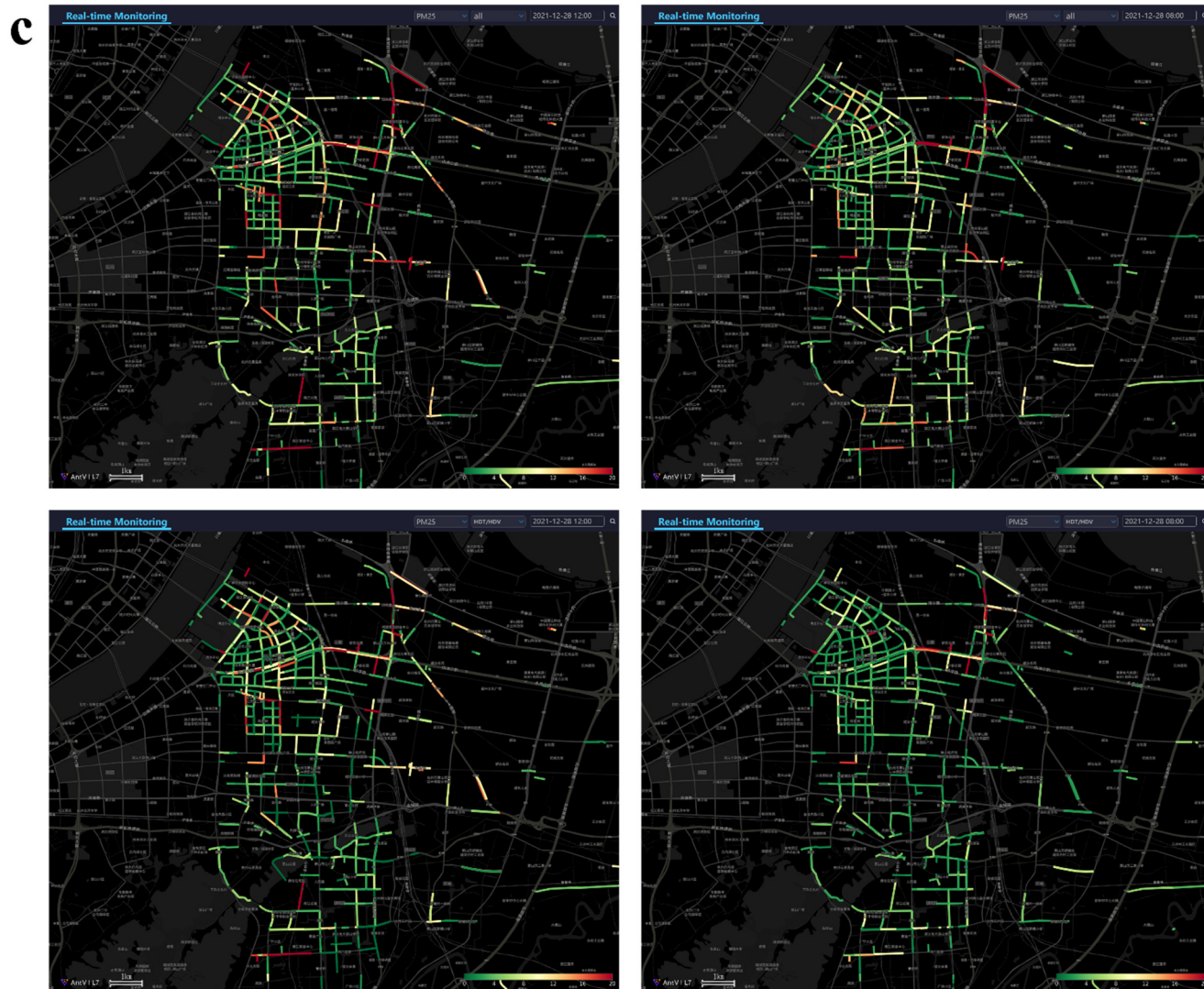


Figure S6. The same as Figure 6a but for (a) CO, (b) HC, and (c) PM_{2.5}.

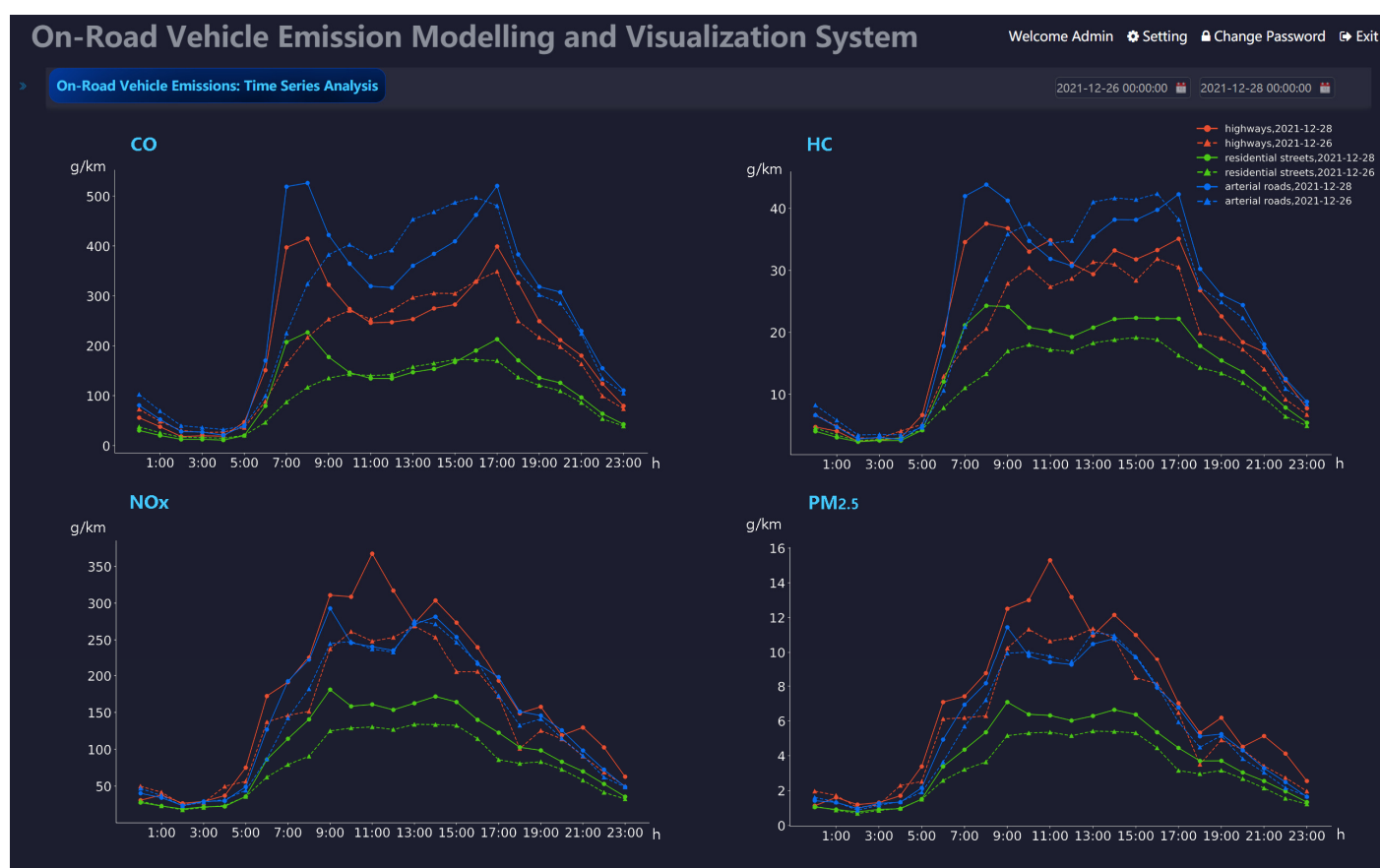


Figure S7. Hourly variation of CO, HC, NO_x, and PM_{2.5} by road types on weekdays and weekends. We took December 28 2021 and December 26 2021 as the examples of the weekdays and weekends, respectively.

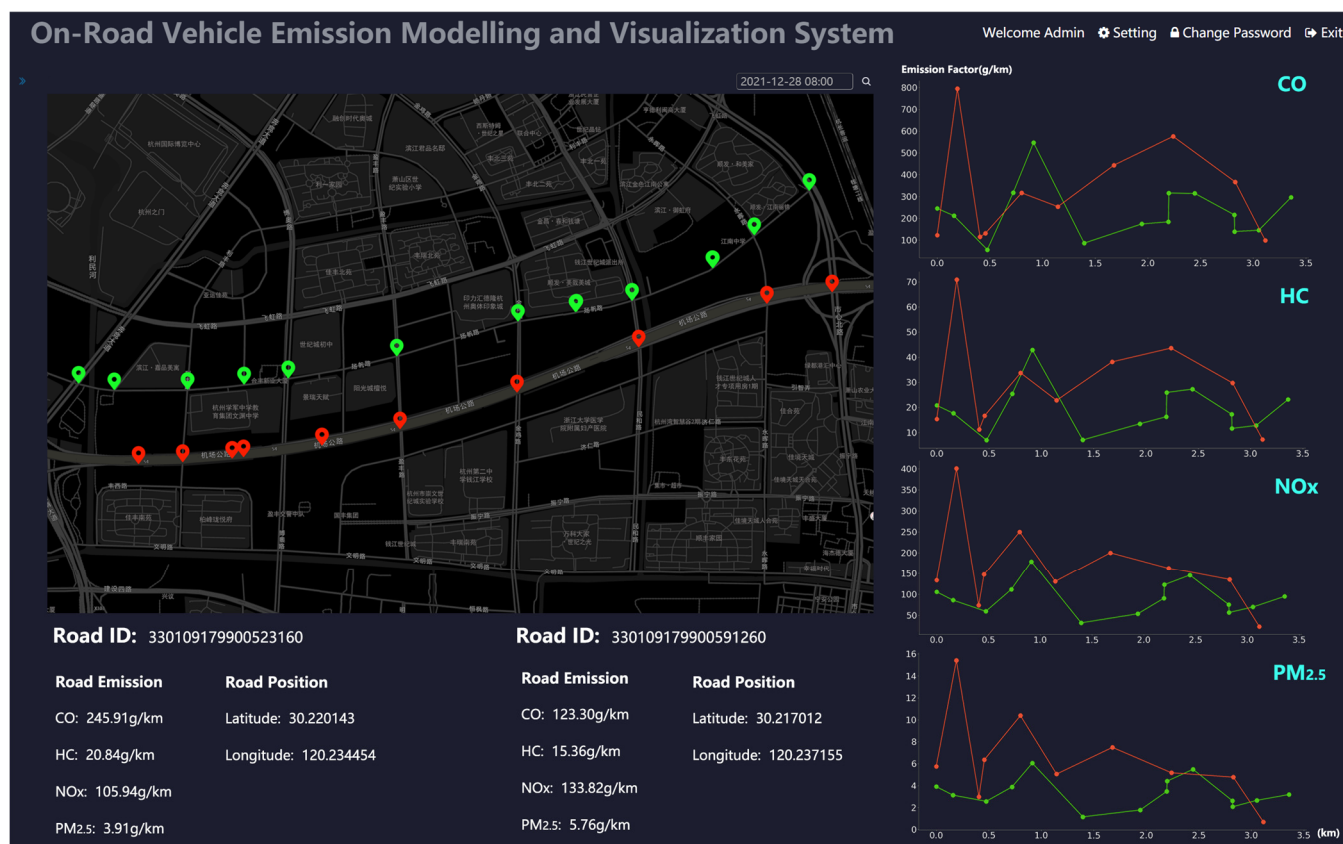


Figure S8. Comparison of on-road vehicle emissions between a highway (i.e., Airport Road) and a residential street (i.e., Yangfan Road) on December 28 2021. Emissions are plotted on a basis of cumulative distance along each road route. The road cross-sections correspond to the locations of traffic monitoring (Top panel). Map data © 2022, AntV L7.

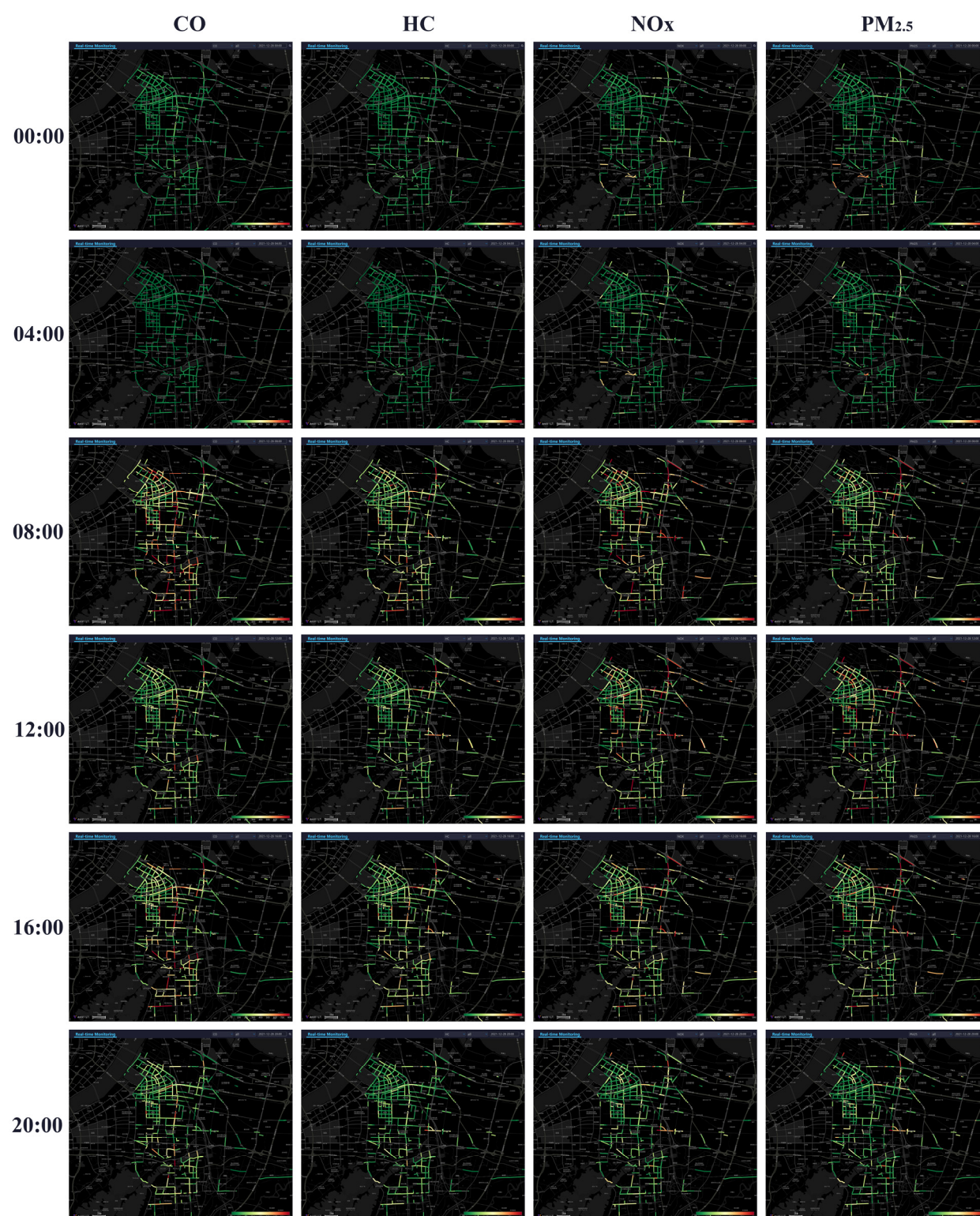


Figure S9. A hyperfine map of hourly on-road vehicle emissions over the Xiaoshan District on December 28 2021. Map data © 2022, AntV L7.

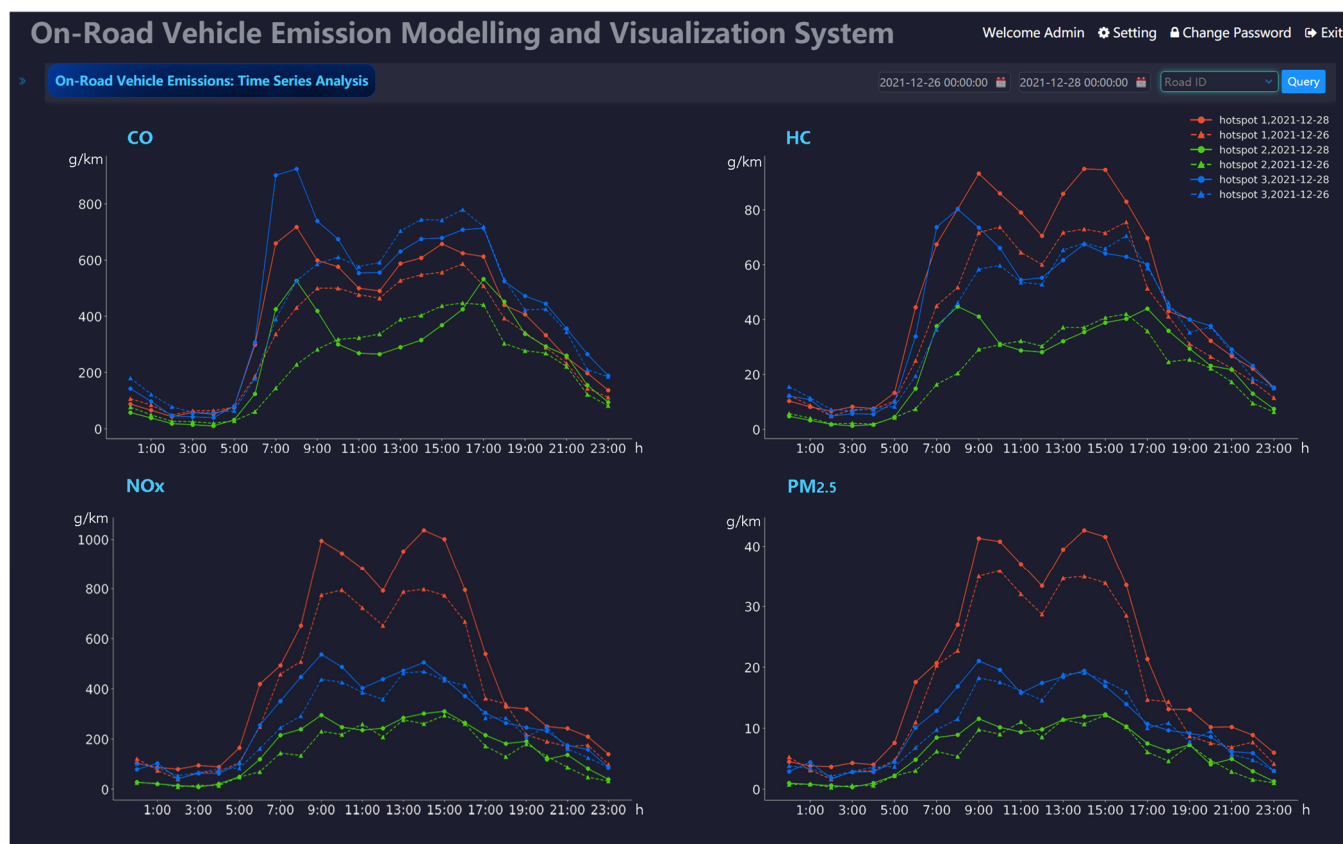


Figure S10. Hourly variations of on-road vehicle emission hotspots' intensities on December 28 2021 and December 26 2021. The hotspots are presented in Figure 6.

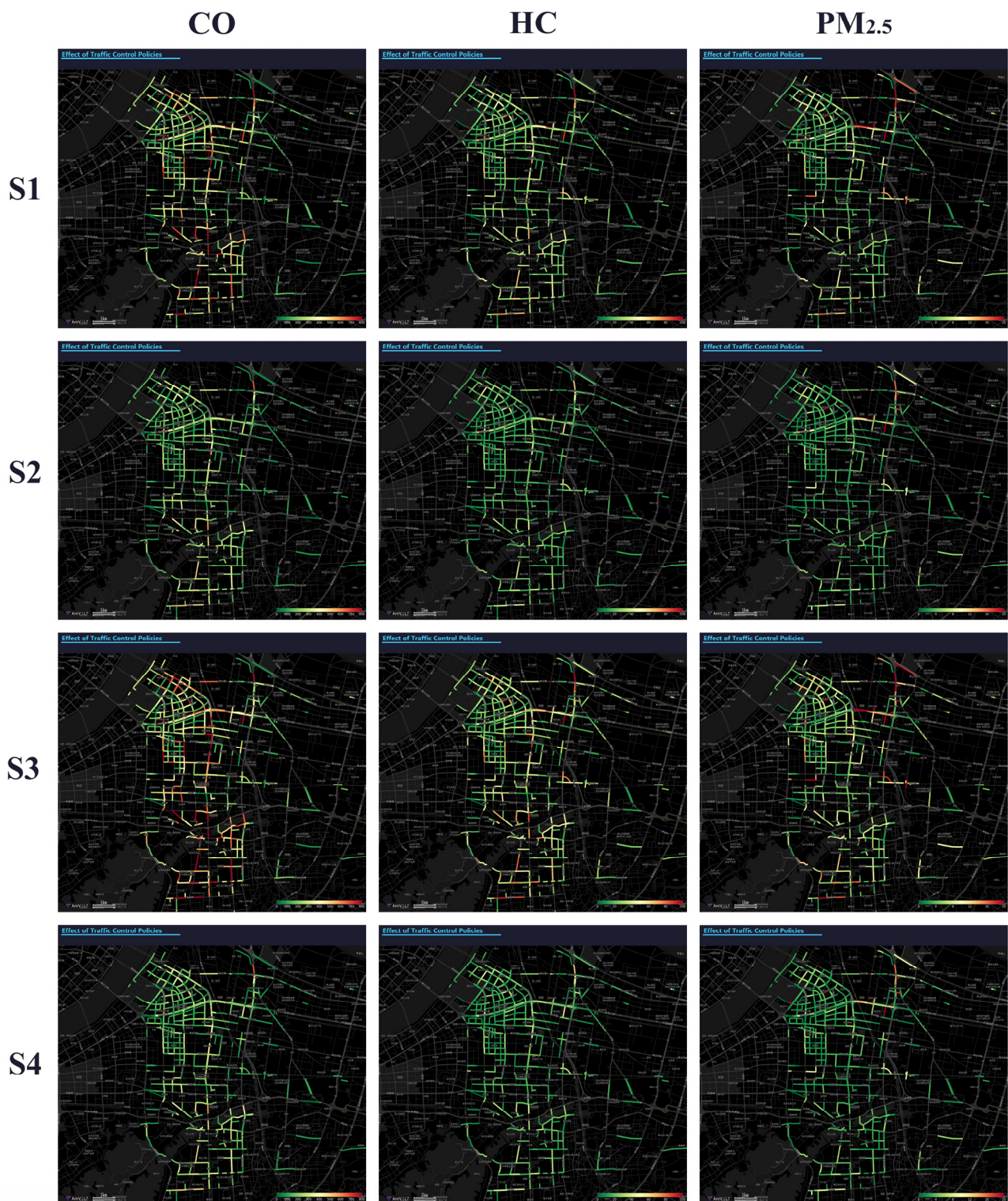


Figure S11. Effects of traffic control policies on hourly average on-road vehicle emissions on 28 December 2021. The traffic control policies were applied during a morning rush hour (8:00, Local time) to maximize their influences. Map data © 2022, Gaode Map.

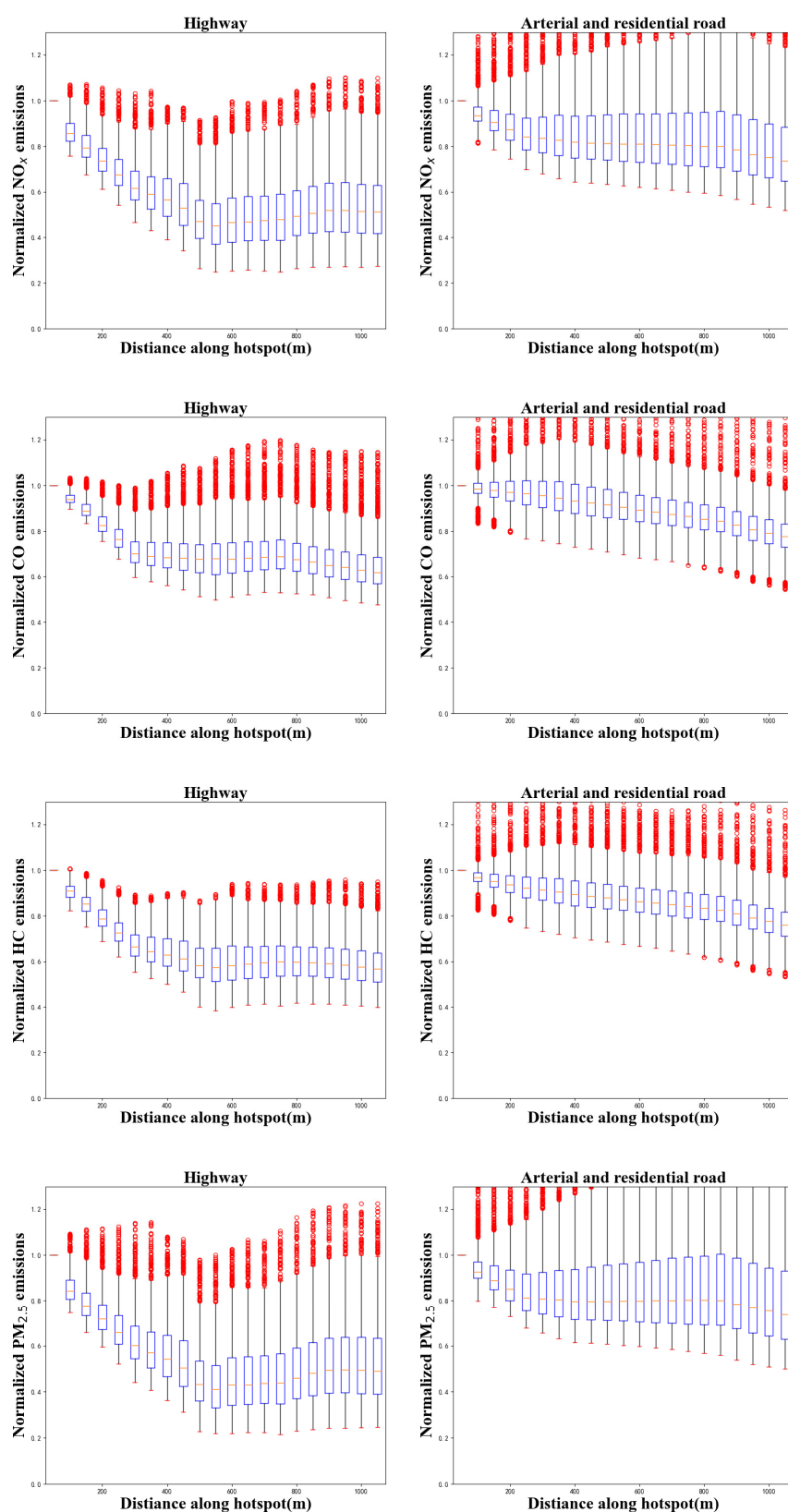


Figure S12. Hotspot emissions data distribution of the distance to the hotspot cores and normalized values. The ratio of annual weekday hourly emissions (NO_x, CO, HC, and PM_{2.5}) to hourly hotspot emissions for different road types within a given hotspot distance.

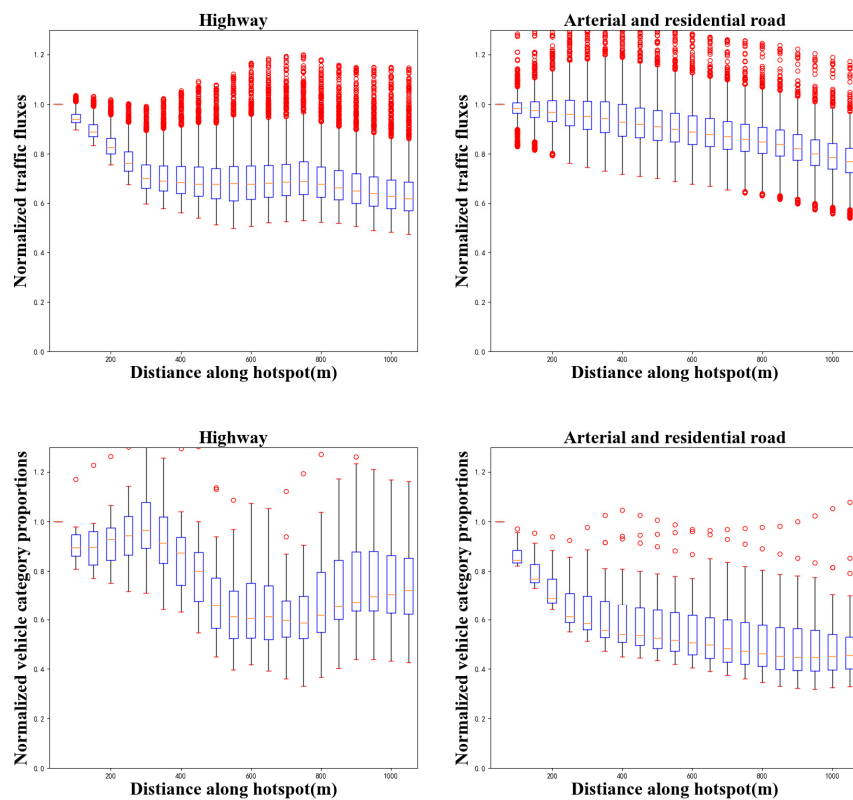


Figure S13. Hotspot traffic data distribution of the distance to the hotspot cores and normalized values.

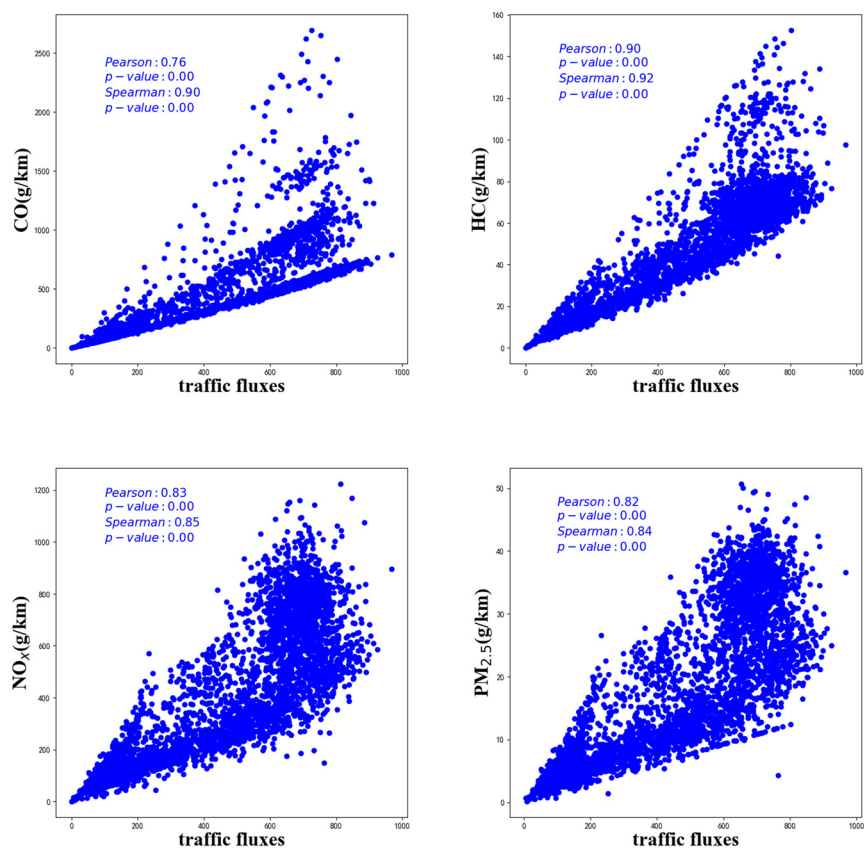


Figure S14. Correlation analysis of traffic flow and pollutant emissions in hotspot. Select the annual hourly traffic flow and pollutant emission calculation results of hotspots (highways) in 2021.

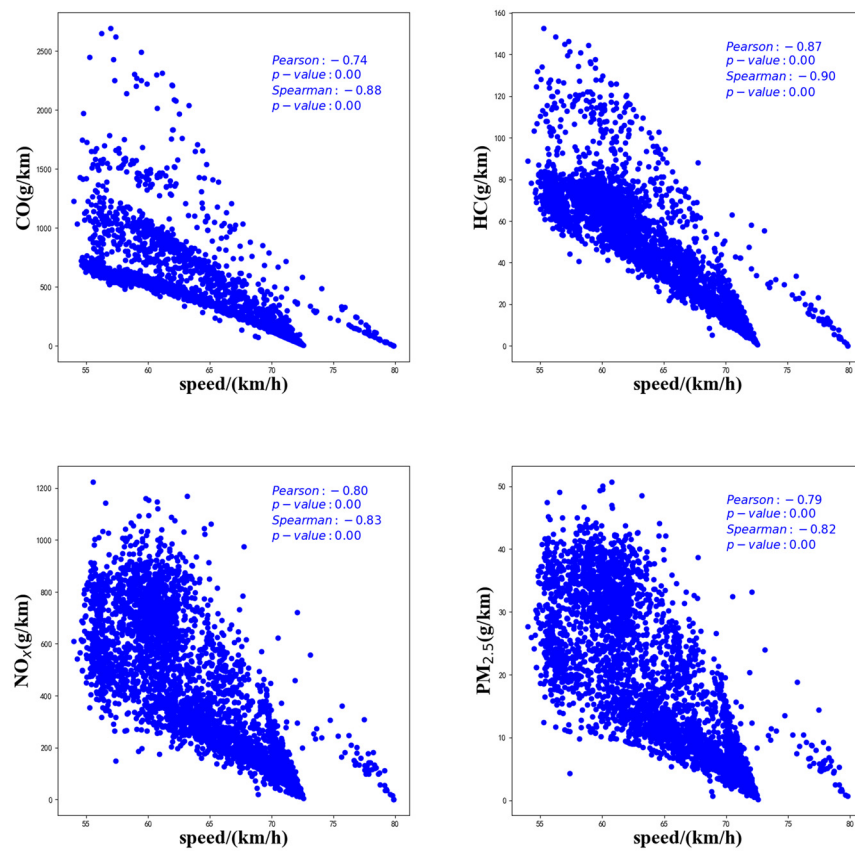


Figure S15. Correlation analysis of traffic speed and pollutant emissions in hotspot. Select the annual hourly traffic flow and pollutant emission calculation results of hotspots (highways) in 2021.