

Comments on "Hyperfine-Resolution Mapping of On-Road Vehicle Emissions with Comprehensive Traffic Monitoring and Intelligent Transportation System" by Linhui Jiang et al., *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2021-533>, 2021

The manuscript by Jiang et al. establishes an urban on-road vehicle-specific emission inventory, which makes an important technological breakthrough and is central to urban ozone and particular matter pollution control. In particular, this study proposes a hyperfine-resolution bottom-up model framework built upon a series of valuable ITS facilities and algorithms, like radar velocimeters, surveillance cameras, and the image recognition algorithm. To my knowledge, this is the first time for investigating urban on-road emissions with a resolution up to several meters. The authors much have gone a long way towards such findings. Consequently, an unprecedented emission map is obtained in this study. Therein, widespread and persistent emission hotspots emerged. They are of significantly sharp small-scale variability, up to 8 ~ 15 times within individual hotspots, attributable to distinct traffic fluxes, road conditions, and vehicle categories.

Overall, this work is novel, important, and well-written. I recommend its acceptance for publication after minor revisions.

General Comments:

Line 394. The authors conclude with several final important implications of this work. For the public, as pointed by the authors, "the hyperfine-resolution emission inventory can alter personal behaviour, much as real-time traffic navigation data now inform individual driving patterns.". However, policymakers still question how this hyperfine-resolution emission inventory would help improve air quality and address exposure misclassification. Hence, the discussions would be more insightful if the authors could make this clearer. I believe the chemical transport model (CTM) might be a key link.

Specific comments:

Line 113: What is the exact period of the "rush hours"? As appearing for the first time, it has to be specified.

Line 171: Does "during the morning and evening rush hours" mean the same as "during the morning and afternoon rush hours" (Line 113)? If so, please unify the definitions.

Line 159: Please give brief definitions for the "light-duty vehicles (LDVs), middle-duty vehicles (MDVs), heavy-duty vehicles (HDVs), light-duty trucks (LDTs), middle-duty trucks (MDTs), and heavy-duty trucks (HDTs)?"

Line 222: The "overall" should be deleted.

Figure 8: This picture lacks the description of the abscissa. Is that the number of weekdays?