

Interactive comment on “Tempo-spatial variation of emission inventories of speciated volatile organic compounds from on-road vehicles in China” by H. Cai and S. D. Xie

S. Xie

sdxie@pku.edu.cn

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General response: We would like to thank the referee for the time he/she took on the manuscript– it should lead to an improvement of the manuscript. As a result, we have clarified any unclear description we can realize and particularly state clearly the estimation methods with results in the revised manuscript.

Specific comment 1: Page 11055, line 15, “. . .which includes six situations: : :” - The meaning of six situations is not clear. Authors need to provide more explanation about six situations.

Response: Thanks to the referee for pointing out this obscure statement. The six
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situations refer to different vehicle categories running under particular modes which resulted in six distinct emission profiles. The six situations are: (1) gasoline vehicles with TWC (three-way catalysts) running under the normal mode (20 km/h and 40 km/h); (2) gasoline vehicles without TWC running under the normal mode; (3) gasoline vehicles running under the freeway mode (80 km/h); (4) diesel vehicles running under the normal mode; (5) diesel vehicles running under the freeway mode; and (6) the emission profile for motorcycles.

Specific comment 2: Page 11057, line 12-26, The provincial emissions were allocated to the country-level emissions and to the grid cell level emissions, based on economical variable (GDP). The temporal pattern of emissions was strongly correlated with the GDP as depicted in this paper; however, spatial pattern was generally allocated by the geographical variables (e.g. road networks) in the previous works (Tuia et al., 2007; Ossés de Eicker et al., 2008). Authors should include a comment for the limitation of the spatial allocation factor.

Response: Thanks to the referee for reminding us of the limitation of the spatial allocation based on the factor of GDP, in comparison with the alternative option based on some geographical variables like road network or street density (Tuia et al., 2007; Ossés de Eicker et al., 2008), which obtained more accurate emission inventory at city-level application. Accordingly, we have included a comment on our method limitation in the revised manuscript: the major limitation of our GDP-based topdown allocation approach is that it assumes that the traffic emission is homogeneously distributed over every entire city, neglecting differences in spatial distribution of emissions within cities. While our results can provide an approximation to the real-world situation, higher spatial accuracy requires the application of the bottom-up approach based on the availability of accurate local data such as detailed road network, traffic volume on specific road segments or street densities. Therefore, prospective users of the emission inventories, who need higher spatial resolution and accuracy at a county or provincial level, can further allocate our inventories based on the local geographical variables (e.g. road

networks) when these data are available, in order to satisfy their practical needs.

References

Tuia, D., Ossés, D.E., Zah, R., Osses, M., Zarate, E., and Clappier, A.: Evaluation of a simplified top-down model for the spatial assessment of hot traffic emissions in mid-sized cities, *Atmos. Environ.*, 41, 3658-3671, 2007.

Ossés, D.E., Zah, R., Trivino, R., and Hurni, H.: Spatial accuracy of a simplified disaggregation method for traffic emissions applied in seven mid-sized Chilean cities, *Atmos. Environ.*, 42, 1491-1502, 2008.

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