

Interactive comment on “High-resolution simulation of link-level vehicle emissions and concentrations for air pollutants in a traffic-populated East Asian city” by Shaojun Zhang et al.

Anonymous Referee #1

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Overall Comments: My overall comments are favorable. I thought the paper presented interesting results of the use of a vehicle emission model to infer the dominant sources of vehicle pollution in Macao, as well as the potential use of traffic information linked to an emission model and air dispersion model to inform environmental and transportation policy. My major comment on the content of the paper, is that the authors need to provide more information into how the emissions and air quality concentrations were estimated are estimated. For example, the paper is unclear on how the vehicle split by link is estimated, how the speeds are estimated and applied in the vehicle emission model, and how the ‘fleet average’ emission rates in Table 4 are estimated. Also the

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discussion on the air dispersion modeling is very limited.

I would also strongly recommend the authors change the wording on page 2 (line 25) and pae 17 (line 6) from 'irreplaceable' tool, to 'can be to a valuable tool'. I do not think the paper showed that the high-resolution traffic tool is an irreplaceable assessment tool. The paper did show that the results from the tool, appear to compare reasonably well with at least one air quality monitor, and it discusses ways, in which it could be used to inform air quality and policy decisions in the future. I have other minor comments that I would like to see the authors address, to improve clarity of the report, and improve the communication. Page 4. Line 4, huge a large transportation demand. Page 6. Line 21. What is the MC fraction on the Macao Peninsula? Page 7, Line 24. You should mention the variability in the speed trends across roadway links which could be due to the limited data based on chase-car study. Figure 3 appears to have significant variability from hour to hour, that I would think would be smoother if it had a larger sample size across more sample days, more links, and more vehicles. This should at least be discussed, especially if confidence intervals of the mean speed are not presented (which I think would show that many of the hourly mean speeds are not significantly different than one another). Page 11. How do you obtain estimates of vehicle classifications by link? This is not clear to me from reading the first paragraph on page 11. Page 14. Line 8-9. I think you mean higher emission rates, for lower level of service? Page 14. Line 17. 'broad' instead of 'board' Page 14. Line 25-26. Rephrase this sentence. 'poor representativeness...' Page 15. Line 1-3. How does the daily variations in speeds, results in the variation in CO2 emission factors? Is that from analysis done from the Beijing study? Or is that variation in link speeds applied to your emission model for Macao? Please be clear. Page 16. Line 5-9. Rewrite sentence, and improve grammar. Page 16. Line 29. Start new paragraph. Page 17. Line 6. Suggest 'can be a valuable assessment tool' (not 'irreplaceable') Page 17. Line 17. Replace 'significantly less traffic' with 'smaller' Page 17. Line 30. The Taxis are diesel powered? This should be clarified in the main text, as well as in Table 4. RE: Table 4. I am surprised that the diesel Taxis' have lower NOx g/km, than the MDPV gasoline vehicles? Are these

emission rates based on PEMS data or emission standards? If some of these emission rates are based on certification vehicle standards, than the paper should mention the uncertainty of using vehicle emission standards (particularly EURO diesel standards) to represent real-world emission rates. Also, similarly, why is the MDPV diesel in the same range as the MDPV gasoline vehicles? In general, more information is needed on the derivation of the fleet-average emission factors in Table 4.

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