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Interactive comment on "VEIN v0.2.2: an R package for bottom-up Vehicular Emissions Inventories" *by* Sergio Ibarra-Espinosa et al.

Anonymous Referee #1

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This paper shows comprehensive work done as part of VEIN development. Lately, there is lot of interest in bottom-up on-road processing, so, this paper is very relevant for current context. Especially, this model focuses on emerging economies, where to obtain higher resolution and improved quality emissions is always a big challenge. However, I found some minor things which needs to be explained before accepting this paper for final publication.

Minor Comments: 1. This paper presents almost comprehensive review of emission inventories available in different parts of the world in page 2 , line 1-7. It would have been nice if they can include about how US-EPA develops their emission inventory as part of NEI.

2. The authors can mention about how their study improved methodology compared to

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Andrade et. al., 2015 in page 2 and line 24-26.

3. Even though, the paper referred about top-down emission process studies like Ntziachristos and Sampras, 2016 and Andrade et al 2015, it did not cover the examples for bottom-up methods. Following study proposed a comprehensive methodology for bottom-up vehicular emission processing for air quality models.@article{perugu2017developing, title={Developing high-resolution urban scale heavy-duty truck emission inventory using the data-driven truck activity model output}, author={Perugu, Harikishan and Wei, Heng and Yao, Zhuo}, journal={Atmospheric Environment}, volume={155}, pages={210–230}, year={2017}, publisher={Pergamon} }. This study can be referred in page 2 , line 19.

4. Author could explain "deterioration" in page 3, line 13 when it was first time introduced. May be authors were referring vehicle deterioration in terms of emission performance.

5. F* i,j,k in the equation 3 should be explained . is it generic flow for link types of l? what kind of classification was used so that a particular link is identified that it belongs to type "l"

6. In page 3, line 19-22, it was mentioned that Capacity is found to be average of peak and free-flow speeds. But capacity of a highway link is constant throughout the day, based on their functional classification. May be authors referring traffic flow, which change hour by hour, and corresponding line has to be modified accordingly.

7. In the selection of emission factors section, the authors have discussed about vehicle type, technology and years of use etc.. I did not see important factor like fuel composition, is it inherently taken care in emission rates based on years of use?It is also looks like mostly these factors were borrowed from COPERT, I assume that model would have already taken care about it. Then, please include that clarification in this section.

8. page 5, line 20. How were vehicle deterioration factors were obtained?

9.Page 6, line 4-6, there is minor confusion about calculating cold start emissions on links. Theoretically, start emissions happen when vehicle started or if it is in idle condition after start. May be authors trying to distribute the start emissions happened at parking locations to the links, isn't it? please clarify it.

10. Page 6, line 21-22. it looks like only some seasonal days were selected in this step. You can add this as potential improvement for future versions if VEIN.

11. page 7, line 3, equation 10 : The "running " loss emissions should be by distance isn't it? Why authors considered them emissions by parks?

12. Page 11, line 7, MASP CET , is it travel demand model or micro simulation model?

13.page 11,line 12, you may use "size of" instead of weights

14.page 15, line 15, it looks alike the age vehicles were considered up to 41 years. However, the technology change in vehicles happened only 25 years before 2017. why did the researchers choose such a long time horizon as it looks the emissions from 31-41 years vehicles from figure 6(b) are very low.

15.Page 20, line 27: PM species what is bcom? and line 28 what is iag

16.page 20, line 32 , may be "in line" instead of on-line

17.page 20, line 24, missing citation for Vera-Vela et al 18. page 23, line 6-7: may be (R) instead of (c)?

In addition to above mentioned minor comments, I found some minor language issues.

Language issues: Page 2, line 17: it should be bottom-up page 2, line 33: when you first time introduce a abbreviation like VEIN, please provide the full name. page 3, line 11: it should be involved page 10, table 1 : emis_paved: It should be Re-suspension page 13, line 3: defined instead of defend page 21, line 2, may be inception instead of

conception

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