

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2022-147

Stefan Hausberger (Referee)

Referee comment on "Yeti 1.0: a generalized framework for constructing bottom-up emission inventories from traffic sources at road-link resolutions" by Edward C. Chan et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2022-147-RC2>, 2022

General comments:

You should define the targets for your model somewhere at the beginning. Then the reader gets an impression, what the targets for model development are. Shall emissions calculated by Yeti be used in air quality models? I assume so, then a high resolution makes sense. If one just wants to know the total emissions in Berlin, low resolution is sufficient and more cost efficient.

General remark: it seems you did a very good job in programming the tool. However, the paper reads in many passages rather like a detailed user guide than a scientific paper. Together with the annexes and the supplementing information the text is extremely long for a description, how HBEFA emission factors have been multiplied with the number of vehicles passing street sections. If this detailed description was intended, it is ok. My conclusion is, that I would find such a paper interesting only, if I would be just in the position to develop a similar software (fortunately, we have similar software ready in place since more than 20 yearsJ). I hope you had the target group of readers in mind, when writing the paper.

Some detailed comments and suggestions for improvements

Line 28 ff: your definition of top down and bottom up is not common sense. I see top down to use overall traffic activities (e.g. km/day in Berlin per vehicle category) with average emission factors. Bottom up uses traffic flow on street segment levels. Emission factors may be used or detailed vehicle simulation tools.

Why should the top down be “less sensitive to atmospheric transport processes and boundary conditions”? The calculated emissions do not depend on atmospheric transport. Please explain or adjust text.

Line 98: how is the emission factor e selected from HBEFA? Traffic situation and level of service are needed as input for each road section. Did you perform a manual attribution of traffic situations for all roads in Berlin?

Line 127: is there any analysis behind setting the cold start share to 0.3? Please explain.

In addition, the parking time is important for cold start extra emissions (zero extra emissions at short park time, full extra emissions after ca 6 to 8 hours). Please describe how you included parking time. Did you use the 8 hour parking values only?

Are deterioration factors for all exhaust components and ambient temperature corrections for hot NO_x emissions from diesel cars considered? Same NO_x emissions for winter and summer reported in chapter 4.1 suggest, that no temperature correction is included. Please specify possible simplifications.

Line 138, Equation 4: is the unit for the day to hour redistribution factor provided in B2 correct? Changing g/day into g/h suggests a unit of [day/hour] you state day^{-1}

B2: please provide the units for “emission factor” and check units for “hourly emissions”, which should be [g/h] and not [g].

Line 235 ff: this reads rather like a user guide for Yeti than a scientific paper. Knowing that road category is named RoadCat in Yeti is not relevant for the majority of readers I guess. How you attribute the road category and hourly levels of service to all streets in Berlin on the other hand is more important but not described. You describe in chapter 3.1.3 input data, but do not mention any source for traffic flows, road categories etc.