

Interactive comment on “An updated emission inventory of vehicular VOCs/IVOCs in China” by Huan Liu et al.

Anonymous Referee #1

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In this work, Liu et al. developed an updated VOC emission inventory for the on-road vehicles in China for 2015. Particularly, they refined their analysis by using vehicle activity data collected from a large number of GPS records, taking into account VOC evaporation emissions from gasoline vehicles, and including tailpipe IVOC emission estimates. The topic is suitable for the Atmospheric Chemistry and Physics and the technical part of the manuscript is relatively well described. However, there are some technical, editorial, and grammatical issues in the current manuscript that need to be clarified and corrected first. The manuscript is highly suggested to be grammar-checked by native English speakers. Considering the results of this work is potentially of great value to the atmospheric modeling community, the reviewer suggests a carefully revised manuscript for publication in ACP.

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Abstract line 27. The authors state in the abstract that the VKT level of “trucks were calculated from reported data by more than 2 million trucks in China”. According to the Chinese official statistics, there were ~20 million trucks in China in 2015. That means the authors have collected VKT data of ~10%, which is a quit decent sampling ratio, of all trucks in China. However, relevant results are neither described nor referenced to previous studies in the main text (e.g., Sect. 2.2 and 3.1.2). The reviewer suggests the authors adding the description and discussion paragraphs or sections to introduce the methods and results in detail.

The section heading of Sect. 2.1 is “Vehicle stock and classification”. However, only vehicle classification is described.

The classification of vehicles is not very clear to the reviewer and needs more clarification. First, the criterions to distinguish LD, MD, and HD passenger vehicles and to distinguish LD, MD, and HD trucks are not given. Second, if taxis are classified as separate vehicle types, the authors should add a statement previously that LD, MD, and HD passenger vehicles do not include taxis. Third, the reviewer is wondering what kind of vehicles are treated as alternative-fuel vehicles? Electric? Plug-in electric? Hybrid? Internal combustion engine vehicles running on alternative fuels such as CNG/LNG/LPG, methanol, or ethanol? Fourth, the vehicle classification is not consistently used in the manuscript. For example, there are a number of vehicle types in Table S4 and S5 that are not described in Sect. 2.1. “Mini” truck is mentioned line 215, but is not described in Sect. 2.1. The authors classified the vehicles into passenger vehicles (LD, MD, and HD), taxis, buses, trucks (LD, MD, and HD), and motorcycles in Sect. 2.1. However, later in the main text (e.g., Sec. 3.2, Figures 1a, 4c, and 5a, and Table S4 and S5), it seems that they also considered taxis and buses as passenger vehicles. If so, this should be stated in the manuscript, and classification criterions should be clearly provided.

Line 143, please double check whether provincial motorcycle population data are provided in China Automotive Industry Yearbook.

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Sect. 2.2 and 3.1.2. Except for LDPVs, the authors did not provide any VKT data for all the other vehicle types. The review suggests the authors adding a table to summarize the VKT values of all vehicle types (i.e., LDPV, MDPV, HDPV, Taxi, Bus, LDT, MDT, HDT, and motorcycles) used in this work. The reviewer suggests the authors providing the vehicle population, not the population percentage, by vehicle type (i.e., LDPV, MDPV, HDPV, Taxi, Bus, LDT, MDT, HDT, and motorcycles) and by control technology (i.e., China 0 to 5) in Table 1. The population of motorcycle is missing in Table 1. In addition to Figures 4 and 5, the reviewer suggests the authors providing a table to summarize the VOC/IVOC emissions at the country level by vehicle type (i.e., LDPV, MDPV, HDPV, Taxi, Bus, LDT, MDT, HDT, and motorcycles) and by control technology (i.e., China 0 to 5).

About emission factors (EFs) of VOC/IVOC, the reviewer has the following suggestions and questions:

- (1) Title of Table S4 and S5, indicate these are “tailpipe” VOCs. Please also double check whether the unit is mg/km or g/km
- (2) Tailpipe EFs of motorcycles are missing in Table S4 and S5. They are not mentioned in the main text, either.
- (3) The vehicle classification in Table S4 and Table S5 is different from the description in Sect. 2.1. For example, LDGTAs, LDDTAs, LDABs, MDGBUs, MDDBUs, MDABs, HDGBUs, HDDBUs, and HDABs, these vehicle types are not mentioned in Sect. 2.1, nor in the results and discussion section. If the study was conducted with more detailed vehicle classification, it should be introduced in the main text.
- (4) The EFs of evaporation are not given. The reviewer suggests adding a table listing EFs of diurnal loss (<24, 24-48, and 48-72), hot soak, refueling, and running loss by vehicle type (i.e., LDPV, MDPV, HDPV, Taxi, Bus, LDT, MDT, HDT, and motorcycles). Data sources should be provided too.

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(5) Line 239-248. First, the meanings of T, N, and P in Eqs. (3)-(6) are not provided. Second, besides simply providing the meanings of each variable in Eqs. (3)-(6), the authors are suggested to explain these equations.

(6) Line 244, 264, why China 4 LDGVs' EFs could be used for all non-motorcycle vehicle types and control technologies?

(7) Eqs. (7), (9), (11), (12). The authors claimed that the units of EFs are g/hour. The reviewer believes that this is not correct.

Line 290. Is the motor gasoline consumption by province calculated or derived from official statistics? Methods or data sources should be provided.

Main text after Sect. 3.2 may need to be polished to make it read like a scientific article.

The authors are suggested to check citations carefully before submitting the revised manuscript. Examples are:

Line 61, change "Cai et al" to "Cai and Xie". Remove "(Cai et al., 2009)" in line 62

Yang et al., 2015 is mentioned several times in the manuscript (e.g., lines 95, 106, 150, 194, 205, 281, etc.). However, there are two references by Yang et al. in 2015. Letters a and b should be added to the year both in the in-text citation as well as in the reference list.

Line 163-164, 179-180, "Zhao et al." to "Zhao et al. (2015, 2016)" and remove "(Zhao et al.; 2016; Zhao et al; 2015)"

Line 275, 307, "ICCT, 2012" is not in the reference list

Line 301, "MOVES, 2010" is not in the reference list

Line 326, "Man et al., 2016" is not in the reference list

In the reference list, there are lots of references that are not cited in the main text. Please have them carefully checked before submitting the revised manuscript.

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Minor editorial issues:

Line 121, remove “five”. According the introduction section, it seems that there are six deficiencies, while in Sect. 4, it seems the authors discussed four aspects.

Line 217, “POA” should be defined in the first appearance.

Line 257, “GTs”??

Line 324, incomplete sentence

Line 394, “eg.” to “e.g., ”

What is the unit of EFs in Table S3?

The caption of Figure 1 should be self-explained.

There are grammatical errors throughout the manuscript. I strongly suggest a grammar checking by native English speaker before submitting the revised manuscript. Examples in the first five pages are: Abstract should be written in the present tense.

Line 41-42.

Line 47, remove “the year of”

Line 62, add “during” after “China”

Line 63, “include” to “included”, add “a” before “part”

Line 68, “provide” o “provided”

Line 70 remove “trend”

Line 74, “has” to “have”, “a non-ignorable contributor” to “non-ignorable contributors”

Line 76

Line 81, “profile” to “profiles”

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Line 82, “with” to “to”

Line 83, “were” to “are”, “method section” to “Sect. 2”

Line 84, “impact” to “impacts”, “atmospheric condition” to “air quality”???

Line 86, “complicate” to “complicated”, add “of” after “a series”

Line 90, “measurements” to “measurement”, “none of the” to “to our knowledge, there is no”, add “for China” at the end of this sentence

Line 98

Line 100, “method” to “methods”

Line 106, “emission” to “emissions were”

Line 109, “common-used” to “commonly-used”

Line 111, “provided” to “provide”, “level” to “levels”

Line 113, “recently” to “recent”.

Line 114, add “furthermore,” at the beginning of the sentence, “provides” to “provide”, “types” to “type”

Line 115, remove “However,”

Line 116-117, change to “More detailed vehicle population data by fuel type and by control technology are required to calculate emissions because they have been reported to . . .”

Line 120, “were” to “are”

Line 121, “were” to “are”

Line 123, “were” to “are”

Line 124, change to “there is no local IVOC emission factor reported”

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There are more...

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-393>, 2017.

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