Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2020-639-SC1, 2020

Atmospheric Chemistry and Physics Discussions
Open Access
EGU

Interactive comment on "Analysis of atmospheric ammonia over South and East Asia based on the MOZART-4 model and its comparison with satellite and surface observations" *by* Pooja V. Pawar et al.

S. K. Sharma

sudhircsir@gmail.com

Received and published: 26 September 2020

Paper present the comparison of the MOZART-4 model along with monthly averaged satellite distributions of ammonia emission across South Asia. The authors are trying to identify the northern region of India i.e., Indo-Gangetic Plain, IGP as a hotspot for NH3 in Asia, both using the model and satellite observations. They highlighted a close agreement was found between yearly-averaged NH3 total columns simulated by the model and IASI satellite measurements over the IGP, South Asia (râĂĹ=âĂĹ0.85) and North China Plain (NCP), of East Asia (râĂĹ=âĂĹ0.88) with a moderate correlation coefficient. Model simulated surface NH3 concentrations and reported the under pred-

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Discussion paper

ication with the measured surface/ground based NH3 concentration of online pollution monitoring sites of India. The manuscript adds some new information on existing information over Indian sub-continent with model prediction which is compared with online NH3 monitoring sits of CPCB of India. There is lot of issues / questions about the quality of the ground based data sets which is used in the comparison of model. The present study fails to establish the NH3 emissions/scenario over Asian region due to lack of model comparison with quality controlled information of NH3.

Major issues

The NH3 and NOx datasets are used in comparison of model are taken from the online monitoring sites of Central Pollution Control Board (CPCB), India are not quality controlled. There are a lot of issues related to calibration and validation NH3. The comparison of model should also be based on available quality controlled data sets published in a peer reviewed journals.

The instruments used in NH3 and NOx at CPCB sites are molybdenum based which converts all the gaseous nitrogen at 980oC in Nitric oxide (NO) and NOx in to NO (at 350oC). The difference of these two provides the NH3. Due to available moisture in the atmosphere and conversion of all gaseous nitrogen species at very high temperature it provide/estimate the high ambient NH3 concentration. Hence, for that weekly NH3 calibration is required with certified NH3 span gases.

A comparison of surface NH3 has been performed by Saraswati et al. (2019) (published in Mapan 34 (1):56-69) based on pollution monitoring sites (4 sites in Delhi) with quality controlled measurement of NH3 and reported the 2-3 times more concentration of NH3 over Delhi in compared with quality controlled data. The similar observations are reported in this manuscript in Figure 8b. In this manuscript model under predicted surface NH3 concentration. Authors are suggested the validate the model with published quality controlled datasets.

Fig 4a and Fig. 6 shows the over prediction of NH3 emission by MOZART models which should be validated by quality controlled datasets. The panels are showing that sand, rocks and hillocks regions are emitting the NH3. It is sowing lack of experience/knowledge of Indian co-authors (it seems that most of the co-authors have not hands on experience/expertise of NH3 measurements).

Lot of publications are available on NH3 concentration and NH3 emissions from various Indian regions. Some of them listed below which can be used for model comparison. Few papers are only sited in the manuscript.

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There are also several issues with this comparative study that needs to be taken care by Indian co-authors. They are familiar with the scenario, mainly fertilizer used and NH_3 emissions from the agricultural activities.

Such type of over predication/publication of NH_3 emission from Indian sub-continent may create the havoc in future. We faced the problem of CH_4 emission from rice/paddy fields in India. Hence, quality controlled datasets should be used in model comparison with experimental experts.

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