

Geosci. Model Dev. Discuss., referee comment RC1  
<https://doi.org/10.5194/gmd-2021-80-RC1>, 2021  
© Author(s) 2021. This work is distributed under  
the Creative Commons Attribution 4.0 License.



## Comment on gmd-2021-80

Anonymous Referee #1

---

Referee comment on "Exploring deep learning for air pollutant emission estimation" by Lin Huang et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-80-RC1>, 2021

---

The uncertainty in emission inventory is always a concern of atmospheric science community, as the so-called "bottom-up" emission inventory relied largely on the economic and energy statistics, and the limited measurement data on emission factors. In this work, the authors proposed a novel method to update the emission inventory based on deep learning, and significantly improved the performance of the chemical transport model. The study is innovative and of great significance to the intersection of computer and environmental fields. I think the manuscript fits the scope of Geoscientific Model Development, but needs minor revisions before it can be published in the Journal.

- How does the authors ensure the robustness of the model?
- The authors use the observation data to update the emissions, however they do not mention what happens in case more than one observation station is in the grid. 27 km × 27 km is a large grid size and hence would include many observation stations in one grid. The averaged observed concentration of all stations if used won't serve the purpose to accurately update the emissions at a station.
- The entire premise of the model depends on availability of observation data, what happens if data is very sparsely available e.g. say out of 4 neighboring grids only one has observation data how are the emissions in other 3 grids updated?
- Does the deep learning process consider the impact of transmission between different grids? The authors are suggested to explain this point in detail.
- Lines 24-26, Abstract. Please be specific on the simulation year and the emission inventory you applied.
- Line 310, Page 15. I suggest the authors add more description for Figure 8, such as explaining why the performance of using the new emission inventory worsened at some sites.
- The language of the manuscript needs to be further polished.