

Review of the manuscript: “Estimating the variability of NO<sub>x</sub> emissions from Wuhan with TROPOMI NO<sub>2</sub> data during 2018 to 2023” by Zhang et al.

I would recommend accepting the manuscript for publication after minor revisions as follows (the line numbers refer to the revised manuscript):

L28 rephrase as: “though it is even higher in the bottom-up inventories”

L33 “, the estimation for Wuhan is ~4% for the emissions and ~8% for the chemical lifetime.” What is the estimation here? Do you mean the underestimation compared to something? Not sure what these numbers represents... Please clarify.

L146 “114.4°E, 30.6°N,” put this in parenthesis maybe?

L147- “Compared to Zhang et al. (2023), our study domain is limited to the urban area (within the Fourth Ring Road) of Wuhan. For one reason, most (~ 60%) of the NO<sub>x</sub> emissions are concentrated in the urban area (Zhang et al., 2023); for another, we use regional mean wind fields and NO<sub>x</sub> chemical loss rate, the larger study domain would induce large uncertainty in the result.”

This sentence is a bit strangely formulated. Maybe try to rephrase it for example as follows: “Compared to Zhang et al. (2023), our study domain is limited to the urban area (within the Fourth Ring Road) of Wuhan, as most (~ 60%) of the NO<sub>x</sub> emissions are concentrated in this area (Zhang et al., 2023). In addition, since we use regional mean wind fields and NO<sub>x</sub> chemical loss rate, the larger study domain would induce larger uncertainty in the result.” Or something similar.

L151 “One demission of the grid map is along with and the other perpendicular to the wind direction.” Maybe rephrase as “One dimension of the grid map is along the wind direction, and the other is perpendicular to it.”

L153 “rotated grid map” should you say here as well resampled instead of rotated? Same in the title of Fig. 1b.

L229-231 “Overall we calculate a mean NO<sub>x</sub> chemical lifetime of 2.82 h, close to the 2.46 h estimated by Zhang et al. (2023), and is around 5% lower than Lange et al. (2022) reported 2.94±0.3 h for the NO<sub>x</sub> effective lifetime.” Rephrase maybe as follows: “Overall we obtain a mean NO<sub>x</sub> chemical lifetime of 2.82 h, which is close to the 2.46 h estimated by Zhang et al. (2023), and around 5% lower than the value (2.94±0.3 h) reported by Lange et al. (2022) for the NO<sub>x</sub> effective lifetime.”

L231 “The fitting result for cold months NO<sub>x</sub> chemical lifetime is 4.25 h, and for most of the days, the estimated NO<sub>x</sub> chemical lifetime is between 1.5 h and 6 h.” replace with “For the cold months the estimated NO<sub>x</sub> chemical lifetime is 4.25 h, and for most of the days, the estimated NO<sub>x</sub> chemical lifetime is between 1.5 h and 6 h.” Also what do you mean with “most of the days”? How many?

L313 here and elsewhere, the word “valley” could be replaced with “sudden decrease/reduction/drop” or something similar.

L337 we compute -> we obtain

L398 we discard, We should be with first capital letter

L402 “Our analysis of the temporal variability of the estimated NO<sub>x</sub> chemical lifetime and emission is also of uncertainty, though this part of uncertainty is difficult to quantify.” This sentence does not read right, please check and rephrase.

L404 ... for this is also found... you mean: “since this..”?

L405 “Second, we have overestimated the summer-to-winter emission ratio...”  
Overestimated compared to what?

L422 align -> aligned

L446 “dominated with fast winds.” -> dominated by fast winds

Overall, I would recommend a review by an English mother-tongue, because I might not be able to catch imprecisions in English grammar.