# Comment on gmd-2022-26

Anonymous Referee #1

Referee comment on "MUNICH v2.0: a street-network model coupled with SSH-aerosol (v1.2) for multi-pollutant modelling" by Youngseob Kim et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2022-26-RC1, 2022

This paper presents the new version of the street-network model, Model of Urban Network of Intersecting Canyons and Highways version 2.0 (MUNICH v2.0) as well as its evaluation against observations (for a suburban area of Paris). This is very interesting state-of-the-art atmospheric chemistry transport model for the urban canopy. Its description and results of evaluation are well structured and thorough, which makes the paper relevant for the scope of the GMD journal. However, the paper requires an extra work with respect to language. Plus, minor improvements and clarifications (specified below) are needed before publication.

**Specific comments:**

- **Line 79:** What does the sentence "An academic test case is set up in this section to illustrate how the pollutants are transported 80 within the street network." exactly mean? What is the academic test?
- **Figure 1:** Although you specified in the figure caption how you define the wind direction, it is still confusing when one look at the figure. Therefore, I recommend to add arrows indicating wind direction for every investigated wind direction (perhaps, a top row of 3 arrows or an arrow inside each subfigure (a, b, c, …)).
- **Lines 17-18:** Change $s^{-1}$ to $m \times s^{-1}$
- **Line 162:** What is the actual location of observation site at "Boulevard Alsace Lorraine" (street or rooftop level)?
- **Line 205:** What is the offline coupling interval between Polair3D and WRF?
- **Figure 4 or Figure 6**: Perhaps, adding the mean wind direction (or better the wind rose) for the period of simulation (22 March and 13 May 2014) could be a good idea, since you have the test case (in Figure 1) indicating its influence for dispersion modelling in the urban canopy.
- **Figure 6 caption:** What is the "temporal normalised mean error (NME)"? Is it time-averaged NME? If so, it seems not quite right definition/name as the temporal quantity implies time variability (like time-series).
- **Lines 258-259:** In the following sentence "However, the difference are more

important for the peak concentrations with a maximum of 13% for $PM_5$ and 30% for $NO_2$ (see Figure 8)." do you mean the difference between observations and model output or between the Cases? The comparison of Cases does not exhibit so large differences (in particular for $NO_2$).

- **Figures 6, 9, 11, 13:** The NME metric gives only relative absolute change of a quantity. Thus, one cannot see the reduction or upswing in concentrations in the figures, which in turn means the statements in the text of the manuscript about the sign of changes (in sections 3-5) are not supported by the figures 6, 9, 11, 13.
- **Line 326:** Change $PM_10$ to $PM_{10}$
- **Lines 334-335:** Since "vehicles are forbidden in this street", how is the traffic redistributed in the adjacent streets and what are the corresponding changes in traffic emissions (apart from "Boulevard Alsace Lorraine") in the Case-12? What would happen with the emissions in reality?
- **Lines 48-49:** The following statement is vague: "the importance of properly representing the transition from the regional to the street scale". What do you mean by the "property"?