

Atmos. Chem. Phys. Discuss., referee comment RC2  
<https://doi.org/10.5194/acp-2022-365-RC2>, 2022  
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## **Comment on acp-2022-365**

Anonymous Referee #2

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Referee comment on "Modelling of street-scale pollutant dispersion by coupled simulation of chemical reaction, aerosol dynamics, and CFD" by Chao Lin et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-365-RC2>, 2022

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The authors coupled the SSH-Aerosol modular box model into Code\_Saturne and OpenFOAM CFD models. This coupling allows the representation of primary and secondary pollutants such as NO<sub>2</sub> and secondary aerosols (including size distribution) inside an urban canyon in Paris. Results of twelve-hour simulations of NO<sub>2</sub> and PM<sub>10</sub> between OpenFOAM and Code\_Saturne with SSH-Aerosol were similar and closer to measurements. Configuration experiments and case studies were focused on OpenFOAM coupling (CFD\_Chemistry). CFD-Chemistry was evaluated in grid size, time step, and coupling method. Averaged concentration fields of gasses and particles and the size distribution of PM<sub>10</sub> were evaluated. Finally, a case increasing NH<sub>3</sub> traffic emission was presented as an example of using the model for regulatory purposes.

The manuscript is well written and organized, the tables and figures support the results and the results and conclusions represent an improvement in the field.

Minor comments and required clarifications are detailed below:



- Line 241-243 Fig. 4.b showed that the PM10 CFD-chemistry did improve PM10 simulation but only during the morning hours, CFD-chemistry is closed to CFD-passive during the afternoon. When compared with Fig 3 a. It seems that it follows the behavior of background concentration, even when there is an increase of PM10 emitted compounds during the late hour of the afternoon (Fig 3 b). Did the authors perform sensitive tests of background concentration?
  
- Line 293: Please elaborate on the reasons for choosing OpenFOAM instead of Code\_Saturne. Maybe it is easier and faster to run or it performs better than Code\_Saturne (Table 1 only showed performance statistics for OpenFOAM). In that sense, It is also important to show the difference in computational time of running CFD-Chemistry and CFD-Passive.
  
- Line 591 - 592. The authors said that background concentration came from measurements, nevertheless in line 193 they said that they were obtained from the regional-scale simulations, please clarify.

#### Technical corrections

- Line 124 and Line 127. Please include the definition of RNG (Re-Normalisation Group), PISO (Pressure Implicit with Splitting of Operator), and SIMPLE (Semi-Implicit Method for Pressure-Linked Equations) acronyms.
  
- Recommend to add units in colorbars in Fig. 12 and 13, like in Fig. 11.

