Review of manuscript GMD- 2020-387

The revised manuscript has been improved, and the authors have addressed most of the comments I raised previously. This study demonstrates the capability of APFoam to simulate the dispersion of reactive pollutants in urban configurations. However, some inconsistencies need to be addressed before publication. For example, the validation of pollutant dispersion in 2D and 3D street canyon is performed using APreactingFoam (compressible flow/unsteady conditions) in Section 3.3 and 3.4, and the analysis in Section 4.3-4.7 is carried out using APonlyChemReactingFoam (incompressible fluid/steady conditions), while Section 4.2 shows that these two solvers provide different wind flow patterns and therefore, pollutant dispersion changes. Additionally, there are some typos/language inconsistencies in the revised version. I suggest revising the manuscript carefully to improve readability and clarity in describing the simulations and results.

General comments:

Section 4.2. Why is this comparison performed using different fluid properties for each solver? Has the flow reached the (quasi) steady-state conditions in the simulations using APreactingFoam and APsteadyReactingFoam after 90 minutes?

My suggestion is to use incompressible fluid for all cases to perform a proper comparison of these three solvers. After reaching the quasi-steady state, the wind pattern should approximately be the same using any of these solvers (if incompressible fluid is selected for all cases). The same applies for the dispersion of a non-reactive pollutant. Having the same wind pattern, it would make sense to compare the results from these solvers and provide the different computational time required to reach the quasi-steady state including chemical reactions as well. Based on this information (i.e. computational time require), users can select the appropriate solver for their simulations.

If the same fluid properties cannot be applied, then each solver would need to be validated independently.

Conclusions. Please be precise in giving the details of the methodology used in this study.

Line 565. Please add that the validations presented in this paper are using APFoam with CS07A.

Line 564-567. Please clarify that the validation of the photochemical mechanism (CS07A) is carried out against the *box* modelling SAPRC and flow and dispersion are performed against wind tunnel measurements.

Line 576. Please add in which conditions the NOx increases up to 98%, "…when wind speed is reduced to the half".

Line 578-581. I suggest the authors include the percentage reduction of NO, NO2 and O3 for the most relevant scenarios (e.g. NOx50% and VOC30%) since the outcomes from the analysis in Section 4.7 are interesting to be highlighted in this section.

Specific comments:

Line 14. Please add "with SAPRC *box* modelling"

Line 259. Please add units "…10^-5 to 10^-6"

Line 296. This sentence "The air flow… " is repeated (line 273-274).

Line 312. The acceptance criteria were originally defined in previous studies. Please see my previous comment and add the appropriate references.

Line 332-333. Please remove this sentence. This section presents the evaluation of dispersion of a tracer (non-reactive pollutant), and therefore, chemical reactions are not solved in this simulation.

Line 355. Please remove "ODE solvers for chemistry". The same applies here since chemical reactions are not solved in this simulation.

Line 394-400. Please use the same nomenclature for the simulated cases. For the same scenario, EMIS_zero_out is first used in Line 396 and Case_Emis_zero in the following line.

Line 432. Which is the case setting? Please clarify this.

Line 478. Based on what the authors stated in their responses to my previous comment. This sentence is therefore not correct. Please remove "background" since this statement applies to all VOC (background and emitted).