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Interactive comment on "Aerosol chemical and optical properties over the Paris area within ESQUIF project" *by* A. Hodzic et al.

Anonymous Referee #3

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This article compares the observed and the simulated chemical and optical properties of aerosols over the Paris area. The comparison is focused on two pollution episodes during the ESQUIF project. The comparison results presented in the article are informative and provide insight into the future improvement of the aerosol transport model (CHIIMERE). The following are my comments on both the model simulation and the interpretation of the comparison results.

1. Uncertainty in the aerosol emission inventory

The authors indicate (line 21 on p. 408) that in their simulation all primary emissions are lumped into a single compound (i.e., the primary particulate matter) due to the lack

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of specification in anthropogenic emission inventories. There is no doubt that such an approach introduces errors in the aerosol simulation. The question is how great the errors are. I suggest that a sensitivity simulation experiment be performed to estimate how much difference will be made in the simulation if various species are specified in the primary emissions.

2. Lack of vertical resolution

Since there are only 8 hybrid sigma-pressure levels between the surface and 500 hPa in the CHIMERE model (line 16 on p. 409), I am not convinced that it is sufficient to accurately simulate the vertical transport due to the vertical mixing in the atmospheric boundary layer (ABL), given that the meteorological model has much higher resolution within the lower half of the trauposhere than the CHIMERE model. I suggest that a sensitivity simulation experiment be carried out to provide the reader with the information on how much improvement can be achieved if a higher resolution (e.g., 16 levels) is used between the surface and 500 hPa.

3. Uncertainty in conclusion (ii)

The authors attribute the underestimated aerosol load at the top of the ABL to the misdisplaced pollution plume and the underestimate of the relative humidity at the ABL top. I suspect that the lack of vertical resolution in the CHIMERE model may be blamed as well. I strongly suggest that this issue be reexamined once the sensitivity simulation experiment is conducted to address my concern with the lack of vertical resolution in the CHIMERE model.

4. Editorial recommendation

The discussion of Fig. 8 starts after Fig. 18 is discussed. I suggest that Fig. 8 be renumbered in accordance with the order of discussions.

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