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Interactive comment on "Investigating the quality of modeled aerosol profiles based on combined lidar and sunphotometer data" *by* Nikolaos Siomos et al.

Anonymous Referee #2

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General comments: An evaluation study is presented to assess the capability of the air quality model CAMx to describe the aerosol conditions over Thessaloniki. The model simulations are compared to combined sun photometer and lidar observations. Backward trajectories and results of a sophisticated dust forecast model are used to attribute shortcomings to a poor representation of biomass burning and desert dust aerosol.

In principle, I like the idea of using different tools, not only measurements, to evaluate the simulations of a specific model and track down shortcomings to suggest model improvements. The evaluation is properly done, although the focus on the comparison with LIRIC data from Thessaloniki only may be too one-sided. Maybe other observa-

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Discussion paper

tions could be additionally included to underpin the findings.

However, my essential criticism is that the CAMx model is evaluated regarding two aerosol types, which, by design, are not directly computed or only poorly represented. Biomass burning emissions are highly variable in time and space. The actual pollution will largely depend on specific events. Of course, it is not to be expected that the TNO emission database from 2007 in detail is representative for the fire emissions in 2013 – 2015. The same holds for Saharan dust that is not online computed based on modelled winds but input as boundary condition. This must be considered when evaluating the model results, and the conclusions have to be revised in this regard. How exactly is the CAMx model suggested to be improved with this in mind, and based on the evaluation results?

Specific comments: 1. Page 4, line 10: A plot showing the model domains would be very helpful, in particular, to show if relevant Saharan dust sources are included. 2. Page 11, lines 5 – 8: Here and later in Section 4, the study period 2013 – 2015 should be mentioned in order to clearly separate example cases from the broader statistical analysis. 3. Figures 1 and 3 – 7: Please indicate in each figure caption whether the results refer to a specific case or the entire period 2013 – 2015.