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Interactive comment on "A 3-D evaluation of the MACC reanalysis dust product over Europe, Northern Africa and Middle East using CALIOP/CALIPSO dust satellite observations" *by* Aristeidis K. Georgoulias et al.

Anonymous Referee #1

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The authors present in their paper a 3-D evaluation of the MACC dust product using the EARLINET-optimized dust product from CALIPSO generated from the LIVAS project. They perform a detailed comparison focusing over Europe, Northern Africa and Middle East both for the total dust optical depth as well as for the dust profile product of MACC. The analysis is very detailed and well-presented and the paper is well written. The paper is suitable for publication in ACP after considering some general and specific issues detailed below in my review.

General comment

The structure of section 3 separates the DOD and profile evaluation from MACC and examines separately differences with CALIPSO at annual and seasonal scales. In principle this a reasonable approach. However as it is written and structured, the text has many repetitions accompanied by the same explanations. I would suggest to consider revising the structure of this section focusing eventually on the most interesting regions (or even merge regions in the discussion) and for each region then the authors could compare DOD and profiles at various time scales. This way they will avoid repeating the same discussion in different sections. In addition, in the discussion many differences are attributed to possible modelling issues related to the assimilation or model parametrization in a very generic way, and the text as written lacks justification and seems speculative.

Figures 2, 3 and 5. The color scale used makes the figures hard to read, especially for values close to zero. The authors should consider choosing a different color scale.

Specific comments

Page 4 line 7. What do the authors mean by "if used properly".

Section 2.1 It is not clear how the assimilation of MODIS data is associated with the dust product and the natural aerosol product. Please provide more information here because this info is later used in the discussion of the results.

Section 2.3 (page 5, line 30). Why the authors interpolate the model levels to 399 LIVAS levels and then regrid vertically with 300m resolution instead of first converting LIVAS to the 60 MACC layers and directly average then vertically over the four 1800-meter layers? Why did they choose 1800m? The authors should justify better why they think this way they obtain more robust statistics.

Section 2.3 (page 6, lines 7-15) Are there any estimates how much is the contribution of marine aerosols in the natural aerosols above 1km?

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