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Interactive comment on “Comparing ECMWF AOD with AERONET observations at visible and UV wavelengths” by V. Cesnulyte et al.

Anonymous Referee #2

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Dear Authors,

First, thanks for a coherent, readable manuscript on a topic of considerable interest to the operational forecasting community. The skill of model analyses of aerosol particle concentrations is an important measure of progress toward desired goals in air quality, climate, and atmospheric chemistry research. This paper describes an evaluation of the aerosol optical depth output from the ECMWF MACC modeling system. This study builds on the results from Morcrette et al. evaluating the model AOD output, and extends the analysis into the UV wavelengths, which are also retrieved by AERONET sun photometer instruments. There are a few passages of results I found confusing that probably need to be rewritten, especially the discussion of fine and coarse mode AOD on page 19871. In your revisions, you should con-

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sider whether your results permit conclusions to be drawn about your model behavior. If biases are different in the UV compared with the mid-visible, the two most likely causes are 1) balance of the aerosol species in your model simulation; 2) assumed optical properties of one or more of the aerosol species. To some extent, you can separate #1 and #2 by considering the behavior of the model results for only those locations where AERONET indicates that the fine mode fraction is very high, or very low (Note: be wary of AERONET retrievals with very low fine mode fraction, as that can be indicative of cirrus cloud contamination: (Chew et al. *AtmEnv* 2011: <http://www.sciencedirect.com/science/article/pii/S1352231011008375>)

Your paper has a lot of numerical results presented, which are of interest for model development, but you should work to identify general trends representing model tendencies not tied to specific regions. One way you can do this is by testing whether the optical properties of MACC coarse-mode aerosols are consistent with what is observed by AERONET. The prognosis for both model developers and model data users is very different if the aerosol species are unbalanced, vs. if the aerosol particle optical properties are biased. Good luck with your revisions, this is a worthwhile paper.

Small typos and comments follow.

19861-29: “of the year”

19862-25: “November”

19862-18: “When we removed. . .before removing AOD340,500).” Unclear. I think this might be easier to comprehend if it were two, or even 3, separate sentences.

19863-11: “calculated using these two wavelengths” I assume this is 340 and 550; you should just say that.

19866-21: “(where the origin of rain dust is)” I’m not sure exactly what you meant by this.

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