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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Retrieval of Aerosol Combined with Assimilated Forecast" *by* Mayumi Yoshida et al.

Anonymous Referee #3

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The paper "Retrieval of Aerosol Combined with Assimilated Forecast" is an interesting paper that uses model forecast to improve the aerosol satellite retrieval especially over aerosol absorption and size parameters. However, there are couple major problems need to be clarified. First of all, what is the relations between Angstrom exponent and particle mixing ratio? If this ratio is similar to fine mode fraction, which defined as fine mode AOD over total AOD, then the Angstrom Exponent is not only depending on this parameter. Similarly, the single scattering albedo is not only dependent on imaginary part of the refractive index, it is also function of size distribution. Also in the paper, it claims that imaginary part of the refractive index is between 0-1, but realistically, this value is between 0.00001 to 0.01 at 550nm. Look at the value the author cited in line 36 these values are around e-8. So I am not sure how is this value in case study can

be above 0.1 (which wavelength are we talking about here)? Is mi really the imaginary part of the refractive index? Also setting aerosol to non-absorbing totally causes big problem when there is transported dust/smoke over ocean. The case study shown the improved relation of Angstrom exponent/single scattering albedo vs ground truth, I think it is worth exploring with more cases with more discussion of the error sources in each cases.

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