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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Relationship between wind speed and aerosol optical depth over remote ocean" *by* H. Huang et al.

Anonymous Referee #3

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This paper should not be published because it is scientifically unsound in the results which it produces!!

This paper reports a linear relationship between wind speed over the ocean and AOD. It is reported that the AOD ranges from 0.1 to about 0.18 over a wind speed of 0 to 20 m/s. Relative to the most recent studies (Mulcahy et al & Smirnov et al) using an absolute column measurement of AOD, where a range of 0.05 to 0.35-0.45 is observed (depending on wavelength - and the latter upper estimates are for wind speeds of 18 m/s), the current estimates are significantly astray.

Moreover, analysis of MODIS AOD in clean remote marine areas (not published but available) support the above Mulcahy range particularly at the lower wind speeds. At the higher wind speeds MODIS reports lower values than Mulcahy but this is to be ex-

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pected with different and more rigorous cloud screening used by Mulcahy, nevertheless these values are significantly higher than what is reported here.

The authors need to justify why in clean and remote marine area's the AOD of 0.1 is so high - this has never been supported by ground based AOD measurements. The upper limit at high wind speeds is, on the other hand, too low but perhaps is the subject of debate. Nevertheless, the slope of the reported relationship needs to be justified.

In order to do this, the authors must demonstrate that the reported values are realistic as follows:

(1) calculate a typical remote marine aerosol AOD at low and high wind speeds.

(2) Use an accumulation mode dry radius of 0.08 microns.

(3) Assume a clean accumulation mode concentration of 80 /cc and a mixed growth factor of 50/50 seasalt and ammonium sulphate.

(4) Assume a boundary layer height of 1000 m with RH=98% at top.

(5) Calculate the resultant AOD.

(6) The take any steady state or flux function for supermicron seasalt at 20 m/s and repeat the above steps, but this time assume only seasalt groth factors.

If you do the above, I believe you will find serious errors in your retrieved AOD values - I know because I have done it!!

It is insufficient to simply report new satellite products relating to process-based relationships which are in stark contrast to the state of the art without rationale and robust supporting material. This paper has none of the above!!!

In summary, I believe this paper should be rejected as even if the above exercise is conducted, it will only demonstrate the satellite products reported here are seriously in error.

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24511, 2009.

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Interactive Comment