

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

### **Anonymous Referee #4**

Received and published: 4 January 2010

#### Overall quality of paper

This paper examines the correlation between observed AOD from the AATSR satellite instrument and 10-m ECMWF windspeed. The authors use the dependence of the standard deviation of AOD on wind direction to estimate the influence of long-range transport vs. remote oceans. Focusing on three regions in the Southern Ocean, they find a consistent relationship between windspeed and AOD indicative of sea-salt production. The paper is generally well written and the topic is interesting.

#### Specific comments

My main concern regarding this paper is the lack of in depth discussion of the AOD dataset used from AATSR. Two references are mentioned in section 2 (Data), but one

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is a PhD thesis and the other is a conference proceedings, thus not accessible to the reviewer. Given this, the authors should include more information in their description of the dataset. What are the uncertainties on the retrieved AOD? Has the product been validated against AERONET observations, especially in marine regions? How does it compare to other satellite AOD products like MODIS or MISR?

Also, the authors mention the issue of whitecaps in influencing surface reflectance and retrieval of AOD by SeaWiFS in their introduction. This is an important issue, yet it is only mentioned in passing in section 2. Could the author be more specific in their discussion of the AATSR retrieval? As the surface reflectance is retrieved independently of the AOD, could they show how surface reflectance varies with windspeed – thus constraining the whitecap effect.

Finally, the southern ocean is a very cloudy region and cloud contamination has hampered the retrieval of AOD from other satellites like MODIS. How are clouds dealt with in the AATSR retrieval? Do the authors impose a cloud cover threshold in the data that they use?

#### Technical comments

1. Figure 3. Please clarify in the figure caption that the horizontal and vertical lines represent the chosen threshold.

2. Figure 4 seems to indicate that 20-40% of the Southern Ocean cannot be considered remote ocean, as  $\theta > 0.035$ . It is unclear in the text whether the author eliminate those points in their analysis of the southern ocean or whether these are included in Figs 6-8. The text on page 24517, line 3 “Based on this analysis, we have chosen remote ocean points over three regions shown as black frames in Fig. 4” is somewhat ambiguous and seems to indicate that all points in the boxes have been chosen. Please clarify.

3. Correlation coefficient in Figures 6-9. I assume that the  $R^2$  shown is for the AOD

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binned by wind speed. To get a sense of the actual scatter in the data, it would be useful to also indicate the correlation coefficient for the ensemble of the daily data without any averaging.

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

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