

Response to the reviewers

*Anonymous Referee #2*

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*This paper is an analysis of the relationship between wind speed and aerosol optical thickness in remote marine areas using data from the extremely valuable Maritime Aerosol Network (MAN). The authors have many years of experience making measurements of maritime aerosols, yet their efforts to reassess data and the parameterizations based upon data are commendable. Specifically, the authors show that the correlation between wind speed and aerosol optical depth is highly variable and probably not as large as is often assumed. In a particularly useful section of the paper, they show with a simulation that the measurement uncertainties of both aerosol optical depth and wind speed are currently too large to find a very precise relationship between the two parameters. Indeed, the slope and intercept of a linear fit between the two change with the quantity of measurement uncertainty. This is an important result and this paper should be published after only some minor changes.*

Thank you for kind words.

*I'm concerned about the comments in the second to last paragraph of section 2 (lines 9-13 on page 7191). If I understand correctly, this says that some cruises were not accepted because they did not show a relationship between wind speed and AOD. If this is the case I am worried because this might affect the relationship presented in this paper. Please add more details about what specifically was excluded (one cruise? many cruises?) and the justification for doing so.*

We slightly changed the wording to make it clearer. The current version reads: "Among those cruises we accepted only those that actually showed at least some relationship between AOD and wind speed (slope of the AOD scatterplot versus wind speed for any individual cruise at least 0.002). This "cherry-picking" is justified by the ultimate goal of finding the most robust possible dependence of AOD on wind speed over the oceans". The corrected version will read: "Among the selected cruises, we excluded one (presented in Fig. 1), which showed no relationship between AOD and wind speed. For any other individual cruise considered, the slope of the AOD scatterplot versus wind speed was found to be at least 0.002 m<sup>-1</sup>s. This "cherry-picking" is justified by the ultimate goal of finding the most robust possible dependence of AOD on wind speed over the oceans".

*The conclusion states that a linear relationship was found between AOD and wind speed. While a linear fit was made to the data, considering the large amount of scatter it is not clear to me that this excludes other types of (non-linear) relationships. I would imagine there is some sort of confidence test to prove or disprove this, but that's probably beyond the scope of this paper at this point. Perhaps language can be added saying that a linear fit was made, but not going so far*

*as to say that the data exclusively show a linear relationship. This refers to the first line of the conclusion and the description of the results on line 6 of page 7192.*

Non-linear relationships were considered however did not improve correlations. For example, the power fit yielded same as linear fit correlation coefficients and a power parameter of 0.3 which led to almost constant AOD at higher winds. Exponential fit looked similar to the linear fit within the range of wind speed considered.

*I had difficulty understanding figure 4, and to a lesser extent, figure 5. I think this is because the plotted values 'overlap' each other and the fit lines. Perhaps these figures and be plotted in a nicer way? I would suggest at least re-plotting the fit lines on top of everything else so they are visible.*

We agree with the reviewer and completely changed the Figure 4. Now we present scatter density histograms of AOD at 500 nm which gives an opportunity to see the scatter clearly. Regression coefficients for other wavelengths are listed in a Table (Table 2). This makes this graph less busy and easier to read. We changed Figure 5 showing scatterplot for one wavelength (500 nm) only and listing regression statistics in Table 2.

*I think the abstract should more explicitly state that the slope of the AOD-wind speed relationship is on the low end of observations in the literature.*

We prefer not to change the abstract in this way, because the main point is that the gradient varies by a factor of two dependent on wind data source.