

## Replies to Referee comments

*On “Interactive comment on “Spatio-temporal aerosol optical characteristics over the Arabian Sea during the pre monsoon season” by D. G. Kaskaoutis et al.*

### For Anonymous Referee #1

The paper is a useful contribution to the understanding of aerosol sources and resulting optical properties over the Arabian Sea. Given the sparse global data set of marine AOD values, it should be published. However, a thorough editing for English grammar is required before it is suitable for publication in ACT. In addition, the issues listed below should be adequately addressed.

**Reply: We appreciate the summary evaluation of the reviewer. We have also taken care of the English Grammar, to our best, in the revision and several parts have been modified.**

1) abstract, lines 4 – 5: Explain what exactly the influence is of the surrounding arid region on the Angstrom exponent. Also, the dates of the measurements should be given in the abstract.

**Reply: This sentence is corrected now. The dates of the measurements are also given.**

2) abstract, line 5: omit “typically”

**Reply: Complied with**

3) abstract, lines 6 – 7: Explain the significance of a more accurate polynomial fit.

**Reply: An accurate polynomial fit, analytically parameterizes the observed wavelength dependencies of AOD with least errors and yields accurate estimates of the coefficients ( $a_1$  and  $a_2$ ). This is included in the revised text**

4) abstract, lines 11 – 12: The uncertainty of AOD derived from a microtops sunphotometer is +/- 0.01 at best. These values should not be reported to 3 significant figures.

**Reply: The mean values along the standard deviations are now given limited to two decimal points.**

5) p. 22225, lines 8 – 12: Should be re-stated as “The aerosol load and spatial distribution in the AS region are highly variable due to air mass origin, local and regional meteorology, El Nino – La Nina patterns, and location of the ITCZ.”

**Reply: The suggestion is implemented.**

6) p. 22229, line 14: Does 1 um here refer to particle diameter?

**Reply: No, it corresponds to wavelength of the radiation. This is made explicit in the revised version.**

7) p. 22229, line 14: Omit “contains information about the nature of the aerosol particles present in the atmosphere and”.

**Reply: The suggestion is implemented.**

8) p. 22231, line 26: define  $\text{erra1}$  and  $\text{erra2}$ . Three significant figures here is unwarranted. Also, please provide information on how the magnitude of these errors translates into uncertainty in calculated Angstrom Exponents.

**Reply: In the revised version the errors and the uncertainties revealed from the linear and the 2<sup>nd</sup> order polynomial fit are discussed in more detail.**

9) p. 22232, line 9: With  $r^2$  values around 0.3, describing the correlations as “strongly positive” is an overstatement.

**Reply: This sentence is omitted from the revised version.**

10) p. 22232, lines 19 – 20: It is stated that “this fact also indicates the great effort and attention spent on the accuracy of the AOD1020.” This statement contradicts the earlier statement on p. 22227 that water vapor absorption effects at 1020 nm were not considered in this study. Is this statement referring only to keeping the Microtops in the shade after each observation?

**Reply: Water absorption at 1020 nm is insignificant as the absorption cross section is more than 4 orders lower than its value at 935 nm. Moreover, in section 2 we used the reference (Eck et al., 1999) in order to reveal that the optical depth due to water vapor is negligible at 1020 nm. Furthermore, the microtops-II was kept in the shade before and after each set of measurements. These are incorporated in the revised. However, following the suggestions of other reviewers we have taken into account the water-vapor effect, mainly at 1020 nm, in the revised version and for this reason the results in the revised as somewhat different, especially the  $a_1$  and  $a_2$  values.**

11) p. 22236, lines 10 – 12: It is stated that “on the first days of the cruise: : the spectral AOD variation is larger due to the proximity to the urbanized coast.” The spectral variation is larger several days into the cruise (April 25) than in the beginning (April 19). Use dates here for clarification.

**Reply: The lines are revised giving the actual dates.**

12) p. 22236, lines 13 – 14: Condensation growth and coagulation are more efficient at producing accumulation mode aerosols than what?

**Reply: Condensation growth, coagulation and non-precipitating cloud cycling are the main processes for generation of accumulation and/or coarse-mode aerosols (than primary production). We cited (Fitzgerald 1991), which has extensively dealt with these.**

13) p. 22237, 2nd paragraph: Angstrom exponent values should not be reported to 2 significant figures.

**Reply: The Angstrom exponent is now given with two decimal digits.**

14) Figure 11: It would be helpful to put 24 hour markers on the back trajectory lines.

**Reply: This figure is modified taking also into account the suggestions from the other reviewer.**

15) p. 22242, lines 15 – 16: What is meant by the statement that “transport patterns can be quite different for pollutants and aerosols that penetrate the boundary layer to the free troposphere”? That transport is different to the BL vs. the FT?

**Reply: Yes. The aerosol and pollutant transport patterns could be different in the BL and FT. The term “free troposphere” has been replaced by “in the upper atmospheric levels (above the ABL)”.**

16) p. 22243, line 28: What is meant by “they also extinct over oceanic areas: :.”?

**Reply: The sentence is re-written**

17) p. 22244, lines 7 – 8: Indicate the location of the Maldives and KCO in Figure 12 or, at the very least, give their latitude and longitude in the text.

**Reply: Latitude and Longitude have has been provided in the text. Note the KCO belong to the Maldives Islands.**

18) p. 22244, line 20: What is meant by “measurements obtained?” Is this referring to the location of the measurements?

**Reply: This sentence is modified.**

19) p. 22247, line 11: What is meant by “small regions”?

**Reply: This sentence is modified.**