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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Extremely large anthropogenic aerosol component over the Bay of Bengal during winter season" *by* D. G. Kaskaoutis et al.

Anonymous Referee #1

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The paper presents a unique dataset of aerosols optical thicknesses and total precipitable water content in the Bay of Bengal during the dry season taken during the W-ICARB cruise campaign.

The dataset is obtained using two handheld Microtops II photometers. The authors highligth the occurrence of 'extremely' high (> 0.4 @ 500 nm) values of aerosols optical thickness that uniquely on the basis of the analyses of spectral dependence are defined as anthropogenic.

The tools used for the analyses of the spectral dependence demonstrate the knowledge of the status of the art in this field that it is also evident by the rich bibliography

cited, even if in some case the analyses appears as redundant.

Apart for few details in the processing of the Microtops data, the weakness of this paper is to be limited to the analyses of a subset of Microtops II observations while other relevant observations were available to support or discuss the results. for this reason the paper is not suitable for publication in reviewed scientific literature. Reviewed scientific literature should contain contributions that exploit the best available information to support conclusions or that make use of intensive and not frequent observational efforts, as for example from oceanographic campaign, to discuss the limits of relatively inexpensive observations or such of more global ones as the satellite derived products. In fact, as evident by the cited literature, during the W-ICARB cruise there were other observations that could have been used to support some of the conclusions. The paper could be published if it would include in the discussion other observations or alternatively if the dataset would be used to validate satellite products and then discuss on this basis the spatial and low frequency temporal variability as deduced form satellite products.

Even accepting the hypothesis of a paper based only on Microtopts II data there would be some issues to be better discussed before the spectral analyses. For example:

- The screening of the data on the basis of the results of the 2nd order polynomial fit.

- All preprocessing steps that are likely to introduce a spectral dependence in the retrieved aerosols optical thicknesses. Corrections for molecular optical thickness (both in terms of error in the surface pressure value and used formula) and gas absorbtion introduce, as discussed in the literature, relatively low uncertainties in the value of optical thickness. Are these uncertainties acceptable also when computing the Angstrom coefficient?

- Ozone retrieved columnar content can contain some useful and independent information? For example the disagreement between around 0.5-0.6 micron fit and observations in fig 14 couldn't be explained by residual absorbption from ozone?

- The OPAC dataset is based, in terms of complex refractive indices, mostly on the Shettle and Fenn (1979) aerosol models. Status of the art modeling should include more recent results both in terms of size distribution as well as of complex refractive indices. As an example the HITRAN package contains a regularly updated and well documented datasets in terms of complex refractive indices.

- The residual effect of aerosol correction in the computation of total precipitable water vapour, particularly when discussing fig.13.

Minor comments:

- is the use of correlation to indicate scatterplots correct?

- table 2 contains the 4 columns from the extinction coefficient to the SSA that can be summarized by any combination of two columns among the 4. Also the number of digits used in this table could be reduced.

- the meaning of the comparison of spatial distribution shown in figure 12 is not clear.

- figures 4, 11 and 13: what is the purpose of computing a linear fit?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 7851, 2011.