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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 #2

Received and published: 2 May 2011

Review of manuscript 'Extremely large anthropogenic aerosol component over the Bay of Bengal during winter season' by Kaskaoutis et al.

General comments

The paper by Kaskaoutis et al. deals with microtop measurements made on a cruise during a campaign W-ICARB organized by Indian Space Agency. Angström exponent (alpha) and curvature (a2) derived from polynomial fit to aerosol optical depth spectra have been analyzed as well an attempt has been made to understand the dynamics of aerosol size distribution (growth, coagulation etc.) by deriving a relationship between alpha and spectral curvature of alpha (dalpha). Contribution of various aerosol species

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Interactive Discussion
Discussion Paper

to columnar optical depth has been inferred by constraining the measured spectral optical depths to those obtained from Optical Properties of Aerosol and Cloud (OPAC). However, there are serious pitfalls in all of the above analyses which I list one by one. That said there is no significant advancement of the present knowledge of BoB aerosol size properties already published (e.g. Nair et al., 2008; Kedia and Ramachandarn, 2009 and many more) based on radiometery therefore I recommend the paper be rejected for ACP.

Specific Comments

1. The authors used the method presented in detail by Schuster et al. (2006) for alpha and a2 deduction however they should have noted that Schuster et al. (2006) clearly mention the cutoff size as 0.6 micron (effective radius) which is the mode of separation for coarse and fine aerosol, as recommended by aeronet team. Strangely enough the authors have not even cared to mention this cut-off size. Schuster et al. (2006) were careful not to mention about the source of aerosols except restricting to size distribution analysis. Authors should know from India aerosol climatology that a significant amount of anthropogenic aerosols may be found in coarse mode aerosol with effective radius > 0.6 micron due to mixing and aging processes. In addition to that the direct usage of the classification developed by Kalapureddy et al. (2009) for Arabian Sea is highly questionable given the striking differences between BoB and AS aerosols.

2. The methodology used in second part of the paper based on a visual analysis approach of Gobbi et al. (2006) is also erroneous. First, the authors should note that definition of dalpha proposed by Gobbi et al. (2007) is valid for aeronet measurements, which has well known uncertainties for various channels. It was expected from the authors to perform a rigorous analysis before using same set of wavelengths as used previously. Secondly, the details of computations performed are missing. How is the use of low and uniform absorbing refractory index justified when the authors subsequently found highly absorbing aerosols with significant spatial variation in their single scattering properties in BoB?

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3. Use of OPAC model to infer the various aerosol types contributing to the columnar burden without having any validation against a concurrent in situ surface measurement is something stretched too far. I seriously doubt the validity of entire section 4.4.

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

ACPD

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Fig. 1.

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Interactive Comment