

**CARBONACEOUS AEROSOLS OVER BAY OF BENGAL AND ARABIAN SEA
IN THE PRE MONSOON SEASON**

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Abstract

As a part of ICARB Campaign, Concentrations and mass fractions of organic carbon, elemental carbon, and numerous organic species have been determined during March-May 2006 over the Bay of Bengal and Arabian sea on board Reaserch vessel sagar kanya. The organic carbon and elemental carbon are found to be more in the Bay of Bengal region which probably due to large transport of biomass burning aerosols as compared to Arabian Sea. Aerosol samples were analyzed for carbonaceous content by a thermal optical transmission/reflection method. However, low OC/EC ratios indicate the existence of primary OC. The concentration of OC (and its share to total aerosol mass) lies between $10 \mu\text{g m}^{-3}$ and $0.7 \mu\text{g m}^{-3}$ in the Bay of Bengal region whereas it is from $4.4 \mu\text{g m}^{-3}$ to $0.9 \mu\text{g m}^{-3}$ in the Arabian sea region. Similarly values of EC lies between $3.9 \mu\text{g m}^{-3}$ and $0.2 \mu\text{g m}^{-3}$ in the Bay of Bengal region whereas it is from $0.8 \mu\text{g m}^{-3}$ to $0.1 \mu\text{g m}^{-3}$ in the Arabian sea region. Daily mean OC and EC concentration as high as $10 \mu\text{g m}^{-3}$ and $4.4 \mu\text{g m}^{-3}$ respectively were observed on several occasions.

Keywords: Organic carbon; Black carbon; thermal optical reflectance(TOR).

Introduction

Carbonaceous aerosols consist of fine particles, mostly less than 1 micrometer (μm) in diameter, which are usually classified as black carbon (BC) and organic carbon (OC). Anthropogenic aerosols are believed to affect climate in several ways. They primarily scatter and cool the earth's surface. However if dark and absorbing component are present they also may heat the air in which they are suspended.

The ability of carbonaceous aerosols to modify local meteorology and climatology in regions where emissions are high, like China and India, has been postulated [Ramanathan et al., 2001a, 2001b; Menon et al., 2002]. Dickerson et al. [2002] expressed the belief that BC emissions could be considerably higher, possibly as high as 2–3 Tg, based on atmospheric measurements taken during INDOEX, especially the observed BC/CO ratios. Global emissions of OC were first estimated by Lioussé et al. [1996] to be about 62 Tg. Biomass burning contributed 34 Tg, fossil-fuel combustion 22 Tg, and natural sources 6 Tg. Very less amount of work has been done in and around India for finding these emissions.

Methodology for sample analysis

The filter paper samples have been analyzed for OC and EC and total carbon using DRI Model 2001a in Delhi Zonal Lab (NEERI). Analysis has been carried out following the USEPA Method 'Improve Protocol' with negative pyrolysis areas zeroed. The

principle of the analyzer is based on the preferential oxidation of organic carbon(OC) and elemental carbon(EC) at different temperatures. Its function relies on the fact that organic carbon can be volatilized from the sample deposit in a non oxidizing helium atmosphere, while elemental carbon must be combusted by an oxidizer.

Results and Discussions

Elemental carbon and Organic carbon concentration are found more in the Bay of Bengal region as compared to Arabian Sea region. Higher concentration over Bay of Bengal may be due to long range transport of aerosol from anthropogenic sources south and Southeast Asia.

Table 1: Concentration of EC OC and TC

	Bay of Bengal ($\mu\text{g}/\text{m}^3$)			Arabian Sea ($\mu\text{g}/\text{m}^3$)		
	EC	OC	TC	EC	OC	TC
Maximum	3.9	10.0	13.9	0.8	4.4	5.1
Minimum	0.2	0.7	1.0	< 0.1	0.9	1.0
Average	0.7	3.1	3.8	0.2	1.9	2.1

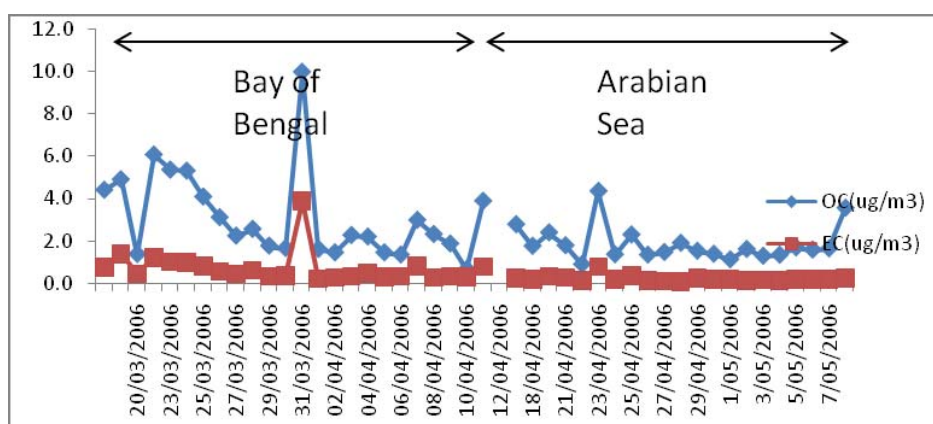


Figure 1: OC and EC concentration over Bay of Bengal and Arabian Sea

Overall, we can see there is some consistent pattern in the EC/OC trends.

Conclusion

This study has presented the status of carbonaceous aerosols over the Bay of Bengal and Arabian Sea during the campaign period from March 2006 to May 2006. These analysis were done by EC/OC analyzer using TOR method which is the accurate method for measuring carbonaceous particles so far. The concentration of OC is found as high as $10 \mu\text{g m}^{-3}$ in the Bay of Bengal region and highest EC concentration is found to be $4.4 \mu\text{g m}^{-3}$. It can be seen that mean mass fraction of EC, OC and TC to TSP in Bay of Bengal and Arabian Sea as 0.27%, 1.16%, 1.43% and 0.1%, 0.92%, 1.02% respectively.

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