

Auxiliary material for Paper

Examination of aerosol distributions and radiative effects over the Bay of Bengal and the Arabian Sea region during ICARB using satellite data and a general circulation model

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Table S1. Comparison of model simulated AOD @550 nm and Ångström Exponent (550 / 825 nm) with MODIS AOD and Ångström Exponent (550 / 865 nm) during cloud-free days and cloudy days.

	Cloud-free days			Cloudy days (# 7)		
	HAM	MODIS	Ratio	HAM	MODIS	Ratio
AOD @ 550 nm	0.18	0.26	0.69	0.16	0.32	0.5
Ångström Exponent	0.99	0.94	1.05	0.78	0.61	1.28

Table S2. Comparison of mean aerosol optical depth (AOD) and angstrom exponent (AE) between model simulated and aerosol climatology values from satellite measurements over BoB and AS regions.

Period	Bay of Bengal		Arabian Sea		Reference
	AOD	AE	AOD	AE	
ICARB-2006 Mar-May	0.27±0.06	1.1 ±0.31	0.26±0.09	0.83 ± 0.23	Present study
MISR 9 year (2000-2008)	0.33±0.05	1.02±0.12	0.33±0.05	0.80 ± 0.13	Dey and Di Girolamo, 2008 (Mar-May)
MODIS 6 year (2001-2006)	0.29±0.02	1.05±0.14	0.28± 0.03	0.75±0.18	Present study
ICARB-2006 Mar-May	0.36± 0.17	1.12±0.29	0.25± 0.17	0.73 ± 0.38	Kedia and Ramachandran, 2008

Table S3. Mean fine mode and coarse mode contribution (% , at 550 nm) to the AOD, and Ångström exponents, over the BoB and AS legs during ICARB period.

Region	Fine mode AOD	Coarse mode AOD	Ångström Exponent (550/825 nm)
Bay of Bengal	68%	32%	1.1 ± 0.3
Arabian Sea	61%	39%	0.83 ± 0.2

Table S4. Comparison of model simulated DARF sampling along the ship track and regional-seasonal mean values over BoB and AS legs during ICARB period.

HAM DARF (W m ⁻²)	TOA		SUR		ATM	
	Sampled along the track	Regional- seasonal mean	Sampled along the track	Regional- seasonal mean	Sampled along the track	Regional- seasonal mean
Total	-5.3	-5.3	-11	-10.4	5.8	5.1
Bay of Bengal	-4.7	-4.2	-11.3	-9.8	6.6	5.6
Arabian Sea	-6.1	-6	-10.7	-10.7	4.6	4.7

Table S5. Comparison of model simulated multiyear (2001-2005) pre-monsoon seasonal mean satellite-tied direct aerosol radiative forcing (DARF, W m^{-2}) with the DARF during ICARB 2006 period.

Region	2001-2005 pre-monsoon mean			ICARB 2006 pre-monsoon mean		
	satellite-tied DARF (W m^{-2})			satellite-tied DARF (W m^{-2})		
	TOA	SUR	ATM	TOA	SUR	ATM
Bay of Bengal	-8.5±2.2	-21.4±5	12.8±3.8	-8.6±2	-21.4±4.9	12.9±4.2
Arabian Sea	-7.7±1.2	-14.3±2.6	6.5±1.9	-6.8±1.8	-12.8±4	6±2.5

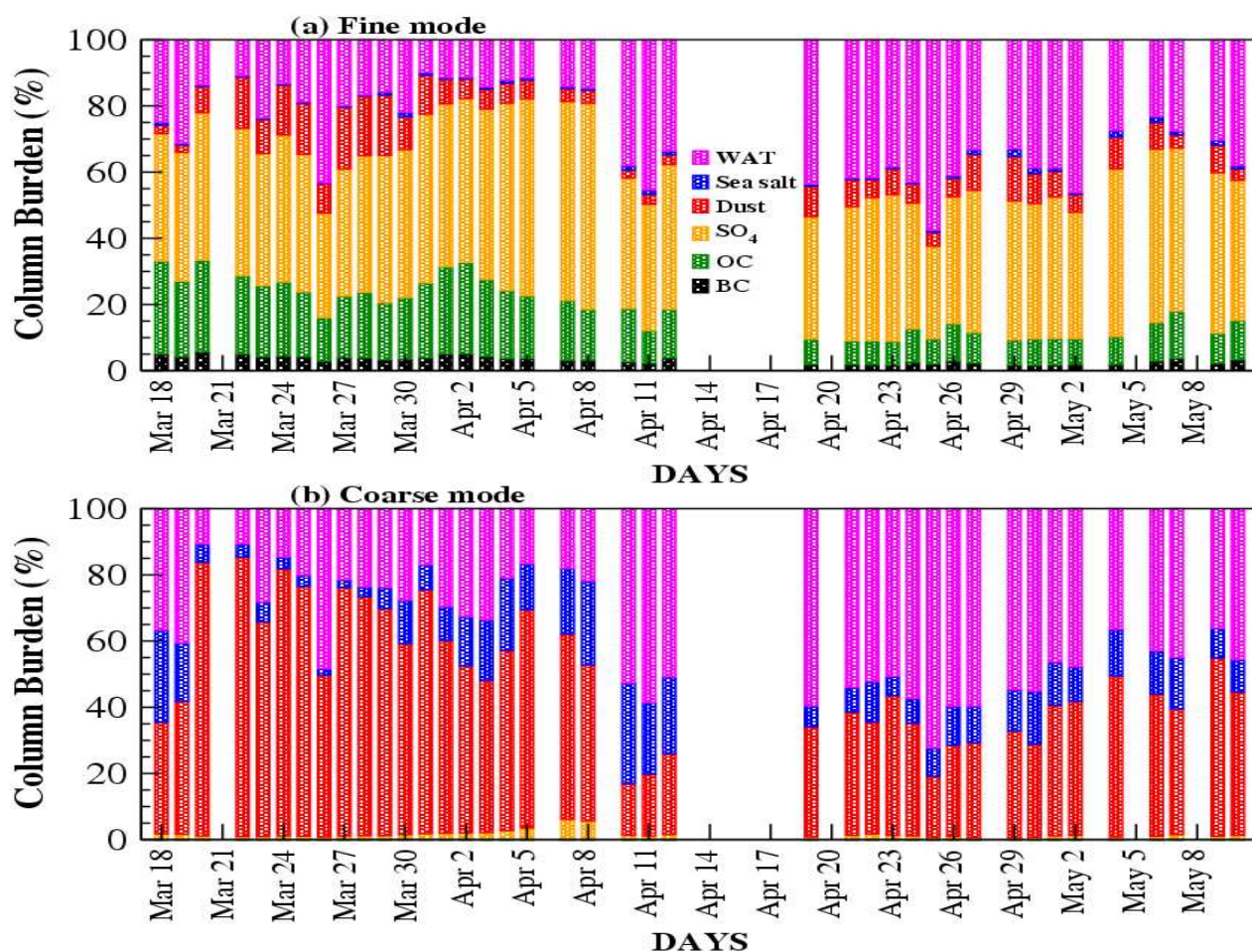


Fig.S1. The chemical composition of the simulated fine and coarse mode column burden during the ICARB cruise period.

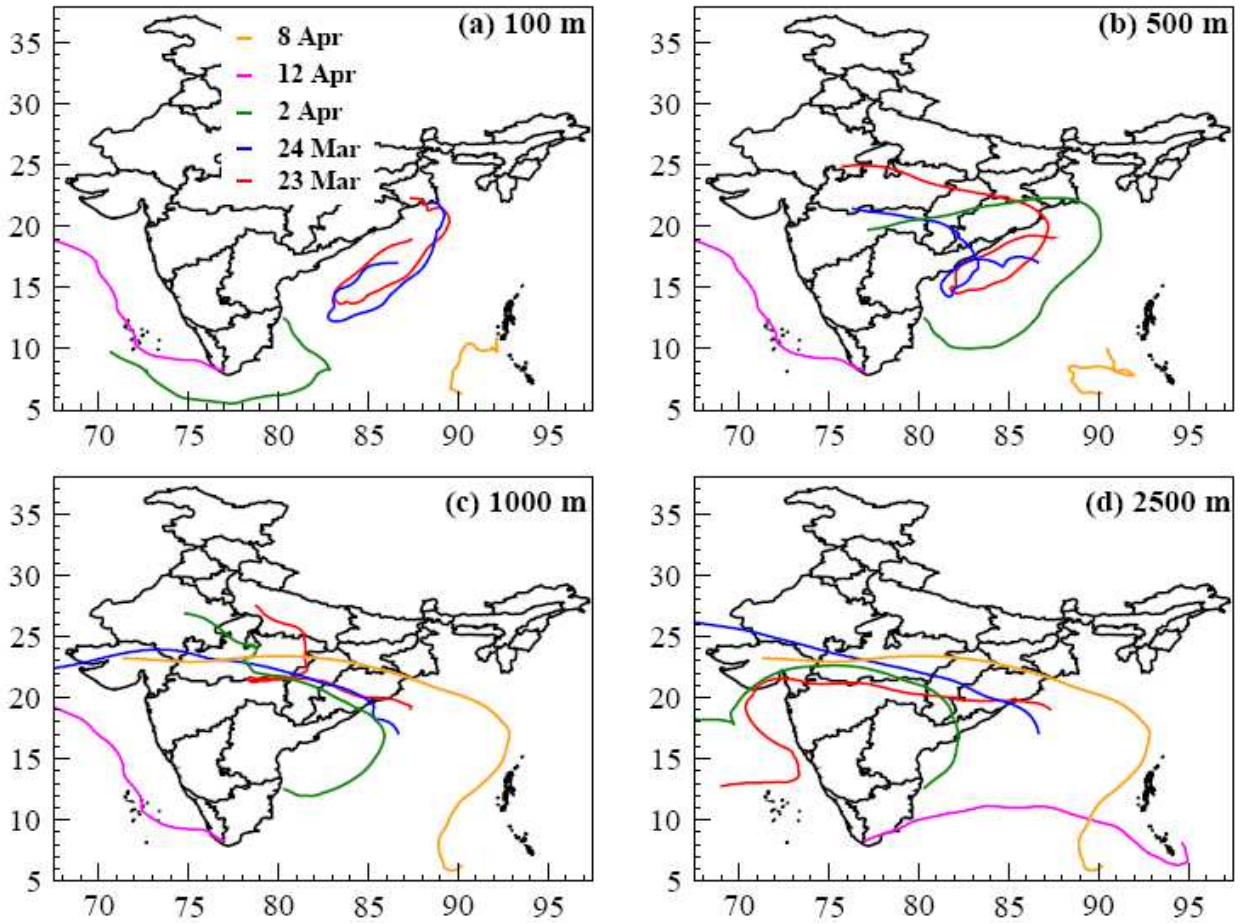


Fig.S2. Five day air back trajectory corresponding to 100 m, 500m, 1000 m, and 2500 m (a, b, c and d) during the days where ECHAM5.5-HAM failed to capture large values of AOD (24th March, 1st, 2nd, 8th, and 12th April), calculated using vertical velocity fields at an hourly interval.

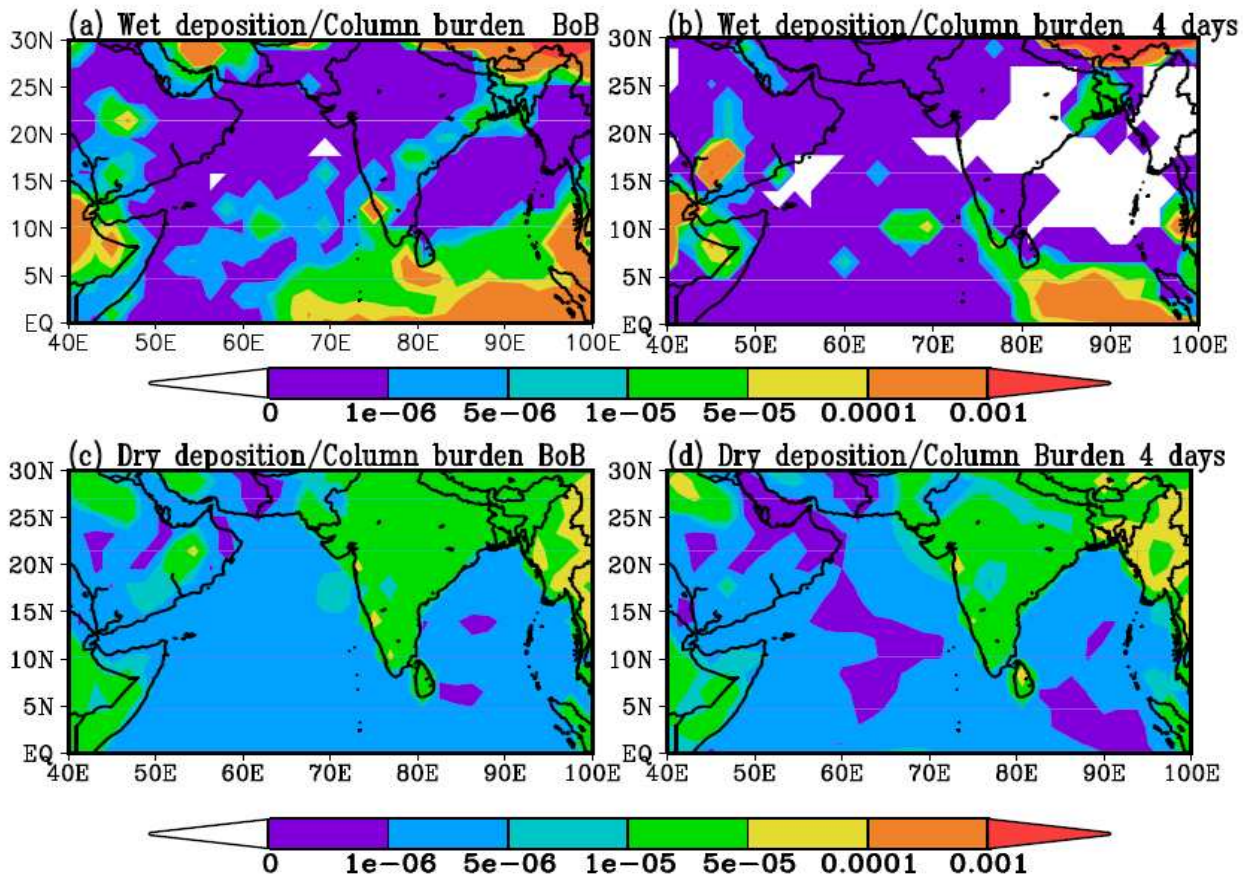


Fig.S3. Comparison of modelled normalised wet and dry deposition flux (deposition flux/column burden) for the entire BoB periods (18 March – 11 April; a & c) and for the average of 4 days where ECHAM5.5-HAM failed capture large AODs (24th March, 1st, 2nd, and 8th April, b & d).

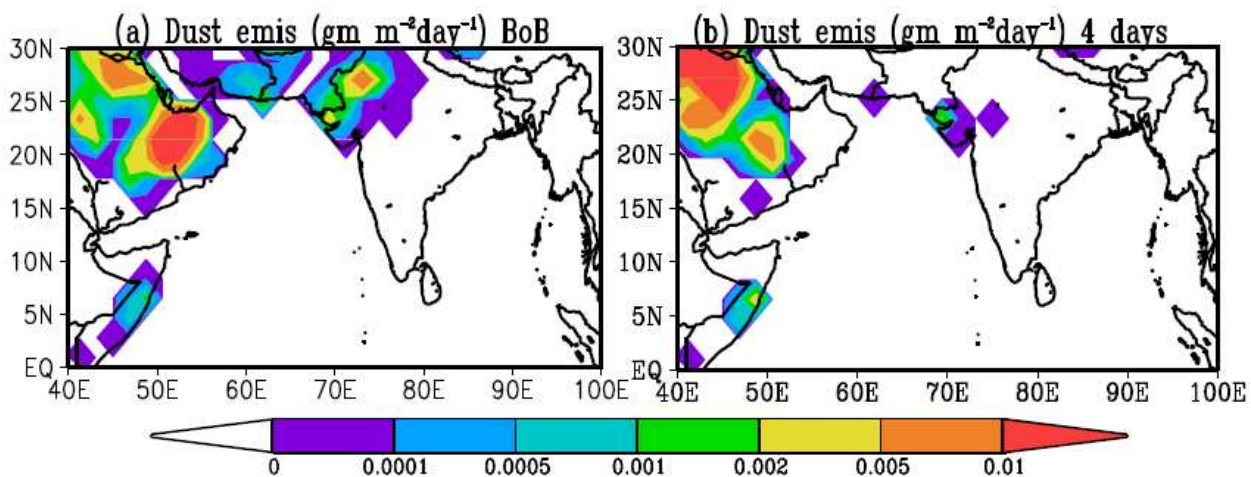


Fig.S4. Comparison of modelled dust emissions ($\text{gm m}^{-2} \text{day}^{-1}$) for the entire BoB periods (18 March – 11 April; a & c) and for the average of 4 days where missing dust source regions in ECHAM5.5-HAM (18th March, 19th March, 28th March, and 2nd April).

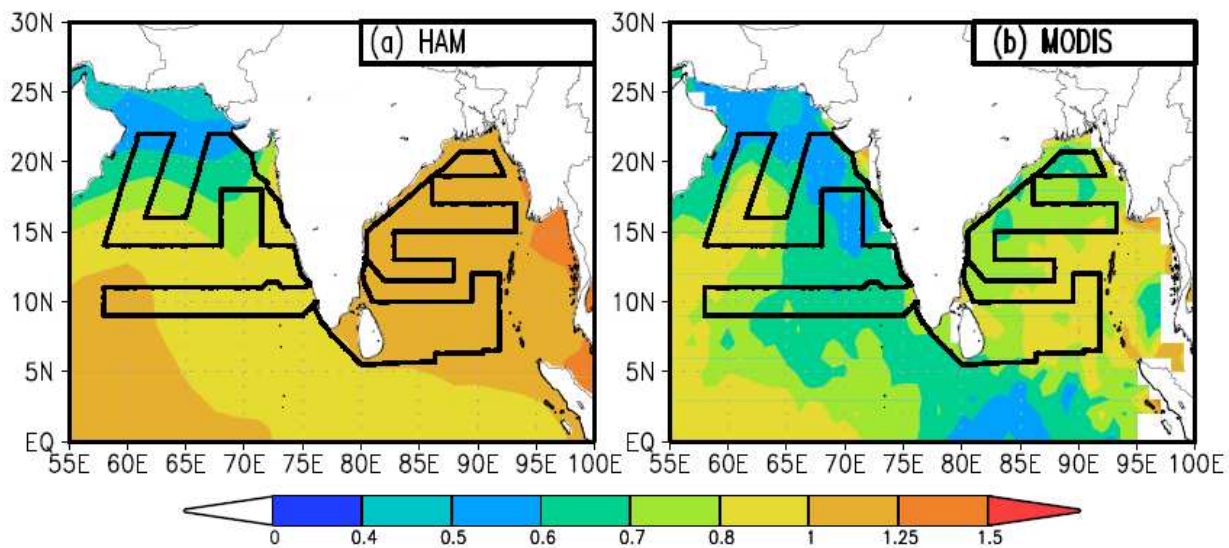


Fig.S5. Comparison of the spatial distribution of the simulated Ångström exponent (550 nm/825 nm) against MODIS derived Ångström exponent (550 nm/865 nm) during the ICARB cruise period.