

1 **Tropospheric warming over the North Indian Ocean caused by the South Asian**
2 **anthropogenic aerosols: possible implications**

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16 **Supplementary material**

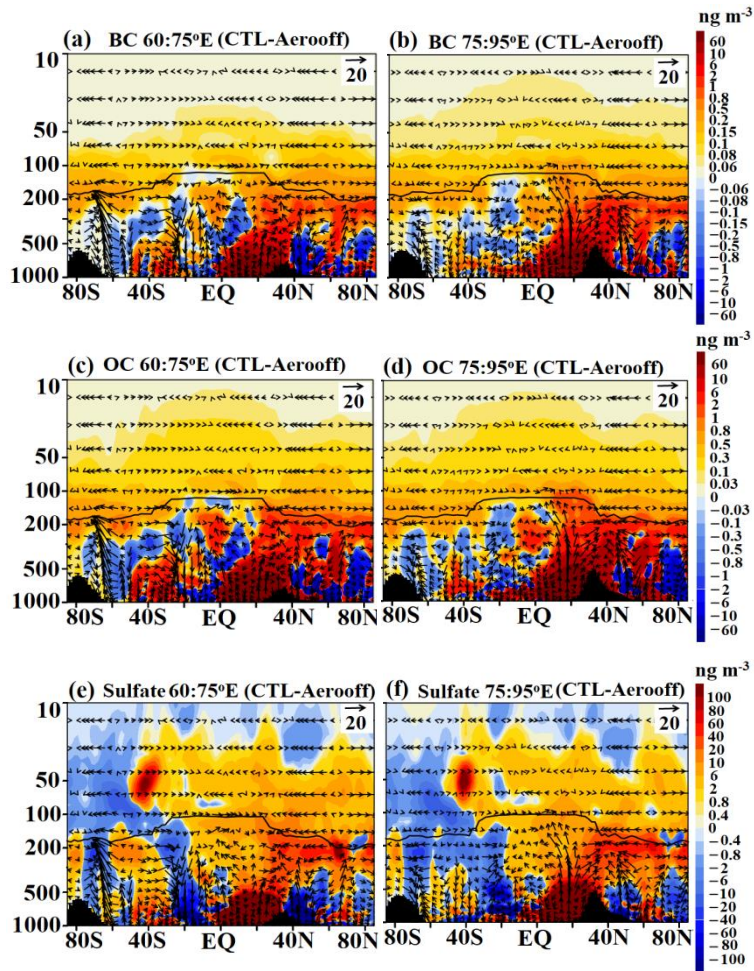
17 Table-S1: Mean radiative forcing ($W m^{-2}$) (averaged for spring) at the Top of the Atmosphere
18 (TOA), surface (Surface) and In-atmosphere (TOA- Surface) averaged over the Indo-
19 Gangetic Plan (IGP, Lon:75 – 83° E, lat: 26 – 30° N), Arabian Sea (A.S.: lon: 55 – 70° E,
20 lat: 8 – 20 N), and Bay of Bengal (BoB) (Lon:88 – 92° E, lat:12 – 20° N) from all aerosols
21 (CTL -Aerooff), BC (CTL - BCoff), OC (CTL - OCoff) and sulfate (CTL - Suloff).

CTL-Aerooff			
	TOA ($W m^{-2}$)	Surface ($W m^{-2}$)	In-atmosphere ($W m^{-2}$)
IGP	1.27±0.16	-11.16±0.50	12.44±0.42
A.S	-0.72±0.14	-3.009±0.28	2.27±0.19
BoB	-1.24±0.15	-5.14±0.44	3.89±0.30
CTL-BCoff			
IGP	4.33±0.17	-9.27±0.37	13.61±0.44
A.S	1.24±0.13	-2.56±0.25	3.81±0.23
BoB	1.54±0.26	-3.70±0.49	5.25±0.39
CTL-OCoff			

IGP	-0.44±0.15	-2.56±0.45	2.12±0.42
A.S	-0.216±0.13	-0.49±0.31	0.27±0.10
BoB	-0.41±0.20	-0.79±0.34	0.38±0.19
CTL-Suloff			
IGP	-1.62±0.18	-2.67±0.36	1.05±0.30
A.S	-1.55±0.16	-1.19±0.24	-0.36±0.10
BoB	-2.14±0.17	-2.04±0.44	-0.095±0.032

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37 Figure S1: Meridional cross-section over the Arabian Sea (averaged 60 – 75° E) and Bay-of-
 38 Bengal (75 – 95° E) averaged for the spring season of anomalies (ng m^{-3}) from CTL-Aerooff
 39 for (a-b) BC aerosols, (c-d) OC aerosols, (e-f) sulfate aerosols. Vectors in Figs. a-f indicate
 40 anomalies of winds (m s^{-1}) (the vertical velocity field has been scaled by 300 and the units
 41 are m s^{-1}).

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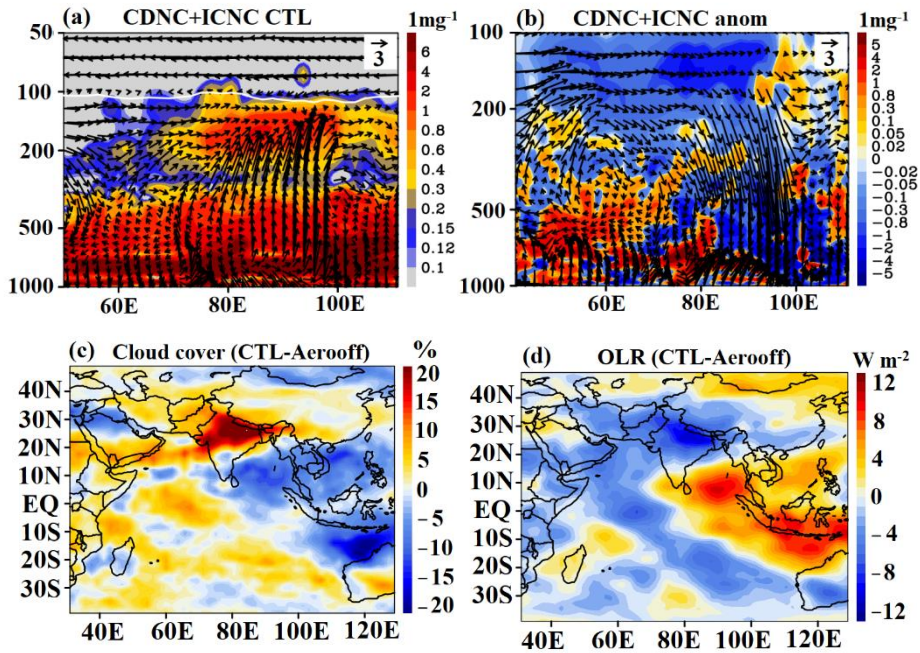
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57 Figure S2: (a) Vertical distribution of Cloud Droplet Number Concentration (CDNC) and Ice
58 Crystal Number Concentration (ICNC) together (m g^{-1}) from CTL simulation averaged for 0 –
59 20° N and the spring season during 2001 – 2016, (b) same as (a) but for anomalies (CTL -
60 Aerooff), (c) spatial distribution of anomalies of cloud cover (%) (CTL - Aerooff) averaged for
61 the spring season during 2001 – 2016, (d) spatial distribution of anomalies of outgoing
62 longwave radiation (W m^{-2}) (CTL - Aerooff) averaged for the spring season during 2001 –
63 2016.

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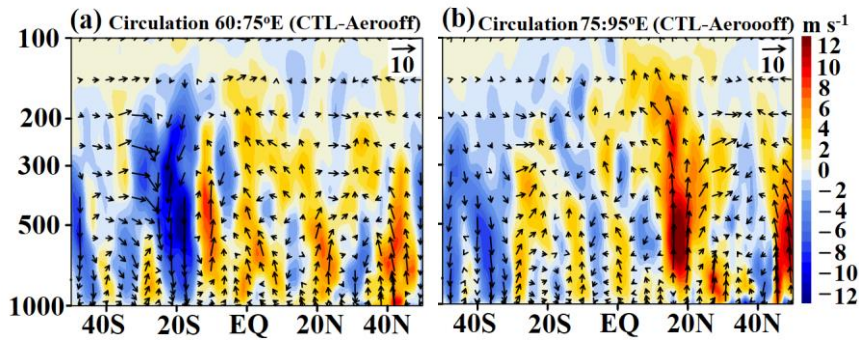


Figure S3: Meridional section of anomalies in circulation averaged for the spring season during 2001 – 2016 (CTL-Aerooff) over the (a) Arabian Sea (60 – 75° E) (b) Bay of Bengal region (75 – 95° E), shades indicate anomalies in the vertical velocity field (m s^{-1}), vectors indicate anomalies in winds (the vertical velocity field has been scaled by 300 and the units are m s^{-1}).

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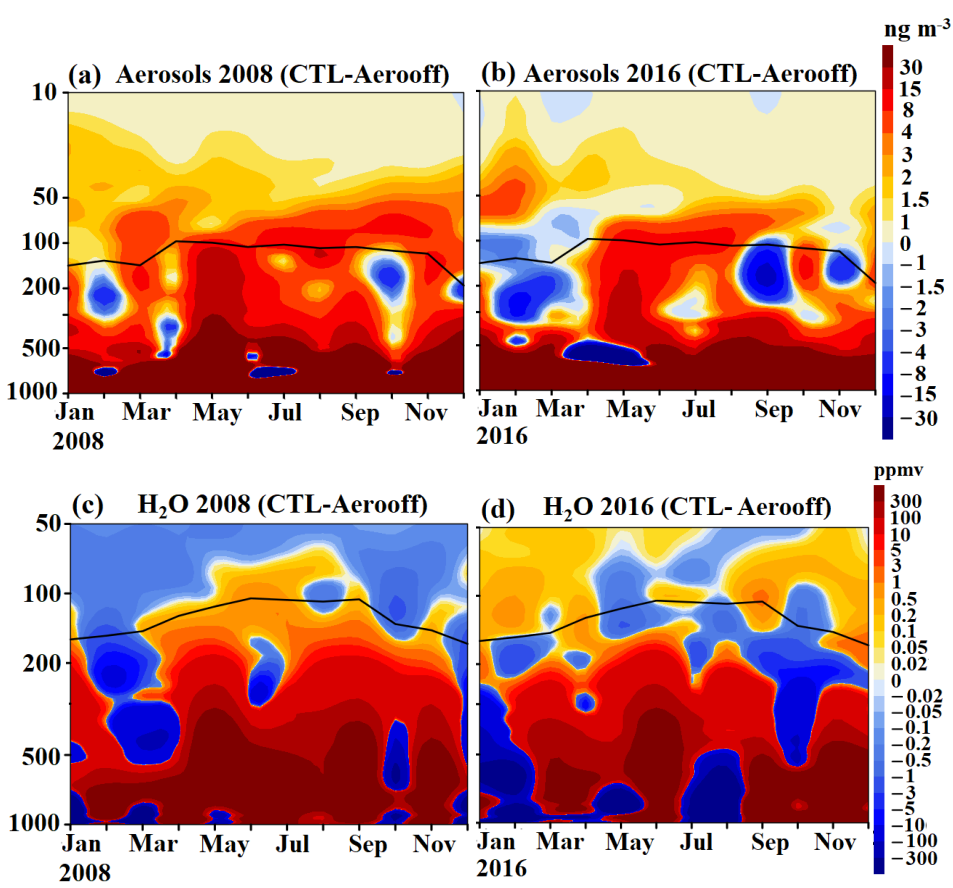
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Figure S4: Annual distribution of anomalies aerosols (average of BC, OC and Sulfate) (ng m^{-3}) averaged over Arabian Sea and Bay-of-Bengal-North Indian region ($55 - 100^\circ \text{E}$, $10 - 30^\circ \text{N}$) (CTL-Aerooff) for (a) 2008, (b) 2016. (c-d) same as (a-b) but for anomalies of water vapour (ppmv).