

Supplementary Information

Space-time variability of ambient PM_{2.5} diurnal pattern over India from 18-years (2000-2017) of MERRA-2 reanalysis data

¹Kunal Bali*, ^{1,2}Sagnik Dey, ¹Dilip Ganguly and ^{3,4}Kirk R. Smith

¹Centre for Atmospheric Sciences, Indian Institute of Technology Delhi, Hauz Khas, New Delhi, India

²Centre of Excellence for Research on Clean Air, Indian Institute of Technology Delhi, Hauz Khas, New Delhi, India

³School of Public Health, University of California, Berkeley, USA

⁴Collaborative Clean Air Policy Center, New Delhi, India

*Corresponding author: kunal.bali9@gmail.com

The supplementary information contains twenty figures and one table.

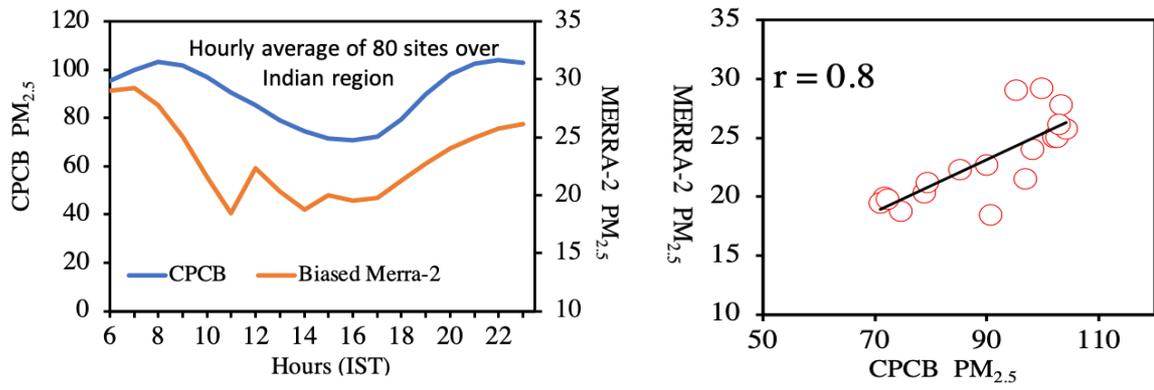


Figure R1. Diurnal climatology and correlation (hourly average of 80 sites) of PM_{2.5} exposure the period of 2009-2017 over the Indian region.

JF-Hourly climatology (2000-2017)

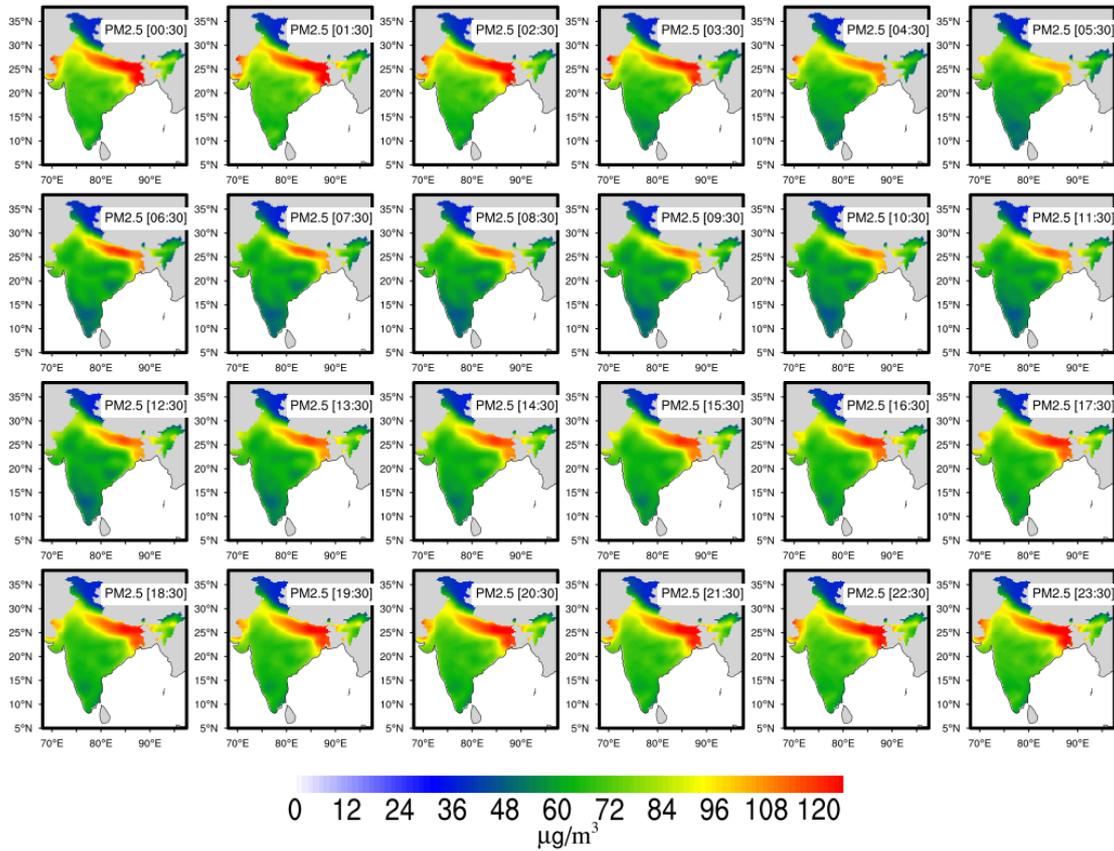


Figure S1. Hourly climatology of PM_{2.5} exposure during January-February (JF) for the period of 2000-2017 over the Indian region.

MAM-Hourly climatology (2000-2017)

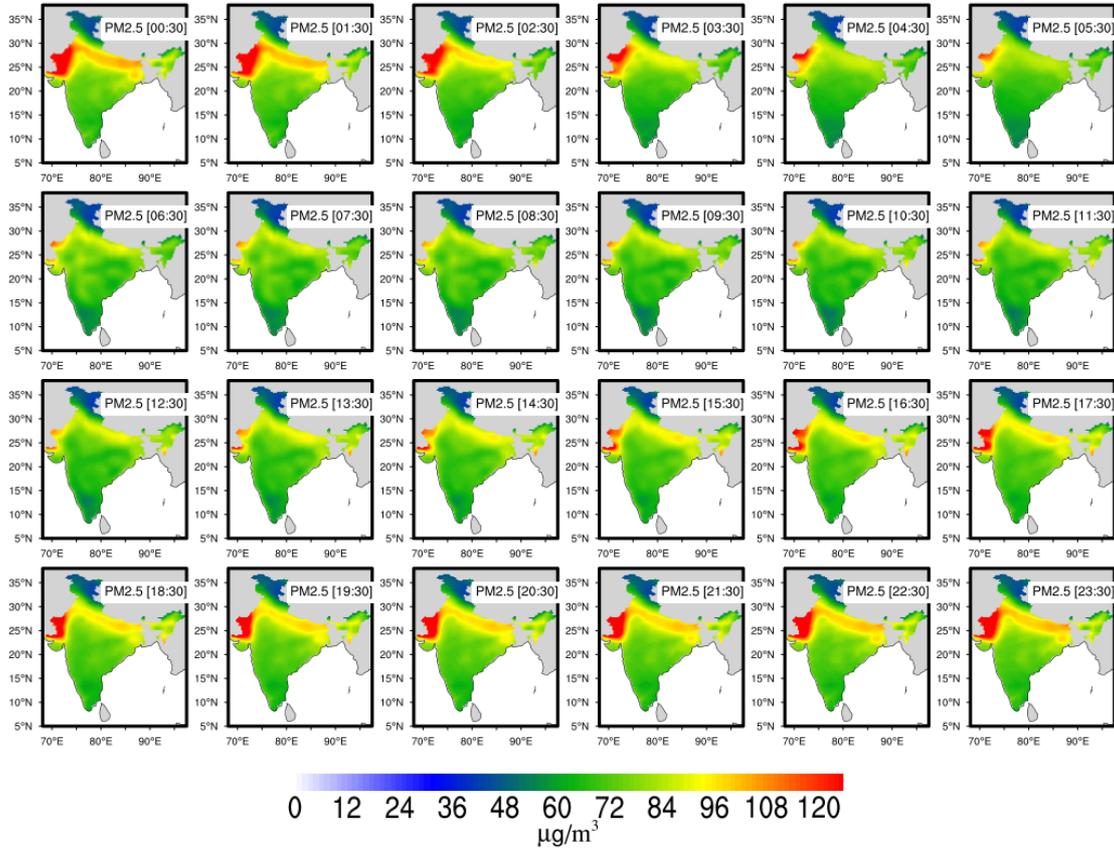


Figure S2. Hourly climatology of PM_{2.5} exposure during March-April-May (MAM) for the period of 2000-2017 over the Indian region.

JJAS-Hourly climatology (2000-2017)

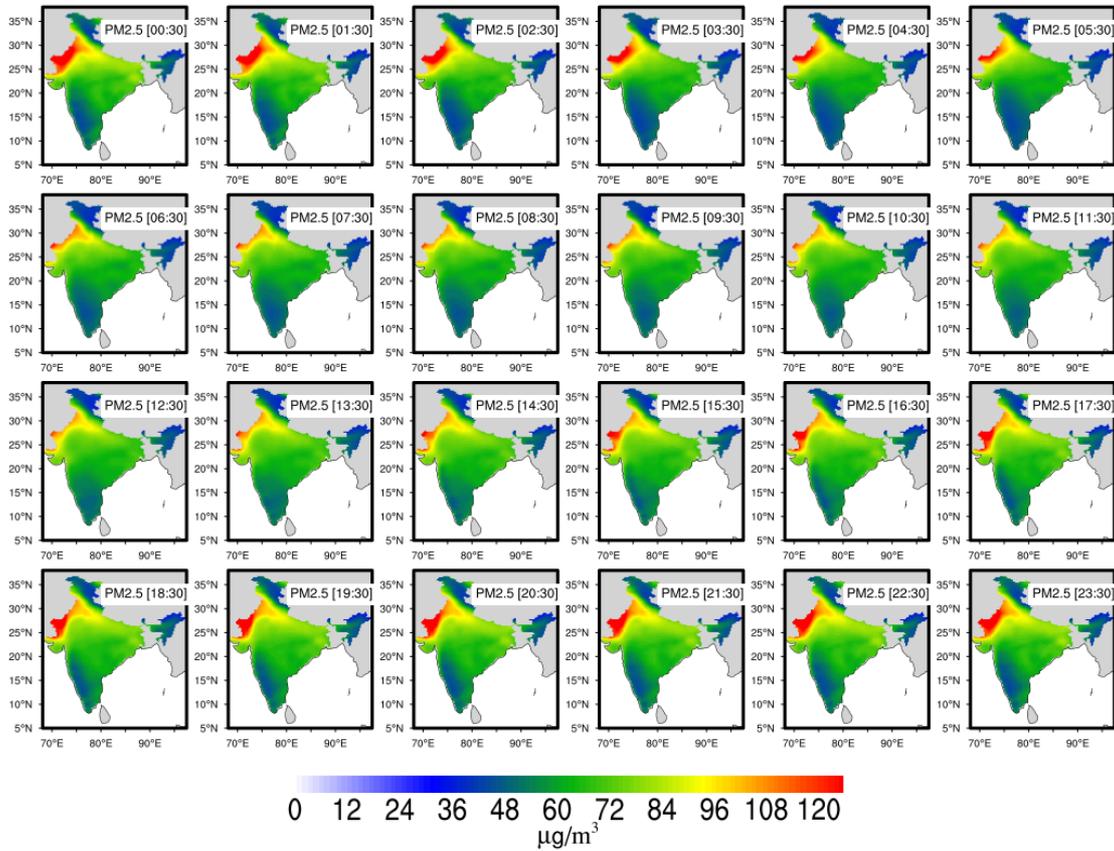


Figure S3. Hourly climatology of PM_{2.5} exposure during June-July-August-September (JJAS) for the period of 2000-2017 over the Indian region.

OND-Hourly climatology (2000-2017)

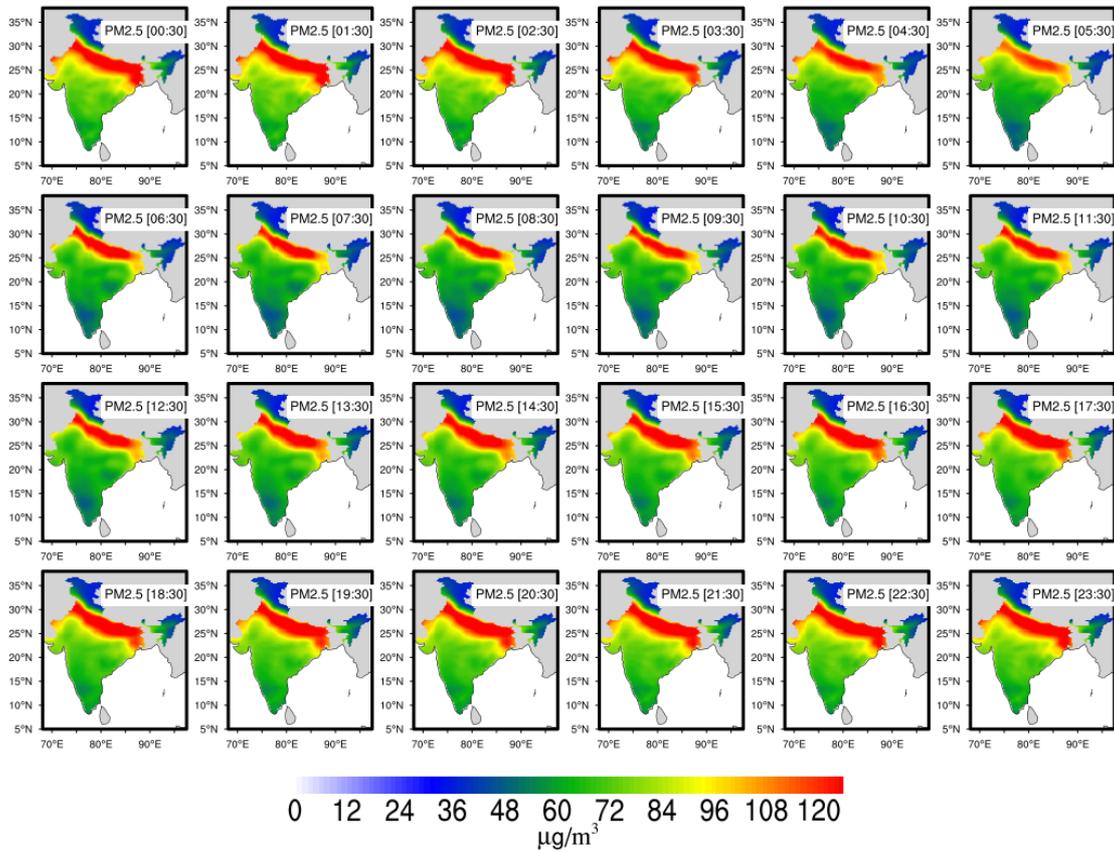


Figure S4. Hourly climatology of PM_{2.5} exposure during October-November-December (OND) for the period of 2000-2017 over the Indian region.

JF-Hourly Anomaly (2000-2017)

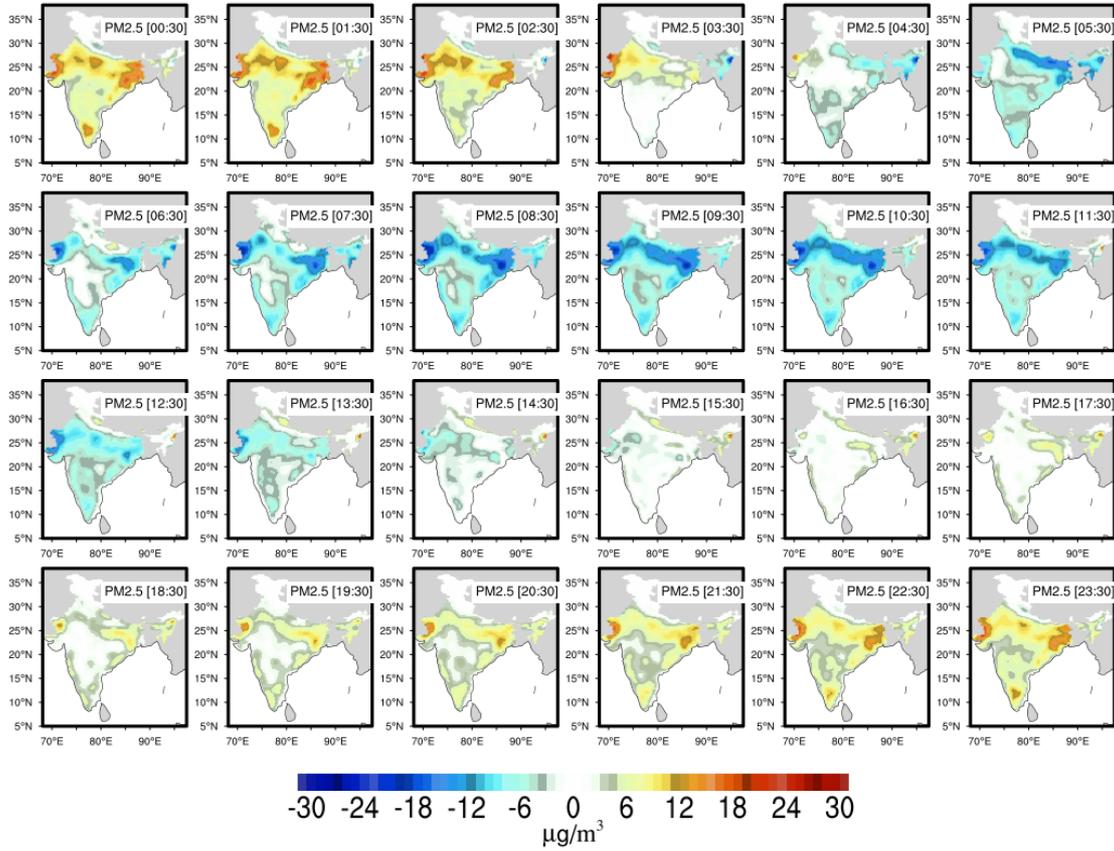


Figure S5. Hourly anomaly of PM_{2.5} exposure during January-February (JF) for the period of 2000-2017 over the Indian region.

MAM-Hourly Anomaly (2000-2017)

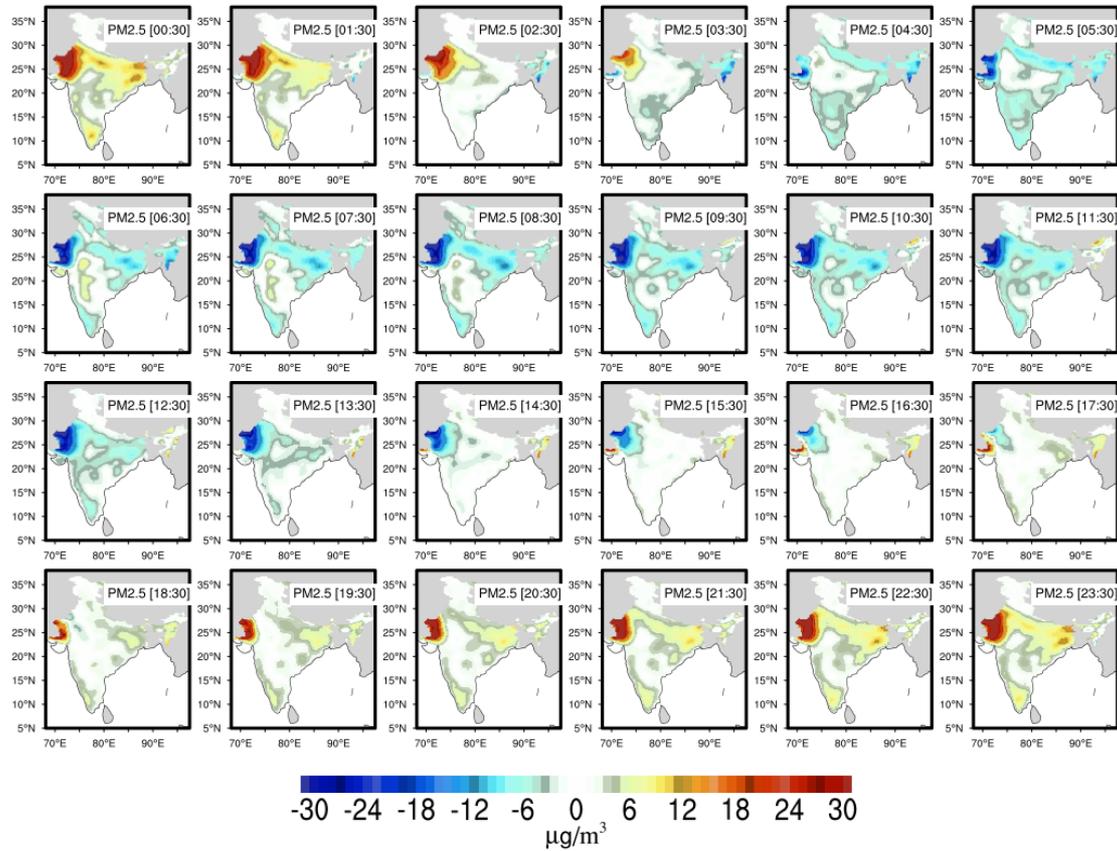


Figure S6. Hourly anomaly of PM_{2.5} exposure during March-April-May (MAM) for the period of 2000-2017 over the Indian region.

JJAS-Hourly Anomaly (2000-2017)

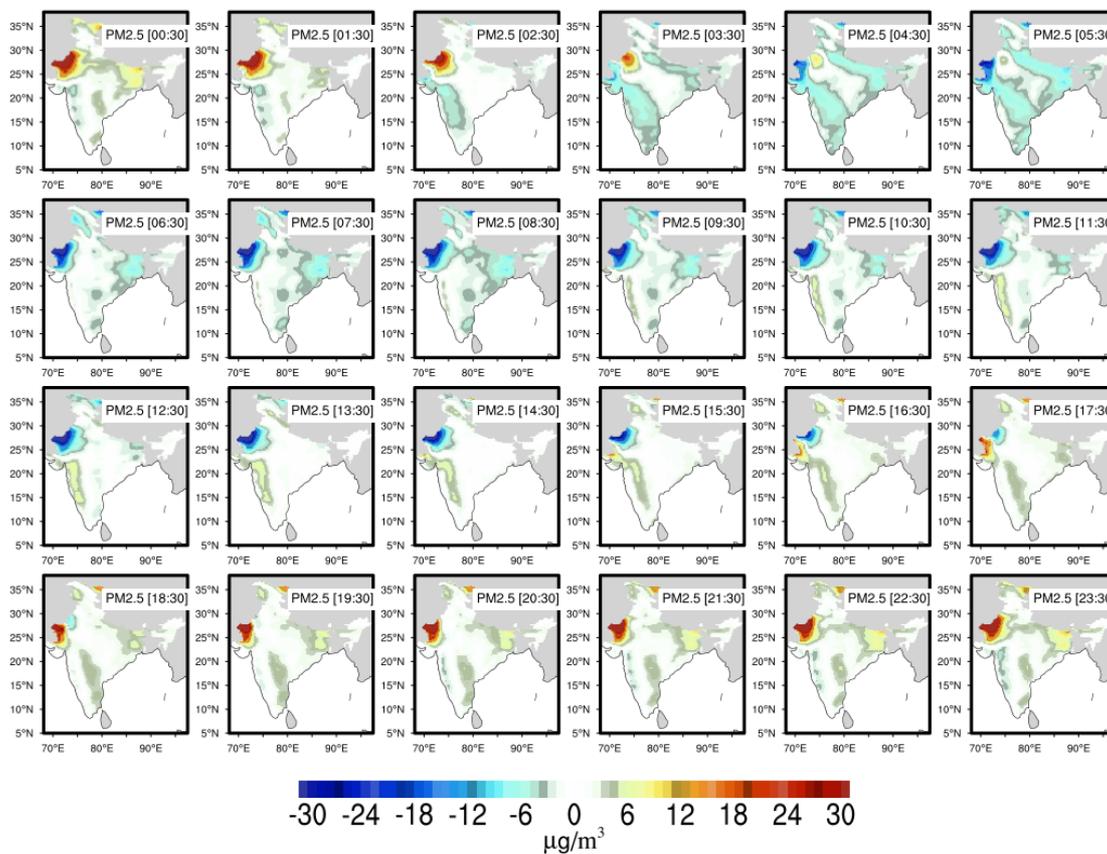


Figure S7. Hourly anomaly of PM_{2.5} exposure during June-July-August-September (JJAS) for the period of 2000-2017 over the Indian region.

OND-Hourly Anomaly (2000-2017)

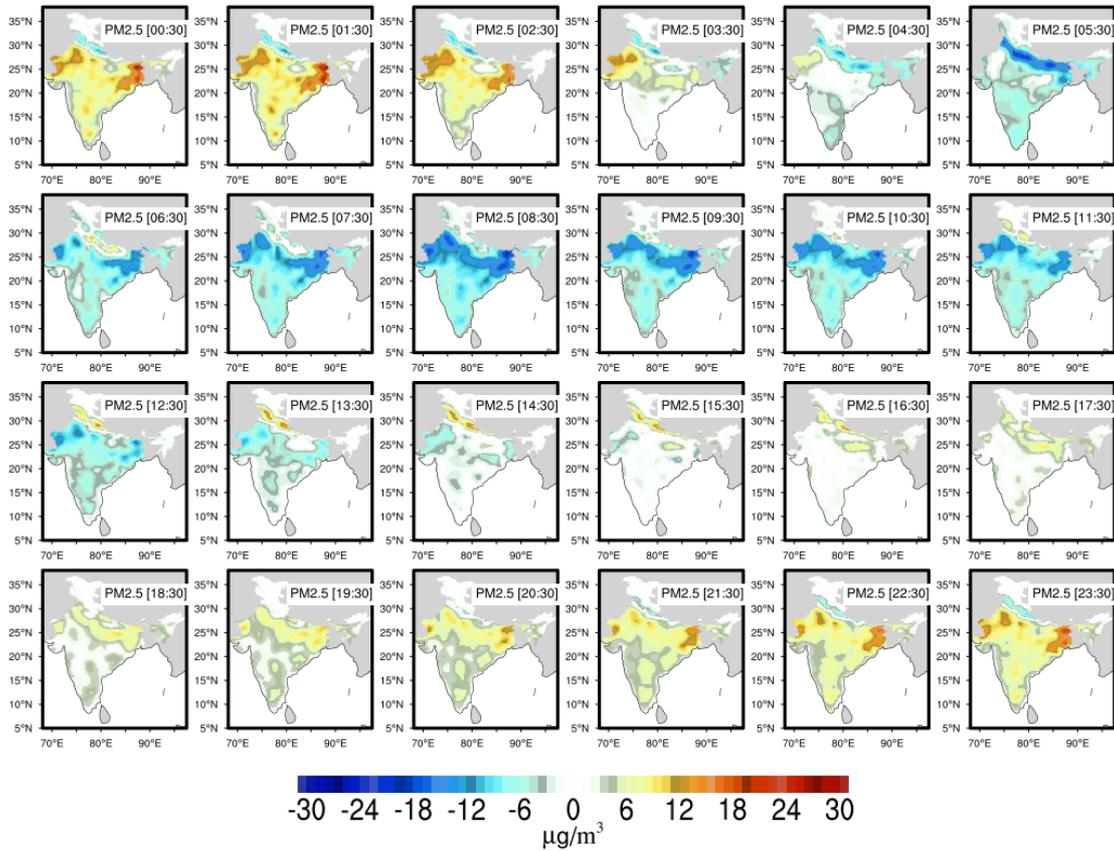


Figure S8. Hourly anomaly of PM_{2.5} exposure during October-November-December (OND) for the period of 2000-2017 over the Indian region.

JF Trend/Year (2000-2017)

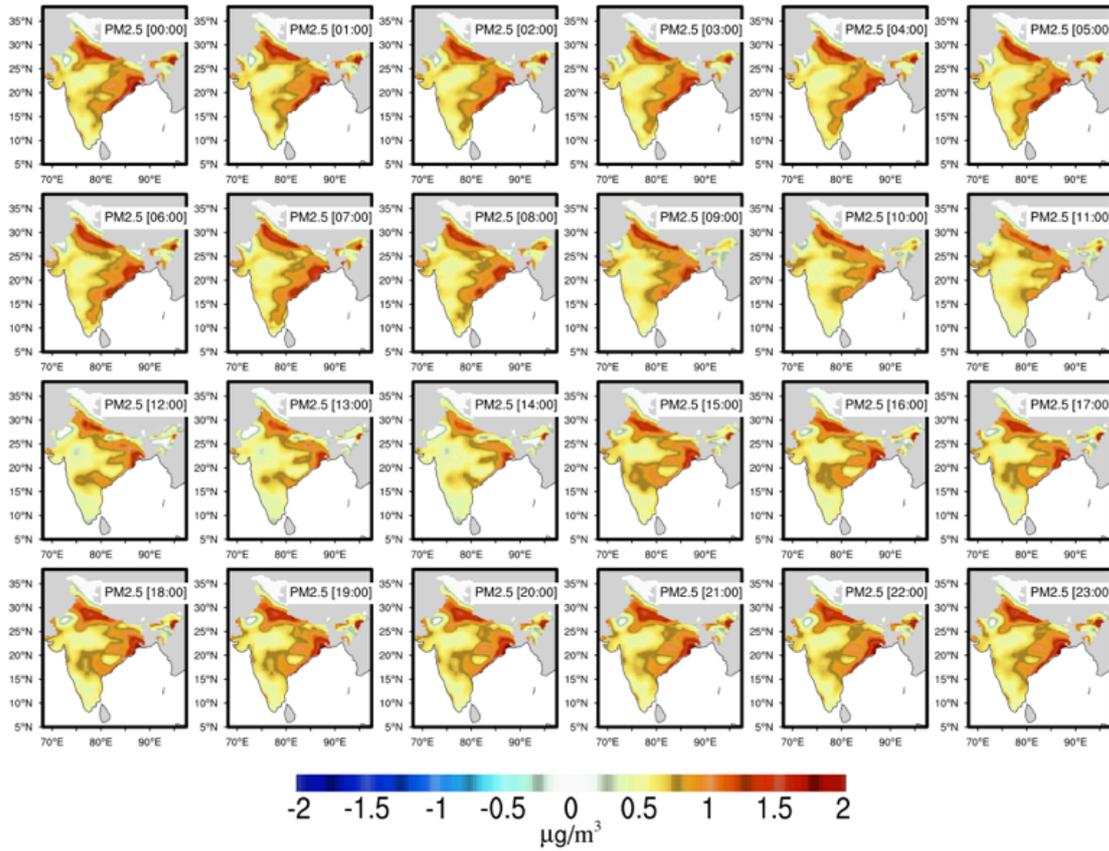


Figure S9. Hourly anomaly of PM_{2.5} exposure trend during January-February (JF) for the period of 2000-2017 over the Indian region.

MAM Trend/Year (2000-2017)

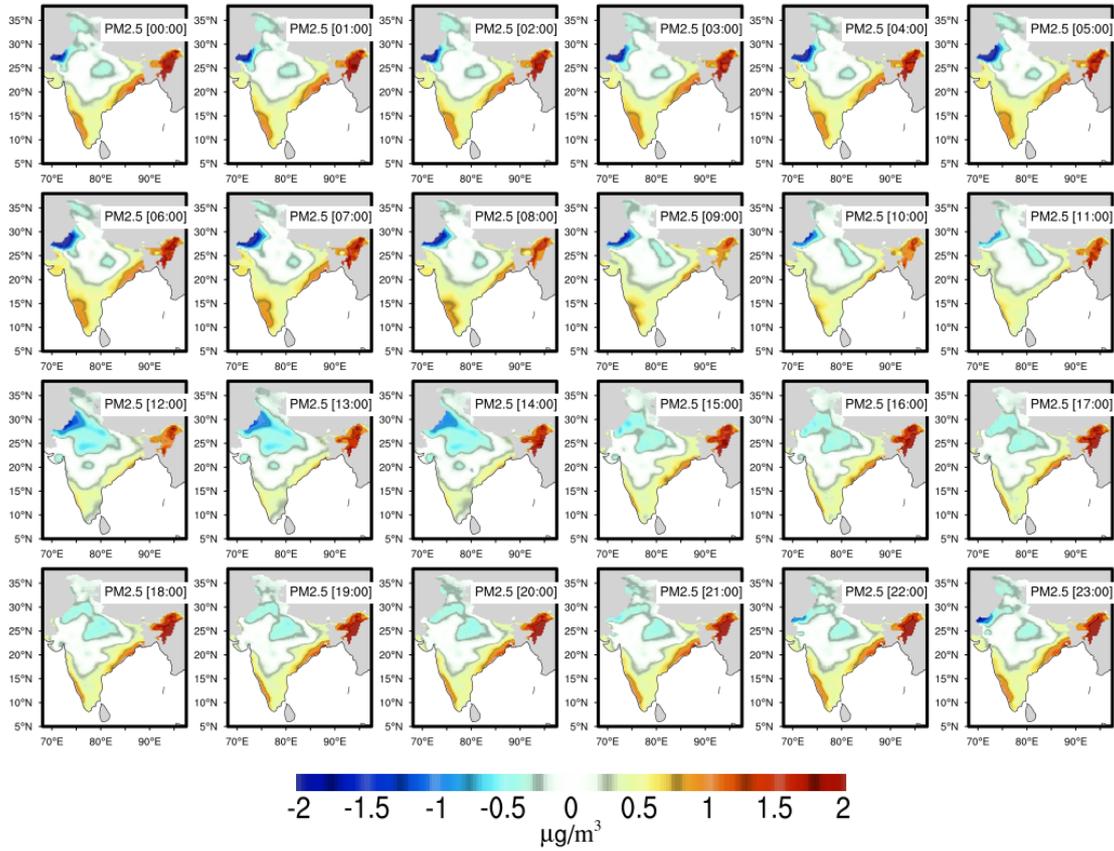


Figure S10. Hourly anomaly of PM_{2.5} exposure trend during March-April-May (MAM) for the period of 2000-2017 over the Indian region.

JJAS Trend/Year (2000-2017)

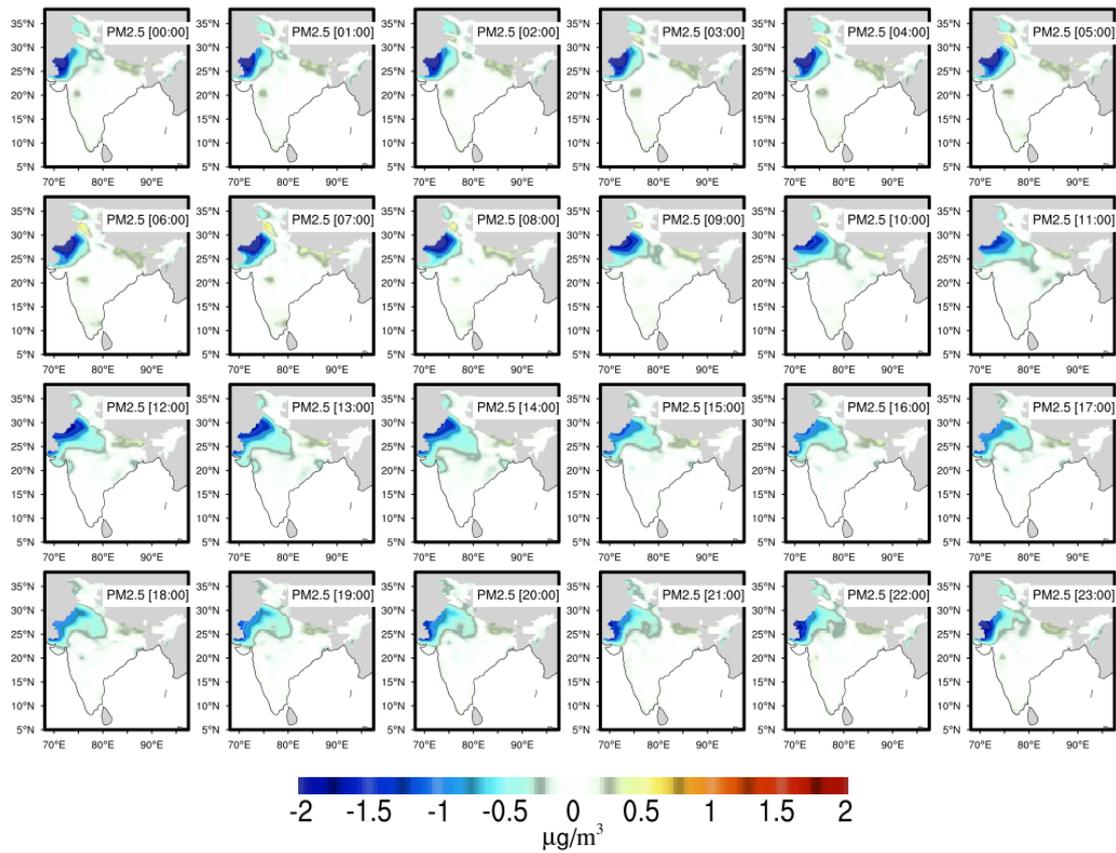


Figure S11. Hourly anomaly of PM_{2.5} exposure trend during June-July-August-September (JJAS) for the period of 2000-2017 over the Indian region.

OND Trend/Year (2000-2017)

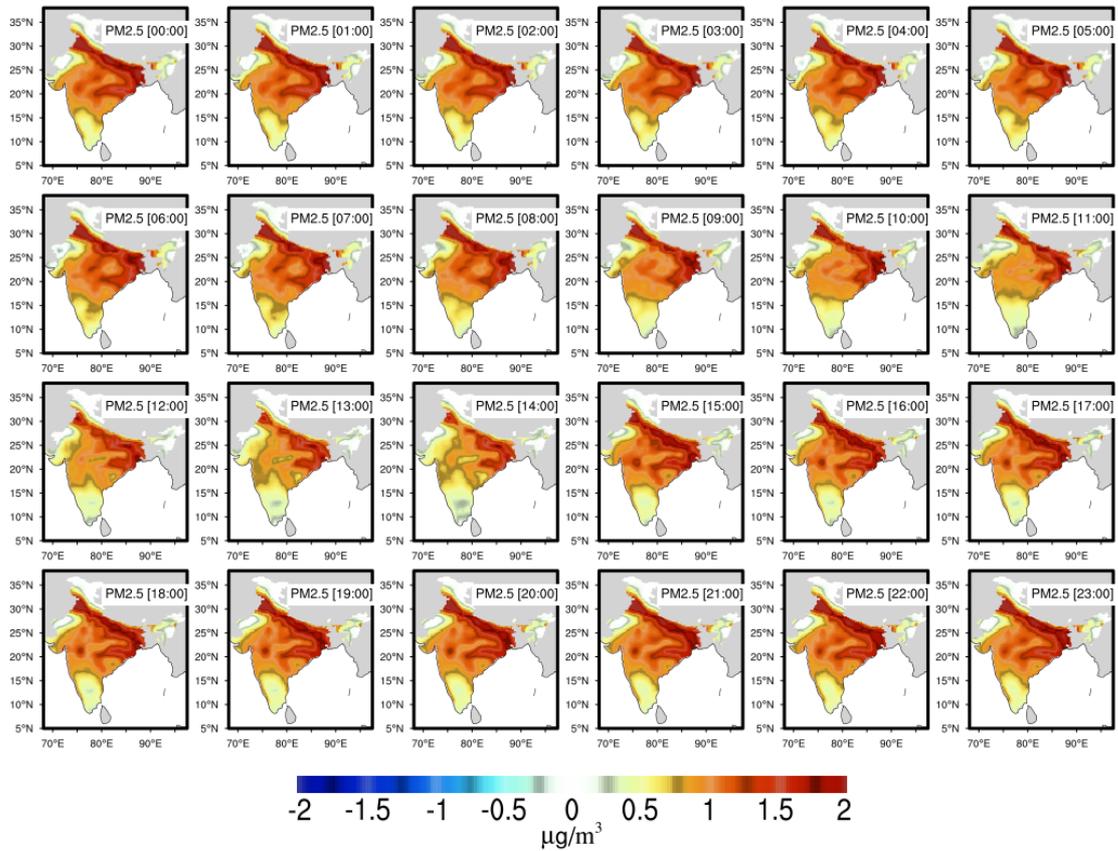


Figure S12. Hourly anomaly of PM_{2.5} exposure trend during October-November-December (OND) for the period of 2000-2017 over the Indian region.

JF Trend/Year (2000-2017)

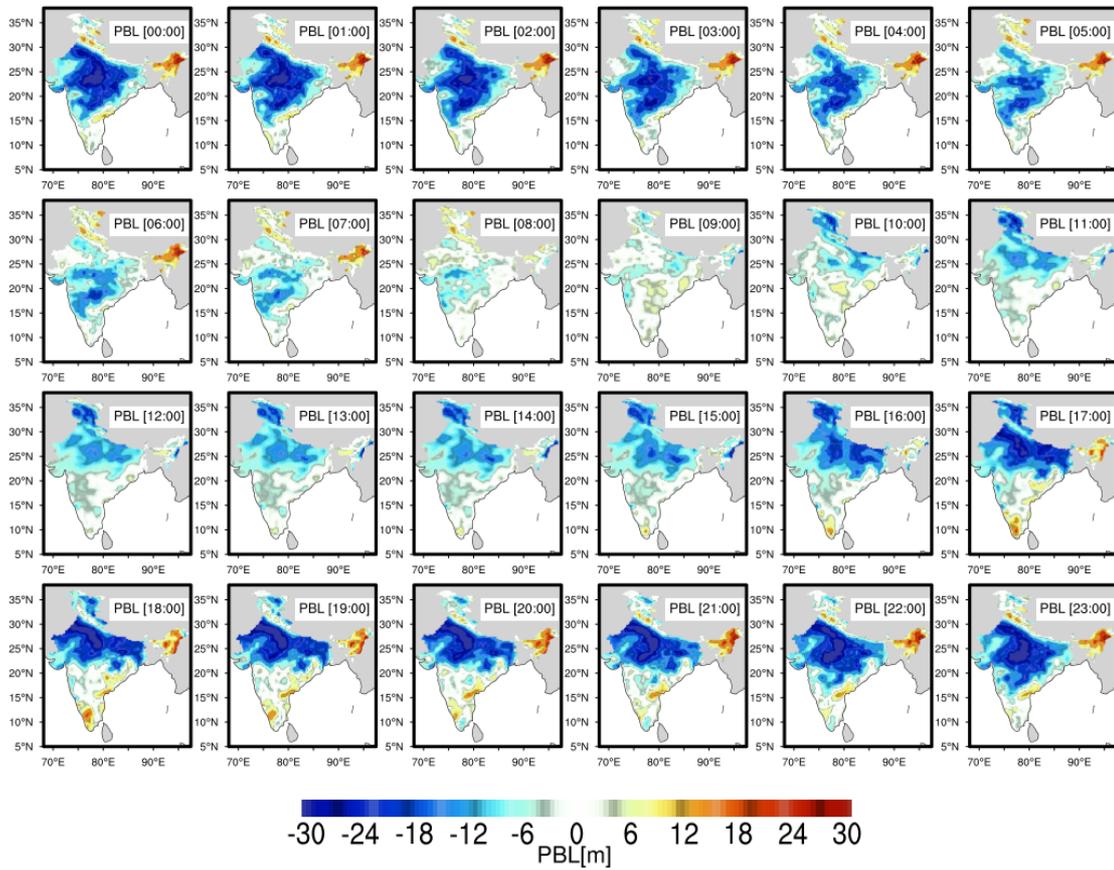


Figure S13. Annual trend of PBL during January-February (JF) for every hour for the period of 2000-2017 over the Indian region.

MAM Trend/Year (2000-2017)

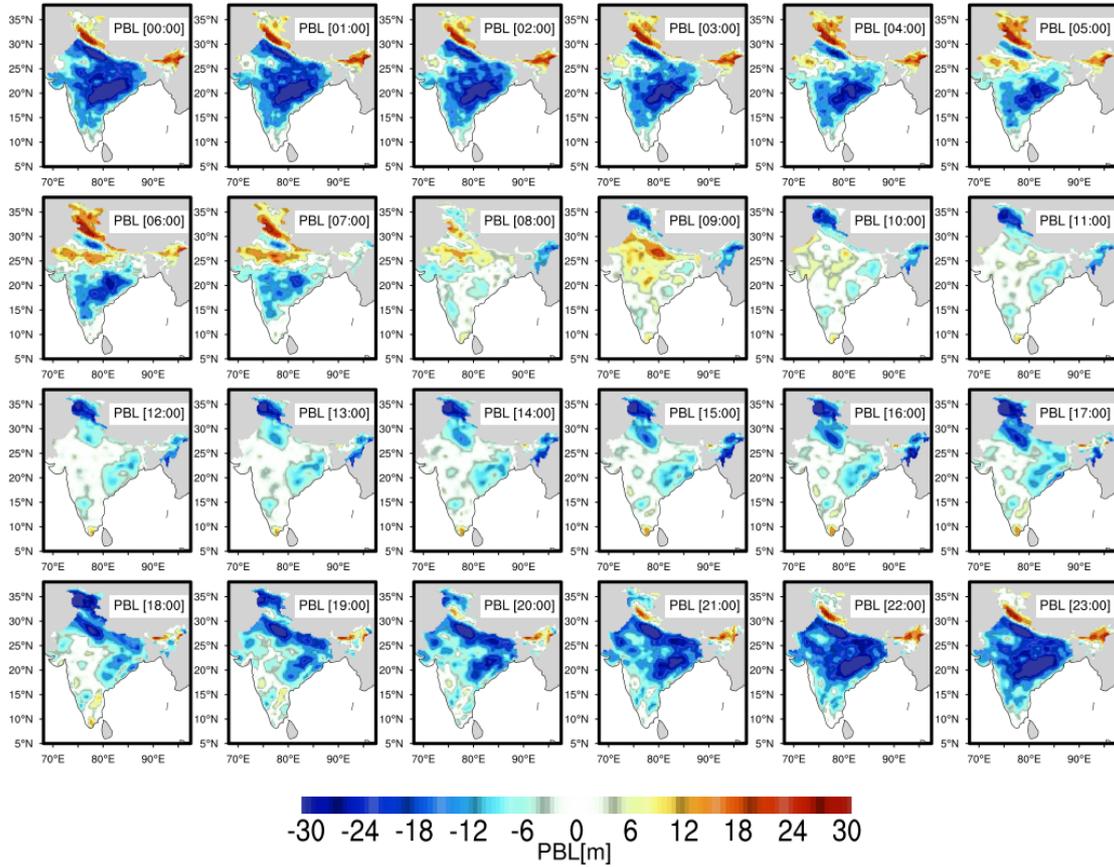


Figure S14. Annual trend of PBL during March-April-May (MAM) for every hour for the period of 2000-2017 over the Indian region.

JJAS Trend/Year (2000-2017)

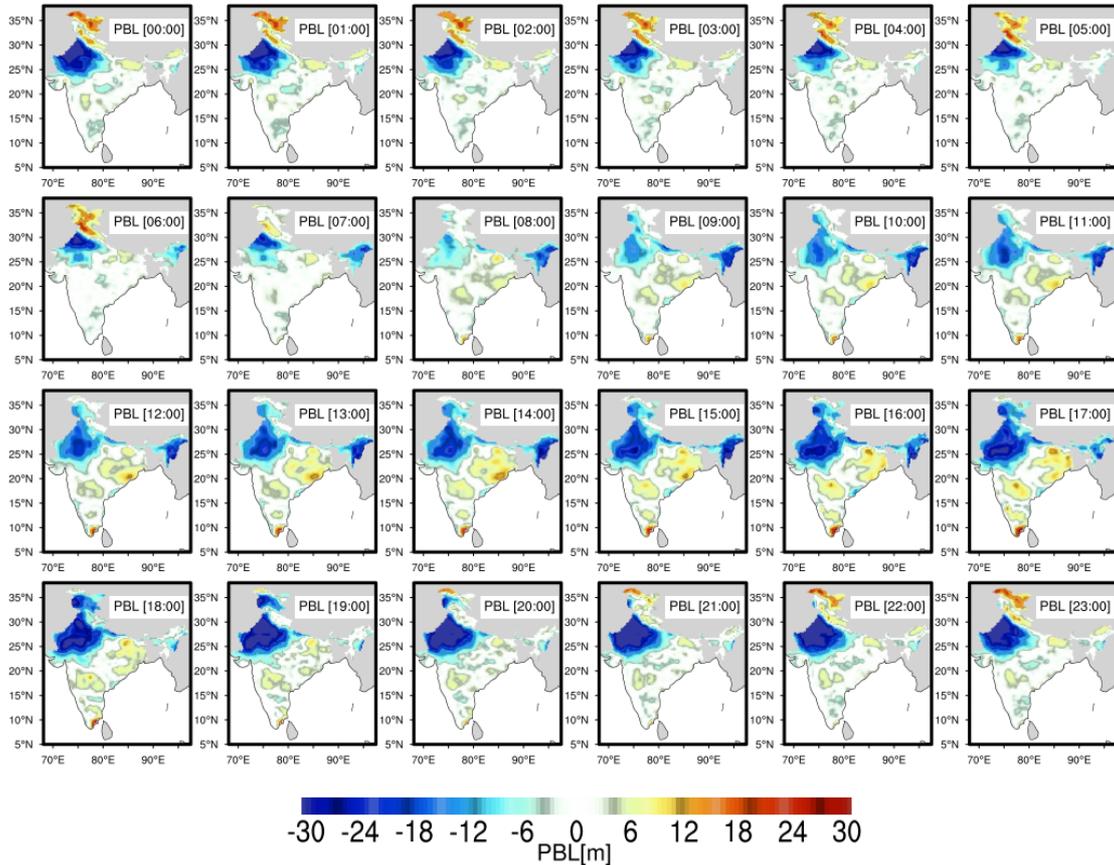


Figure S15. Annual trend of PBL during June-July-August-September (JJAS) for every hour for the period of 2000-2017 over the Indian region.

OND Trend/Year (2000-2017)

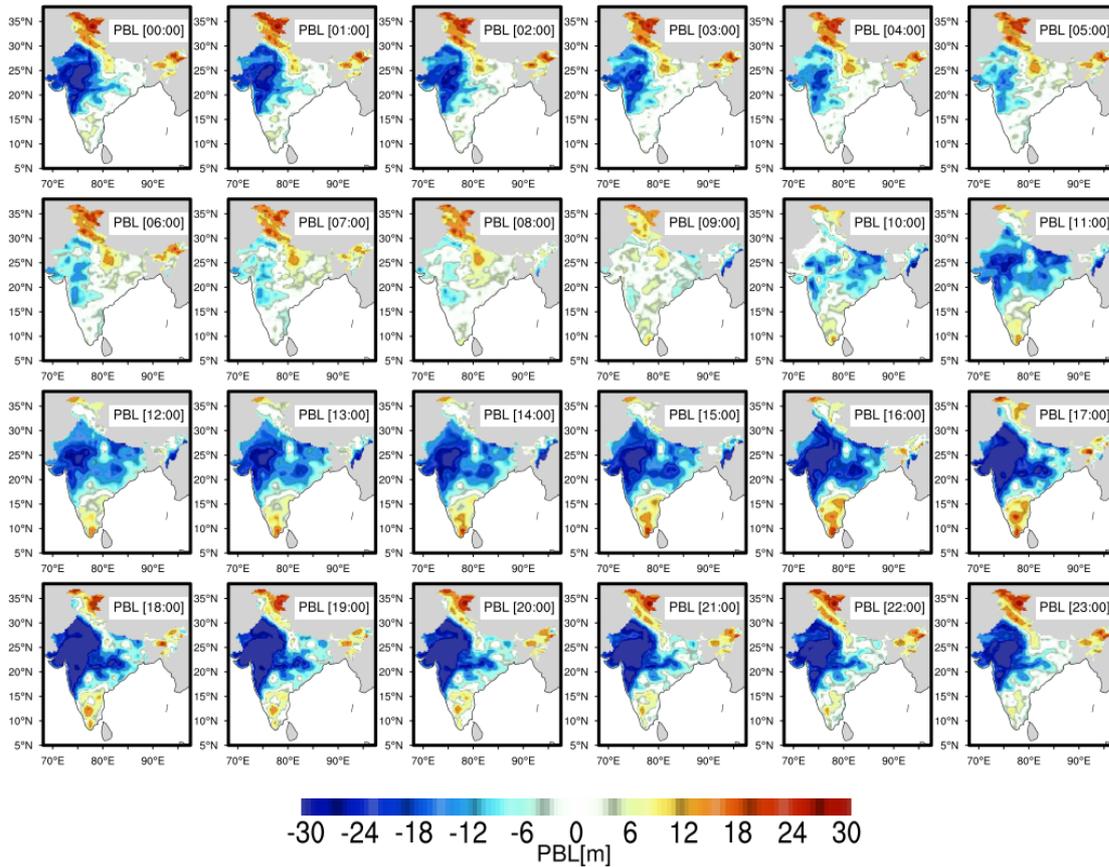


Figure S16. Annual trend of PBL during October-November-December (OND) for every hour for the period of 2000-2017 over the Indian region.

Trend/Year (2000-2017)

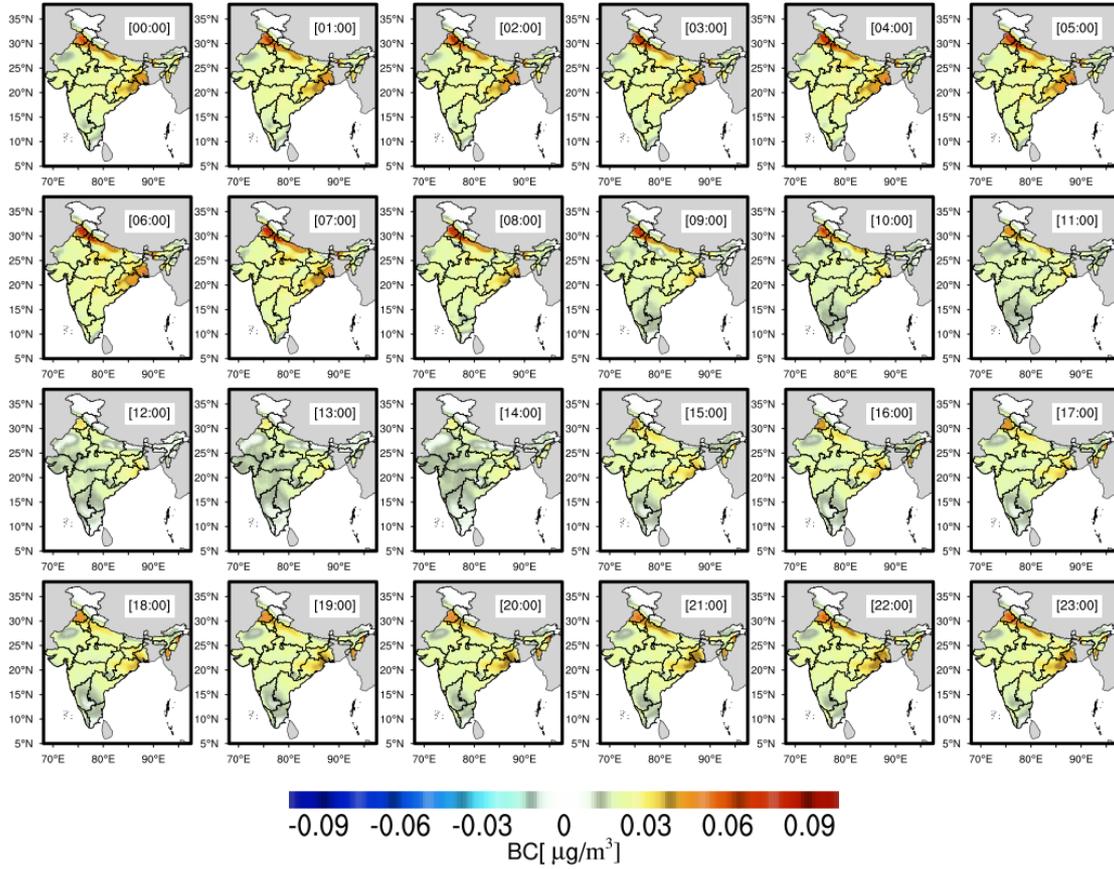


Figure S17. Annual trend of BC for every hour for the period of 2000-2017 over the Indian region.

Trend/Year (2000-2017)

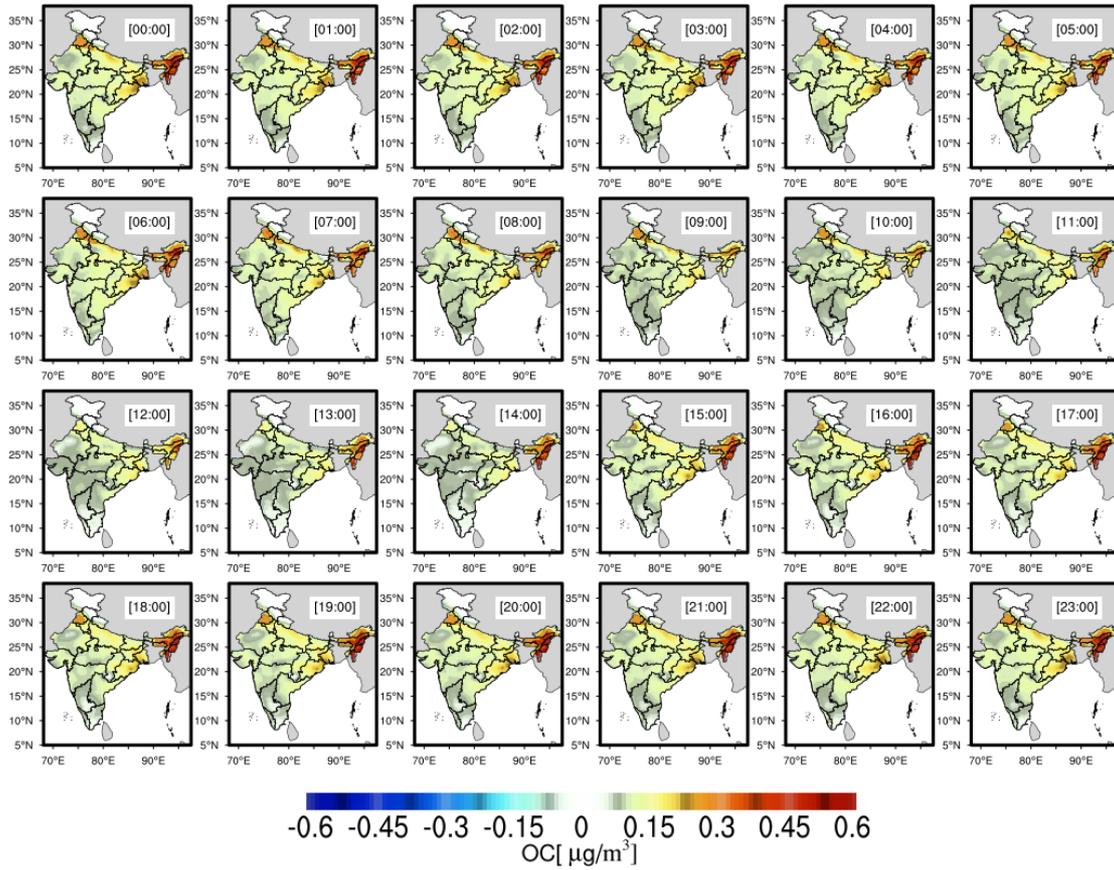


Figure S18. Annual trend of OC for every hour for the period of 2000-2017 over the Indian region.

Trend/Year (2000-2017)

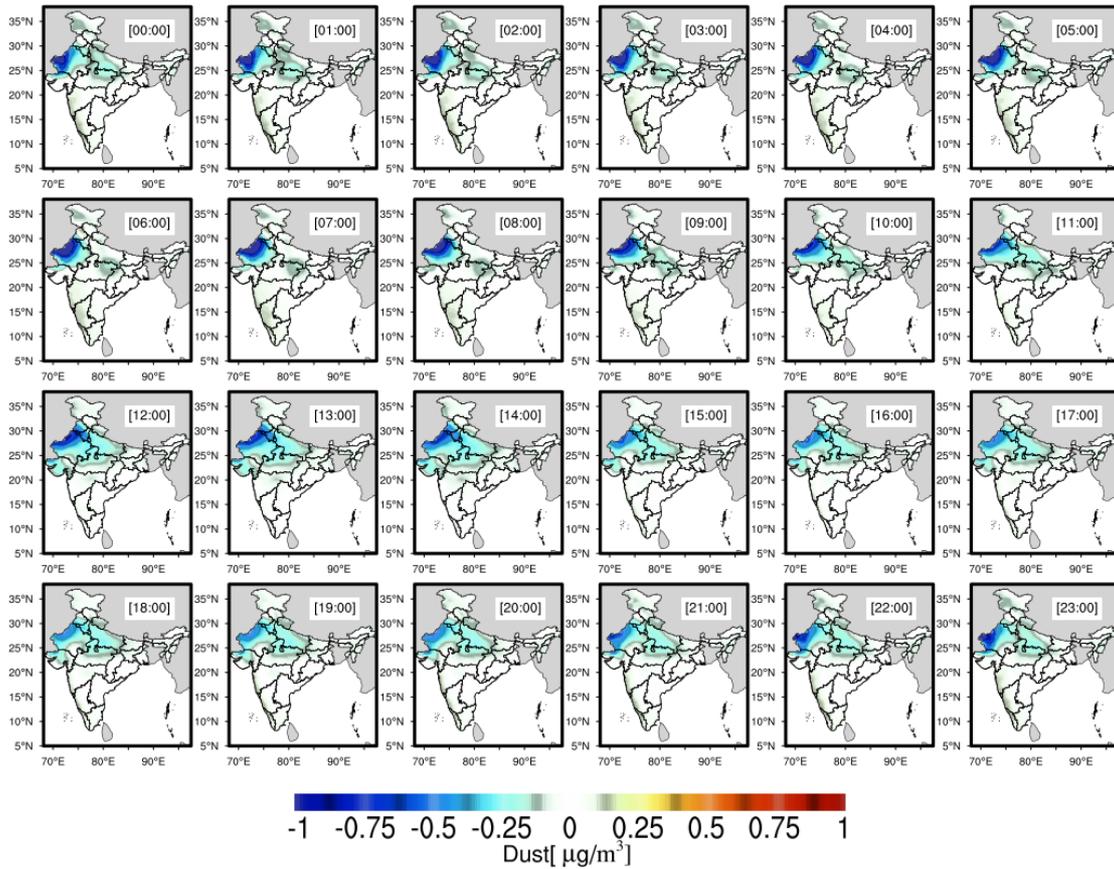


Figure S19. Annual trend of Dust for every hour for the period of 2000-2017 over the Indian region.

Table 1. Brief description of in-situ CPCB sampling sites over Indian region.

States	Cities	Coordinates
Delhi (North India)	Anand_Vihar	lon=77.3027_lat=28.6502
	Ashok_Vihar	lon=77.1758_lat=28.6885
	Aya_Nagar	lon=77.1329_lat=28.4720
	Bawana	lon=77.0463_lat=28.8055
	Burari_Crossing	lon=77.1975_lat=28.7283
	CRRI_Mathura_Road	lon=77.2749_lat=28.5505
	Dr_Karni_Singh_Shooting	lon=77.2671_lat=28.4997
	Delhi Technical University	lon=77.1177_lat=28.7501
	Dwarka	lon=77.0460_lat=28.5921
	East_Arjun_Nagar	lon=77.2947_lat=28.6556
	IGI_Airport_T3	lon=77.0844_lat=28.5551
	IHBAS_Dilshad_Garden	lon=77.3047_lat=28.6812
	ITO	lon=77.2506_lat=28.6308
	Jahangirpuri	lon=77.1666_lat=28.7296
	Jawaharlal_Nehru_Stadium	lon=77.2344_lat=28.5828
	Lodhi_Road	lon=77.2283_lat=28.5821
	Major_Dhyan_Chand_Stadium	lon=77.2373_lat=28.6125
	Mandir_Marg	lon=77.1972_lat=28.6303
	Mundaka	lon=77.0349_lat=28.6823
	Norh_Campus_Delhi_University	lon=77.2078_lat=28.6899
	NSIT_Dwarka	lon=77.0362_lat=28.6081
	Punjabi_Bagh	lon=77.1242_lat=28.6620
RK_Puram	lon=77.1767_lat=28.5660	
Shadipur	lon=77.1582_lat=28.6516	
Sirifort	lon=77.2278_lat=28.5512	
Odisha (East India)	GM_Office_Brajrajnagar	lon=83.9248_lat=21.8547
Andhra Pradesh (South India)	PWD_Grounds_Vijayawada	lon=80.6323_lat=16.5070
	Secretriati_Amaravati	lon=80.5143_lat=16.5131
	Tirumala	lon=79.3521_lat=13.6781
Bihar (North India)	Gaya	lon=85.0002_lat=24.7914
	IGSC_Planetarium_Complex_Patna	lon=85.1440_lat=25.6110
	Muzaffarpur_Collectorate_Muzaffarpur	lon=85.3812_lat=26.1235
Haryana (North India)	Sec16A_Faridabad	lon=77.3161_lat=28.4090
	Vikas_Sadan_Gurugram	lon=77.0285_lat=28.4501
	Sector6_Panchkula	lon=76.8562_lat=30.7065
	MD_University_Rohatak	lon=76.6211_lat=28.8768
Hyderabad (South India)	Bollaram_Industrial_Area	lon=78.3514_lat=17.5433
	Central_University_Hyderabad	lon=78.3264_lat=17.4567

	ICRISAT_Patancheru_Hyderabad	lon=78.2752_lat=17.5111
	IDA_Pashamylaram_Hyderabad	lon=78.1849_lat=17.5325
	Sanathnagar	lon=78.4434_lat=17.4527
	Zoopark	lon=78.4518_lat=17.3507
Karnataka (South India)	BTM_Layout_Bengaluru	lon=77.6101_lat=12.9166
	Peenya_Bengaluru	lon=77.5197_lat=13.0285
Kerala (South India)	Plammoodu_Thiruvananthpuram	lon=76.9477_lat=8.5141
Maharashtra (Middle India)	More_Chowk_Waluj_Aurangabad	lon=75.2466_lat=19.8406
	Chandrapur	lon=79.3015_lat=19.9705
	MIDC_Khutala_Chandrapur	lon=79.2359_lat=19.9775
	Bandra_Mumbai	lon=72.8362_lat=19.0607
	Opp_GPO_Civil_Lines_Nagpur	lon=79.0693_lat=21.1525
	Gangapur_Road_Nashik	lon=73.7590_lat=20.0204
	Airoli_Navi_Mumbai	lon=72.9935_lat=19.1579
	Solapur	lon=75.9064_lat=17.6599
Madhya Pradesh (Middle India)	Bhopal_Chauraha_Dewas	lon=76.0605_lat=22.9642
	Sec2_Industrial_Area_Pithampur	lon=75.6674_lat=22.6355
	Vindhyachal_STPS_Singrauli	lon=82.6716_lat=24.0960
	Mahakaleshwar_Temple_Ujjain	lon=75.7682_lat=23.1827
Punjab (North India)	Golden_Temple_Amritsar	lon=74.8765_lat=31.6200
	Punjab_Agricultural_University_Ludhiana	lon=75.8078_lat=30.9019
Rajasthan (West India)	Civil_Lines_Ajmer	lon=74.6415_lat=26.4727
	Moti_Doongri_Alwar	lon=76.6081_lat=27.5516
	RIICO_Ind_Arealll_Bhiwadi	lon=76.8576_lat=28.2070
	Adarsh_Nagar_Jaipur	lon=75.8272_lat=26.9018
	Police_Commissionerate_Jaipur	lon=75.8017_lat=26.9164
	Shastri_Nagar_Jaipur	lon=75.8009_lat=26.9503
	Collectorate_Jodhpur	lon=73.0367_lat=26.2918
	Shrinath_Puram_Kota	lon=75.8214_lat=25.1372
	Indira_Colony_Vistar_Pali	lon=73.3502_lat=25.7731
Ashok_Nagar_Udaipur	lon=73.7022_lat=24.5886	
Tamil Nadu (South India)	Alandur_Bus_Depot_Chennai	lon=80.1917_lat=12.9970
	Manali_Chennai	lon=80.2586_lat=13.1636
	Velachery_Res_Area_Chennai	lon=80.2390_lat=13.0050
Uttar Pradesh (North India)	Sanjay_Palace_Agra	lon=78.0060_lat=27.1987
	Adarsh_Nagar_Jaipur	lon=77.3698_lat=28.6636
	Nehru_Nagar_Kanpur	lon=80.3238_lat=26.4716

	Lalbagh_Lucknow	lon=80.9415_lat=26.8460
	Lajpat_Nagar_Moradabad	lon=78.7830_lat=28.8254
	Sector125_Noida	lon=77.3310_lat=28.5438
	Sector62_Noida	lon=77.3639_lat=28.6208
Gujrat (West India)	Maninagar_Ahamedabad	lon=72.5996_lat=22.9962