

Supplementary material

COVID-19 lockdown induced changes in NO₂ levels across India observed by multi-satellite and surface observations

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1. CPCB locations with regions of India

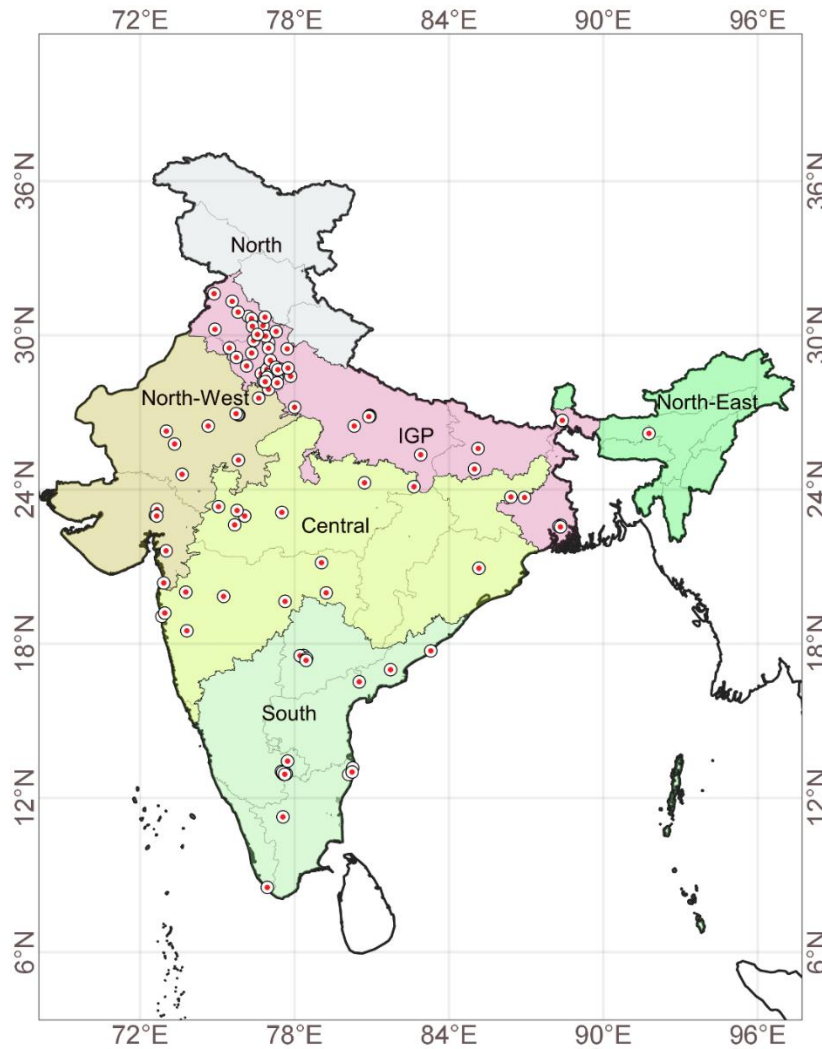
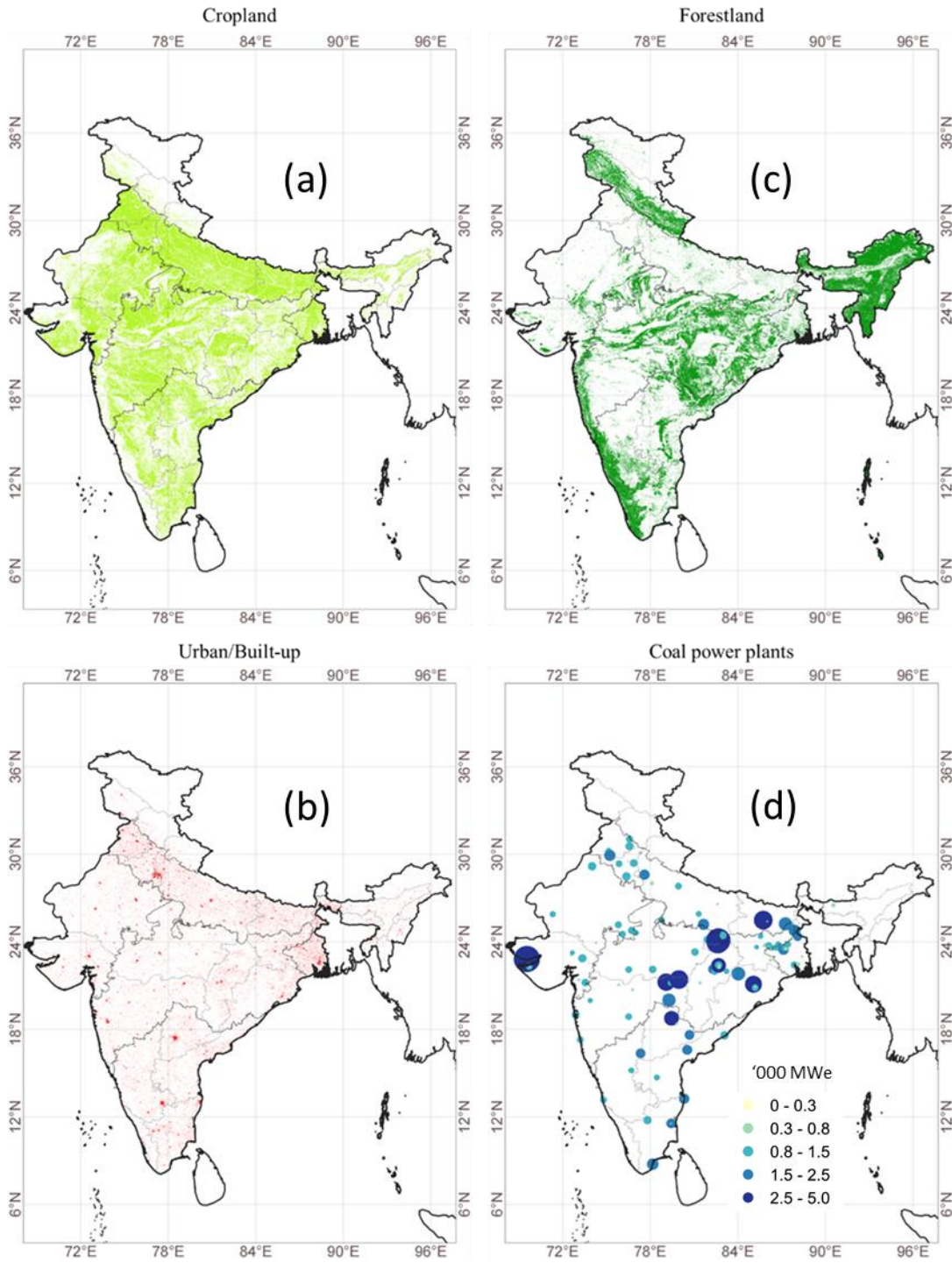


Fig. S1: Location of the CPCB monitoring stations used in the study and six geographic regions of India filled in different colours.

2. Different land use land cover spread over India



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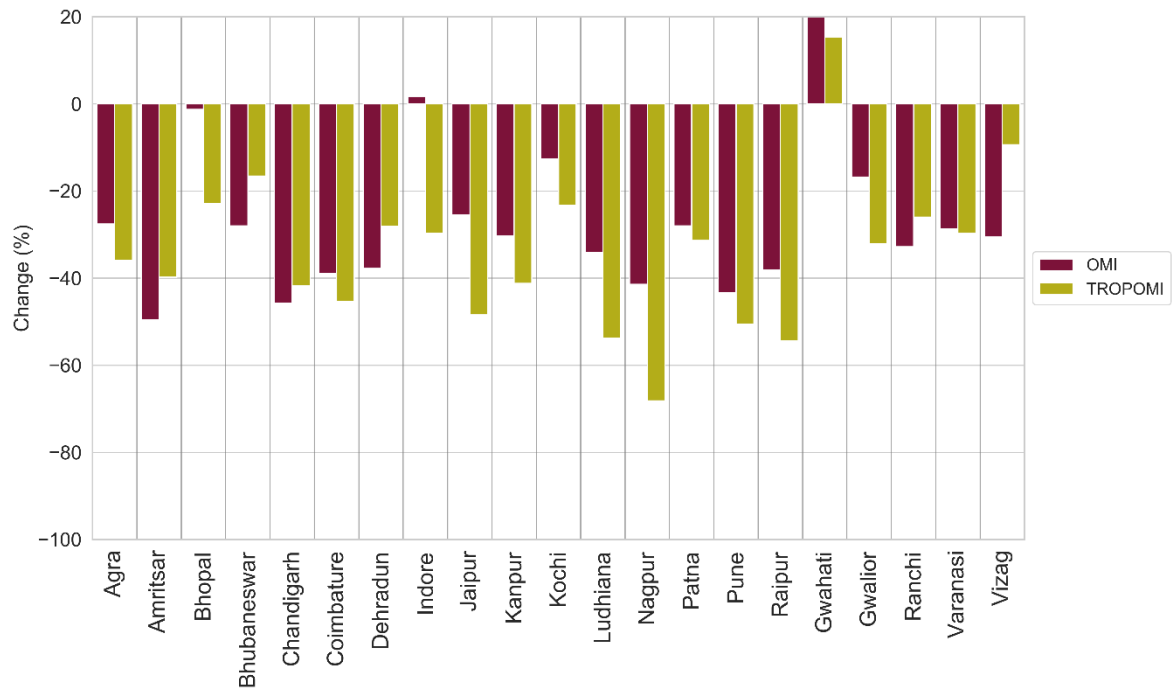
15 *Fig. S2: (a-c) NRSC LULC over India (a) Cropland (b) Urban/Built-up (c) Forestland and, (d)*
16 *Thermal powerplants over India and the increasing bubble size proportional to the capacity.*

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20 3. Change in VCD_{trop} over twenty-two cities of India



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22 *Fig. S3: Barchart showing the VCD_{trop} NO_2 change observed by OMI and TROPOMI over*
23 *major cities of India*

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25 Table S1 Statistics of VCD_{trop} NO₂ difference and percentage change observed over different
 26 regions

Landuse	Region	Change in VCD _{trop} NO ₂ ($\times 10^{13}$ molecules cm ⁻²)				Change in VCD _{trop} NO ₂ (%)			
		mean \pm SD		Median (25th, 75th Percentile)		mean \pm SD		Median (25th, 75th Percentile)	
		OMI	TROPOMI	OMI	TROPOMI	OMI	TROPOMI	OMI	TROPOMI
Cropland	Central	-47.7 \pm 47.2	-21.4 \pm 38.8	-42.6 (-80.6, -14.1)	-12.7 (-34.1, 0.8)	-15.3 \pm 13.5	-8.2 \pm 12.8	-16.6 (-26.0, -6.0)	-7.0 (-16.9, 0.5)
	NWest	-18.6 \pm 27.8	-24.8 \pm 28.7	-18.5 (-36.3, 2.4)	-22.3 (-36.6, -7.7)	-8.1 \pm 13.3	-11.6 \pm 12.5	-9.3 (-17.0, 1.3)	-12.6 (-18.7, -5.1)
	IGP	-91.9 \pm 34.7	-43.3 \pm 26.5	-89.1 (-111.8, -66.5)	-40.4 (-53.7, -29.1)	-27.6 \pm 8.3	-18.4 \pm 8.5	-27.5 (-32.4, -22.7)	-18.5 (-22.8, -14.1)
	South	-59.1 \pm 35.8	-39.4 \pm 32.2	-53.1 (-75.6, -32.0)	-33.9 (-49.5, -21.5)	-25.1 \pm 11.1	-18.3 \pm 10.8	-24.7 (-33.1, -16.5)	-18.5 (-24.6, -11.4)
	North	-51.3 \pm 11.1	-8.4 \pm 12.0	-51.3 (-55.2, -47.4)	1.4 (-11.5, 2.9)	-21.4 \pm 2.7	-5.6 \pm 9.4	-21.4 (-22.4, -20.5)	1.2 (-9.1, 2.3)
	NEast	6.6 \pm 28.7	18.7 \pm 15.2	2.7 (-13.3, 22.8)	18.6 (5.5, 31.2)	2.6 \pm 14.3	14.9 \pm 12.3	1.5 (-6.3, 11.6)	15.1 (3.9, 24.6)
Forestland	Central	-72.2 \pm 47.9	-35.6 \pm 46.2	-65.5 (-103.1, -34.6)	-31.7 (-60.0, -8.7)	-21.8 \pm 12.2	-14.6 \pm 16.9	-21.1 (-28.5, -13.8)	-16.3 (-25.4, -4.7)
	NWest	-23.2 \pm 34.2	-17.3 \pm 38.1	-30.8 (-45.5, -8.9)	-15.5 (-31.6, -4.6)	-10.2 \pm 14.0	-8.0 \pm 15.6	-15.0 (-21.7, -4.7)	-10.1 (-18.2, -3.1)
	IGP	-88.8 \pm 55.7	-19.1 \pm 56.0	-78.3 (-123.5, -26.8)	-4.5 (-37.0, 14.2)	-23.6 \pm 12.4	-2.9 \pm 19.4	-19.2 (-31.3, -14.2)	-4.2 (-16.8, 10.8)
	South	-38.0 \pm 26.7	-33.1 \pm 20.6	-22.9 (-41.0, -9.6)	-30.2 (-40.9, -20.8)	-20.5 \pm 16.2	-20.6 \pm 10.1	-20.5 (-28.8, -9.6)	-22.2 (-28.2, -17.0)
	North	-44.1 \pm 43.8	-15.6 \pm 17.8	-36.0 (-72.1, -9.1)	-13.4 (-26.1, -3.1)	-23.2 \pm 22.7	-12.7 \pm 16.0	-27.4 (-38.8, -10.0)	-14.2 (-22.7, -3.9)
	NEast	9.2 \pm 32.3	12.2 \pm 24.8	2.2 (-18.7, 24.0)	6.2 (-7.0, 19.1)	4.9 \pm 30.8	13.2 \pm 42.4	2.0 (-16.9, 18.9)	7.7 (-9.8, 24.9)
Urban	Central	-53.7 \pm 48.2	-65.2 \pm 63.4	-46.4 (-80.8, -30.3)	-40.7 (-85.0, -25.4)	-19.8 \pm 11.3	-21.5 \pm 14.6	-20.8 (-29.1, -14.9)	-20.2 (-31.0, -13.1)
	NWest	-33.1 \pm 26.2	-74.1 \pm 56.1	-31.8 (-49.7, -14.6)	-55.0 (-110.7, -32.6)	-13.9 \pm 11.4	-26.7 \pm 14.4	-15.9 (-21.8, -7.6)	-25.2 (-38.8, -16.5)
	IGP	-110.5 \pm 44.4	-68.2 \pm 46.4	-104.5 (-132.4, -82.3)	-63.2 (-93.0, -34.3)	-30.4 \pm 10.1	-23.6 \pm 13.3	-30.4 (-36.9, -23.8)	-24.9 (-31.2, -16.4)
	South	-55.0 \pm 37.0	-67.3 \pm 48.7	-43.6 (-68.1, -25.0)	-48.5 (-82.1, -32.1)	-25.9 \pm 13.0	-27.0 \pm 11.6	-25.4 (-34.2, -15.8)	-25.7 (-33.7, -19.7)
	North	-92.3 \pm 37.5	-43.4 \pm 17.2	-86.1 (-108.9, -64.7)	-47.3 (-51.8, -36.2)	-30.0 \pm 6.5	-23.9 \pm 8.4	-29.0 (-30.7, -23.0)	-24.9 (-27.4, -19.6)
	NEast	2.7 \pm 28.1	19.6 \pm 19.3	-0.7 (-18.0, 11.0)	14.8 (2.4, 25.1)	1.6 \pm 16.3	15.9 \pm 15.1	-0.4 (-8.2, 5.1)	12.0 (1.8, 18.3)

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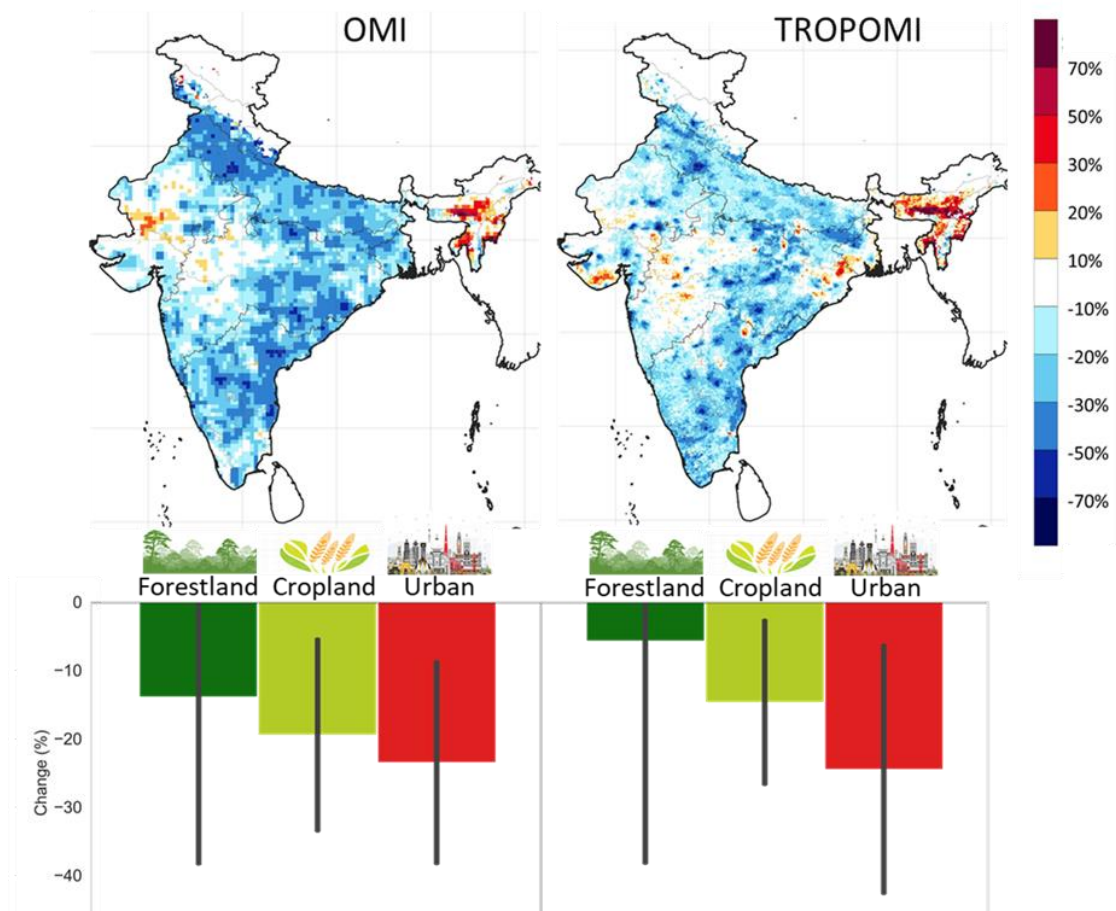
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32 Highlight figure

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35 Percentage change in VCD_{trop} NO₂ during COVID-19 lockdown

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