Supporting Information for "Fossil fuel CO_2 emission signatures over India captured by OCO-2 satellite measurements"

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Table S1: The dates and locations of identified anomalies, reported emissions in the CB database, estimated emissions using the GP model and CS flux method, and emissions reported in EDGAR, ODIAC and CAMS biomass data for power plant cases.

S No	Date (anomaly location)	Power Plants Name	Reported Emission in the CB database (in Mt $Year^{-1}$)	Emission estimate using GP model (in Mt $Year^{-1}$)	Emission estimate using c/s emission flux method (in Mt $Year^{-1}$)	EDGAR emission within 50 km upwind (in Mt $year^{-1}$)	ODIAC emission within 50 km upwind (in Mt $year^{-1}$)	Biomass burning emission within 50 km upwind (in Mt $year^{-1}$)
1.	20141023 (23.95, 82.6)	Sasan Ultra Mega Power Project Vindhyachal Power Station Singrauli Super Thermal Power Station Rihand Power Station Anpara Power Station Anpara-C Power Station Renusagar Power Station	84.14	64.78±17.66	-	101.5616	108.8215	0
2.	20170201 (23.96, 82.62)	Sasan Ultra Mega Power Project Vindhyachal Power Station Singrauli Super Thermal Power Station Rihand Power Station Anpara Power Station Anpara-C Power Station Anpara-D Power Station Renusagar Power Station	88.37	114.8±33.58	-	103.8266	118.5322	0

3.	20170305 (23.98, 82.62)	Sasan Ultra Mega Power Project Vindhyachal Power Station Singrauli Super Thermal Power Station Rihand Power Station Anpara Power Station Anpara-C Power Station Anpara-D Power Station Renusagar Power Station	88.37	99.85±30.04	-	103.8266	129.5251	0
4.	20210113 (23.92, 83.12)	Sasan Ultra Mega Power Project Vindhyachal Power Station Singrauli Super Thermal Power Station Rihand Power Station Anpara Power Station Anpara-C Power Station Anpara-D Power Station Renusagar Power Station	88.37	91.02±28.27	75.32±27.4	74.6588	164.7294	0
5.	20141110 (24, 82.71)	Singrauli Super Thermal Power Station Rihand Power Station Anpara Power Station Anpara-C Power Station Renusagar Power Station	44.93	74.13±24.71	-	62.4616	54.6805	0.1802
6.	20150116 (18.6, 79.34)	Ramagundam-B Power Station Ramagundam Power Station	14.33	14.61±6.7	18.41±5.9	21.5016	40.4657	0.0526
7.	20161220 (18.6, 79.23)	Ramagundam-B Power Station Ramagundam Power Station Pegadapalli (Jaipur Mandal) Power Station	19.49	10.71±3.89	7.92±4.31	20.7014	43.4112	0.0212

8.	20171105 (18.62, 79.24)	Ramagundam-B Power Station Ramagundam Power Station Pegadapalli (Jaipur Mandal) Power Station	19.49	23.19±12.86	29.6±12.85	22.0493	42.6319	0.0324
9.	20171207 (18.65, 79.2)	Ramagundam-B Power Station Ramagundam Power Station Pegadapalli (Jaipur Mandal) Power Station	19.49	20.26±15.6	19.32±12.01	23.3059	45.2223	0
10.	20181126 (18.65, 79.33)	Ramagundam-B Power Station Ramagundam Power Station Pegadapalli (Jaipur Mandal) Power Station	19.49	24.16±11.69	24.9±13.4	23.6754	44.5287	0.1235
11.	20200215 (18.72, 79.33)	Ramagundam-B Power Station Ramagundam Power Station Pegadapalli (Jaipur Mandal) Power Station	19.49	18.9±4.1	25.2±5.36	22.2271	46.7727	0
12.	20150116 (20, 79)	Chandrapur Thermal Power Station Dhariwal power station Ghugus power station	20.19	12.31±9.08	13.4±8.8	29.7422	40.0671	0
13.	20161222 (19.93, 79.27)	Chandrapur Thermal Power Station	14.42	12.97±8.65	7.3±6.2	25.3036	41.7171	0
14.	20170125 (21.05, 84.86)	Angul Power Station Talcher Kaniha Super Thermal Power Station	19.54	23.83±10.94	-	44.3551	69.3914	1.4008

15.	20191115 (20.8, 84.88)	Angul Power Station Talcher Kaniha Super Thermal Power Station Angul Steel Power Station	23.72	10.43±4.74	-	16.4265	73.3165	1.5494
16.	20180301 (22.22, 82.48)	Sipat Power Station	12.95	14.24±8.54	17.13±10.46	25.6729	13.5886	0.2531
17.	20181003 (22.82, 69.6)	Tata Mundra Ultra Mega Power Project Mundra Thermal Power Project (Adani)	37.07	51.89±12.22	57.04±14.92	2.997	1.268	0
18.	20210113 (22.16, 83.68)	Dongamahua Captive Power Plant Tamnar Power Station	18.65	26.29±15.85	25.44±15.43	38.8885	3.2841	0.3622
19.	20180110 (21.21, 79.22)	Khaperkheda power station Koradi Thermal Power Station	17.76	10.65±6.74	-	23.9697	36.7688	0.1410
20.	20141119 (23.3, 87.56	Durgapur Steel City Andal power station Durgapur SAIL power station Durgapur Projects Limited power station Mejia power station	20.98	56.77±12.98	-	53.8409	19.6708	0
21.	20170316 (23.52, 87.4)	Durgapur Steel City Andal power station Durgapur SAIL power station Durgapur Projects Limited power station Mejia power station	20.98	71.33±36.71	-	76.0030	25.0810	0

22.	20171229 (23.35, 87.44)	Durgapur Steel City Andal power station Durgapur SAIL power station Durgapur Projects Limited power station Mejia power station	20.98	55.38±19.3	-	61.8673	23.0727	0.1210
23.	20170118 (22.62, 86.04)	Jojobera Power Plant Jamshedpur Works power station Adityapur works power station	5.2	43.26±17.16	53.06±9.12	41.4552	9.4802	0.1245
24.	20201128 (22.5, 86.14)	Jojobera Power Plant Jamshedpur Works power station Adityapur works power station	5.2	42.38±14.35	41.5±32.75	34.1113	8.0214	0.0979
25.	20221031 (22.64, 86.11)	Jojobera Power Plant Jamshedpur Works power station Adityapur works power station	5.2	27.04±15.88	36.5±28.4	45.9448	9.7384	0
26.	20180107 (22.74, 86.46)	Jojobera Power Plant Jamshedpur Works power station Adityapur works power station Mahadev Prasad Super Thermal Power Plant	7.98	44.04±33.51	46.46±40.7	46.3038	10.1899	0.0715
27.	20141230 (23.58, 86.05)	Bokaro Steel City Thermal Power Station Chandrapura power station	7.47	19.79±12.69	11.49±7.11	70.8386	8.6428	0.7196
28.	20150131 (23.7, 86.54)	Bokaro Steel City Thermal Power Station Chandrapura power station	7.47	41.08±16.95	-	66.6614	4.8155	0.4131

29.	20220118 (23.66, 86.44)	Bokaro Steel City Thermal Power Station Chandrapura power station	7.47	47.73±22.93	47.67±9.32	80.3754	45.4088	0.7404
30.	20210131 (23.57, 86.58)	Bokaro Steel City Thermal Power Station Chandrapura power station Santaldih Thermal Power Station	10.11	61.67±32.35	60.3±38.8	91.3430	11.7864	0.4334
31.	20170107 (21.58, 81.66)	Bhilai Steel power station	3.17	46.59±31.35	46.89±36.1	58.6355	2.9587	0.0309
32.	20170208 (21.26, 81.74)	Bhilai Steel power station	3.17	8.05±4.88	8.24±6.8	56.8281	13.4112	0.1603
33.	20190214 (21.46, 81.62)	Bhilai Steel power station	3.17	11.91±11.09	13.93±12.7	58.6355	12.3757	0.0216
34.	20200210 (21.15, 81.2)	Bhilai Steel power station	3.17	52.05±31.38	66.5±42.72	54.6881	14.7715	0.0387
35.	20180304 (15.22, 76.54)	Bellary Thermal Power Station JSW Vijayanagar Toranagallu power station	12.08	17.87±1.38	22.84±5.5	30.2110	7.4953	0.0440

36.	20190118 (14.9, 76.21)	Bellary Thermal Power Station JSW Vijayanagar Toranagallu power station	12.08	68.85±15.82	64.6±6.7	32.7618	8.2091	0
37.	20210224 (15.19, 76.54)	Bellary Thermal Power Station JSW Vijayanagar Toranagallu power station	12.08	35.87±4.1	43.45±6.2	32.0224	7.5785	0.0807 (0.0807, 0.0807)
38.	20150224 (11.45, 79.3)	Neyveli Thermal Power Station I Neyveli Thermal Power Station II Neyveli Zero power station	19.36	37.55±9.29	38.8±12.15	36.0196	41.1005	0
39.	20170130 (24.68, 76.94)	Kawai Thermal Power Project	5.48	9.31±3.3	12.14±3.61	0.5225	1.0355	0

Table S2: The dates and locations of identified anomalies, estimated emissions using the CS flux method, and emissions reported in EDGAR, ODIAC and CAMS biomass data for non-power plant cases.

S No	Date (anomaly location)	Emission estimate using CS emission flux method (in Mt $Year^{-1}$)	EDGAR emission within 50 km upwind (in Mt $year^{-1}$)	ODIAC emission within 50 km upwind (in Mt $year^{-1}$)	Biomass burning emission within 50 km upwind (in Mt $year^{-1}$)
1.	20151218 (28.25, 73.6)	91.95±29.21	0.29	0.77	0
2.	20160112 (27, 75.98)	40.14±17.38	3.13	13.86	0
3.	20170130 (22.5, 77.52)	26.06±13.73	0.34	0.77	0.02
4.	20171125 (21.36,81.72)	41.59±33.49	3.73	2.37	0.05
5.	20180119 (21.76,83.21)	11.18±6.56	2.30	2.04	0.95
6.	20180129 (15.35,75.36)	46.96 ± 6.18	1.23	1.41	0
7.	20181122 (22.50,72.06)	20.88 ± 12.08	0.54	0.69	0.51
8.	20190104 (19.12,77.96)	19.05 ± 12.82	0.35	1.93	0
9.	20190106 (22.04,82.94)	15.27 ± 9.63	1.58	2.89	0.23
10.	20190228 (28.22,76.92)	67.58 ± 38.91	2.43	6.47	0
11.	20190327 (23.72,80.69)	7.50 ± 3.53	1.22	1.17	0

12.	20191124 (21.05,83.38)	4.68 ± 3.39	0.60	0.35	0
13.	20191124 (21.86,83.18)	4.72 ± 2.50	3.63	2.08	0
14.	20191201 (28.96,79.48)	111.55 ± 64.30	1.43	3.53	0.02
15.	20200210 (24.48,80.30)	5.66 ± 1.96	0.38	0.20	0
16.	20201202 (22.36,70.71)	32.10 ± 23.89	0.95	4.37	0
17.	20201210 (21.00,83.36)	8.47 ± 6.25	0.59	0.37	0.02
18.	20210308 (22.18,70.68)	40.18 ± 25.13	0.37	1.94	0
19.	20211129 (21.05,83.46)	14.10 ± 11.75	0.67	0.40	0
20.	20220128 (22.58,77.56)	26.57 ± 11.52	0.50	1.14	0
21.	20221223 (21.50,81.68)	40.86 ± 26.66	6.83	3.50	0.03