



*Supplement of*

## **Development of a new emission reallocation method for industrial sources in China**

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# **Figures and Equations included in the Supplementary**

## **Figures:**

Figure S1: a) satellite image of BE and b) regional satellite image of BE.

Figure S2: Time series of surface PM<sub>2.5</sub> at station CN\_1372A (23°02'22.2"N 113°06'18.0"E) – Foshan for January.

5 Figure S3: Satellite image with observation stations (© (Google).

Figure S4: Time series of surface PM<sub>2.5</sub> at station CN\_1352A (23° 8' 26.628"N 113° 15' 57.24") – North of Guangzhou: a) January and b) August.

## **Equation:**

10 Eq (S1). Hit Rate

Eq (S2). False Detection Rate

Eq (S3). False Alarm Rate

## **Table:**

Table S1: Station-based statistical performance (RMSE) of PM<sub>2.5</sub> - part 1.

15 Table S2: Station-based statistical performance (RMSE) of PM<sub>2.5</sub> - part 2.

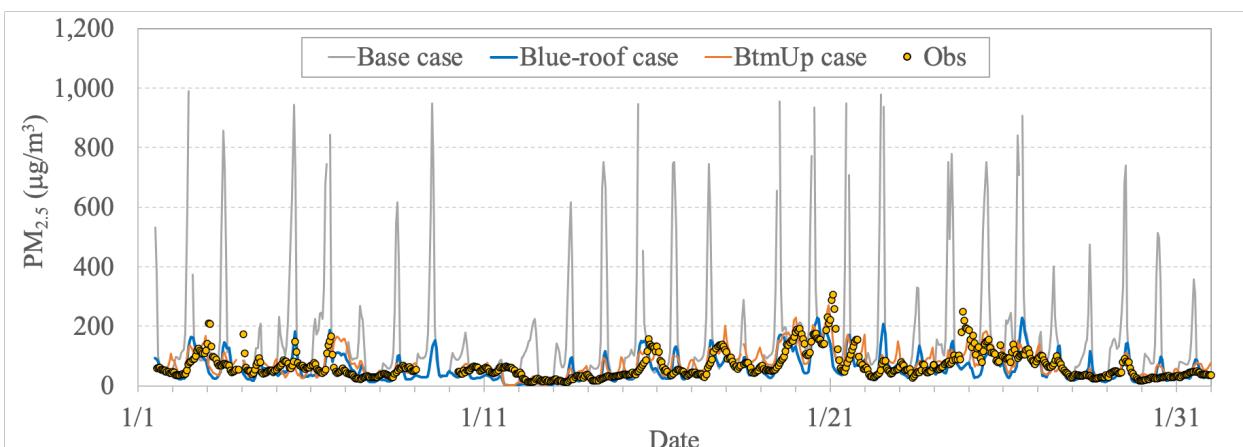
## **References:**

Google: Map showing location of Pearl River Delta (PRD), [earth.google.com/web/](http://earth.google.com/web/), n.d.



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Figure S1: a) satellite image of BE (© Google Earth) and b) regional satellite image of BE (© Google Earth).



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Figure S2: Time series of surface PM<sub>2.5</sub> at station CN\_1372A (23°02'22.2"N 113°06'18.0"E) – Foshan for January.

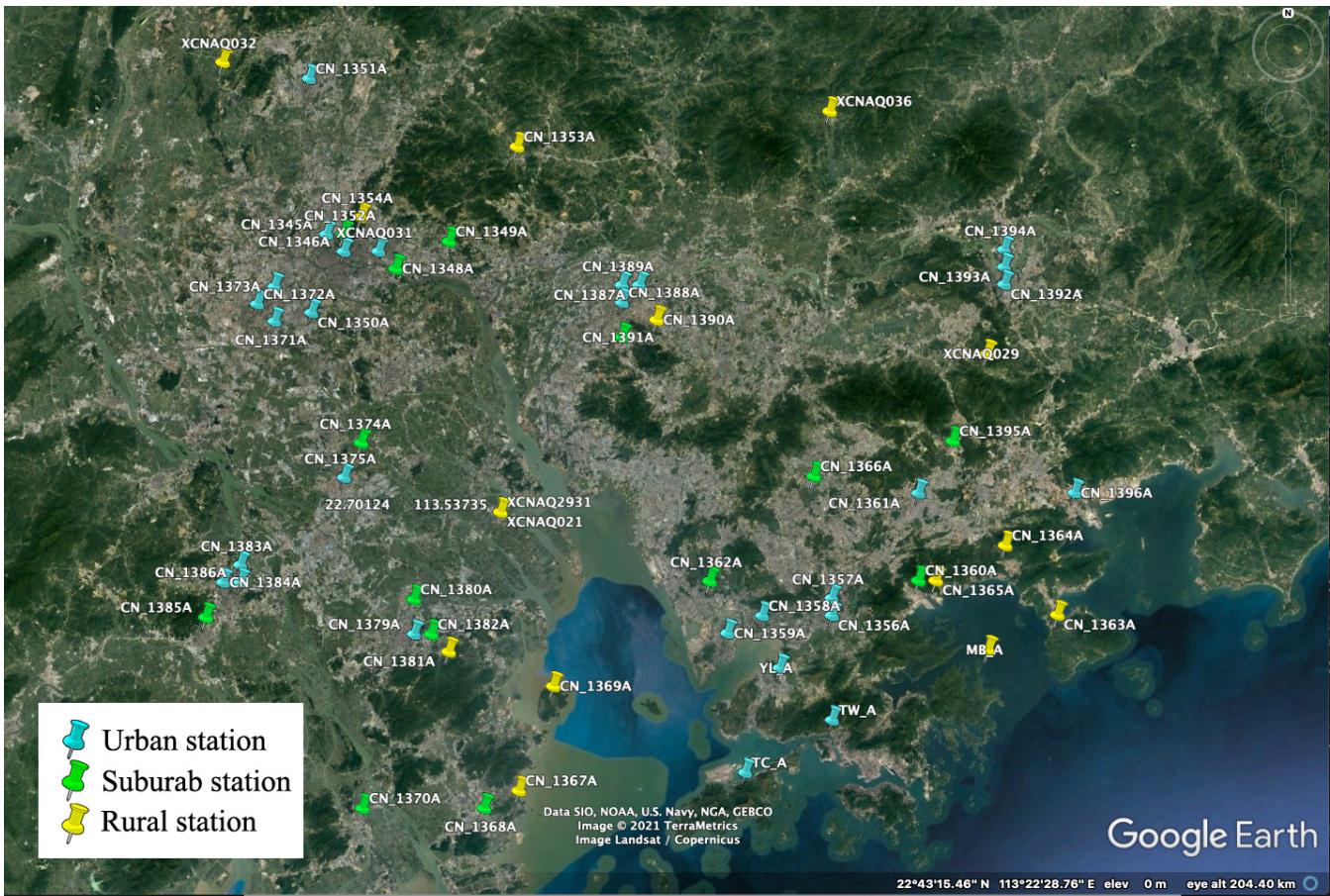
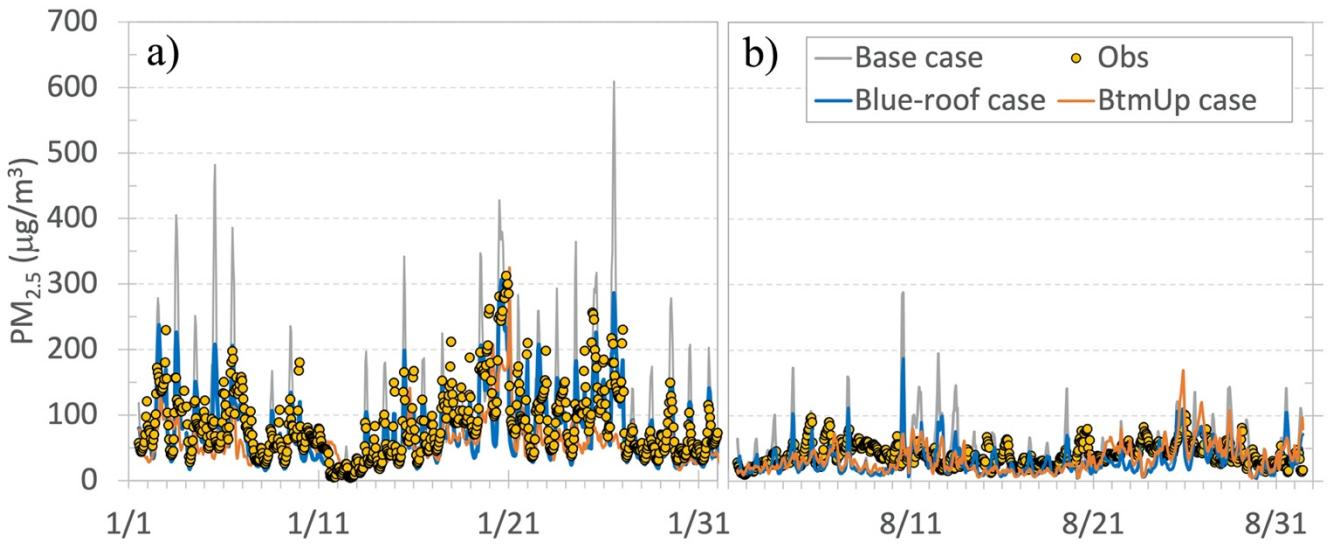


Figure S3: Satellite image with observation stations (© Google Earth).



30 **Figure S4:** Time series of surface PM<sub>2.5</sub> at station CN\_1352A (23° 8' 26.628"N 113° 15' 57.24"E) – North of Guangzhou: a) January and b) August.

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**Equations:**

$$HR = \frac{BR_A}{BR_T} \times 100\%, \quad (S1)$$

40 where  $HR$  is the total hit area,  $BR_A$  is the total blue roof area detected by the blue-roof algorithm,  $BR_T$  is the total “ground truth” (visually detected) blue roof area.

$$F_D R = \frac{BR_T - BR_A}{BR_A} \times 100\% \quad (S2)$$

45 where  $F_D R$  is the false detection rate,  $BR_A$  is the total blue roof area detected by the blue-roof algorithm,  $BR_T$  is the total “ground truth” (visually detected) blue roof area.

$$F_A R = \frac{BR_T - BR_A}{BR_T} \times 100\% \quad (S3)$$

50 where  $F_A R$  is the false omission rate,  $BR_A$  is the total blue roof area detected by the blue-roof algorithm,  $BR_T$  is the total “ground truth” (visually detected) blue roof area.

**Table S1: Station-based statistical performance (RMSE) of PM<sub>2.5</sub> – Part 1.**

Station Name	Latitude	Longitude	Station Type	January			August		
				Base	Blue-roof	BtmUp	Base	Blue-roof	BtmUp
MB_A	22.48129	114.37235	Background	32.7	32.8	25.2	17.1	17.5	13.9
CN_1353A	23.27982	113.565	Rural	31.1	29.3	24.9	26.2	27.2	21.8
CN_1354A	23.16846	113.29568	Rural	48.1	33.8	51	28.7	25.1	24.3
CN_1363A	22.53597	114.49176	Rural	29	29.6	22.8	15.6	16.1	13.4
CN_1364A	22.64638	114.40274	Rural	26.2	27	20.5	22.8	23.6	20.6
CN_1365A	22.59163	114.28326	Rural	22	22.3	19.5	16.1	16.7	14.2
CN_1367A	22.26095	113.56888	Rural	37	39.1	29	21	21.5	15.1
CN_1369A	22.42625	113.62781	Rural	40.8	41.3	31.7	19.8	19.4	14.3
CN_1381A	22.48067	113.44888	Rural	34.8	34.4	27.9	20.1	20.1	15.6
CN_1390A	23.00487	113.80548	Rural	32.9	32	26.1	20.7	20.1	14.9
SC_AWS	22.34416	113.89584	Rural	37.8	38.6	34.4	16	16.2	12.6
XCNAQ021	22.70124	113.53735	Rural	34.7	34	25.7	21.4	19.9	17.3
XCNAQ029	22.94939	114.3739	Rural	24	23.9	21.5	20.9	21.1	17.9
XCNAQ032	23.41499	113.05386	Rural	36.7	34.6	30.3	33.4	31.4	26.2
XCNAQ036	23.3356	114.10504	Rural	32.8	32.7	27.1	26.1	25.9	20.5
CN_1348A	23.0861	113.35608	Suburban	40.9	33.5	28	23	22.4	20.7
CN_1349A	23.11406	113.4458	Suburban	33	31.3	28.3	26.7	25.8	20.8
CN_1352A	23.14073	113.2659	Suburban	84.4	50	51.4	36	27.5	24.5
CN_1360A	22.59167	114.25345	Suburban	29.6	30.1	28.2	17.1	18	15.6
CN_1362A	22.59187	113.89563	Suburban	40.7	40.3	33.6	20.7	22.5	18
CN_1366A	22.7571	114.07465	Suburban	38.2	38.2	27.5	27	25	20.3
CN_1368A	22.23323	113.50952	Suburban	36.6	38.1	27.1	21.1	22.2	15.9
CN_1370A	22.2323	113.30145	Suburban	28	29.2	29.9	15.8	15	20.7
CN_1374A	22.81036	113.29791	Suburban	33.7	34.8	25.5	22	24.3	20.6
CN_1380A	22.56299	113.38886	Suburban	27.8	28.1	24.4	18.4	18.9	19.5
CN_1382A	22.50808	113.41895	Suburban	30.3	29.5	25.6	15	15.2	12.9
CN_1385A	22.53334	113.03137	Suburban	28.4	28	27.6	16.2	15.2	13.8
CN_1391A	22.97722	113.74567	Suburban	34.4	32.8	25.6	22	21.1	16.3
CN_1395A	22.81183	114.31369	Suburban	21.8	21.5	21.7	17.5	17	15.2
XCNAQ2931	22.70124	113.53735	Suburban	34.5	33.5	25.3	21.8	20	15.9
MKaR	22.31659	114.16357	Urban	29.1	29.3	25	20.7	21.2	16.9
CB_R	22.28902	114.1933	Urban	33.2	33.5	26.4	29.8	30.4	24.7
CL_R	22.28907	114.16354	Urban	23	23.3	23.3	19.7	20.2	16.4
CN_1345A	23.14056	113.23593	Urban	92.9	43.7	49.7	37.7	28	25.6
CN_1346A	23.11317	113.26608	Urban	106.5	62.4	40.2	42	28	24.3
CN_1350A	22.94836	113.35687	Urban	37	33.8	29.3	25.6	27	23.9

Note: Grey colour indicates the lowest RMSE among three cases; the presence of square box indicates the lowest RMSE value is observed in the blue-roof case between the base and blue-roof case;

**Table S2: Station-based statistical performance (RMSE) of PM<sub>2.5</sub> - Part 2.**

Station Name	Latitude	Longitude	Station Type	January			August		
				Base	Blue-roof	BtmUp	Base	Blue-roof	BtmUp
CN_1351A	23.3884	113.20422	Urban	37.5	35.1	33	35.7	34.4	28
CN_1356A	22.53683	114.10431	Urban	28.3	28.5	24.5	20.3	21.8	18.7
CN_1357A	22.56435	114.10431	Urban	45.7	30.3	31.6	21.6	17.1	19.3
CN_1358A	22.53687	113.98508	Urban	31.2	29.5	25.9	21.1	22.1	19.8
CN_1359A	22.50932	113.92551	Urban	31.8	28.5	23.3	20.6	22.7	20
CN_1361A	22.72934	114.25375	Urban	34.6	35	26.8	21.3	22.7	17.9
CN_1371A	23.00229	113.14709	Urban	60.2	37.3	29.7	28.7	26.9	21.9
CN_1372A	23.02963	113.11694	Urban	194	42.6	36	96.6	33.1	26.7
CN_1373A	23.05739	113.14667	Urban	60.3	36.5	41.8	29.6	24.7	19.7
CN_1375A	22.75513	113.26837	Urban	63.9	68.4	25.2	27.1	28.6	20.4
CN_1379A	22.50794	113.38916	Urban	49.2	25.7	23.2	20.5	20.5	16.9
CN_1383A	22.61635	113.09033	Urban	48.4	48.8	31.4	20.8	20.3	19
CN_1384A	22.58861	113.06073	Urban	43.7	44	30.9	21.4	21.3	17.6
CN_1386A	22.58881	113.09055	Urban	39.2	37.9	27	26.3	26.1	23.1
CN_1387A	23.05991	113.77542	Urban	39.5	37.7	26.2	27.8	26.6	18.6
CN_1388A	23.03231	113.74554	Urban	34.8	34.7	25.9	24.3	24	18.9
CN_1389A	23.05985	113.74548	Urban	33.2	32.2	33.1	27.8	26.6	20.3
CN_1392A	23.0595	114.40421	Urban	21.6	21.9	22.2	21.9	22.3	18.3
CN_1393A	23.08704	114.4043	Urban	21.1	20.2	25.8	22.3	22.9	19.4
CN_1394A	23.1146	114.40439	Urban	21.8	22.1	29.5	19	19.6	16
CN_1396A	22.72857	114.52243	Urban	22.4	22.3	20.4	20	20.1	16.4
CW_A	22.28909	114.13382	Urban	27.7	28.1	21.9	19.5	20	15.7
EN_A	22.28898	114.22302	Urban	23.9	24.1	21.6	16.3	16.7	12.9
GZEMBUS	23.14073	113.2659	Urban	75.1	43.4	43	35.3	24.2	23
KC_A	22.37165	114.13391	Urban	23.1	23.6	19	20.6	21.3	17.6
KT_A	22.31648	114.22308	Urban	29.7	30.1	24.2	20.5	21.1	16.6
PH1	22.31667	113.92563	Urban	26.6	27.5	22.2	20.7	20.9	16
PH5	22.28914	113.92566	Urban	21.7	22.2	19.6	9.6	9.5	8.9
SP_A	22.34409	114.16364	Urban	18.9	18.8	23.6	19.8	20.4	16.4
ST_A	22.37157	114.19342	Urban	24.4	24.7	21.3	15.7	16.2	13.4
TC_A	22.28917	113.95538	Urban	23.2	23.7	20	14.8	15.1	11.8
TM_A	22.39923	113.98511	Urban	33.5	34.9	25.6	22	22.6	17.4
TP_A	22.45419	114.16379	Urban	23.9	24.1	22.5	16.3	17.2	13.5
TW_A	22.37168	114.10416	Urban	20.1	20.4	17.8	17.8	18.5	14.9
XCNAQ031	23.11349	113.32599	Urban	48.3	28.5	33.6	24.5	19.7	20.6
YL_A	22.45428	114.01489	Urban	36	37.5	27.5	19.7	20.6	16.2

Note: Grey colour indicates the lowest RMSE among three cases; the presence of square box indicates the lowest RMSE value is observed in the blue-roof case between the base and blue-roof case;