Supplementary Materials for

Local and regional contributions to fine particulate matter in the 18 cities of Sichuan Basin, southwestern China

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Table S1. Predicted contributions from different regions to $PM_{2.5}$ in the 18 city centers of the SCB in the summer.

Region ID	City	$PM_{2.5}$	Percentage contributions from each region, SOA, and others* (%)													
		($\mu g\ m^{-3}$)	R1	R2	R3	R4	R5	Within SCB	R6	R7	R8	R9	Outside SCB	SOA	Others	Non-local #
R1	Chongqing	64	**71.2**	1.3	0.9	0.1	0.6	**74.1**	1.8	8.5	0.0	0.5	**10.8**	8.8	6.3	13.7
R2	Bazhong	22	1.1	**37.3**	1.0	0.5	1.5	**41.4**	0.6	26.1	0.0	1.2	**27.9**	22.2	8.4	32.0
	Dazhou	29	0.6	**45.9**	0.4	0.1	3.6	**50.6**	0.6	23.1	0.0	1.0	**24.7**	16.7	8.1	29.4
	Guangan	31	5.8	**45.6**	0.7	0.2	2.9	**55.2**	1.5	18.1	0.0	1.0	**20.6**	16.2	8.1	30.2
	Guangyuan	20	2.0	**46.2**	2.0	0.9	0.7	**51.8**	0.6	18.5	0.0	1.4	**20.5**	18.3	9.4	26.1
	Nanchong	33	5.8	**52.9**	1.2	0.3	1.3	**61.5**	1.1	14.7	0.0	0.8	**16.6**	15.1	6.8	25.2
R3	Deyang	40	3.0	1.7	**57.8**	13.3	0.3	**76.1**	0.5	6.7	0.1	0.6	**7.9**	9.9	6.2	26.2
	Leshan	30	3.3	0.9	**53.8**	6.6	0.2	**64.8**	1.1	7.3	0.1	0.7	**9.2**	20.0	6.2	20.2
	Luzhou	41	13.0	1.0	**51.9**	0.5	0.4	**66.8**	2.8	8.6	0.0	0.6	**12**	15.2	6.0	26.9
	Meishan	38	3.4	0.9	**38.9**	27.5	0.2	**70.9**	0.8	6.8	0.1	0.6	**8.3**	15.0	5.8	40.3
	Mianyang	31	3.6	3.5	**59.8**	2.7	0.5	**70.1**	0.7	9.3	0.0	0.8	**10.8**	12.3	6.9	21.1
	Neijiang	39	14.2	1.7	**49.9**	0.9	0.4	**67.1**	1.9	9.3	0.1	0.6	**11.9**	14.9	6.1	29.1
	Suining	25	16.4	21.1	**11.5**	0.4	1.4	**50.8**	1.9	18.4	0.0	1.0	**21.3**	20.0	7.9	60.6
	Ya'an	14	4.2	1.1	**36.1**	10.2	0.3	**51.9**	1.0	9.6	0.1	1.2	**11.9**	28.2	8.0	27.7
	Yibin	37	4.2	0.8	**58.8**	1.4	0.3	**65.5**	2.0	7.1	0.1	0.6	**9.8**	18.4	6.2	16.5
	Zigong	45	7.9	1.1	**60.0**	0.9	0.3	**70.2**	1.7	7.5	0.0	0.5	**9.7**	14.0	6.0	19.9
	Ziyang	33	8.8	2.1	**48.0**	5.7	0.5	**65.1**	1.5	10.2	0.0	0.7	**12.4**	16.2	6.3	29.5
R4	Chengdu	44	2.5	1.1	13.6	**60.0**	0.3	**77.5**	0.6	5.8	0.1	0.6	**7.1**	9.6	6.0	24.6

*Others include IC, BC, windblown dust, and sea salt.

Non-local=Within SCB + Outside SCB - Local

Table S2. Source-region contributions to the NH_4^+, NO_3^-, and SO_4^{2-} of $PM_{2.5}$ in each city center of the SCB in the summer.

Region ID	Cities	Source-region contributions (%)																	
		NH_4^+						NO_3^-						SO_4^{2-}					
		Conc*	Local	Non-local	Within SCB	Outside SCB	Others$	Conc*	Local	Other regions	Within SCB	Outside SCB	Others$	Conc*	Local	Non-local	Within SCB	Outside SCB	Others$
1	Chongqing	4.0	53.4	38.2	**65.5**	**26.1**	8.4	0.8	81.1	17.9	**91.8**	**7.2**	1.0	12.6	39.7	36.6	**43.4**	**33.0**	23.7
2	Bazhong	2.1	67.1	31.7	**74.0**	**24.8**	1.2	0.3	35.6	61.0	**47.9**	**48.8**	3.3	5.9	4.3	74.6	**9.4**	**69.5**	21.1
	Dazhou	2.6	68.3	30.4	**80.1**	**18.6**	1.3	0.7	54.6	42.8	**63.6**	**33.9**	2.6	7.0	6.2	70.5	**9.3**	**67.3**	23.4
	Guang'an	2.8	66.5	31.9	**81.0**	**17.5**	1.5	1.0	60.0	38.4	**78.7**	**19.8**	1.6	7.4	10.9	64.8	**19.2**	**56.4**	24.4
	Guangyuan	1.7	71.9	26.7	**78.4**	**20.2**	1.4	0.4	60.5	37.2	**72.8**	**25.0**	2.3	4.7	8.2	67.7	**18.1**	**57.7**	24.2
	Nanchong	2.9	74.1	24.3	**84.3**	**14.1**	1.6	1.4	72.3	26.4	**84.9**	**13.8**	1.3	7.2	14.8	62.7	**25.7**	**51.8**	22.5
3	Deyang	3.5	75.2	22.9	**91.9**	**6.2**	1.9	2.9	64.2	35.1	**94.7**	**4.6**	0.8	7.8	26.2	51.3	**49.6**	**28.0**	22.5
	Leshan	2.4	82.0	16.6	**90.5**	**8.0**	1.4	0.9	68.8	30.0	**90.8**	**7.9**	1.2	6.3	23.1	54.2	**45.7**	**31.7**	22.7
	Luzhou	3.7	67.3	30.5	**82.9**	**14.9**	2.2	2.2	66.1	33.2	**92.9**	**6.4**	0.7	8.8	20.8	57.0	**42.8**	**35.1**	22.2
	Meishan	3.8	68.6	29.9	**92.6**	**5.9**	1.6	2.4	39.2	60.1	**94.1**	**5.2**	0.7	8.7	17.5	63.8	**55.2**	**26.1**	18.8
	Mianyang	2.6	76.2	22.1	**89.5**	**8.7**	1.8	1.6	77.2	21.9	**92.0**	**7.0**	1.0	6.2	22.7	53.9	**39.3**	**37.3**	23.4
	Neijiang	3.3	64.9	33.0	**85.0**	**12.9**	2.1	1.8	58.1	41.0	**90.6**	**8.5**	0.9	8.2	17.9	59.5	**40.2**	**37.3**	22.6
	Suining	2.6	24.6	74.3	**81.1**	**17.8**	1.1	1.0	9.6	89.3	**81.6**	**17.3**	1.1	6.5	3.0	76.8	**26.7**	**53.1**	20.2
	Ya'an	1.4	77.5	21.7	**90.0**	**9.1**	0.8	0.3	39.8	58.6	**82.4**	**16.0**	1.6	3.8	18.1	60.9	**45.8**	**33.2**	21.0
	Yibin	3.1	81.6	16.6	**87.6**	**10.6**	1.8	1.6	81.9	17.3	**92.4**	**6.7**	0.9	7.8	30.6	45.8	**45.0**	**31.4**	23.6
	Zigong	3.6	74.5	23.0	**86.0**	**11.5**	2.5	2.0	75.7	23.6	**93.2**	**6.1**	0.8	8.8	26.4	50.4	**44.0**	**32.9**	23.2
	Ziyang	3.0	76.7	22.1	**89.4**	**9.4**	1.2	1.7	53.8	45.2	**89.0**	**10.0**	1.0	7.1	16.4	62.4	**39.8**	**39.0**	21.2
4	Chengdu	3.6	46.8	49.3	**85.8**	**10.2**	4.0	1.4	69.6	29.8	**95.3**	**4.0**	0.7	9.6	37.0	43.5	**58.1**	**22.3**	19.6

*concentration; $ including IC, BC, windblown dust, and sea salt.

Table S3. Source-region contributions to the NH_4^+, NO_3^-, and SO_4^{2-} of $PM_{2.5}$ in each city center of the SCB in the winter.

Region ID	Cities	Source-region contributions (%)																	
		NH_4^+						NO_3^-						SO_4^{2-}					
		Conc*	Local	Non-local	Within SCB	Outside SCB	Others$	Conc*	Local	Other regions	Within SCB	Outside SCB	Others$	Conc*	Local	Non-local	Within SCB	Outside SCB	Others$
1	Chongqing	14.7	48.7	44.3	**69.6**	**23.5**	7.0	11.0	61.8	36.8	**79.7**	**18.9**	1.4	40.9	46.0	44.2	**58.4**	**31.8**	9.8
2	Bazhong	6.4	52.5	45.1	**62.0**	**35.7**	2.3	6.1	24.0	72.7	**39.0**	**57.7**	3.3	13.9	8.0	81.0	**21.0**	**68.1**	11.0
	Dazhou	8.4	58.6	39.0	**73.7**	**24.0**	2.3	8.5	35.2	62.2	**52.1**	**45.3**	2.6	17.8	11.1	77.9	**23.9**	**65.1**	11.0
	Guang'an	10.8	60.5	36.9	**78.1**	**19.2**	2.6	12.2	47.8	50.5	**69.9**	**28.3**	1.8	21.5	16.7	73.3	**36.6**	**53.5**	10.0
	Guangyuan	5.9	54.6	43.0	**65.0**	**32.6**	2.5	6.8	35.7	61.5	**52.3**	**44.8**	2.9	11.8	11.1	76.2	**28.9**	**58.4**	12.8
	Nanchong	11.4	65.9	31.5	**79.7**	**17.7**	2.7	13.5	53.2	45.1	**71.0**	**27.3**	1.8	22.1	20.3	69.7	**38.4**	**51.6**	10.0
3	Deyang	14.9	66.0	30.8	**85.8**	**10.9**	3.3	18.5	53.0	45.7	**84.5**	**14.3**	1.3	28.2	34.0	56.2	**62.9**	**27.3**	9.8
	Leshan	13.1	72.2	25.3	**87.9**	**9.6**	2.5	14.8	54.5	44.1	**86.4**	**12.2**	1.4	26.5	30.8	60.9	**66.5**	**25.1**	8.4
	Luzhou	15.6	60.8	36.0	**80.8**	**16.0**	3.2	16.7	54.6	44.2	**82.8**	**16.0**	1.2	33.2	30.9	61.1	**58.2**	**33.8**	8.0
	Meishan	17.1	55.0	42.5	**89.0**	**8.4**	2.6	19.6	38.1	60.8	**88.5**	**10.4**	1.1	35.9	23.1	69.6	**72.1**	**20.7**	7.3
	Mianyang	11.3	65.0	32.0	**82.3**	**14.7**	3.0	13.3	54.9	43.3	**77.3**	**21.0**	1.8	22.4	34.8	55.1	**55.0**	**34.9**	10.1
	Neijiang	14.0	59.4	37.6	**81.9**	**15.1**	3.0	15.4	46.3	52.3	**79.5**	**19.1**	1.5	29.0	24.5	67.0	**54.3**	**37.3**	8.5
	Suining	11.1	19.4	78.5	**77.2**	**20.7**	2.1	12.2	10.9	87.4	**68.8**	**29.5**	1.7	22.2	7.9	83.9	**39.6**	**52.2**	8.2
	Ya'an	9.6	64.1	33.8	**85.0**	**13.0**	2.0	9.2	40.6	57.4	**80.2**	**17.8**	2.0	21.0	25.6	66.7	**63.7**	**28.7**	7.6
	Yibin	14.2	70.7	26.5	**84.3**	**12.8**	2.9	15.5	62.3	36.4	**84.2**	**14.5**	1.3	29.6	33.4	58.4	**61.9**	**29.9**	8.2
	Zigong	14.5	62.6	34.0	**81.7**	**14.9**	3.5	15.2	54.6	44.0	**81.4**	**17.2**	1.4	30.9	29.7	61.4	**57.3**	**33.9**	8.9
	Ziyang	13.4	65.3	32.4	**84.8**	**12.9**	2.4	15.7	48.5	50.0	**79.4**	**19.1**	1.5	25.9	25.7	65.5	**53.9**	**37.3**	8.8
4	Chengdu	13.8	42.9	52.5	**82.7**	**12.7**	4.6	14.4	49.3	49.5	**86.0**	**12.8**	1.2	30.6	37.9	52.5	**67.4**	**23.0**	9.6

*concentration; $ including IC, BC, windblown dust, and sea salt.

Table S4. Predicted maximum daily contribution from a given region (MDCs) in SCB city center and the corresponding $PM_{2.5}$ concentrations in the city center on the same day. Only summer data are included in this table. The units are μg m^{-3}. The numbers in the bold present the contributions due to local emissions or that from R7.

Region IDs	Cities	MDCs (total $PM_{2.5}$ concentrations)										
		Within SCB				Outside SCB					SOA	Other*
		R1	R2	R3	R4	R5	R6	R7	R8	R9		
R1	Chongqing	**147 (214)**	5 (80)	6 (82)	0 (48)	3 (87)	4 (65)	**30 (69)**	0 (48)	2 (64)	21 (50)	10 (42)
R2	Bazhong	4 (50)	**17 (32)**	4 (32)	2 (42)	2 (38)	1 (38)	**36 (63)**	0 (7)	1 (39)	23 (92)	6 (16)
	Dazhou	2 (49)	**43 (56)**	3 (43)	1 (42)	3 (50)	1 (13)	**31 (65)**	0 (12)	1 (35)	42 (214)	6 (23)
	Guangan	18 (88)	**40 (60)**	3 (49)	1 (39)	3 (50)	2 (28)	**33 (71)**	0 (16)	2 (41)	16 (49)	7 (25)
	Guangyuan	7 (46)	**22 (38)**	7 (38)	3 (38)	1 (47)	2 (43)	**23 (48)**	0 (23)	1 (47)	23 (81)	8 (13)
	Nanchong	19 (84)	**45 (73)**	6 (45)	3 (42)	2 (55)	3 (49)	**29 (80)**	0 (25)	1 (51)	33 (88)	7 (42)
R3	Deyang	13 (54)	3 (41)	**48 (57)**	44 (89)	1 (82)	2 (78)	**18 (82)**	0 (74)	1 (30)	19 (46)	9 (23)
	Leshan	7 (63)	1 (50)	**34 (45)**	16 (56)	0 (66)	3 (80)	**17 (66)**	0 (80)	1 (80)	25 (80)	7 (24)
	Luzhou	46 (88)	3 (87)	**61 (87)**	2 (30)	1 (71)	6 (47)	**24 (55)**	0 (65)	1 (47)	29 (88)	9 (65)
	Meishan	9 (59)	2 (84)	**40 (55)**	55 (100)	1 (84)	2 (74)	**21 (84)**	0 (68)	1 (68)	25 (54)	8 (26)
	Mianyang	7 (57)	4 (42)	**61 (87)**	13 (85)	1 (49)	2 (47)	**18 (64)**	0 (87)	1 (24)	20 (81)	10 (24)
	Neijiang	32 (70)	6 (44)	**61 (76)**	4 (38)	1 (104)	5 (66)	**21 (104)**	0 (41)	1 (66)	27 (84)	6 (29)
	Suining	25 (53)	18 (36)	**14 (33)**	3 (33)	2 (78)	3 (41)	**30 (53)**	0 (31)	1 (53)	27 (81)	7 (15)
	Ya'an	6 (43)	1 (23)	**13 (39)**	7 (22)	0 (41)	1 (30)	**10 (37)**	0 (41)	0 (19)	28 (70)	5 (14)
	Yibin	12 (67)	1 (47)	**60 (73)**	4 (49)	1 (73)	5 (87)	**19 (73)**	0 (83)	1 (34)	18 (29)	7 (83)
	Zigong	21 (74)	5 (53)	**61 (76)**	3 (28)	1 (102)	5 (80)	**21 (102)**	0 (49)	1 (80)	27 (87)	6 (31)
	Ziyang	16 (56)	3 (39)	**39 (53)**	21 (54)	1 (80)	3 (56)	**21 (47)**	0 (56)	1 (56)	23 (66)	8 (20)
R4	Chengdu	8 (55)	2 (97)	19 (68)	**73 (112)**	1 (107)	2 (89)	**21 (107)**	0 (74)	1 (27)	26 (66)	8 (31)

* Others include IC, BC, windblown dust, and sea salt.

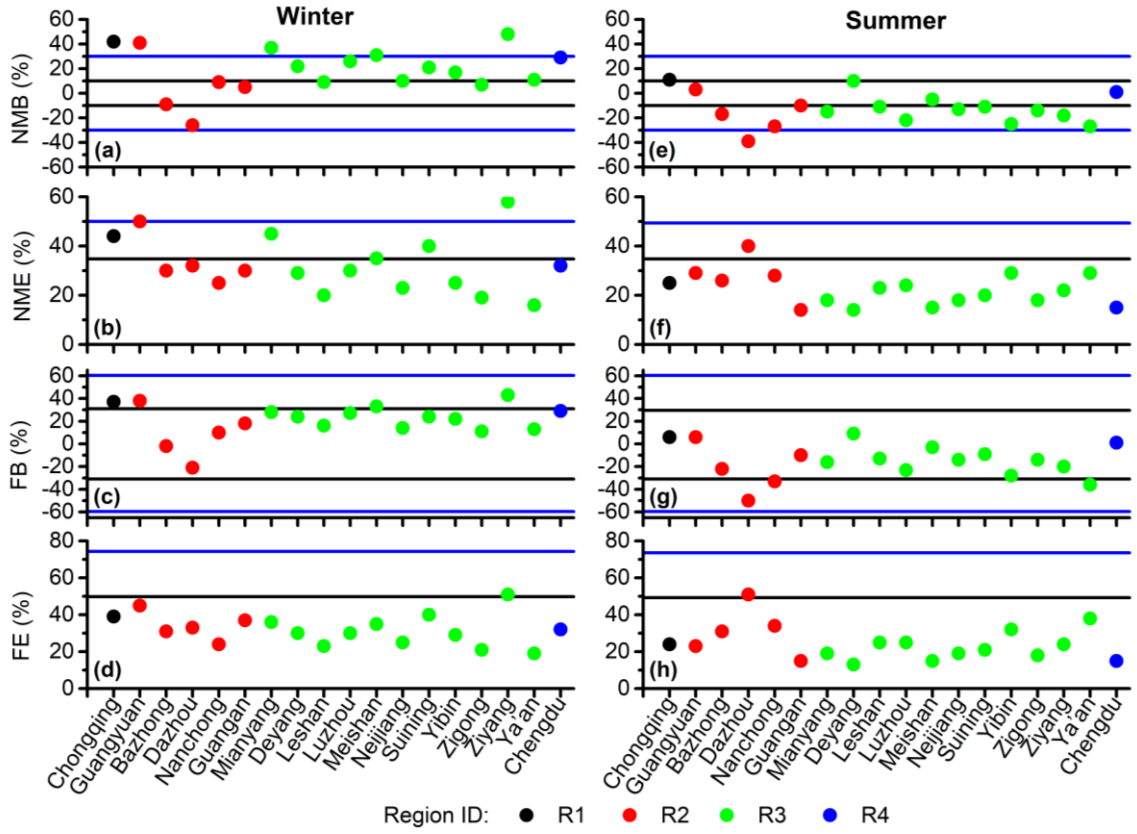

Figure S 1. Model performance for 24-hr $PM_{2.5}$ in the 18 city centers of the SCB in the winter and summer. Note: NMB, NME, FB, and FE denote normalized mean bias, normalized mean error, fractional bias, and fractional error, respectively. The blue and black lines represent the modeling criteria and goals suggested by Emery et al. (2017), respectively. The predicted daily $PM_{2.5}$ concentrations used to calculate NMB, NME, FB, and FE are those closest to the observations within 3x3 grid cell regions that surround the urban centers.

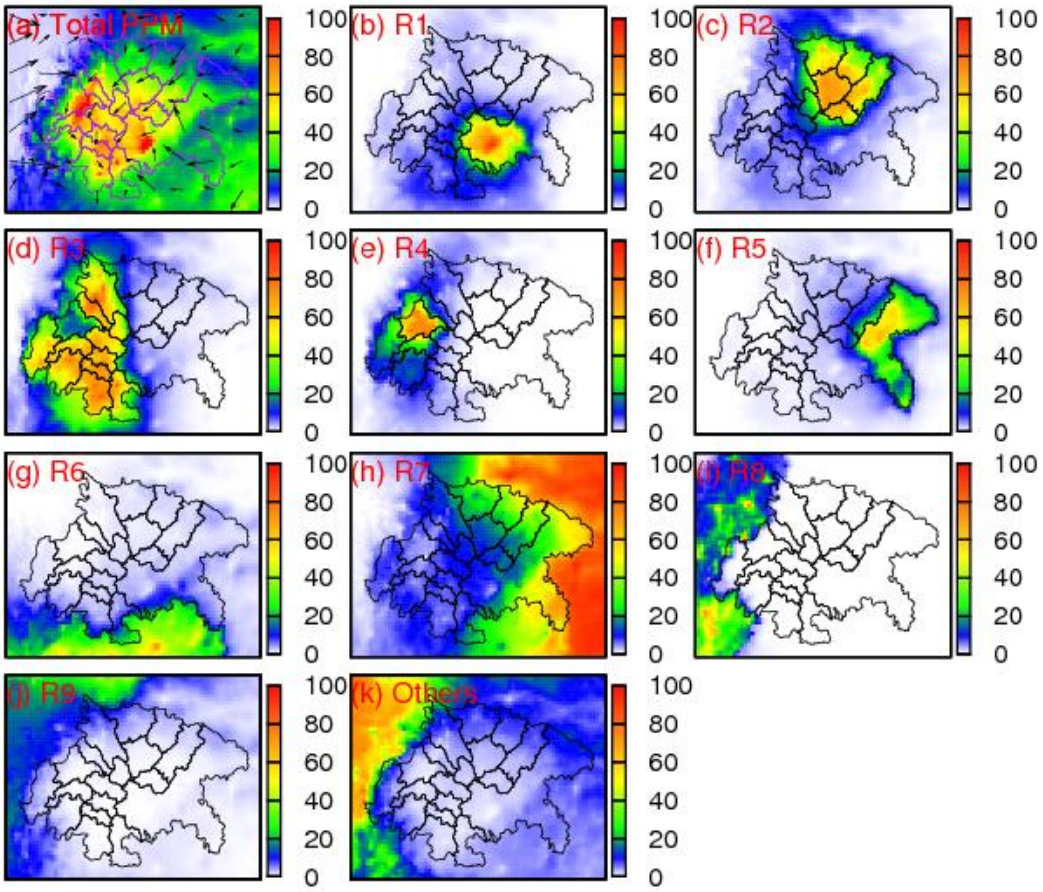

Figure S 2. (a) Spatial distributions of predicted PPM concentrations (μg m^{-3}) and (b-l) the source-region contributions to PPM (%) in the SCB in the winter. Others include IC, BC, windblown dust, and sea salt.

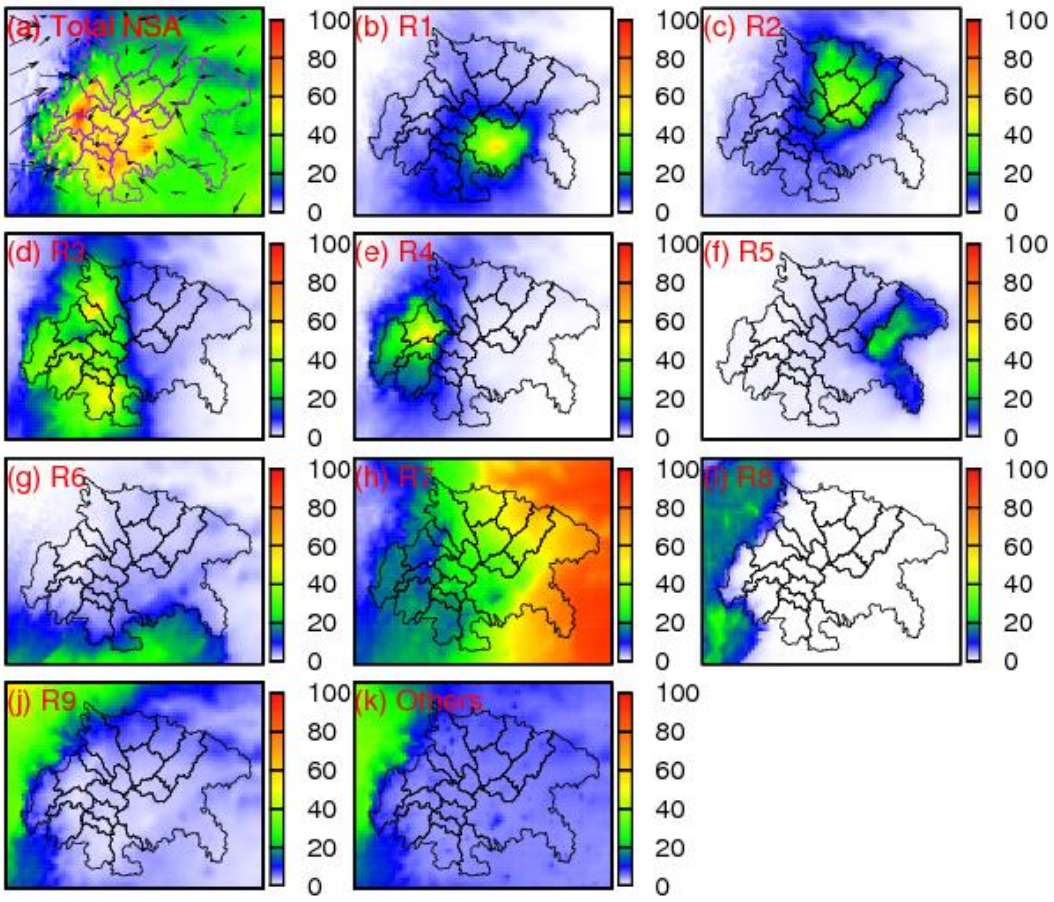

Figure S 3. (a) Spatial distributions of predicted seasonal SIA concentrations (μg m^{-3}) and (b-l) source-region contributions to SIA (%) in the SCB in the winter. Others include IC, BC, windblown dust, and sea salt.

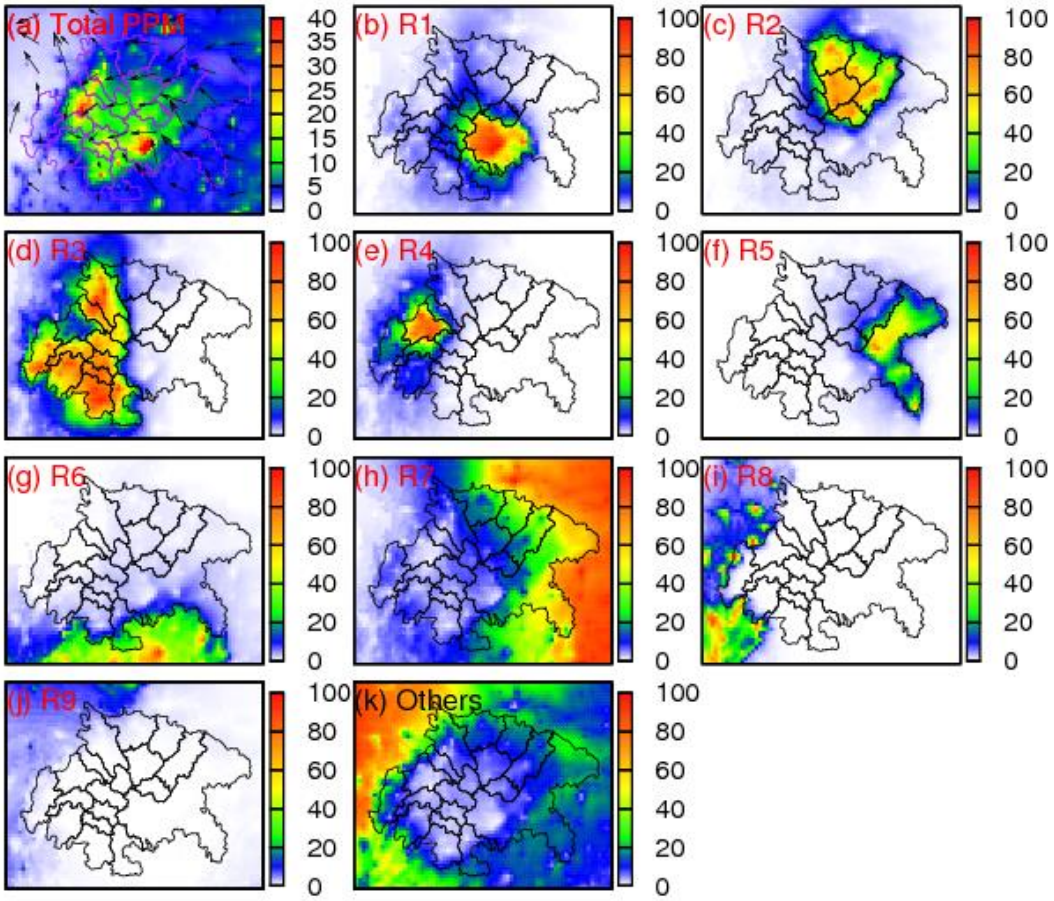

Figure S 4. (a) Spatial distributions of predicted PPM concentrations (μg m^{-3}) and (b-l) source-region contributions (%) to PPM in the SCB in the summer. Others include IC, BC, windblown dust, and sea salt.

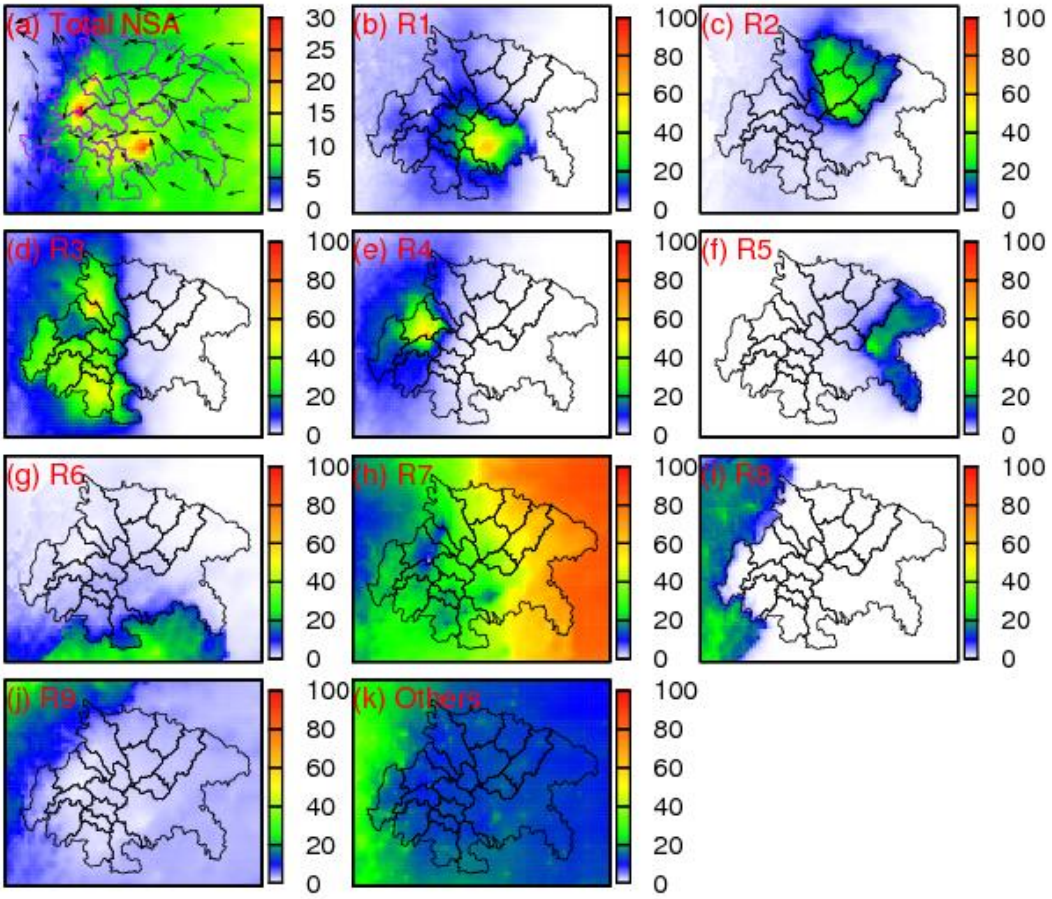

Figure S 5. (a) Spatial distributions of predicted SIA concentrations (μg m^{-3}) and (b-l) source-region contributions (%) to SIA in the SCB in the summer. Others include IC, BC, windblown dust, and sea salt.

References

Emery, C., Liu, Z., Russell, A.G., Odman, M.T., Yarwood, G., Kumar, N.J.J.o.t.A., Association, W.M., 2017. Recommendations on statistics and benchmarks to assess photochemical model performance. 67, 582-598.