

# CMBGC-Iteration 1.0

## User Guide

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# CMBGC-Iteration 1.0

Chemical mass balance gas constraint-Iteration model (CMBGC-Iteration) is an extension to the more traditional CMB model and can be applied to estimate the contribution of sources to particulate matter, using gas phase species concentration constraints.

In this model, the uncertainties of ambient dataset and source profiles are involved in the iterative solution.

# CMBGC-Iteration 1.0

[illegible]

# CMBGC-Iteration 1.0

- **RUNNING ENVIRONMENT :**

Win XP、Win7、Win8 (32 bit or 64 bit system)

Before running the program, **Matlab (2009 or higher)** should be install firstly.

# CMBGC-Iteration 1.0

- **Download address:**

<http://russellgroup.ce.gatech.edu/node/16>

or

[http://env.nankai.edu.cn/air/list/?110\\_1.html](http://env.nankai.edu.cn/air/list/?110_1.html)

# CMBGC-Iteration 1.0



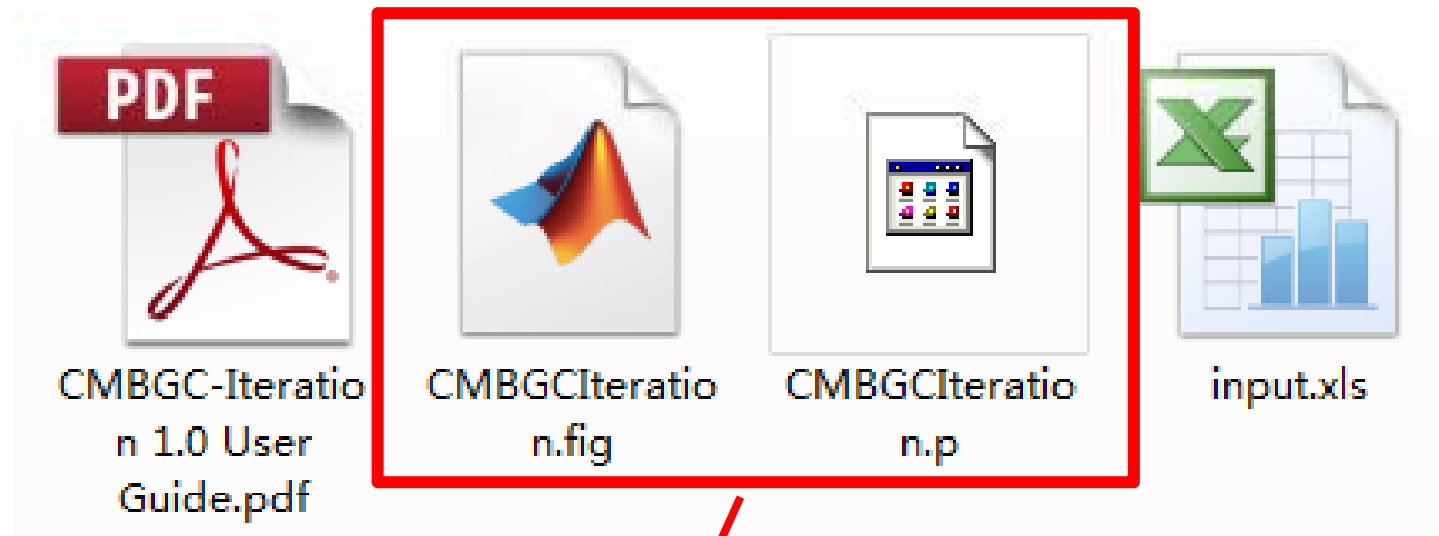
CMBGC-Iteratio  
n.zip



Extract the CMBGC-Iteration.zip  
file

# CMBGC-Iteration 1.0

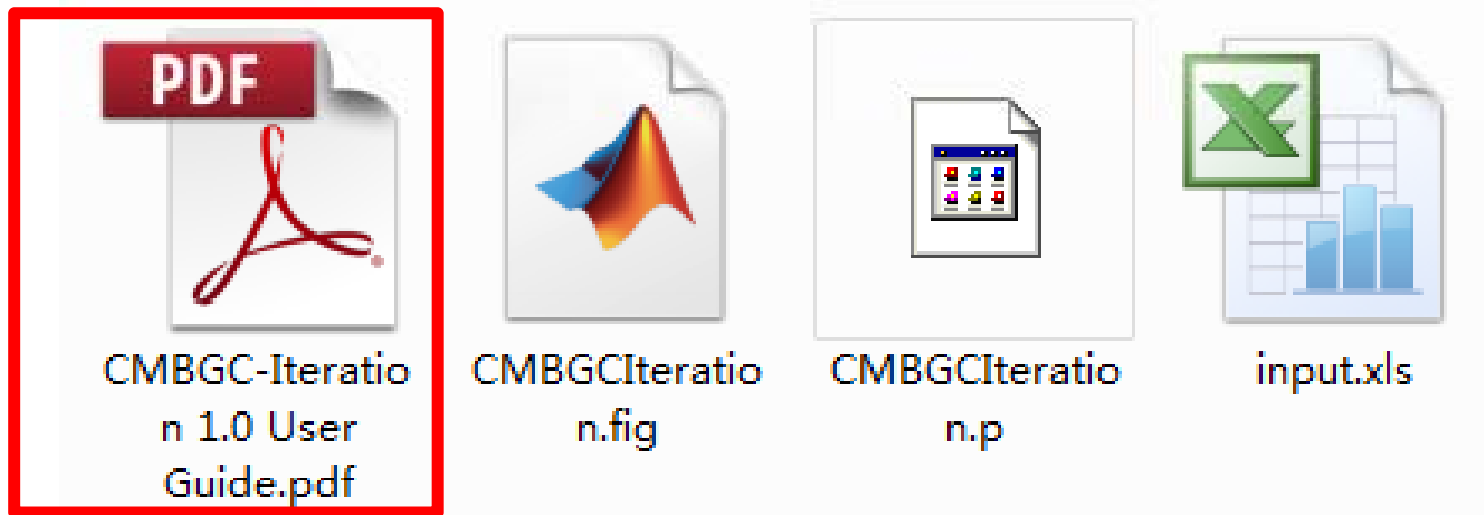
Four files in CMBGC-Iteration.zip



Matlab program files

# CMBGC-Iteration 1.0

Four files in CMBGC-Iteration.zip

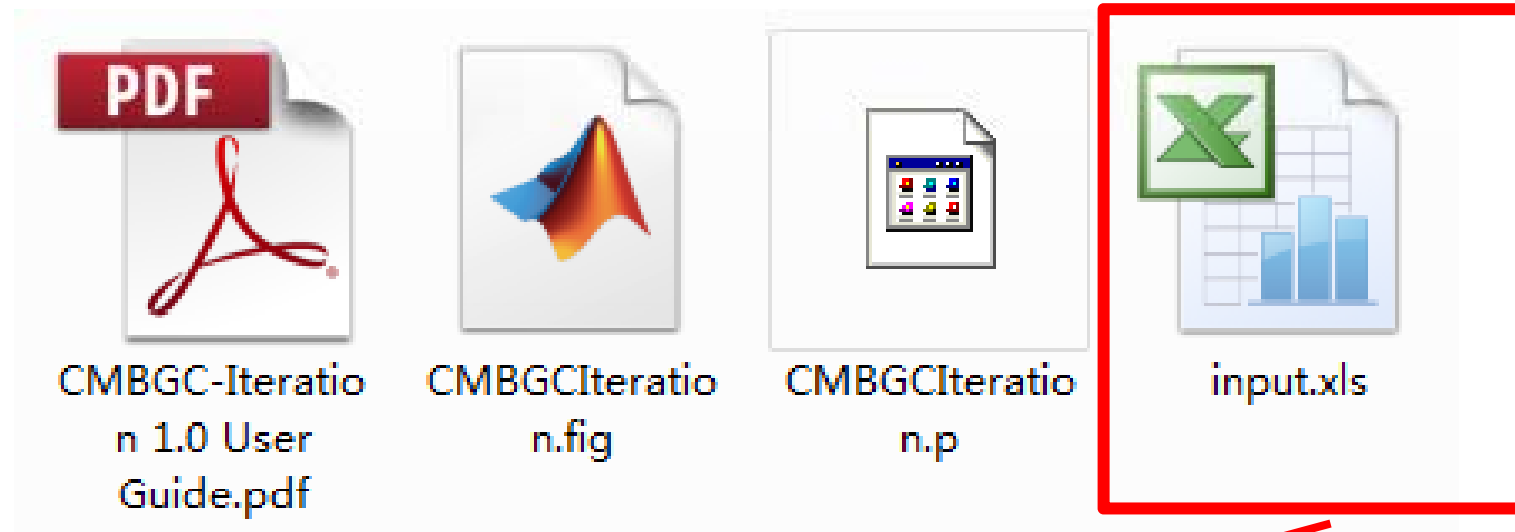


User Guide for CMBGC-Iteration



# CMBGC-Iteration 1.0

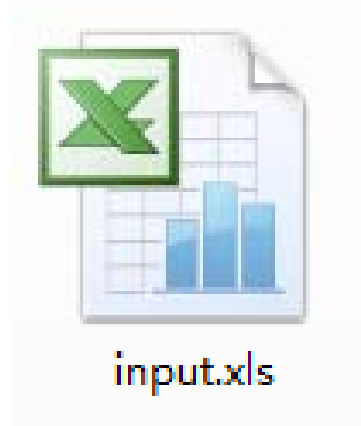
Four files in CMBGC-Iteration.zip



Example of input file

# CMBGC-Iteration 1.0

- Input file



**Input file of CMBGC-Iteration 1.0 is .xls file**

(User can modify the name of input file)

# CMBGC-Iteration 1.0

## Input file

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K
2	2006/1/5	4	0.26	367.4183	48.87959	0.288	0.516	0.0611	0.5252	1.4088	0.00547	0.00096	0.0888	0.00133	0.0539	
3	2006/1/8	7.2	6.2168	522.8087	72.80349	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704	
4	#####	5.9	3.817333	434.2217	78.61594	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641	
5	#####	3.7	0.6544	510.5683	49.40925	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	
6	#####	10.8	2.508533	534.4267	96.77554	1.75	2.82	1.11	1.0413	2.5097	0.0027	0.00217	0.0434	0.00216	0.0708	
7	#####	5.8	7.8528	334.0167	73.84904	0.579	0.391	0.174	0.975	2.215	0.0027	0.00166	0.0573	0.00215	0.0577	
8	#####	7.9										0.00254	0.0603	0.00089	0.0934	
9	2006/2/1	9.9										0.0043	0.0294	0.0014	0.0436	
10	2006/2/4	6.3										0.00117	0.0577	0.00343	0.0767	
11	2006/2/7	10.5	2.9448	586.915	149.8924	1.44	2.37	0.807	1.547	2.613	0.0027	0.00306	0.0828	0.00284	0.111	
12	#####	12.5	2.9448	331.1935	39.64846	2.38	1.91	1.29	0.7839	2.8191	0.0027	0.00362	0.0398	0.00251	0.0414	
13	#####	12.4	0.26	167.0083	18.68926	3.44	0.752	1.17	0.598	2.602	0.0359	0.00485	0.0695	0.000325	0.0358	
14	#####	14.7	0.26	428.2052	21.62643	1.39	2.89	2.22	0.3588	2.0672	0.0027	0.00298	0.0106	0.00146	0.0106	
15	#####	17.1	0.26	267.2133	53.57082	3.55	3.16	2.29	0.7943	2.4067	0.0027	0.00323	0.0116	0.00171	0.0292	
16	#####	9.2	0.26	243.355	39.3458	1.37	1.5	0.88	0.5343	2.1467	0.0027	0.00192	0.0149	0.00129	0.0204	
17	#####	9	0.810034	331.1935	29.50704	3.24	1.06	1.17	0.507	1.443	0.0154	0.00516	0.0292	0.000325	0.0345	
18	2006/3/6	17.6	0.9816	434.2217	57.65673	6.76	1.55	2.56	1.0972	3.0568	0.0027	0.00602	0.0446	0.00294	0.0529	
19	2006/3/9	6.6	0.26	200.41	43.58004	1.38	0.457	0.477	0.5967	1.1523	0.0363	0.00187	0.0617	0.0011	0.0677	
20	#####	18.8	0.9816	184.2278	29.50704										0.021	
21	#####	12.2	7.1984	496.2533	47.97161										0.0503	
22	#####	0.42	0.569043	510.5683	12.78739										0.0227	
23	#####	0.42	0.26	291.0717	17.78128										0.0189	
24	#####	8.9	0.951855	484.1073	81.26421										0.0752	
25	#####	13.4	0.26	348.3617	13.09005										0.0276	
26	2006/4/2	14.3	0.26	408.2887	16.09601										0.0451	
27	2006/4/5	11	0.343333	114.32	28.33112	1.41	1.03	1.55	0.6682	2.7858	0.0027	0.00414	0.0444	0.00106	0.0356	
28	2006/4/8	8.3	0.26	252.8083	20.05123	2.98	1.16	1.16	0.3822	1.9418	0.0027	0.00236	0.0352	0.0014	0.0426	
concentration un_con profile un_pro source_gas parameter																

Six worksheets in input file

Do not change the names of  
six worksheets!

# CMBGC-Iteration 1.0

## Input file

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K
2	2006/1/5	4	0.26	367.4183	48.87959	0.288	0.516	0.0611	0.5252	1.4088	0.00547	0.00096	0.0888	0.00133	0.0539	
3	2006/1/8	7.2	6.2168	522.8087	72.80349	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704	
4	#####	5.9	3.817333	434.2217	78.61594	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641	
5	#####	3.7	0.6544	510.5683	49.40925	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	
6	#####	10.8	2.508533	534.4267	96.77554	1.75	2.82	1.11	1.0413	2.5097	0.0027	0.00217	0.0434	0.00216	0.0708	
7	#####	5.8	7.8528	334.0167	73.84904	0.579	0.391	0.174	0.975	2.215	0.0027	0.00166	0.0573	0.00215	0.0577	
8	#####	7.9	0.6544	390.4091	51.11927	0.844	0.215	0.304	0.6097	1.5893	0.075	0.00254	0.0603	0.00089	0.0934	
9	2006/2/1	9.9	2.835733	501.025	41.54009	2.98	0.515	1.01	0.7631	1.8539	0.0027	0.0043	0.0294	0.0014	0.0436	
10	2006/2/4	6										0.00117	0.0577	0.00343	0.0767	
11	2006/2/7	10										0.00306	0.0828	0.00284	0.111	
12	#####	12										0.00362	0.0398	0.00251	0.0414	
13	#####	12.4	0.26	167.0083	18.68926	3.44	0.752	1.17	0.598	2.602	0.0359	0.00485	0.0695	0.000325	0.0358	
14	#####	14.7	0.26	428.2012	21.62643	3.39	2.89	2.22	0.3588	2.0672	0.0027	0.00298	0.0106	0.00146	0.0106	
15	#####	17.1	0.26	267.2133	53.57082	3.55	3.16	2.29	0.7943	2.4067	0.0027	0.00323	0.0116	0.00171	0.0292	
16	#####	9.2	0.26	247.355	39.3458	1.37	1.5	0.88	0.5343	2.1467	0.0027	0.00192	0.0149	0.00129	0.0204	
17	#####	9	0.810034	331.1935	29.50704	3.24	1.06	1.17	0.507	1.443	0.0154	0.00516	0.0292	0.000325	0.0345	
18	2006/3/6	17.6	0.9816	434.2217	57.65673	6.76	1.55	2.56	1.0972	3.0568	0.0027	0.00602	0.0446	0.00294	0.0529	
19	2006/3/9	6.6	0.26	200.41	43.58304	1.38	0.457	0.477	0.5967	1.1523	0.0363	0.00187	0.0617	0.0011	0.0677	
20	#####	18.8	0.9816	184.2278	29.50704	7.16	1.57	2.15	0.5278	2.2982	0.0027	0.00583	0.0435	0.000325	0.021	
21	#####	12.2	7.1984	496.2533	47.97161	1.5	0.757	0.612	1.0127	4.5363	0.0027	0.00437	0.0584	0.00107	0.0503	
22	#####	0.42	0.509043	510.5683	12.78739	2.83	1.31	1.52	0.4186	2.7534	0.0027	0.00387	0.0181	0.000325	0.0227	
23	#####	0.42	0.26	291.0717	17.78128	2.76	1.24	1.1	0.2964	1.0816	0.0027	0.00134	0.0182	0.00082	0.0189	
24	#####	8.9	0.951855	484.1073	81.26421	1.16	2.49	1.03	0.9126	2.1794	0.0027	0.00251	0.205	0.00192	0.0752	
25	#####	13.4	0.26	348.3317	13.09005	5.38	0.298	1.94	0.3471	1.4599	0.0027	0.00413	0.04	0.001	0.0276	
26	2006/4/2	14.3	0.26	408.2887	16.09601	5.14	0.759	1.7	0.4238	2.2122	0.00659	0.00635	0.043	0.00104	0.0451	
27	2006/4/8	11	0.545333	114.52	26.33142	4.41	1.05	1.55	0.6682	2.7858	0.0027	0.00414	0.0444	0.00106	0.0356	
28	2006/4/8	8.3	0.26	252.8083	20.05123	2.98	1.16	1.16	0.3822	1.9418	0.0027	0.00236	0.0352	0.0014	0.0426	

Concentration of ambient dataset

# CMBGC-Iteration 1.0

Input file

Concentration of ambient dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	
2	2006/1/5	4	0.26	367.4183	48.87959	0.288	0.516	0.0611	0.5252	1.4088	0.00547	0.00096	0.0888	0.00133	0.0539	
3	2006/1/8	7.2	6.2168	522.8087	72.80349	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704	
4	#####	5.9	3.817333	434.2217	78.61594	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641	
5	#####	3.7	0.6544	510.5683	49.40925	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	
6	#####	10.8	2.508533	534.4267	96.77554	1.75	2.82	1.11	1.0413	2.5097	0.0027	0.00217	0.0434	0.00216	0.0708	
7	#####	5.8	7.8528	334.0167	73.84904	0.579	0.391	0.174	0.975	2.215	0.0027	0.00166	0.0573	0.00215	0.0577	
8	#####	7.9	0.6544	390.4091	51.11927	0.844	0.215	0.304	0.6097	1.5893	0.075	0.00254	0.0603	0.00089	0.0934	
9	2006/2/1	9.9	2.835733	501.025	41.54009	2.98	0.515	1.01	0.7631	1.8539	0.0027	0.0043	0.0294	0.0014	0.0436	
10	2006/2/4	6.3	1.934748	796.8683	105.477	0.711	0.63	0.247	1.1401	2.4669	0.0027	0.00117	0.0577	0.00343	0.0767	
11	2006/2/7	10.5	2.9448	586.915	149.8924	1.44	2.37	0.807	1.547	2.613	0.0027	0.00306	0.0828	0.00284	0.111	
12	#####	12.5	2.9448	331.1									398	0.00251	0.0414	
13	#####	12.4	0.26	167.0									695	0.000325	0.0358	
14	#####	14.7	0.26	428.2									106	0.00146	0.0106	
15	#####	17.1	0.26	267.2133	53.57082	3.55	3.16	2.29	0.7943	2.4067	0.0027	0.00323	0.0116	0.00171	0.0292	
16	#####	9.2	0.26	243.355	39.3458	1.37	1.5	0.88	0.5343	2.1467	0.0027	0.00192	0.0149	0.00129	0.0204	
17	#####	9	0.810034	331.1935	29.50704	3.24	1.06	1.17	0.507	1.443	0.0154	0.00516	0.0292	0.000325	0.0345	
18	2006/3/6	17.6	0.9816	434.2217	57.65673	6.76	1.55	2.56	1.0972	3.0568	0.0027	0.00602	0.0446	0.00294	0.0529	
19	2006/3/9	6.6	0.26	200.41	43.58304	1.38	0.457	0.477	0.5967	1.1523	0.0363	0.00187	0.0617	0.0011	0.0677	
20	#####	18.8	0.9816	184.2278	29.50704	7.16	1.57	2.15	0.5278	2.2982	0.0027	0.00583	0.0435	0.000325	0.021	
21	#####	12.2	7.1984	496.2533	47.97161	1.5	0.757	0.612	1.0127	4.5363	0.0027	0.00437	0.0584	0.00107	0.0503	
22	#####	0.42	0.569043	510.5683	12.78739	2.83	1.31	1.52	0.4186	2.7534	0.0027	0.00387	0.0181	0.000325	0.0227	
23	#####	0.42	0.26	291.0717	17.78128	2.76	1.24	1.1	0.2964	1.0816	0.0027	0.00134	0.0182	0.00082	0.0189	
24	#####	8.9	0.951855	484.1073	81.26421	1.16	2.49	1.03	0.9126	2.1794	0.0027	0.00251	0.205	0.00192	0.0752	
25	#####	13.4	0.26	348.3317	13.09005	5.38	0.298	1.94	0.3471	1.4599	0.0027	0.00413	0.04	0.001	0.0276	
26	2006/4/2	14.3	0.26	408.2887	16.09601	5.14	0.759	1.7	0.4238	2.2122	0.00659	0.00635	0.043	0.00104	0.0451	
27	2006/4/5	14	0.545333	114.52	26.33142	4.41	1.05	1.55	0.6682	2.7858	0.0027	0.00414	0.0444	0.00106	0.0356	
28	2006/4/8	8.3	0.26	252.8083	20.05123	2.98	1.16	1.16	0.3822	1.9418	0.0027	0.00236	0.0352	0.0014	0.0426	

First line: title line

# CMBGC-Iteration 1.0

Input file

Concentration of ambient dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K
2	2006/1/5	4	0.26	367.4183	48.87959	0.288	0.516	0.0611	0.5252	1.4088	0.00547	0.00096	0.0888	0.00133	0.0539	
3	2006/1/8	7.2	6.2168	522.8087	72.80349	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704	
4	#####	5.9	3.817333	434.2217	78.61594	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641	
5	#####	3.7	0.6544	510.5683	49.40925	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	
6	#####	10.8	2.508533	534.4267	96.77554	1.75	2.82	1.11	1.0413	2.5097	0.0027	0.00217	0.0434	0.00216	0.0708	
7	#####	5.8	7.8528	334.0167	73.84904	0.579	0.391	0.174	0.975	2.215	0.0027	0.00166	0.0573	0.00215	0.0577	
8	#####	7.9	0.6544	390.4091	51.11927	0.844	0.215	0.304	0.6097	1.5893	0.075	0.00254	0.0603	0.00089	0.0934	
9	2006/2/1	9.9	2.8							539	0.0027	0.0043	0.0294	0.0014	0.0436	
10	2006/2/4	6.3	1.9							569	0.0027	0.00117	0.0577	0.00343	0.0767	
11	2006/2/7	10.5	2							513	0.0027	0.00306	0.0828	0.00284	0.111	
12	#####	12.5	2							191	0.0027	0.00362	0.0398	0.00251	0.0414	
13	#####	12.4								502	0.0359	0.00485	0.0695	0.000325	0.0358	
14	#####	14.7								572	0.0027	0.00298	0.0106	0.00146	0.0106	
15	#####	17.1								067	0.0027	0.00323	0.0116	0.00171	0.0292	
16	#####	9.2								467	0.0027	0.00192	0.0149	0.00129	0.0204	
17	#####	9	0.8							443	0.0154	0.00516	0.0292	0.000325	0.0345	
18	2006/3/6	17.6	0							568	0.0027	0.00602	0.0446	0.00294	0.0529	
19	2006/3/9	6.6	0.26	200.41	43.58304	1.38	0.457	0.477	0.5967	1.1523	0.0363	0.00187	0.0617	0.0011	0.0677	
20	#####	18.8	0.9816	184.2278	29.50704	7.16	1.57	2.15	0.5278	2.2982	0.0027	0.00583	0.0435	0.000325	0.021	
21	#####	12.2	7.1984	496.2533	47.97161	1.5	0.757	0.612	1.0127	4.5363	0.0027	0.00437	0.0584	0.00107	0.0503	
22	#####	0.42	0.569043	510.5683	12.78739	2.83	1.31	1.52	0.4186	2.7534	0.0027	0.00387	0.0181	0.000325	0.0227	
23	#####	0.42	0.26	291.0717	17.78128	2.76	1.24	1.1	0.2964	1.0816	0.0027	0.00134	0.0182	0.00082	0.0189	
24	#####	8.9	0.951855	484.1073	81.26421	1.16	2.49	1.03	0.9126	2.1794	0.0027	0.00251	0.205	0.00192	0.0752	
25	#####	13.4	0.26	348.3317	13.09005	5.38	0.298	1.94	0.3471	1.4599	0.0027	0.00413	0.04	0.001	0.0276	
26	2006/4/2	14.3	0.26	408.2887	16.09601	5.14	0.759	1.7	0.4238	2.2122	0.00659	0.00635	0.043	0.00104	0.0451	
27	2006/4/5	14	0.545333	114.52	26.33142	4.41	1.05	1.55	0.6682	2.7858	0.0027	0.00414	0.0444	0.00106	0.0356	
28	2006/4/8	8.3	0.26	252.8983	20.05123	2.98	1.16	1.16	0.3822	1.9418	0.0027	0.00236	0.0352	0.0014	0.0426	

concentration un\_con profile un\_pro source\_gas parameter

Dataset

Number of samples should  
greater than one

# CMBGC-Iteration 1.0

Input file

Concentration of ambient dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Date	P2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K
2	2006/1/5	4	0.26	367.4183	48.87959	0.288	0.516	0.0611	0.5252	1.4088	0.00547	0.00096	0.0888	0.00133	0.0539	
3	2006/1/8	7.2	6.2168	522.8087	72.80349	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704	
4	#####	5.9	3.817333	434.2217	78.61594	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641	
5	#####	3.7	0.6544	510.5683	49.40925	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	
6	#####	10.8	2.508533	534.4267	96.77554	1.75	2.82	1.11	1.0413	2.5097	0.0027	0.00217	0.0434	0.00216	0.0708	
7	#####	5.8	7.8528	334.0167	73.84904	0.579	0.391	0.174	0.975	2.215	0.0027	0.00166	0.0573	0.00215	0.0577	
8	#####	7.9	0.6544	390.40										0.00089	0.0934	
9	2006/2/1	9.9	2.835733	501.0										0.0014	0.0436	
10	2006/2/4	6.3	1.934748	769.86										0.00343	0.0767	
11	2006/2/7	10.5	2.9448	586.915	149.8924	1.44	2.37	0.807	1.547	2.613	0.0027	0.00306	0.0828	0.00284	0.111	
12	#####	12.5	2.9448	331.1935	39.64846	2.38	1.91	1.29	0.7839	2.8191	0.0027	0.00362	0.0398	0.00251	0.0414	
13	#####	12.4	0.26	167.0083	18.68926	3.44	0.752	1.17	0.598	2.602	0.0359	0.00485	0.0695	0.000325	0.0358	
14	#####	14.7	0.26	428.2052	21.62643	3.39	2.89	2.22	0.3588	2.0672	0.0027	0.00298	0.0106	0.00146	0.0106	
15	#####	17.1	0.26	267.2133	53.57082	3.55	3.16	2.29	0.7943	2.4067	0.0027	0.00323	0.0116	0.00171	0.0292	
16	#####	9.2	0.26	243.355	39.3458	1.37	1.5	0.88	0.5343	2.1467	0.0027	0.00192	0.0149	0.00129	0.0204	
17	#####	9	0.810034	331.1935	29.50704	3.24	1.06	1.17	0.507	1.443	0.0154	0.00516	0.0292	0.000325	0.0345	
18	2006/3/6	17.6	0.9816	434.2217	57.65673	6.76	1.55	2.56	1.0972	3.0568	0.0027	0.00602	0.0446	0.00294	0.0529	
19	2006/3/9	6.6	0.26	200.41	43.58304	1.38	0.457	0.477	0.5967	1.1523	0.0363	0.00187	0.0617	0.0011	0.0677	
20	#####	18.8	0.9816	184.2278	29.50704	7.16	1.57	2.15	0.5278	2.2982	0.0027	0.00583	0.0435	0.000325	0.021	
21	#####	12.2	7.1984	496.2533	47.97161	1.5	0.757	0.612	1.0127	4.5363	0.0027	0.00437	0.0584	0.00107	0.0503	
22	#####	0.42	0.569043	510.5683	12.78739	2.83	1.31	1.52	0.4186	2.7534	0.0027	0.00387	0.0181	0.000325	0.0227	
23	#####	0.42	0.26	291.0717	17.78128	2.76	1.24	1.1	0.2964	1.0816	0.0027	0.00134	0.0182	0.00082	0.0189	
24	#####	8.9	0.951855	484.1073	81.26421	1.16	2.49	1.03	0.9126	2.1794	0.0027	0.00251	0.205	0.00192	0.0752	
25	#####	13.4	0.26	348.3317	13.09005	5.38	0.298	1.94	0.3471	1.4599	0.0027	0.00413	0.04	0.001	0.0276	
26	2006/4/2	14.3	0.26	408.2887	16.09601	5.14	0.759	1.7	0.4238	2.2122	0.00659	0.00635	0.043	0.00104	0.0451	
27	2006/4/5	14	0.545333	114.52	26.33142	4.41	1.05	1.55	0.6682	2.7858	0.0027	0.00414	0.0444	0.00106	0.0356	
28	2006/4/8	8.3	0.26	252.8983	20.05123	2.88	1.16	1.16	0.3822	1.9418	0.0027	0.00236	0.0352	0.0014	0.0426	

First column: Date column



# CMBGC-Iteration 1.0

Input file

Concentration of ambient dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K
2	2006/1/5	4	0.26	367.4183	48.87959	0.288	0.516	0.0611	0.5252	1.4088	0.00547	0.00096	0.0888	0.00133	0.0539	
3	2006/1/8	7.2	6.2168	522.8087	72.80349	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704	
4	#####	5.9	8.17333	434.2217	78.61594	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641	
5	#####	3.7	0.6544	510.5683	49.40925	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	
6	#####	10.8	5.08533	534.4267	96.77554	1.75	2.82	1.11	1.0413	2.5097	0.0027	0.00217	0.0434	0.00216	0.0708	
7	#####	5.8	7.8528	334.0167	73.84904	0.558	0.881	0.154	0.855	0.815	0.0027	0.00132	0.0558	0.0015	0.0577	
8	#####	7.9	0.6544	390.4091	51.11927	0.558	0.881	0.154	0.855	0.815	0.0027	0.00132	0.0558	0.0015	0.0577	0.934
9	2006/2/1	9.9	8.35733	501.025	41.54399	2.83	1.31	1.52	0.4186	2.7534	0.0027	0.00387	0.0181	0.000325	0.0227	0.436
10	2006/2/4	6.3	9.34748	796.8683	105.477	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704	0.767
11	2006/2/7	10.5	2.9448	586.915	149.8924	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641	1.11
12	#####	12.5	2.9448	331.1935	39.64846	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	0.414
13	#####	12.4	0.26	167.0083	18.68926	0.558	0.881	0.154	0.855	0.815	0.0027	0.00132	0.0558	0.0015	0.0577	0.358
14	#####	14.7	0.26	428.2052	21.62643	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	0.106
15	#####	17.1	0.26	267.2133	53.57082	0.558	0.881	0.154	0.855	0.815	0.0027	0.00132	0.0558	0.0015	0.0577	0.292
16	#####	9.2	0.26	243.355	39.3458	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	0.204
17	#####	9	0.810034	331.1935	29.50704	0.558	0.881	0.154	0.855	0.815	0.0027	0.00132	0.0558	0.0015	0.0577	0.345
18	2006/3/6	17.6	0.9816	434.2217	57.65673	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	0.529
19	2006/3/9	6.6	0.26	200.41	43.58304	0.558	0.881	0.154	0.855	0.815	0.0027	0.00132	0.0558	0.0015	0.0577	0.677
20	#####	18.8	0.9816	184.2278	29.50704	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	0.021
21	#####	12.2	7.1984	496.2533	47.97161	0.558	0.881	0.154	0.855	0.815	0.0027	0.00132	0.0558	0.0015	0.0577	0.503
22	#####	0.42	0.569043	510.5683	12.78739	2.83	1.31	1.52	0.4186	2.7534	0.0027	0.00387	0.0181	0.000325	0.0227	
23	#####	0.42	0.26	291.0717	17.78128	2.76	1.24	1.1	0.2964	1.0816	0.0027	0.00134	0.0182	0.00082	0.0189	
24	#####	8.9	0.951855	484.1073	81.26421	1.16	2.49	1.03	0.9126	2.1794	0.0027	0.00251	0.205	0.00192	0.0752	
25	#####	13.4	0.26	348.3317	13.09005	5.38	0.298	1.94	0.3471	1.4599	0.0027	0.00413	0.04	0.001	0.0276	
26	2006/4/2	14.3	0.26	408.2887	16.09601	5.14	0.759	1.7	0.4238	2.2122	0.00659	0.00635	0.043	0.00104	0.0451	
27	2006/4/5	14	0.545333	114.52	26.33142	4.41	1.05	1.55	0.6682	2.7858	0.0027	0.00414	0.0444	0.00106	0.0356	
28	2006/4/8	8.3	0.26	252.8983	20.05123	2.88	1.16	1.16	0.3822	1.9418	0.0027	0.00236	0.0352	0.0014	0.0426	

Second column: PM column -  
concentration of PM (unit: ug/m<sup>3</sup>)

PM column should be list after  
of Date column



# CMBGC-Iteration 1.0

Input file

Concentration of ambient dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K
2	2006/1/5		0.26	367.4183	48.87959	0.288	0.516	0.0611	0.5252	1.4088	0.00547	0.00096	0.0888	0.00133	0.0539	
3	2006/1/8	7.	6.2168	522.8087	72.80349	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704	
4	#####	5.	3.817333	434.2217	78.61594	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641	
5	#####	3.	0.6544	510.5683	49.40925	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397	
6	#####	10.	2.508533	534.4267	96.77554	1.75	2.82	1.11	1.0413	2.5097	0.0027	0.00217	0.0434	0.00216	0.0708	
7	#####	5.	7.8528	334.0167	73.84904	0.579	0.391	0.174	0.975	2.215	0.0027	0.00166	0.0573	0.00215	0.0577	
8	#####	7.	0.6544	390.4091	51.11927	0.844	0.215	0.304	0.6097	1.5893	0.075	0.00254	0.0603	0.00089	0.0934	
9	2006/2/1	9.	2.835733	501.025	41.54009	2.98	0.515	1.01	0.7631	1.8539	0.0027	0.0043	0.0294	0.0014	0.0436	
10	2006/2/4	6.	1.934748	796.8683	105.477											0767
11	2006/2/7	10.	2.9448	586.915	149.8924											0.111
12	#####	12.	2.9448	331.1935	39.64846											0414
13	#####	12.	0.26	167.0083	18.68926											0358
14	#####	14.	0.26	428.2052	21.62643											0106
15	#####	17.	0.26	267.2133	53.57082											0292
16	#####	9.	0.26	243.355	39.3458											0204
17	#####		0.810034	331.1935	29.50704											0345
18	2006/3/6	17.	0.9816	434.2217	57.65673											0529
19	2006/3/9	6.	0.26	200.41	43.58304											0677
20	#####	18.	0.9816	184.2278	29.50704											0.021
21	#####	12.	7.1984	496.2533	47.97161											0503
22	#####	0.4	0.569043	510.5683	12.78739											0227
23	#####	0.4	0.26	291.0717	17.78128											0189
24	#####	8.	0.951855	484.1073	81.26421											0752
25	#####	13.	0.26	348.3317	13.09005											0276
26	2006/4/2	14.	0.26	408.2887	16.09601											0451
27	2006/4/5	1	0.545333	114.52	26.33142											0356
28	2006/4/8	8	0.26	252.8083	20.05123											0426

Gases columns: concentration of ambient gases (unit: ug/m<sup>3</sup>)

Gases columns should be list after of PM column

User can modify the number of gas categories

# CMBGC-Iteration 1.0

Input file

Concentration of ambient dataset

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe
2	2006/1/5	4	0.26	367.4183	48.87959	0.288	0.516	0.0611	0.5252	1.4088	0.00547	0.00096	0.0888	0.00133	0.0539
3	2006/1/8	7.2	6.2168	522.8087	72.80349	0.72	0.653	0.18	0.7592	2.5848	0.0027	0.00372	0.104	0.00271	0.0704
4	#####	5.9	3.817333	434.2217	78.61594	1.15	0.459	0.367	0.8658	1.8702	0.0027	0.00132	0.0957	0.00147	0.0641
5	#####	3.7	0.6544	510.5683	49.40925	0.626	0.247	0.207	0.403	1.317	0.0027	0.00027	0.0511	0.00076	0.0397
6	#####	10.8	2.508533	534.4267	96.77554	1.75	2.82	1.11	1.0413	2.5097	0.0027	0.00217	0.0434	0.00216	0.0708
7	#####	5.8	7.8528	334.0167	73.84904	0.579	0.391	0.174	0.975	2.215	0.0027	0.00166	0.0573	0.00215	0.0577
8	#####	7.9	0.6544	390.4091	51.11927	0.844	0.215	0.304	0.6097	1.5893	0.075	0.00254	0.0603	0.00089	0.0934
9	2006/2/1	9.9	2.835733	501.025	41.54009	2.98	0.515	1.01	0.7631	1.8539	0.0027	0.0043	0.0294	0.0014	0.0436
10	2006/2/4	6.3	1.934748	756.8683	105.477	0.711	0.63	0.247	1.1401	2.4669	0.0027	0.00117	0.0577	0.00343	0.0767
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Species columns: concentration of species in PM(unit: ug/m<sup>3</sup>)

Species columns should be list after of Gases columns

User can modify the number of Species categories

# CMBGC-Iteration 1.0

## Input file

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu
2	2006/1/5	0.53333333	0	0	0	0.021	0.032	0.0043	0.156	0.190392	0.003	0.00026	0.0064	0.00034
3	2006/1/8	0.74133333	0	0	0	0.052	0.04	0.013	0.169	0.266566	0.0045	0.00038	0.0075	0.00034
4	#####	0.65683333	0	0	0	0.083	0.026	0.026	0.182	0.219606	0.0045	0.00026	0.0069	0.00034
5	#####	0.51383333	0	0	0	0.045	0.015	0.015	0.143	0.180834	0.0045	0.00045	0.0038	0.00034
6	#####	0.97533333	0	0	0	0.12	0.14	0.078	0.182	0.266502	0.0045	0.00029	0.0033	0.00034
7	#####	0.65033333	0	0	0	0.042	0.021	0.012	0.182	0.24747	0.0045	0.00028	0.0042	0.00034
8	#####	0.78683333	0	0	0	0.061	0.012	0.021	0.156	0.199925	0.0066	0.00031	0.0044	0.00034
9	2006/2/1	0.916833									0.0045	0.0004	0.0023	0.00034
10	2006/2/4	0.682833									0.0045	0.00026	0.0042	0.00034
11	2006/2/7	0.955833									0.0045	0.00033	0.006	0.00034
12	#####	1.085833									0.0045	0.00038	0.003	0.00034
13	#####	1.079333									0.0035	0.00043	0.0051	0.000542
14	#####	1.22883333	0	0	0	0.24	0.2	0.16	0.143	0.228882	0.0045	0.00034	0.0012	0.00034
15	#####	1.38483333	0	0	0	0.25	0.22	0.16	0.169	0.257532	0.0045	0.00035	0.0013	0.00034
16	#####	0.87133333	0	0	0	0.098	0.092	0.062	0.156	0.238356	0.0045	0.00027	0.0014	0.00034
17	#####	0.85833333	0	0	0	0.23	0.062	0.083	0.156	0.191484	0.003	0.00045	0.0023	0.000542
18	2006/3/6	1.41733333	0	0	0	0.48	0.1	0.18	0.195	0.30515	0.0045	0.00051	0.0034	0.00034
19	2006/3/9	0.70233333	0	0	0	0.099	0.026	0.034	0.156	0.172439	0.0036	0.00026	0.0045	0.00034
20	#####	1.49533333	0	0	0	0.51	0.087	0.15	0.156	0.247501	0.0045	0.00049	0.0033	0.000542
21	#####	1.06633333	0	0	0	0.11	0.039	0.043	0.182	0.401203	0.0045	0.00041	0.0043	0.00034
22	#####	0.54666667	0	0	0	0.2	0.088	0.11	0.156	0.276236	0.0045	0.00037	0.0017	0.000542
23	#####	0.54666667	0	0	0	0.2	0.08	0.078	0.143	0.163017	0.0045	0.00025	0.0017	0.00034
24	#####	0.85183333	0	0	0	0.083	0.15	0.073	0.182	0.247622	0.0045	0.00029	0.015	0.00034
25	#####	1.14433333	0	0	0	0.38	0.016	0.14	0.143	0.190628	0.0045	0.00039	0.0031	0.00034
26	2006/4/2	1.20283333	0	0	0	0.36	0.041	0.12	0.156	0.239145	0.003	0.00053	0.0033	0.00034
27	2006/4/5	1.18333333	0	0	0	0.31	0.066	0.11	0.169	0.286122	0.0045	0.0004	0.0034	0.00034
28	2006/4/8	0.81283333	0	0	0	0.21	0.078	0.082	0.143	0.219988	0.0045	0.0003	0.0027	0.00034

Uncertainties of ambient dataset  
(Unit: ug/m<sup>3</sup>)

concentration un\_con profile un\_pro source\_gas parameter

# CMBGC-Iteration 1.0

Input file

Uncertainties of ambient dataset  
(Unit:  $\mu\text{g}/\text{m}^3$ )

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu
2	2006/1/5	0.53333333	0	0	0	0.021	0.032	0.0043	0.156	0.190392	0.003	0.00026	0.0064	0.00034
3	2006/1/8	0.74133333	0	0	0	0.052	0.04	0.013	0.169	0.266566	0.0045	0.00038	0.0075	0.00034
4	#####	0.65								0.219606	0.0045	0.00026	0.0069	0.00034
5	#####	0.51								0.180834	0.0045	0.00045	0.0038	0.00034
6	#####	0.97								0.266502	0.0045	0.00029	0.0033	0.00034
7	#####	0.65								0.24747	0.0045	0.00028	0.0042	0.00034
8	#####	0.78								0.199925	0.0066	0.00031	0.0044	0.00034
9	2006/2/1	0.91833333	0	0	0	0.21	0.021	0.012	0.169	0.219877	0.0045	0.0004	0.0023	0.00034
10	2006/2/4	0.68283333	0	0	0	0.051	0.036	0.017	0.195	0.267329	0.0045	0.00026	0.0042	0.00034
11	2006/2/7	0.95583333	0	0	0	0.1	0.12	0.057	0.221	0.286328	0.0045	0.00033	0.006	0.00034
12	#####	1.08583333	0	0	0	0.17	0.11	0.091	0.169	0.285971	0.0045	0.00038	0.003	0.00034
13	#####	1.07933333	0	0	0	0.24	0.039	0.083	0.156	0.266989	0.0035	0.00043	0.0051	0.000542
14	#####	1.22883333	0	0	0	0.24	0.2	0.16	0.143	0.228882	0.0045	0.00034	0.0012	0.00034
15	#####	1.38483333	0	0	0	0.25	0.22	0.16	0.169	0.257532	0.0045	0.00035	0.0013	0.00034
16	#####	0.87133333	0	0	0	0.098	0.092	0.062	0.156	0.238356	0.0045	0.00027	0.0014	0.00034
17	#####	0.85833333	0	0	0	0.23	0.062	0.083	0.156	0.191484	0.003	0.00045	0.0023	0.000542
18	2006/3/6	1.41733333	0	0	0	0.48	0.1	0.18	0.195	0.30515	0.0045	0.00051	0.0034	0.00034
19	2006/3/9	0.70233333	0	0	0	0.099	0.026	0.034	0.156	0.172439	0.0036	0.00026	0.0045	0.00034
20	#####	1.49533333	0	0	0	0.51	0.087	0.15	0.156	0.247501	0.0045	0.00049	0.0033	0.000542
21	#####	1.06633333	0	0	0	0.11	0.039	0.043	0.182	0.401203	0.0045	0.00041	0.0043	0.00034
22	#####	0.54666667	0	0	0	0.2	0.088	0.11	0.156	0.276236	0.0045	0.00037	0.0017	0.000542
23	#####	0.54666667	0	0	0	0.2	0.08	0.078	0.143	0.163017	0.0045	0.00025	0.0017	0.00034
24	#####	0.85183333	0	0	0	0.083	0.15	0.073	0.182	0.247622	0.0045	0.00029	0.015	0.00034
25	#####	1.14433333	0	0	0	0.38	0.016	0.14	0.143	0.190628	0.0045	0.00039	0.0031	0.00034
26	2006/4/2	1.20283333	0	0	0	0.36	0.041	0.12	0.156	0.239145	0.003	0.00053	0.0033	0.00034
27	2006/4/5	1.18333333	0	0	0	0.31	0.066	0.11	0.169	0.286122	0.0045	0.0004	0.0034	0.00034
28	2006/4/8	0.81283333	0	0	0	0.21	0.078	0.082	0.143	0.219988	0.0045	0.0003	0.0027	0.00034

Pattern of “un\_con” is the same to that of “concentration”

# CMBGC-Iteration 1.0

Input file

Uncertainties of ambient dataset  
(Unit:  $\mu\text{g}/\text{m}^3$ )

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Date	PM2.5	SO2	CO	NOx	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu
2	2006/1/5	0.53333333	0	0	0	0.021	0.032	0.0043	0.156	0.190392	0.003	0.00026	0.0064	0.00034
3	2006/1/8	0.74133333	0	0	0	0.052	0.04	0.013	0.169	0.266566	0.0045	0.00038	0.0075	0.00034
4	#####	0.65683333	0	0	0	0.083	0.026	0.026	0.182	0.219606	0.0045	0.00026	0.0069	0.00034
5	#####	0.51383333	0	0	0	0.045	0.015	0.015	0.143	0.180834	0.0045	0.00045	0.0038	0.00034
6	#####	0.97533333	0	0	0	0.12	0.14	0.078	0.182	0.266502	0.0045	0.00029	0.0033	0.00034
7	#####	0.65033333	0	0	0	0.042	0.021	0.012	0.182	0.24747	0.0045	0.00028	0.0042	0.00034
8	#####	0.78683333	0	0	0	0.061	0.018	0.021	0.156	0.199925	0.0066	0.00031	0.0044	0.00034
9	2006/2/1	0.91683333	0	0	0	0.21	0.027	0.072	0.169	0.219877	0.0045	0.0004	0.0023	0.00034
10	2006/2/4	0.68283333	0	0	0									0.00034
11	2006/2/7	0.95583333	0	0	0									0.00034
12	#####	1.08583333	0	0	0									0.00034
13	#####	1.07933333	0	0	0									0.00034
14	#####	1.22883333	0	0	0									0.00034
15	#####	1.38483333	0	0	0	0.23	0.22	0.16	0.169	0.237532	0.0045	0.00033	0.0013	0.00034
16	#####	0.87133333	0	0	0	0.098	0.092	0.062	0.156	0.238356	0.0045	0.00027	0.0014	0.00034
17	#####	0.85833333	0	0	0	0.23	0.062	0.083	0.156	0.191484	0.003	0.00045	0.0023	0.000542
18	2006/3/6	1.41733333	0	0	0	0.48	0.1	0.18	0.195	0.30515	0.0045	0.00051	0.0034	0.00034
19	2006/3/9	0.70233333	0	0	0	0.099	0.026	0.034	0.156	0.172439	0.0036	0.00026	0.0045	0.00034
20	#####	1.49533333	0	0	0	0.51	0.087	0.15	0.156	0.247501	0.0045	0.00049	0.0033	0.000542
21	#####	1.06633333	0	0	0	0.11	0.039	0.043	0.182	0.401203	0.0045	0.00041	0.0043	0.00034
22	#####	0.54666666	0	0	0	0.2	0.088	0.11	0.156	0.276236	0.0045	0.00037	0.0017	0.000542
23	#####	0.54666666	0	0	0	0.2	0.08	0.078	0.143	0.163017	0.0045	0.00025	0.0017	0.00034
24	#####	0.85183333	0	0	0	0.083	0.15	0.073	0.182	0.247622	0.0045	0.00029	0.015	0.00034
25	#####	1.14433333	0	0	0	0.38	0.016	0.14	0.143	0.190628	0.0045	0.00039	0.0031	0.00034
26	2006/4/2	1.20283333	0	0	0	0.36	0.041	0.12	0.156	0.239145	0.003	0.00053	0.0033	0.00034
27	2006/4/5	1.18333333	0	0	0	0.31	0.066	0.11	0.169	0.286122	0.0045	0.0004	0.0034	0.00034
28	2006/4/8	0.81283333	0	0	0	0.21	0.078	0.082	0.143	0.219988	0.0045	0.0003	0.0027	0.00034

Uncertainties of gases can be  
set as zeros

# CMBGC-Iteration 1.0

Input file

Uncertainties of ambient dataset  
(Unit: ug/m<sup>3</sup>)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Date	PM2.5	SO2	CO	NOx	SO4	NO2	NH4	EC	OC	A1	Pa	Ca	Ca
2	2006/1/5	0.53333333	0	0	0	0.021	0.032	0.0043	0.156	0.190392	0.003	0.00026	0.0064	0.0003
3	2006/1/8	0.74133333	0	0	0	0.052	0.04	0.013	0.169	0.266566	0.0045	0.00038	0.0075	0.0003
4	#####	0.65683333	0	0	0	0.083	0.026	0.026	0.182	0.219606	0.0045	0.00026	0.0069	0.0003
5	#####	0.51383333	0	0	0	0.045	0.015	0.015	0.143	0.180834	0.0045	0.00045	0.0038	0.0003
6	#####	0.97533333	0	0	0	0.12	0.14	0.078	0.182	0.266502	0.0045	0.00029	0.0033	0.0003
7	#####												0.0042	0.0003
8	#####												0.0044	0.0003
9	2006/												0.0023	0.0003
10	2006/												0.0042	0.0003
11	2006/												0.006	0.0003
12	#####												0.003	0.0003
13	#####												0.0051	0.00054
14	#####												0.0012	0.0003
15	#####												0.0013	0.0003
16	#####												0.0014	0.0003
17	#####												0.0023	0.00054
18	2006/												0.0034	0.0003
19	2006/												0.0045	0.0003
20	#####												0.0033	0.00054
21	#####												0.0043	0.0003
22	#####												0.0017	0.00054
23	#####												0.0017	0.0003
24	#####												0.015	0.0003
25	#####												0.0031	0.0003
26	2006/4/2	1.20283333	0	0	0	0.36	0.041	0.12	0.156	0.239145	0.003	0.00053	0.0033	0.0003
27	2006/4/5	1.18333333	0	0	0	0.31	0.066	0.11	0.169	0.286122	0.0045	0.0004	0.0034	0.0003
28	2006/4/8	0.81283333	0	0	0	0.21	0.078	0.082	0.143	0.219988	0.0045	0.0003	0.0027	0.0003

Daily uncertainties of species can be measured or calculated as:

$$Un_{ij} = \sqrt{a \cdot x_{ij}^2 + b \cdot (MDL)^2}$$

Un is the uncertainties of species, a is the error fractions, b is the coefficient of MDL (can be set as 0.5), MDL is the Minimum Detectable Limits of species.



# CMBGC-Iteration 1.0

## Input file

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	SID	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K	Mn	Pb	Se
2	LDGV	0.0133	0	0	0.2355	0.5486	0.0019	0	0.0118	0.0004	0.012	0.0001	0.0001	0.0006	
3	HDDV	0.0046	0.002	0	0.7351	0.1981	0	0	0.0006	0	0.0002	0.0001	0	0	
4	SDUST	0.001	0.001	0	0.006	0.044	0.095	0	0.018	0.0003	0.053	0.0092	0.0016	0.0001	
5	BURN	0.0239	0.0024	0.0165	0.1575	0.6441	0.0011	0.0008	0.004	0	0.0007	0.0573	0	0	
6	CFPP	0.2874	0.0069	0.0179	0.0138	0.2718	0.053	0.0003	0.1655	0.0009	0.0361	0.0052	0.0012	0.0006	0.005
7	AMSULF	0.727	0	0.273	0	0	0	0	0	0	0	0	0	0	
8	AMBSLF	0.835	0	0.156	0	0	0	0	0	0	0	0	0	0	
9	AMNITR										0	0	0	0	
10	SOC										0	0	0	0	
11															
12															
13															
14															
15															
16															
17															
18															
19															
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24															
25															
26															
27															

Profiles of source categories  
(Unit: g/g)

concentration un\_con profile un\_pro source\_gas parameter

# CMBGC-Iteration 1.0

Input file

Profiles of source categories  
(Unit: g/g)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	SID	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K	Mn	Pb	Se
2	ESDV	0.0188	0	0	0.2855	0.5188	0.0018	0	0.0118	0.0001	0.012	0.0001	0.0001	0.0008	0
3	HDDV	0.0046	0.002	0	0.7351	0.1981	0	0	0.0006	0	0.0002	0.0001	0	0	0
4	SDUST	0.001	0.001	0	0.006	0.044	0.095	0	0.018	0.0003	0.053	0.0092	0.0016	0.0001	0
5	BURN	0.0239	0.0024	0.0165	0.1575	0.6441	0.0011	0.0008	0.004	0	0.0007	0.0573	0	0	0
6	CFPP	0.2874	0.0069	0.0179	0.0138	0.2718	0.053	0.0003	0.1655	0.0009	0.0361	0.0052	0.0012	0.0006	0.005
7	AMSULF	0.727	0	0.273	0	0	0	0	0	0	0	0	0	0	0
8	AMBSLF	0.835	0	0.156	0	0	0	0	0	0	0	0	0	0	0
9	AMNITR	0	0.775	0.225	0	0	0	0	0	0	0	0	0	0	0
10	SOC	0	0	0	0	1	0	0	0	0	0	0	0	0	0
11															
12															
13															
14															
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18															
19															
20															
21															
22															
23															
24															
25															
26															
27															

Title Line

The sequence of species should be the same to that in “concentration” worksheet



# CMBGC-Iteration 1.0

Input file

Profiles of source categories  
(Unit: g/g)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	SID	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K	Mn	Pb	Se
2	LDGV	0.0133	0	0	0.2355	0.5486	0.0019	0	0.0118	0.0004	0.012	0.0001	0.0001	0.0006	
3	HDDV	0.0046	0.002	0	0.7351	0.1981	0	0	0.0006	0	0.0002	0.0001	0	0	
4	SDUST	0.001	0.001	0	0.006	0.044	0.095	0	0.018	0.0003	0.053	0.0092	0.0016	0.0001	
5	BURN	0.0239	0.0024	0.0165	0.1575	0.6441	0.0011	0.0008	0.004	0	0.0007	0.0573	0	0	
6	CFPP	0.2374	0.0069	0.0179	0.0138	0.2718	0.053	0.0003	0.1655	0.0009	0.0361	0.0052	0.0012	0.0006	0.005
7	AMSULF	0.727	0	0.273	0	0	0	0	0	0	0	0	0	0	
8	AMBSLF	0.835	0	0.156	0	0	0	0	0	0	0	0	0	0	
9	AMNITR	0	0.775	0.225	0	0	0	0	0	0	0	0	0	0	
10	SOC	0	0	0	0	1	0	0	0	0	0	0	0	0	
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															
26															
27															

Source name column

User can change the order or number of source categories

# CMBGC-Iteration 1.0

Input file

Profiles of source categories  
(Unit: g/g)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	SID	SO4	NO2	NH4	EC	OC	Al	Pb	Cd	Cu	Fe	K	Mn	Pb	Se
2	LDGV	0.0133	0	0	0.2355	0.5486	0.0019	0	0.0118	0.0004	0.012	0.0001	0.0001	0.0006	
3	HDDV	0.0046	0.002	0	0.7351	0.1981	0	0	0.0006	0	0.0002	0.0001	0	0	
4	SDUST	0.001	0.001	0	0.006	0.044	0.095	0	0.018	0.0003	0.053	0.0092	0.0016	0.0001	
5	BURN	0.0239	0.0024	0.0165	0.1575	0.6441	0.0011	0.0008	0.004	0	0.0007	0.0573	0	0	
6	CFPP	0.2874	0.0069	0.0179	0.0138	0.2718	0.053	0.0003	0.1655	0.0009	0.0361	0.0052	0.0012	0.0006	0.009
7	AMSULF	0.727	0	0.273	0	0	0	0	0	0	0	0	0	0	
8	AMBSLF	0.835	0	0.156	0	0	0	0	0	0	0	0	0	0	
9	AMNTR	0	0.775	0.225	0	0	0	0	0	0	0	0	0	0	
10	SOC	0	0	0	0	1	0	0	0	0	0	0	0	0	
11															
12															
13															
14															
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22															
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24															
25															
26															
27															

concentration un\_con profile un\_pro source\_gas parameter

Source profile dataset (g/g)

Sum of species in one source  
should  $\leq 1$

# CMBGC-Iteration 1.0

## Input file

SID	SO4	NO3	NH4	EC	OC	Al	Br	Ca	Cu	Fe	K	Mn	Pb	Se	Si
LDGV	0.0056	0.0052	0.01	0.0277	0.0642	0.0024	0.0003	0.0016	0.0006	0.0016	0.0015	0.0008	0.0008	0.0003	0.01
HDDV	0.0048	0.0014	0.01	0.1014	0.0774	0.01	0	0.0005	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.
SDUST	0.0004	0.0004	0	0.004	0.017	0.001	0	0.004	0.0003	0.006	0.0033	0.0007	0	0	0.0
BURN	0.0227	0.0018	0.0253	0.1545	0.1645	0.001	0.0009	0.005	0	0.0008	0.0563	0	0	0	0.00
CFPP	0.2256	0.0109	0.0213	0.0222	0.2577	0.0326	0.0006	0.1053	0.0007	0.0202	0.0026	0.0011	0.0009	0.0083	0.06
AMSULF	0.0360	0.0000	0.0140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
AMBSLF	0.0420	0.0000	0.0080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
AMNTR	0.0000	0.0390	0.0110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
OTHROC	0.0000											0	0.0000	0.0000	0.00

Uncertainties of source profile  
(Unit: g/g)

Pattern of “un\_pro” is the same  
to that of “profile”


concentration un\_con profile un\_pro source\_gas parameter

# CMBGC-Iteration 1.0

# Input file

	SID	SO2	CO	NOx
2	LDGV	4	800	83.7
3	HDDV	0.71	13.4	21.9
4	SDUST	0	0	0
5	BURN	0.013	10.1	0.24
6	CFPP	128	2.1	41
7	AMSULF	0.0000	0.0000	0.0000
8	AMBSLF	0.0000	0.0000	0.0000
9	AMNTR	0.0000	0.0000	0.0000
10	OTHROC	0.0000	0.0000	0.0000

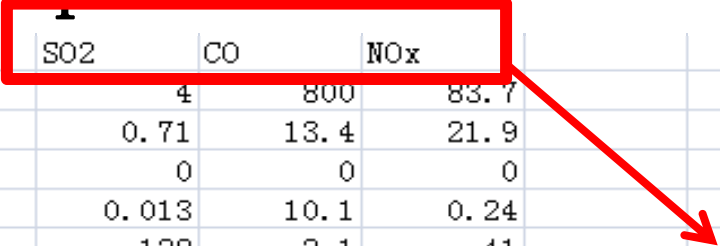
**Gas-to-PM2.5 Ratios for source emissions  
used as Constraints (Unit: g/g)**



concentration
un\_con
profile
un\_pro
source\_gas
parameter

# CMBGC-Iteration 1.0

## Input file



1	SID	SO2	CO	NOx
2	LDGV	4	800	83.7
3	HDDV	0.71	13.4	21.9
4	SDUST	0	0	0
5	BURN	0.013	10.1	0.24
6	CFPP	128	2.1	41
7	AMSULF	0.0000		
8	AMBSLF	0.0000		
9	AMNITR	0.0000		
10	OTHROC	0.0000		

**Gases name line:**

The number and sequence of gases should be the same to that in “concentration” worksheet

# CMBGC-Iteration 1.0

# Input file

	SO <sub>2</sub>	CO	NO <sub>x</sub>
LDGV	4	800	83.7
HDDV	0.71	13.4	21.9
SDUST	0	0	0
BURN	0.013	10.1	0.24
CFPP	128	2.1	41
AMSULF	0.0000	0.0000	0.0000
AMBSLF	0.0000	0.0000	0.0000
AMNTR	0.0000	0.0000	0.0000
OTHROC	0.0000	0.0000	0.0000

Sources name column:

The number and sequence of source should be the same to that in “profile” worksheet

# CMBGC-Iteration 1.0

# Input file

1	3	number of gas
2	3	range for gas constraints
3	40	coefficient of ub
4	20	step_max
5	0.02	step_constrain
6		
7		
8		
9		
10		
11		
12		
13		
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23		
24		
25		
26		
27		
28		

Key parameters for solution

# CMBGC-Iteration 1.0

# Input file

## Key parameters for solution

1 3 number of gas  
2 0 range for gas constraints  
3 40 coefficient of ub  
4 20 step\_max  
5 0.02 step\_constrain  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
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22  
23  
24  
25  
26  
27  
28

Number of gases

Should be the same to the number of gases in “concentration” worksheet

concentration un\_con profile un\_pro source gas parameter



# CMBGC-Iteration 1.0

# Input file

## Key parameters for solution

1 3 number of gas  
2 3 range for gas constraints  
3 40 coefficient of ub  
4 20 step\_max  
5 0.02 step\_constrain  
6  
7  
8  
9

10 Range of gas constraints for global  
11 optimization solution in the model  
12  
13  
14  
15  
16  
17 Can be set as default value  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28

concentration un\_con profile un\_pro source gas parameter

# CMBGC-Iteration 1.0

# Input file

## Key parameters for solution

1	3 number of gas
2	5 range for gas constraints
3	40 coefficient of ub
4	20 step_max
5	0.02 step_constrain
6	
7	
8	
9	
10	
11	
12	
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15	
16	
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27	
28	

40

Coefficient of up bound for global optimization solution in the model

Can be set as the average PM concentration

concentration un\_con profile un\_pro source gas parameter

# CMBGC-Iteration 1.0

# Input file

## Key parameters for solution

1 3 number of gas  
2 3 range for gas constraints  
3 40 coefficient of ub  
4 20 step\_max  
5 0.02 step\_constrain  
6  
7  
8  
9  
10  
11  
12  
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24  
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27  
28

Max step of Iteration

concentration un\_con profile un\_pro source gas parameter

# CMBGC-Iteration 1.0

# Input file

## Key parameters for solution

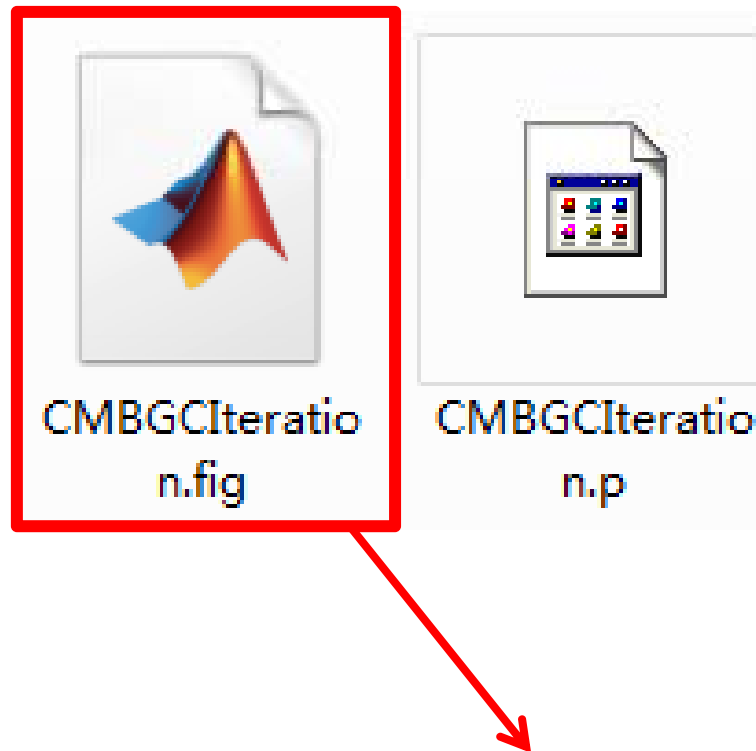
1	3 number of gas
2	3 range for gas constraints
3	40 coefficient of ub
4	20 step_max
5	0.02 step_constrain
6	
7	
8	
9	
10	
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Condition of Iterative convergence

concentration un\_con profile un\_pro source gas parameter

# CMBGC-Iteration 1.0

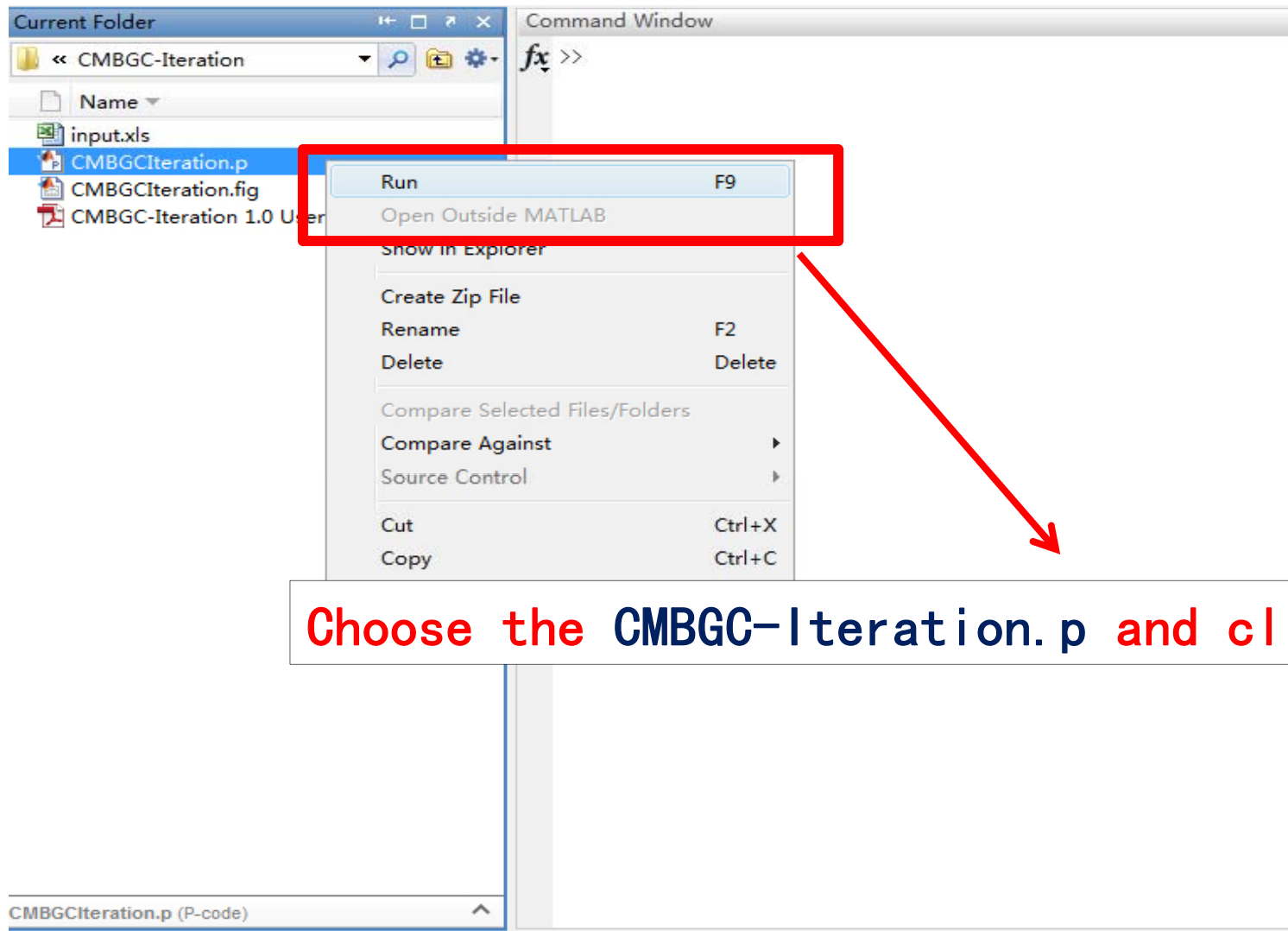
- Run the model



Double click the **CMBGCIteration.fig** file

# CMBGC-Iteration 1.0

- Run the model



# CMBGC-Iteration 1.0

[illegible]

## Panel display of CMBGC-Iteration

# CMBGC-Iteration 1.0

The screenshot shows the CMBGC-Iteration 1.0 software interface. At the top, there are three buttons: "Loading", "Run", and "Save". Below these, the interface is divided into several sections. On the left, there is a "PM concentration" section with a table for "PM", "Mean", and "SD". Below this is a "Gas concentration" section with a "Gas select" button and a table for "Gas" and "Mean". At the bottom left is a "Source" section with a "Source select" button and a table for "Source category". In the center, there is an "Ambient species concentration" section with a "Species select" button and a table. To the right of this is a "Source contribution" section with a table. On the far right is an "MPIN" section with a table. At the bottom right, there is a "Bound of C/M" section with a text input field. A large red text overlay is positioned in the center of the interface, listing four steps: 1. Click "Loading" button: load the input data, 2. Select fitting gases, sources and species, 3. Click "Run" button: run the model, and 4. Click "Save" button: save result.

**Steps:**

1. Click "Loading" button: load the input data
2. Select fitting gases, sources and species
3. Click "Run" button: run the model
4. Click "Save" button: save result



# CMBGC-Iteration 1.0

CMBGC-Iteration

Loading  Run  Save

PM concentration

PM	Mean	SD	Max	Min

Gas concentration

Gas select

Gas	Mean	SD

Source

Source select

Source category

profile

Ambient species concentration

Species select

Species	Mean	SD	Max

Source contribution

Source	Mean	Uncerta...	%
1			
2			
3			
4			

Contribution plot

Convergence

R2  Chi2

Modeled species information

Species	fitting	Measure	Un_M	Calculate	Un_C	C/M

Modeled gas information

Gas	Fitting	Measure	Calculate	C/M

Bound of C/M

1. Load the input dataset

# CMBGC-Iteration 1.0

**a** PM concentration

PM	Mean	SD	Max	Min
PM2.5	10.28	4.92	31.00	0.42

**b** Gas concentration

Gas	Mean	SD	Max
SO2	1.19	1.37	11.89
CO	360.73	147.63	107.1
NOx	37.15	34.91	298

**c** Source

Source category
<input checked="" type="checkbox"/> LDGV
<input checked="" type="checkbox"/> HDDV
<input checked="" type="checkbox"/> SDUST
<input checked="" type="checkbox"/> BURN
<input checked="" type="checkbox"/> CFPP
<input checked="" type="checkbox"/> AMSULF
<input checked="" type="checkbox"/> AMSLE

**d** Ambient species concentration

Species	Mean	SD	Max
SO4	2.72	1.80	10.90
NO3	0.87	0.94	11.10
NH4	1.08	0.77	5.21
EC	0.73	0.46	3.81
OC	2.32	1.05	6.58
Al	0.06	0.12	0.99
Br	0.00	0.00	0.01
Ca	0.07	0.08	0.63
Cu	0.00	0.00	0.02
Fe	0.08	0.08	0.62
K	0.06	0.05	0.46
Mn	0.00	0.00	0.01
Pb	0.00	0.00	0.03
Se	0.00	0.00	0.01
Si	0.15	0.27	2.06
Zn	0.01	0.00	0.03

Sample: 379  
Species: 16

**Source contribution**

Source	Contribution
1	
2	
3	
4	

**MPIN**

MPIN	Concentration
1	
2	
3	
4	

Bound of C/M

**Display the information of input dataset**

- a: concentrations of PM
- b: concentrations of gases
- c: categories of source
- d: concentration of species

# CMBGC-Iteration 1.0

CMBGC-Iteration

Loading  Run  Save

**a** PM concentration

PM	Mean	SD	Max	Min
PM2.5	10.28	4.92	31.00	0.42

**b** Gas concentration

Gas select

Gas	Mean	SD	Max
<input checked="" type="checkbox"/> SO2	1.19	1.37	11.89
<input checked="" type="checkbox"/> CO	360.73	147.63	107...
<input checked="" type="checkbox"/> NOx	37.15	34.91	298

**c** Source

Source select

Source category
<input checked="" type="checkbox"/> LDGV
<input checked="" type="checkbox"/> HDDV
<input checked="" type="checkbox"/> SDUST
<input checked="" type="checkbox"/> BURN
<input checked="" type="checkbox"/> CFPP
<input checked="" type="checkbox"/> AMSULF
<input checked="" type="checkbox"/> AMSLF

profile

**d** Species select

Species	Mean	SD	Max
<input checked="" type="checkbox"/> SO4	2.72	1.80	10.90
<input checked="" type="checkbox"/> NO3	0.87	0.94	11.10
<input checked="" type="checkbox"/> NH4			
<input checked="" type="checkbox"/> EC			
<input checked="" type="checkbox"/> OC			
<input checked="" type="checkbox"/> Al			
<input checked="" type="checkbox"/> Br			
<input checked="" type="checkbox"/> Ca			
<input checked="" type="checkbox"/> Cu			
<input checked="" type="checkbox"/> Fe			
<input checked="" type="checkbox"/> K	0.06	0.05	0.46
<input checked="" type="checkbox"/> Mn	0.00	0.00	0.01
<input checked="" type="checkbox"/> Pb	0.00	0.00	0.03
<input checked="" type="checkbox"/> Se	0.00	0.00	0.01
<input checked="" type="checkbox"/> Si	0.15	0.27	2.06
<input checked="" type="checkbox"/> Zn	0.01	0.00	0.03

Sample

Species

Source contribution

Source	Mean	Uncerta...	%
1			
2			

Contribution plot

Modeled species information

Species	fitting	Measure	Un_M	Calculate	Un_C	C/M
---------	---------	---------	------	-----------	------	-----

Modeled gas information

Gas	Fitting	Measure	Calculate	C/M
-----	---------	---------	-----------	-----

Bound of C/M

MPIN

|--|--|--|--|--|--|--|--|

**b: concentrations of gases**

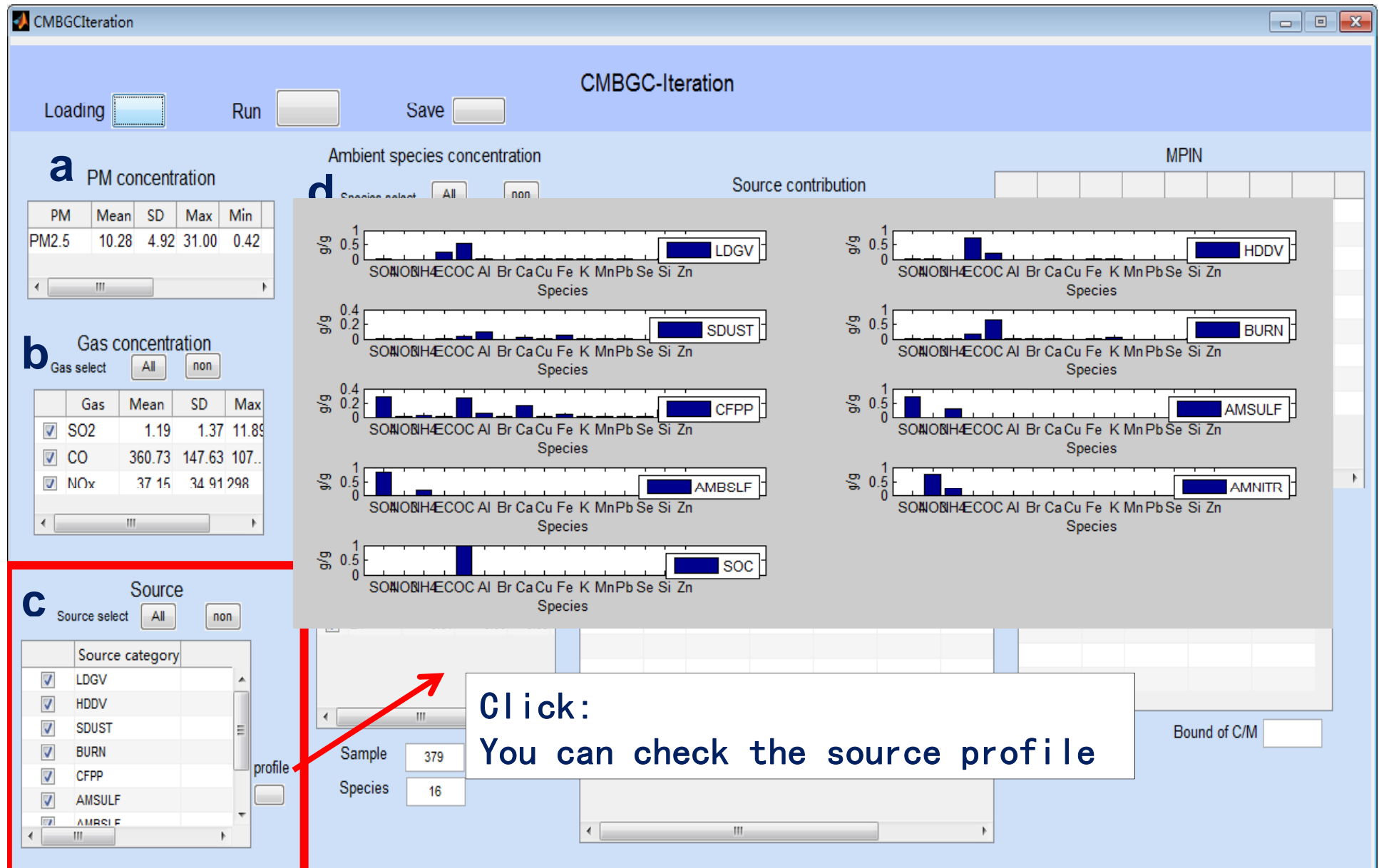
**2.1 Select the fitting gases**

# CMBGC-Iteration 1.0

**c: categories of source**

**2.2 Select the fitting source categories**

# CMBGC-Iteration 1.0



# CMBGC-Iteration 1.0

The screenshot displays the CMBGC-Iteration software interface. A red rectangle highlights the "Ambient species concentration" panel (labeled 'd' in the original image), which contains a table of species concentrations. The table has columns for Species, Mean, SD, and Max. The following table represents the data shown in this highlighted panel:

	Species	Mean	SD	Max
<input checked="" type="checkbox"/>	SO <sub>4</sub>	2.72	1.80	10.90
<input checked="" type="checkbox"/>	NO <sub>3</sub>	0.87	0.94	11.10
<input checked="" type="checkbox"/>	NH <sub>4</sub>	1.08	0.77	5.21
<input checked="" type="checkbox"/>	EC	0.73	0.46	3.81
<input checked="" type="checkbox"/>	OC	2.32	1.05	6.58
<input checked="" type="checkbox"/>	Al	0.06	0.12	0.99
<input checked="" type="checkbox"/>	Br	0.00	0.00	0.01
<input checked="" type="checkbox"/>	Ca	0.07	0.08	0.63
<input checked="" type="checkbox"/>	Cu	0.00	0.00	0.02
<input checked="" type="checkbox"/>	Fe	0.08	0.08	0.62
<input checked="" type="checkbox"/>	K	0.06	0.05	0.46
<input checked="" type="checkbox"/>	Mn	0.00	0.00	0.01
<input checked="" type="checkbox"/>	Pb	0.00	0.00	0.03
<input checked="" type="checkbox"/>	Se	0.00	0.00	0.01
<input checked="" type="checkbox"/>	Si	0.15	0.27	2.06
<input checked="" type="checkbox"/>	Zn	0.01	0.00	0.03

Other visible panels include:

- a PM concentration:** A table with columns PM, Mean, SD, Max, Min. Data row: PM2.5, 10.28, 4.92, 31.00, 0.42.
- b Gas concentration:** A table with columns Gas, Mean, SD, Max. Data rows: SO<sub>2</sub> (1.19, 1.37, 11.89), CO (360.73, 147.63, 107..), NO<sub>x</sub> (37.15, 34.91, 298).
- c Source:** A list of source categories with checkboxes: LDGV, HDDV, SDUST, BURN, CFPP, AMSULF, AMRSIF.
- d: concentration of species** (highlighted area).
- e Source contribution:** A table with columns Source, Mean, Uncerta..., %. Below it are fields for R2 and Chi2.
- f Modeled species information:** A table with columns Species, fitting, Measure, Un\_M, Calculate, Un\_C, C/M.
- g Modeled gas information:** A table with columns Gas, Fitting, Measure, Calculate, C/M.
- h Bound of C/M:** A field labeled "Bound of C/M".

# CMBGC-Iteration 1.0

[illegible]

# CMBGC-Iteration 1.0

**Result:**

- a: Source contribution
- b: Performance index
- c: MPIN matrix
- d: modeled species
- e: modeled gases

**a Source contribution**

	Source	Mean	Uncerta...	%
1	LDGV	0.47	0.02	
2	HDDV	0.15	0.45	
3	SDUST	0.67	0.01	
4	BURN	3.52	2.61	
5	CFPP	0.01	0.01	

PM(%) 92.5044  
R2 0.97502  
Chi2 0.054409

**b**

**c MPIN**

species	LDGV	HDDV	SDUST	BURN	CFPP	AMS...	AMB...	A
SO4	0.00	-0.00	-0.00	0.00	-0.00	-0.33	0.65	
NO3	-0.00	-0.00	0.00	-0.00	-0.00	-0.11	0.11	
NH4	-0.00	0.00	-0.00	-0.00	0.00	1.00	-1.00	
EC	-0.27	1.00	0.05	-0.00	0.01	0.01	-0.01	
OC	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	
Al	-0.11	0.02	0.88	0.00	0.02	-0.00	-0.00	
Br	-0.09	-0.30	-0.11	0.63	-0.14	-0.08	0.06	
Ca	-0.13	-0.09	-0.65	0.21	0.87	-0.01	-0.02	
Cu	0.09	-0.00	-0.05	-0.06	0.12	0.01	-0.01	
Fe	0.18	-0.02	0.64	-0.06	0.05	0.01	-0.01	

**d Modeled species information**

Species	fitting	Measure	Un_M	Calculate	Un_C	C/
SO4	*	2.72	0.23	2.68	0.13	
NO3	*	0.87	0.08	0.82	0.01	
NH4	*	1.08	0.09	1.07	0.09	
EC	*	0.73	0.17	0.78	0.45	
OC	*	2.32	0.42	2.86	0.47	
Al	*	0.06	0.01	0.07	0.01	
Br	*	0.00	0.00	0.00	0.00	
Ca	*	0.07	0.02	0.03	0.01	
Cu	*	0.00	0.00	0.00	0.00	
Fe	*	0.08	0.02	0.04	0.00	
K	*	0.06	0.01	0.21	0.15	

**e Modeled gas information**

Gas	Fitting	Measure	Calculate	C/M
SO2	*	1.19	3.53	2.98
CO	*	360.73	413.92	1.15
NOx	*	37.15	44.06	1.19

Bound of C/M 3



# CMBGC-Iteration 1.0

**Result:**

**a: Source contribution**

Mean contribution ( $\mu\text{g}/\text{m}^3$ ),  
uncertainties of contribution,  
Percentage of contribution (%)

**Source**

Source select

Source category

<input checked="" type="checkbox"/>	LDGV
<input checked="" type="checkbox"/>	HDDV
<input checked="" type="checkbox"/>	SDUST
<input checked="" type="checkbox"/>	BURN
<input checked="" type="checkbox"/>	CFPP
<input checked="" type="checkbox"/>	AMSULF
<input checked="" type="checkbox"/>	AMSLE

profile

Se 0.00 0.00 0.01  
Si 0.15 0.27 2.06  
Zn 0.01 0.00 0.03

Sample 379  
Species 16

**a Source contribution**

	Source	Mean	Uncerta...	%
1	LDGV	0.47	0.02	
2	HDDV	0.15	0.45	
3	SDUST	0.67	0.01	
4	BURN	3.52	2.61	
5	CFPP	0.01	0.01	

Contribution plot

Convergence

PM(%) 92.5044  
R2 0.97502  
Chi2 0.054409

**b**

**c MPIN**

species	LDGV	HDDV	SDUST	BURN	CFPP	AMS...	AMB...	A
SO4	0.00	-0.00	-0.00	0.00	-0.00	-0.33	0.65	
NO3	-0.00	-0.00	0.00	-0.00	-0.00	-0.11	0.11	
NH4	-0.00	0.00	-0.00	-0.00	0.00	1.00	-1.00	
EC	-0.27	1.00	0.05	-0.00	0.01	0.01	-0.01	
OC	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	
Al	-0.11	0.02	0.88	0.00	0.02	-0.00	-0.00	
Br	-0.09	-0.30	-0.11	0.63	-0.14	-0.08	0.06	
Ca	-0.13	-0.09	-0.65	0.21	0.87	-0.01	-0.02	
Cu	0.09	-0.00	-0.05	-0.06	0.12	0.01	-0.01	
Fe	0.18	-0.02	0.64	-0.06	0.05	0.01	-0.01	

**d**

**Modeled species information**

Species	fitting	Measure	Un_M	Calculate	Un_C	C/
SO4	*	2.72	0.23	2.68	0.13	
NO3	*	0.87	0.08	0.82	0.01	
NH4	*	1.08	0.09	1.07	0.09	
EC	*	0.73	0.17	0.78	0.45	
OC	*	2.32	0.42	2.86	0.47	
Al	*	0.06	0.01	0.07	0.01	
Br	*	0.00	0.00	0.00	0.00	
Ca	*	0.07	0.02	0.03	0.01	
Cu	*	0.00	0.00	0.00	0.00	
Fe	*	0.08	0.02	0.04	0.00	
K	*	0.06	0.01	0.21	0.15	

**e Modeled gas information**

Gas	Fitting	Measure	Calculate	C/M
SO2	*	1.19	3.53	2.98
CO	*	360.73	413.92	1.15
NOx	*	37.15	44.06	1.19

Bound of C/M

# CMBGC-Iteration 1.0

**Write the sequence number of source to check the contribution**

**Click:**  
**You can check the daily source contribution**

**Convergence yes or not**

**a**

**b**

**Source contribution**

Source	Mean	Uncerta...	%
1 LDGV	0.47	0.02	
2 HDDV	0.15	0.15	
3 SDUST	0.67	0.01	
4 BURN	3.52	2.61	
5 CFPP	0.01	0.01	

**Contribution plot**

**Convergence**

**Yes**

**Species**

Species	LDGV	HDDV	SDUST	BURN	CFPP	AMS...	AMB...	A
SO4	0.00	-0.00	-0.00	0.00	-0.00	-0.33	0.65	
NO3	-0.00	-0.00	0.00	-0.00	-0.00	-0.11	0.11	
NH4	-0.00	0.00	-0.00	-0.00	0.00	1.00	-1.00	
EC	-0.27	1.00	0.05	-0.00	0.01	0.01	-0.01	
OC	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	
Al	-0.11	0.02	0.88	0.00	0.02	-0.00	-0.00	
Br	-0.09	-0.30	-0.11	0.63	-0.14	-0.08	0.06	
Ca	-0.13	-0.09	-0.65	0.21	0.87	-0.01	-0.02	
Cu	0.09	-0.00	-0.05	-0.06	0.12	0.01	-0.01	

**Gas select**

**Gas**

**Source select**

**Concentration**

**Sample**

**LDGV**

**Modeled gas information**

Measure	Calculate	C/M
1.19	3.53	2.98
360.73	413.92	1.15
37.15	44.06	1.19

**Bound of C/M**

**3**

# CMBGC-Iteration 1.0

**Result:**

**b: Performance index**

**PM (%) :**  
(80–120%) would be satisfactory

**Chi2:**  
Close to 0 would be better

**R2:**  
Close to 1 would be better

**CMBGC-Iteration**

Loading  Run  Save

**a Source contribution**

	Source	Mean	Uncerta...	?
1	LDGV	0.47	0.02	
2	HDDV	0.15	0.45	
3	SDUST	0.67	0.01	
4	BURN	3.52	2.61	
5	CFPP	0.01	0.01	

Contribution plot

Convergence

**b**

PM(%) 92.5044  
R2 0.97502 Chi2 0.054409

**c MPIN**

species	LDGV	HDDV	SDUST	BURN	CFPP	AMS...	AMB...	A
SO4	0.00	-0.00	-0.00	0.00	-0.00	-0.33	0.65	
NO3	-0.00	-0.00	0.00	-0.00	-0.00	-0.11	0.11	
NH4	-0.00	0.00	-0.00	-0.00	0.00	1.00	-1.00	
EC	-0.27	1.00	0.05	-0.00	0.01	0.01	-0.01	
OC	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	
Al	-0.11	0.02	0.88	0.00	0.02	-0.00	-0.00	
Br	-0.09	-0.30	-0.11	0.63	-0.14	-0.08	0.06	
Ca	-0.13	-0.09	-0.65	0.21	0.87	-0.01	-0.02	
Cu	0.09	-0.00	-0.05	-0.06	0.12	0.01	-0.01	
Fe	0.18	-0.02	0.64	-0.06	0.05	0.01	-0.01	

**d Modeled species information**

Species	fitting	Measure	Un_M	Calculate	Un_C	C/
SO4	*	2.72	0.23	2.68	0.13	
NO3	*	0.87	0.08	0.82	0.01	
NH4	*	1.08	0.09	1.07	0.09	
EC	*	0.73	0.17	0.78	0.45	
OC	*	2.32	0.42	2.86	0.47	
Al	*	0.06	0.01	0.07	0.01	
Br	*	0.00	0.00	0.00	0.00	
Ca	*	0.07	0.02	0.03	0.01	
Cu	*	0.00	0.00	0.00	0.00	
Fe	*	0.08	0.02	0.04	0.00	
K	*	0.06	0.01	0.21	0.15	

**e Modeled gas information**

Gas	Fitting	Measure	Calculate	C/M
SO2	*	1.19	3.53	2.98
CO	*	360.73	413.92	1.15
NOx	*	37.15	44.06	1.19

Bound of C/M

Species 16

# CMBGC-Iteration 1.0

**CMBGC-Iteration**

Loading  Run  Save

PM concentration      Ambient species concentration      **a**      Source contribution

Species select

**Modified Pseudo-Inverse Normalized (MPIN)**

Show the sensitive species for the sources

For each source, the species with 1 would be the most sensitive one for this source category

**c** MPIN

species	LDGV	HDDV	SDUST	BURN	CFPP	AMS...	AMB...	A
SO4	0.00	-0.00	-0.00	0.00	-0.00	-0.33	0.65	
NO3	-0.00	-0.00	0.00	-0.00	-0.00	-0.11	0.11	
NH4	-0.00	0.00	-0.00	-0.00	0.00	1.00	-1.00	
EC	-0.27	1.00	0.05	-0.00	0.01	0.01	-0.01	
OC	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	
Al	-0.11	0.02	0.88	0.00	0.02	-0.00	-0.00	
Br	-0.09	-0.30	-0.11	0.63	-0.14	-0.08	0.06	
Ca	-0.13	-0.09	-0.65	0.21	0.87	-0.01	-0.02	
Cu	0.09	-0.00	-0.05	-0.06	0.12	0.01	-0.01	
Fe	0.18	-0.02	0.64	-0.06	0.05	0.01	-0.01	

**d**

EC	*	0.73	0.17	0.78	0.45
OC	*	2.32	0.42	2.86	0.47
Al	*	0.06	0.01	0.07	0.01
Br	*	0.00	0.00	0.00	0.00
Ca	*	0.07	0.02	0.03	0.01
Cu	*	0.00	0.00	0.00	0.00
Fe	*	0.08	0.02	0.04	0.00
K	*	0.06	0.01	0.21	0.15

**e** Modeled gas information

Gas	Fitting	Measure	Calculate	C/M
SO2	*	1.19	3.53	2.98
CO	*	360.73	413.92	1.15
NOx	*	37.15	44.06	1.19

Bound of C/M

Source category

- ☒ LDGV
- ☒ HDDV
- ☒ SDUST
- ☒ BURN
- ☒ CFPP
- ☒ AMSULF
- ☒ AMSLF

Sample

Species

profile

# CMBGC-Iteration 1.0

CMBGC-Iteration

Loading  Run  Save

## Modeled species information

**Species column:** shows the name of species

**Fitting column:** shows the species selected for fitting (marked with “\*” )

**Measure column:** shows the mean concentrations of species in PM

**Un\_M column:** shows the mean uncertainties of species in PM

**Calculate column:** shows the calculated mean concentrations of species

**Un\_C column:** shows calculated mean uncertainties of species

PM

☒ NOx 37.15 34.91 298...

Source

Source select

Source category

<input checked="" type="checkbox"/>	LDGV
<input checked="" type="checkbox"/>	HDDV
<input checked="" type="checkbox"/>	SDUST
<input checked="" type="checkbox"/>	BURN
<input checked="" type="checkbox"/>	CFPP
<input checked="" type="checkbox"/>	AMSULF
<input checked="" type="checkbox"/>	AMRSLE

profile

Sample 379

Species 16

<input checked="" type="checkbox"/>	Fe	0.08	0.08	0.62
<input checked="" type="checkbox"/>	K	0.06	0.05	0.46
<input checked="" type="checkbox"/>	Mn	0.00	0.00	0.01
<input checked="" type="checkbox"/>	Pb	0.00	0.00	0.03
<input checked="" type="checkbox"/>	Se	0.00	0.00	0.01
<input checked="" type="checkbox"/>	Si	0.15	0.27	2.06
<input checked="" type="checkbox"/>	Zn	0.01	0.00	0.03

### Modeled species information

Species	fitting	Measure	Un_M	Calculate	Un_C	C/
SO4	*	2.72	0.23	2.68	0.13	
NO3	*	0.87	0.08	0.82	0.01	
NH4	*	1.08	0.09	1.07	0.09	
EC	*	0.73	0.17	0.78	0.45	
OC	*	2.32	0.42	2.86	0.47	
Al	*	0.06	0.01	0.07	0.01	
Br	*	0.00	0.00	0.00	0.00	
Ca	*	0.07	0.02	0.03	0.01	
Cu	*	0.00	0.00	0.00	0.00	
Fe	*	0.08	0.02	0.04	0.00	
K	*	0.06	0.01	0.21	0.15	

### e Modeled gas information

Gas	Fitting	Measure	Calculate	C/M
SO2	*	1.19	3.53	2.98
CO	*	360.73	413.92	1.15
NOx	*	37.15	44.06	1.19

Bound of C/M

# CMBGC-Iteration 1.0

**Modeled species information**

**C/M column:** shows the ratio of **calculated** and **measured concentrations** for **species**

**C/M\_un column:** shows the ratio of **Un\_M** of **measured concentrations** for **species**

**Residu/Un column:** shows the ratio of **residual** and **modeled uncertainties** for **species**

**Source**

Source select

Source category
<input checked="" type="checkbox"/> LDGV
<input checked="" type="checkbox"/> HDDV
<input checked="" type="checkbox"/> SDUST
<input checked="" type="checkbox"/> BURN
<input checked="" type="checkbox"/> CFPP
<input checked="" type="checkbox"/> AMSULF
<input checked="" type="checkbox"/> AMSULF

profile

Sample

Species

**Modeled species information**

M	Calculate	Un_C	C/M	C/M_Un	Residu/Un
0.23	2.68	0.13	0.99	0.05	-0.17
0.08	0.82	0.01	0.94	0.01	-0.66
0.09	1.07	0.09	0.99	0.08	-0.11
0.17	0.78	0.45	1.08	0.62	0.32
0.42	2.86	0.47	1.23	0.20	1.28
0.01	0.07	0.01	1.24	0.13	0.90
0.00	0.00	0.00	0.98	0.82	-0.04
0.02	0.03	0.01	0.46	0.19	-2.13
0.00	0.00	0.00	0.17	0.03	-2.51
0.02	0.04	0.00	0.57	0.03	-1.87
0.01	0.21	0.15	3.24	2.30	11.91

**e Modeled gas information**

Gas	Fitting	Measure	Calculate	C/M
SO2	*	1.19	3.53	2.98
CO	*	360.73	413.92	1.15
NOx	*	37.15	44.06	1.19

Bound of C/M

# CMBGC-Iteration 1.0

**Modeled gases information**

- Gas column:** shows the name of gases
- Fitting column:** shows the gases selected for fitting (marked with “\*” )
- Measure column:** shows the mean concentrations of gases
- Calculate column:** shows the calculated mean concentrations of gases
- C/M:** shows the ratio of **calculated** and **measured concentrations** for gases

**Modeled species information**

M	Calculate	Un_C	C/M	C/M_Un	Residu/Un
0.23	2.68	0.13	0.99	0.05	-0.17
0.08	0.82	0.01	0.94	0.01	-0.66
0.09	1.07	0.09	0.99	0.08	-0.11
0.17	0.78	0.45	1.08	0.62	0.32
0.42	2.86	0.47	1.23	0.20	1.28
0.04	0.87	0.04	1.24	0.19	0.90
0.01	0.21	0.15	3.24	2.30	11.91

**Modeled gas information**

Gas	Fitting	Measure	Calculate	C/M
SO2	*	1.19	3.53	2.98
CO	*	360.73	413.92	1.15
NOx	*	37.15	44.06	1.19

Bound of C/M 3

Show the bound of C/M set in input file

# CMBGC-Iteration 1.0

CMBGC-Iteration

Loading  Run  **Save**

**PM concentration**

PM	Mean	SD	Max	Min
PM2.5	10.28	4.92	31.00	0.42

**Gas concentration**

Gas select

Gas	Mean	SD	Max
<input checked="" type="checkbox"/> SO2	1.19	1.37	11.89
<input checked="" type="checkbox"/> CO	360.73	147.63	107...
<input checked="" type="checkbox"/> NOx	37.15	34.91	298

**Source**

Source select

Source category
<input checked="" type="checkbox"/> LDGV
<input checked="" type="checkbox"/> HDDV
<input checked="" type="checkbox"/> SDUST
<input checked="" type="checkbox"/> BURN
<input checked="" type="checkbox"/> CFPP
<input checked="" type="checkbox"/> AMSULF
<input checked="" type="checkbox"/> AMSLF

**Ambient species concentration**

Species select

Species	Mean	SD	Max
<input checked="" type="checkbox"/> SO4	2.72	1.80	10.90
<input checked="" type="checkbox"/> NO3	0.87	0.94	1.10
<input checked="" type="checkbox"/> NH4	1.08	0.77	5.11
<input checked="" type="checkbox"/> EC	0.73	0.46	3.8
<input checked="" type="checkbox"/> OC	2.32	1.05	6.58
<input checked="" type="checkbox"/> Al	0.06	0.12	0.99
<input checked="" type="checkbox"/> Fe	0.08	0.08	0.62
<input checked="" type="checkbox"/> K	0.06	0.05	0.46
<input checked="" type="checkbox"/> Mn	0.00	0.00	0.01
<input checked="" type="checkbox"/> Pb	0.00	0.00	0.03
<input checked="" type="checkbox"/> Se	0.00	0.00	0.01
<input checked="" type="checkbox"/> Si	0.15	0.27	2.06
<input checked="" type="checkbox"/> Zn	0.01	0.00	0.03

**Source contribution**

Source	Mean	Uncerta...
1 LDGV	0.47	0.02
2 HDDV	0.15	0.45
3 SDUST	0.67	0.01
4 BURN	3.52	2.61
5 CFPP	0.01	0.01

Contribution plot

Convergence

**MPIN**

species	LDGV	HDDV	SDUST	BURN	CFPP	AMS...	AMB...
SO4	0.00	-0.00	-0.00	0.00	-0.00	-0.33	0.65
NO3	-0.00	-0.00	0.00	-0.00	-0.00	-0.11	0.11
NH4	-0.00	0.00	-0.00	-0.00	0.00	1.00	-1.00
EC	-0.27	1.00	0.05	-0.00	0.01	0.01	-0.01
OC	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00
Al	-0.11	0.02	0.88	0.00	0.02	-0.00	-0.00
Br	-0.09	-0.30	-0.11	0.63	-0.14	-0.08	0.06
Ca	-0.13	-0.09	-0.65	0.21	0.87	-0.01	-0.02
Cu	0.09	-0.00	-0.05	-0.06	0.12	0.01	-0.01
Fe	0.18	-0.02	0.64	-0.06	0.05	0.01	-0.01

**Modeled species information**

M	Calculate	Un_C	C/M	C/M_Un	Residu/Un
0.23	2.68	0.13	0.99	0.05	-0.17
0.08	0.82	0.01	0.94	0.01	-0.66
0.09	1.07	0.09	0.99	0.08	-0.11
0.17	0.78	0.45	1.08	0.62	0.32
0.42	2.86	0.47	1.23	0.20	1.28
0.01	0.07	0.01	1.24	0.13	0.90
0.00	0.00	0.00	0.98	0.82	-0.04
0.02	0.03	0.01	0.46	0.19	-2.13
0.00	0.00	0.00	0.17	0.03	-2.51
0.02	0.04	0.00	0.57	0.03	-1.87
0.01	0.21	0.15	3.24	2.30	11.91

**Modeled gas information**

Gas	Fitting	Measure	Calculate	C/M
SO2	*	1.19	3.53	2.98
CO	*	360.73	413.92	1.15
NOx	*	37.15	44.06	1.19

Bound of C/M

**4. Save the result**



# CMBGC-Iteration 1.0

## • Result

	A	B	C	D	E	F	G	H	I	J	K	
1	Date	LDGV	HDDV	SDUST	BURN	CFPP	AMSULF	AMBSLF	AMNITR	SOC		
2	2006/1/5	0.193993	0	0.189761	0.30992	-4.3E-20	0	0.213315	0.200402	1.094407		
3	2006/1/8	0.876502	0	0.200461	3.041995	0.118007	0	0.476396	0.592802	0.103708		
4	#####	1.007543	0.540507	0.183157	0.692743	0.054915	0.120152	1.214659	0.587993	0.741207		
5	#####	0.346507	0.23734	0.142343	0.232864	0.003169	0.124563	0.626495	0.317164	0.922777		
6	#####	1.238296	0.658799	0.125292	0.690938	0.016373	0	2.031739	3.59948	1.244866		
7	#####	1.018562	0.731049	0.146287	0.599467	0.148104	0	0.531261	0.468513	1.078588		
8	#####	0.396992	0.3593	1.023218	1.180839	0.000819	0.52876	0.506801	0.271508	0.49451		
9	2006/2/1	1.476973	0	0.134121	0.699706	0.020236	2.189189	1.612148	0.661996	0.581551		
10	2006/2/4	0.816432	0.874691	0.155177	0.76253	0.014903	0	0	0	0		
11	2006/2/7	2.017761	1.06293	0.167117	0.667417	0	0	1	0	0		
12	#####	1.078722	0	0.076773	3.723811	0.03493	1.841804	1	0	0		
13	#####	0.174339	0	0.239376	6.357181	0	1.731074	2	0	0		
14	#####	0.190209	0	0.142466	1.474295	0	4.690958	0	0	0		
15	#####	0.147519	0.227849	0.073053	2.165643	-1.4E-17	4.829672	0	0	0		
16	#####	0.191088	-3.6E-21	0.096328	1.203574	2.91E-19	1.278919	0	0	0		
17	#####	0.604079	-1.6E-22	0.156334	1.060559	1.32E-19	1.796884	2	0	0		
18	2006/3/6	0.712073	1.42E-17	0.196413	7.423645	0	5.574883	3	0	0		
19	2006/3/9	0.19296	-1.7E-21	0.523633	0.627631	1.1E-19	0.584028	1	0	0		
20	#####	0.152698	7.64E-18	0.183394	7.229157	0.0175	2.009667	6	0	0		
21	#####	1.650678	0	0.083071	4.031656	0.116719	0.545484	1	0	0		
22	#####	0.423293	0	0.183426	1.073601	0	3.930665	0	0	0		
23	#####	0.193979	-8.7E-22	0.114532	0.314035	2.69E-21	1.613499	1	0	0		
24	#####	0.707195	0.020388	0.166325	0.946737	-1.8E-18	0.594195	0.655201	0.203101	1.170282		
25	#####	0.18032	0	0.235105	4.517053	-2.2E-19	5.815131	1.247675	0.370224	0		
26	2006/4/2	0.168761	0	0.222948	8.07362	0	3.12256	3.202961	0.954065	0		
27	2006/4/5	0.358642	7.62E-18	0.223367	5.608316	0.001004	2.614904	2.837898	1.337174	0		
28	2006/4/8	0.191468	0	0.380178	1.086889	0	1.857576	1.016032	1.402018	1.110068		
	Contribution	Un_Contribution	Mean_contribution	Performance Index	MPIN	Modeled Species	Modeled gas					

### Output information:

Daily contributions;  
 Daily contribution uncertainties;  
 Mean source contribution;  
 Performance index;  
 MPIN matrix;  
 Modeled species information;  
 Modeled gases information

# References

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- USEPA. EPA Positive matrix factorization (PMF) 5.0 fundamentals and user guide, 2014.