NCAPCA 1.0
User Guide

Guoliang Shi, Yingze Tian, Yinchang Feng, Armistead G. Russell

Nankai University, China

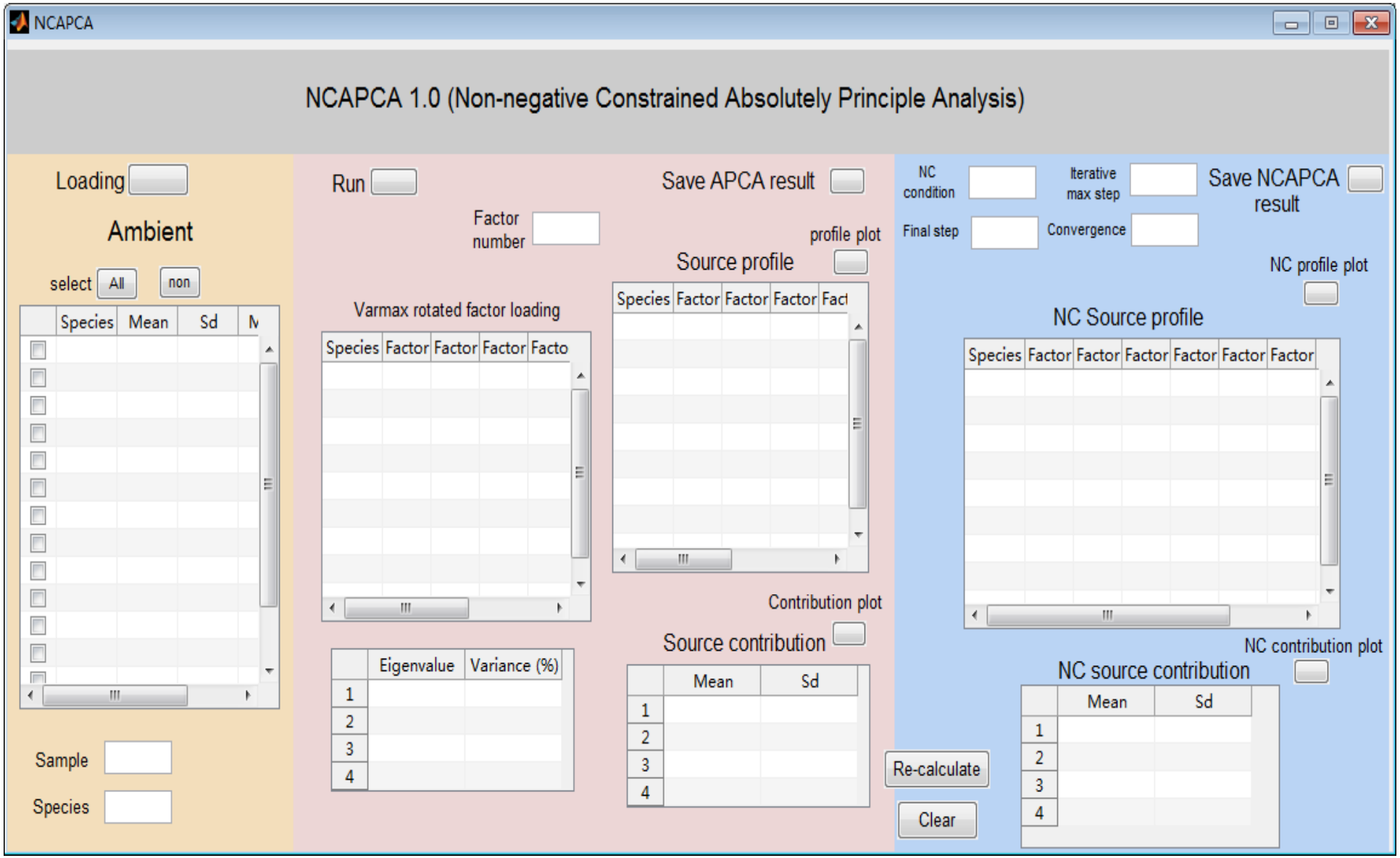
Georgia Institute of Technology, USA

nksgl@nankai.edu.cn (G.L Shi)
ted.russell@gatech.edu (A.G. Russell)

NCAPCA 1.0

Non-negative Constrained Absolutely Principle Analysis (APCA) model is a factor analytic approach and can be applied to estimate the contribution of sources to particulate matter, based on the PCA method. Non-negative contributions are obtained

NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species
Mean
Sd
Sample
Species
Run
Factor number
Varmax rotated factor loading
Species
Factor
Eigenvalue
Variance (%)
Save APCA result
profile plot
Source profile
Contribution plot
Source contribution
Mean
Sd
NC condition
Iterative max step
Save NCAPCA result
Final step
Convergence
NC profile plot
NC Source profile
NC contribution plot
NC source contribution
Re-calculate
Clear

NCAPCA 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.

NCAPCA 1.0

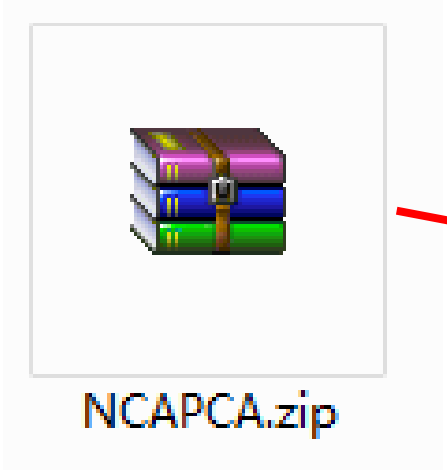
- **Download address:**

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

or

http://env.nankai.edu.cn/air/list/?110_1.html

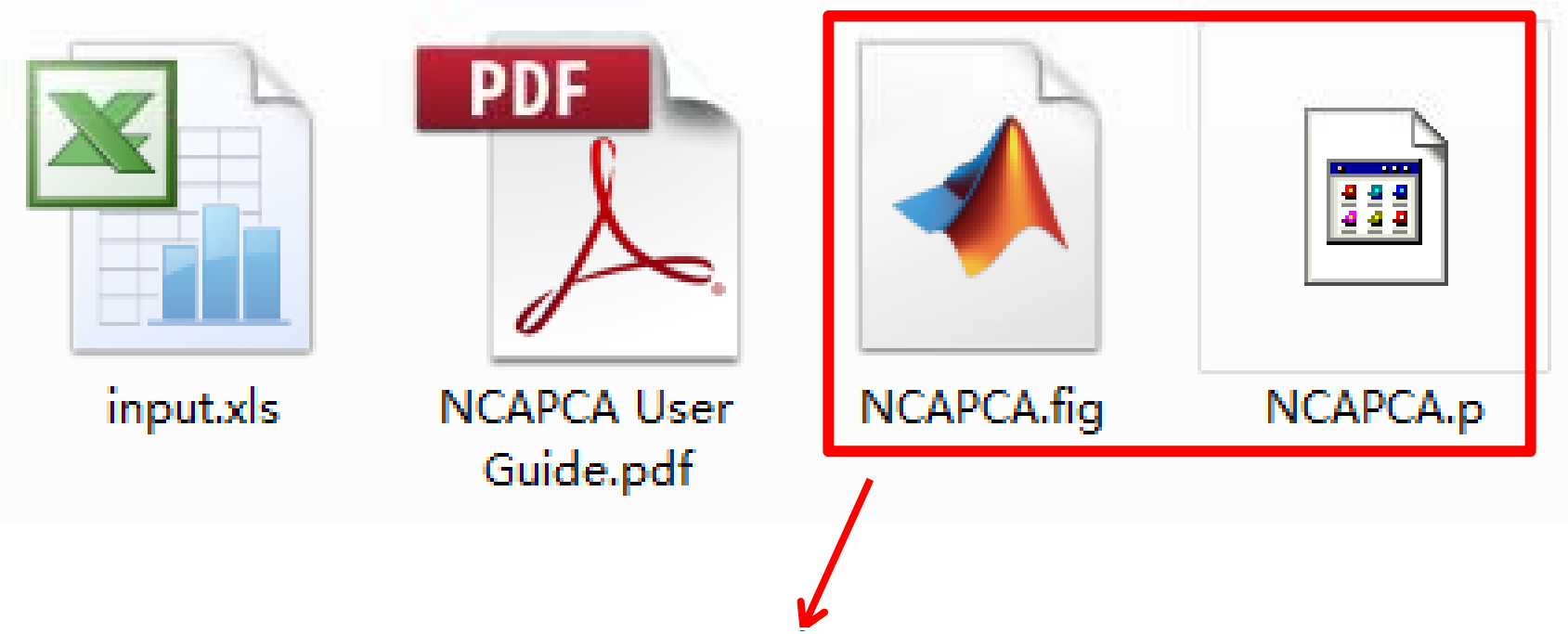
NCAPCA 1.0



Extract the NCAPCA.zip file

NCAPCA 1.0

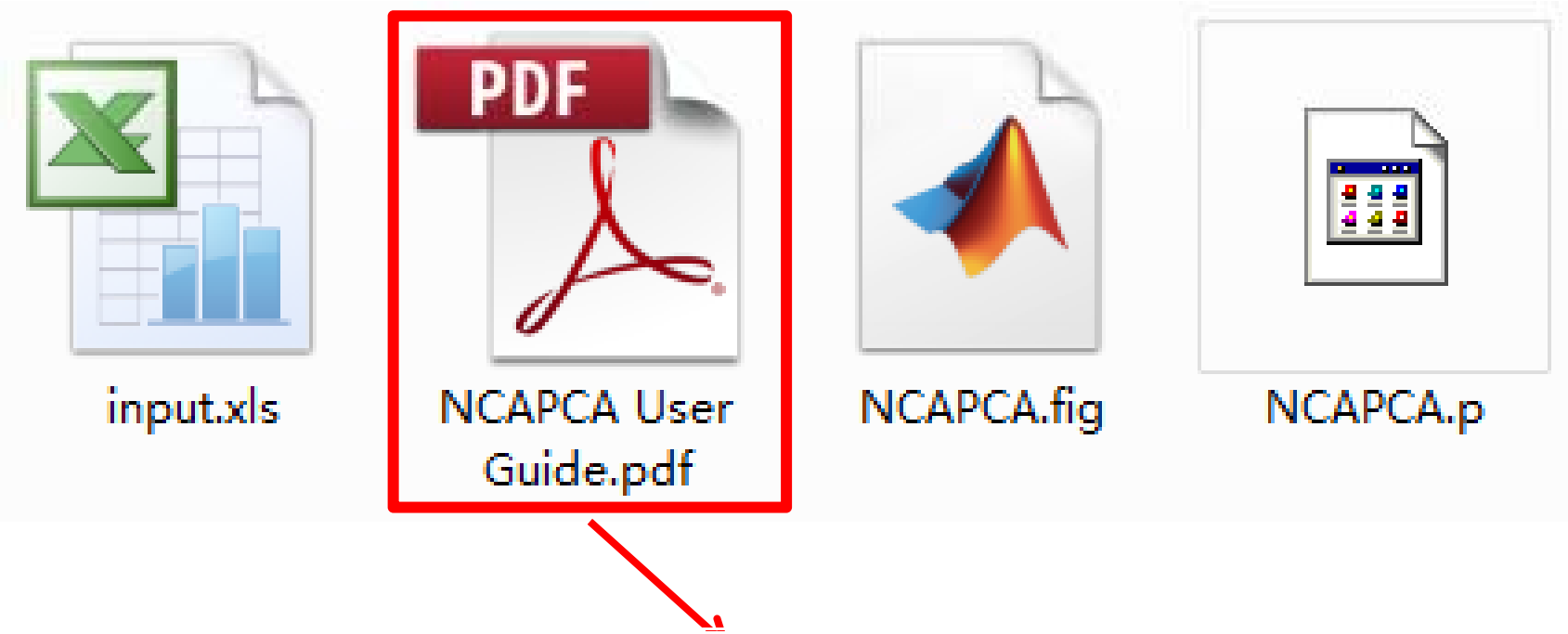
Four files in NCAPCA.zip



Matlab program files

NCAPCA 1.0

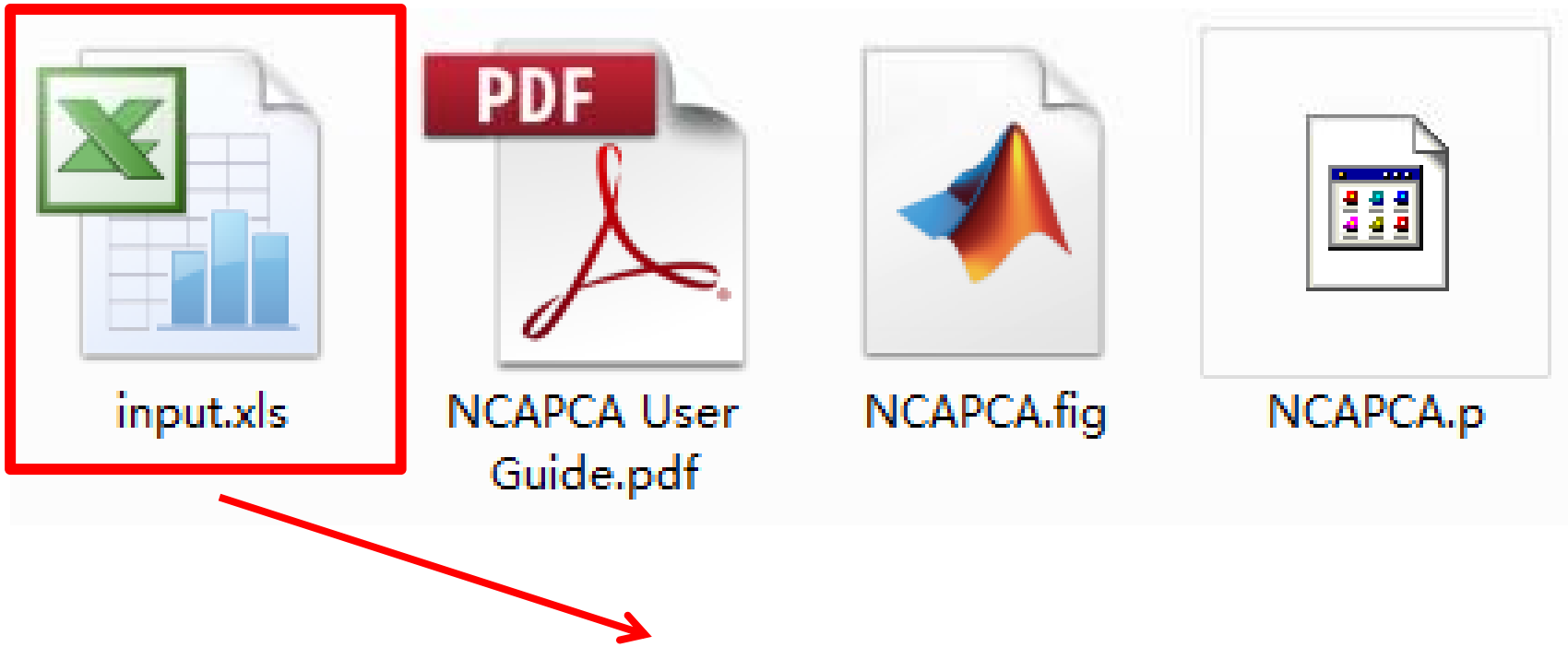
Four files in NCAPCA.zip



User Guide for CMB-GC

NCAPCA 1.0

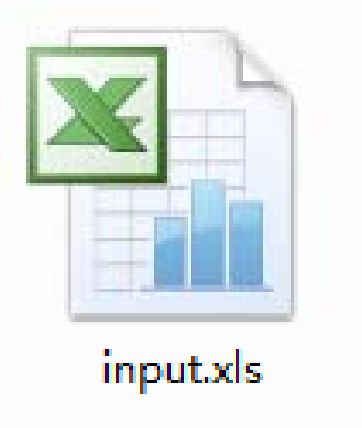
Four files in NCAPCA.zip



Example of input file

NCAPCA 1.0

- Input file



Input file of NCAPCA 1.0 is .xls file

(User can modify the name of input file)

NCAPCA 1.0

Input file

	SO4	NO3	Cl	NH4	EC	OC	Al	As	Ba	Br	Ca	Cu
2	26.33127	10.36647	1.102581	10.80773	13.0402	32.89267	5.437436	0.001619	0.007444	0.0179	4.207578	0.04
3	27.58169	14.24344	1.120944	12.3469	13.73474	34.04381	3.893708	0.001557	0.007545	0.018293	4.025165	0.03
4	28.17244	17.50126	1.31177	13.16665	15.32911	38.18578	4.804991	0.001772	0.008769	0.021329	4.716187	0.04
5	30.22822	12.31878	0.984992	12.97433	15.37807	37.7092	3.725095	0.001615	0.006864	0.016286	3.749026	0.03
6	26.97743	9.939551	1.070559	10.93035	15.26339	37.9134	5.02654	0.00167	0.007337	0.017507	4.169257	0.04
7	26.95557	13.87623	0.782154	12.6042	12.84461	32.22389	5.55628	0.001667	0.00573	0.013022	3.445838	0.04
8	25.11706	12.40496	0.960457	11.15128	14.53584	36.29273	5.536721	0.001695	0.006737	0.015787	3.954564	0.04
9	24.23841	15.38								0.013657	3.397715	0.03
10	28.31873	10.9								0.014545	3.541688	0.03
11	22.71821	11.15								0.01478	3.807623	0.04
12	22.29276	10.0496	0.883909	9.474767	16.57307	40.17725	2.971248	0.001445	0.006171	0.014655	3.436654	0.03
13	30.27722	16.19236	1.187544	13.81775	13.83996	34.65075	4.892918	0.001728	0.008041	0.019371	4.35919	0.04
14	25.6279	12.88567	0.751524	11.82118	14.48578	35.40184	3.56826	0.001499	0.005474	0.01261	3.116639	0.03
15	26.1424	19.87304	1.518447	12.78101	13.54828	34.08734	4.431233	0.00167	0.009816	0.024437	5.064583	0.03
16	25.35816	13.86131	1.032272	11.59338	11.75655	29.44802	4.140477	0.001463	0.006955	0.016812	3.756926	0.03
17	30.60966	12.57977	1.391339	12.47573	16.90393	41.44101	3.285804	0.001653	0.009149	0.022603	4.728387	0.04
18	28.98828	14.77666	1.175164	12.95106	13.63876	34.325	5.382655	0.001734	0.007959	0.019132	4.40222	0.04
19	23.47092	13.86589	0.569319	11.67795	10.85386	26.77975	3.476924	0.001318	0.004298	0.009647	2.485503	0.03
20	26.99603	10.71682	0.681816	11.81375	14							
21	24.58778	12.09446	1.023579	10.79391	12							
22	25.92405	13.395	1.11307	11.58595	9.							
23	24.40746	14.65072	1.008589	11.47716	13							
24	26.59531	16.104	1.007432	12.66322	15							
25	28.07301	15.47606	1.386392	12.38596	16							
26	27.516	14.91738	1.592521	11.73306	13							
27	24.73965	13.71022	0.621691	11.93635	15.02234	36.67116	3.961989	0.001555	0.004803	0.010633	2.896264	0.03
28	25.082	12.96604	1.029371	11.16444	15.08042	37.1881	4.16546	0.001586	0.007062	0.016889	3.915861	0.04

concentration | TOT | parameter

Three worksheets in input file

Do not change the names of three worksheets!

NCAPCA 1.0

Input file

	SO4	NO3	Cl	NH4	EC	OC	Al	As	Ba	Br	Ca	Cu
2	26.33127	10.36647	1.102581	10.80773	13.0402	32.89267	5.437436	0.001619	0.007444	0.0179	4.207578	0.04
3	27.58169	14.24344	1.120944	12.3469	13.73474	34.04381	3.893708	0.001557	0.007545	0.018293	4.025165	0.03
4	28.17244	17.50126	1.31177	13.16665	15.32911	38.18578	4.804991	0.001772	0.008769	0.021329	4.716187	0.04
5	30.22822	12.31878	0.984992	12.97433	15.37807	37.7092	3.725095	0.001615	0.006864	0.016286	3.749026	0.03
6	26.97743	9.939551	1.070559	10.93035	15.26339	37.9134	5.02654	0.00167	0.007337	0.017507	4.169257	0.04
7	26.95557	13.87623	0.782154	12.6042	12.84461	32.22389	5.55628	0.001667	0.00573	0.013022	3.445838	0.04
8	25.11706	12.40496	0.960457	11.15128	14.53584	36.29273	5.536721	0.001695	0.006737	0.015787	3.954564	0.04
9	24.23841	15.38181	0.819328	11.91528	14.47387	35.64481	4.269608	0.001585	0.005904	0.013657	3.397715	0.03
10	28.31873	10.9218	0.876288	12.04932	14.81842	36.47257	4.209992	0.001594	0.006227	0.014545	3.541688	0.03
11	22.71821	11.								0.01478	3.807623	0.04
12	22.29276	10								0.014655	3.436654	0.03
13	30.27722	16.								0.019371	4.35919	0.04
14	25.6279	12.								0.01261	3.116639	0.03
15	26.1424	19.								0.024437	5.064583	0.03
16	25.35816	13.86131	1.032272	11.59338	11.75655	29.44802	4.140477	0.001463	0.006955	0.016812	3.756926	0.03
17	30.60966	12.57977	1.391339	12.47573	16.90393	41.44101	3.285804	0.001653	0.009149	0.022603	4.728387	0.04
18	28.98828	14.77666	1.175164	12.95106	13.63876	34.325	5.382655	0.001734	0.007959	0.019132	4.40222	0.04
19	23.47092	13.86589	0.969319	11.67795	10.85386	26.77975	3.476924	0.001318	0.004298	0.009647	2.485503	0.03
20	26.99603	10.71682	0.681816	11.81375	14.84344	36.13412	3.421585	0.001487	0.005087	0.011547	2.941331	0.03
21	24.58778	12.09446	1.023579	10.79391	12.83484	32.45399	5.762554	0.00164	0.007019	0.016673	4.062038	0.04
22	25.92405	13.395	1.11307	11.58595	9.630184	24.84265	5.040825	0.001473	0.007371	0.017958	4.000036	0.03
23	24.40746	14.65072	1.008589	11.47716	13.01523	32.28896	3.916713	0.001488	0.00686	0.0165	3.723349	0.03
24	26.59531	16.104	1.007432	12.66322	15.91896	39.13619	4.210926	0.001686	0.007039	0.016647	3.911348	0.04
25	28.07301	15.47606	1.386392	12.38596	16.82913	41.81208	5.054304	0.001833	0.00923	0.022507	5.011072	0.04
26	27.516	14.91738	1.592521	11.73306	13.80519	34.96441	5.144004	0.001711	0.010234	0.025533	5.375866	0.04
27	24.73965	13.71022	0.621691	11.93635	15.02234	36.67116	3.961989	0.001555	0.004803	0.010633	2.896264	0.03
28	25.082	12.96694	1.029371	11.16444	15.08042	37.1881	4.16546	0.001586	0.007062	0.016889	3.915861	0.04

Concentration of ambient dataset (ug/m^3)

concentration | TOT | parameter

NCAPCA 1.0

Input file

Concentration of ambient dataset

1	SO4	NO3	Cl	NH4	EC	OC	Al	As	Ba	Br	Ca	Cu
2	26.33127	10.36647	1.102581	10.80773	13.0402	32.89267	5.437436	0.001619	0.007444	0.0179	4.207578	0.04
3	27.58169	14.24344	1.120944	12.3469	13.73474	34.04381	3.893708	0.001557	0.007545	0.018293	4.025165	0.03
4	28.17244	17.50126	1.31177	13.16665	15.32911	38.18578	4.804991	0.001772	0.008769	0.021329	4.716187	0.04
5	30.22822	12.31878	0.984992	12.97433	15.37807	37.7092	3.725095	0.001615	0.006864	0.016286	3.749026	0.03
6	26.97743	9.939551	1.070559	10.93035	15.26339	37.9134	5.02654	0.00167	0.007337	0.017507	4.169257	0.04
7	26.95557	13.87623	0.782154	12.6042	12.84461	32.22389	5.55628	0.001667	0.00573	0.013022	3.445838	0.04
8	25.11706	12.40496	0.960457	11.15128	14.53584	36.29273	5.536721	0.001695	0.006737	0.015787	3.954564	0.04
9	24.23841	15.38181	0.819328	11.91528	14.47387	35.64481	4.269608	0.001585	0.005904	0.013657	3.397715	0.03
10	28.31873	10.9218	0.876288	12.04932	14.81842	36.47257	4.209992	0.001594	0.006227	0.014545	3.541688	0.03
11	22.71821	11.15734	0.896993	9.986264	14.91354	37.09921	5.462861	0.001652	0.006349	0.01478	3.807623	0.04
12	22.29276	10.0496	0.88390								3.436654	0.03
13	30.27722	16.19236	1.18754								4.35919	0.04
14	25.6279	12.88567	0.75152								3.116639	0.03
15	26.1424	19.87304	1.518447	12.78101	13.54828	34.08734	4.431233	0.00167	0.009816	0.024437	5.064583	0.03
16	25.35816	13.86131	1.032272	11.59338	11.75655	29.44802	4.140477	0.001463	0.006955	0.016812	3.756926	0.03
17	30.60966	12.57977	1.391339	12.47573	16.90393	41.44101	3.285804	0.001653	0.009149	0.022603	4.728387	0.04
18	28.98828	14.77666	1.175164	12.95106	13.63876	34.325	5.382655	0.001734	0.007959	0.019132	4.40222	0.04
19	23.47092	13.86589	0.569319	11.67795	10.85386	26.77975	3.476924	0.001318	0.004298	0.009647	2.485503	0.03
20	26.99603	10.71682	0.681816	11.81375	14.84344	36.13412	3.421585	0.001487	0.005087	0.011547	2.941331	0.03
21	24.58778	12.09446	1.023579	10.79391	12.83484	32.45399	5.762554	0.00164	0.007019	0.016673	4.062038	0.04
22	25.92405	13.395	1.11307	11.58595	9.630184	24.84265	5.040825	0.001473	0.007371	0.017958	4.000036	0.03
23	24.40746	14.65072	1.008589	11.47716	13.01523	32.28896	3.916713	0.001488	0.00686	0.0165	3.723349	0.03
24	26.59531	16.104	1.007432	12.66322	15.91896	39.13619	4.210926	0.001686	0.007039	0.016647	3.911348	0.04
25	28.07301	15.47606	1.386392	12.38596	16.82913	41.81208	5.054304	0.001833	0.00923	0.022507	5.011072	0.04
26	27.516	14.91738	1.592521	11.73306	13.80519	34.96441	5.144004	0.001711	0.010234	0.025533	5.375866	0.04
27	24.73965	13.71022	0.621691	11.93635	15.02234	36.67116	3.961989	0.001555	0.004803	0.010633	2.896264	0.03
28	25.082	12.96604	1.029371	11.16444	15.08042	37.1881	4.16546	0.001586	0.007062	0.016889	3.915861	0.04

First line: title line

concentration | TOT | parameter

NCAPCA 1.0

Input file

Concentration of ambient dataset

1	SO4	NO3	Cl	NH4	EC	OC	Al	As	Ba	Br	Ca	Cu
2	26.33127	10.36647	1.102581	10.80773	13.0402	32.89267	5.437436	0.001619	0.007444	0.0179	4.207578	0.04
3	27.58169	14.24344	1.120944	12.3469	13.73474	34.04381	3.893708	0.001557	0.007545	0.018293	4.025165	0.03
4	28.17244	17.50126	1.31177	13.16665	15.32911	38.18578	4.804991	0.001772	0.008769	0.021329	4.716187	0.04
5	30.22822	12.31878	0.984992	12.97433	15.37807	37.7092	3.725095	0.001615	0.006864	0.016286	3.749026	0.03
6	26.97743	9.939551	1.070559	10.93035	15.26339	37.9134	5.02654	0.00167	0.007337	0.017507	4.169257	0.04
7	26.95557	13.87623	0.782154	12.6042	12.84461	32.22389	5.55628	0.001667	0.00573	0.013022	3.445838	0.04
8	25.11706	12.40496	0.960457	11.15128	14.53584	36.29273	5.536721	0.001695	0.006737	0.015787	3.954564	0.04
9	24.23841	15.38181	0.819328	11.91528	14.47387	35.64481	4.269608	0.001585	0.005904	0.013657	3.397715	0.03
10	28.31873	10.9218	0.876288	12.04932	14.81842		594		0.006227	0.014545	3.541688	0.03
11	22.71821	11.15734	0.896993	9.986264	14.91354		652		0.006349	0.01478	3.807623	0.04
12	22.29276	10.0496	0.883909	9.474767	16.57307		445		0.006171	0.014655	3.436654	0.03
13	30.27722	16.19236	1.187544	13.81775	13.83996	34.65075	4.892918	0.001728	0.008041	0.019371	4.35919	0.04
14	25.6279	12.88567	0.751524	11.82118	14.48578	35.40184	3.56826	0.001499	0.005474	0.01261	3.116639	0.03
15	26.1424	19.87304	1.518447	12.78101	13.54828	34.08734	4.431233	0.00167	0.009816	0.024437	5.064583	0.03
16	25.35816	13.86131	1.032272	11.59338	11.75655	29.44802	4.140477	0.001463	0.006955	0.016812	3.756926	0.03
17	30.60966	12.57977	1.391339	12.47573	16.90393	41.44101	3.285804	0.001653	0.009149	0.022603	4.728387	0.04
18	28.98828	14.77666	1.175164	12.95106	13.63876	34.325	5.382655	0.001734	0.007959	0.019132	4.40222	0.04
19	23.47092	13.86589	0.569319	11.67795	10.85386	26.77975	3.476924	0.001318	0.004298	0.009647	2.485503	0.03
20	26.99603	10.71682	0.681816	11.81375	14.84344	36.13412	3.421585	0.001487	0.005087	0.011547	2.941331	0.03
21	24.58778	12.09446	1.023579	10.79391	12.83484	32.45399	5.762554	0.00164	0.007019	0.016673	4.062038	0.04
22	25.92405	13.395	1.11307	11.58595	9.630184	24.84265	5.040825	0.001473	0.007371	0.017958	4.000036	0.03
23	24.40746	14.65072	1.008589	11.47716	13.01523	32.28896	3.916713	0.001488	0.00686	0.0165	3.723349	0.03
24	26.59531	16.104	1.007432	12.66322	15.91896	39.13619	4.210926	0.001686	0.007039	0.016647	3.911348	0.04
25	28.07301	15.47606	1.386392	12.38596	16.82913	41.81208	5.054304	0.001833	0.00923	0.022507	5.011072	0.04
26	27.516	14.91738	1.592521	11.73306	13.80519	34.96441	5.144004	0.001711	0.010234	0.025533	5.375866	0.04
27	24.73965	13.71022	0.621691	11.93635	15.02234	36.67116	3.961989	0.001555	0.004803	0.010633	2.896264	0.03
28	25.082	12.96604	1.029371	11.16444	15.08042	37.1881	4.16546	0.001586	0.007062	0.016889	3.915861	0.04

Dataset

concentration | TOT | parameter

NCAPCA 1.0

Input file

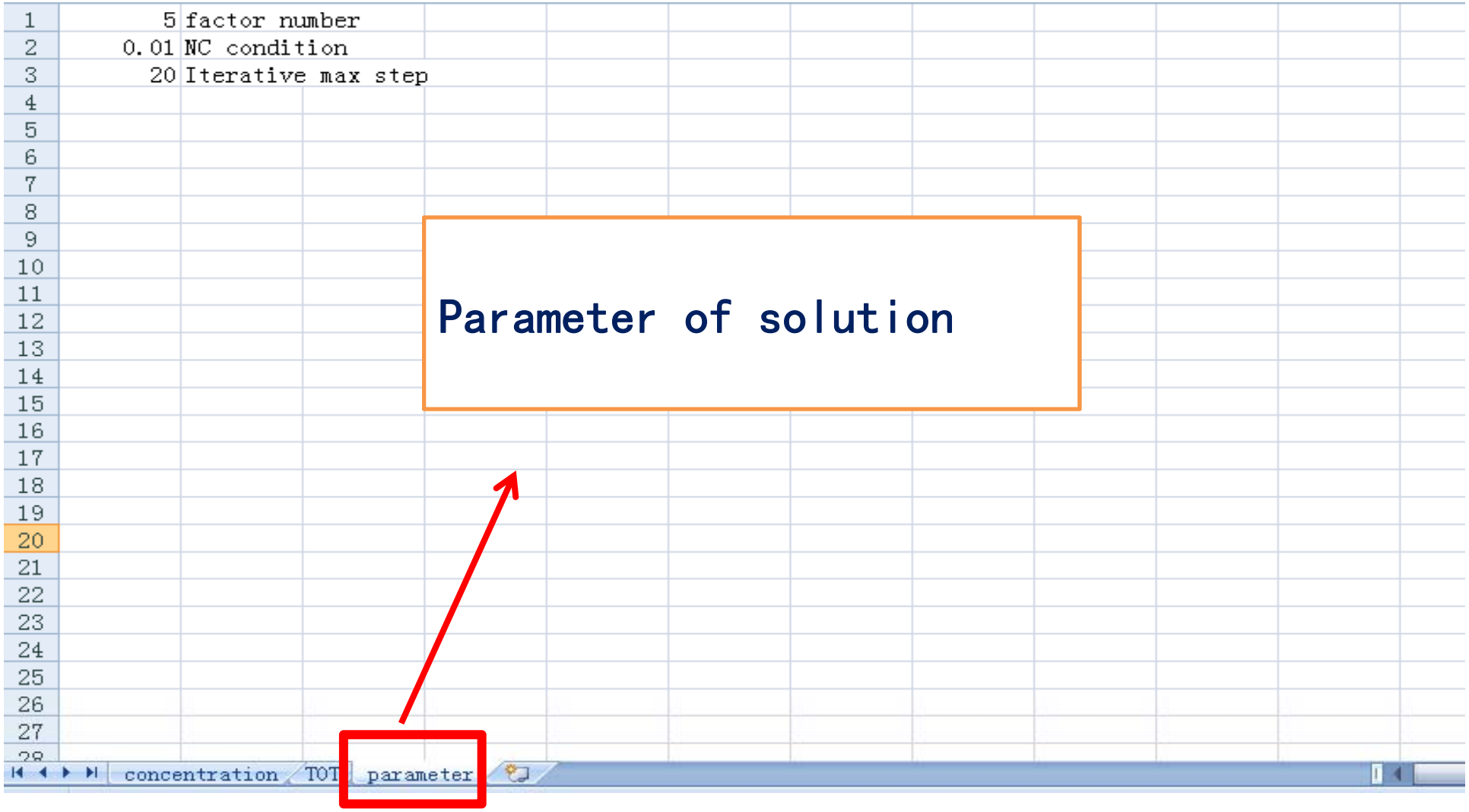
	TOT
1	TOT
2	161.895
3	155.7397
4	177.1812
5	161.4602
6	167.0179
7	166.6873
8	169.5329
9	158.5211
10	159.357
11	165.2131
12	144.4818
13	172.8096
14	149.8812
15	167.005
16	146.3479
17	165.3477
18	173.3532
19	131.8324
20	148.7081
21	163.9603
22	147.2896
23	148.841
24	168.5917
25	183.3431
26	171.0662
27	155.5296
28	158.6406

Concentration of daily total mass of PM (TOT) (Unit: ug/m^3)

concentration | TOT | parameter

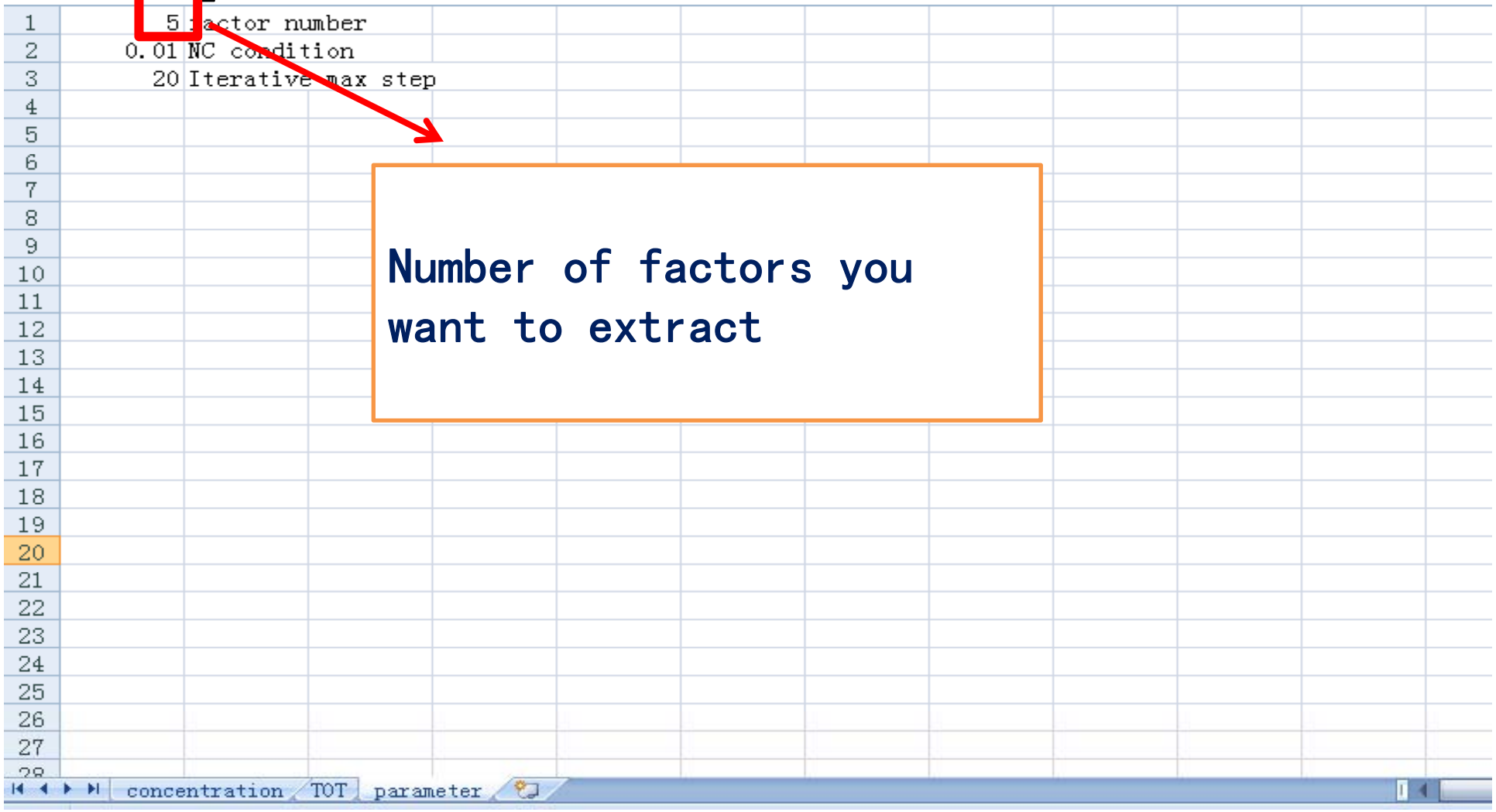
NCAPCA 1.0

Input file



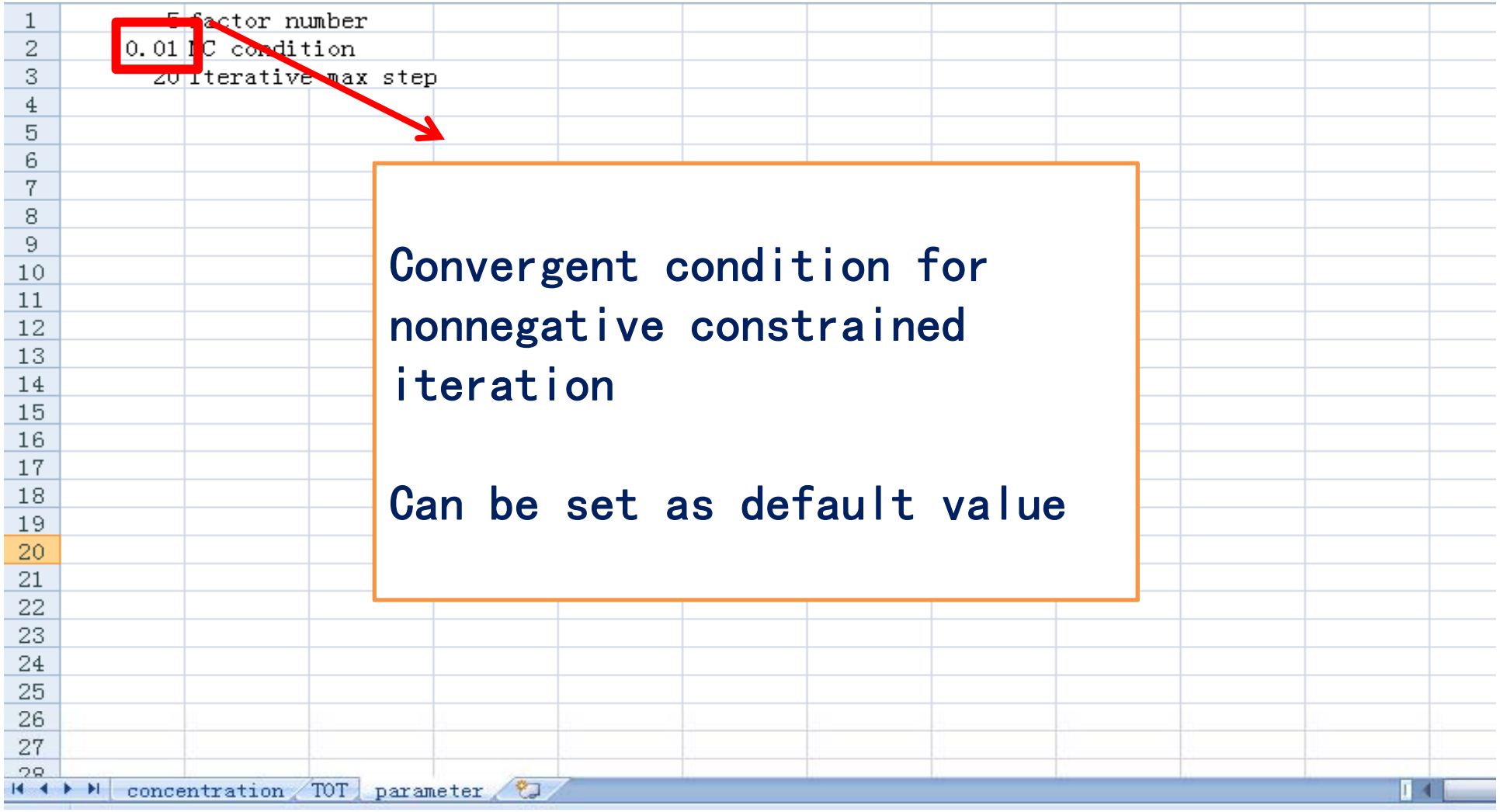
NCAPCA 1.0

Input file



NCAPCA 1.0

Input file



NCAPCA 1.0

Input file

1	5 factor number
2	0.01 NC condition
3	20 Iterative max step
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	

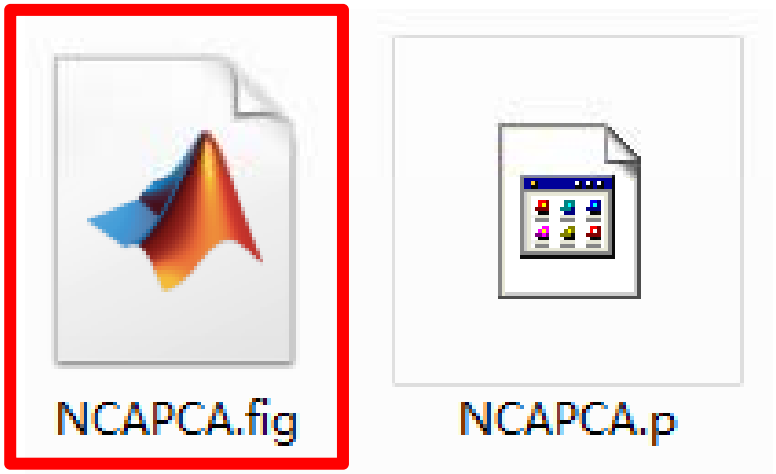
concentration | TOT | parameter

Max step for nonnegative constrained iteration

Can be set as default value

NCAPCA 1.0

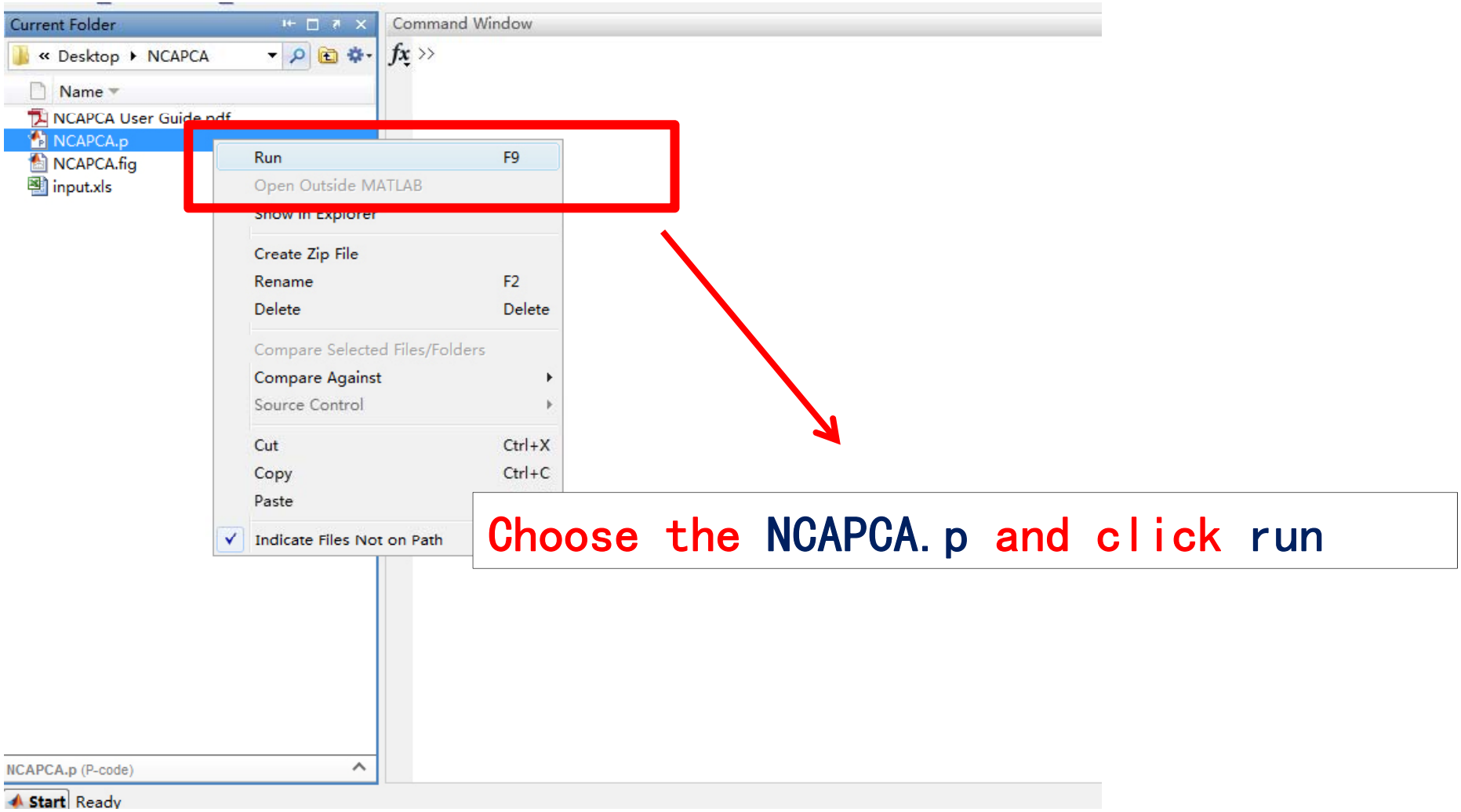
- Run the model



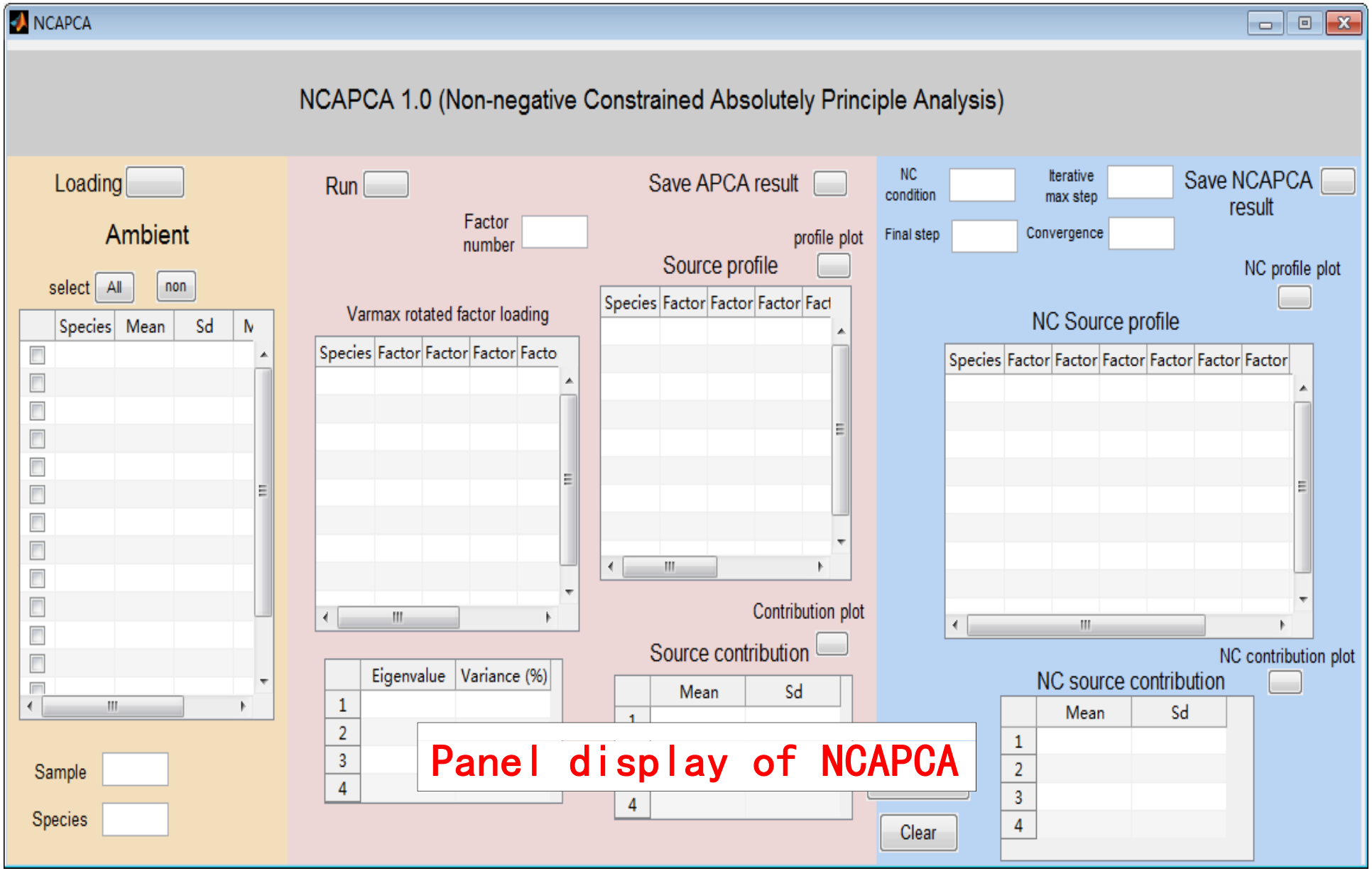
Double click the NCAPCA.fig file

NCAPCA 1.0

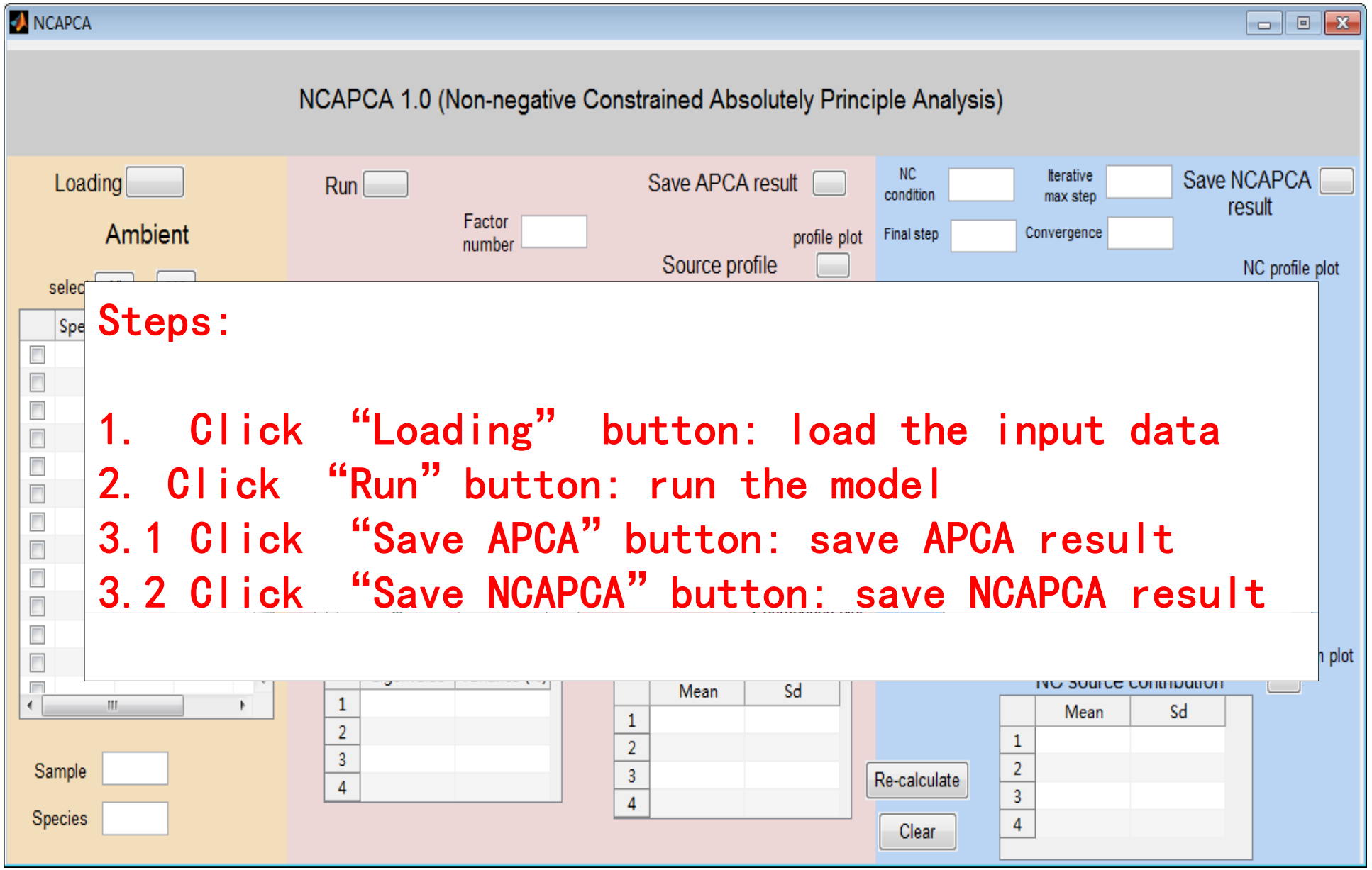
- Run the model



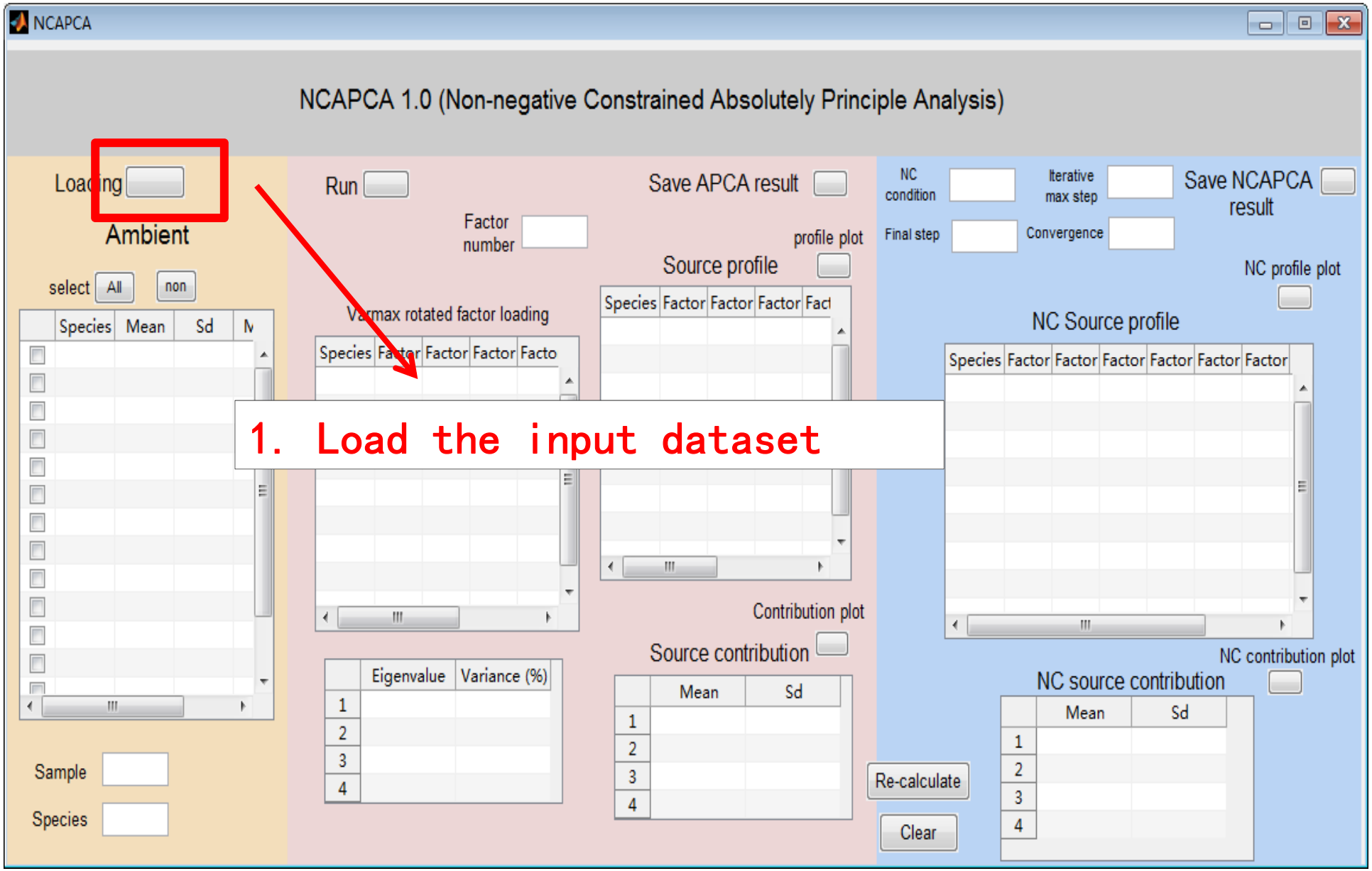
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species
Mean
Sd
Run
Factor number
Varmax rotated factor loading
Species
Factor
Eigenvalue
Variance (%)
Save APCA result
profile plot
Source profile
Contribution plot
Source contribution
Mean
Sd
NC condition
Iterative max step
Save NCAPCA result
Final step
Convergence
NC profile plot
NC Source profile
NC contribution plot
NC source contribution
Clear
Sample
Species
Panel display of NCAPCA

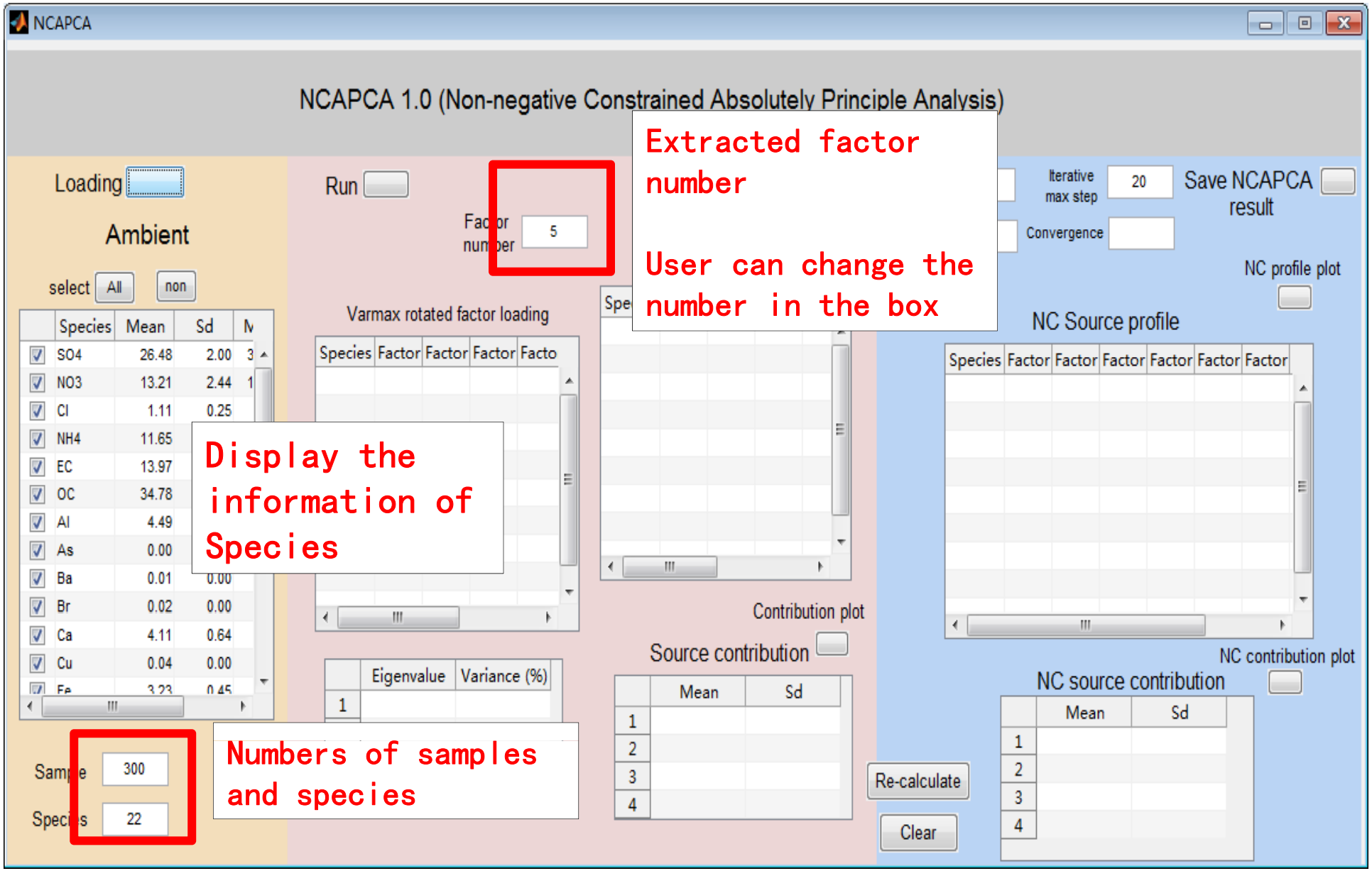
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
Run
Factor number
Save APCA result
profile plot
Source profile
NC condition
Iterative max step
Save NCAPCA result
Final step
Convergence
NC profile plot
Steps:
1. Click "Loading" button: load the input data
2. Click "Run" button: run the model
3.1 Click "Save APCA" button: save APCA result
3.2 Click "Save NCAPCA" button: save NCAPCA result
Mean
Sd
Sample
Species
Re-calculate
Clear

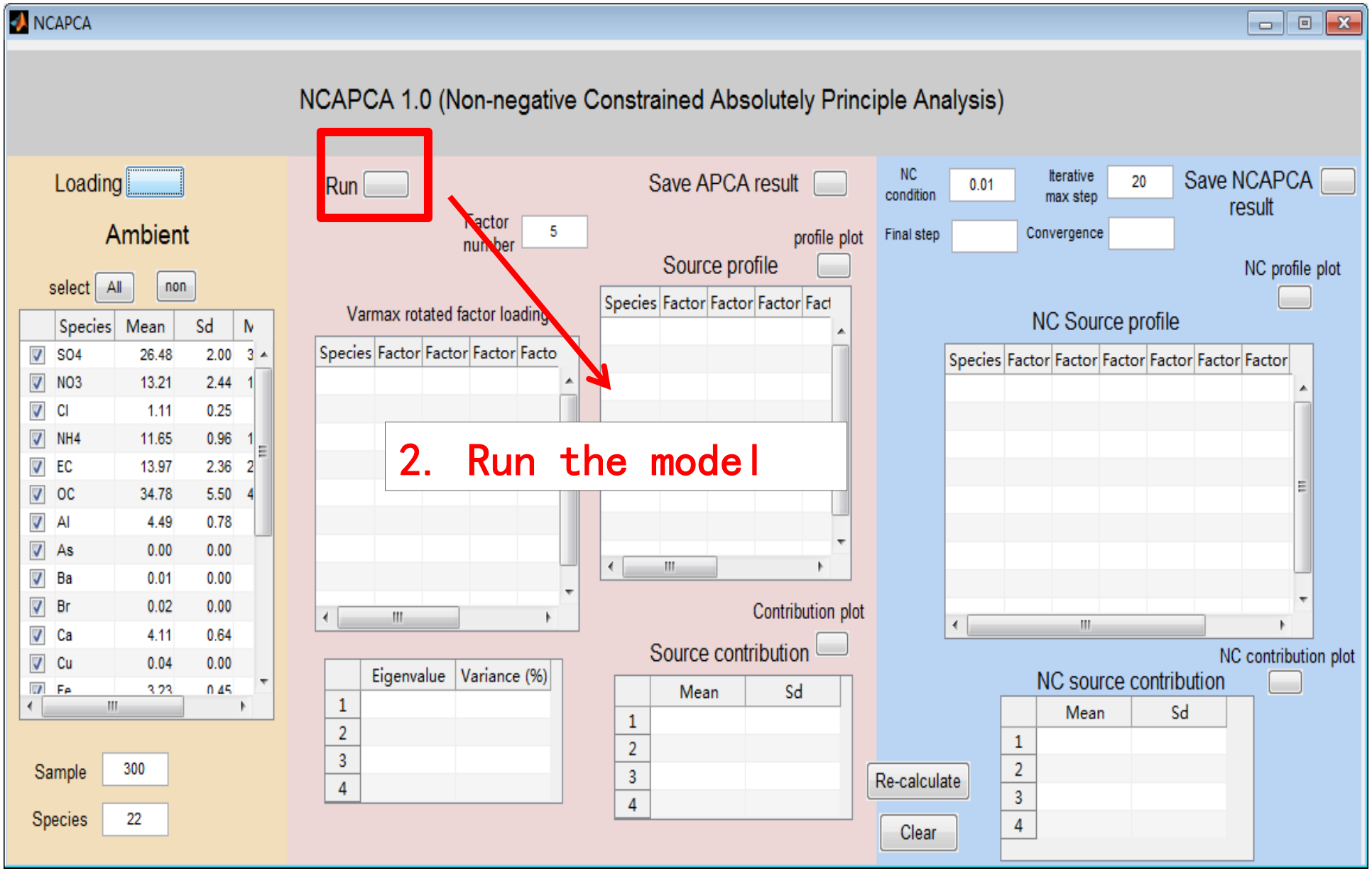
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species
Mean
Sd
Run
Factor number
Varmax rotated factor loading
Species
Factor
Eigenvalue
Variance (%)
Save APCA result
profile plot
Source profile
Contribution plot
Source contribution
Mean
Sd
NC condition
Iterative max step
Save NCAPCA result
Final step
Convergence
NC profile plot
NC Source profile
NC contribution plot
NC source contribution
Re-calculate
Clear
Sample
Species
1. Load the input dataset

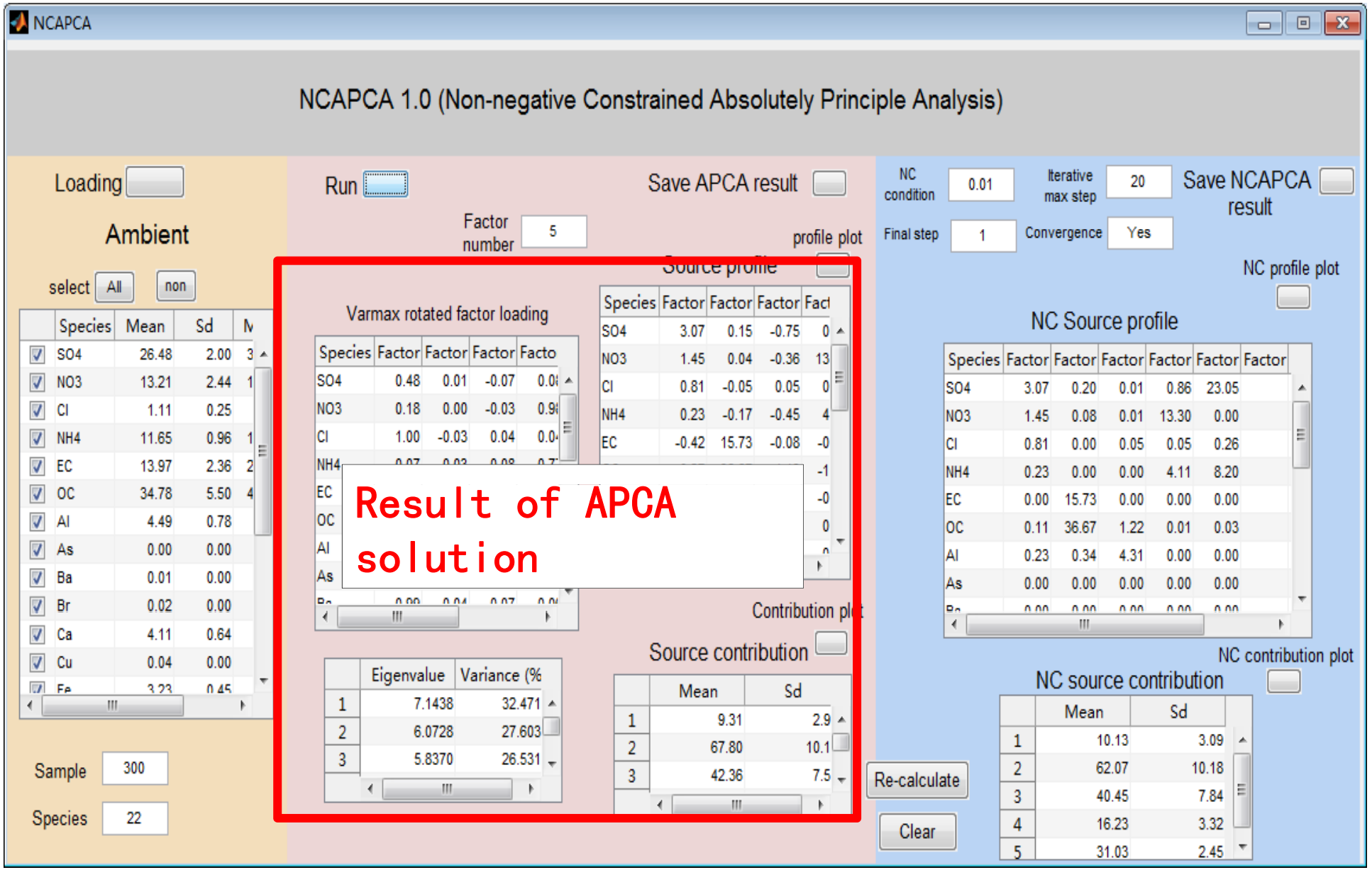
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65
EC 13.97
OC 34.78
Al 4.49
As 0.00
Ba 0.01
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Extracted factor number
User can change the number in the box
Iterative max step 20
Save NCAPCA result
Convergence
NC profile plot
Varmax rotated factor loading
Species Factor Factor Factor Facto
Display the information of Species
NC Source profile
Species Factor Factor Factor Factor Factor Factor
Eigenvalue Variance (%)
1
Contribution plot
Source contribution
Mean Sd
1
2
3
4
Re-calculate
Clear
NC contribution plot
NC source contribution
Mean Sd
1
2
3
4
Numbers of samples and species

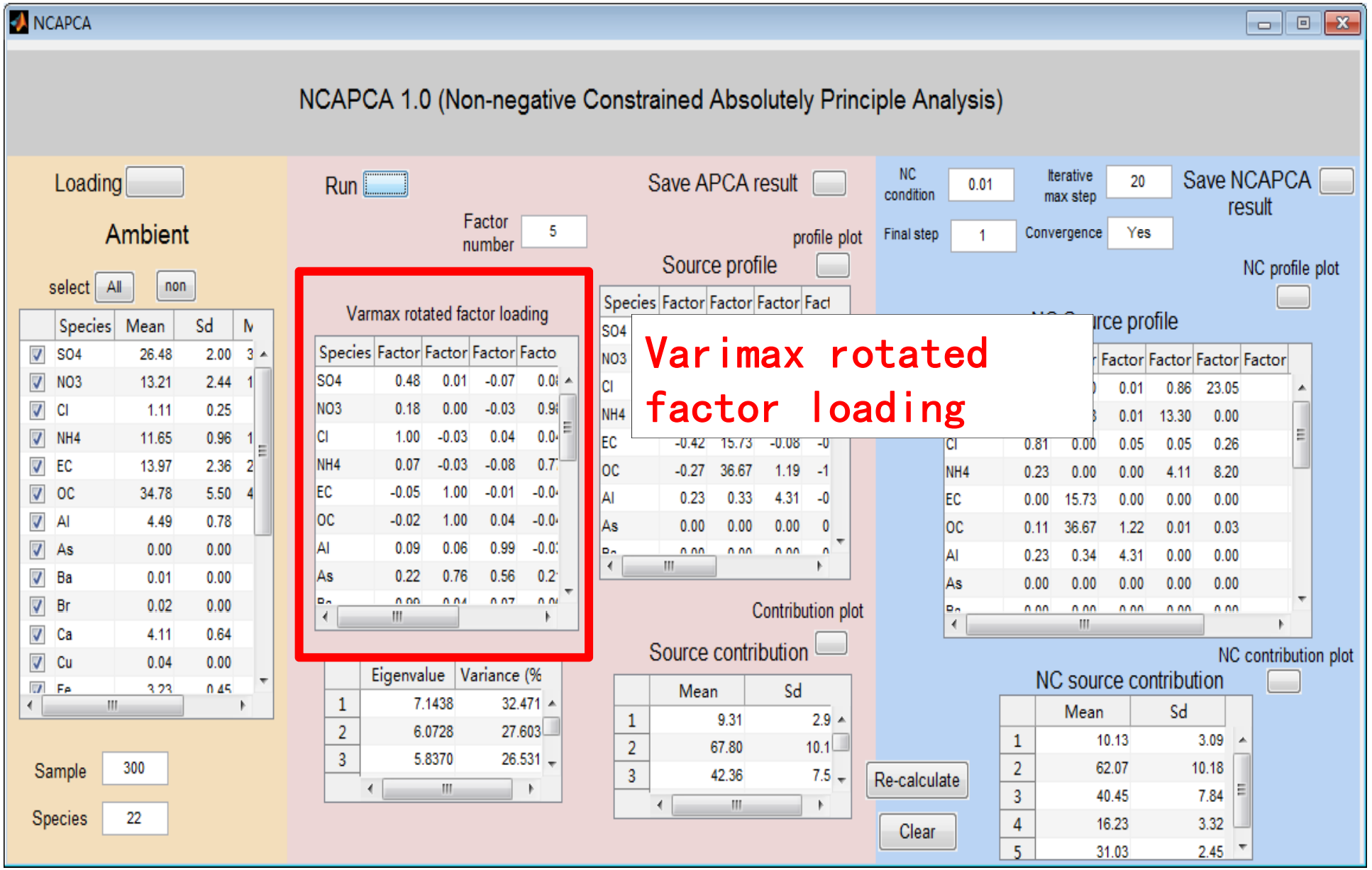
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species
Mean
Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample
300
Species
22
Run
Factor number
5
Varmax rotated factor loading
Species Factor Factor Factor Facto
Eigenvalue
Variance (%)
1
2
3
4
Save APCA result
profile plot
Source profile
Species Factor Factor Factor Fact
2. Run the model
Contribution plot
Source contribution
Mean
Sd
NC condition
0.01
Iterative max step
20
Save NCAPCA result
Final step
Convergence
NC profile plot
NC Source profile
Species Factor Factor Factor Factor Factor Factor
NC contribution plot
NC source contribution
Re-calculate
Clear

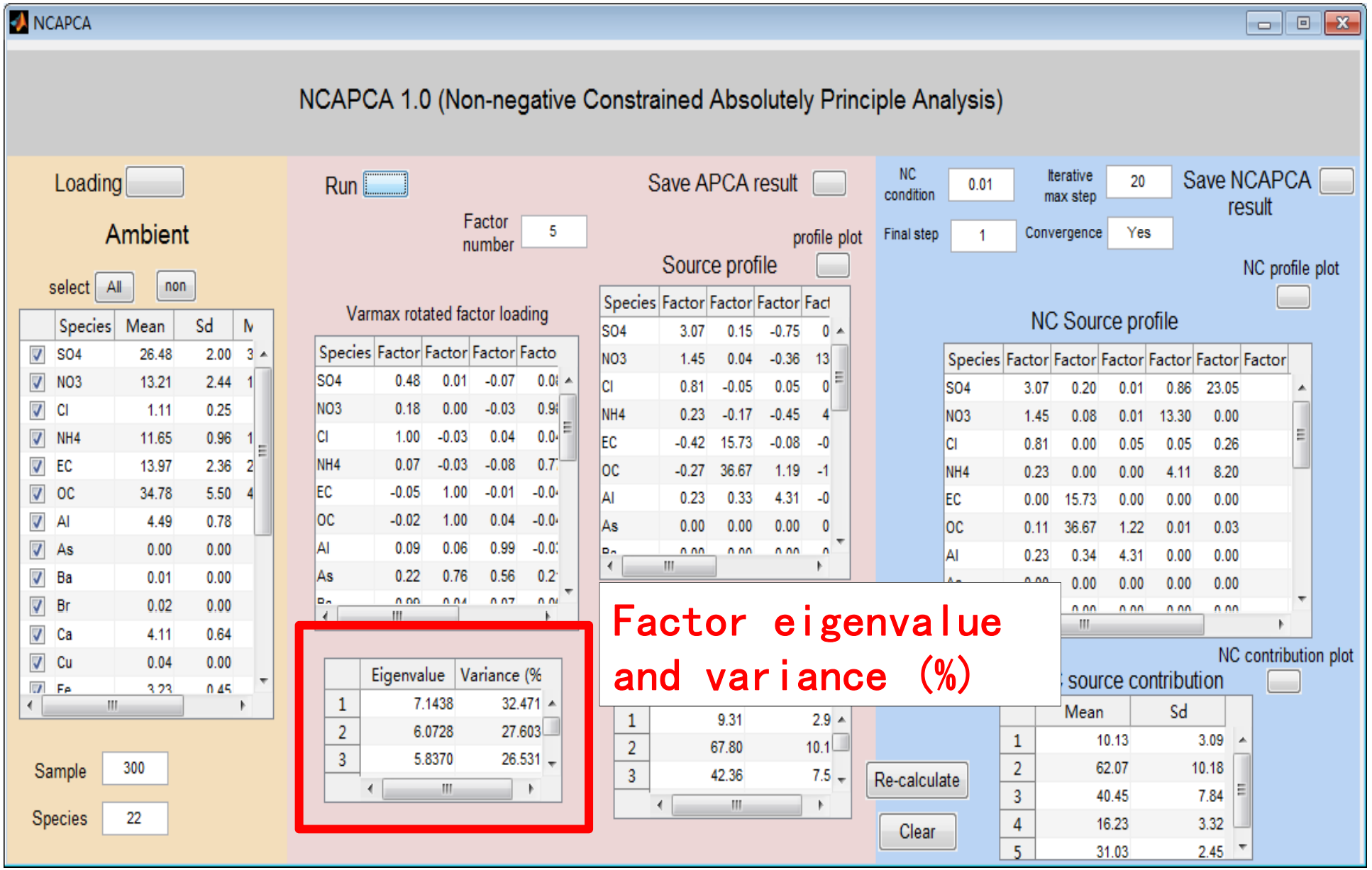
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Save APCA result
profile plot
Source profile
Species Factor Factor Factor
SO4 3.07 0.15 -0.75
NO3 1.45 0.04 -0.36
Cl 0.81 -0.05 0.05
NH4 0.23 -0.17 -0.45
EC -0.42 15.73 -0.08
Varmax rotated factor loading
Species Factor Factor Factor
SO4 0.48 0.01 -0.07
NO3 0.18 0.00 -0.03
Cl 1.00 -0.03 0.04
Result of APCA solution
Eigenvalue Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
Contribution plot
Source contribution
Mean Sd
1 9.31 2.9
2 67.80 10.1
3 42.36 7.5
Re-calculate
Clear
NC condition 0.01
Iterative max step 20
Save NCAPCA result
Final step 1
Convergence Yes
NC profile plot
NC Source profile
Species Factor Factor Factor Factor Factor Factor
SO4 3.07 0.20 0.01 0.86 23.05
NO3 1.45 0.08 0.01 13.30 0.00
Cl 0.81 0.00 0.05 0.05 0.26
NH4 0.23 0.00 0.00 4.11 8.20
EC 0.00 15.73 0.00 0.00 0.00
OC 0.11 36.67 1.22 0.01 0.03
Al 0.23 0.34 4.31 0.00 0.00
As 0.00 0.00 0.00 0.00 0.00
NC contribution plot
NC source contribution
Mean Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45

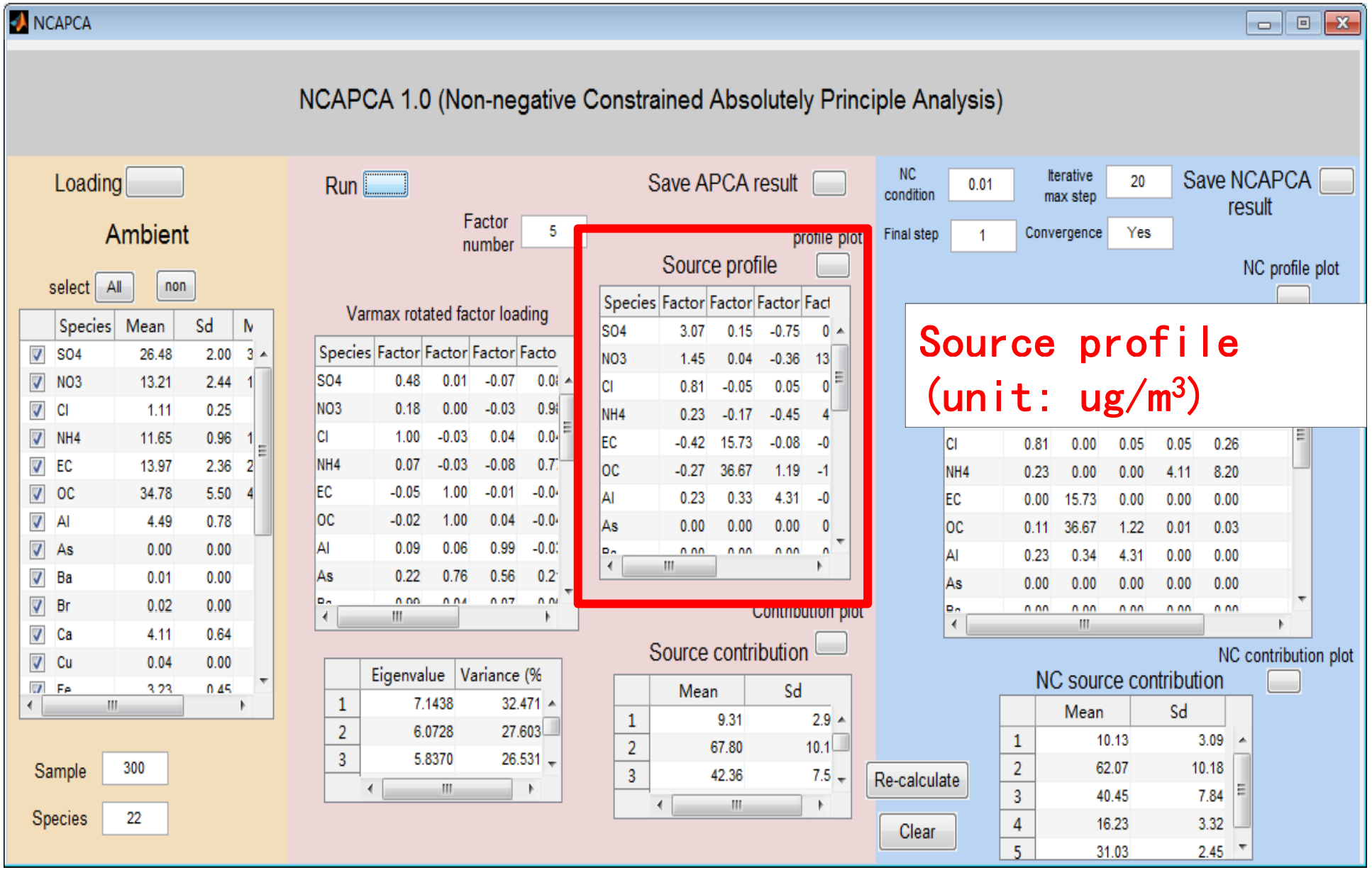
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Varmax rotated factor loading
Species Factor Factor Factor Facto
SO4 0.48 0.01 -0.07
NO3 0.18 0.00 -0.03
Cl 1.00 -0.03 0.04
NH4 0.07 -0.03 -0.08
EC -0.05 1.00 -0.01
OC -0.02 1.00 0.04
Al 0.09 0.06 0.99
As 0.22 0.76 0.56
Eigenvalue Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
Save APCA result
profile plot
Source profile
Species Factor Factor Factor Fact
SO4
NO3
Cl
NH4
EC -0.42 15.73 -0.08
OC -0.27 36.67 1.19
Al 0.23 0.33 4.31
As 0.00 0.00 0.00
Varimax rotated factor loading
Contribution plot
Source contribution
Mean Sd
1 9.31 2.9
2 67.80 10.1
3 42.36 7.5
Re-calculate
Clear
NC condition 0.01
Iterative max step 20
Final step 1
Convergence Yes
Save NCAPCA result
NC profile plot
rce profile
Factor Factor Factor Factor
0.01 0.86 23.05
0.01 13.30 0.00
Cl 0.81 0.00 0.05 0.05 0.26
NH4 0.23 0.00 0.00 4.11 8.20
EC 0.00 15.73 0.00 0.00 0.00
OC 0.11 36.67 1.22 0.01 0.03
Al 0.23 0.34 4.31 0.00 0.00
As 0.00 0.00 0.00 0.00 0.00
NC contribution plot
NC source contribution
Mean Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45

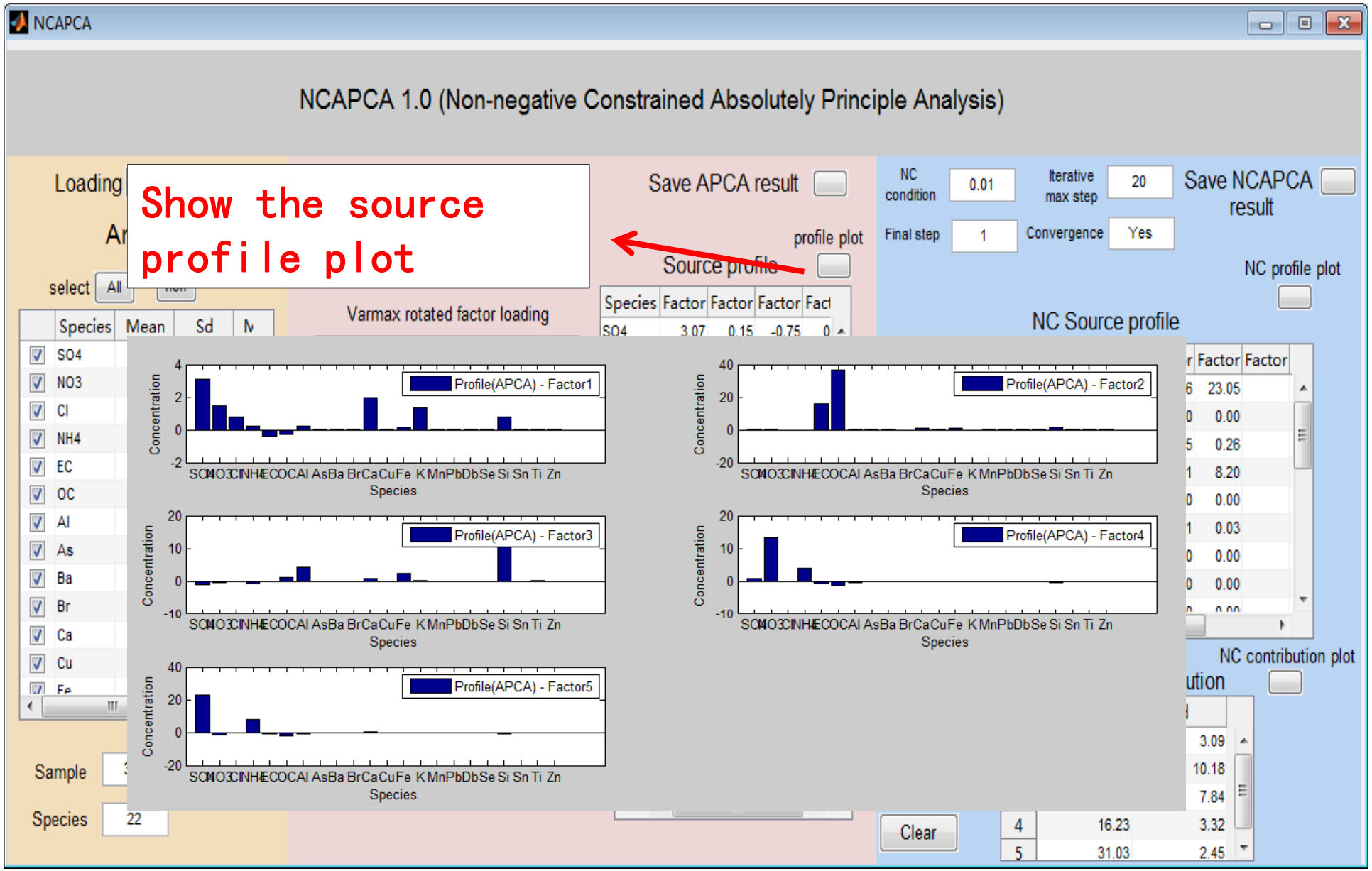
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Varmax rotated factor loading
Species Factor Factor Factor Facto
SO4 0.48 0.01 -0.07
NO3 0.18 0.00 -0.03
Cl 1.00 -0.03 0.04
NH4 0.07 -0.03 -0.08
EC -0.05 1.00 -0.01
OC -0.02 1.00 0.04
Al 0.09 0.06 0.99
As 0.22 0.76 0.56
Eigenvalue Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
Save APCA result
profile plot
Source profile
Species Factor Factor Factor Fact
SO4 3.07 0.15 -0.75
NO3 1.45 0.04 -0.36
Cl 0.81 -0.05 0.05
NH4 0.23 -0.17 -0.45
EC -0.42 15.73 -0.08
OC -0.27 36.67 1.19
Al 0.23 0.33 4.31
As 0.00 0.00 0.00
1 9.31 2.9
2 67.80 10.1
3 42.36 7.5
Factor eigenvalue and variance (%)
Re-calculate
Clear
NC condition 0.01
Iterative max step 20
Final step 1
Convergence Yes
Save NCAPCA result
NC profile plot
NC Source profile
Species Factor Factor Factor Factor Factor Factor
SO4 3.07 0.20 0.01 0.86 23.05
NO3 1.45 0.08 0.01 13.30 0.00
Cl 0.81 0.00 0.05 0.05 0.26
NH4 0.23 0.00 0.00 4.11 8.20
EC 0.00 15.73 0.00 0.00 0.00
OC 0.11 36.67 1.22 0.01 0.03
Al 0.23 0.34 4.31 0.00 0.00
NC contribution plot
source contribution
Mean Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45

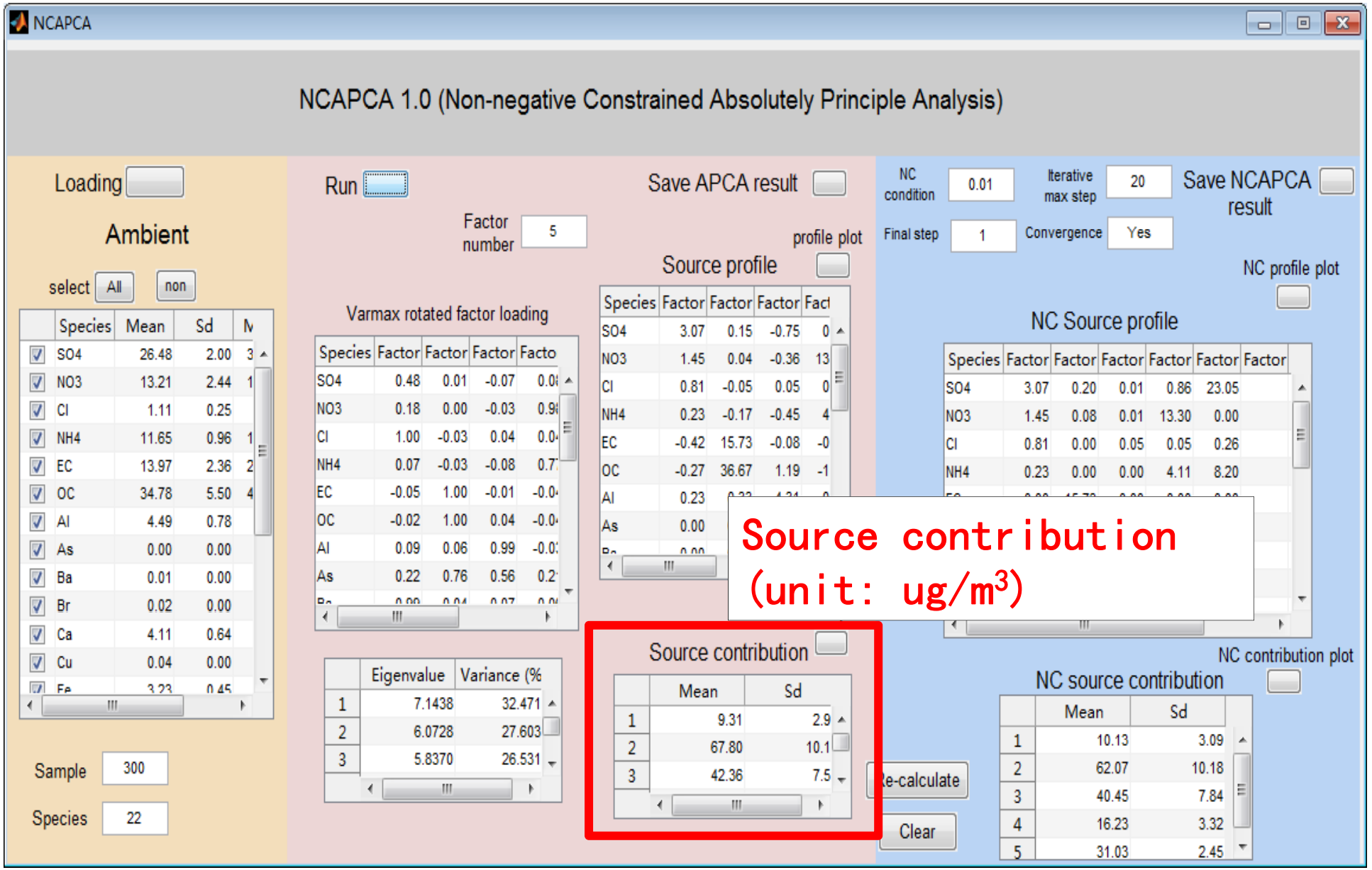
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Save APCA result
Factor number 5
Varmax rotated factor loading
Species Factor Factor Factor Facto
SO4 0.48 0.01 -0.07
NO3 0.18 0.00 -0.03
Cl 1.00 -0.03 0.04
NH4 0.07 -0.03 -0.08
EC -0.05 1.00 -0.01
OC -0.02 1.00 0.04
Al 0.09 0.06 0.99
As 0.22 0.76 0.56
Eigenvalue Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
profile plot
Source profile
Species Factor Factor Factor Fact
SO4 3.07 0.15 -0.75
NO3 1.45 0.04 -0.36
Cl 0.81 -0.05 0.05
NH4 0.23 -0.17 -0.45
EC -0.42 15.73 -0.08
OC -0.27 36.67 1.19
Al 0.23 0.33 4.31
As 0.00 0.00 0.00
Contribution plot
Source contribution
Mean Sd
1 9.31 2.9
2 67.80 10.1
3 42.36 7.5
Re-calculate
Clear
NC condition 0.01
Iterative max step 20
Save NCAPCA result
Final step 1
Convergence Yes
NC profile plot
Source profile (unit: ug/m3)
Cl 0.81 0.00 0.05 0.05 0.26
NH4 0.23 0.00 0.00 4.11 8.20
EC 0.00 15.73 0.00 0.00 0.00
OC 0.11 36.67 1.22 0.01 0.03
Al 0.23 0.34 4.31 0.00 0.00
As 0.00 0.00 0.00 0.00 0.00
NC contribution plot
NC source contribution
Mean Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45

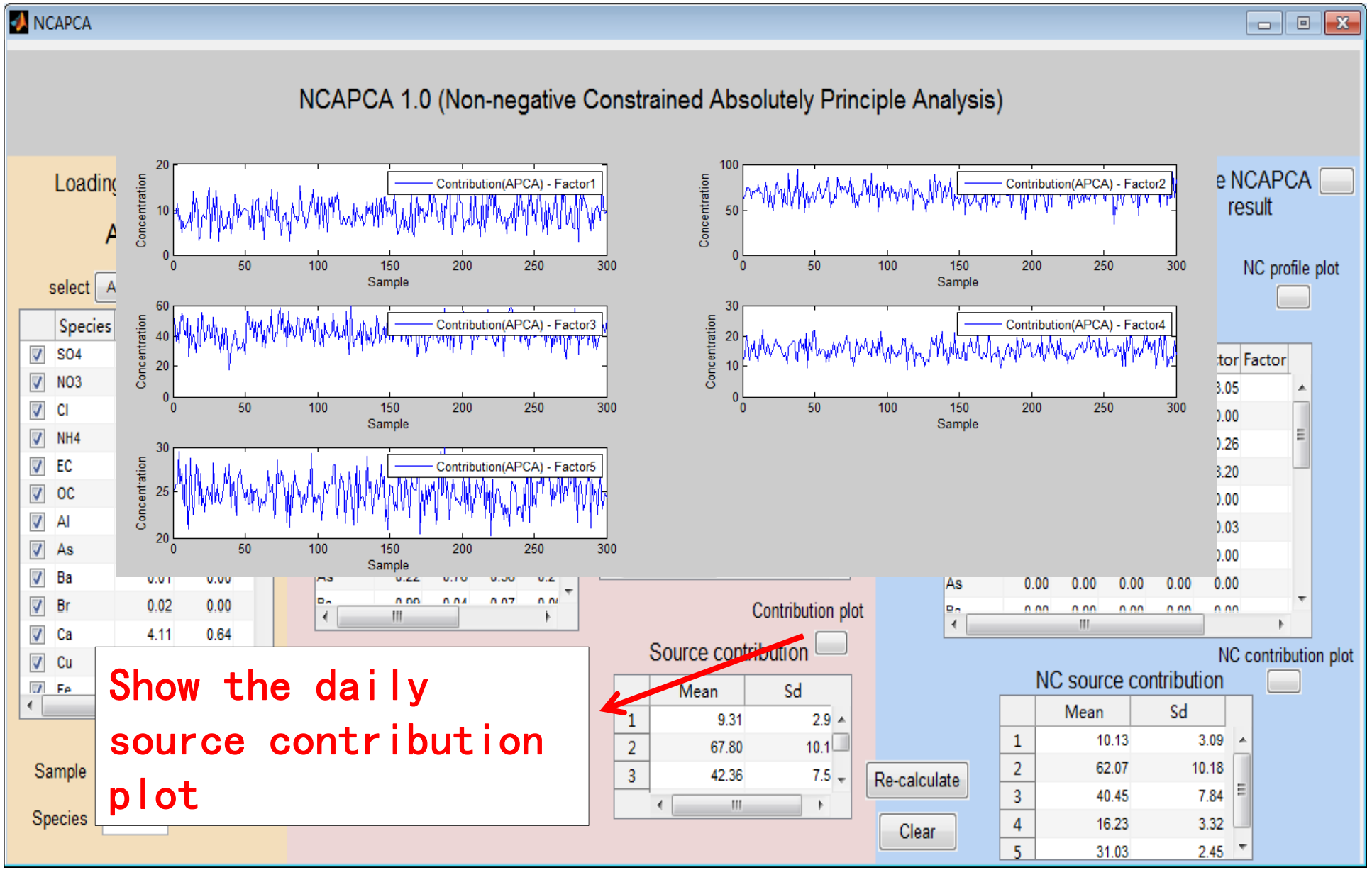
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Show the source profile plot
Save APCA result
profile plot
Source profile
NC condition
0.01
Iterative max step
20
Save NCAPCA result
Final step
1
Convergence
Yes
NC profile plot
NC Source profile
Varmax rotated factor loading
select
All
Species
Mean
Sd
SO4
NO3
Cl
NH4
EC
OC
Al
As
Ba
Br
Ca
Cu
Fe
Profile(APCA) - Factor1
Profile(APCA) - Factor2
Profile(APCA) - Factor3
Profile(APCA) - Factor4
Profile(APCA) - Factor5
Concentration
Species
NC contribution plot
Sample
Species
22
Clear

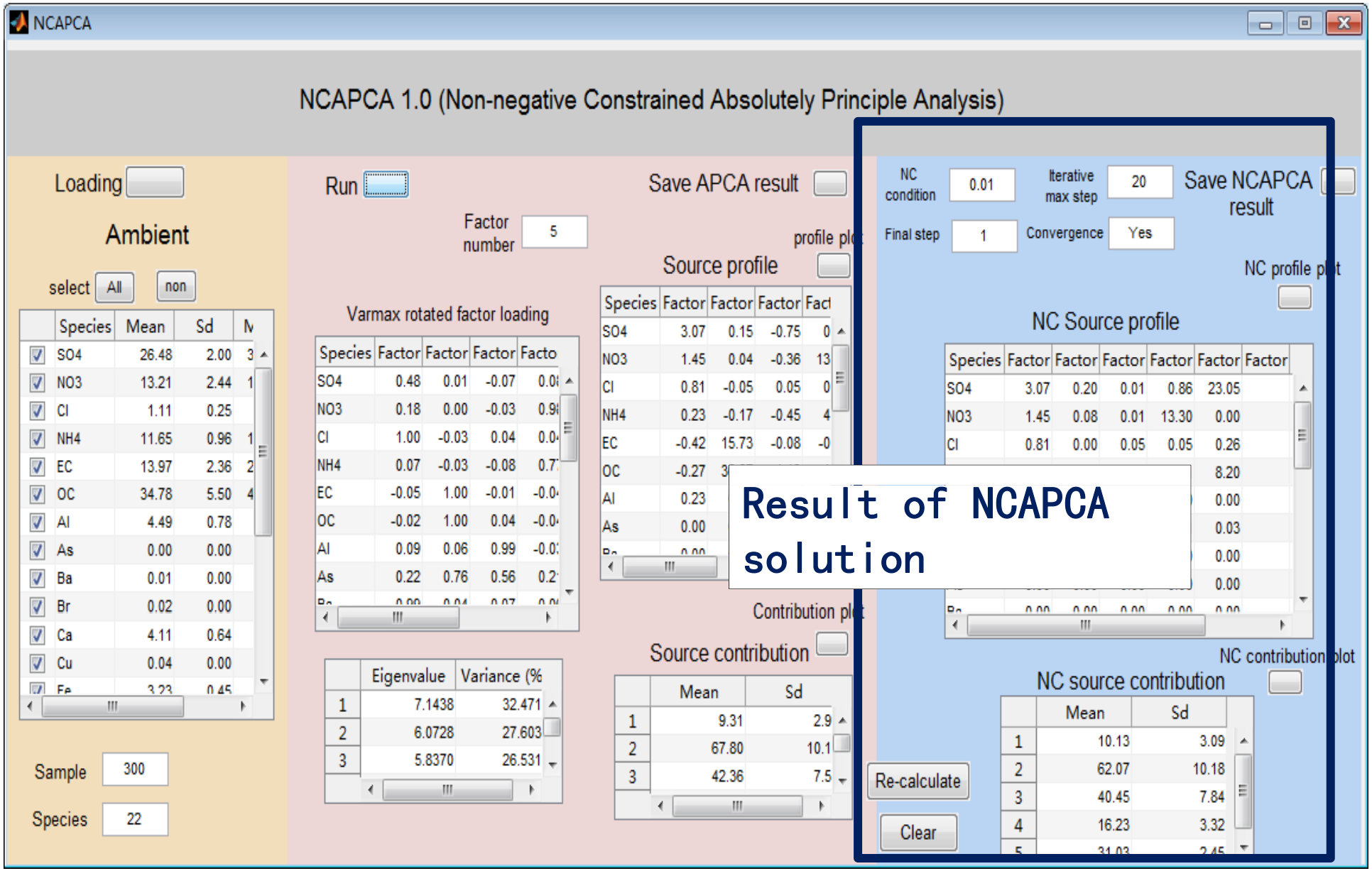
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Varmax rotated factor loading
Species Factor Factor Factor
SO4 0.48 0.01 -0.07
NO3 0.18 0.00 -0.03
Cl 1.00 -0.03 0.04
NH4 0.07 -0.03 -0.08
EC -0.05 1.00 -0.01
OC -0.02 1.00 0.04
Al 0.09 0.06 0.99
As 0.22 0.76 0.56
Eigenvalue Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
Save APCA result
profile plot
Source profile
Species Factor Factor Factor
SO4 3.07 0.15 -0.75
NO3 1.45 0.04 -0.36
Cl 0.81 -0.05 0.05
NH4 0.23 -0.17 -0.45
EC -0.42 15.73 -0.08
OC -0.27 36.67 1.19
Al 0.23
As 0.00
Source contribution
Mean Sd
1 9.31 2.9
2 67.80 10.1
3 42.36 7.5
Re-calculate
Clear
NC condition 0.01
Iterative max step 20
Final step 1
Convergence Yes
Save NCAPCA result
NC profile plot
NC Source profile
Species Factor Factor Factor Factor Factor Factor
SO4 3.07 0.20 0.01 0.86 23.05
NO3 1.45 0.08 0.01 13.30 0.00
Cl 0.81 0.00 0.05 0.05 0.26
NH4 0.23 0.00 0.00 4.11 8.20
Source contribution (unit: ug/m3)
NC contribution plot
NC source contribution
Mean Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45

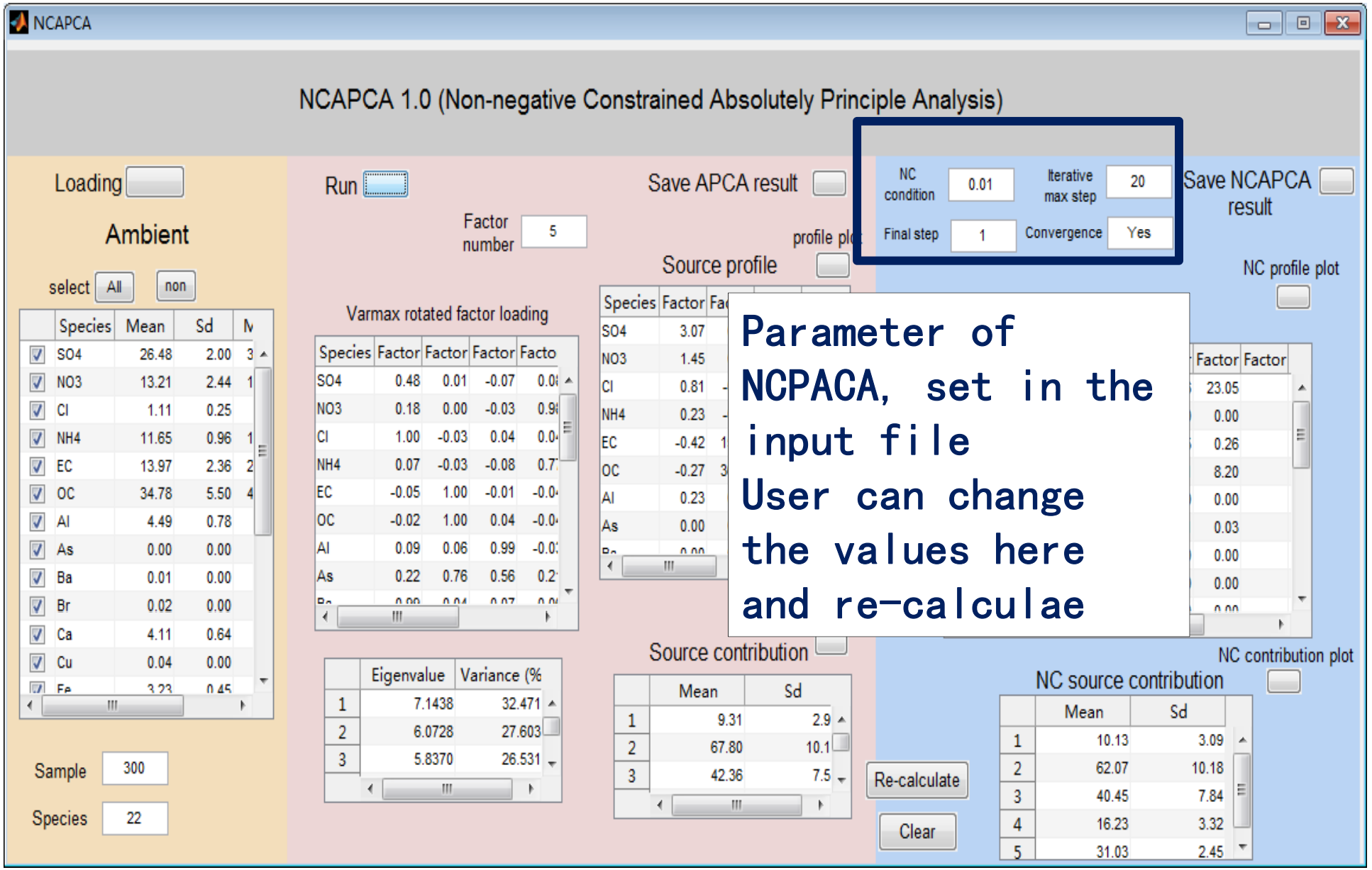
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Contribution(APCA) - Factor1
Contribution(APCA) - Factor2
Contribution(APCA) - Factor3
Contribution(APCA) - Factor4
Contribution(APCA) - Factor5
Concentration
Sample
Species
SO4
NO3
Cl
NH4
EC
OC
Al
As
Ba
Br
Ca
Cu
Contribution plot
Source contribution
Mean
Sd
NC profile plot
NC contribution plot
NC source contribution
Re-calculate
Clear
Show the daily source contribution plot

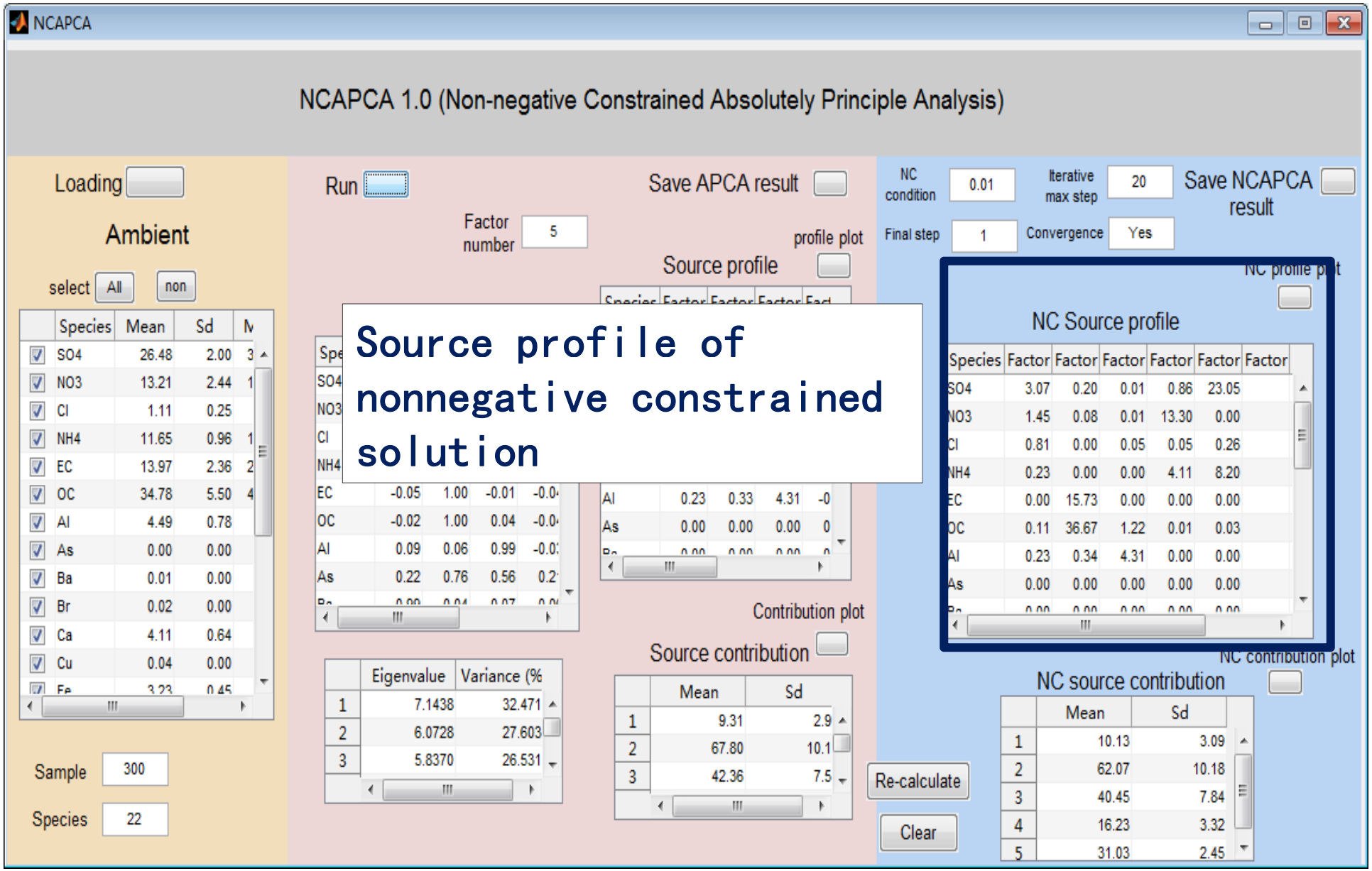
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Varmax rotated factor loading
Species Factor Factor Factor
SO4 0.48 0.01 -0.07
NO3 0.18 0.00 -0.03
Cl 1.00 -0.03 0.04
NH4 0.07 -0.03 -0.08
EC -0.05 1.00 -0.01
OC -0.02 1.00 0.04
Al 0.09 0.06 0.99
As 0.22 0.76 0.56
Eigenvalue Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
Save APCA result
profile plot
Source profile
Species Factor Factor Factor
SO4 3.07 0.15 -0.75
NO3 1.45 0.04 -0.36
Cl 0.81 -0.05 0.05
NH4 0.23 -0.17 -0.45
EC -0.42 15.73 -0.08
OC -0.27
Al 0.23
As 0.00
Contribution plot
Source contribution
Mean Sd
1 9.31 2.9
2 67.80 10.1
3 42.36 7.5
NC condition 0.01
Iterative max step 20
Save NCAPCA result
Final step 1
Convergence Yes
NC profile plot
NC Source profile
Species Factor Factor Factor Factor Factor Factor
SO4 3.07 0.20 0.01 0.86 23.05
NO3 1.45 0.08 0.01 13.30 0.00
Cl 0.81 0.00 0.05 0.05 0.26
8.20
0.00
0.03
0.00
0.00
NC contribution plot
NC source contribution
Mean Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
Re-calculate
Clear
Result of NCAPCA solution

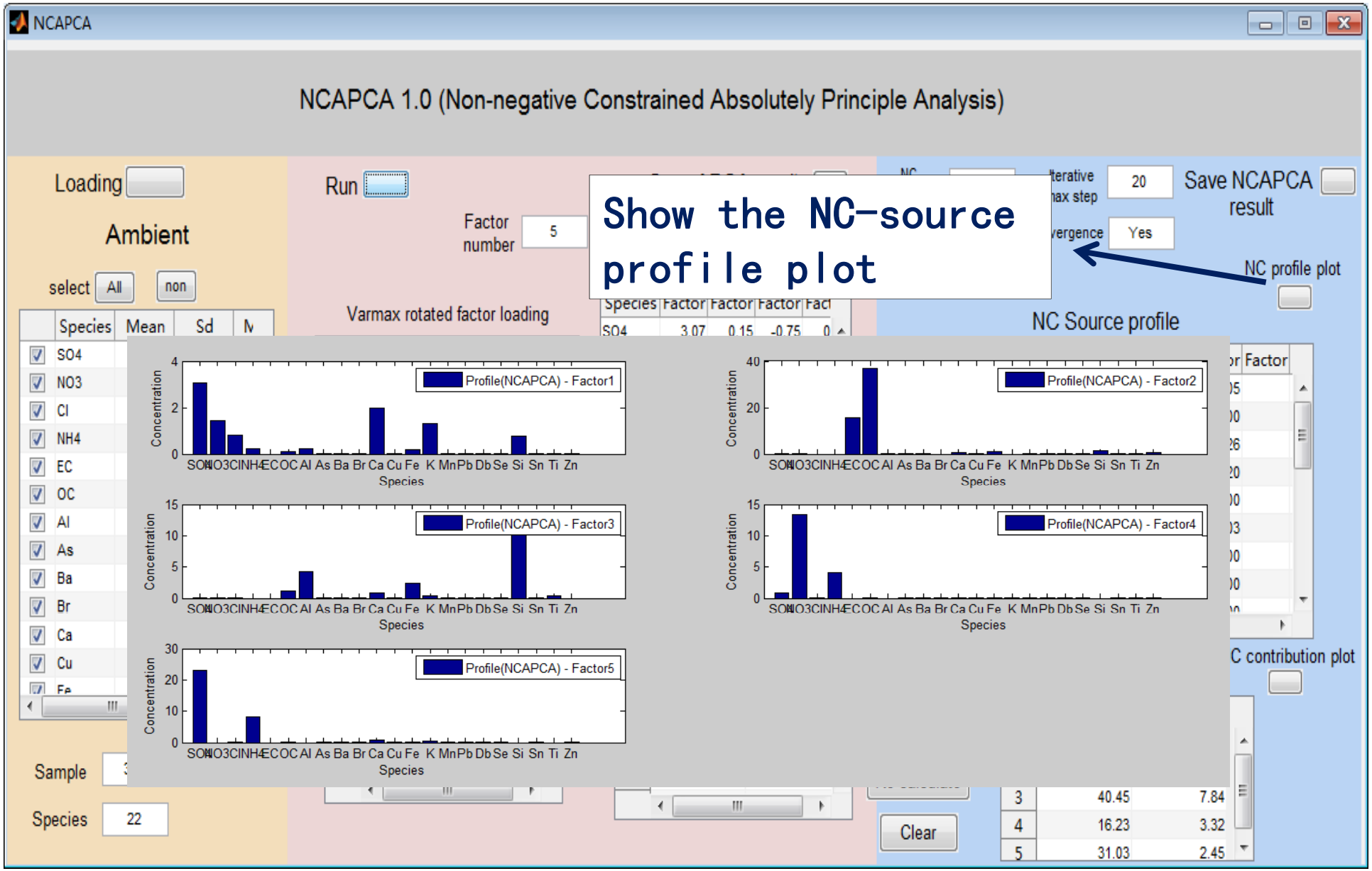
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Save APCA result
Varmax rotated factor loading
Species Factor Factor Factor
SO4 0.48 0.01 -0.07
NO3 0.18 0.00 -0.03
Cl 1.00 -0.03 0.04
NH4 0.07 -0.03 -0.08
EC -0.05 1.00 -0.01
OC -0.02 1.00 0.04
Al 0.09 0.06 0.99
As 0.22 0.76 0.56
Eigenvalue Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
Source profile
Species Factor
SO4 3.07
NO3 1.45
Cl 0.81
NH4 0.23
EC -0.42
OC -0.27
Al 0.23
As 0.00
Source contribution
Mean Sd
1 9.31 2.9
2 67.80 10.1
3 42.36 7.5
Re-calculate
Clear
NC condition 0.01
Iterative max step 20
Final step 1
Convergence Yes
Save NCAPCA result
NC profile plot
Factor Factor
23.05
0.00
0.26
8.20
0.00
0.03
0.00
0.00
NC contribution plot
NC source contribution
Mean Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45
Parameter of NCPACA, set in the input file
User can change the values here and re-calculae

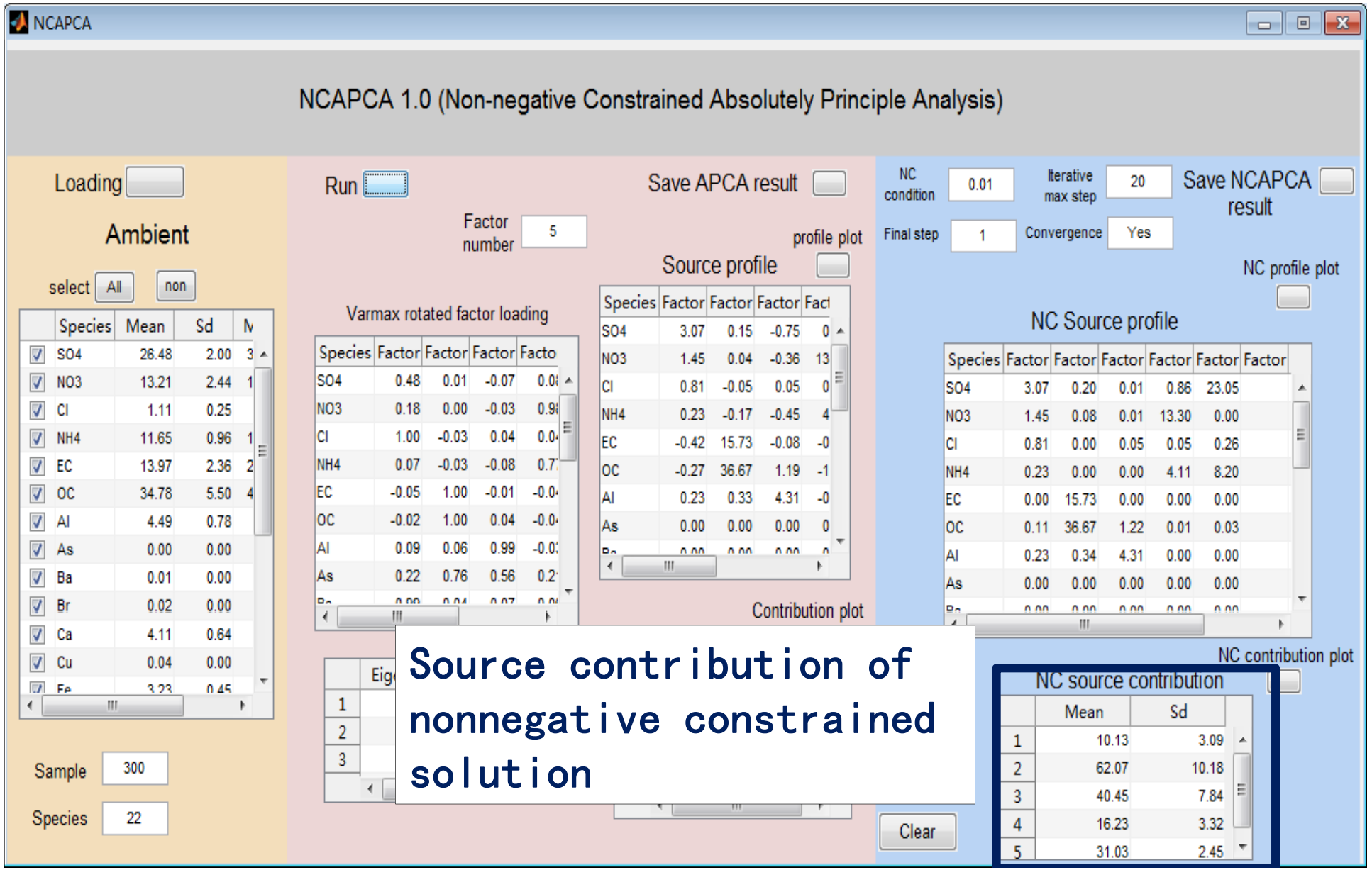
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species
Mean
Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Save APCA result
profile plot
Source profile
Source of nonnegative constrained solution
Eigenvalue
Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
Contribution plot
Source contribution
Mean
Sd
1 9.31 2.9
2 67.80 10.1
3 42.36 7.5
NC condition 0.01
Iterative max step 20
Save NCAPCA result
Final step 1
Convergence Yes
NC profile plot
NC Source profile
Species Factor Factor Factor Factor Factor Factor
SO4 3.07 0.20 0.01 0.86 23.05
NO3 1.45 0.08 0.01 13.30 0.00
Cl 0.81 0.00 0.05 0.05 0.26
NH4 0.23 0.00 0.00 4.11 8.20
EC 0.00 15.73 0.00 0.00 0.00
OC 0.11 36.67 1.22 0.01 0.03
Al 0.23 0.34 4.31 0.00 0.00
As 0.00 0.00 0.00 0.00 0.00
NC contribution plot
NC source contribution
Mean
Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45
Re-calculate
Clear

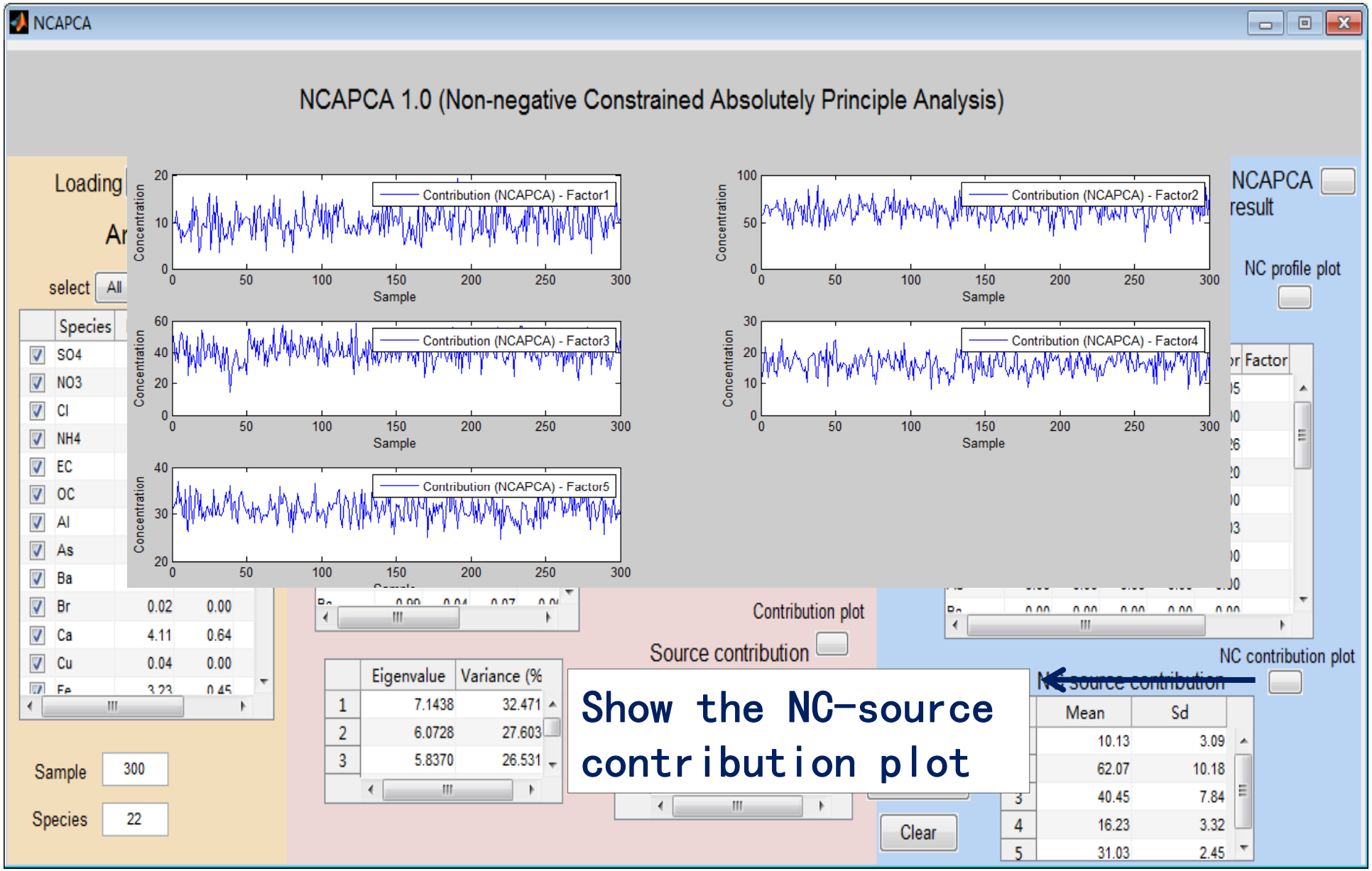
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species
Mean
Sd
SO4
NO3
Cl
NH4
EC
OC
Al
As
Ba
Br
Ca
Cu
Fe
Run
Factor number
5
Varmax rotated factor loading
Show the NC-source profile plot
Iterative max step
20
Save NCAPCA result
Convergence
Yes
NC profile plot
NC Source profile
Profile(NCAPCA) - Factor1
Profile(NCAPCA) - Factor2
Profile(NCAPCA) - Factor3
Profile(NCAPCA) - Factor4
Profile(NCAPCA) - Factor5
Concentration
Species
SO4 NO3 Cl NH4 EC OC Al As Ba Br Ca Cu Fe K Mn Pb Db Se Si Sn Ti Zn
C contribution plot
Sample
Species
22
Clear
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45

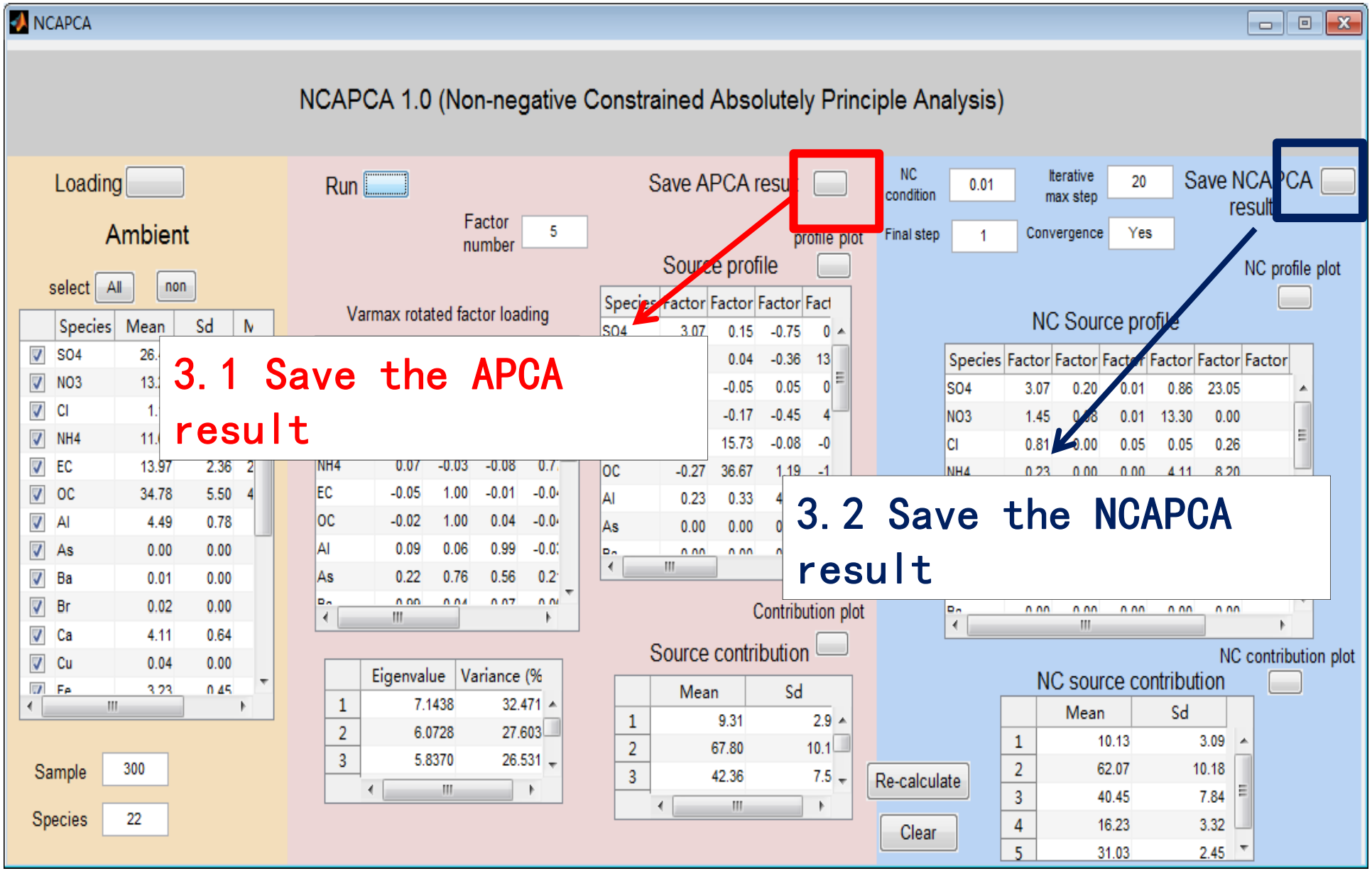
NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species Mean Sd
SO4 26.48 2.00
NO3 13.21 2.44
Cl 1.11 0.25
NH4 11.65 0.96
EC 13.97 2.36
OC 34.78 5.50
Al 4.49 0.78
As 0.00 0.00
Ba 0.01 0.00
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Run
Factor number 5
Save APCA result
Varmax rotated factor loading
Species Factor Factor Factor
SO4 0.48 0.01 -0.07
NO3 0.18 0.00 -0.03
Cl 1.00 -0.03 0.04
NH4 0.07 -0.03 -0.08
EC -0.05 1.00 -0.01
OC -0.02 1.00 0.04
Al 0.09 0.06 0.99
As 0.22 0.76 0.56
profile plot
Source profile
Species Factor Factor Factor
SO4 3.07 0.15 -0.75
NO3 1.45 0.04 -0.36
Cl 0.81 -0.05 0.05
NH4 0.23 -0.17 -0.45
EC -0.42 15.73 -0.08
OC -0.27 36.67 1.19
Al 0.23 0.33 4.31
As 0.00 0.00 0.00
Contribution plot
Source contribution of nonnegative constrained solution
Clear
NC condition 0.01
Iterative max step 20
Save NCAPCA result
Final step 1
Convergence Yes
NC profile plot
NC Source profile
Species Factor Factor Factor Factor Factor Factor
SO4 3.07 0.20 0.01 0.86 23.05
NO3 1.45 0.08 0.01 13.30 0.00
Cl 0.81 0.00 0.05 0.05 0.26
NH4 0.23 0.00 0.00 4.11 8.20
EC 0.00 15.73 0.00 0.00 0.00
OC 0.11 36.67 1.22 0.01 0.03
Al 0.23 0.34 4.31 0.00 0.00
As 0.00 0.00 0.00 0.00 0.00
NC contribution plot
NC source contribution
Mean Sd
1 10.13 3.09
2 62.07 10.18
3 40.45 7.84
4 16.23 3.32
5 31.03 2.45

NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Contribution (NCAPCA) - Factor1
Contribution (NCAPCA) - Factor2
Contribution (NCAPCA) - Factor3
Contribution (NCAPCA) - Factor4
Contribution (NCAPCA) - Factor5
Concentration
Sample
Loading
select
All
Species
SO4
NO3
Cl
NH4
EC
OC
Al
As
Ba
Br 0.02 0.00
Ca 4.11 0.64
Cu 0.04 0.00
Sample 300
Species 22
Eigenvalue Variance (%
1 7.1438 32.471
2 6.0728 27.603
3 5.8370 26.531
Contribution plot
Source contribution
NCAPCA result
NC profile plot
NC contribution plot
Mean Sd
10.13 3.09
62.07 10.18
40.45 7.84
16.23 3.32
31.03 2.45
Clear
Show the NC-source contribution plot

NCAPCA 1.0


NCAPCA
NCAPCA 1.0 (Non-negative Constrained Absolutely Principle Analysis)
Loading
Ambient
select
All
non
Species
Mean
Sd
SO4
NO3
Cl
NH4
EC
OC
Al
As
Ba
Br
Ca
Cu
Sample
300
Species
22
Run
Factor number
5
Varmax rotated factor loading
Eigenvalue
Variance (%
7.1438
32.471
6.0728
27.603
5.8370
26.531
Save APCA result
Source profile
Factor
3.1 Save the APCA result
Contribution plot
Source contribution
Mean
Sd
9.31
67.80
42.36
Re-calculate
Clear
NC condition
0.01
Iterative max step
20
Final step
1
Convergence
Yes
Save NCAPCA result
NC profile plot
NC Source profile
3.07
1.45
0.81
0.23
3.2 Save the NCAPCA result
NC contribution plot
NC source contribution
10.13
3.09
62.07
10.18
40.45
7.84
16.23
3.32
31.03
2.45

NCAPCA 1.0

- Result (APCA result)

1	SO4	0.477011	0.011486	-0.06714	0.078033	0.872772
2	NO3	0.184241	0.002416	-0.02664	0.981802	-0.03748
3	Cl	0.99529	-0.03103	0.037139	0.041435	0.073063
4	NH4	0.074135	-0.02712	-0.08304	0.771232	0.626159
5	EC	-0.05486	0.997505	-0.00624	-0.0361	-0.02516
6	OC	-0.01501	0.998224	0.038537	-0.03571	-0.02372
7	Al	0.093767	0.064623	0.992791	-0.02557	-0.02728
8	As	0.216141	0.75655	0.563776	0.208107	0.14058
9	Ba	0.991387	0.040097	0.067777	0.060665	0.085266
10	Br	0.995153	-0.00605	0.034043	0.048829	0.078037
11	Ca	0.955512	0.162804	0.23709	0.027602	0.059312
12	Cu	0.089211	0.864492	0.493029	-0.0325	-0.02367
13	Fe	0.12383	0.302165	0.944238	-0.03106	-0.02851
14	K	0.978375	-0.02177	0.191266	0.036129	0.066481
15	Mn	0.296174	0.104489	0.949228	-0.01502	-0.0102
16	Pb	0.250104	0.961911	0.10845	-0.02021	-0.00222
17	Db	0.216141	0.75655	0.563776	0.208107	0.14058
18	Se	0.931528	0.245344	0.216144	0.111121	0.113995
19	Si	0.111198	0.094845	0.98857	-0.02579	-0.02652
20	Sn	0.931528	0.245344	0.216144	0.111121	0.113995
21	Ti	0.111416	0.051731	0.99181	-0.02402	-0.02544
22	Zn	0.059016	0.997518	-0.01637	-0.03076	-0.01618
23						
24						
25						
26						
27						

Sheet1 / Sheet2 / Sheet3 / Loading / F_profile / APCS / Contribution / Mean_Contribution

Output information:

Factor loading

F_profile: source profile

APCS: absolutely principle component score

Source contribution

Mean contribution

NCAPCA 1.0

- Result (APCA result)

1	SO4	3.068816	0.153723	-0.7533	0.867119	23.14446
2	NO3	1.445468	0.039435	-0.36452	13.30461	-1.21221
3	Cl	0.806535	-0.0523	0.052489	0.057996	0.244049
4	NH4	0.228193	-0.17364	-0.44579	4.100359	7.944534
5	EC	-0.41589	15.73191	-0.08256	-0.47273	-0.78619
6	OC	-0.26512	36.67077	1.186908	-1.08929	-1.72635
7	Al	0.233401	0.334626	4.310006	-0.10994	-0.27994
8	As	9.31E-05	0.000678	0.000424	0.000155	0.00025
9	Ba	0.004506	0.000379	0.000537	0.000476	0.001598
10	Br	0.012427	-0.00016	0.000741	0.001053	0.004017
11	Ca	1.962661	0.69566	0.849361	0.097926	0.502176
12	Cu	0.001352	0.027259	0.013034	-0.00085	-0.00148
13	Fe	0.179697	0.912184	2.389825	-0.07785	-0.17055
14	K	1.322761	-0.06123	0.451006	0.08437	0.370488
15	Mn	0.013007	0.009546	0.072707	-0.00114	-0.00185
16	Pb	0.004983	0.039866	0.003768	-0.0007	-0.00018
17	Db	9.31E-05	0.000678	0.000424	0.000155	0.00025
18	Se	0.001112	0.000609	0.00045	0.000229	0.000561
19	Si	0.777891	1.380244	12.06136	-0.31162	-0.76471
20	Sn	0.001112	0.000609	0.00045	0.000229	0.000561
21	Ti	0.029238	0.02824	0.453935	-0.01089	-0.02752
22	Zn	0.017215	0.60533	-0.00833	-0.0155	-0.01946
23						
24						
25						
26						
27						

Sheet1 Sheet2 Sheet3 Loading F_profile APCS Contribution Mean_Contribution

Output information:

Factor loading

F_profile: source profile

APCS: absolutely principle component score

Source contribution

Mean contribution

NCAPCA 1.0

- Result (APCA result)

1	3.161633	6.246893	6.836655	4.406118	13.37072
2	3.226536	6.59898	4.853713	5.969058	13.75298
3	3.922469	7.363956	5.951593	7.220554	13.67274
4	2.60047	7.286069	4.685118	5.350525	15.641
5	3.063944	7.184991	6.257491	4.24309	13.75108
6	1.722227	6.177071	7.205208	6.187311	14.38424
7	2.605504	6.87402	6.988526	5.344357	12.90026
8	2.081616	6.843969	5.415059	6.623028	12.44945
9	2.213431	6.992868	5.335604	4.829772	14.86167
10	2.476906	6.974648	6.849365	4.796442	11.6365
11	2.634045	7.631259	3.525858	4.193067	11.09712
12	3.296108	6.726677	6.201294	6.862408	15.27762
13	1.814137	6.817647	4.532501	5.646073	13.40958
14	4.841533	6.637529	5.397248	7.955699	11.9114
15	2.914408	5.713653	5.22916	5.840777	12.70478
16	4.337984	7.994602	3.876055	5.079763	14.86202
17	3.291551	6.607351	6.812723	6.26621	14.64536
18	1.079197	5.233575	4.576333	6.164874	12.55632
19	1.506707	6.947531	4.369406	4.833946	14.41788
20	2.859282	6.151566	7.289377	5.162341	12.50799
21	3.148	4.832839	6.437407	5.649739	13.02214
22	2.879105	6.24001	4.899426	6.143761	12.12134
23	2.780831	7.525227	5.259051	6.82214	13.37556
24	4.280327	7.98444	6.173203	6.307979	13.5108
25	5.127763	6.715243	6.261789	5.8942	12.7898
26	1.280698	7.03028	5.085967	6.095923	13.19302
27	2.979242	7.108198	5.149453	5.443078	12.52258
28	4.321096	5.273336	6.879633	5.071978	15.0867

Sheet1 | Sheet2 | Sheet3 | Loading | F_profile | APCS | Contribution | Mean_Contribution

Output information:

Factor loading
F_profile: source profile
APCS: absolutely principle component score
Source contribution
Mean contribution

NCAPCA 1.0

- Result (APCA result)

1	9.1732	63.44157	51.73949	12.30876	25.23197
2	9.361512	67.01726	36.73268	16.67493	25.95334
3	11.3807	74.78613	45.04139	20.17106	25.80192
4	7.545034	73.99513	35.45676	14.94702	29.51624
5	8.889766	72.96861	47.35641	11.85333	25.94976
6	4.99689	62.73247	54.52869	17.28463	27.14459
7	7.559641	69.81048	52.88885	14.92979	24.34416
8	6.039625	69.50529	40.98092	18.50183	23.49344
9	6.422077	71.01747	40.37961	13.49226	28.04556
10	7.186525	70.83243	51.83568	13.39915	21.95932
11	7.64245	77.50078	26.68354	11.71359	20.94144
12	9.563368	68.31411	46.93111	19.17056	28.8305
13	5.26356	69.23798	34.30176	15.77265	25.3053
14	14.04728	67.40875	40.84613	22.22473	22.47808
15	8.455899	58.02614	39.57404	16.31657	23.97526
16	12.58628	81.19077	29.33381	14.19063	28.04621
17	9.550146	67.10228	51.55838	17.50504	27.63736
18	3.131197	53.15061	34.63348	17.22195	23.69512
19	4.371578	70.55703	33.06747	13.50392	27.20807
20	8.295956	62.47345	55.16567	14.42132	23.60391
21	9.133647	49.08087	48.718	15.78289	24.57417
22	8.35347	63.37167	37.07863	17.16297	22.87425
23	8.068337	76.42394	39.80026	19.05806	25.2411
24	12.41899	81.08757	46.71852	17.62172	25.49631
25	14.87776	68.19799	47.38894	16.46581	24.13572
26	3.715834	71.39741	38.49037	17.02933	24.89664
27	8.644011	72.18872	38.97083	15.20557	23.63145
28	12.53728	53.55442	52.06475	14.16888	28.32296

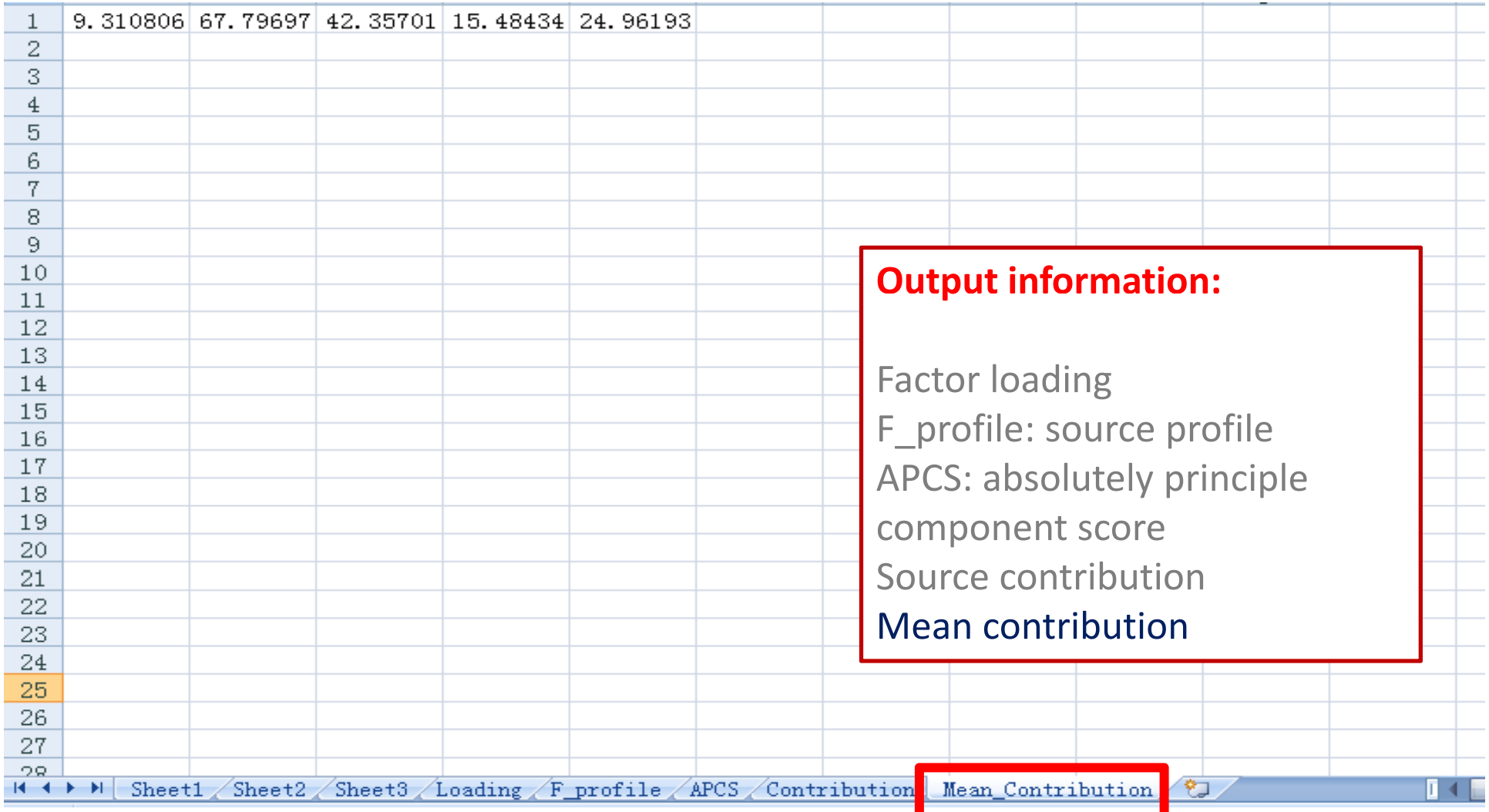
Sheet1 | Sheet2 | Sheet3 | Loading | F_profile | APCS | Contribution | Mean_Contribution

Output information:

Factor loading
F_profile: source profile
APCS: absolutely principle component score
Source contribution
Mean contribution

NCAPCA 1.0

- Result (APCA result)



NCAPCA 1.0

- Result (NCAPCA result)

1	SO4	3.069318	0.201475	0.013679	0.864561	23.05453
2	NO3	1.445925	0.078116	0.011094	13.30254	0
3	Cl	0.80565	0	0.046065	0.047409	0.263574
4	NH4	0.226541	0	0	4.107577	8.195474
5	EC	0	15.73365	0	0	0
6	OC	0.109111	36.66994	1.21635	0.005309	0.029545
7	Al	0.228203	0.336285	4.309771	0	0
8	As	9.92E-05	0.000679	0.000439	0.000184	0.00032
9	Ba	0.004508	0.000342	0.000518	0.000443	0.001764
10	Br	0.01242	0	0.000659	0.000908	0.004357
11	Ca	1.967522	0.679366	0.834539	0.112835	0.628015
12	Cu	0.001606	0.027257	0.013063	0.000227	0.000554
13	Fe	0.18426	0.912588	2.389836	0.001971	0.009299
14	K	1.320836	0	0.440594	0.076217	0.42401
15	Mn	0.012957	0.009497	0.072649	0.000666	0.002973
16	Pb	0.005383	0.039824	0.003775	0.000486	0.002002
17	Db	9.92E-05	0.000679	0.000439	0.000184	0.00032
18	Se	0.001117	0.000601	0.000457	0.000244	0.000653
19	Si	0.767864	1.383755	12.06	0	0
20	Sn	0.001117	0.000601	0.000457	0.000244	0.000653
21	Ti	0.028617	0.028377	0.453883	0.000132	0
22	Zn	0.023442	0.605107	0	0.001645	0.008489
23						
24						
25						
26						
27						
28						

Sheet1 Sheet2 Sheet3 F_profile Contribution Mean_Contribution

Output information:

F_profile: NC source profile

Source contribution

Mean contribution

NCAPCA 1.0

- Result (NCAPCA result)

1	9.9928	58.07357	50.35607	12.3234	31.14915
2	10.15331	61.01282	34.44911	17.66366	32.46082
3	12.38715	68.206	42.85558	21.70741	32.02506
4	8.175165	67.9159	32.86938	15.40247	37.09727
5	9.672609	67.61265	45.76612	11.78663	32.17984
6	5.57966	56.79802	52.69017	18.08221	33.53722
7	8.318332	64.34947	51.44215	15.46953	29.95345
8	6.676422	63.82302	38.93906	19.92508	29.15753
9	7.00041	65.38051	38.20152	13.70128	35.07326
10	7.926285	65.89618	50.68262	13.80951	26.89851
11	8.292201	72.9167	24.83615	12.19777	26.23897
12	10.41513	61.6054	44.56817	20.31547	35.90548
13	5.777105	63.74386	32.01402	16.66125	31.68502
14	15.24371	60.77449	38.73027	24.41459	27.84191
15	9.204665	52.36316	37.60801	17.3305	29.84158
16	13.53324	75.03471	26.7636	14.66753	35.34862
17	10.4195	60.74839	49.59008	18.34893	34.2463
18	3.510207	47.80369	32.41006	18.49466	29.61374
19	4.786599	65.18545	30.68858	13.86448	34.18297
20	9.106024	57.0989	53.91875	14.88816	28.94847
21	9.949309	43.33292	47.06942	16.54739	30.39054
22	9.107906	57.75856	35.071	18.43093	28.4726
23	8.83056	70.31383	37.52212	20.48748	31.43771
24	13.49268	74.8024	44.79747	18.6678	31.58278
25	16.09973	62.02271	45.73314	17.38255	29.82808
26	4.166185	65.90836	36.29488	18.12103	31.03913
27	9.416672	66.72228	37.08348	16.02411	29.39403
28	13.55112	47.29245	50.30374	14.35145	35.14984

Sheet1 Sheet2 Sheet3 F_profile Contribution Mean_Contribution

Output information:

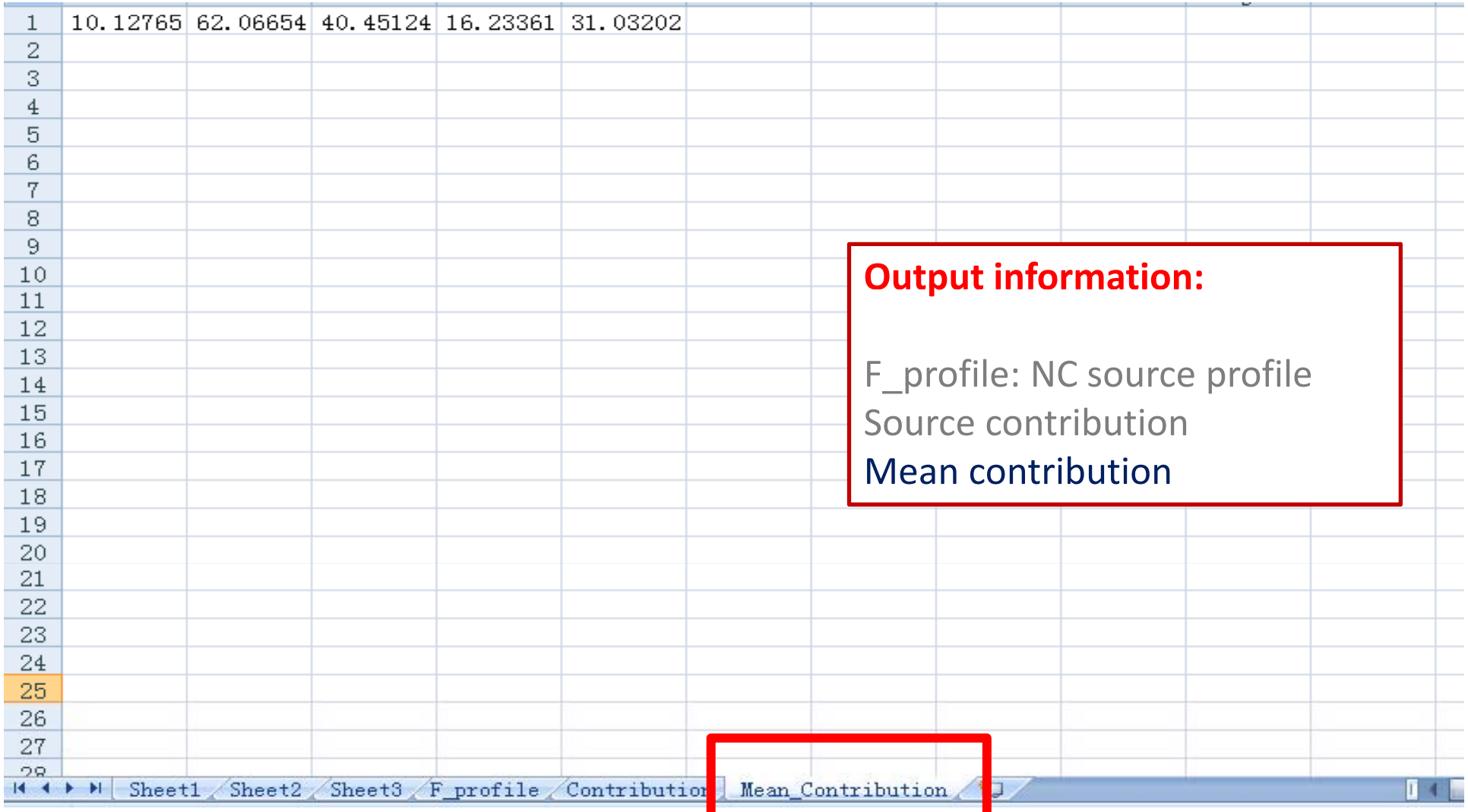
F_profile: NC source profile

Source contribution

Mean contribution

NCAPCA 1.0

- Result (NCAPCA result)



References

- Shi, G.L., Zeng, F., Li, X., Feng, Y.C., Wang, Y.Q., Liu, G.X., Zhu, T. Estimated contributions and uncertainties of PCA/MLR-CMB results: Source apportionment for synthetic and ambient datasets. Atmospheric Environment, 2011, 45, 2811–2819.
- Maier, M.L., Balachandran, S., Sarnat, S.E., Turner, J.R., Mulholland, J.A., Russell, A.G. Application of an Ensemble-Trained Source Apportionment Approach at a Site Impacted by Multiple Point Sources. Environ. Sci. Technol. 2013, 47, 3743−3751.
- Shi, G.L., Feng, Y.C., Zeng, F., Li, X., Zhang, Y.F., Wang, Y.Q., Zhu, T. Use of a Nonnegative Constrained Principal Component Regression Chemical Mass Balance Model to Study the Contributions of Nearly Collinear Sources Environ. Sci. Technol., 2009, 43, 8867-8873.
- Shi, G.L., Li, X., Feng, Y.C., Wang, Y.Q., Wu, J.H., Li, J., Zhu, T. Combined source apportionment, using positive matrix factorization–chemical mass balance and principal component analysis/multiplelinear regression–chemical mass balance models. Atmos. Environ. 2009, 43, 2929–2937.
- Thurston, G.D., Spengler, J.D. A quantitative assessment of source contributions to inhalable particulate matter pollution in Metropolitan Boston. Atmos.Environ. 1985, 19, 9–25.
- EPA Positive matrix factorization (PMF) 5.0 fundamentals and user guide, 2014.