

Supplementary Material

Table S1. Average factor contributions of PM_{2.5} mass concentration at the sampling site

	Average factor contribution (standard error mean)	
	Mass contribution ($\mu\text{g}/\text{m}^3$)	% Contribution
Secondary nitrate	9.37 (0.41)	20.9 (0.6)
Secondary sulfate	8.80 (0.40)	20.5 (0.5)
Gasoline vehicle	5.68 (0.17)	17.2 (0.6)
Biomass burning	5.12 (0.21)	12.1 (0.3)
Diesel emission	3.18 (0.15)	8.1 (0.3)
Soil	3.10 (0.23)	7.4 (0.5)
Industry	2.77 (0.13)	6.7 (0.3)
Road salt/2-stroke engine	2.29 (0.16)	5.1 (0.3)
Aged sea salt	0.78 (0.03)	2.2 (0.1)

Table S2. Summary statistics of meteorological data and gas concentrations

	Number of values	Mean	Minimum	Maximum
Temp ($^{\circ}\text{C}$)	393	13.3	-10.3	30.1
RH (%)	393	61.0	21.1	95.8
WS (m/s)	393	2.3	0.6	5.2
SO ₂ ($\mu\text{g}/\text{m}^3$)	393	5.5	N.D*	34.6
NO ₂ (ppb)	393	34.3	2.2	81.7
HNO ₃ ($\mu\text{g}/\text{m}^3$)	393	3.0	N.D	40.1
CO (ppm)	393	0.6	0.1	1.7

* N.D; Not Detection Limits.

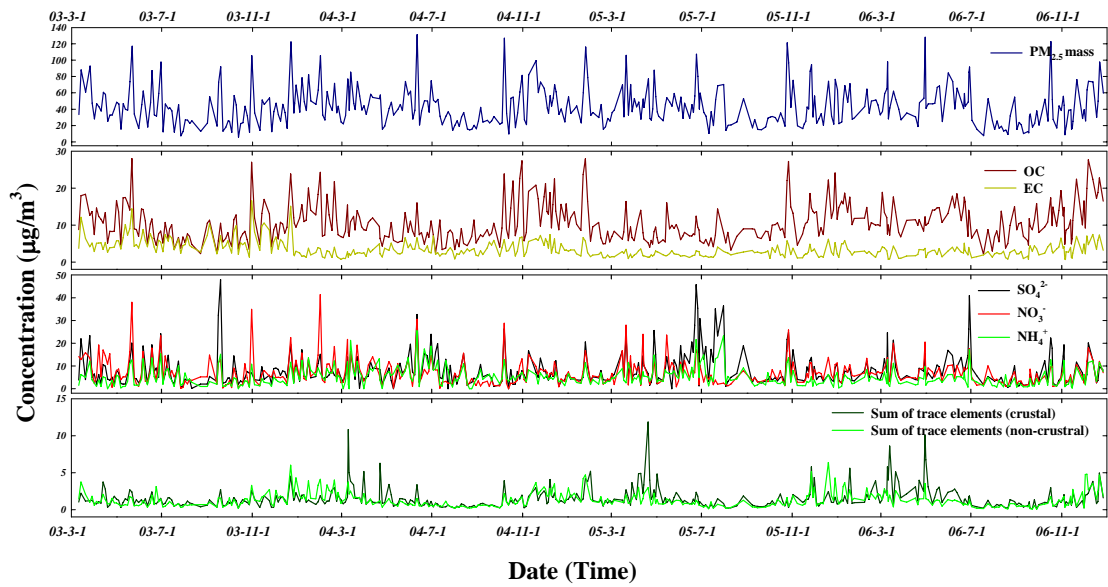


Fig. S1. Time series plot of $PM_{2.5}$ speciation data in Seoul, Korea over the study period (Sum of trace elements – crustal: Al + Si + Ca + Fe + Ti, Sum of trace elements – non crustal: Na + Mg + Cl + K + Mn + Ni + Cu + Zn + Br + Pb).

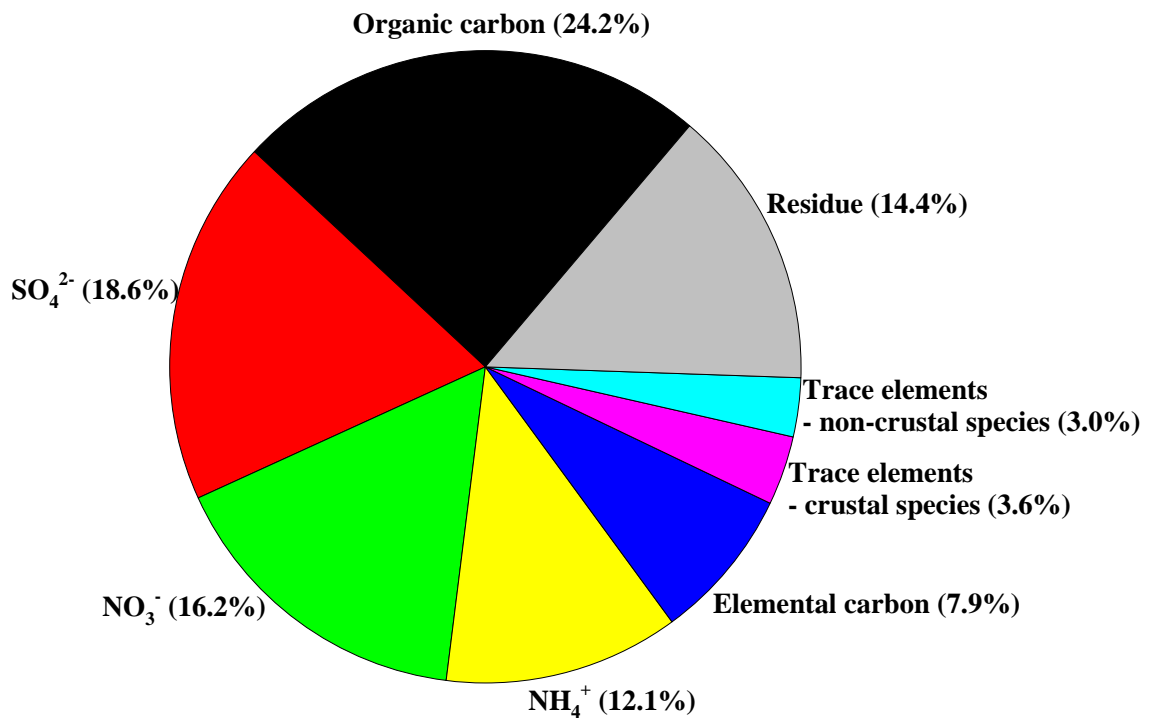


Fig. S2. Average $\text{PM}_{2.5}$ species composition contribution in Seoul, Korea over the study period (Sum of trace elements – crustal: Al + Si + Ca + Fe + Ti, Sum of trace elements – non crustal: Na + Mg + Cl + K + Mn + Ni + Cu + Zn + Br + Pb).

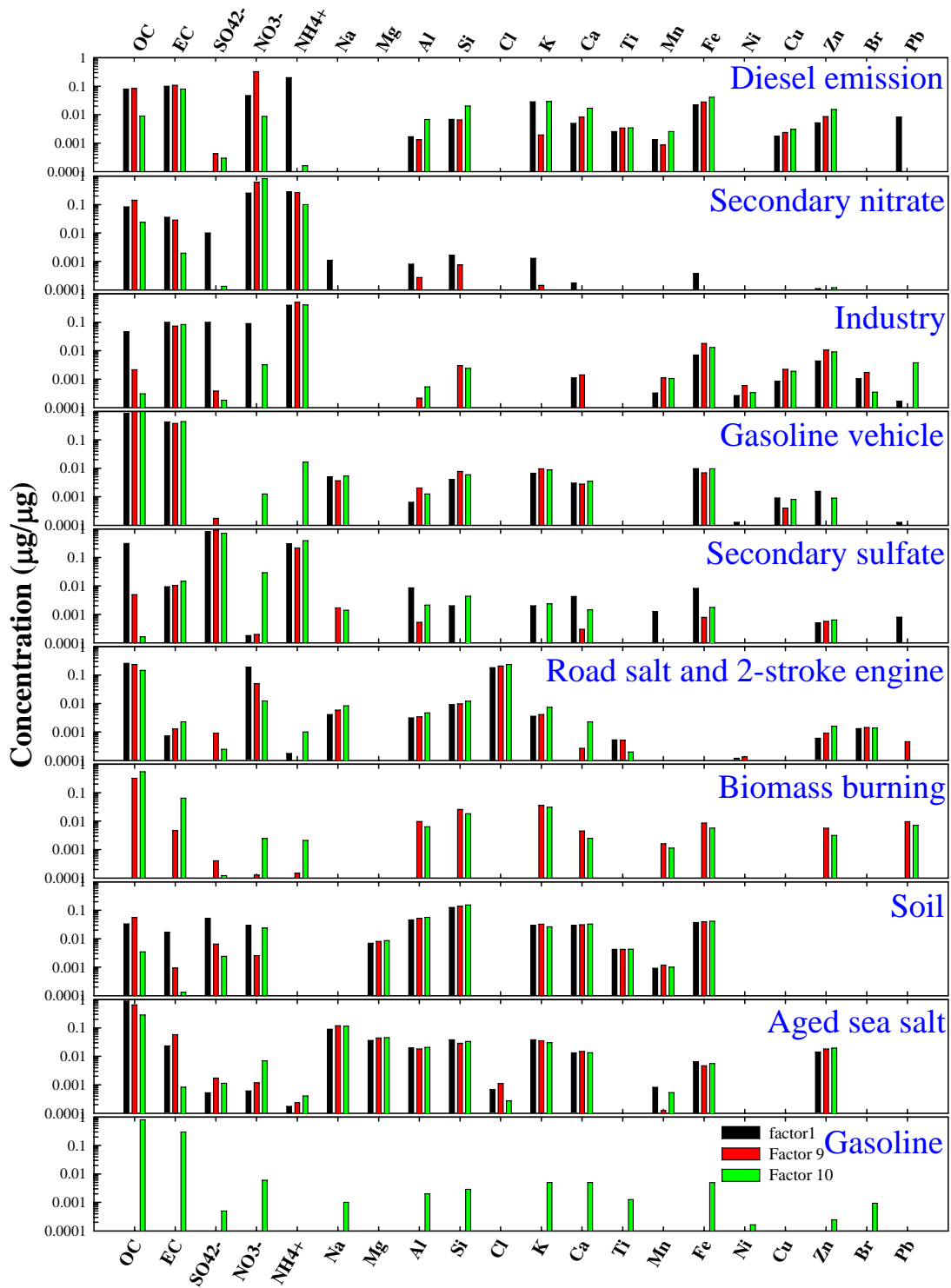


Fig. S3. Comparison of source profiles resolved from 8- to 10-factor solutions.

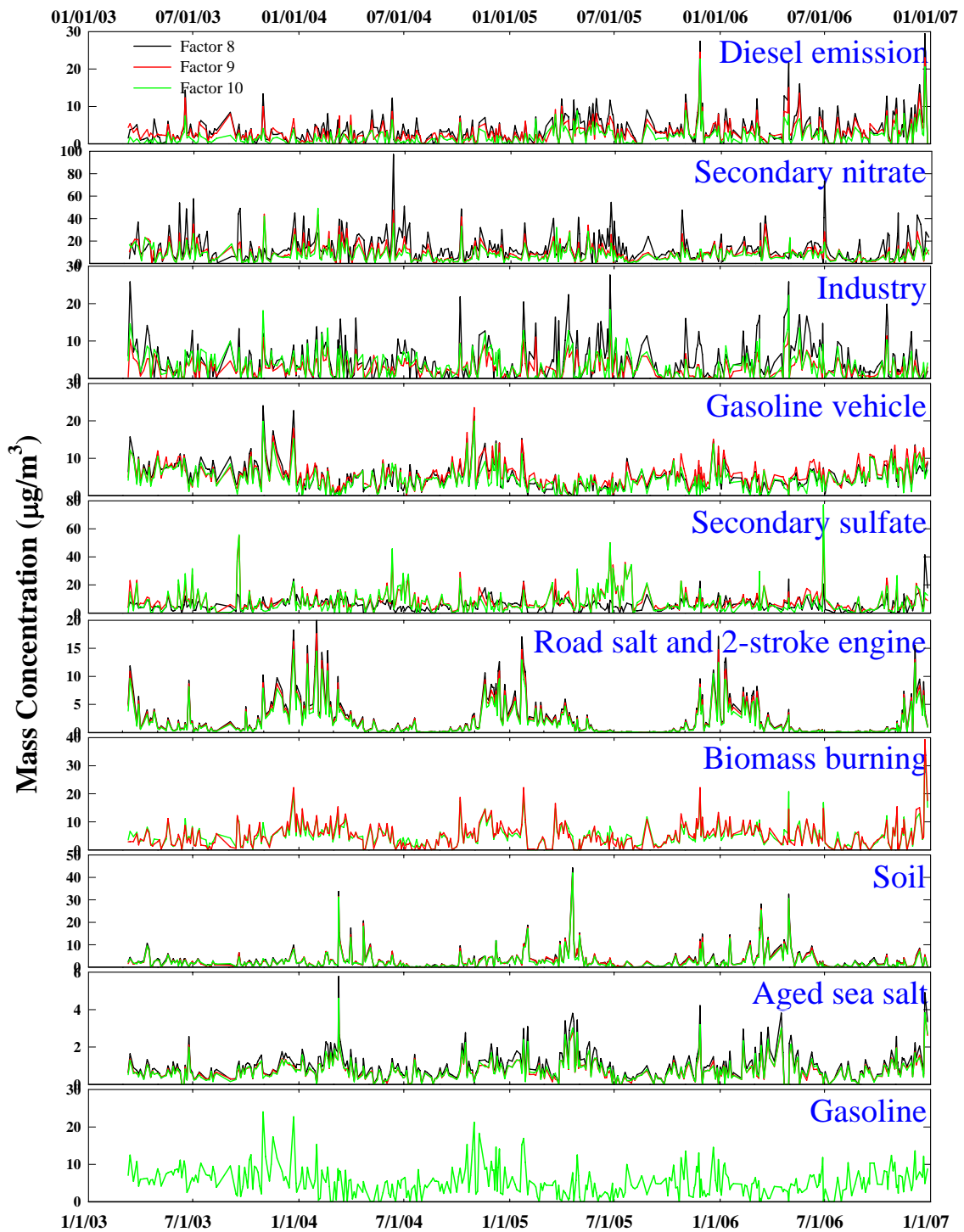


Fig. S4. Comparison of source contributions resolved from 8- to 10-factor solutions.

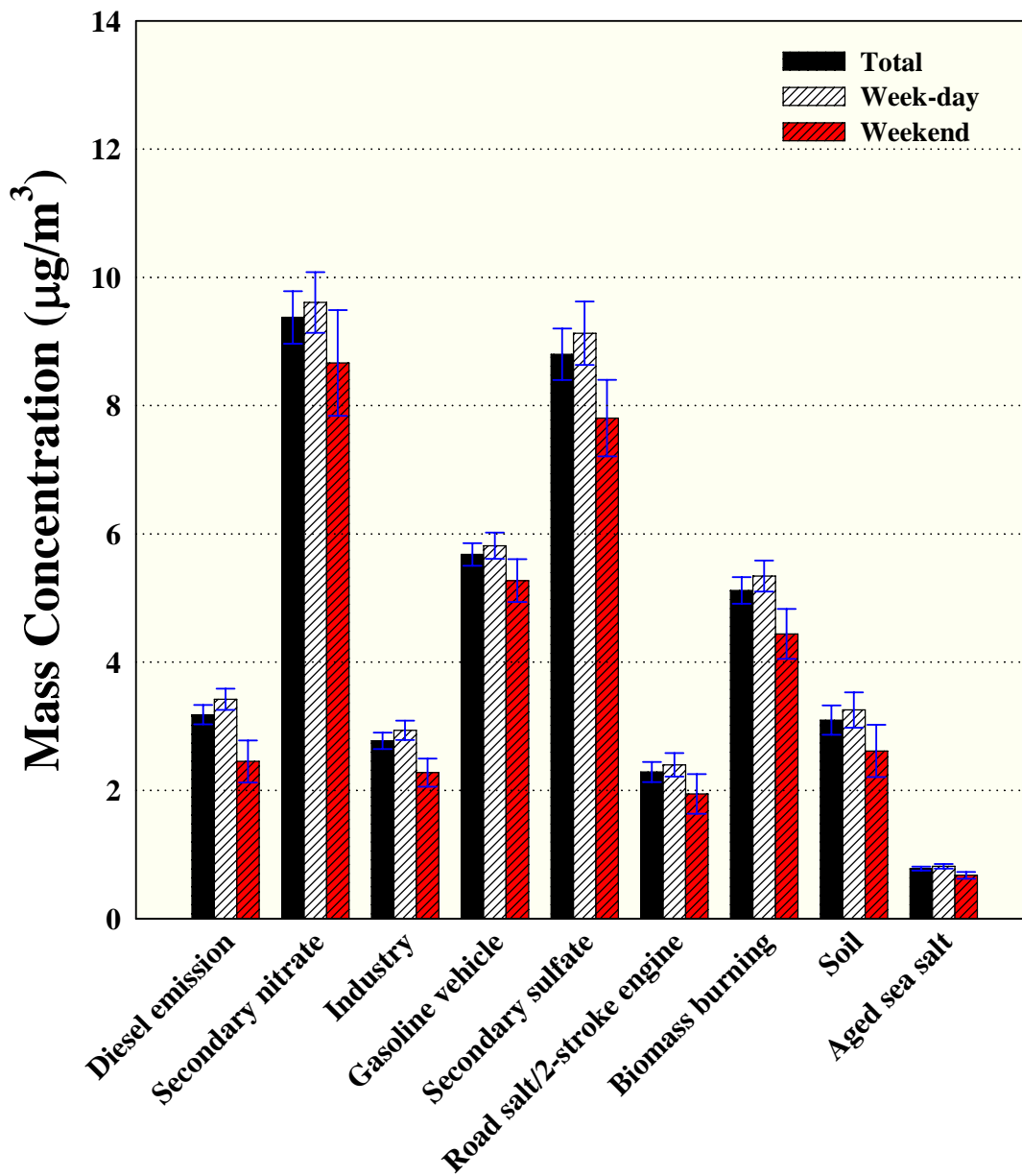


Fig. S5. The average source contributions for weekdays and weekend days in sampling site.

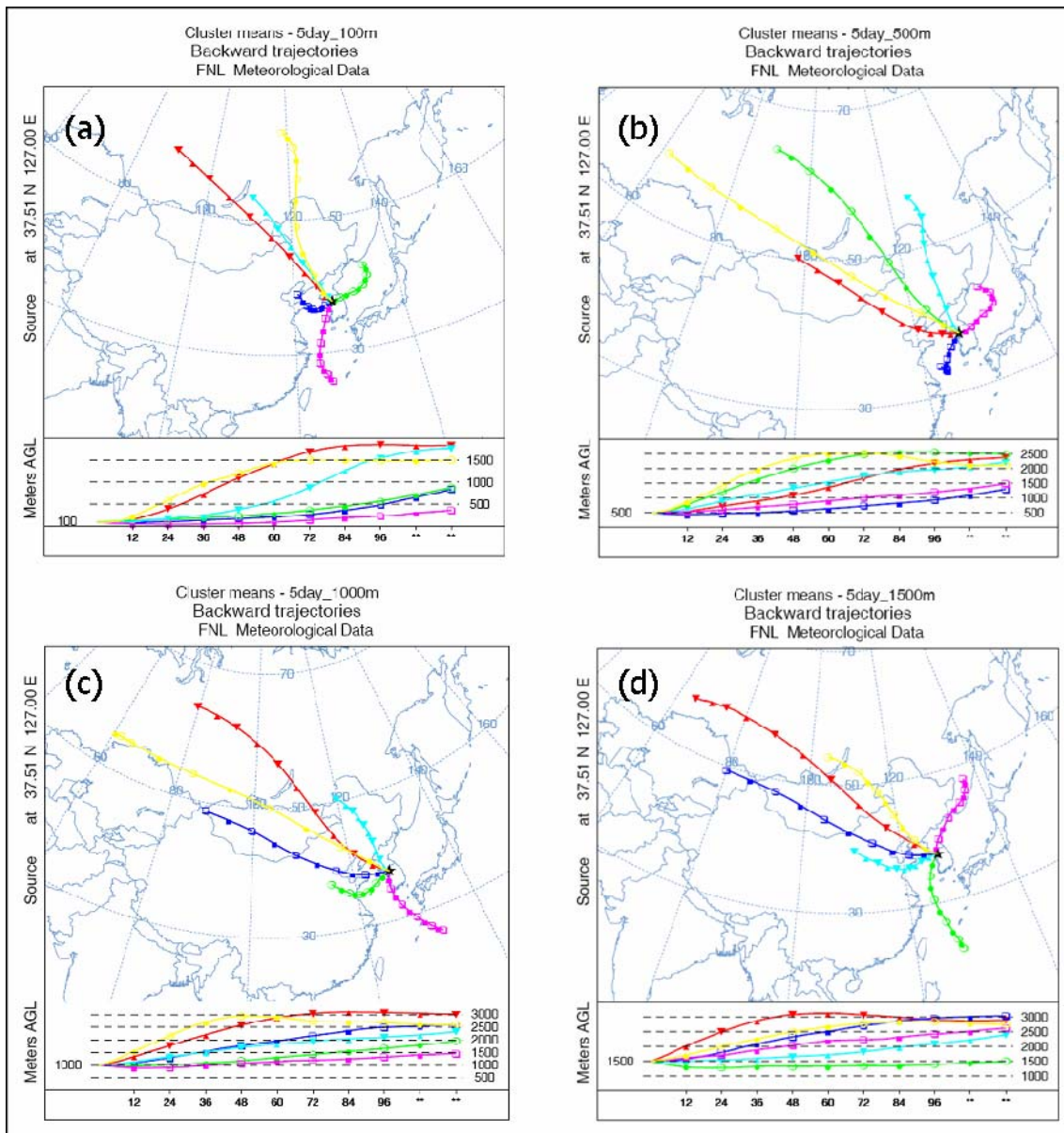


Fig. S6. Cluster analysis results for five-day air mass back trajectories arriving in Seoul over the study period ((a) starting height : 100 m, (b) starting height : 500 m, (c) starting height : 1000 m, (d) starting height : 1500 m).

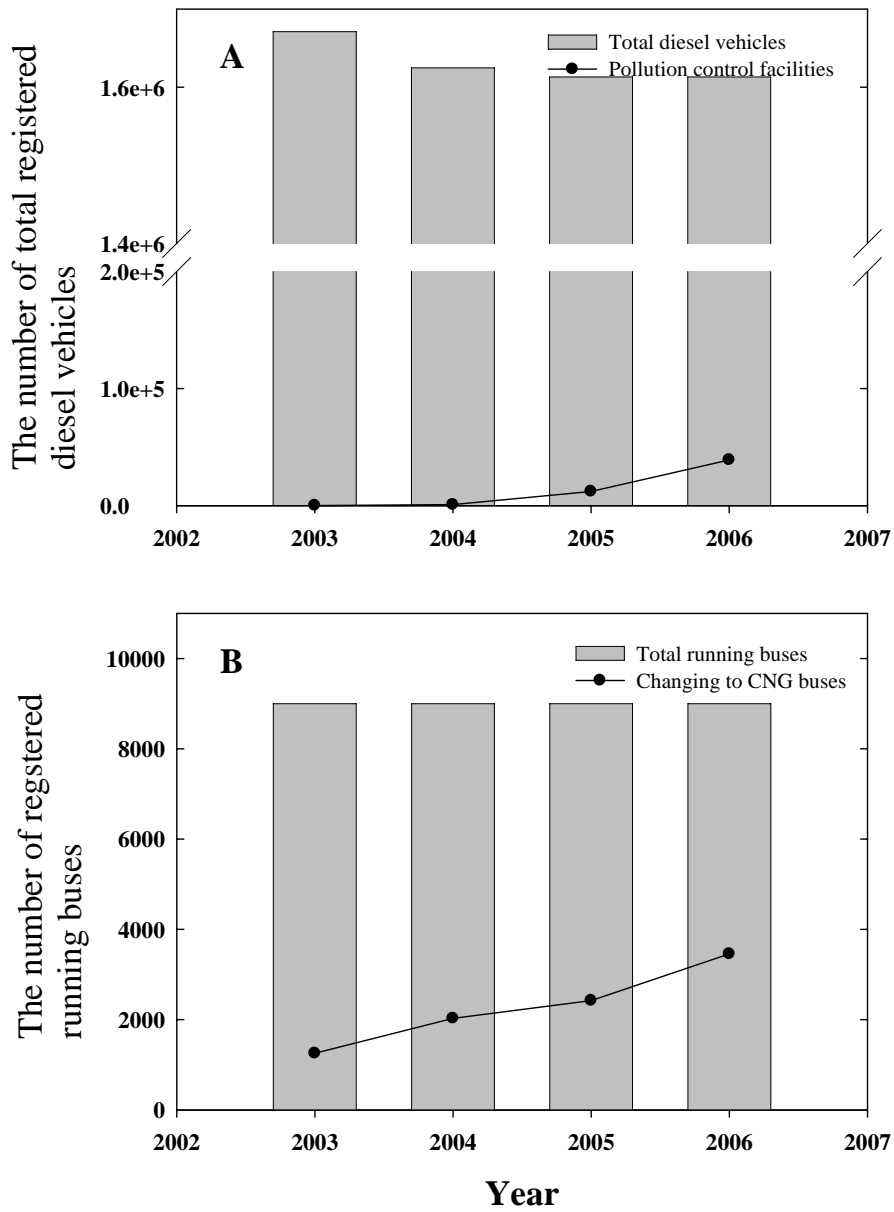


Fig. S7. A. The temporal trend of increasing emission control devices for the running diesel vehicles in Seoul. B. The change of total registered running diesel buses to CNG buses. (Source: Annual results for emission control of motor vehicles in Seoul, Air Pollution Control Division, Seoul Metropolitan Government).