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Characteristics of total gaseous mercury (TGM) concentrations in an industrial complex in South Korea: impacts from local sources

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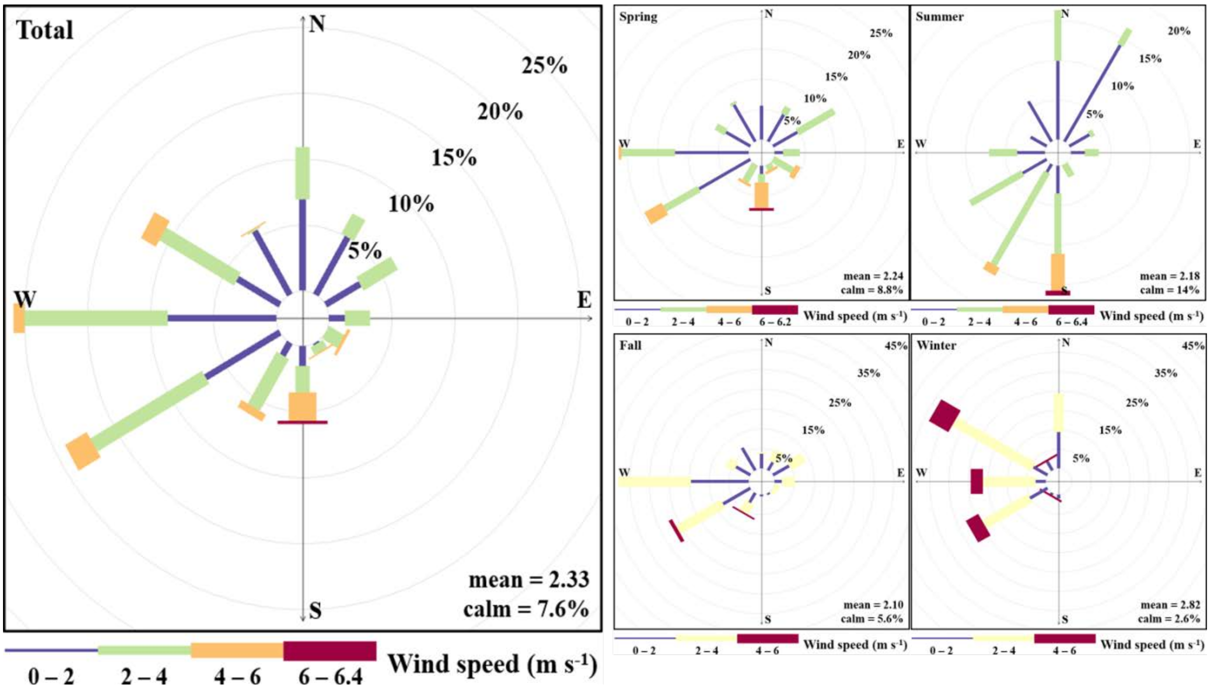

Fig. S1. Frequency of counts of measured wind direction occurrence by season in this study.

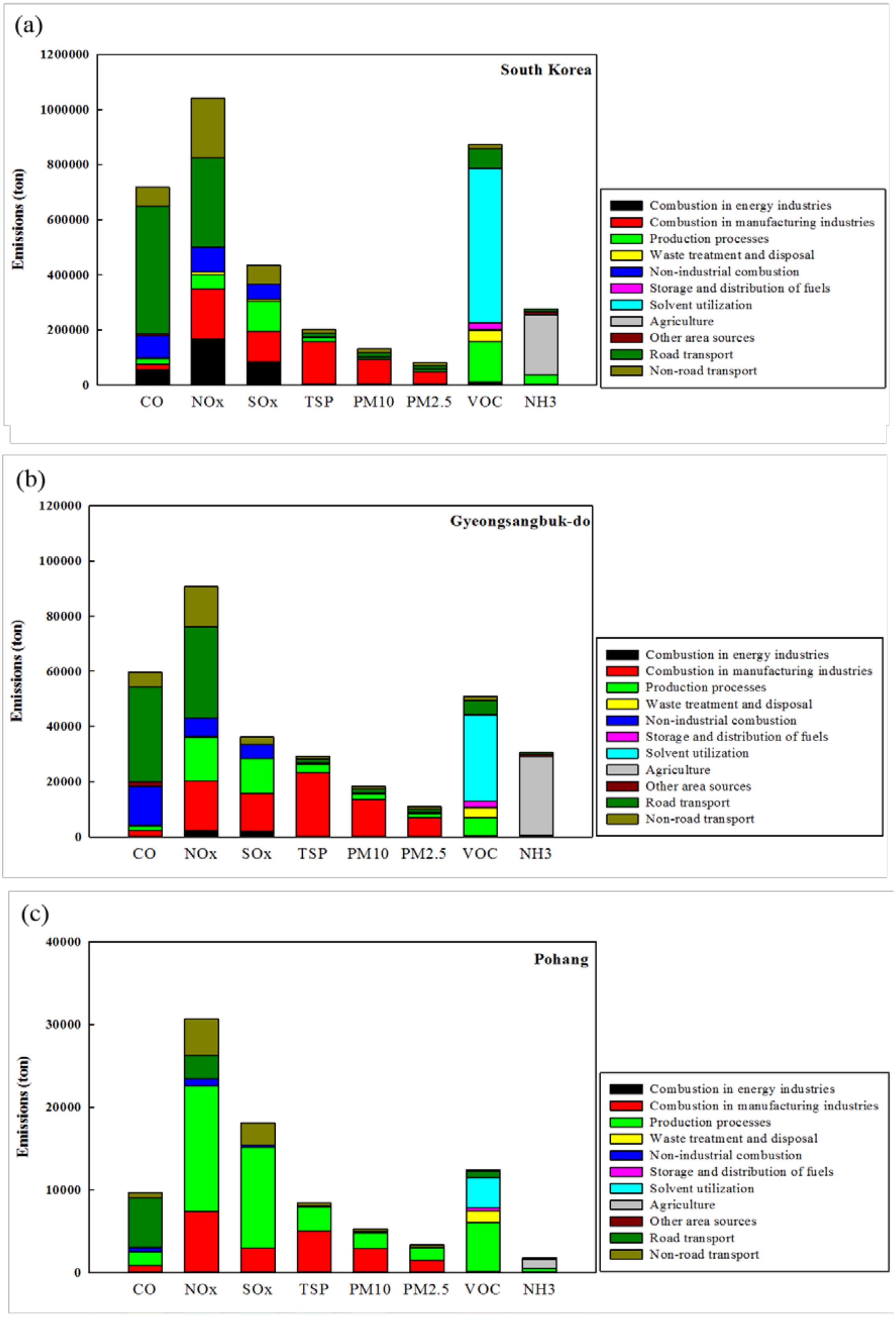

Fig. S2. Sectoral contribution of emissions of (a) South Korea, (b) Gyeongsangbuk-do and (c) Pohang for CO, NOx, SOx, TSP VOC and NH_3.

Sectoral contribution of emissions

In South Korea, the NOx emissions were highest, followed by VOC, CO, SOx, NH_3, TSP, PM_{10} and $PM_{2.5}$ (**Fig. S2(a)**). In Gyeongsangbuk-do, the NOx emissions were highest, followed by CO, VOC, SOx, NH_3, and TSP, PM_{10} and $PM_{2.5}$ which is similar trend to South Korea (**Fig. S2(b)**). However, Pohang showed a different pattern with the highest NOx emissions, followed by SOx, VOC, CO, TSP, PM_{10}, $PM_{2.5}$ and NH_3 (**Fig. S2(c)**).

Point source (combustion in energy industries + combustion in manufacturing industries + production processes + waste treatment and disposal) in South Korea accounted for 1,226,609 tons (34.6% of total emissions in South Korea) of the air pollutants. Gyeongsangbuk-do has a similar trend with 106,439 tons (35.8% of total emissions in Gyeongsangbuk-do) of the air pollutants. However, Pohang has a significantly high contribution with 56,144 tons (69.2% of total emissions in Pohang) of the air pollutants.

Area source (non-industrial combustion + storage and distribution of fuels + solvent utilization + agriculture + other area sources) in South Korea accounted for 1,055,461 tons (29.8% of total emissions in South Korea) of the air pollutants. Gyeongsangbuk-do has a similar trend with 90,982 tons (30.6% of total emissions in Gyeongsangbuk-do) of the air pollutants. However, Pohang has a less contribution with 6,903 tons (8.5% of total emissions in Pohang) of the air pollutants.

Mobile source (road transport + non-road transport) in South Korea accounted for 1,261,782 tons (35.6% of total emissions in South Korea) of the air pollutants. Gyeongsangbuk-do has a similar contribution with 99,709 tons (33.6% of total emissions in Gyeongsangbuk-do) of the air pollutants. Pohang also has a lower contribution with 18,048 tons (22.3% of total emissions in Pohang) of the air pollutants.

Table S1. Source Classification Categories (SCC) in CAPSS. The fugitive dust and biomass were excluded.

Emission characteristics	SCC1 (11)	SCC2 (42)	SCC3 (173)
Point source	**Combustion in energy industries**	- Public power - District heating plants - Petroleum refining plants - Commercial power	4
	Combustion in manufacturing industries	- Process furnace - Combustion plants - Other	44
	Production processes	- Processes in other industries - Processes in wood, paper and pulp industries - Processes in inorganic chemical industries - Processes in petroleum industries - Processes in food and drink industries - Ammonia consumption - Processes in organic chemical industries - Processes in iron and steel industries	44
	Waste treatment and disposal	- Waste incineration - Other waste treatment	5
Area source	**Non-industrial combustion**	- Commercial and institutional plants - Plants in agriculture, forestry and aquaculture - Residential plants	5
	Storage and distribution of fuels	- Gasoline distribution	3
	Solvent utilization	- Paint application -Electronic Degreaser - Dry cleaning - Other use of solvents and related activities	15
	Agriculture	- Enteric fermentation - Cultures with fertilizers	10
	Other area sources	- Forest and other vegetation fires - Animals	3
Mobile source	**Road transport**	- Passenger cars - Light-duty vehicles - Recreational vehicles - Taxis - Buses - Special purpose vehicles - Trucks - Motorcycles	18
	Non-road transport	- Construction machinery and equipment - Agricultural machinery - Ships - Railways - Aircrafts	22

*The numbers represent the number of sources.

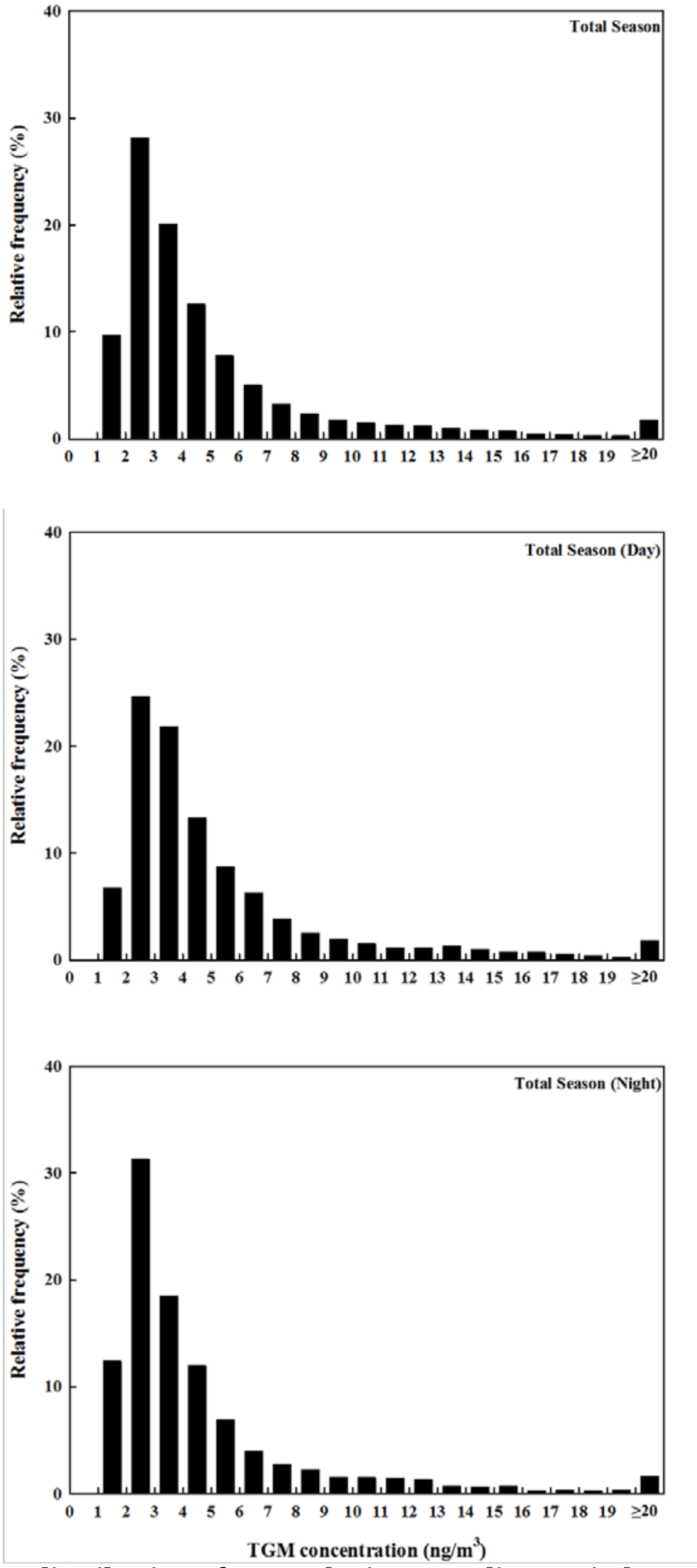

Fig. S3. Frequency distribution of TGM during sampling period. Note that TGM was measured every 5-min.

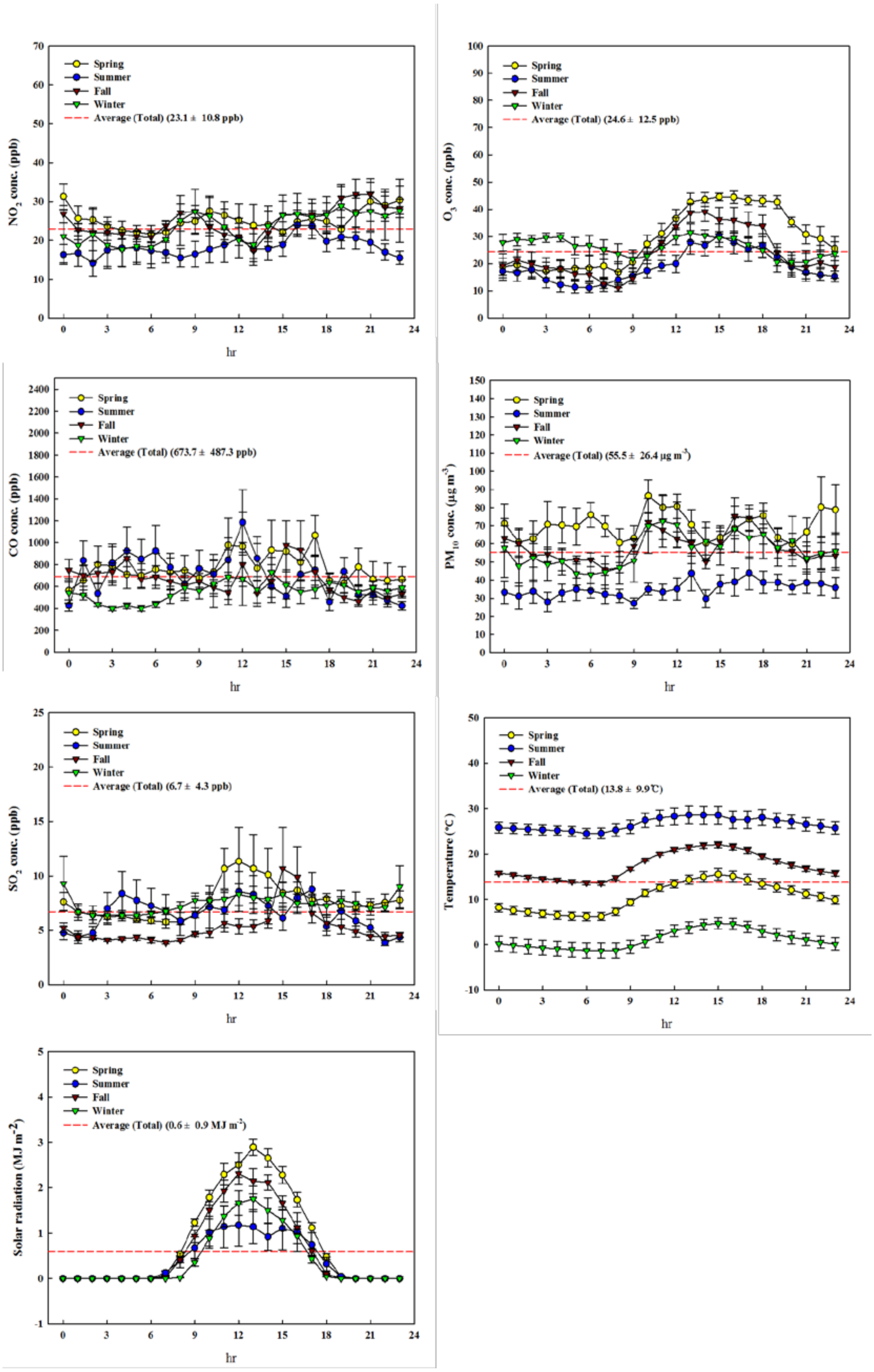

Fig. S4. The diurnal variations of co-pollutants concentrations and meteorological data during the sampling periods. The error bars represent standard error.

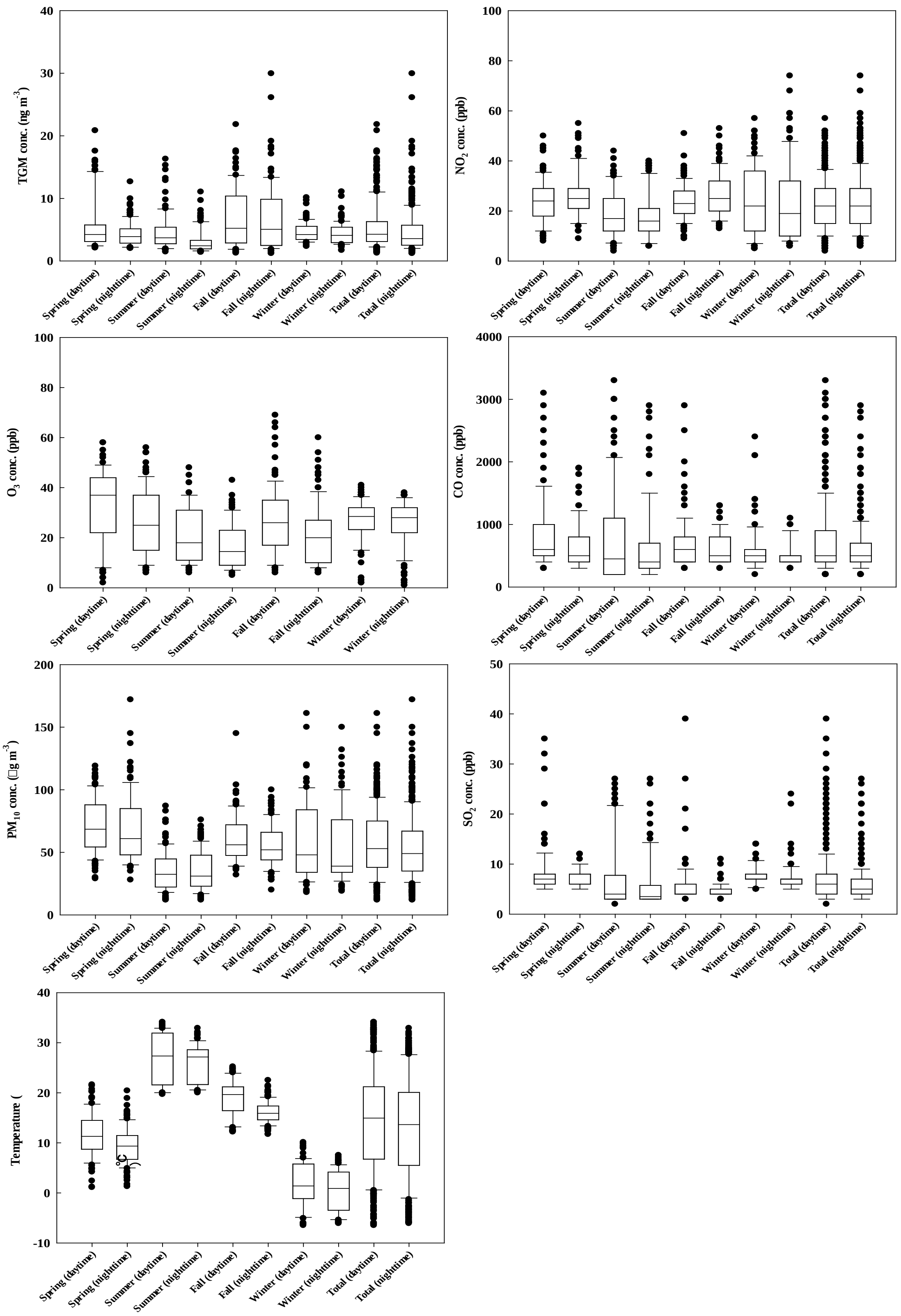

Fig. S5. Comparison of TGM, co-pollutants and meteorological data between daytime and nighttime. Note that TGM was presented with hourly average concentration.

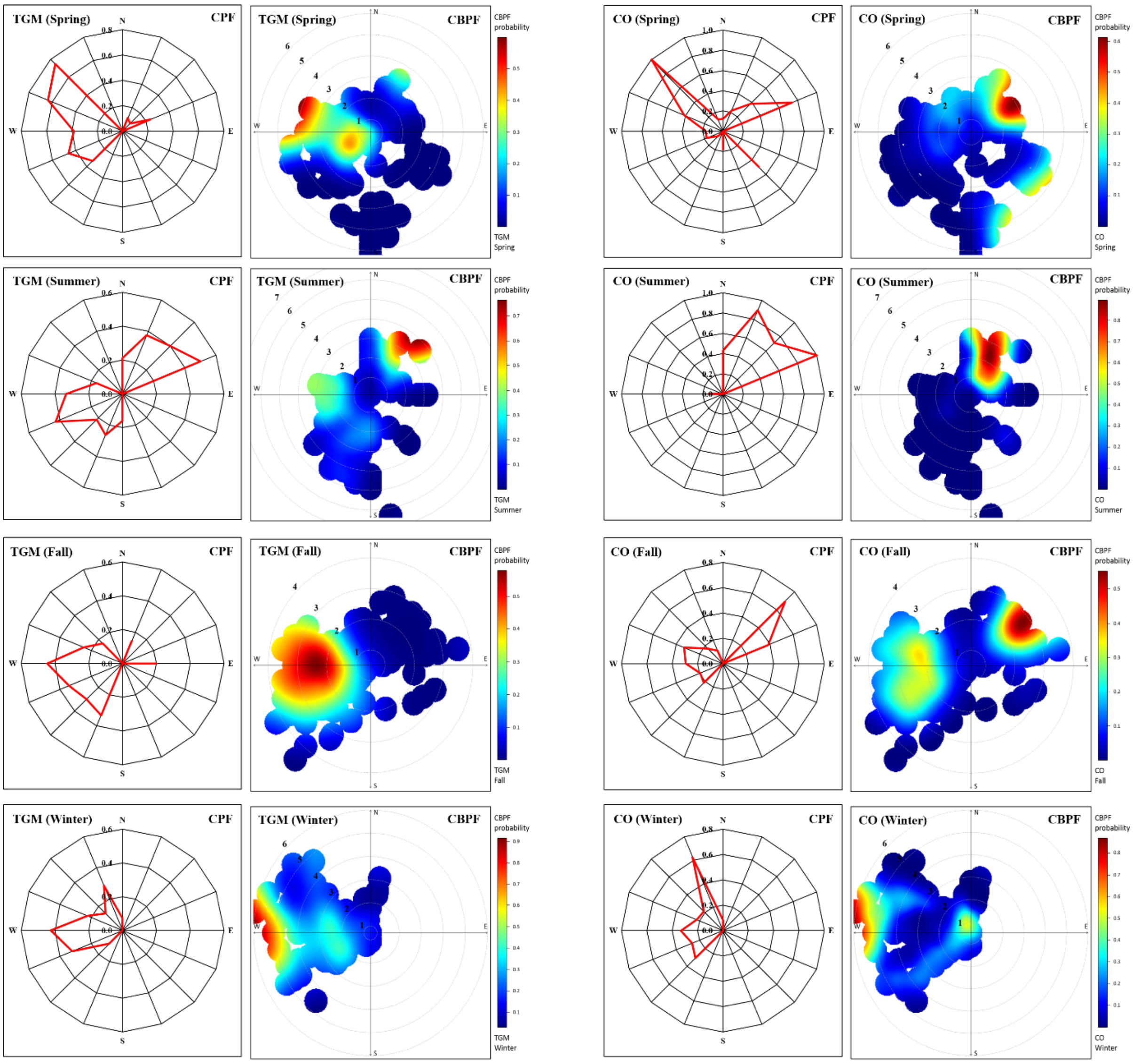

Fig. S6. Comparisons of CPF and CBPF plots for TGM and CO higher than average concentration. The radial axes of CPF and CBPF are the probability and the wind speed (m s^{-1}), respectively.