

Wet Deposition of Total and Methylated Mercury in South Korea

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Sampling site



Gwangju City

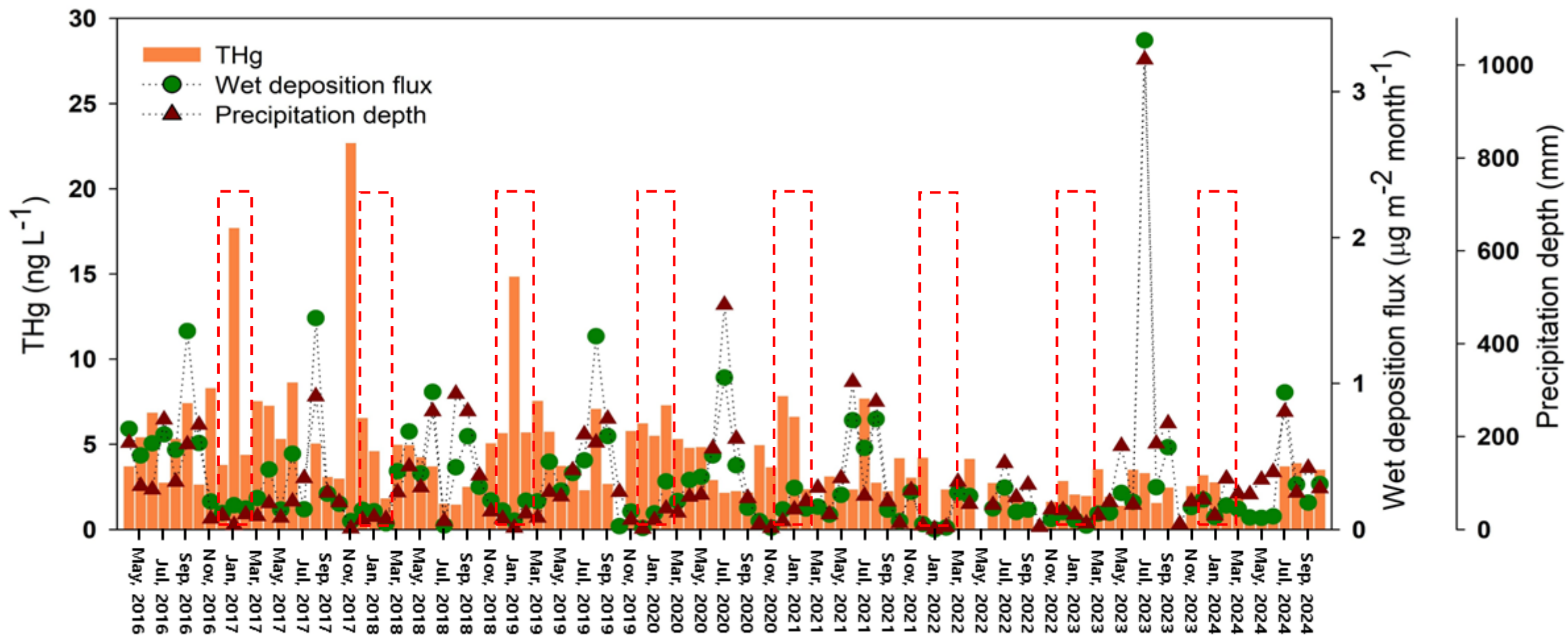
Population: 1,459,024

Area: 501 km²

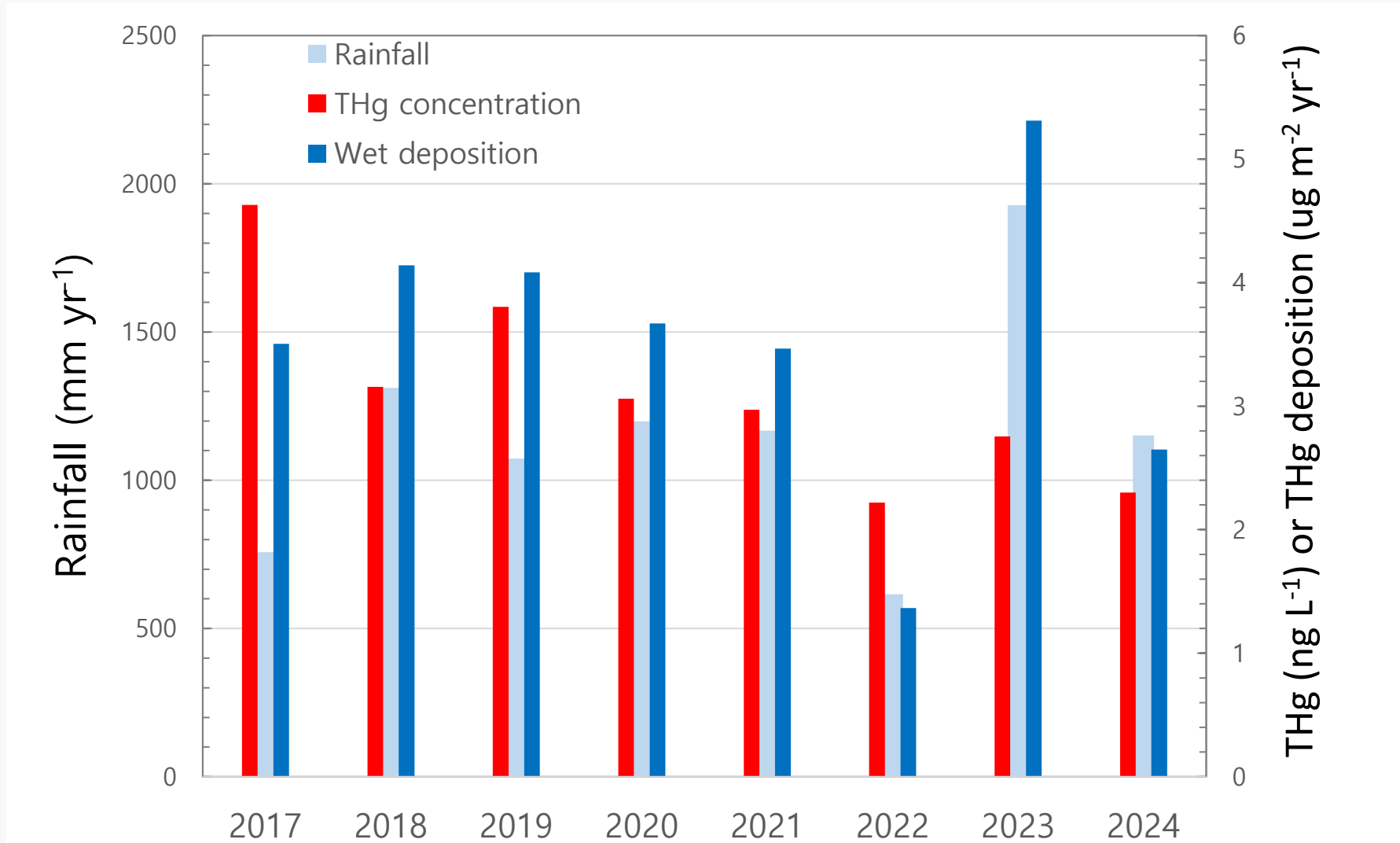
Population density: 2920 km⁻²

Land use type	%
Forests	37
Rice paddies	16
Residential	13
Road network	8
Farms	6
Others	20

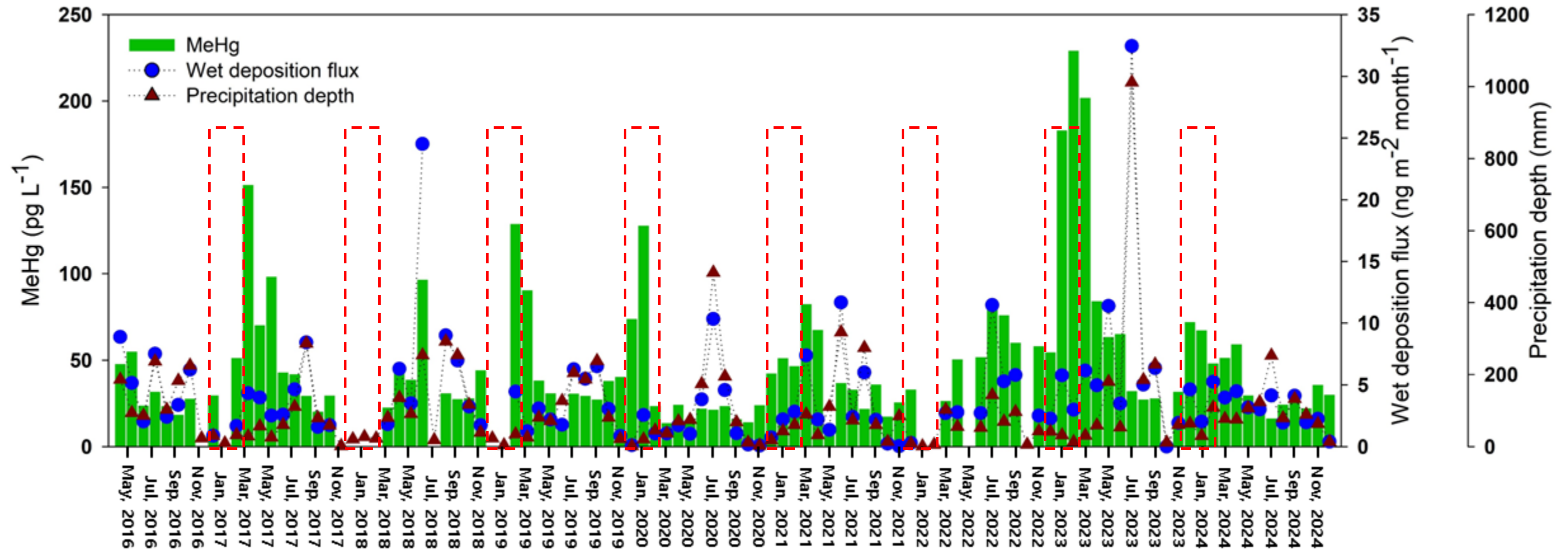
Seasonal variability of THg



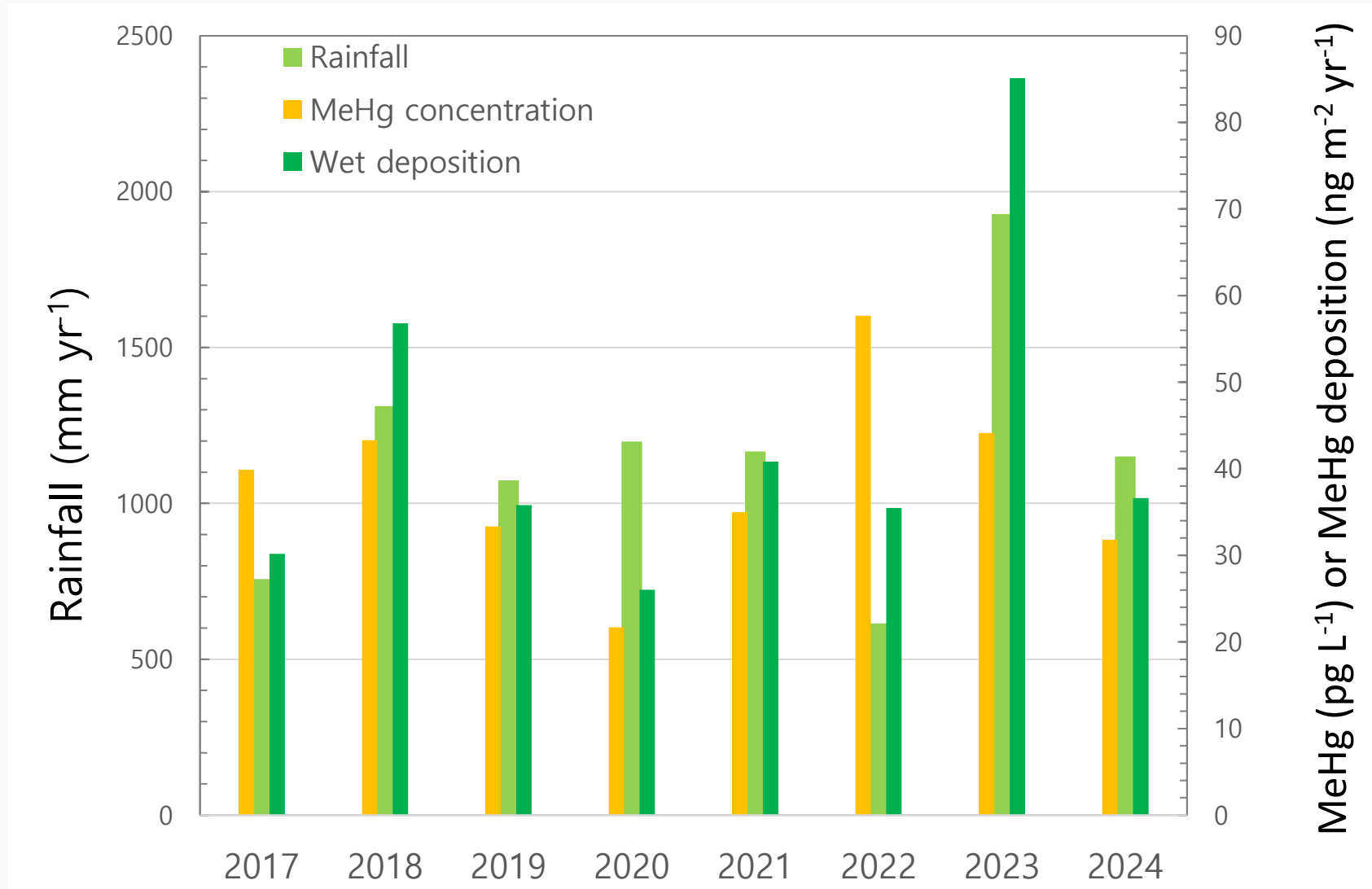
Long-term trend of THg



Seasonal variability of MeHg

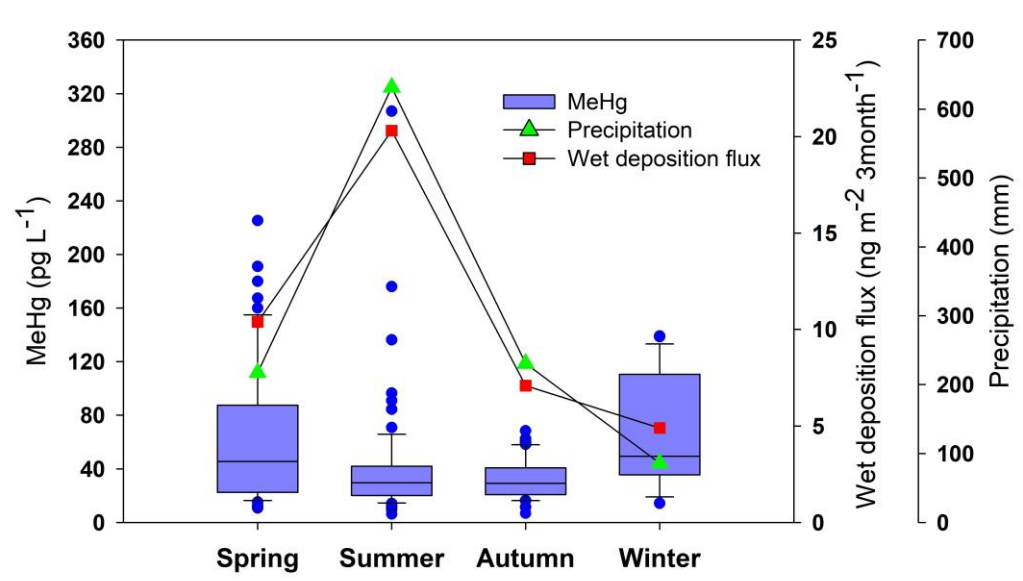
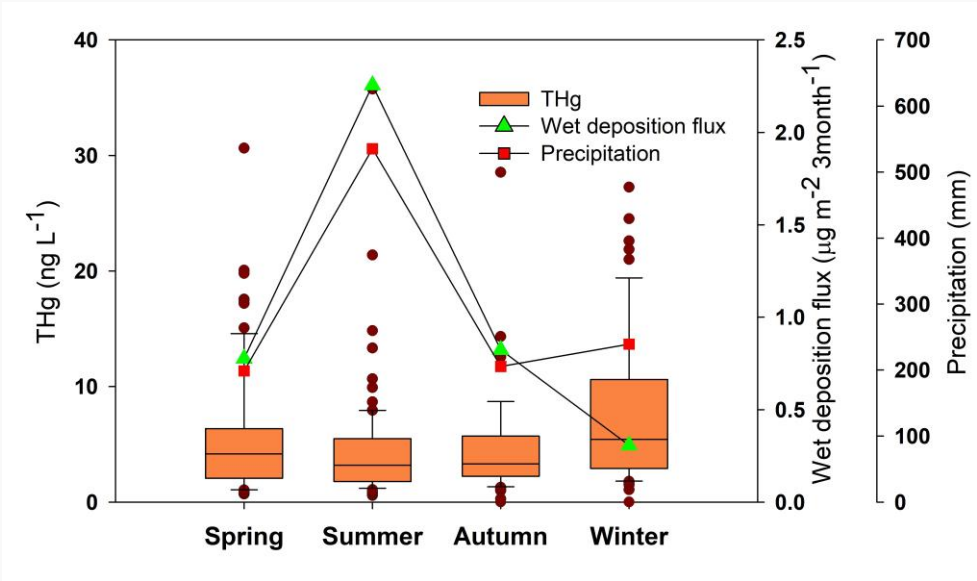


Long-term trend of MeHg



Seasonal trends

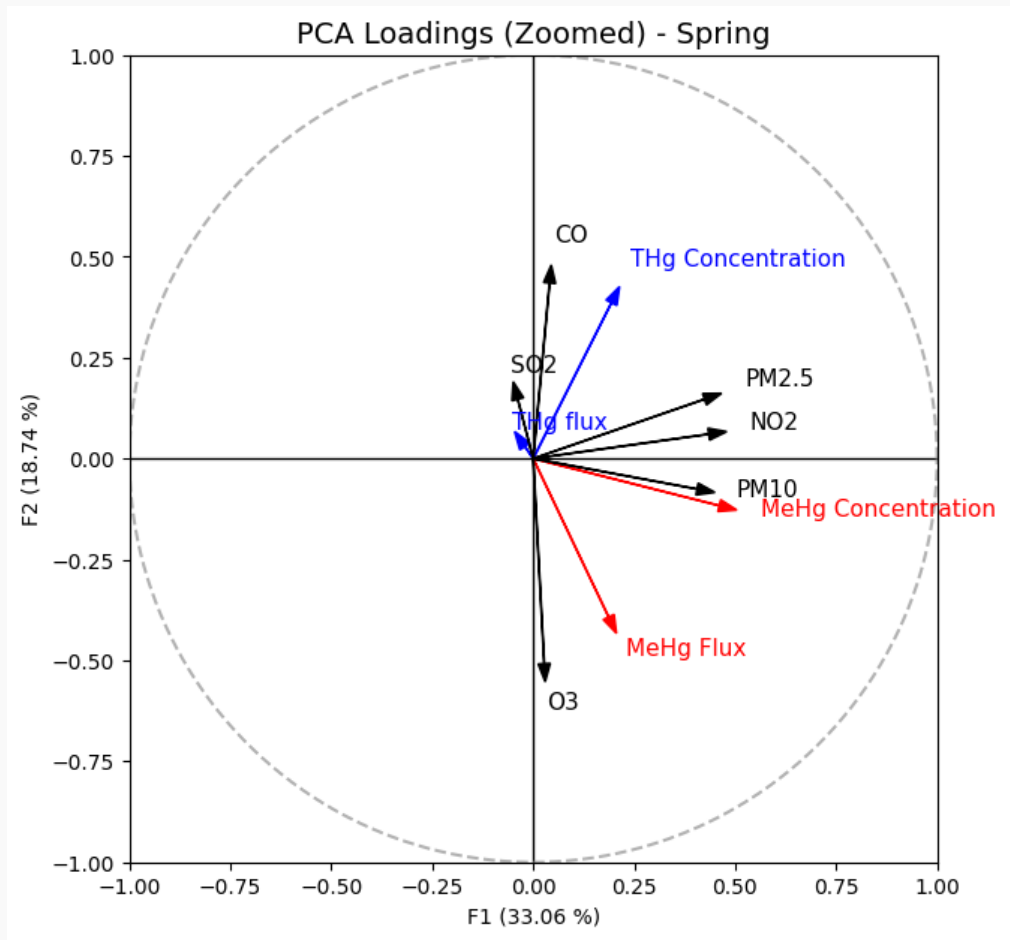
✓ Sampling period : 2016.04 – 2024.12



THg	Rainfall (mm/3mon)	VWM THg (ng L ⁻¹)	Std.	Post-Hoc (Scheffe)
Spring	217	3.48	2.80	Winter, Spring, Summer, Fall
Summer	632	3.11	2.46	
Fall	231	2.80	2.58	
Winter	86	4.03	3.32	

MeHg	Rainfall (mm/3mon)	VWM MeHg (pg L ⁻¹)	Std.	Post-Hoc (Scheffe)
Spring	217	44.9	38.3	Winter, Spring > Summer, Fall
Summer	632	33.3	25.3	
Fall	231	27.0	14.6	
Winter	86	58.1	41.1	

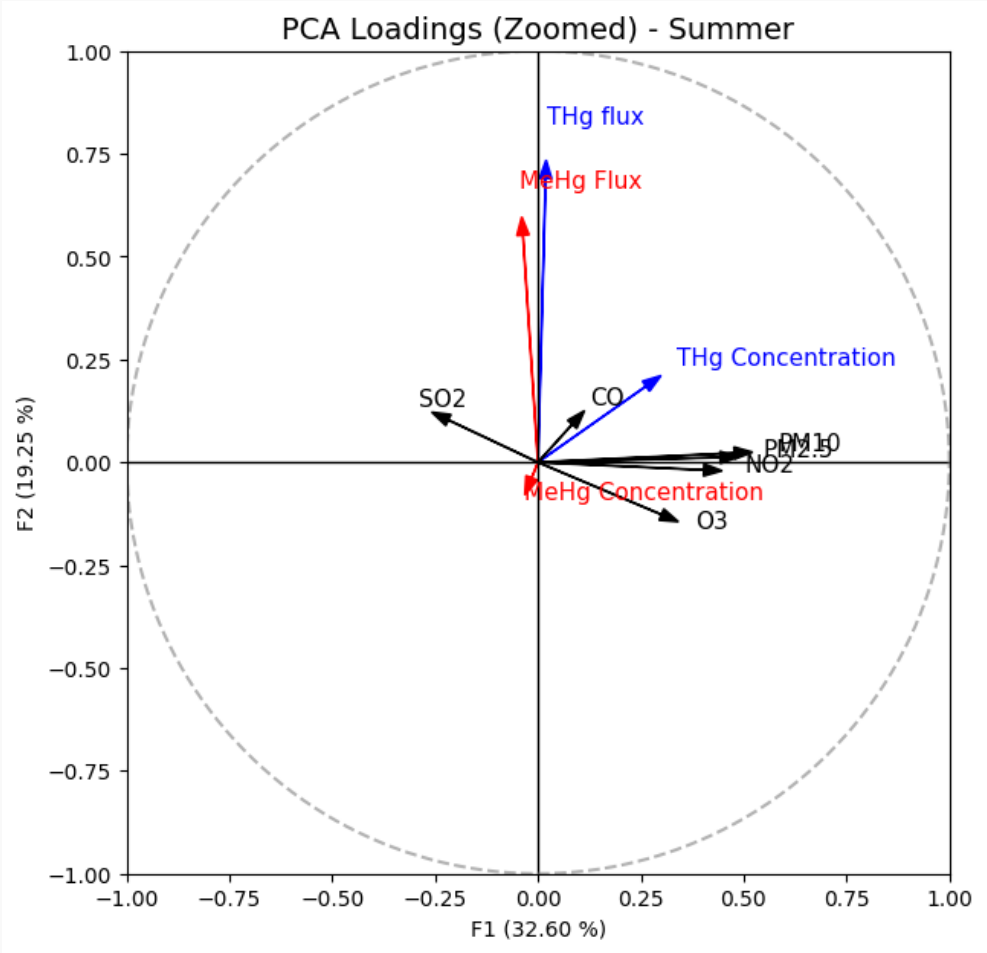
PCA for spring



	Type	Major source
CO	Primary	Vehicle exhaust, residential heating/cooking, industrial combustion
NO ₂	Primary	Vehicle emissions, industrial combustion, power plants
SO ₂	Primary	Coal/oil combustion in power plants, industrial boilers, refineries, ships
O ₃	Secondary	Formed in air (NO _x + VOCs)

- ✓ Rainwater collection period : 2016.04 – 2024.12 (n=25)
- ✓ Monthly concentration of pollutants from Air Korea

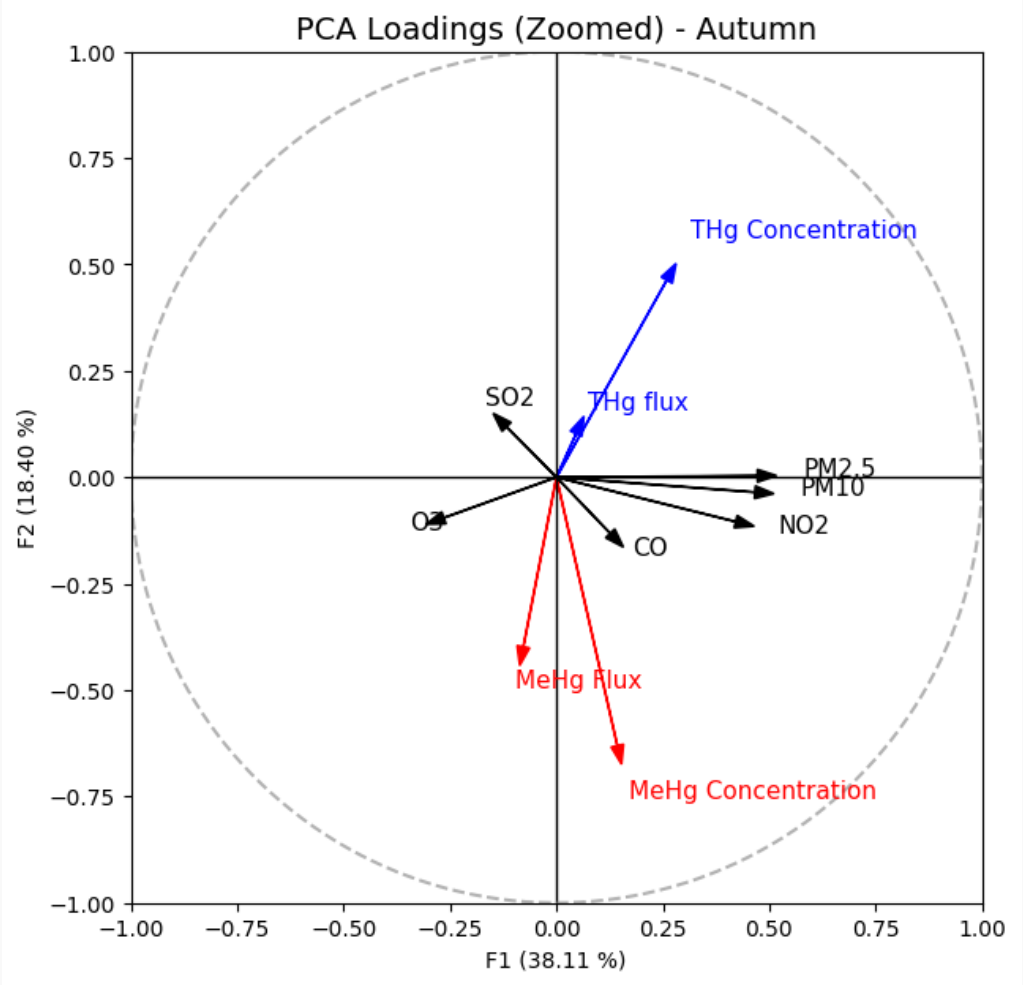
PCA for summer



	Type	Major source
CO	Primary	Vehicle exhaust, residential heating/cooking, industrial combustion
NO ₂	Primary	Vehicle emissions, industrial combustion, power plants
SO ₂	Primary	Coal/oil combustion in power plants, industrial boilers, refineries, ships
O ₃	Secondary	Formed in air (NO _x + VOCs)

- ✓ Rainwater collection period : 2016.04 – 2024.12 (n=25)
- ✓ Monthly concentration of pollutants from Air Korea

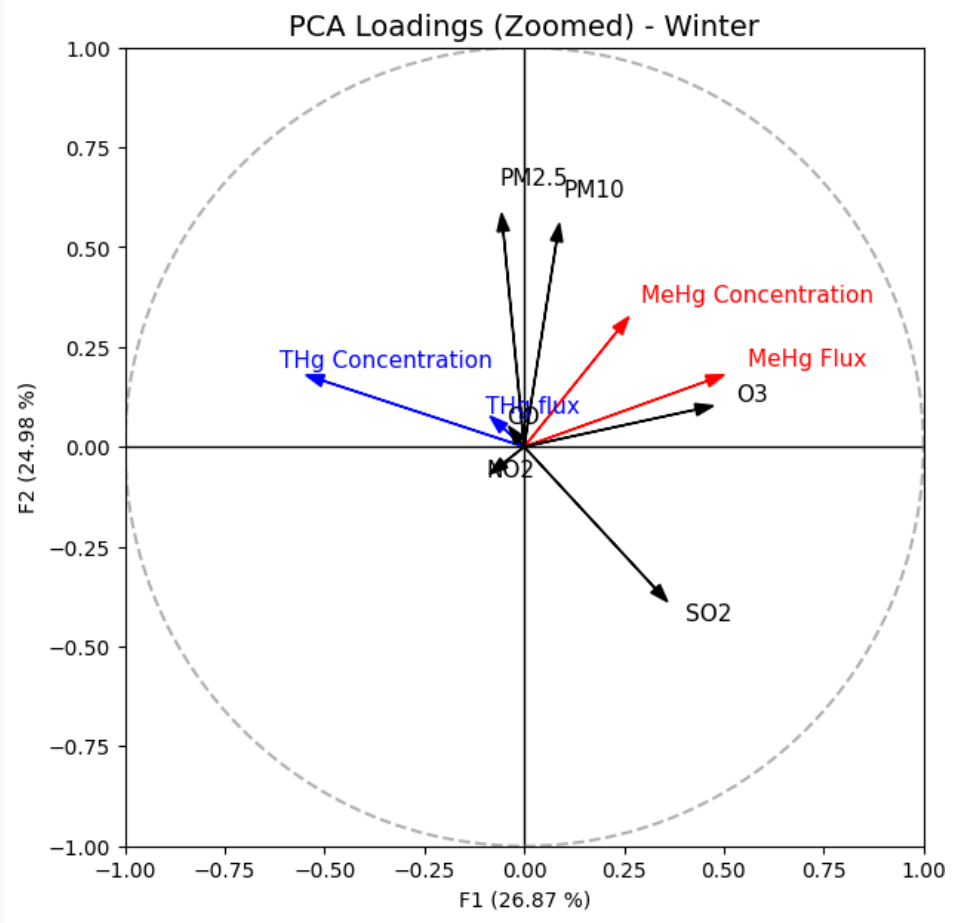
PCA for fall



	Type	Major source
CO	Primary	Vehicle exhaust, residential heating/cooking, industrial combustion
NO ₂	Primary	Vehicle emissions, industrial combustion, power plants
SO ₂	Primary	Coal/oil combustion in power plants, industrial boilers, refineries, ships
O ₃	Secondary	Formed in air (NO _x + VOCs)

- ✓ Rainwater collection period : 2016.04 – 2024.12 (n=25)
- ✓ Monthly concentration of pollutants from Air Korea

PCA for winter



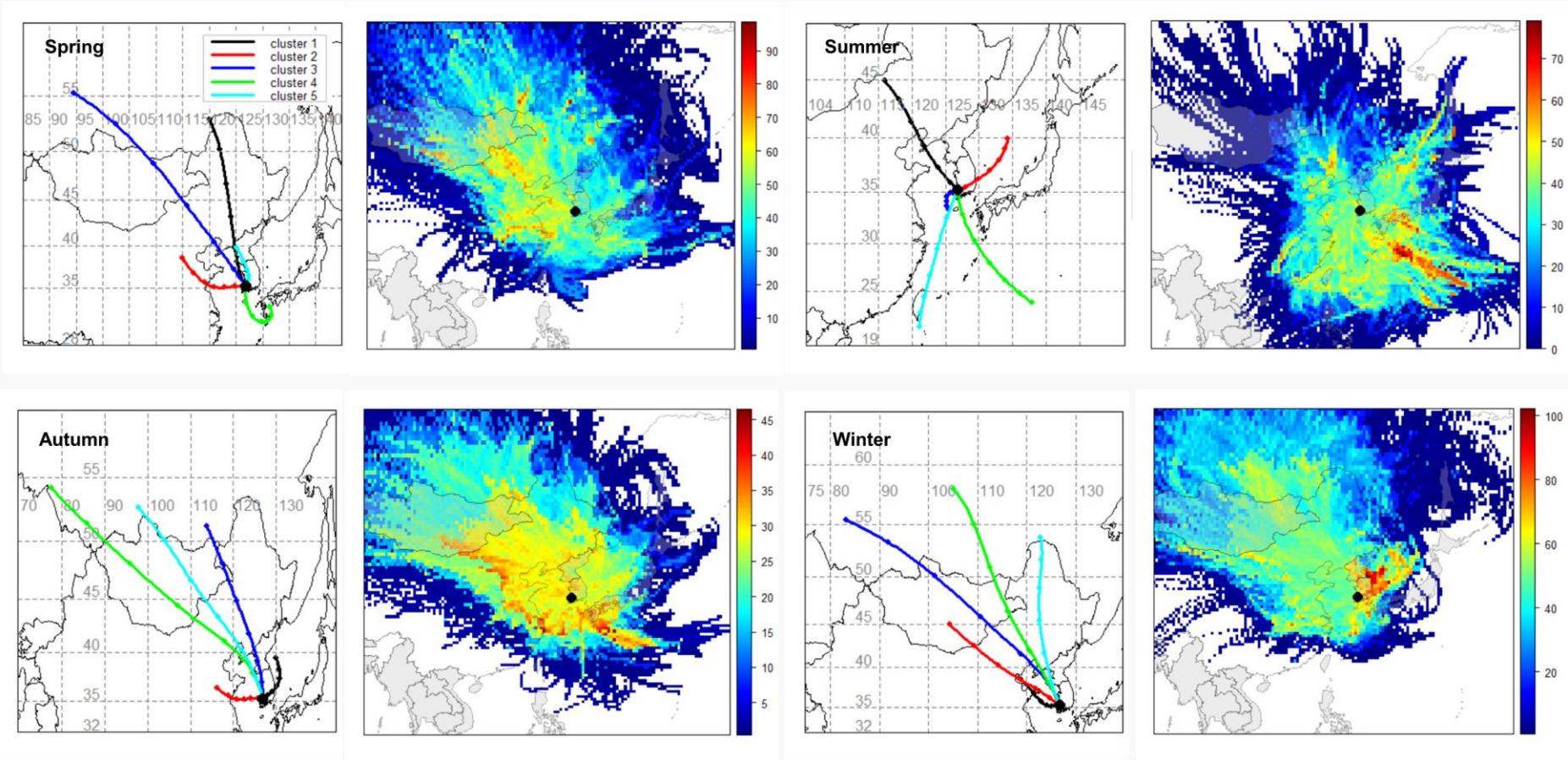
	Type	Major source
CO	Primary	Vehicle exhaust, residential heating/cooking, industrial combustion
NO ₂	Primary	Vehicle emissions, industrial combustion, power plants
SO ₂	Primary	Coal/oil combustion in power plants, industrial boilers, refineries, ships
O ₃	Secondary	Formed in air (NO _x + VOCs)

- ✓ Rainwater collection period : 2016.04 – 2024.12 (n=25)
- ✓ Monthly concentration of pollutants from Air Korea

Backward trajectories for source analysis

Concentration-Weighted Trajectory (CWT):
A receptor-based model to identify potential source regions, by combining backward air mass trajectories with observed pollutant concentration

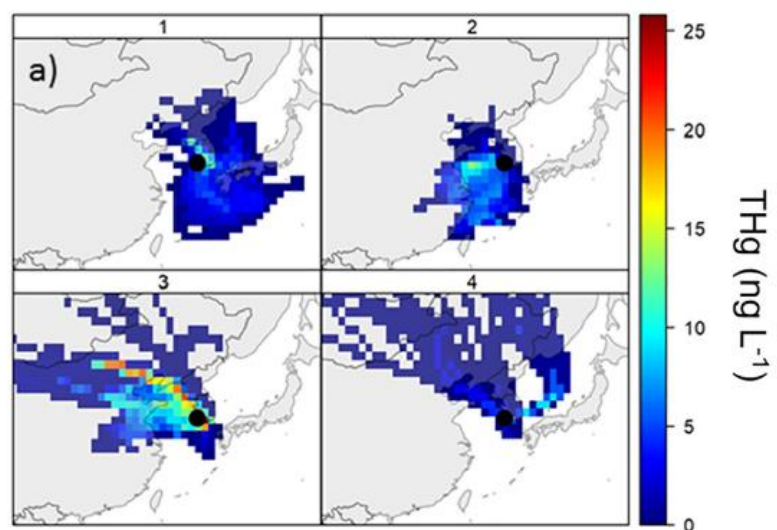
	VWM MeHg (pg L ⁻¹)
Spring	44.9
Summer	33.3
Fall	27.0
Winter	58.1



✓ Sampling period: 2017.01 – 2022.12

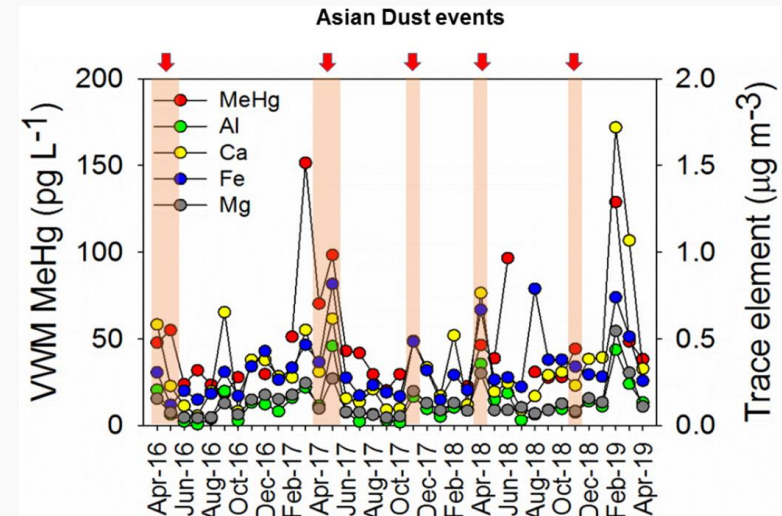
THg

- VWM concentrations and wet deposition fluxes have declined since 2016.
- Seasonal variability remains relatively weak.
- Rainwater THg patterns align with CO and SO₂ distributions, reflecting influences of fuel combustion.



MeHg

- MeHg concentrations and fluxes remained relatively constant over the study period.
- VWM concentrations exhibited distinct seasonality, with higher in winter and spring.
- CWT indicates that spring deposition is influenced by long-range transported dust and winter deposition by domestic emissions.



Acknowledgments



환경부



국립환경
과학원



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