



REPUBLIC OF KOREA

Policies and Practices Concerning Acid Deposition

1. CURRENT SITUATION AND PROGRESS

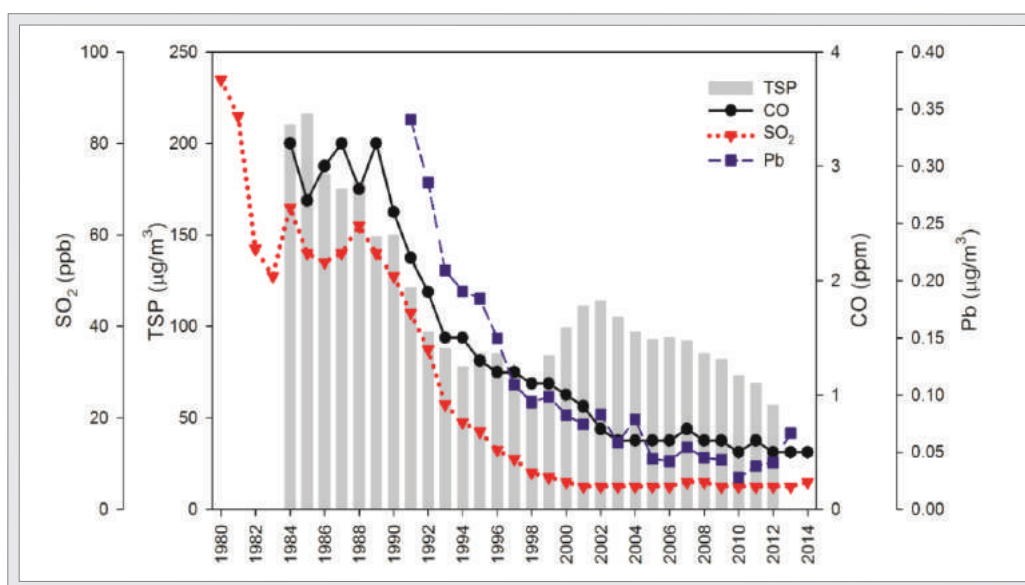
General Evaluation

Air pollution is a significant issue in the Republic of Korea due to rapid industrialization, urbanization, high population density, and increasing socio-economic activities. Transboundary transport of air pollutants from neighboring countries is also affecting ambient air quality of the country, which becomes a significant public concern. The observed yearly average concentration levels of PM_{2.5} at Ganghwa and Jeju monitoring sites in 2017 were 25 $\mu\text{g}/\text{m}^3$ and 16 $\mu\text{g}/\text{m}^3$, respectively, which is almost twice the prescribed WHO guideline of 10 $\mu\text{g}/\text{m}^3$.

Similarly, the observed yearly average concentration levels of PM₁₀ at Ganghwa, Jeju, and Imsil monitoring sites were on an average 2 to 3 times higher than the prescribed WHO guideline of 20 $\mu\text{g}/\text{m}^3$. Long-term monitoring data from national monitoring sites show a slight increase in the concentrations of NO_3^- and decrease in the nss-SO_4^{2-} in wet deposition. SO_2 shown a decreasing trend at EANET monitoring sites. Ground-level ozone concentrations are higher in spring while lower in summer.

Main Pollution Sources and Trends

The main sources of air pollution are road transport, construction, industries, and power plants. In Metropolitan areas, the primary source of air pollutants, in particular PM_{2.5}, is diesel vehicles followed construction, heating, power plants, and fugitive dust. Whereas, nationwide industrial facilities are main contributor followed by construction, power plants, diesel vehicles, and fugitive dust. The long trend of major air pollutants has been showing a decreasing pattern (Kim and Lee, Aerosol and Air Quality Research, 18: 2141–2156, 2018).



National Ambient Air Quality Standards (NAAQS) vs. WHO Guidelines

Air Pollutants	Average Time	NAAQS ($\mu\text{g}/\text{m}^3$)	WHO Guidelines($\mu\text{g}/\text{m}^3$)
PM ₁₀	24-hr	100	50
	1-yr	50	20
PM _{2.5}	24-hr	35	25
	1-yr	15	10
SO ₂	1-hr	393 (= 150 ppb)	-
	24-hr	131 (= 50 ppb)	20
	1-yr	52.4 (= 20 ppb)	-
NO ₂	1-hr	188 (=100 ppb)	200
	24-hr	112.8 (= 60 ppb)	-
	1-yr	56.4 (= 30 ppb)	40
O ₃	1-hr	200 (=100 ppb)	-
	8-hr	120 (= 60 ppb)	100

Participation in EANET

The Republic of Korea is participating in EANET since 1999. Three monitoring sites of the National Acid Deposition Monitoring Network, namely, Ganghwa, Imsil, and Jeju are designated as EANET monitoring sites. The institutional arrangement for the implementation of EANET activities is as follow:

- National Focal Point: Air Quality Policy Division, Air Quality Policy Bureau, Ministry of Environment
- Scientific Advisory Committee Members: National Institute of Environmental Research
- National QA/QC Manager: National Institute of Environmental Research
- National Center: National Institute of Environmental Research

2. SITE INFORMATION

- Continuous National Air Monitoring Sites = 395
- National Acid Deposition Monitoring Sites = 41
- EANET Monitoring Sites = 3

Monitoring Sites	Site Classification	Location		Parameters Measured	
		Latitude	Longitude	Wet Dep.	Dry Dep.
Ganghwa	Rural	37°70'81"N	126°28'14"E	✓	✓
Imsil	Rural	35°61'05"N	127°18'63"E	✓	✓
Jeju	Remote	33°29'25"N	126°16'22"E	✓	✓

Monitoring Parameters

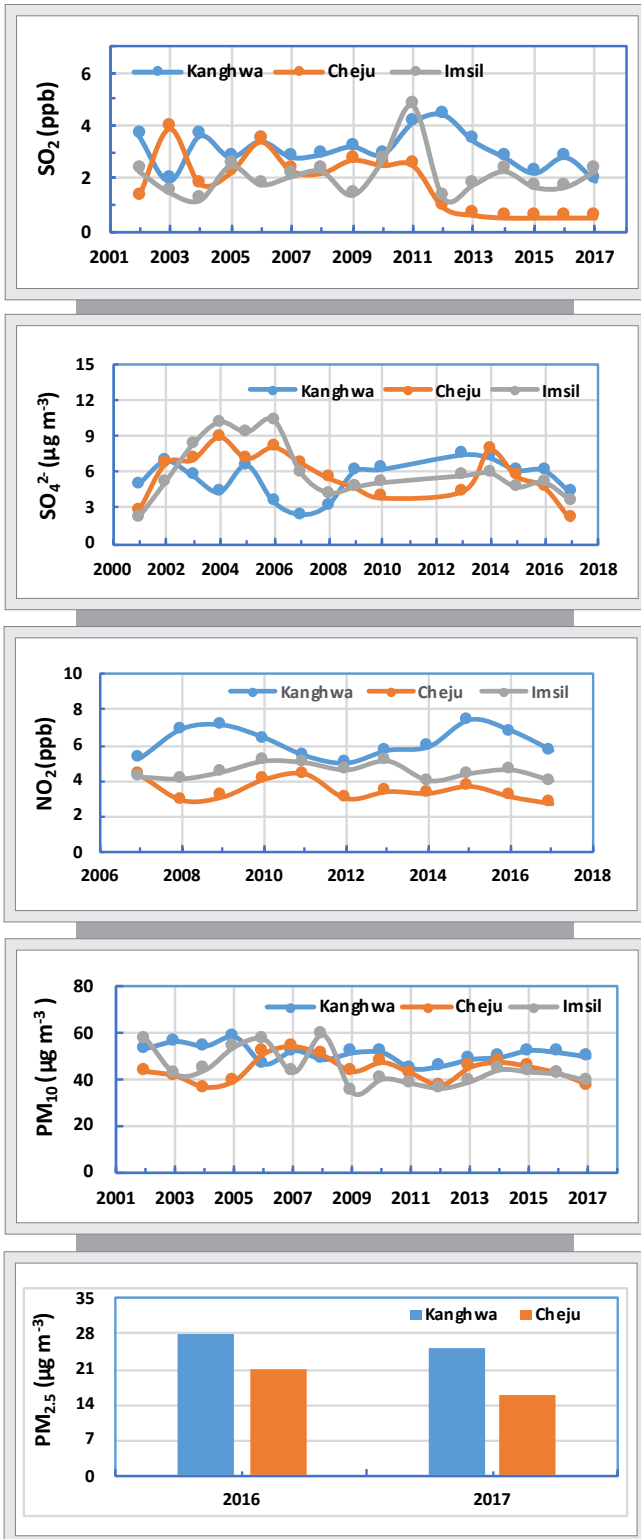
Monitoring Type	Parameters	Frequency
Wet Deposition	pH, EC, NH ₄ ⁺ , Na ⁺ , K ⁺ , Ca ²⁺ , Mg ²⁺ , SO ₄ ²⁻ , NO ₃ ⁻ , Cl ⁻	In case of precipitation
Dry Deposition	SO ₂ , NO ₂ , CO, O ₃ , HNO ₃ , NH ₃ , HCl, PM ₁₀ , PM _{2.5}	6 day interval



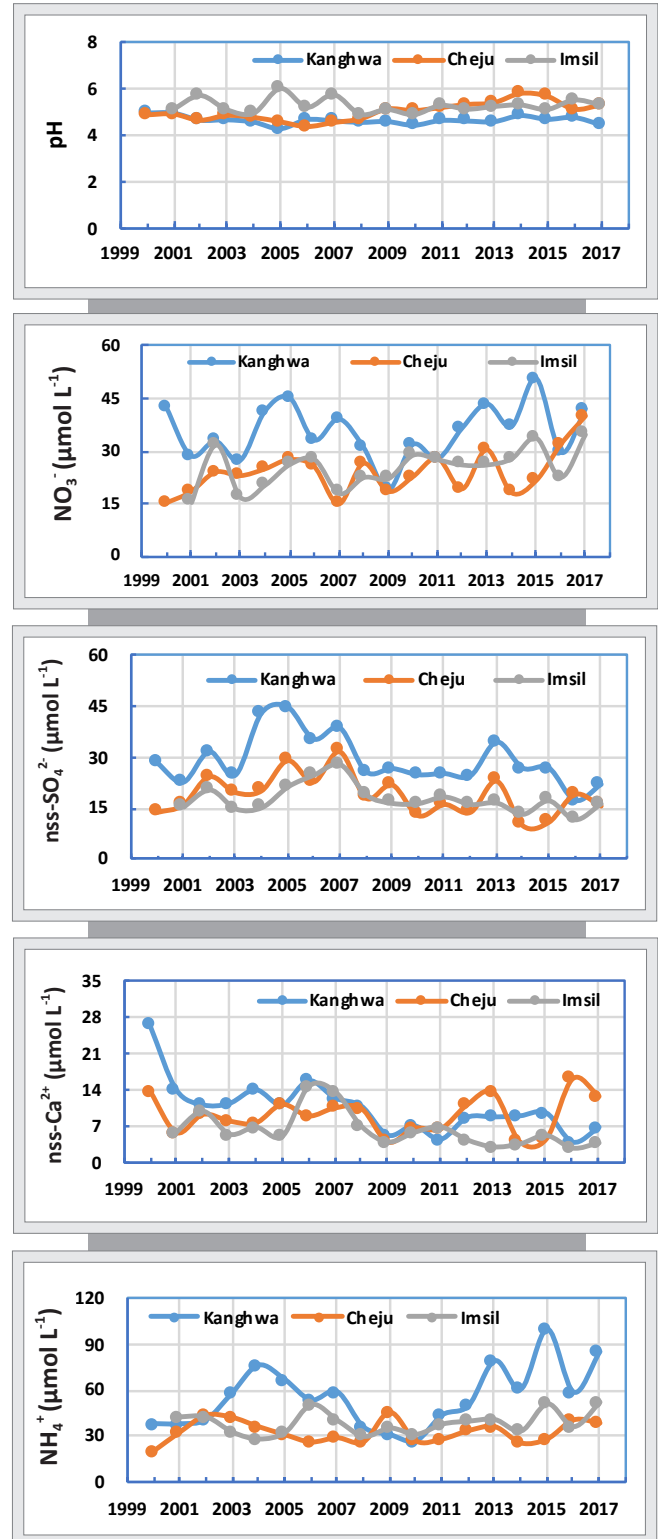
3. HIGHLIGHTS OF MONITORING RESULTS

The following figures show the time-series trend of the annual average of important acid deposition parameters in the dry deposition and wet deposition of Republic of Korea.

Dry Deposition



Wet Deposition



- The level of SO₂ is below than NAAQS.
- The levels of PM_{2.5} and PM₁₀ are almost meeting the NAAQS but higher than WHO Guidelines

- Observed pH is acidic.
- Nss-SO₄²⁻ is decreasing, whereas NO₃⁻ is fluctuating.

4. AWARENESS ACTIVITIES, RELEVANT POLICIES AND FUTURE PLAN

The government of R. of Korea pushes forward the following policies to mitigate air pollution and secure the clean air and a better living environment for the people.

- Construct the integrated air quality control system.
- Control emissions from business facilities from diverse perspectives.
- Implement measures to reduce emissions across the entire cycle of car use.
- Control pollutants from blinded spots in daily surroundings.
- Create a safe air environment free from the risk of HAPs.
- Strengthen the fundamental capacity for science to support policies.

Policies and Practices Concerning Air Pollution

- Strengthen responsive actions for every facet of high fine dust episode: Enacted Special Act for Fine Dust Reduction and Management (Aug 2018); Established Comprehensive Plan for Fine Dust Management (Nov 2019); and Implements Seasonal Management for Response to High Concentration Episode from December to March (Dec 2019 ~).
- Launched the Integrated Environmental Permit System in 2017 that targets large scale businesses under direction of the government (the number of business types to cover will gradually increase).
- Secure more electricity and hydrogen charging stations to increase the penetration rate of zero-emission cars: As of 2019, 18,000 fast and slow electricity charging stations and 34 hydrogen charging stations under operation.
- Establish the legal basis to introduce a tighter standard for sulfur content in shipment fuel (3.5% to 0.5%, July 2019) and to designate Emission Restriction Zones near 5 top ports in Korea (Dec 2019) to apply a stricter fuel standard (0.1% of sulfur content).
- Expand the target area given with the obligation of installing gasoline vapor recovery units at gas stations (to include the middle, south, and east south part of South Korea) (Apr 2020 ~). Provide financial support for the installation to small businesses (up to KRW 10 million).

EANET Activities and Future Plan

- Regular monitoring of EANET parameters pertaining to dry deposition, wet deposition.
- Participation in the QA/QC activities including inter-laboratory comparison projects, namely, project on Wet Deposition
- Annual maintenance, calibration work, and visit to monitoring sites.
- Hands-on training on monitoring and analysis of acid deposition parameters.

National Focal Point

Air Quality Policy Division, Air Quality Policy Bureau, Ministry of Environment, Republic of Korea
Building #6, Government Complex-Sejong 11 Doum 6-ro, Sejong Special Governing City, 339-012, Republic of Korea
Tel : +82-44-201-6879
Fax : +82-44-201-6873

Secretariat

United Nations Environment Programme Asia and the Pacific
2nd Floor, United Nations Building
Rajdamnern Avenue, Bangkok, 10200, Thailand
Tel: +662-288-1627
Fax: +662-288-2829
Email: eanetsecretariat@un.org
www.unenvironment.org

Network Center

Asia Center for Air Pollution Research (ACAP)
1182 Sowa, Nishi-ku, Niigata-shi, 950-2144, Japan
Tel: +81-25-263-0550
Fax: +81-25-263-0566
Email: eanet@acap.asia
www.acap.asia