FACTSHEET

EANET

ACID DEPOSITION MONITORING NETWORK IN EAST ASIA

JAPAN

Policies and Practices Concerning Acid Deposition

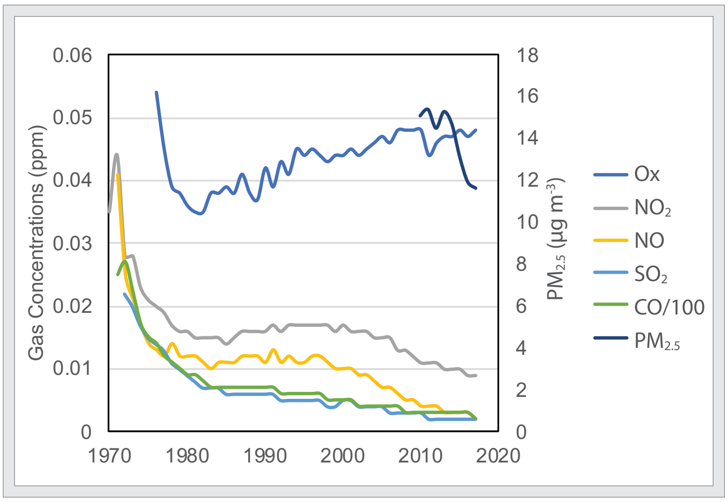
1. CURRENT SITUATION AND PROGRESS

General Evaluation

The Ministry of the Environment, Japan (the former Environmental Agency) started the National Acid Deposition Survey in 1983 to clarify the actual conditions and effects of acid deposition in Japan, and has conducted acid deposition monitoring in the air, soil and vegetation, and inland water. This survey showed that acid deposition was observed nationwide at the same level as in the United States and Europe, suggesting the flux of continent-derived pollutants in the area of Sea of Japan. The monitoring has been implemented in response to growing interest in the issue of transboundary air pollution after that, not only acid deposition but also ozone and particulate matter such as $PM_{2.5}$ were included in the target, and the name was changed to the "Long Term Monitoring Plan for Transboundary Air Pollution and Acid Deposition".

Emission Sources and Trends

The main sources of $PM_{2.5}$ are stationary sources, automobiles, resuspension and tire dust, open burning and ships. The annual average concentration of $PM_{2.5}$ has been improving since 2013 for both the general stations and the roadside stations. However, the annual average concentration of photochemical oxidants has been almost flat in recent years (the right figure shows average concentration trends at general stations based on the Status of 2017 Air Pollution from the Ministry of the Environment; http://www.env.go.jp/air/ref_h29.pdf).



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

According to the latest monitoring results in the fiscal year of 2017 over Japan, the achievement rates of air pollutants for Japanese environmental standards are 99.8% for SO_2 (1002 ambient and roadside air pollution monitoring stations), 99.9% for NO_2 (1640 stations), 99.9% for SPM (1690 stations), 89.1% for $PM_{2.5}$ (1038 stations), and 0% for O_x (1179 stations), respectively. (Source: The air pollution monitoring results in FY 2017 (http://www.env.go.jp/air/ref_h29.pdf))

EANET

UN environment programme

ACAP

Air Pollutants	Average Time	NAAQS ($\mu g/m^3$)	WHO Guidelines ($\mu g/m^3$)
SO_2	24-hr	110 *1	20
	1-hr	270 *1	-
	10-min	-	500
NO_2	1-yr	-	40
	24-hr	77-110 *1	-
	1-hr	-	200
Ox	1-hr	120	-
	8-hr	-	100 *2
SPM	24-hr	100	-
	1-hr	200	-
PM_{10}	1-yr	-	20
	24-hr	-	50 *3
$PM_{2.5}$	1-yr	15	10
	24-hr	35	25 *3

*1: at 20 °C and 1013 hPa
*2: Daily maximum 8-hour average ozone concentration
*3: 99 percentile value

Participation in EANET

Japan joined EANET in 1998 and established the Acid Deposition and Oxidant Research Center (ADORC, renamed Asia Center for Air Pollution Research (ACAP) in 2010), which carries out functions as the Network Center for EANET and also as the National Center for Japan.

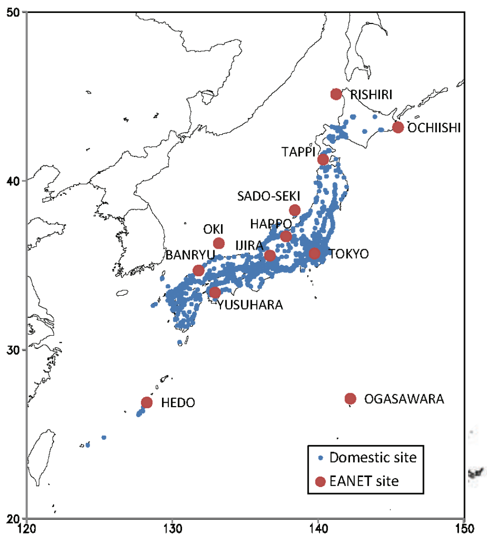
- National Focal Point: Air Environment Division, Environmental Management Bureau, Ministry of the Environment
- Scientific Advisory Committee members: National Institute for Environmental Studies, Kyushu University
- National QA / QC Manager: Asia Center for Air Pollution Research
- National Center: Asia Center for Air Pollution Research

2. SITE INFORMATION

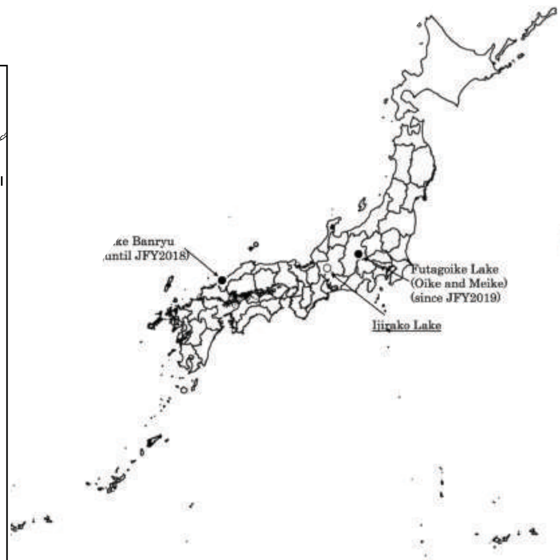
To evaluate long-range transboundary transportation and trends of air pollutants such as acid rain-causing substances, ozone, $PM_{2.5}$, etc. for a long time, atmospheric and ecological impact monitoring has been implemented working closely with EANET.

Information of atmospheric (wet and/or dry deposition) monitoring sites (2017)

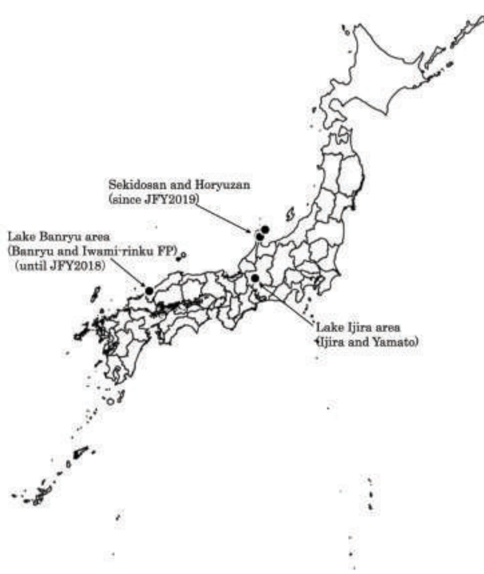
a. Number of domestic monitoring sites: 1910
b. Number of EANET sites: 12
c. Location map of monitoring sites



Inland aquatic environment, and cachment monitoring sites (underlined site) (2017)



Soil and vegetation monitoring sites (2017)

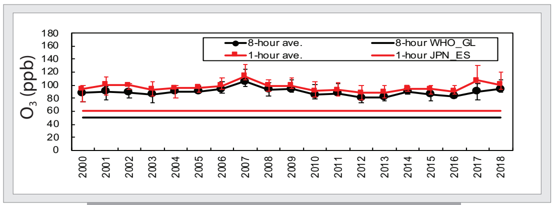


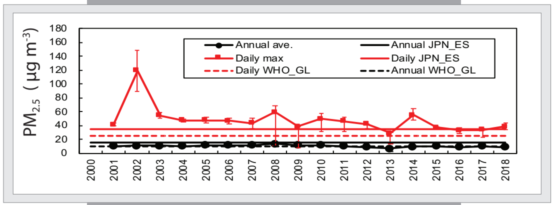
Monitoring Parameters

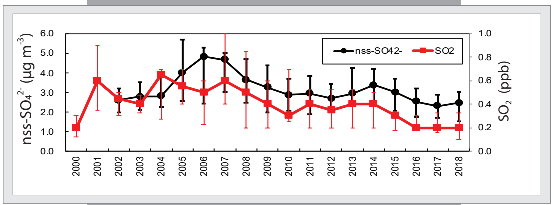
Monitoring Type	Parameters	Frequency
Wet Deposition	pH, EC, SO_4^{2-}, NO_3^-, Cl^-, NH_4^+, Na^+, K^+, Ca^{2+}, Mg^{2+}, Precipitation	Daily/Weekly
Dry Deposition	Automatic: SO_2, NO_x, O_3, PM_{10}, $PM_{2.5}$ Manual: SO_2, HNO_3, HCl, NH_3, SO_4^{2-}, NO_3^-, Cl^-, NH_4^+, Na, K^+, Ca^{2+}, Mg^{2+}	Continuously Biweekly
Inland Aquatic Environment	pH, EC, alkalinity, SO_4^{2-}, NO_3^-, NO_2^-, Cl^-,PO_4^{3-}, NH_4^+, Na, K^+, Ca^{2+}, Mg^{2+}, DOC	4 times/year
Soil	Moisture content, pH(H_2O), pH(KCl), exchangeable base cations (Na^+, K^+, Ca^{2+}, Mg^{2+}), exchangeable acidity, effective cation exchange capacity (ECEC), exchangeable Al and H, carbonate content (for calcareous soil)	Every 5 years
Vegetation	General description of forest (description of trees, understory vegetation survey), survey of tree decline	Every 5 years/ annually

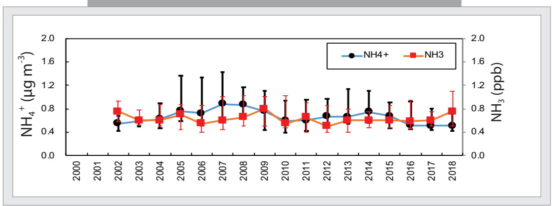
3. HIGHLIGHTS OF MONITORING RESULTS

Dry Deposition







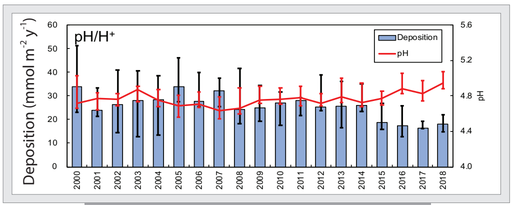


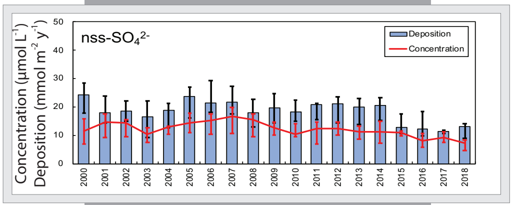
Photochemical oxidant (mainly ozone) has been in high concentration levels exceeding the Japanese Environmental Standard (JPN_ES) and WHO Guideline (WHO_GL).

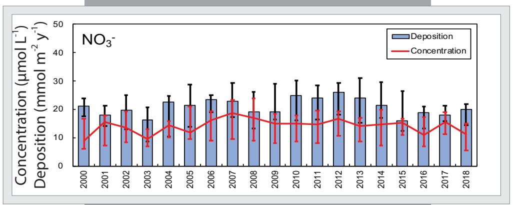
In recent years, the annual and daily average values of $PM_{2.5}$ has been around the WHO_GL and JPN_ES, respectively. Care should be taken in interpreting the data before 2014 because the number of sites was only 2-3 and the method for measuring the concentration is different from the current method.

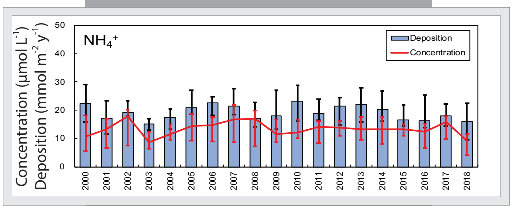
As for precursors of $PM_{2.5}$, SO_2 concentration has been quite low comparing with JPN_ES and WHO_GL. The concentration has decreased recently same as nss-SO_4^{2-}. NH_3 and NH_4^+ concentrations have not shown significant trends.

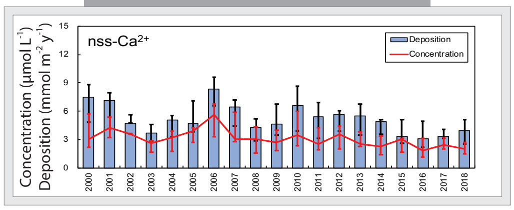
Wet Deposition







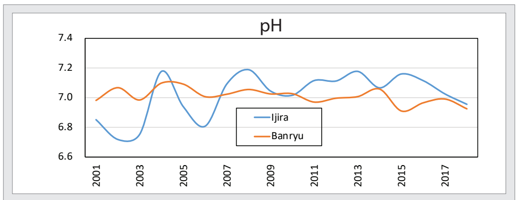


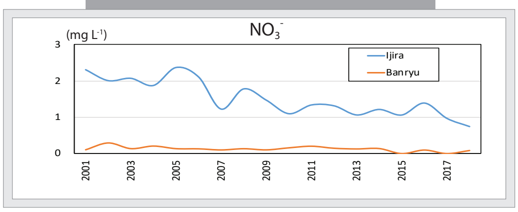


Long-term trends of pH, concentration and wet deposition of major ions (25, 50, and 75 percentile values)

Recently, precipitation pH and non-seasalt sulfate deposition have shown rising and decreasing trends, respectively.

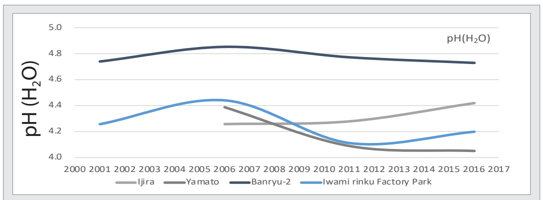
Inland Water





In Ijirako Lake, where acidification and nitrogen saturation in the mid-1990s were suggested, NO_3^- concentration was clearly decreased during the monitoring period since 2001. The pH has recently become stable, around 7.0. Recovery from acidification/nitrogen saturation is suggested.

Soil



At Ijira and Yamato in Gifu Prefecture, soil pH showed different temporal changes, increasing and decreasing, respectively. The change in Ijira was harmonized with that of inland water.

4. AWARENESS ACTIVITIES, RELEVANT POLICIES AND FUTURE PLAN

Highlights of the Country's Awareness Activities

In accordance with the Air Pollution Control Act, the air pollution in Japan is constantly monitored by prefectures and ordinance-designated cities. Measurements (raw data) collected in real time, photochemical oxidant warnings, and PM2.5 alerts issued by prefectures and ordinance-designated cities are provided to the public through the "Atmospheric Environmental Regional Observation System (Soramame-kun)" via the internet in an easy-to-understand way. In order to encourage small and medium-sized manufacturing companies to reduce their emissions of volatile organic compounds (VOCs), a video introducing methods of VOC emission control technique during painting processes was posted on a video sharing website. Furthermore, in cooperation with related ministries and agencies, "10 Recommendations for Eco-Driving" were formulated and related public awareness activities are carried out for the promotion of eco-drive in the context of global warming and air pollution mitigation.

Information on Approaches to Deal with Air Pollution/Acid Deposition Considering the Results of Monitoring

The countermeasures for stationary and mobile sources based on the Air Pollution Control Act are appropriately implemented, and the control of emissions of precursors of photochemical oxidants and PM2.5, such as nitrogen oxides (NOx) and VOCs etc., is in progress as well. In addition, the continuous monitoring system provides necessary information for formulating air quality conservation policies.

Using the long-term monitoring data, the numerical model simulating transboundary air pollution by calculation of atmospheric advection and diffusion has been elaborated. Utilizing this model, in addition to grasping the temporal and spatial distribution of the deposition amounts of air pollutants, a comprehensive analysis and evaluation, including extraction of driving factors of air pollution and elucidation of quantitative source-receptor relationships, has been conducted. Processes of emission, transportation, deposition and ecological impact of air pollutants have been analyzed, and countermeasures for transboundary air pollution have been planned based on the analysis of monitoring data and future predictions by the model simulation.

To provide early awareness of the effects of transboundary air pollution and acid deposition in Japan, long-range transport and long-term trends of air pollutants, monitoring of wet and dry deposition, inland water monitoring for lakes, and soil and vegetation monitoring mainly in remote areas such as remote islands have been implemented to enable the prediction of adverse effects in the future.

EANET Activities and Future Plan

As laid out by the Air Pollution Control Act, measures against stationary and mobile emission sources are continuously implemented. As the precursors of photochemical oxidants and PM2.5, control measures against the emission of NOx and VOCs are implemented while taking account current status of emissions, scientific knowledge, the status of development and spread of emission control technologies (including upgraded simulations that enable quantitative prediction and evaluation of effectiveness of countermeasures), and the economic and technical situation.

In cooperation with EANET, the government of Japan will continue to monitor air pollution to understand the effects of transboundary air pollution and acid deposition in Japan, long-range transport and long-term trends of air pollutants, and prediction of future effects.

National Focal Point

Air Environment Division
Environmental Management Bureau
Ministry of the Environment, Japan
1-2-2, Kasumigaseki, Chiyoda-ku
Tokyo, 100-8975
Japan
Tel: +81-3-5521-8291
Fax: +81-3-3580-7173

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