



25 Years of Achievements of **EANET and ACAP** and Its Future Direction



Function of ACAP (Asia Center for Air Pollution Research)

Network Center of EANET

(Acid Deposition Monitoring Network in East Asia)

- Monitoring
- Data Analysis and Assessment
- Research
- Capacity Building
- Public Awareness
- Intergovernmental Dialog and Information Exchange

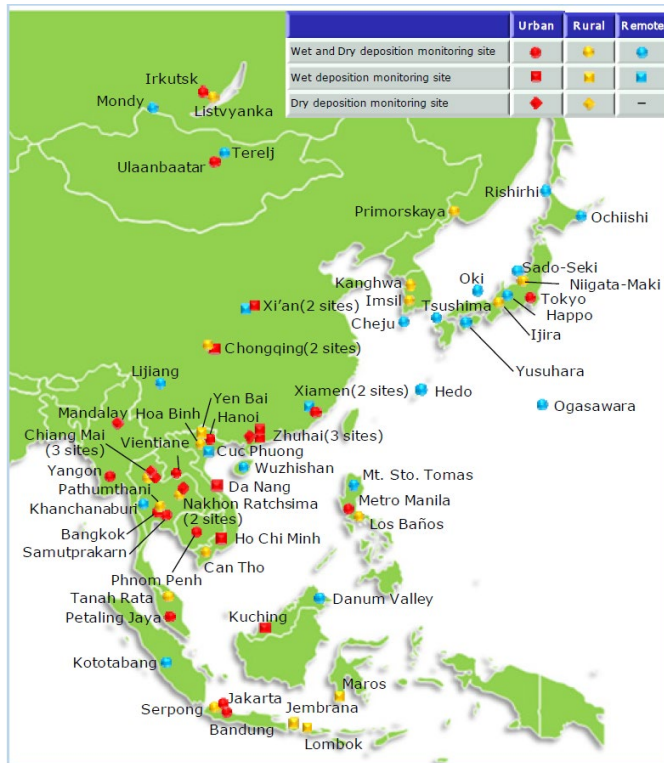
Independent Research Institute on Various Environmental Issues

- **Research**
 - Emission inventory
 - Modeling
 - PM2.5 source identification
 - Ecosystem impacts
 - Health impacts
- **Public awareness**

EANET Achievement 1: High Quality and Open Data

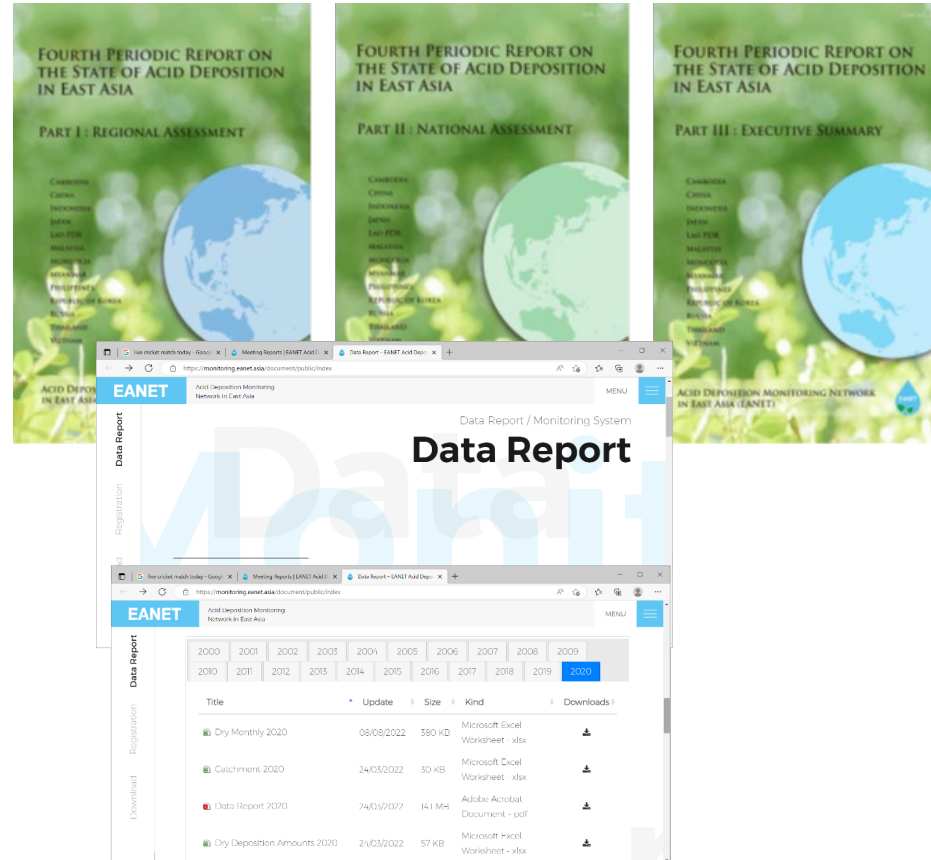
Coordinated Monitoring Network and Data with QA/QC

EANET Monitoring Sites

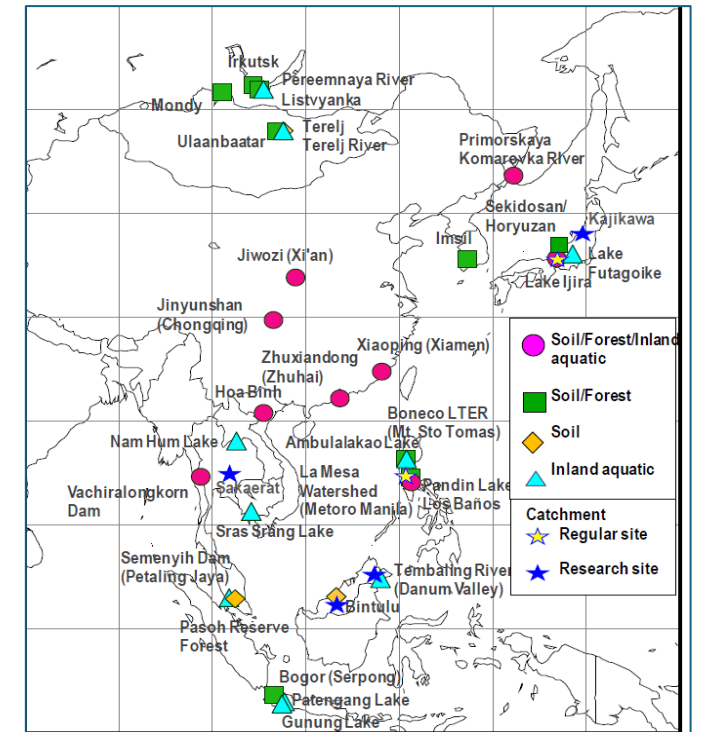


- Wet deposition: 61 sites
- Dry deposition: 54 sites

Successfully established and operating monitoring network in the region for 25 years



Ecological Impacts Monitoring Sites

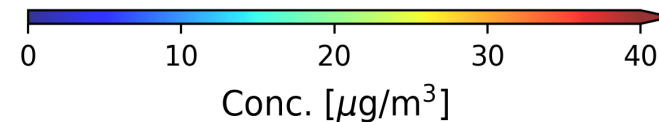
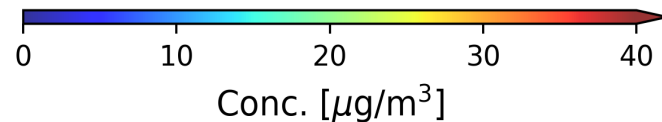
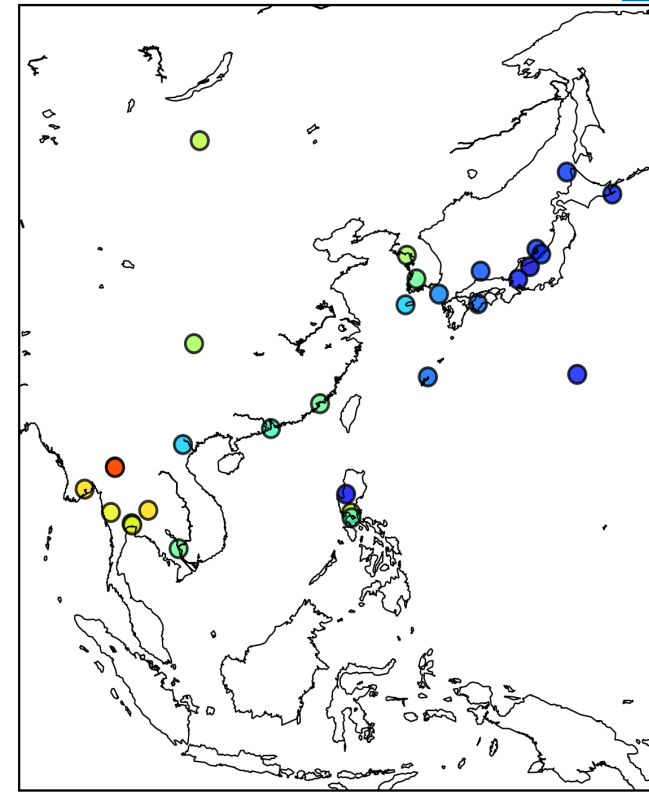
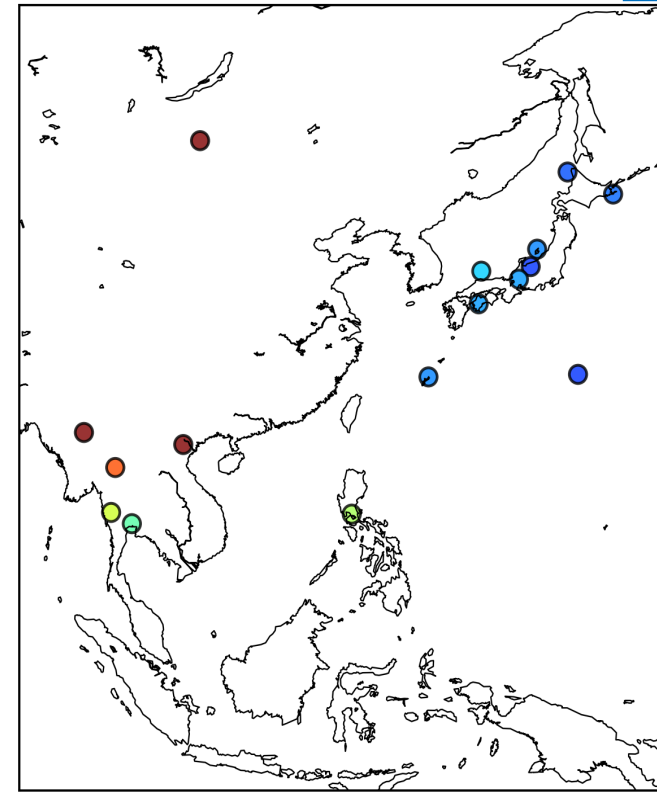


- Soil and vegetation monitoring: 20 areas
- Inland aquatic environment: 19 lakes/ rivers
- Catchment: 2 sites

PM2.5 concentration in East Asia from EANET Data

EANET PM2.5 Monitoring result in 2015

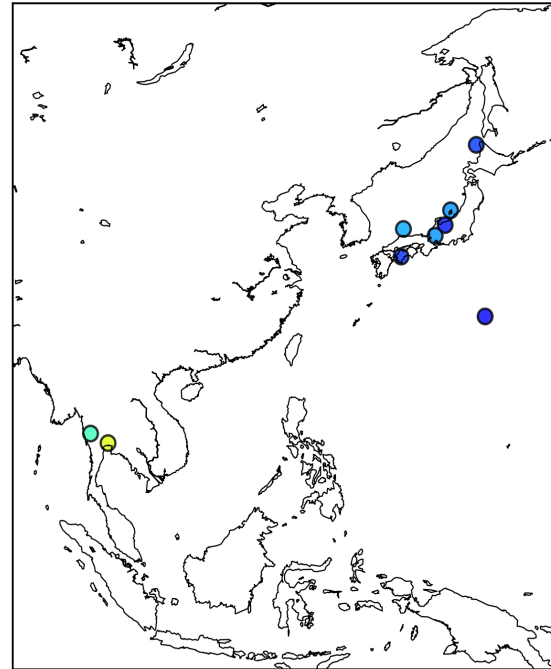
EANET PM2.5 Monitoring result in 2023



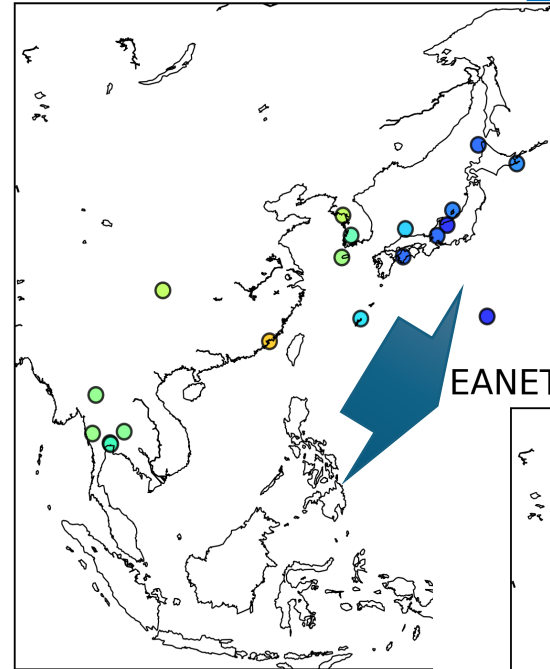
- PM2.5 data in Asia region has been accumulated since 2014.
- PM2.5 concentration obviously decreased in the EANET region.
- PM2.5 Monitoring sites increased and are still keep increasing in the EANET region.

PM10 concentration in East Asia from EANET Data

EANET PM10 Monitoring result in 2000 EANET PM10 Monitoring result in 2010

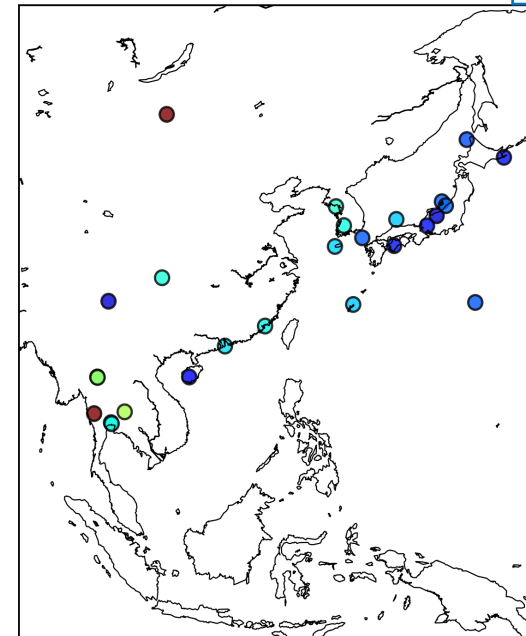


0 20 40 60 80
Conc. [$\mu\text{g}/\text{m}^3$]

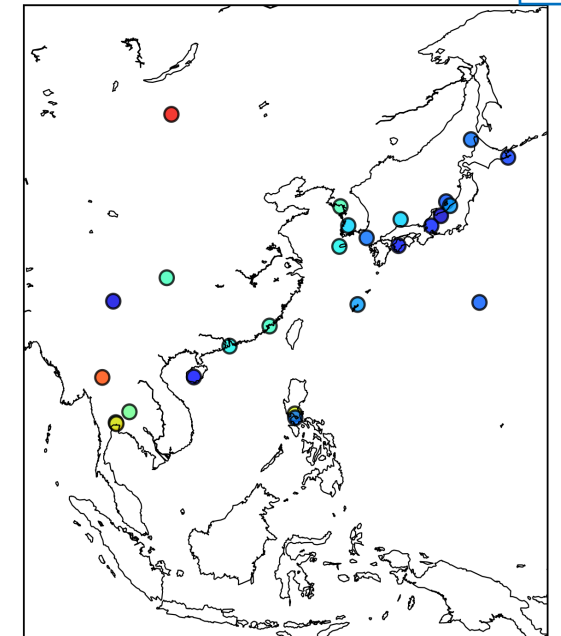


0 20 40 60
Conc. [$\mu\text{g}/\text{m}^3$]

EANET PM10 Monitoring result in 2020 EANET PM10 Monitoring result in 2023



0 20 40 60 80
Conc. [$\mu\text{g}/\text{m}^3$]



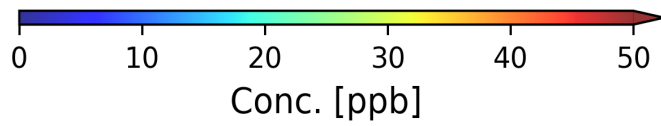
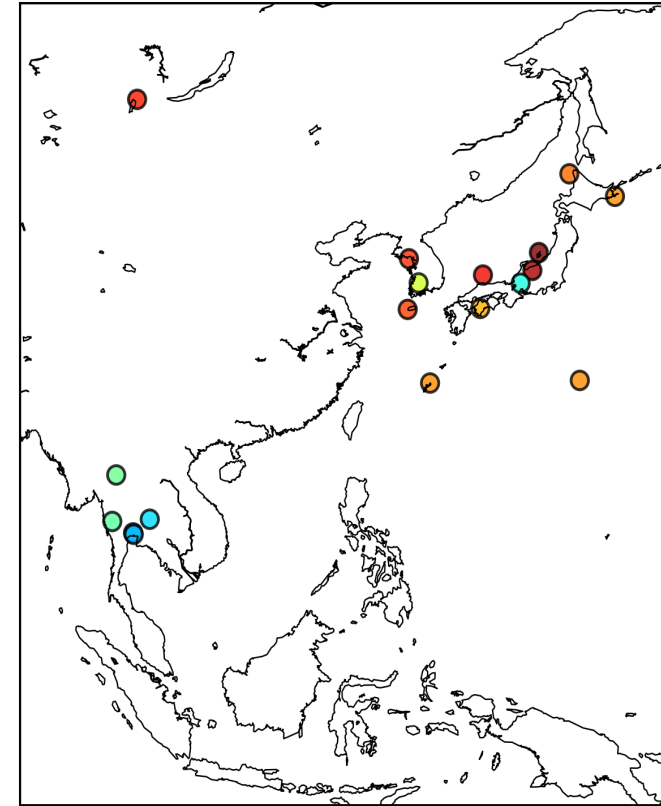
0 20 40 60 80
Conc. [$\mu\text{g}/\text{m}^3$]

- PM10 concentrations in Japan, China, and R. of Korea are relatively low in the EANET region.
- PM10 concentrations in Mongolia and some Southeast Asian countries remain high.

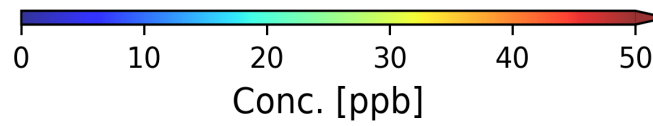
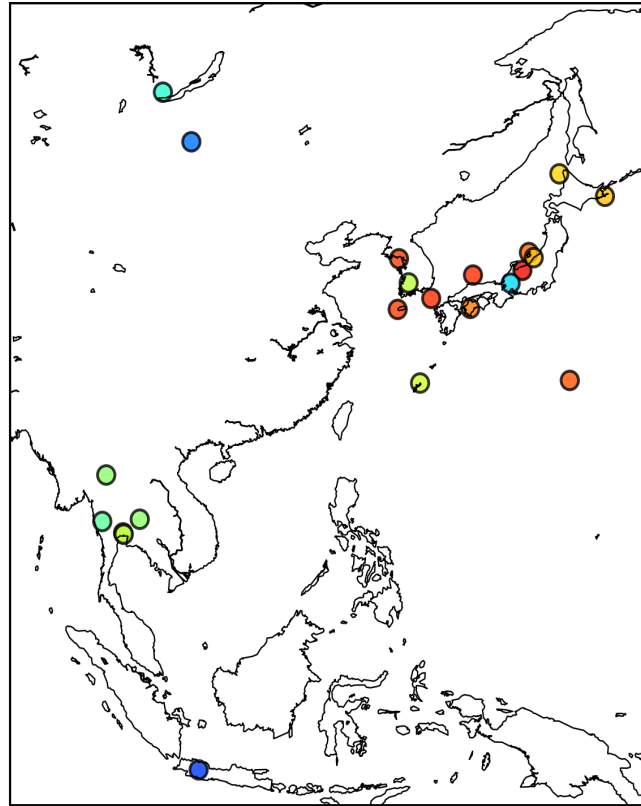
- PM10 data in Asia region has been accumulated since 2000.
- PM10 Monitoring sites has significantly increased in the EANET region.

Ozone Concentration in East Asia from EANET Data

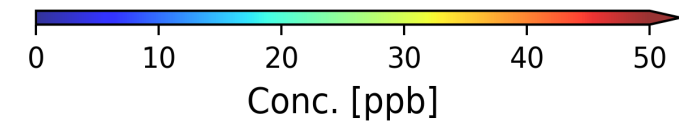
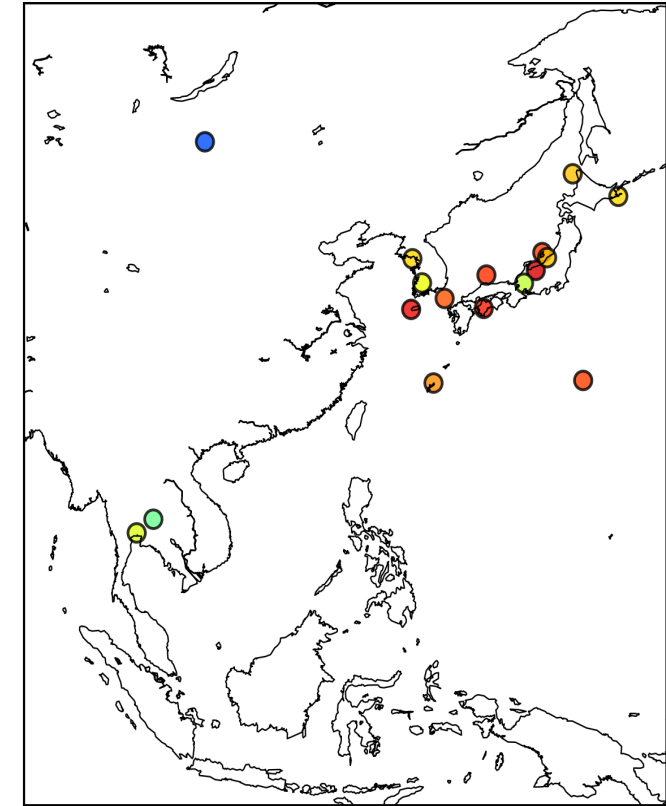
EANET O₃ Monitoring result in 2010



EANET O₃ Monitoring result in 2020



EANET O₃ Monitoring result in 2023



Source: ENET Data reports for the year of 2020, 2020, 2023

EANET Achievement 2: Capacity Buildings

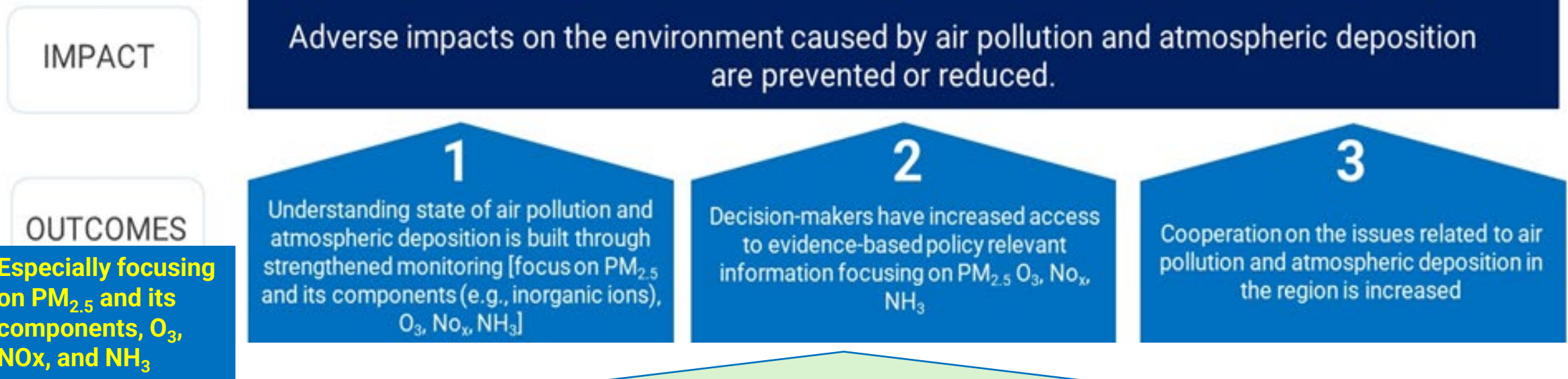
- Provided individual training for **250 people** on monitoring and measurement.
- Accepted research fellowship around **40 people** on various subjects.
- **Dozens** of on sites technical mission on monitoring and measurement in EANET PCs.
- Installation of **ten** PM2.5 and Ozone monitors in EANET PCs.



	Country	City	Institution	Produced by	Installation
PM2.5	Vietnam	HoaBinh	CENRE/IMHEM	Environment S.A.	2015/2
	Myanmar	Mandalay	ECD	Environment S.A.	2015/5
	Mongolia	Ulanbaater	NAMEM	Environment S.A.	2015/10
	Indonesia	Jakarta	BMKG	Thermo	2016/7
	Cambodia	Phnom Penh	MOE	DKK-TOA	2017/4
	Philippines	Metro Manilla	EMB	DKK-TOA	2017/10
	Myanmar	Yangon	DMH	DKK-TOA	2018/3
	LAO PDR	Vientiane	NRERI	DKK-TOA	2018/11
Ozone	Cambodia	Phnom Penh	MOE GDEP	Dylec	2019/8

Future Direction: Next Mid-term Plan of EANET (2026–2030)

Expand EANET's scope from acid deposition to air pollution in 2021, and its related issues (cobenefit of air pollution and climate change)



Especially focusing on PM_{2.5} and its components, O₃, NO_x, and NH₃

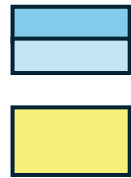
NC proposed three pillars for the next EANET MTP

Sustainable Monitoring System

Nitrogen Flow and Nitrogen management

Co-benefits of Air pollution and Climate change countermeasures

Topics of Technical Training and Schedules in the Medium-Term Plan for the EANET (2026-2030)



CORE

PROJECT

Topics

2026

2027

2028

2029

2030

CORE

Routine Training

Monitoring and QA/QC

Monitoring and QA/QC

Monitoring and QA/QC

Monitoring and QA/QC

Monitoring and QA/QC

Topical Training

VOCs/ Ozone

PM2.5 component

Atmospheric Deposition (Nitrogen etc.)

PM2.5 component

Atmospheric Deposition (Nitrogen etc.)

TNT

PM2.5/ Ozone

PM2.5/ Ozone

PM2.5/ Ozone

PM2.5/ Ozone

PM2.5/ Ozone

PM2.5/ Ozone

VOCs

VOCs

Basic (sampling & analysis) ↔ Application (data analysis, modeling)

Thailand Training

PM2.5 (SE Asia)

PM2.5 (SE Asia)

PM2.5 (SE Asia)

PM2.5 (SE Asia)

PM2.5 (SE Asia)

PM2.5 (SE Asia)

Fellowship

Data and policy analysis/ assessment

Advanced data analysis

Advanced data analysis

Advanced data analysis

Advanced data analysis

Advanced data analysis

linkage



Introduction of ACAP, as Independent Research Institute

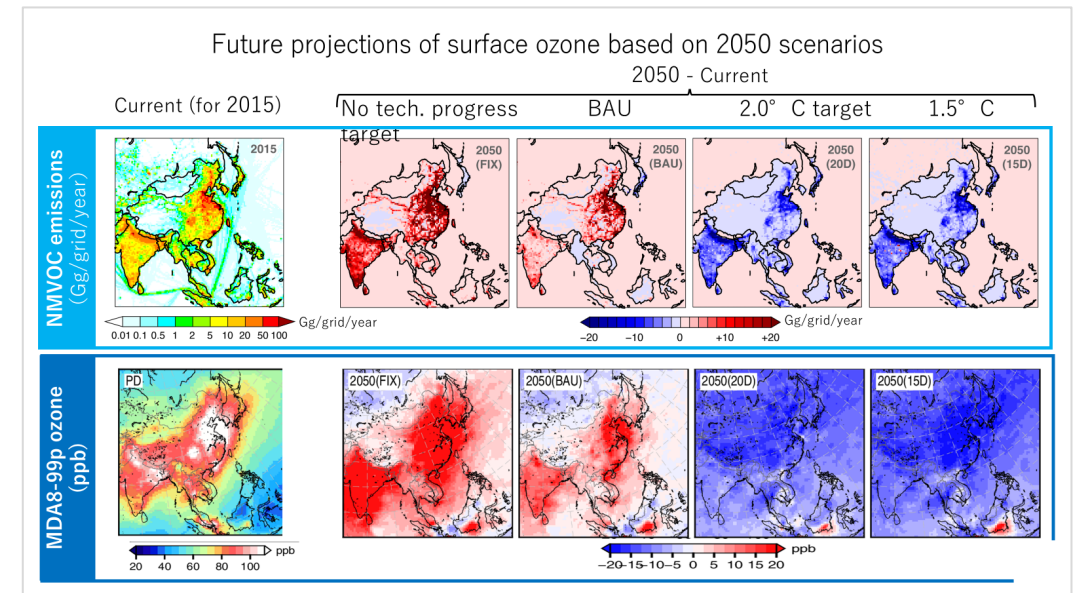
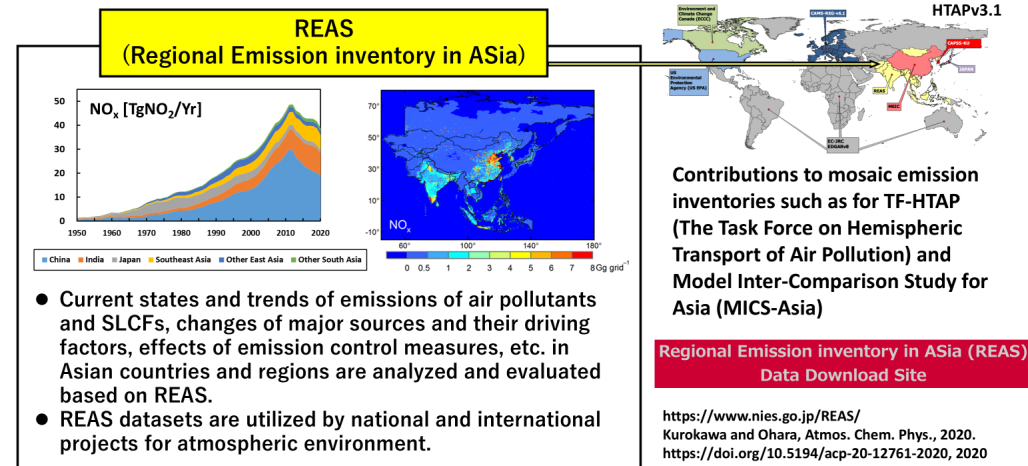
• Research

- Emission inventory
- Modeling
- PM2.5 source identification
- Ecosystem impacts
- Health impacts

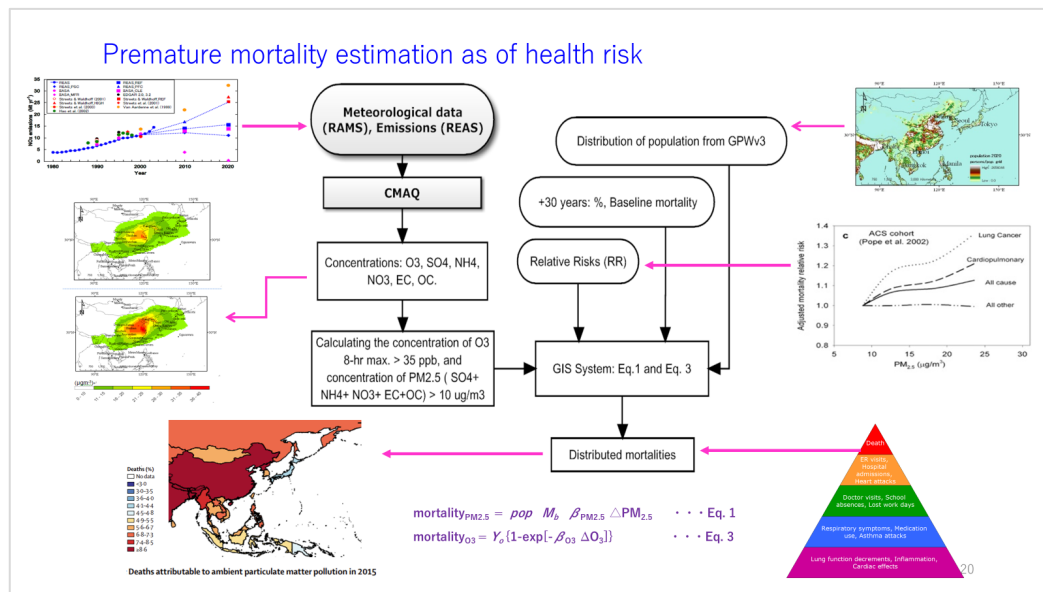
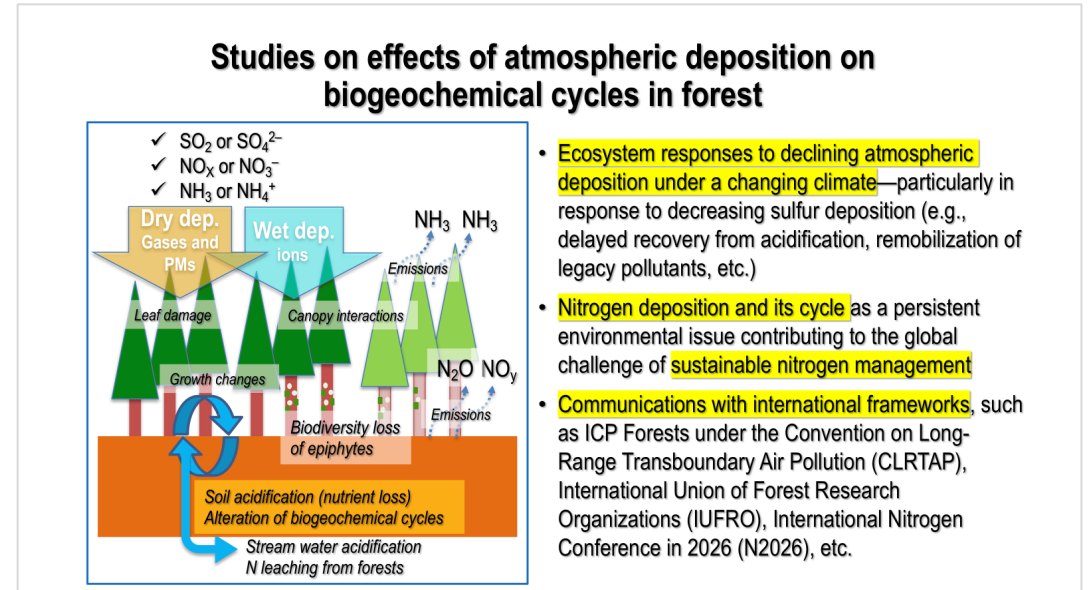
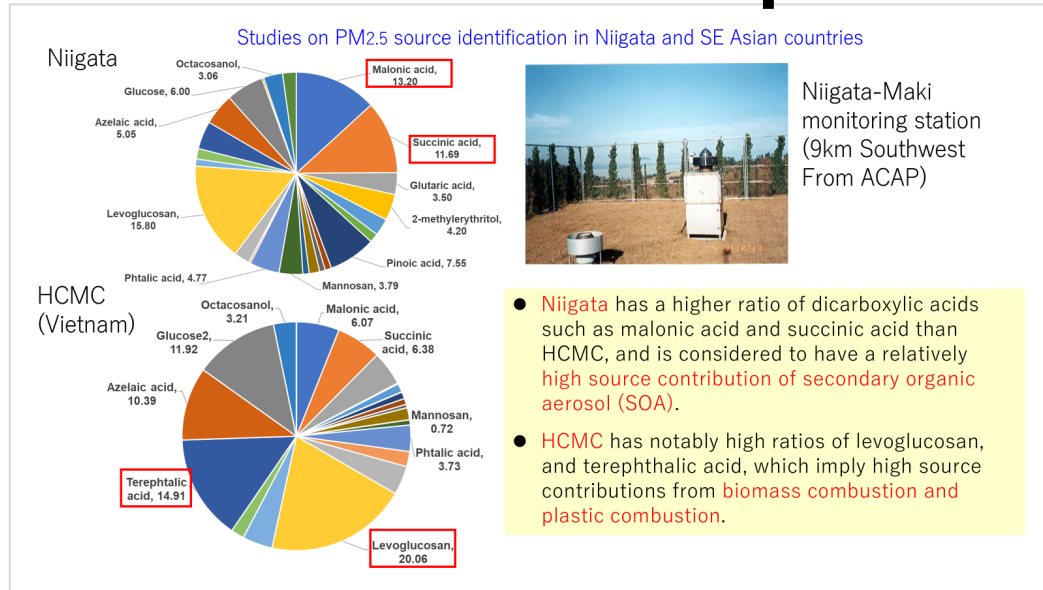
• Public awareness

J. Kurokawa and T. Ohara are **Lead Authors of 2027 IPCC Methodology Report on Inventories for Short-lived Climate Forcers**

Study on Emission Inventory of
Air Pollutants and Short-Lived Climate Forcers (SLCFs) in Asia



Introduction of ACAP, as Independent Research Institute



Public awareness

Every summer, ACAP invites kids to its open house, where they come to open the door to science.

So far, more than 350 young scientists have already set off on their journey to the future!

科学を通して世界へ飛び出そう!

受付開始 6月27日(金) AM10:00~

2025 8.1 (金)

9:30 ~ 16:10 (受付開始 9:10)

会場: アジア大気汚染研究センター

定員: 24名 (先着順)

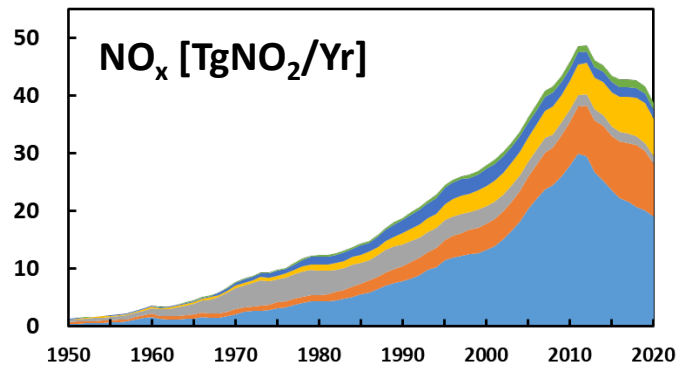
対象: 小学生～中学生

参加はすべて無料!

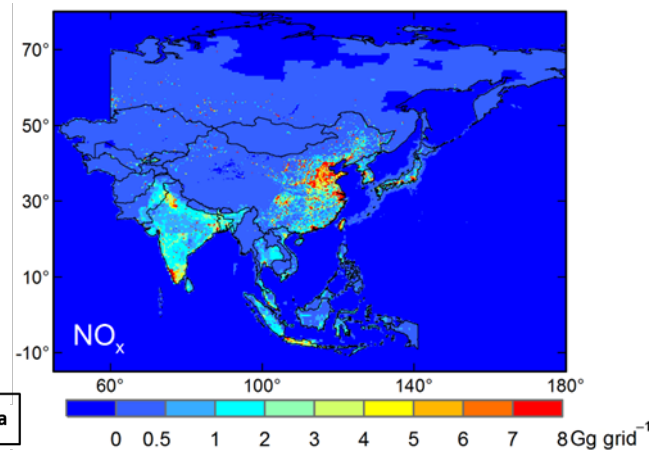
Reference

Study on Emission Inventory of Air Pollutants and Short-Lived Climate Forcers (SLCFs) in Asia

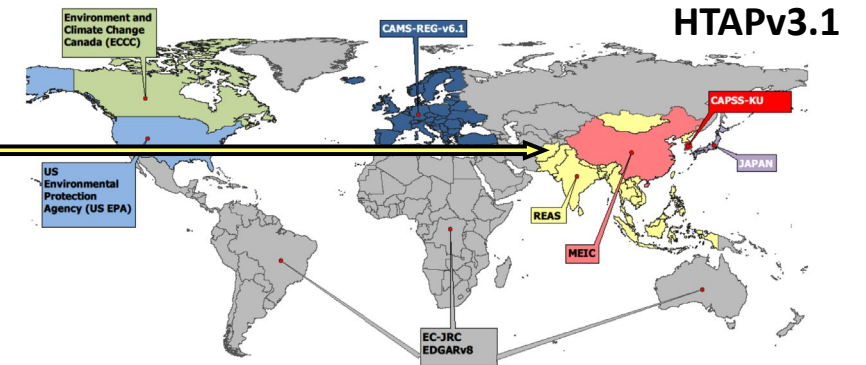
REAS (Regional Emission inventory in ASia)



■ China ■ India ■ Japan ■ Southeast Asia ■ Other East Asia ■ Other South Asia



- Current states and trends of emissions of air pollutants and SLCFs, changes of major sources and their driving factors, effects of emission control measures, etc. in Asian countries and regions are analyzed and evaluated based on REAS.
- REAS datasets are utilized by national and international projects for atmospheric environment.



Contributions to mosaic emission inventories such as for TF-HTAP (The Task Force on Hemispheric Transport of Air Pollution) and Model Inter-Comparison Study for Asia (MICS-Asia)

Regional Emission inventory in ASia (REAS)
Data Download Site

<https://www.nies.go.jp/REAS/>
Kurokawa and Ohara, Atmos. Chem. Phys., 2020.
<https://doi.org/10.5194/acp-20-12761-2020>, 2020

2027 IPCC Methodology Report on Inventories for Short-lived Climate Forcers

Lead Authors From ACAP

J. Kurokawa and T. Ohara



1st Lead Author Meeting (LAM1) for Zero Order Draft: 24-26 MAR 2025

Future projections of surface ozone based on 2050 scenarios

2050 - Current

Current (for 2015)

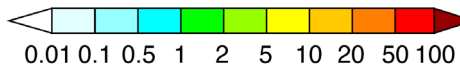
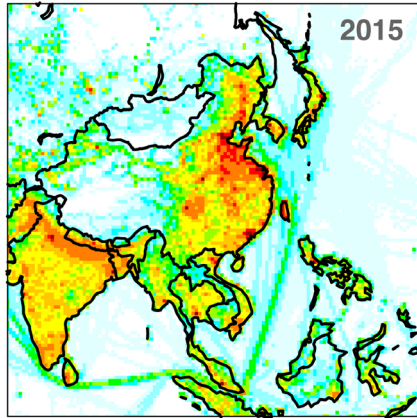
No tech. progress target

BAU

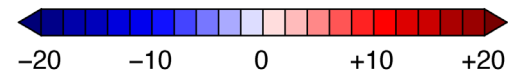
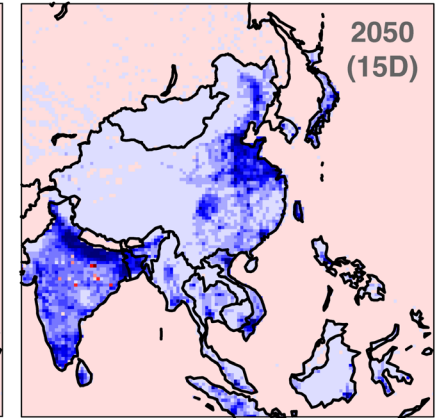
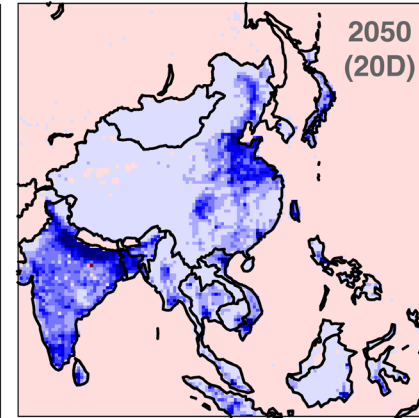
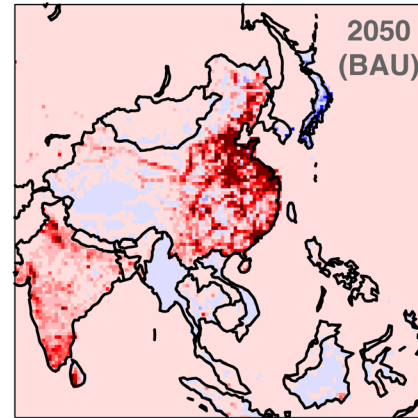
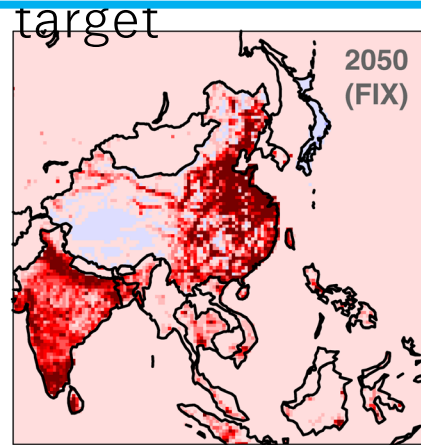
2.0° C target

1.5° C

NMVOC emissions
(Gg/grid/year)

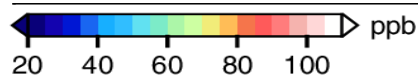
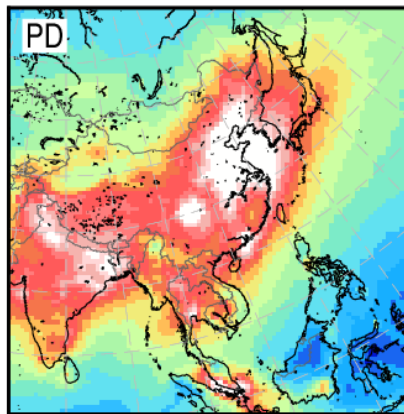


Gg/grid/year

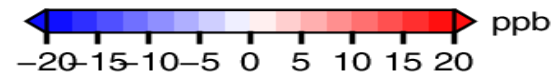
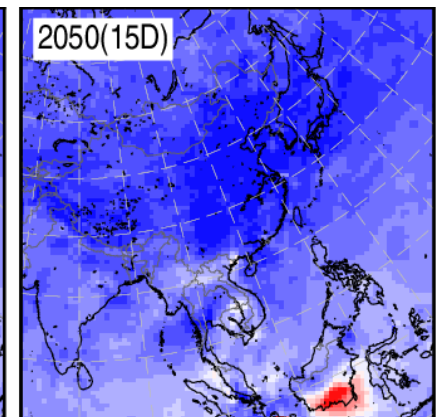
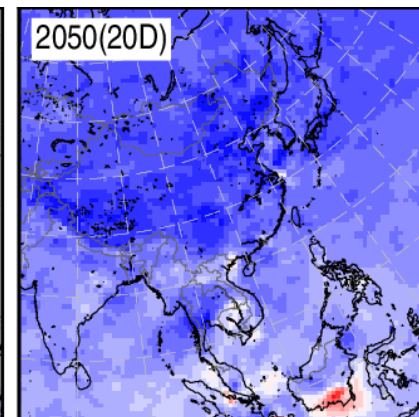
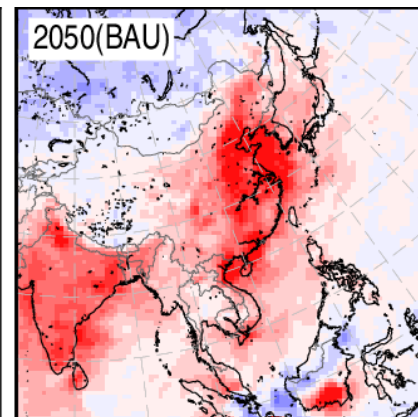
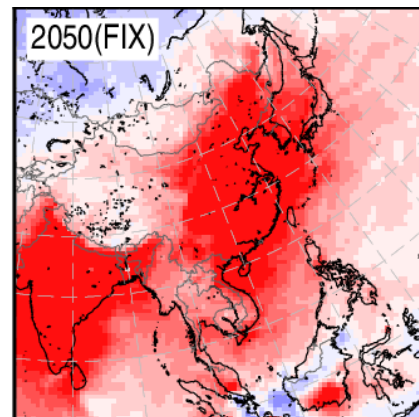


Gg/grid/year

MDA8-99p ozone
(ppb)



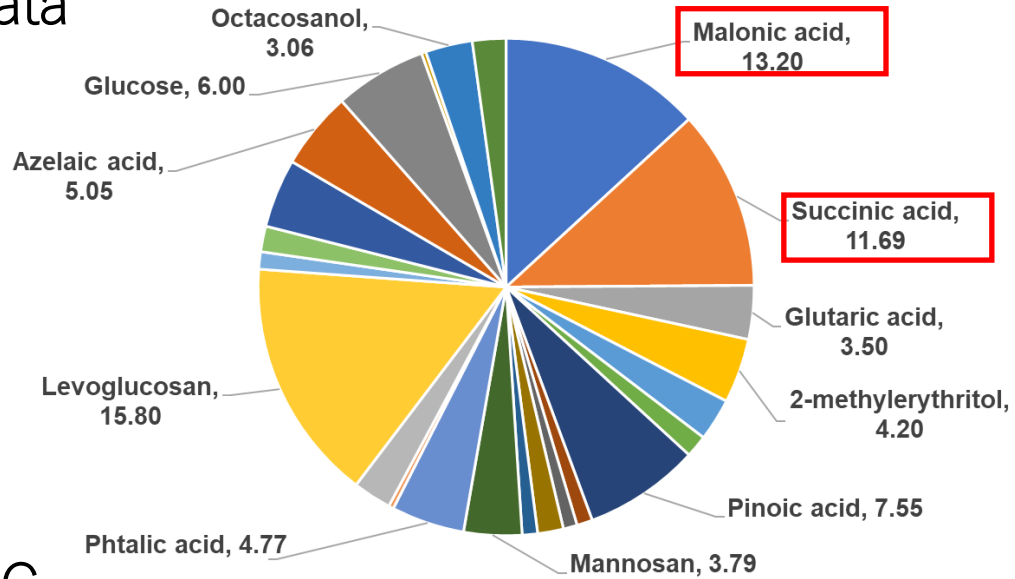
ppb



ppb

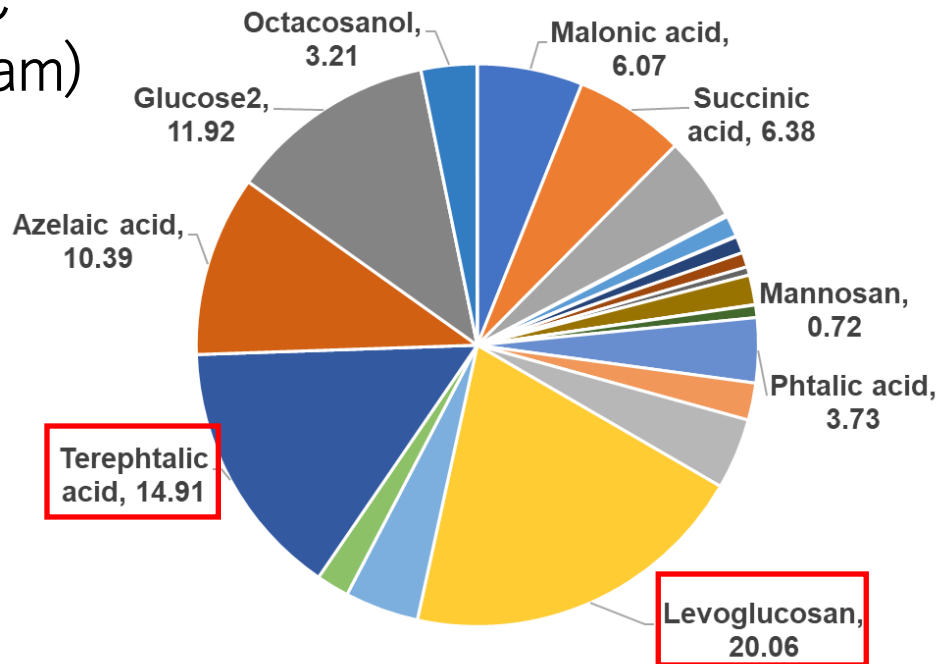
Studies on PM2.5 source identification in Niigata and SE Asian countries

Niigata



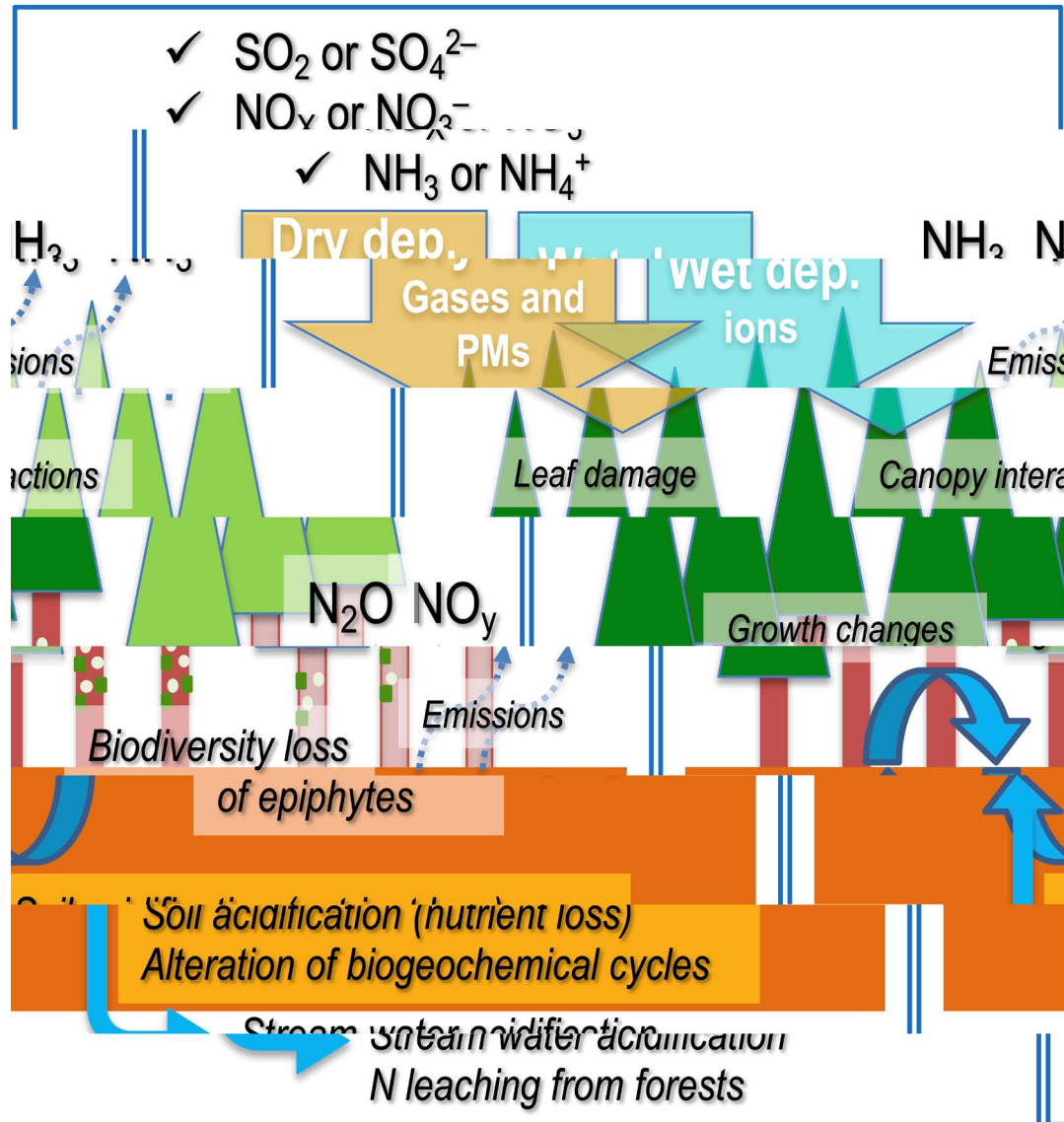
Niigata-Maki monitoring station (9km Southwest From ACAP)

HCMC (Vietnam)



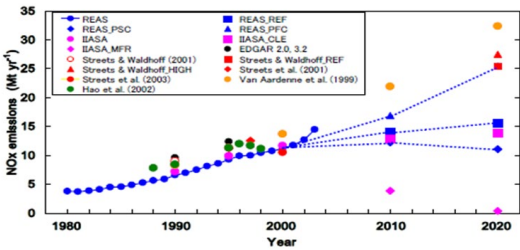
- **Niigata** has a higher ratio of dicarboxylic acids such as malonic acid and succinic acid than HCMC, and is considered to have a relatively **high source contribution of secondary organic aerosol (SOA)**.
- **HCMC** has notably high ratios of levoglucozan, and terephthalic acid, which imply high source contributions from **biomass combustion and plastic combustion**.

Studies on effects of atmospheric deposition on biogeochemical cycles in forest



- Ecosystem responses to declining atmospheric deposition under a changing climate—particularly in response to decreasing sulfur deposition (e.g., delayed recovery from acidification, remobilization of legacy pollutants, etc.)
- Nitrogen deposition and its cycle as a persistent environmental issue contributing to the global challenge of sustainable nitrogen management
- Communications with international frameworks, such as ICP Forests under the Convention on Long-Range Transboundary Air Pollution (CLRTAP), International Union of Forest Research Organizations (IUFRO), International Nitrogen Conference in 2026 (N2026), etc.

Premature mortality estimation as of health risk



Meteorological data (RAMS), Emissions (REAS)

CMAQ

Concentrations: O3, SO4, NH4, NO3, EC, OC.

Calculating the concentration of O3 8-hr max. > 35 ppb, and concentration of PM2.5 (SO4+NH4+NO3+EC+OC) > 10 ug/m3

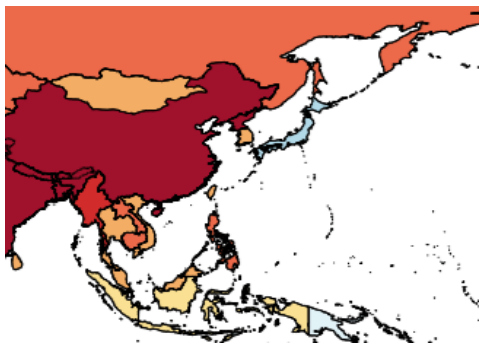
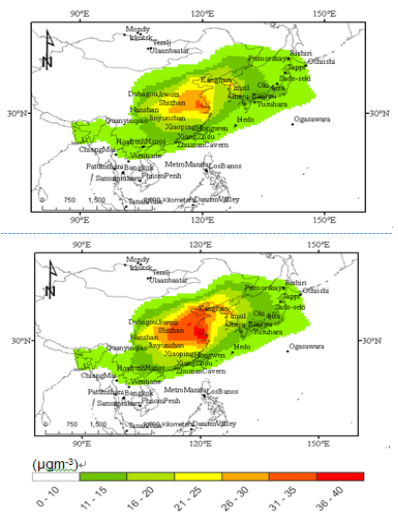
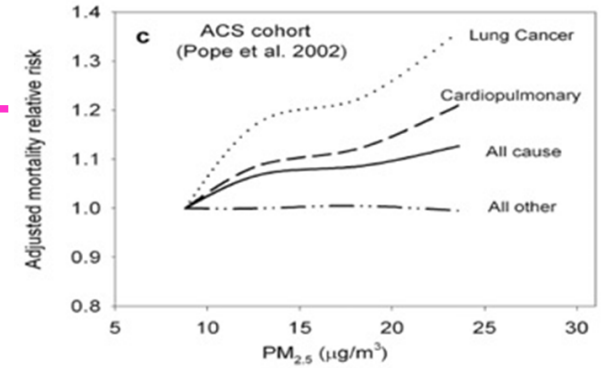
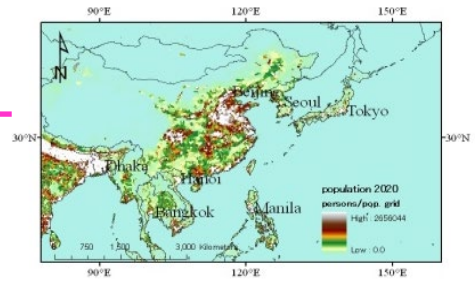
Distribution of population from GPWv3

+30 years: %, Baseline mortality

Relative Risks (RR)

GIS System: Eq. 1 and Eq. 3

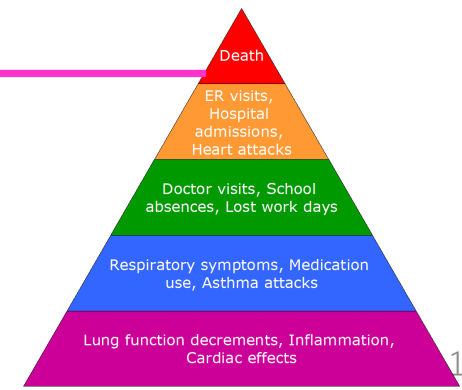
Distributed mortalities



Deaths attributable to ambient particulate matter pollution in 2015

$$\text{mortality}_{\text{PM}_{2.5}} = \text{pop } M_b \beta_{\text{PM}_{2.5}} \Delta \text{PM}_{2.5} \dots \text{Eq. 1}$$

$$\text{mortality}_{\text{O}_3} = Y_o \{1 - \exp[-\beta_{\text{O}_3} \Delta \text{O}_3]\} \dots \text{Eq. 3}$$



Public awareness

Every summer, ACAP invites kids to its open house, where they come to open the door to science.



大気汚染をテーマにしたイベントを開催するの？
調べるって おもしろい！

実験しよう

空気のごよれや酸性雨などの
大気汚染について
学ぼう

科学を通して世界へ飛び出そう！

研究所ってどんなところだろう？
実験室を見学しよう

受付開始
6月27日(金)
AM10:00~
裏面から申し込んでね！

※定員に達した際はホームページ・
Instagramでもお知らせします
(前回の様子も掲載しています)

2025 8.1 (金)

参加はすべて
無料!
(要事前申込)

9:30 ~ 16:10 (受付開始 9:10)

会場: アジア大気汚染研究センター

定員: **24名(先着順)**

対象: 小学5年生~中学3年生

後援: 新潟市教育委員会

詳しくは裏面へ

ACAP

科学を通して世界へ飛び出そう！
M.A.K.E.N.H.I.
日本学術振興会

So far, more than **350 young scientists** have already set off on their journey to the future!