

*The Twentieth Anniversary of the EANET and the EANET Science and Policy Dialogue,
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Progress of Improvement, Challenges and the Way Forward of Air Pollution in East Asia

Hajime Akimoto

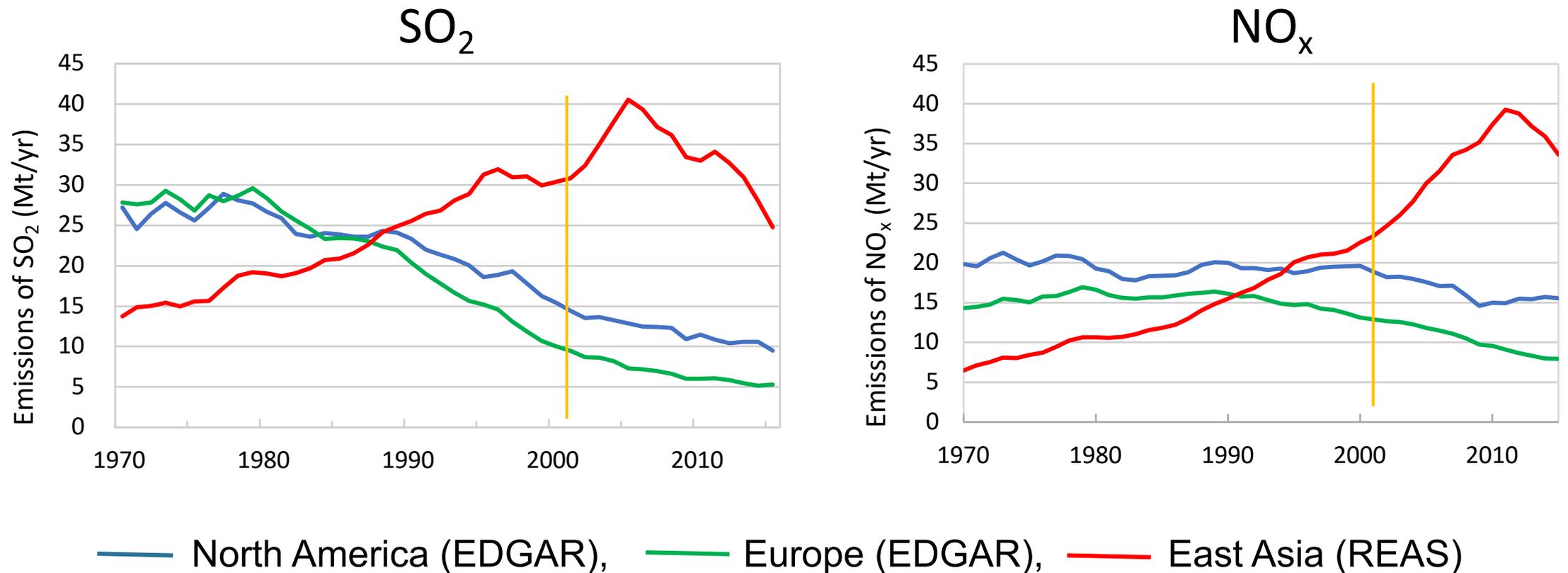
Guest Scientist

National Institute for Environmental Studies

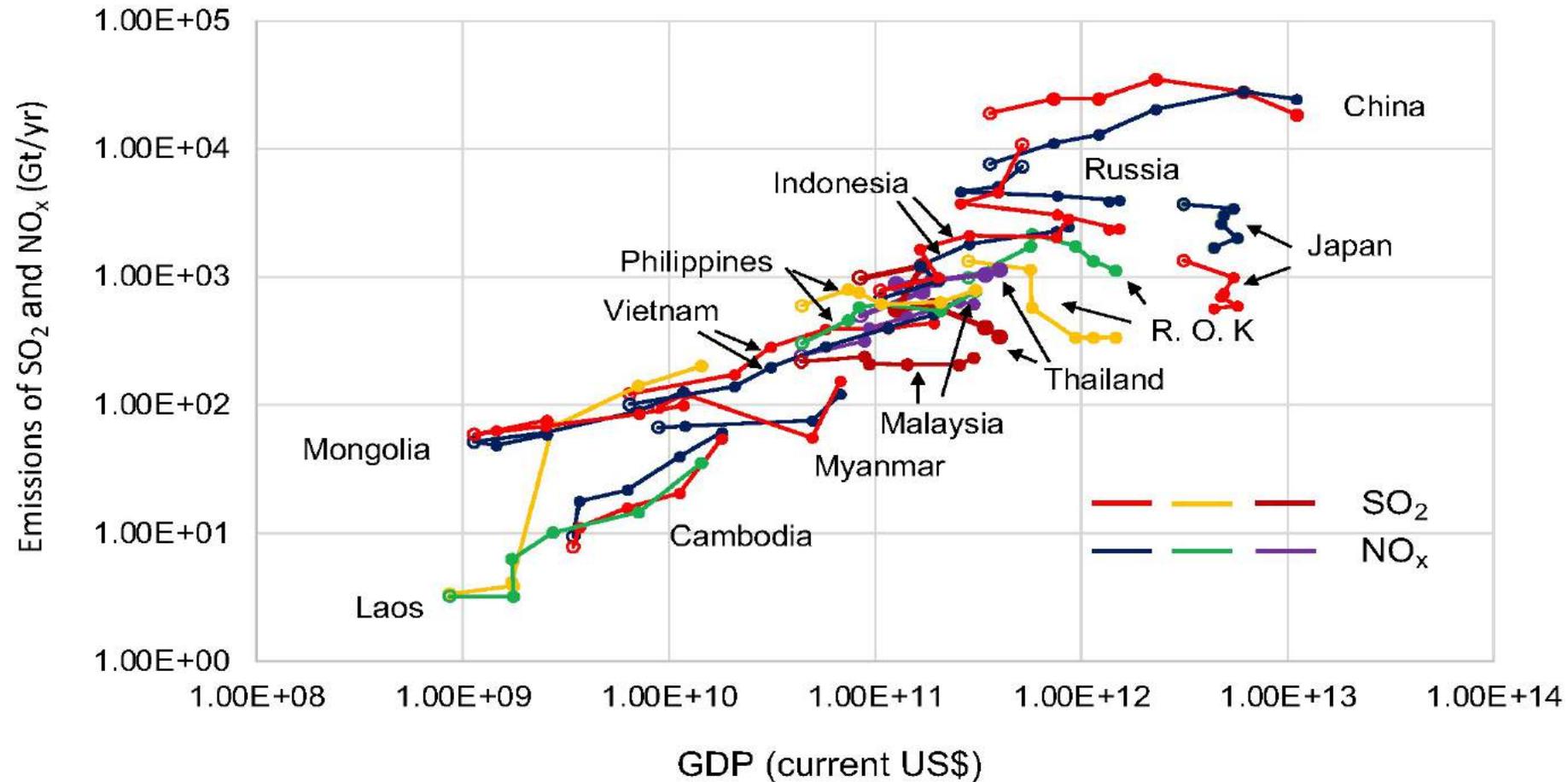


Historical Emissions of (a) SO₂ and (b) NO_x in East Asia Comparing with Europe and North America

(EDGAR v.5 for Europe and North America, and REAS v.3 for East Asia)

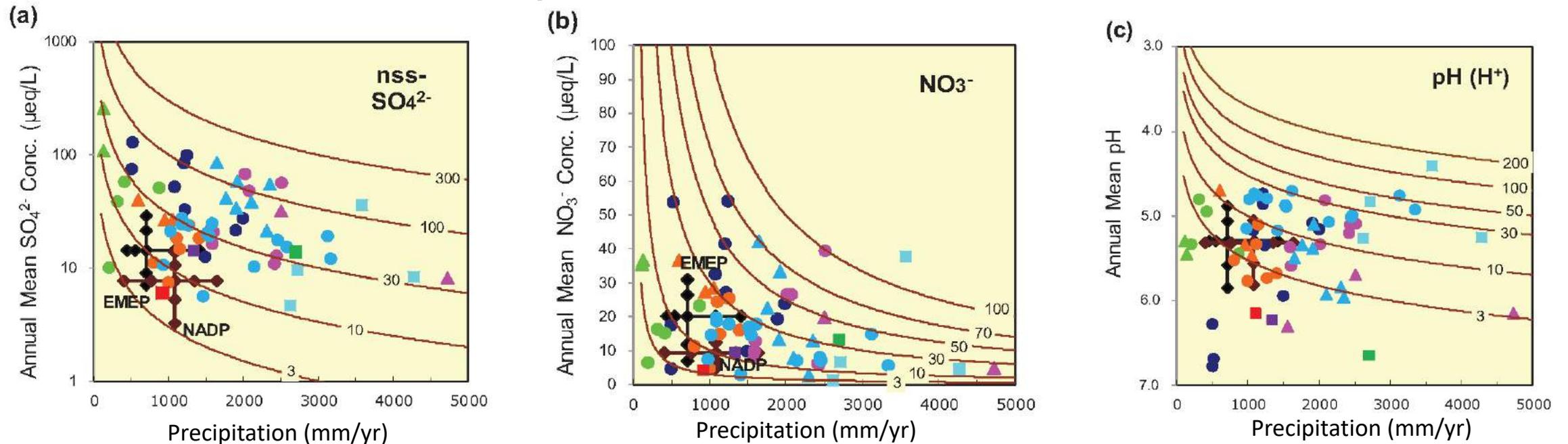


Emissions of SO₂ and NO_x vs. GDP for the EANET Participating Countries 1990(1995*) - 2015 in 5-year intervals (* Cambodia and Myanmar)



Example of Basic Achievement of EANET

Annual Mean Ion Concentrations and pH of precipitation, and Annual Wet deposition Amounts in East Asia in 2014-2019



Ohizumi et al. (2021)

What was caused by these acidification in East Asia?

30 years of Development of Science and Policy Related to Acid Deposition in East Asia

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Submitted to *Ambio*

What has been found:

- Limited acidifying trends of inland water and forest soils have been documented.
- Decline of fish populations and other aquatic biota due to the acidification has not been reported.
- Forest decline or visible forest tree damages have been reported in China, Japan and R.O.K.
- The causes have been speculated to be due to acid fog, air pollutants (NO_2 , SO_2 , HF, or O_3), pests/insects, and their combined effects. The cause due to acid-deposition-induced soil acidification has not been identified.

Scientific Guideline for Future Direction of EANET

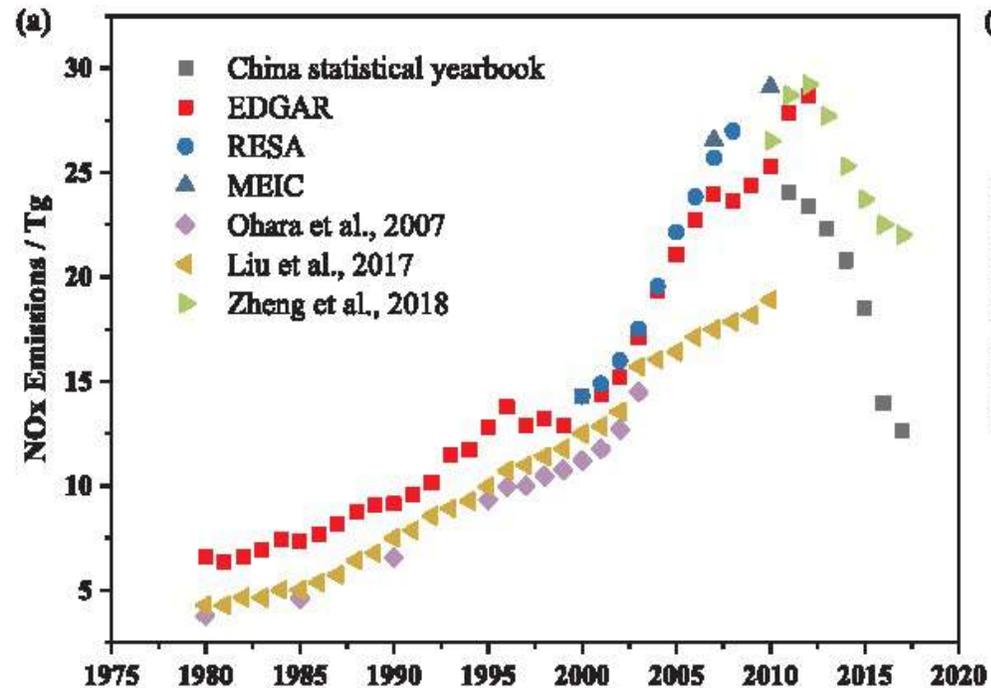
- Fortunately, acid deposition per se has not caused serious damage on neither to aquatic nor terrestrial ecosystems in East Asia.
- However, “nitrogen saturation” of forest soil due to excess deposition of nitrogen (nitrate and ammonium ions) is now a large concern for ecosystem impact.
- Meanwhile, air quality issues caused by high levels of PM_{2.5} and ozone have become quite serious in many countries in this region as alerted by WHO (2014) and Global Environmental Outlook (GEO-6) published by UNEP (2019).
- Climate change has become an issue of increasing concern in relation to science and policy. It is now recognized that co-controlling the CO₂ and SLCPs (short-lived climate pollutants) is mandatory for controlling global warming in near- and long-term future. Economical co-benefits of simultaneous reduction of air pollutants and climate pollutants are well recognized.

“Nitrogen Saturation”

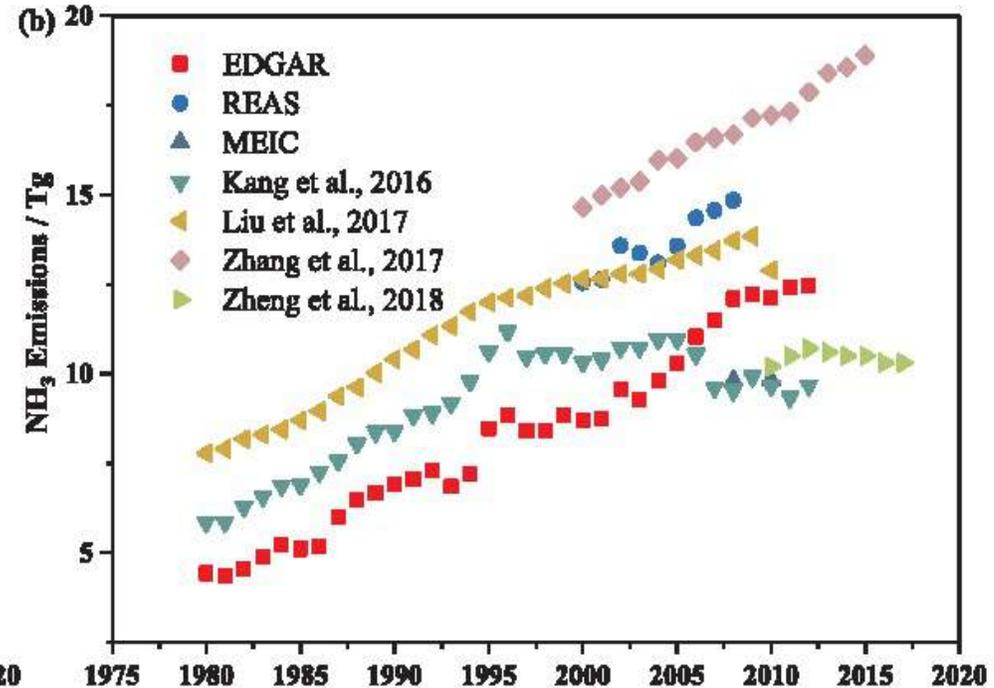
Disturbance of Nitrogen Cycle in Forest Ecosystems due to Excess Nitrogen Inputs

Reductions of nitrate (NO_3^-) and ammonium (NH_4^+) deposition by emission control of NO_x and ammonia (NH_3) are necessary .

Emission Inventories on NO_x



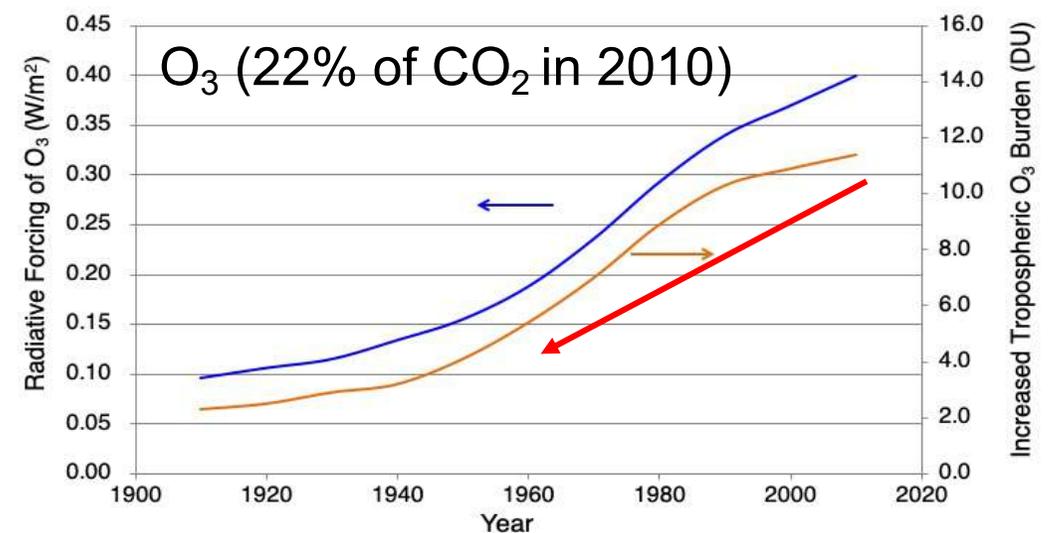
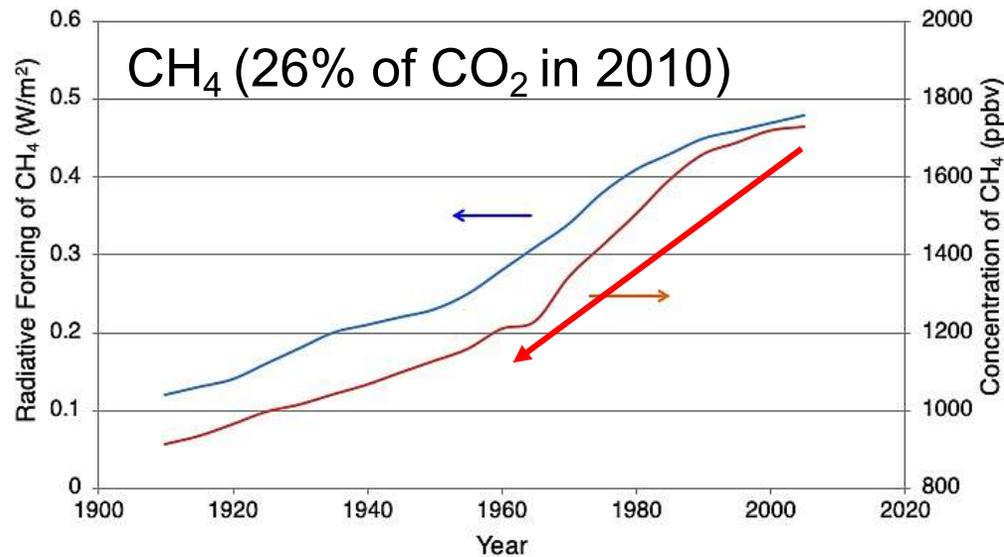
Emission Inventories on NH_3



Priority Species to be monitored based on the scientific Guideline

	NO _x	NH ₃	SO ₂	O ₃	CH ₄	NMVOC	PM _{2.5}
Nitrogen Saturation (NO ₃ ⁻ , NH ₄ ⁺)	X	X					
Air Pollution (PM _{2.5} , O ₃)	X		X	X		X	X
Air Quality-Climate (SLCPs)	X			X	X	X	X

SLCPs (Short-lived Climate Pollutants): Methane (CH₄) and Ozone (O₃ ; NO_x, NMVOC)



Epistemic Community for Science and Policy Interface in East Asia

- An epistemic community is defined as a network of professionals with recognized expertise and authority to policy relevant scientific knowledges in a particular research field.
- Scientific knowledge based on trust and consensus among the members of the epistemic community is considered as a critical element for successful environmental cooperation among countries.
- The time had not yet come for such a community to emerge in Asia 20 years ago when EANET started. Many countries had difficulty in dispatching experts with professional knowledge to the SAC meeting.
- The time has been changing. Epistemic community in atmospheric environment field in Asia has now been forming e.g., through Model Intercomparison Study in Asia (MICS-Asia) project, and Science Panel of Asia Pacific Clean Air Partnership (APCAP) under UNEP ROAP.
- EANET SAC is now expected to be more close to the kernel of the epistemic community.

Expecting Future Successful Development of EANET
for the Governance of Atmospheric Environment in East Asia!

Thank you very much for your attention !

