

TPM11 - Session 4

PRA2. Asian Air Pollution
- NAATS and Action Plan





NAATS and Action Plan

- PRA of Asian Air Pollution -

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Summary of PRA Activity in 2014

◆ NIES & NIER

Real Time AMS(Aerosol Mass Spectrometer) Collaboration Measurement

※ NAATS(Northeast Asian Aerosol Transport Study) Project

- Enhancement of understandings about characteristics of Northeast aerosol
- November 2013 and 2014(BN & Fukue Island)

◆ CRAES & NIER

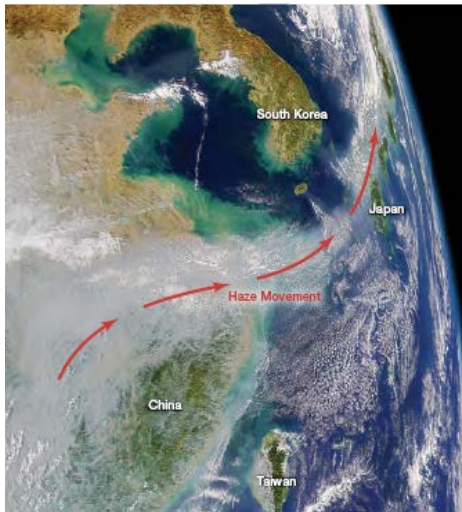
Information Exchange of Air Pollution Reduction Policy and related Scientific Research Program

- Sharing about current status of air quality
- National Air Quality Forecasting Strategy & Clean Air Action Plan

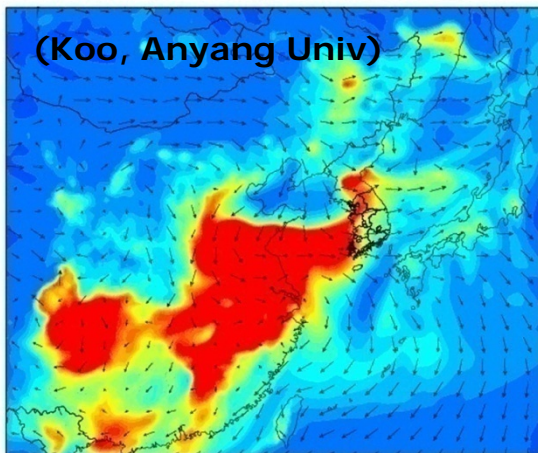


Activity Between NIES and NIER : NAATS

Regional Air Pollution

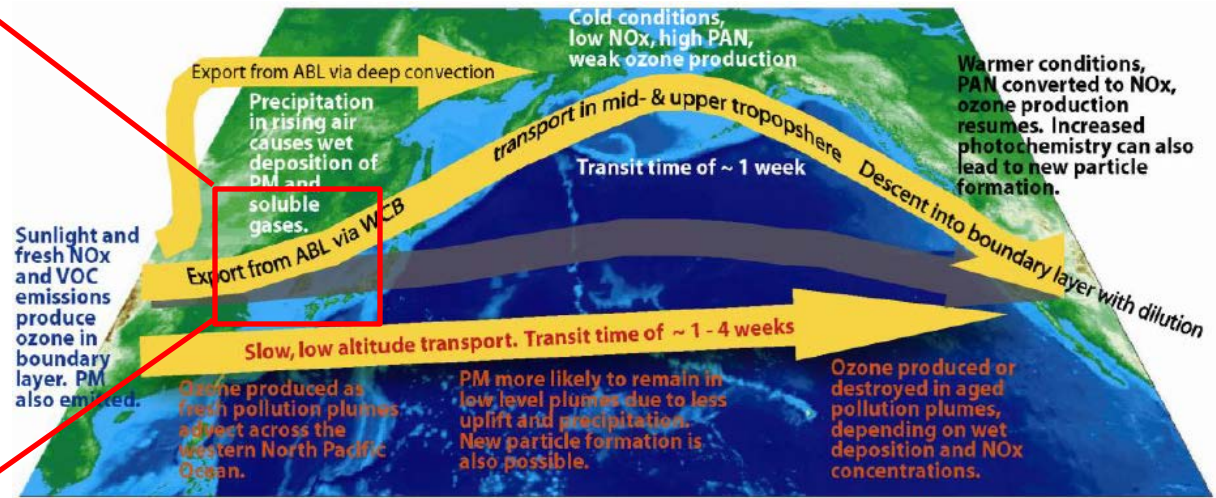


PM_{2.5}($\mu\text{g}/\text{m}^3$)



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Hemispheric Transport of Air Pollution



- ▷ Local air qualities have been severely affected by long-range transport & local emissions.
- ▷ However, there are great unknowns for its contributions, chemical evolution, emissions, and pathways along PBL



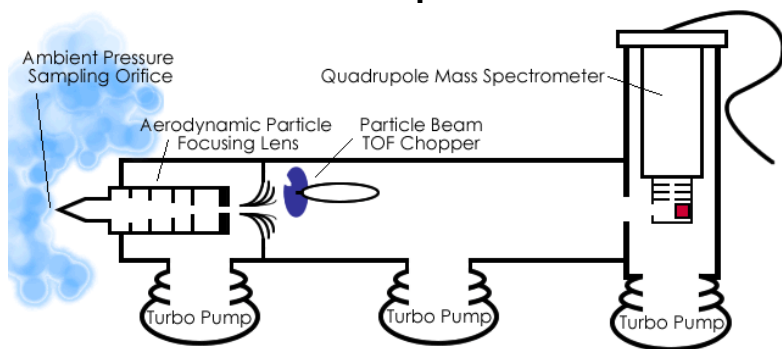
Activity Between NIES and NIER : NAATS

◆ Science Goals

1. Spatial distribution of chemical species (e.g. sulfate, BC) in Northeast Asia
2. Sulfate oxidation processing during long-range transportation
3. OM Oxidation(Aging) state(HOA, SV-OOA, LV-OOA)
4. Particle formation influence by different cases
5. SOA formation

What is AMS?

High Resolution-Time of Flight- Aerosol Mass Spectrometer



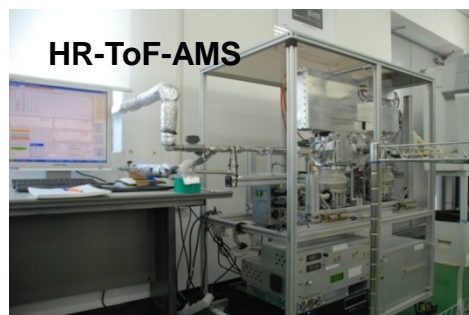
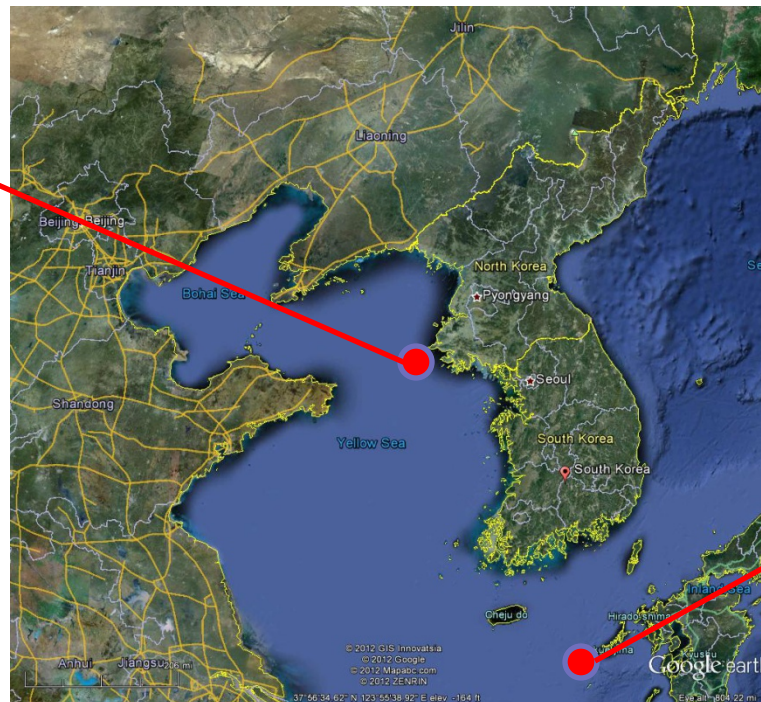
- Gas-particle separation : aerodynamic lens
- Size distribution : Particle time of flight
- Vaporization : Thermal plates 600oC
- Chemical analysis: Q-mass or ToF mass
- Organic, Sulfate, Nitrate, Ammonium
- Define oxidation state of OM



Credit for animation: Matt Thyson (Massachusetts) & Prof. Jose-Luis Jimenez (U Colorado)



Site Information



Fukue, Nagasaki, since 2008

- Located in the west part of Japan, and at the center of East Asia.
- Recognized as the super site for ABC net work.

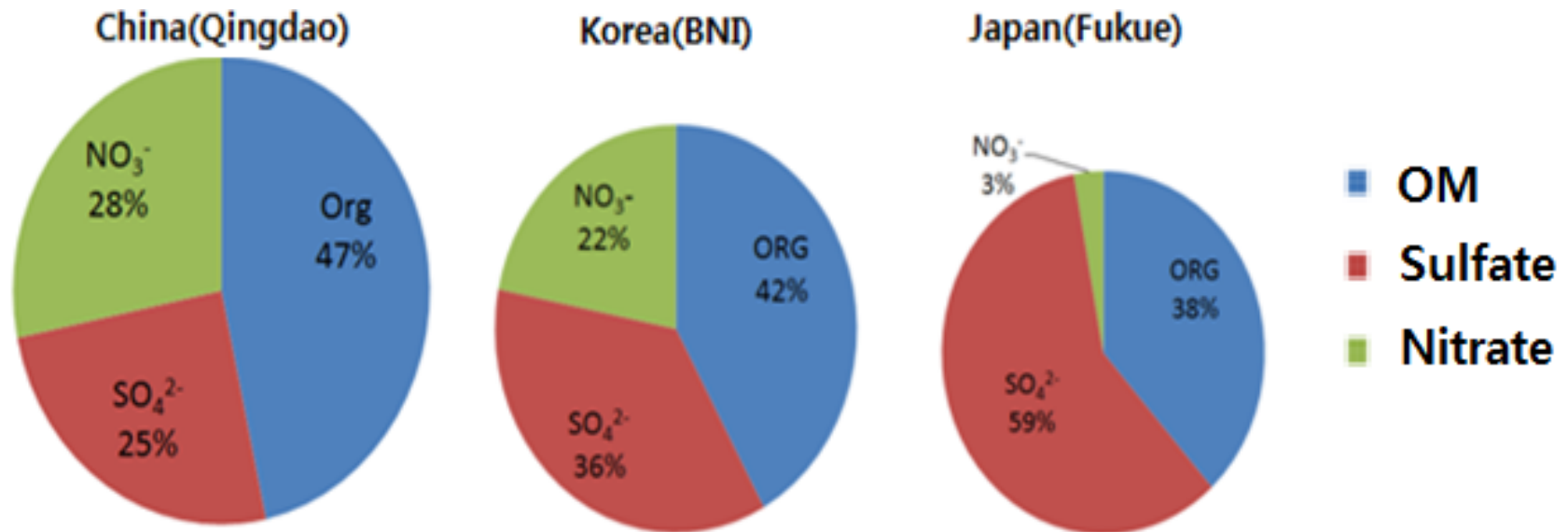
BaengNyeong Supersite, Ongjin Incheon, Since 2008

- It is very close to Shandong Peninsula, about 200 km
- There is any local source.



Results

Composition of PM1.0 Aerosol in NOV, 2013



- The ratio of sulfate in PM1.0 aerosol increases as we move towards Japan (Fukue) and reaches approximately 60% in Fukue.
- This implies the sulfate concentration, the effect of long range transportation is dominant.
- On the contrary, the difference in composition ratio of organic matter is less evident, which suggests effects local of emission in each region.

Activity of CRAES and NIER : Policy Sharing

◆ Action Plan to Prevent and Control Air Pollution in Cities of China Ten Major Countermeasures

1. Strengthen the comprehensive control to reduce emission

- Phasing out small Boilers and yellow label vehicle, Clean fuel for bus, Control of VOCs and F.Dust

2. Structure optimization and update for industry

3. Science and technology innovation

- Scientific research for haze and O₃ mechanism

4. Energy consumption Structure adjustment and clean energy

5. Higher entry threshold and optimization spatial planning for industry

6. Market Mechanism and Economical Policy

7. Improvement of legal regulatory system, strengthen the supervision and management

8. Regional cooperation mechanism

9. Monitoring, forecasting and alerting system

- Monitoring , forecasting and alerting system

10. Responsibility of Local Gov. and Public involvement

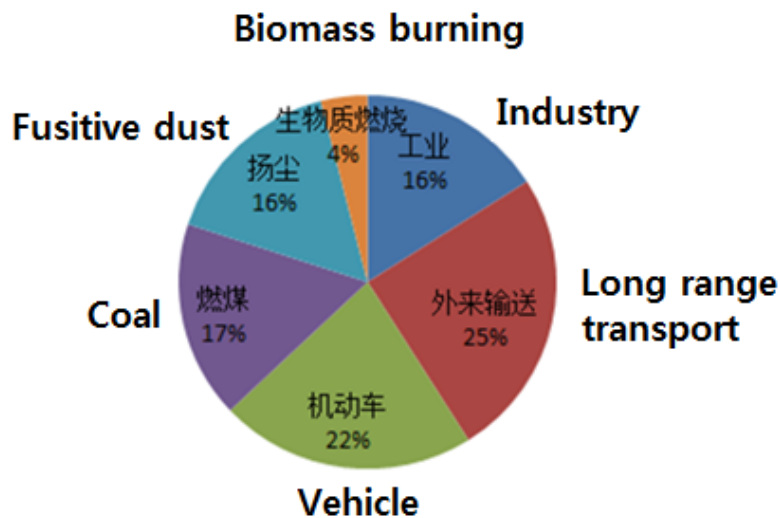


Activity of CRAES and NIER : Research Program

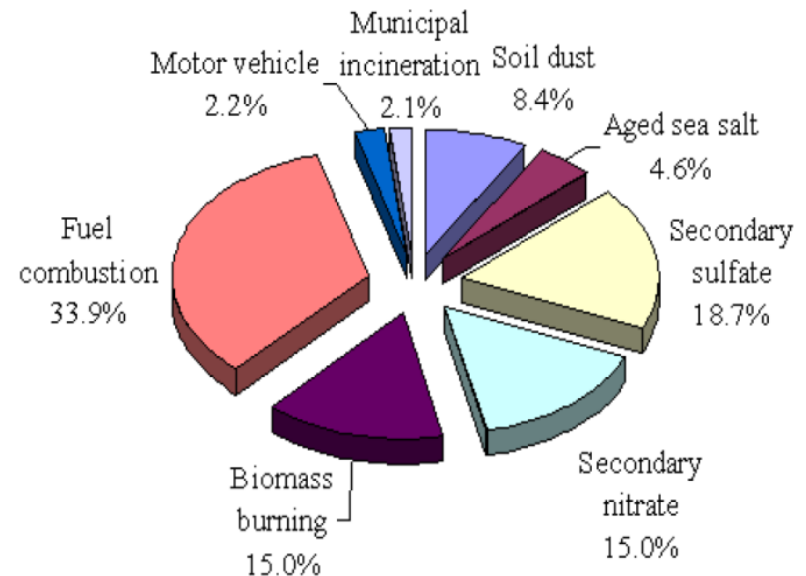
◆ Two methodologies of source apportionment(Receptor Models)

1. Input data: measured concentration and composition, air pollutants profile of sources
2. Results: source type, usually no location information, not good for specific sources
3. Good for primary air pollutants
4. CMB : source profile needed , 5. PMF : source profile not necessary
6. Only for past time

Beijing CMB(2013)



Seoul CMB(2010)

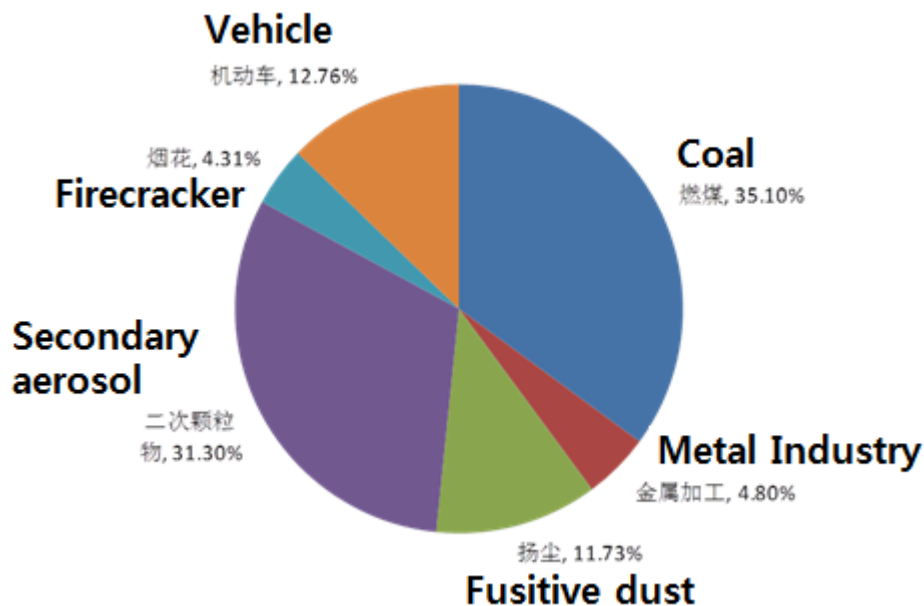


Activity of CRAES and NIER : Research Program

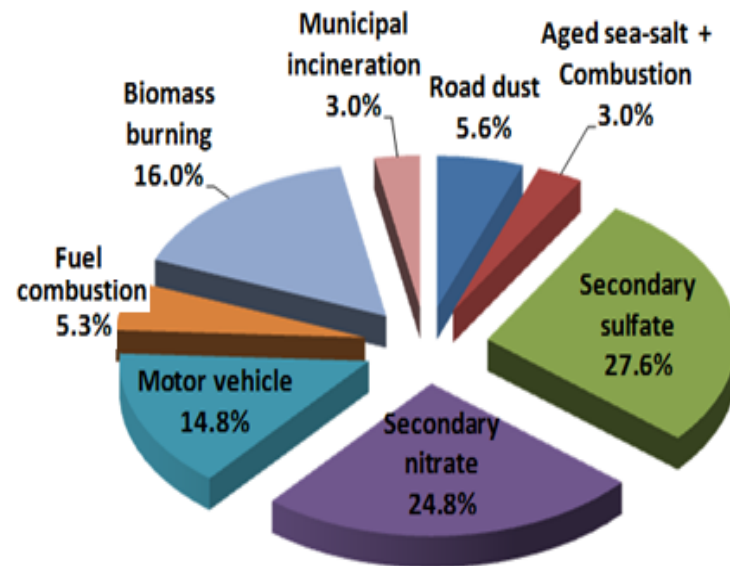
◆ Two methodologies of source apportionment

Receptor Models : PMF

Baoding City PMF (2014.1 ~ 3)



Seoul PMF (2010 ~ 2012)



Activity of CRAES and NIES : Research Program

On going Research between CRAES and NIES

Title : “Elucidation of the impacts of spatial distribution and changes in chemical composition of absorptive aerosols (EC) and dispersive aerosols (OC, metallic elements, and ionic elements) on radiation”

**Member :Akinori Takami (NIES), Fan Meng (CRAES),
Shiro Hatakeyama (TUAT) and others**

Effects of absorptive (Elemental carbon) and scattering (Organic Carbon , metallic elements, and ionic elements) types of aerosols on radiation and, then, on climate around East Asia will be elucidated by measuring aerosol chemical components simultaneously on both Japan and China.



Activity of CRAES and NIES : Research Program

An MoU between NIES and CRAES on atmospheric sciences Akinori Takami (NIES), Fan Meng (CRAES),

Collaboration Arrangement

The Parties are encouraged to collaborate on specific research projects (hereinafter referred to as “Projects”) related to the Joint Research. The specific terms of such Projects will be outlined in individual project agreements (hereinafter referred to as “Project Agreements”) prepared pursuant to this MOU.

The main activities planned as part of the Projects are as follows

- a) Urban and regional atmospheric monitoring (including Dust and Sand Storm remote and in situ measurement, air quality measurement methodology development and comparison especially for PM)**
- b) Laboratory studies relating to atmospheric science**
- c) Emission inventory development methodology including the emission factors and emission model and top-down approach based on open statistic data.**
- d) Regional and local scale modeling for air pollution.**
- e) Atmospheric impact assessment (climactic, ecological, health)**

In addition to the above, the persons responsible for supervising the Focal Points will be Dr. TAKAMI Akinori for NIES and Prof. MENG Fan for CRAES.



**Thank you for your
attention.**

