

Introduction of EANET monitoring data and Simulation works as Phase 2.x activity

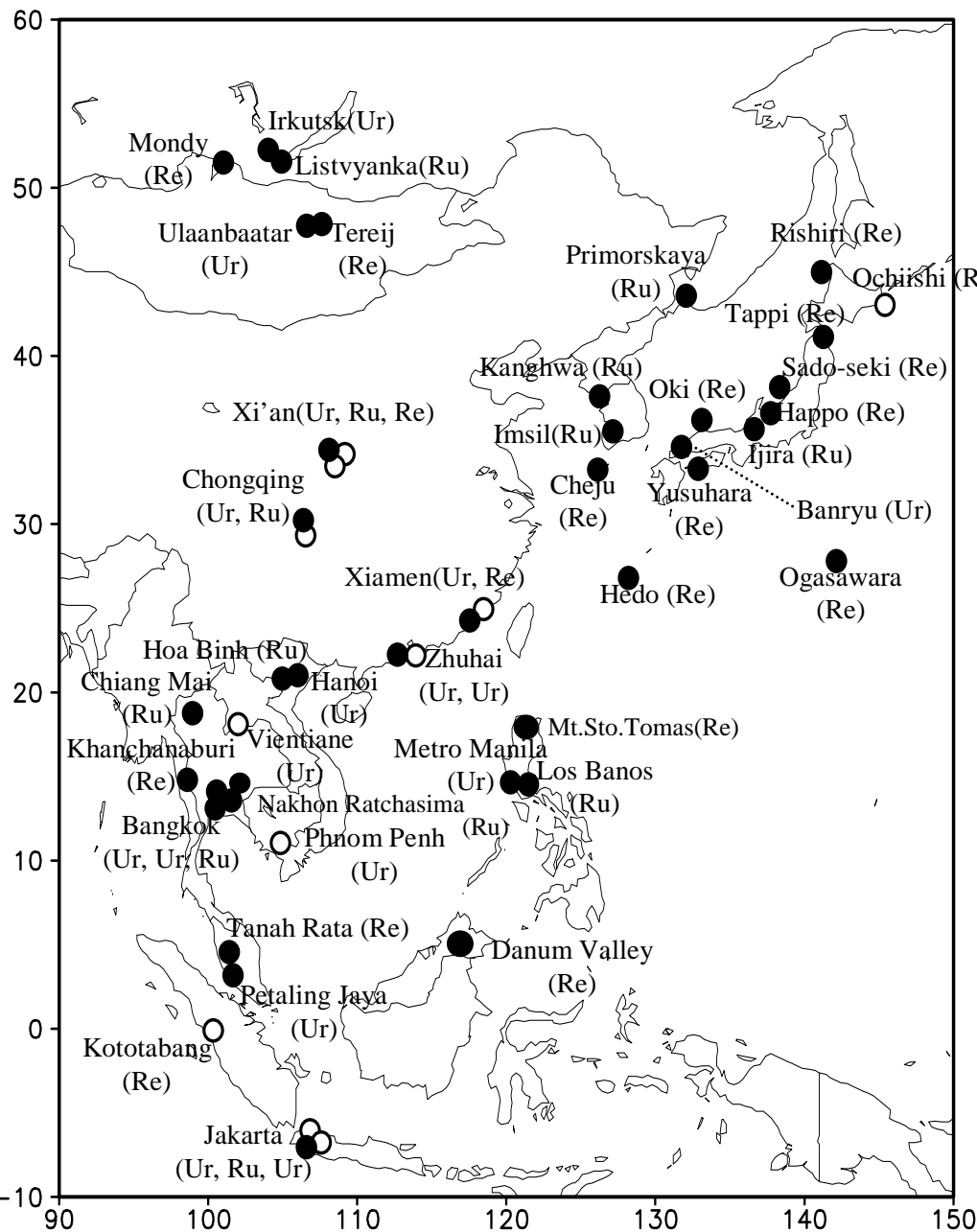
10th MICS Workshop

17-18 February 2008

Tatsuya SAKURAI

ADORC

Location of sites for Wet and Dry dep. monitoring



49 sites in EANET in 2006

● Dry and Wet (38 sites)

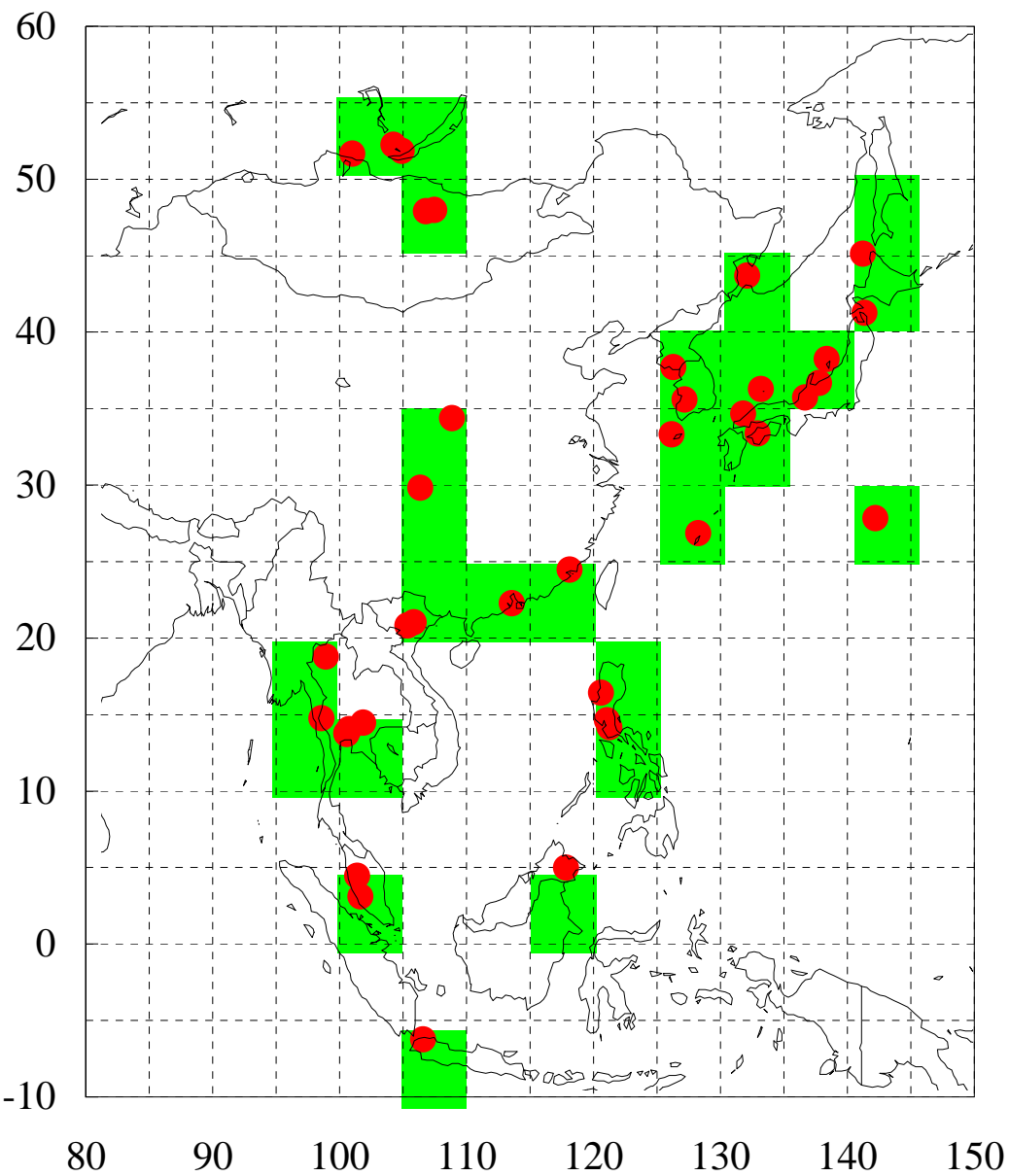
○ Wet (49 sites)

Air concentration monitoring

Filter Pack 33 sites

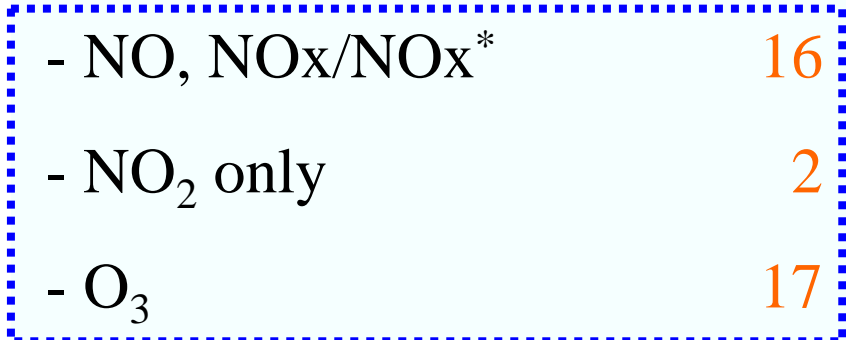
Automatic 22 sites

Current states of Air Conc. Monitoring Network



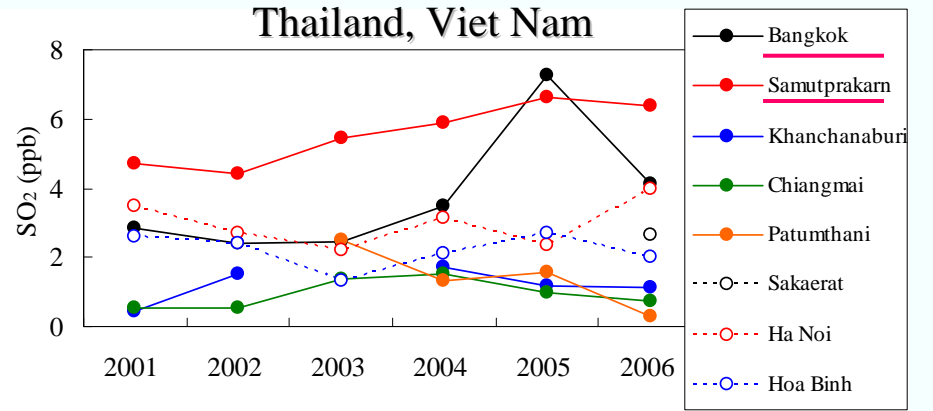
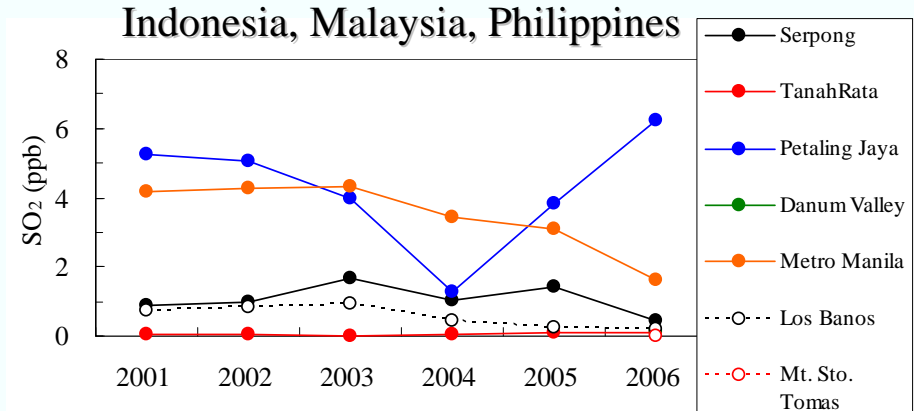
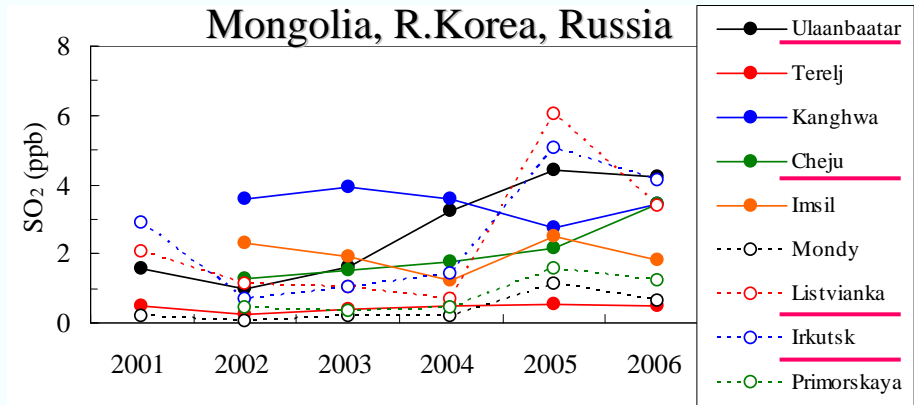
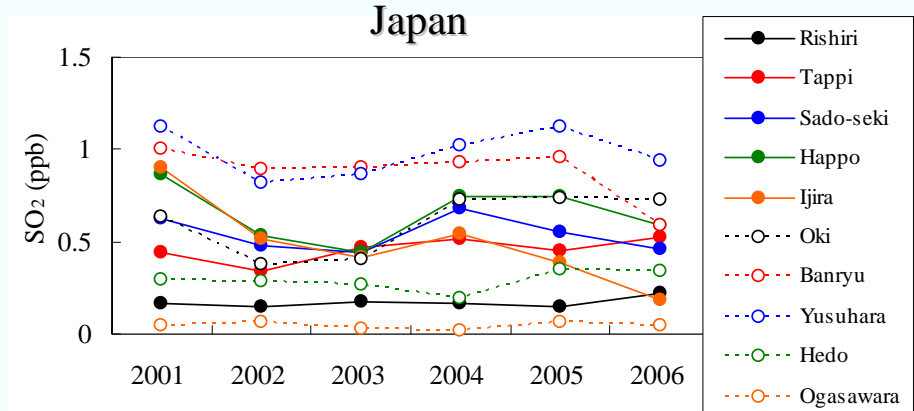
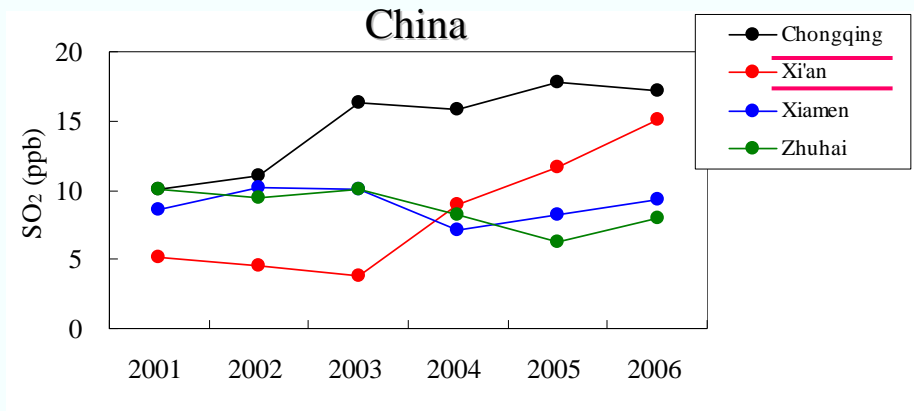
38 stations in 2006

- SO₂ 38
- HNO₃, NH₃, HCl, PMC 33
- NO, NO_x/NO_x* 16
- NO₂ only 2
- O₃ 17
- PM₁₀ 20
- PM_{2.5} 2



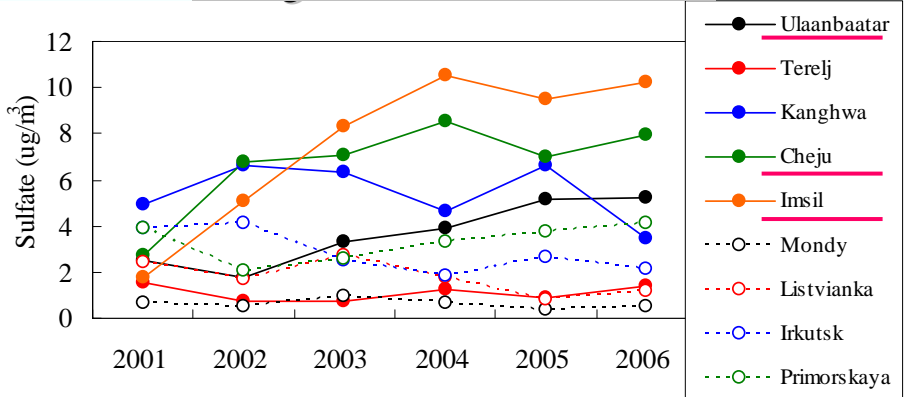
Passive Sampler

Annual trend in 2001-2006 (SO₂; ppb)

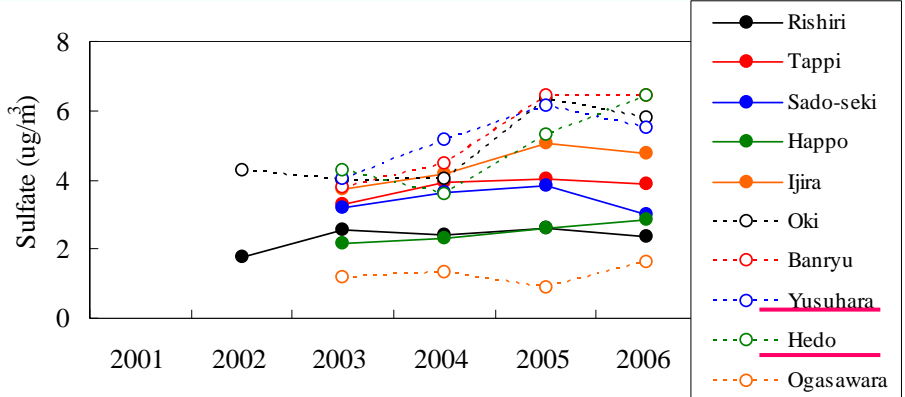


Annual trend in 2001-2006 (Sulfate ; $\mu\text{g}/\text{m}^3$)

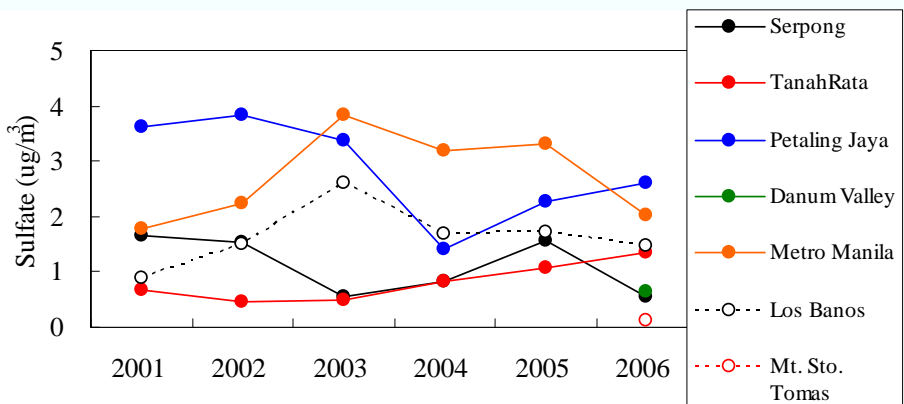
Mongolia, R.Korea, Russia



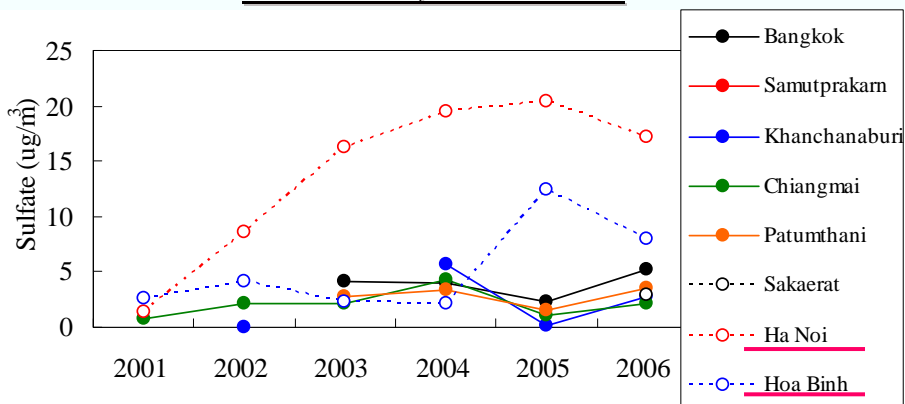
Japan



Indonesia, Malaysia, Philippines

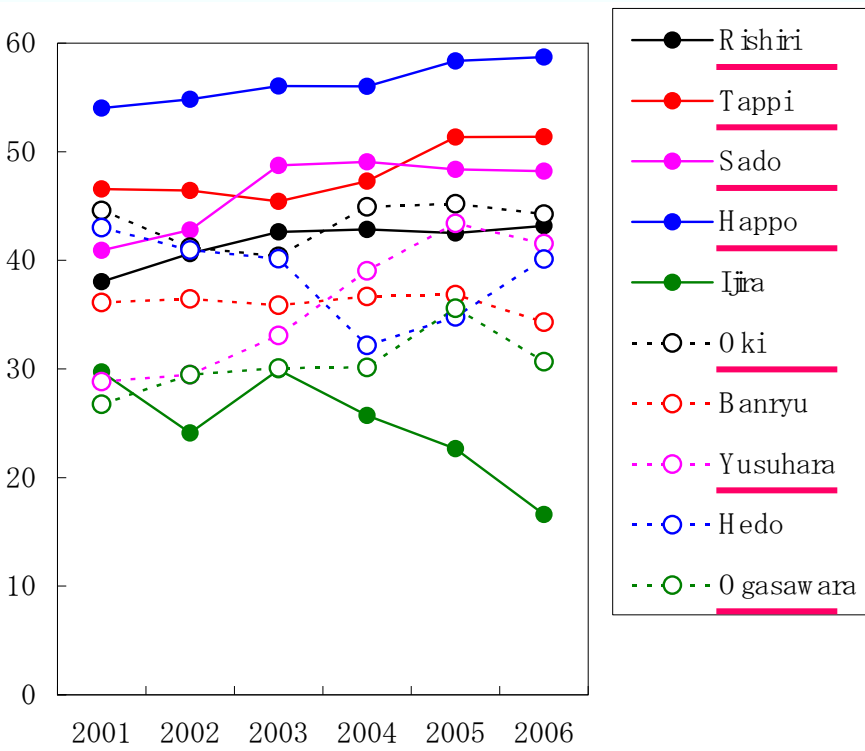


Thailand, Viet Nam

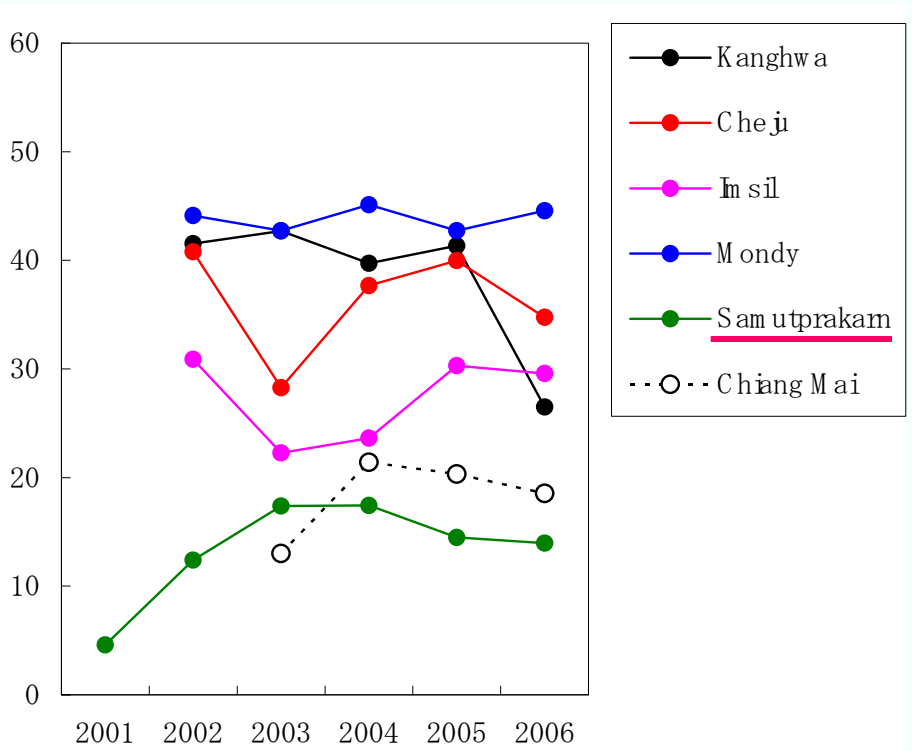


Annual trend in 2001-2006 (O₃ ; ppb)

Japan



R.Korea, Russia, Thailand

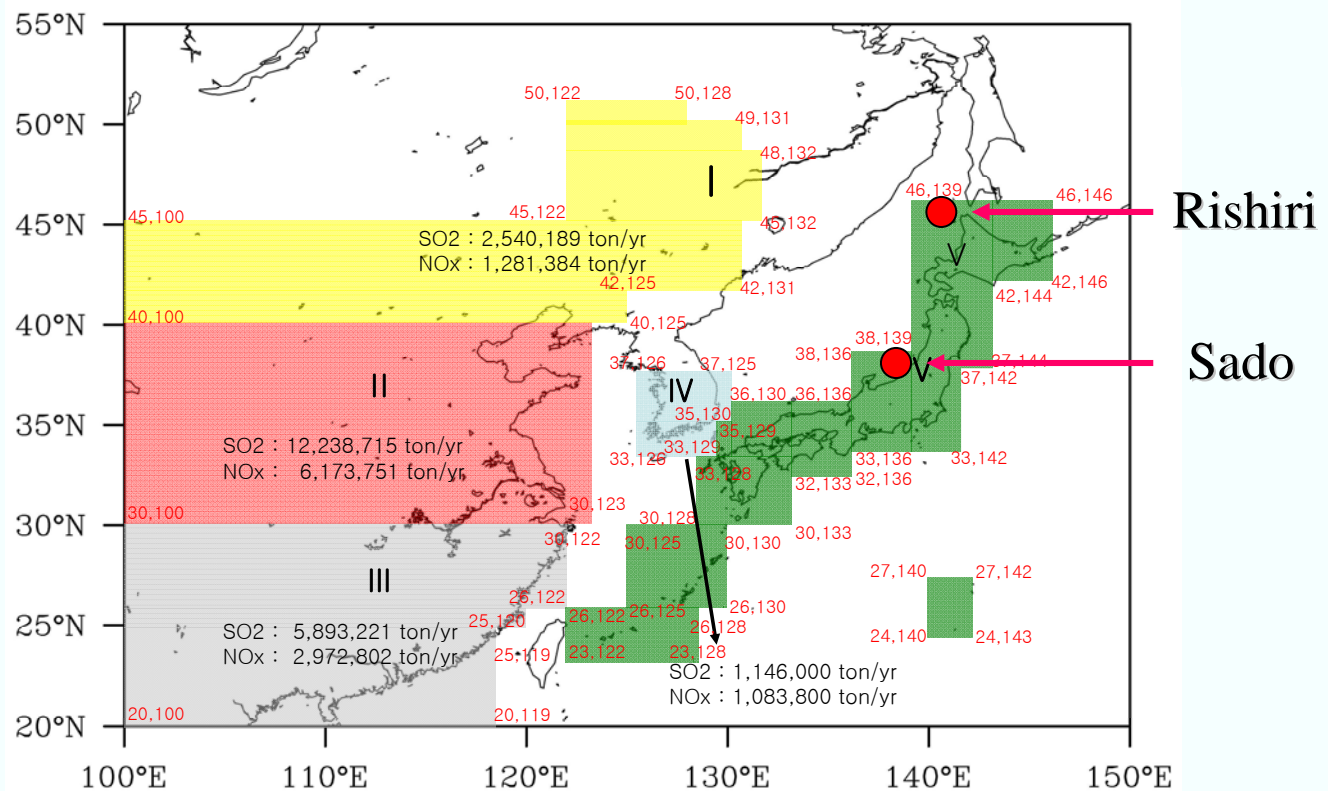


Oxidant has attracted a great deal of public attention in Japan because the concentration exceeded **120ppb** through Japan last May.

Introduction of Simulation works

- Calculation in March, July, December in 2001
 - Model validation for SO₂, NO_x, O₃
 - Sensitivity of concentrations to emission in East Asia
 - Source-Receptor relationship analysis for Sulfur deposition

Study domain of
LTP project



Parameters for simulations

➤ MM5 simulation

- 1 x 1 deg. NCEP-FNL
- 125 x 95 grids with 45km grid resolution, 23 σ layers up to 100hPa

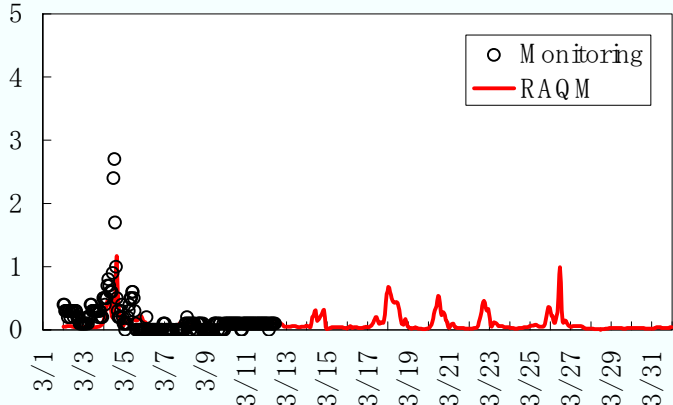
➤ RAQM simulation

- 90 x 60 grids with 0.5deg. grid resolution, 12 σ layers up to 10km (100E-145E, 20N-50N)
- BCs and ICs are derived from recent studies for East Asia (Carmichael.,1998; Luo., 2000)
- Emissions are derived from MICS Phase 2 emission data.

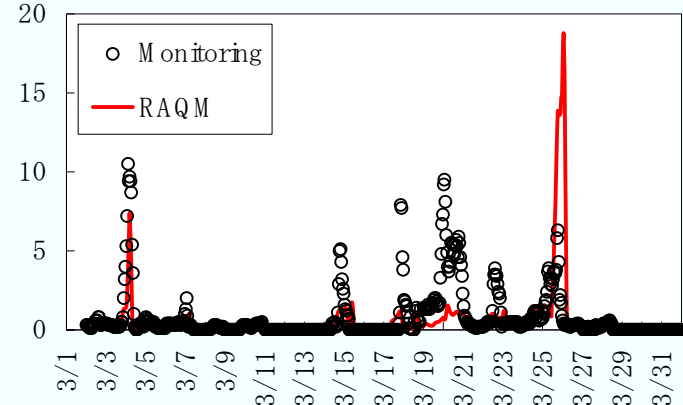
Model validation using EANET data (SO₂: ppb)

March

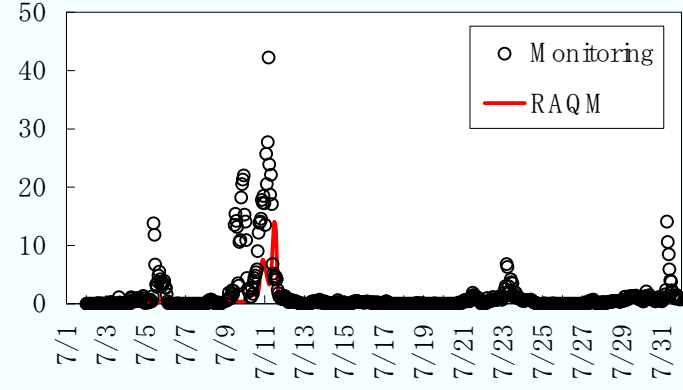
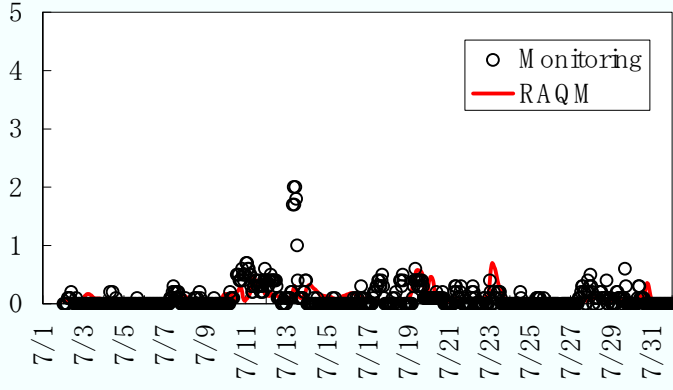
Rishiri



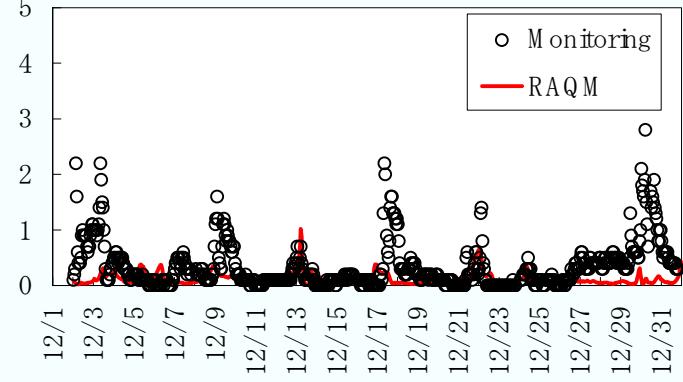
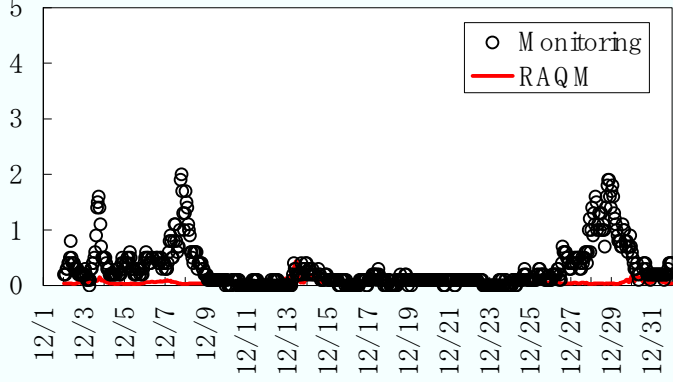
Sado



July



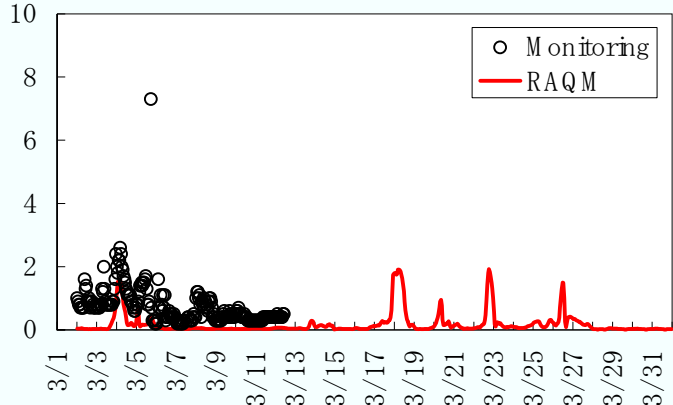
Dec.



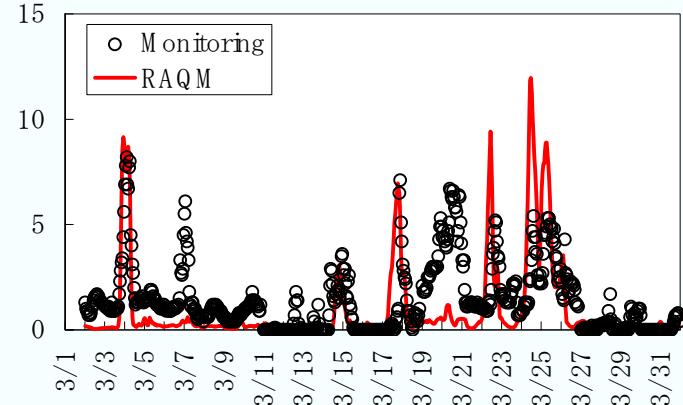
Model validation using EANET data ($\text{NO}_x/\text{NO}_x^*$: ppb)

March

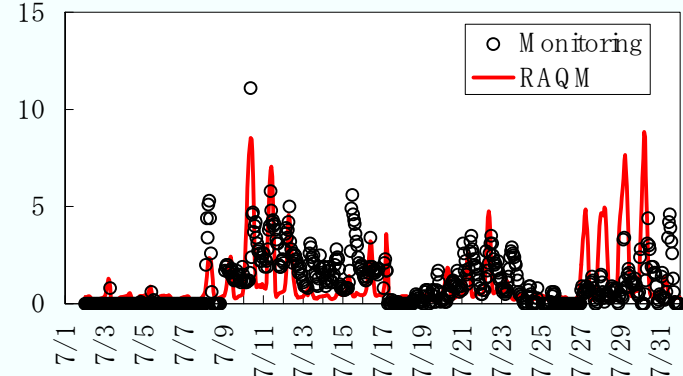
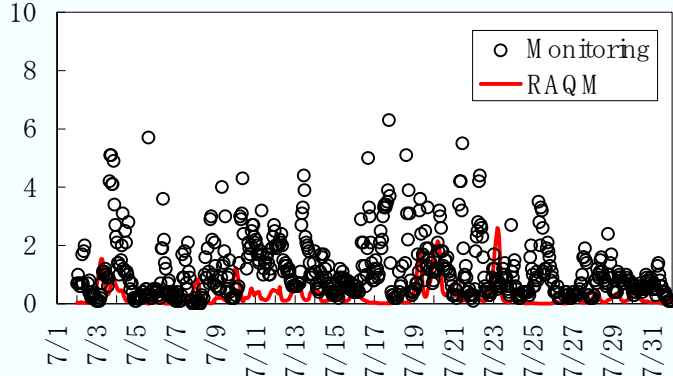
Rishiri



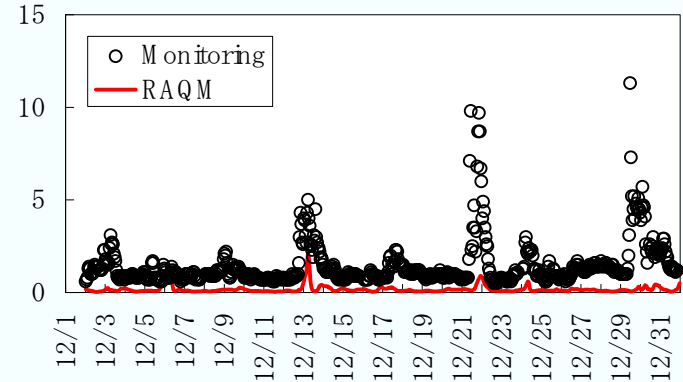
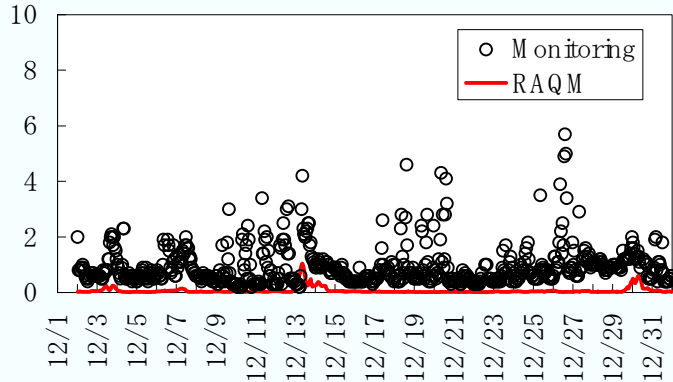
Sado



July



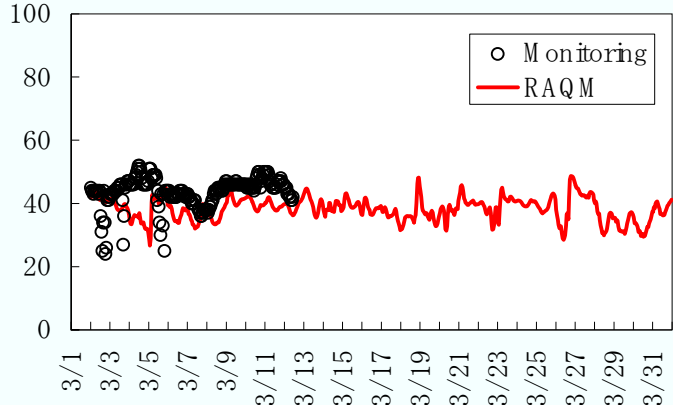
Dec.



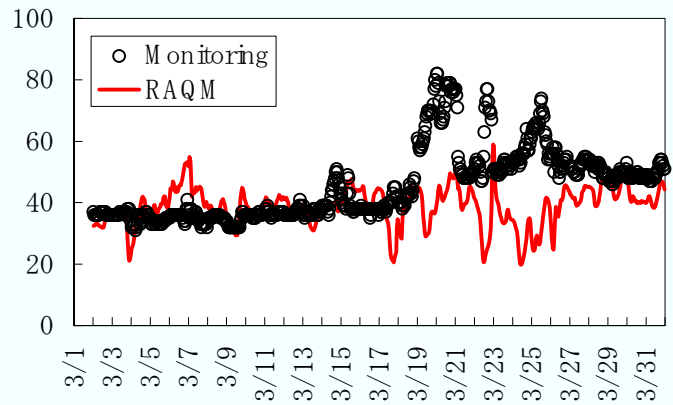
Model validation using EANET data (O_3 : ppb)

March

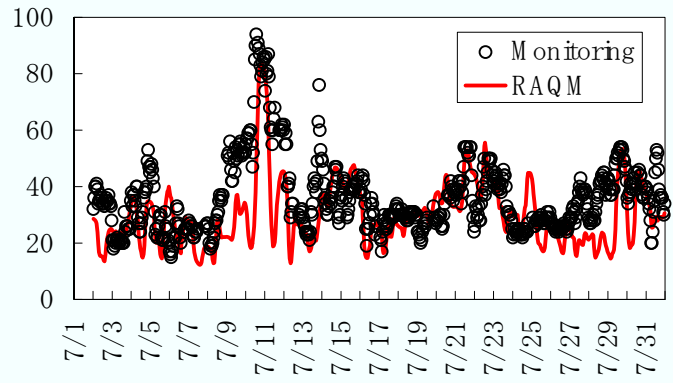
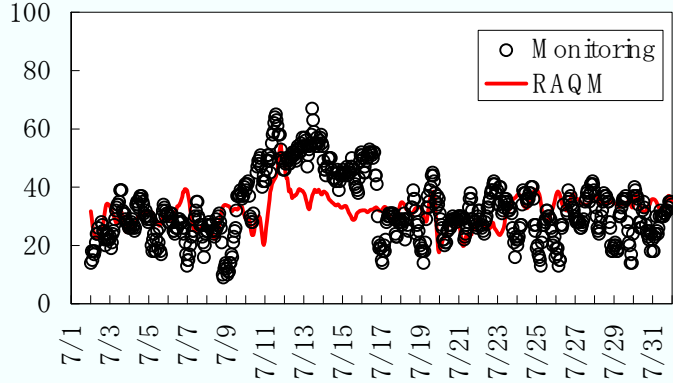
Rishiri



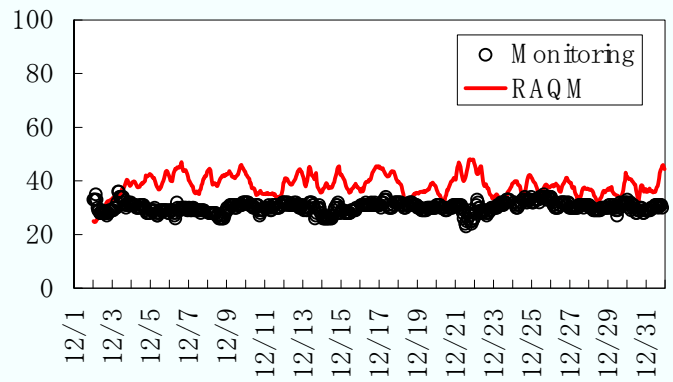
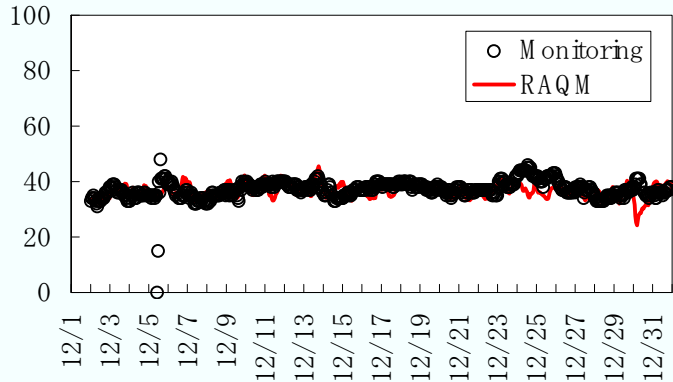
Sado



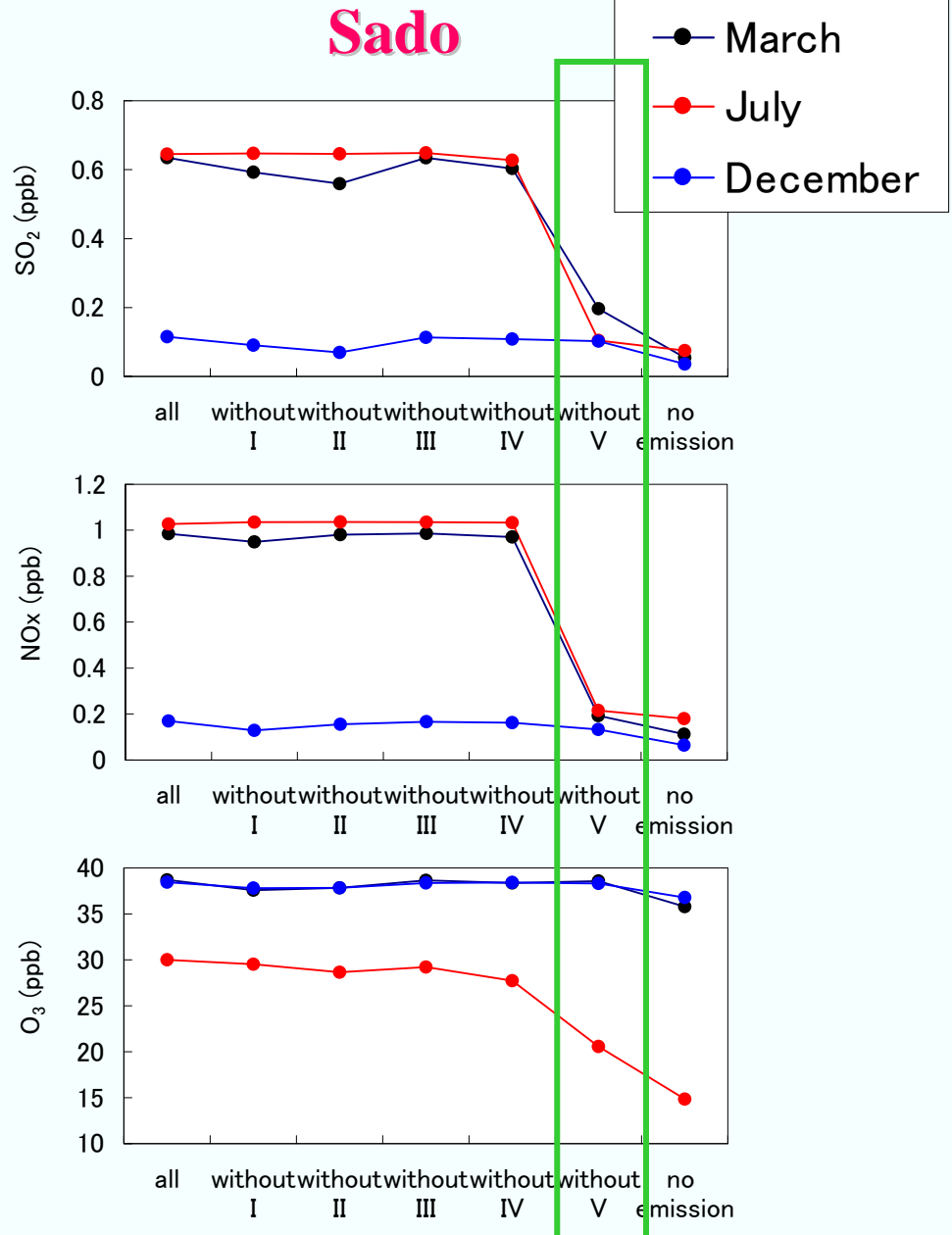
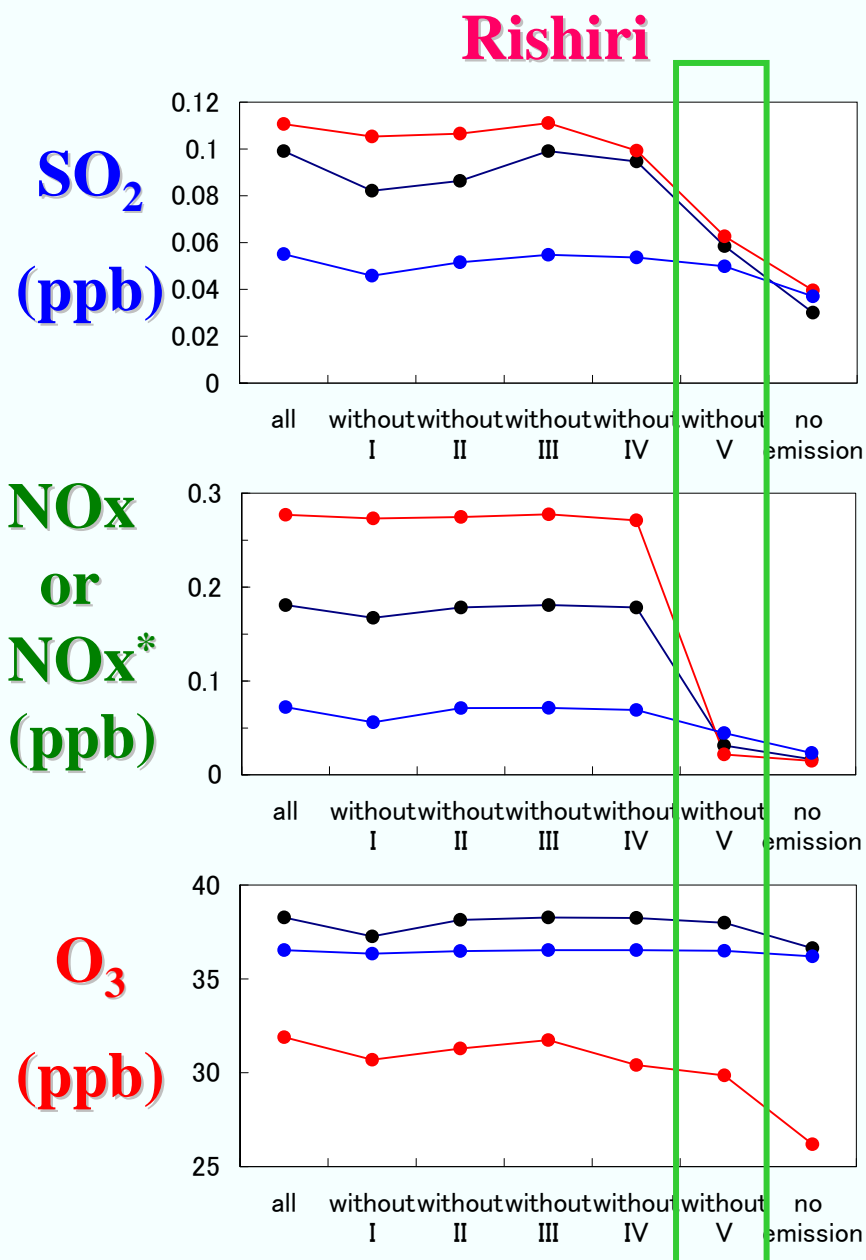
July



Dec.



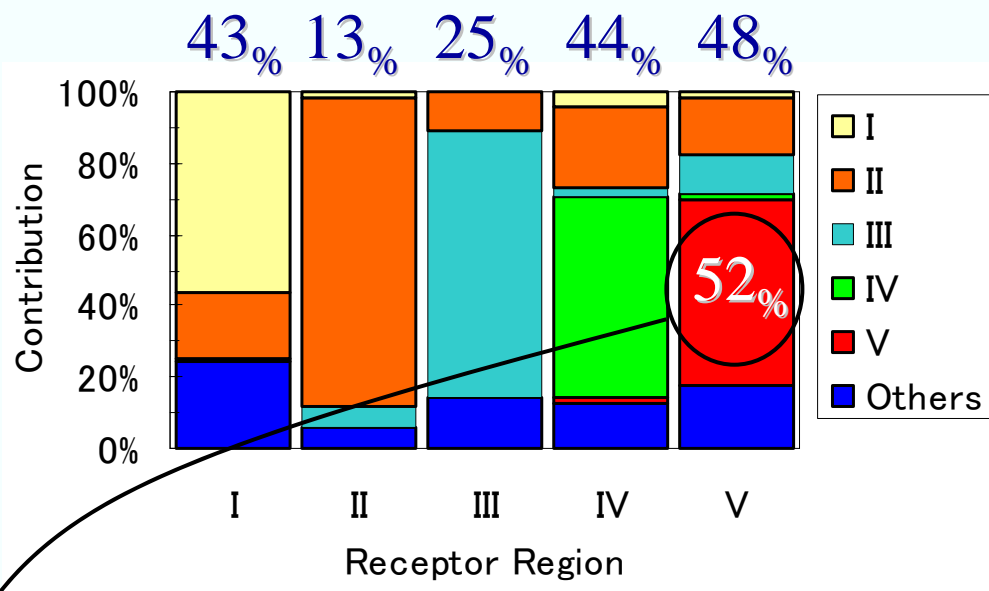
Sensitivity of Conc. to Emission from each region



S-R relationship for Sulfur in March 2001

Region	I	II	III	IV	V
Dry	28.8	241.0	213.9	18.8	104.9
Wet	35.2	49.6	376.6	6.5	270.0
Total	64.0	290.6	590.5	25.3	374.9

(unit: kton)

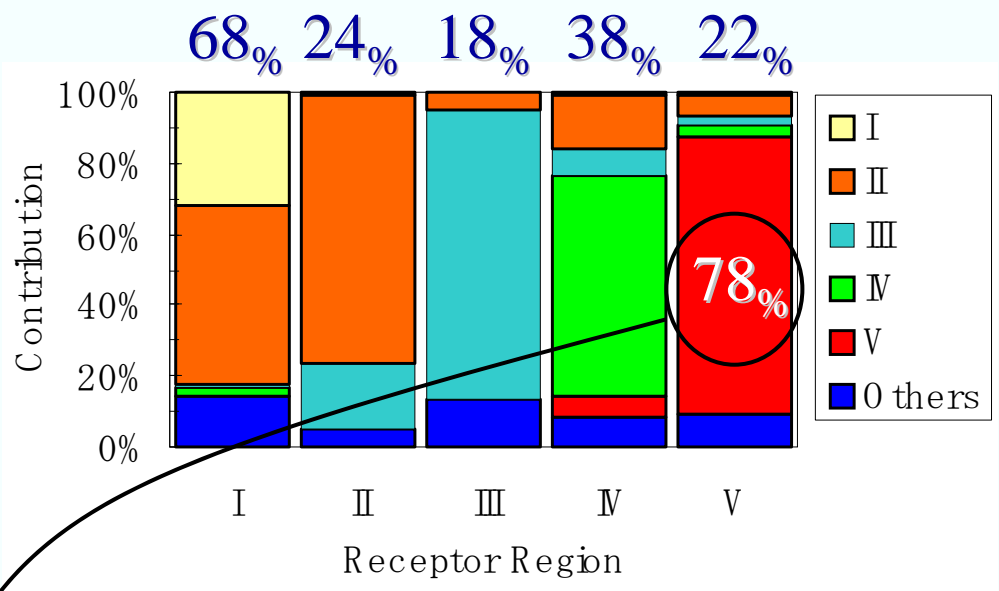


52% { 44%: Volcanic emission in region V
8%: Other emissions in region V

S-R relationship for Sulfur in July 2001

Region	I	II	III	IV	V
Dry	42.3	231.3	135.8	14.4	61.0
Wet	117.9	538.8	614.3	28.4	207.7
Total	160.2	770.1	750.0	42.8	268.7

(unit: kton)

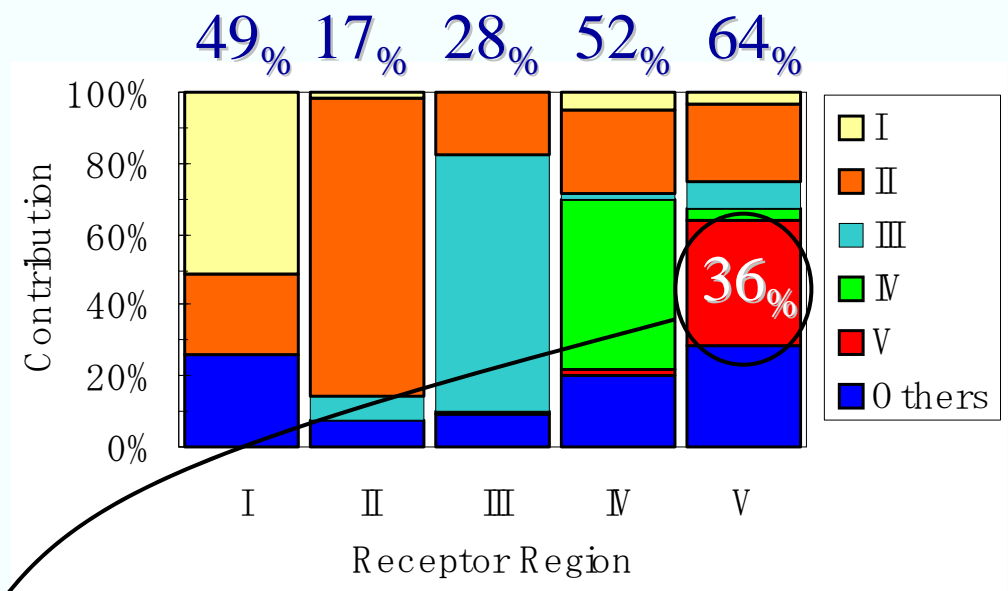


78% { 59%: Volcanic emission in region V
19%: Other emissions in region V

S-R relationship for Sulfur in December 2001

Region	I	II	III	IV	V
Dry	33.2	342.9	269.4	21.9	66.8
Wet	24.4	283.2	346.0	18.0	186.2
Total	57.6	626.0	615.4	39.9	253.0

(unit: kton)



36% { 25%: Volcanic emission in region V
11%: Other emissions in region V

Summary

- Feasibility study for application of passive sampler in EANET region
- O₃ concentration has been increasing in Japan.
- Predicted O₃ concentrations at Rishiri and Sado in March
and December are mainly originated in BCs.
- Outside contribution to Sulfur deposition in Japan is smallest
in July case because of the prevailing winds from Pacific Ocean

Future activities

- Further model improvement (PM prediction, vertical structure, BCs)
- Consideration of appropriate domain and method for S-R relationship
- Test of other models (WRF-CMAQ, WRF/Chem)
- Acid Rain 2010 in China



Thanks !

fin.