

Regional Science Workshop 2009, Tsukuba October 12-13

The transport of acid and alkaline pollutants in East Asia and the neutralization of ammonia

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Need for The Study (1)

A serious regional pollution problem

- Acid rain falls on 30% of land
- % of Emission with 45 140 1000 RMB
- Expand

Source: SEPA³⁾ T. Wang, et al. 2005

Need for The Study (2)

High conc. of acidic aerosol

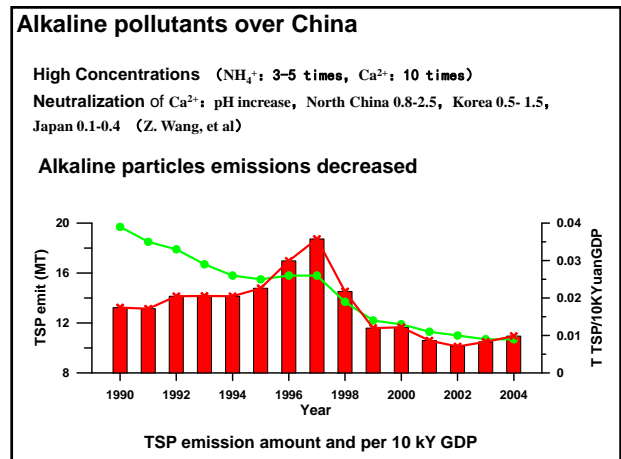
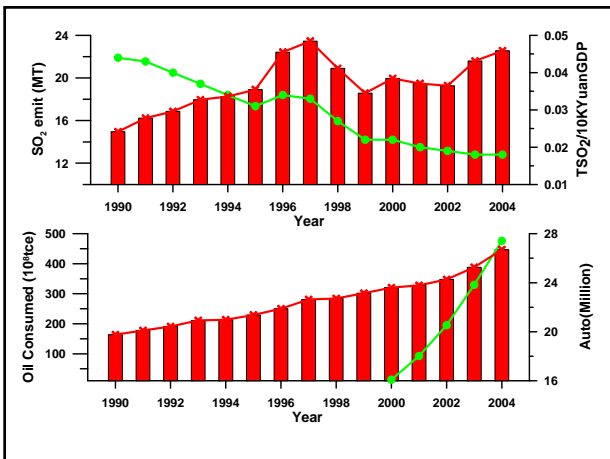
- >2-5 times of N. America and Europe
- Health
- Visibility

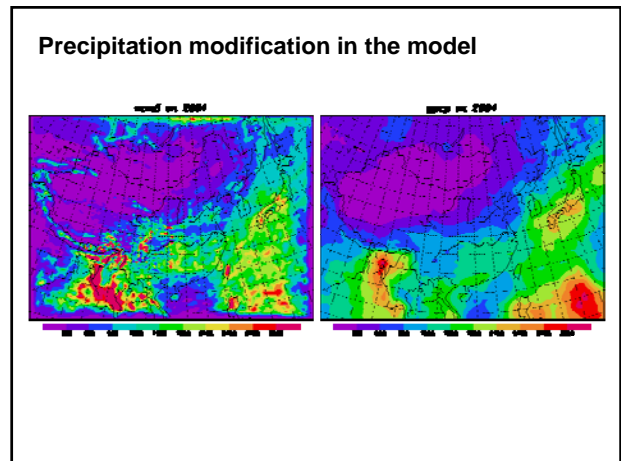
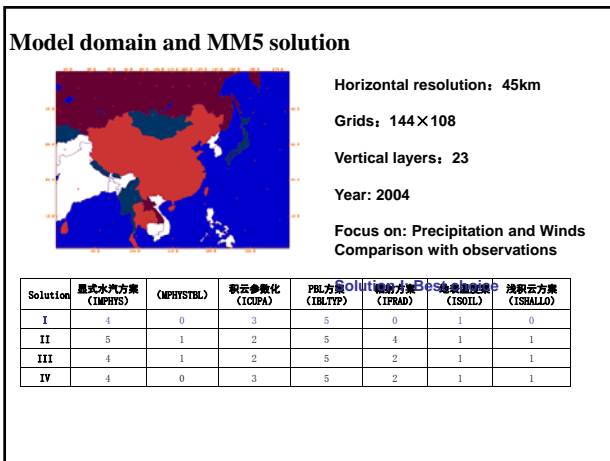
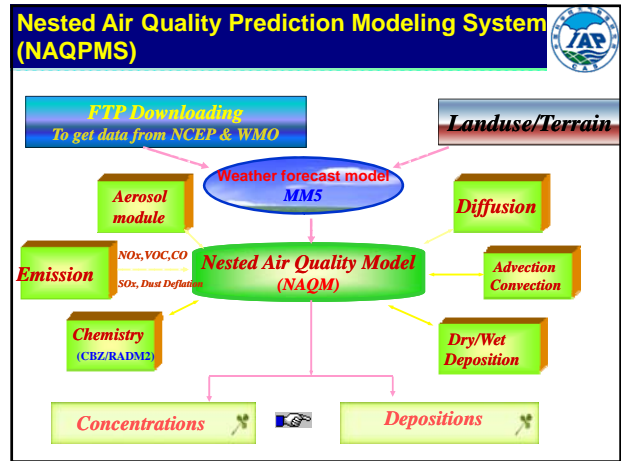
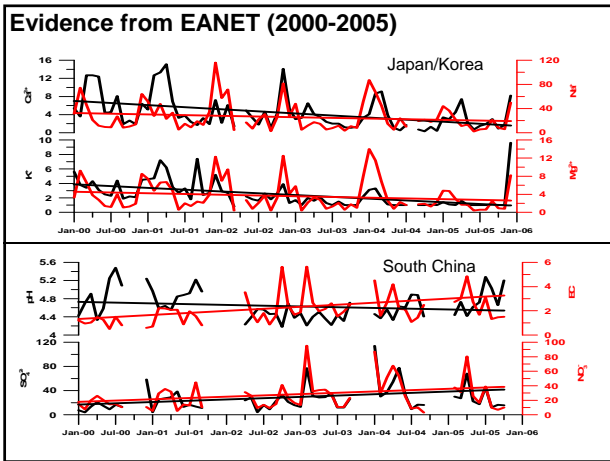
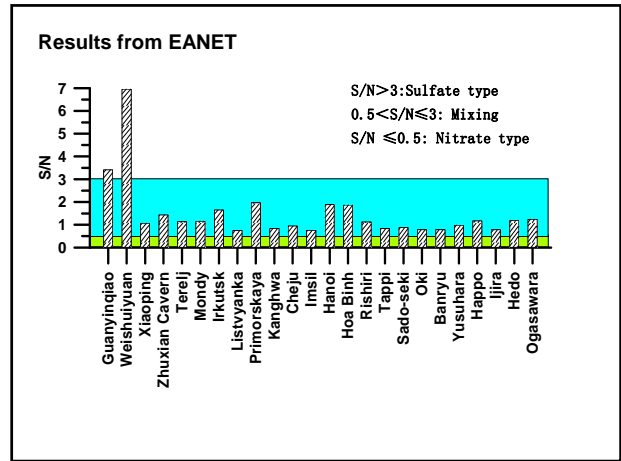
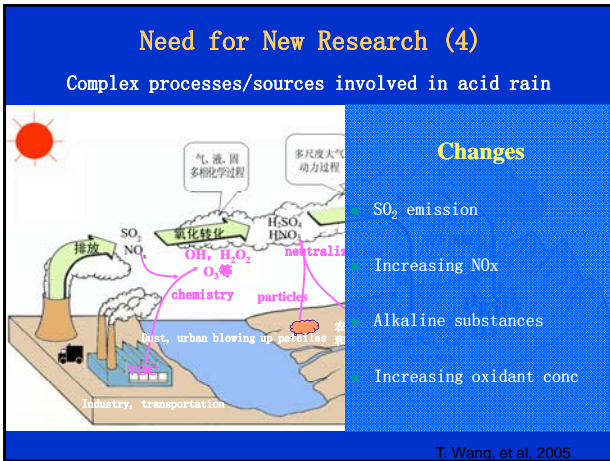
Source: Wang, et al. 2005

Need for The Study (3)

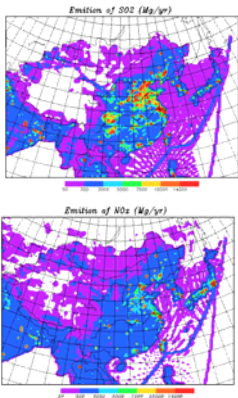
Rising demand for energy

Source: China Statistics and SEPA T. Wang, et al. 2005





NAQPMS Settings



Horizontal resolution and grids:
Same as MM5

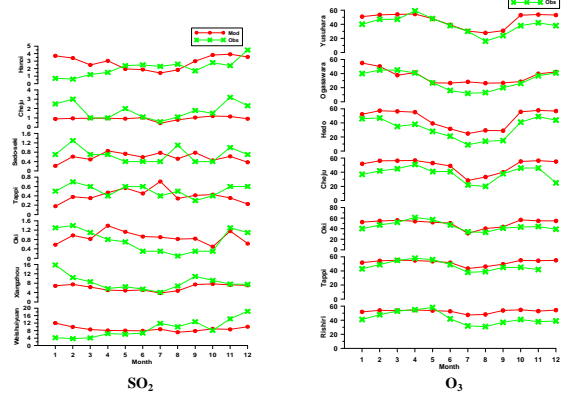
Vertical: from surface to 15 km
(ABS) into 20 levels (50m)

Emissions:
China: Tsinghua University
Other countries: David Streets
Resolution: $0.1^\circ \times 0.1^\circ$
22 species

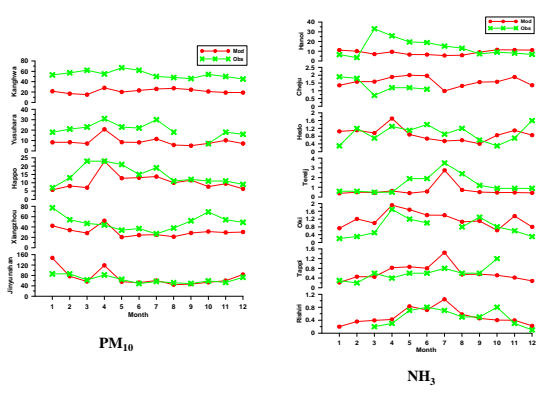
Simulation: Dec. 15, 2003 – Dec.
31, 2004, with 15days spin-up

Outputs: hourly results

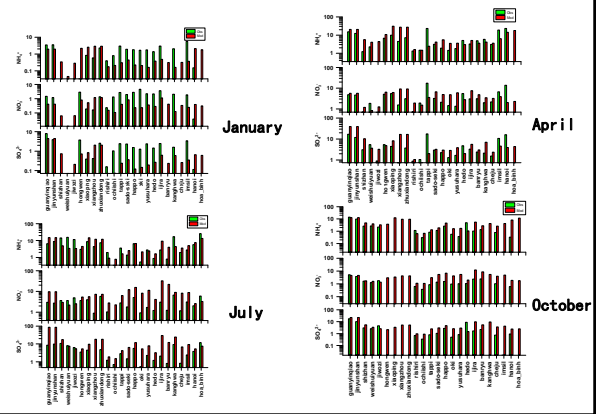
Model Validation with EANET Observations (1)



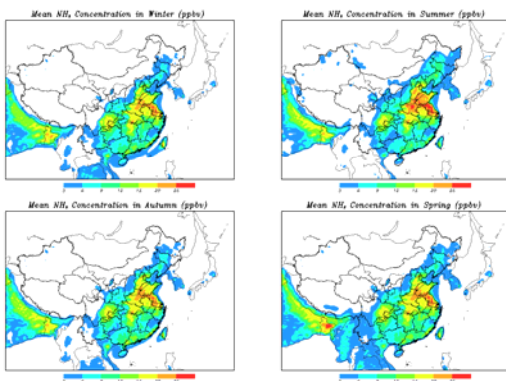
Model Validation with EANET Observations (2)



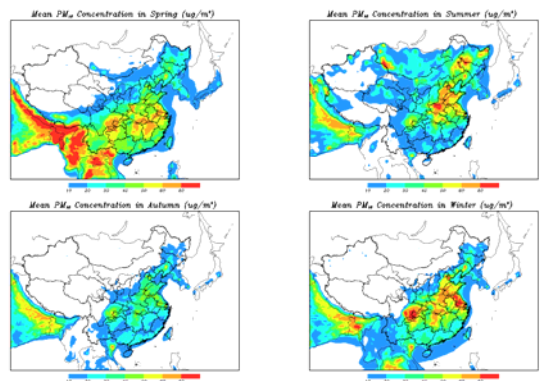
Wet deposition: Model validations

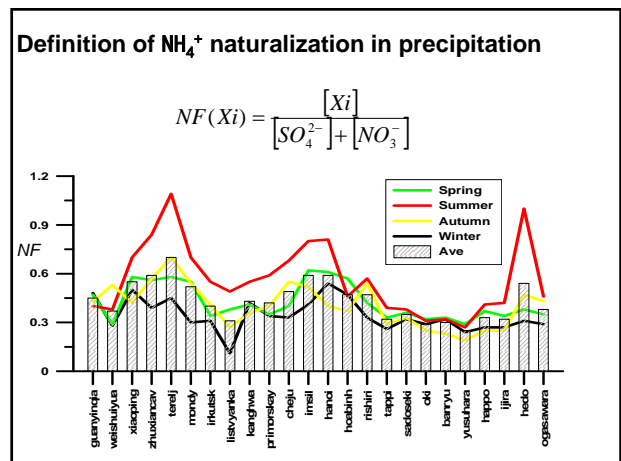
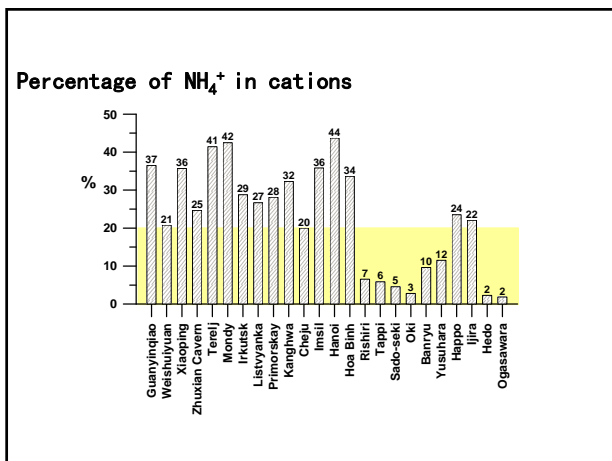
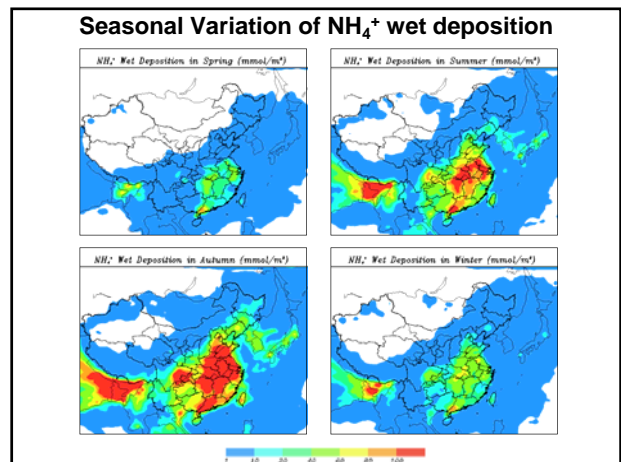
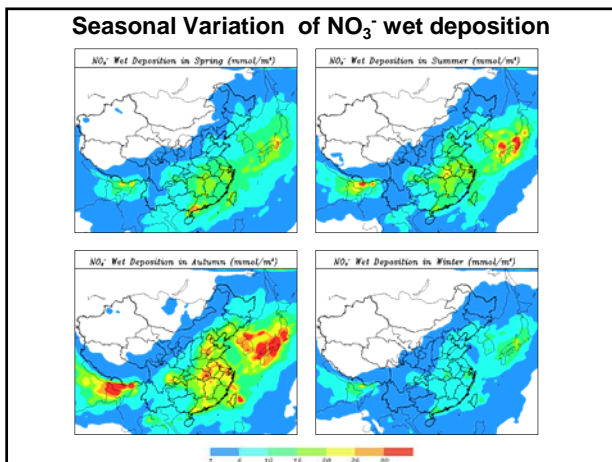
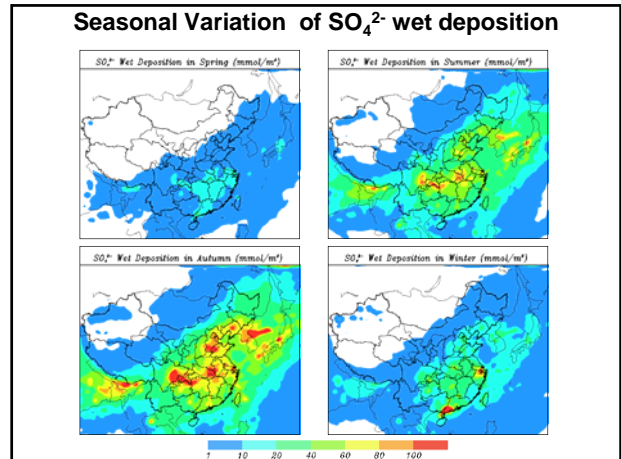
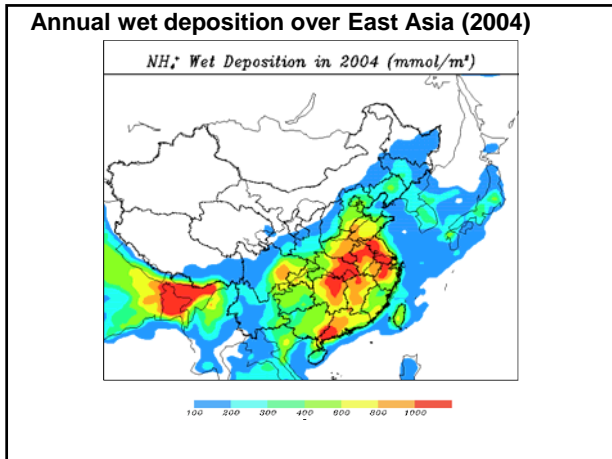


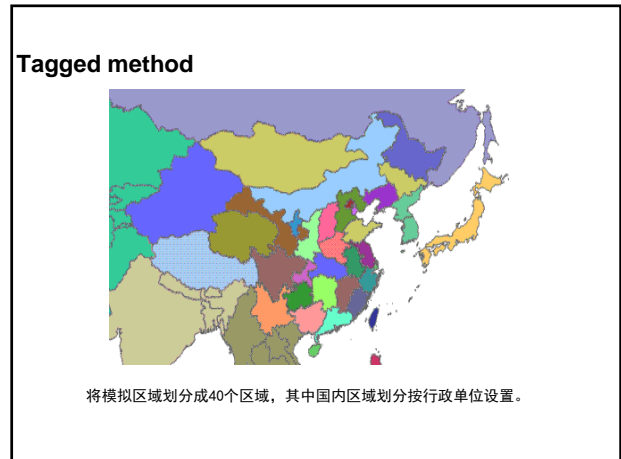
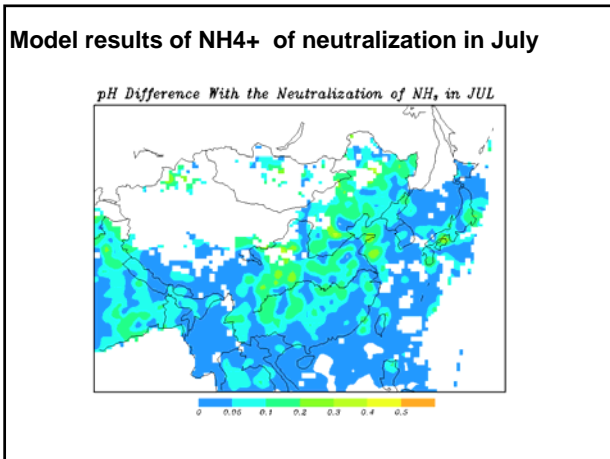
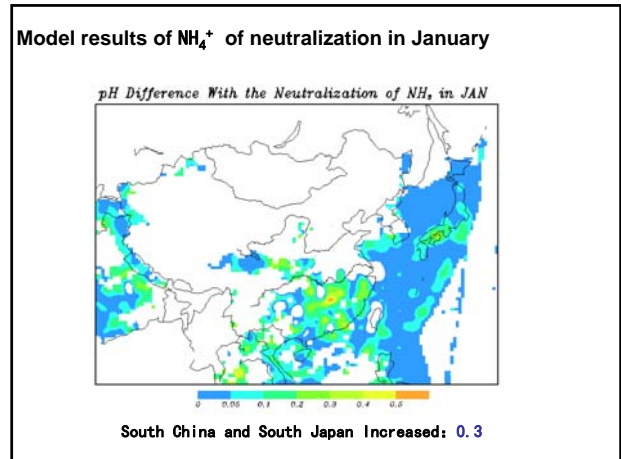
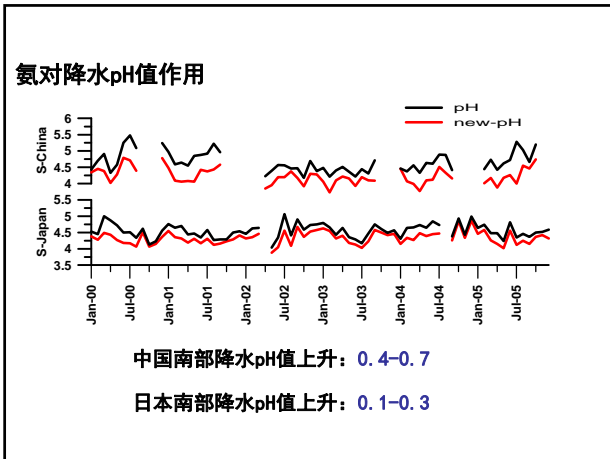
Seasonal variation of NH3



Seasonal variation of PM10







Results

- A regional air quality model NAQPMS (Nested Air Quality Prediction Modeling System) is applied in a full year simulation of 2004.
- The concentration of ammonia is very high in East Asia and its regional and seasonal difference is obvious. Ammonia concentration in South China is the highest in East Asia.
- Ammonia has great neutralization effect on acid rain.