What is CACGP?

The international Commission on Atmospheric Chemistry and Global Pollution (CACGP) is

one of the Commissions in IAMAS (International Association of Meteorology and Atmospheric Sciences),

which in turn is one of the associations within IUGG (International Union of Geodesy and Geophysics)

within the non-governmental ICSU (International Council of Science) family.

a thinking body

History of CACGP

1957	**Foundation of the Commission on Atmospheric Chemistry and Radioactivity (CACR)**
1957-1963	President: W. Bleeker Secretary: C.E. Junge
1964-1967	President: B. Bolin Secretary: E.A. Martell
1967-1971	President: C.E. Junge Secretary: E.A. Martell
1971	**Commission renamed Commission on Atmospheric Chemistry anf Global Pollution (CACGP)**
1971-1975	President: C.E. Junge Secretary: P. Goldsmith
1975-1979	President: E.A. Martell Secretary: P. Goldsmith
1979-1983	President: P. Goldsmith Secretary: R. Duce
1983-1990	President: R. Duce Secretary: H. Rodhe
1988	**Planning and formation of IGAC**

History of CACGP

1990	IGAC accepted as core project of IGBP (chair: R. Prinn)
1990-1994	President: H. Rodhe, Vice President: D. Albritton, Secretary I. Galbally
1993	**First IGAC Science Conference**
1994-1998	President: H. Rodhe, Vice President: H. Akimoto, Secretary L. Barrie
1998-2002	President: H. Akimoto, Vice President: L. Barrie, Secretary P. Artaxo
2000	CACGP Workshop on Priorities in International Chemistry research and the Future of IGAC ➔ A strategic View of Future Research in International Atmospheric Chemistry (2002)
2001	**Surface Ocean – Lower Atmosphere Study (SOLAS) endorsement (Chair P. Liss)**
2002-2006	President: A. Thompson, Vice President: F. Raes, Secretary: P. Quinn
2006-2010	President: M. Kanakidou, Vice President: K. Kawamura, Secretary: J.P. Burrows

Honorary Members

CACGP Honorary Members

Prof. **Hajime Akimoto**
Prof. **Bert Bolin**
Prof. **Paul Crutzen**
Prof. **Robert Duce**
Prof. **Phillip Goldsmith**
Prof. **Mario J. Molina**
Prof. **Henning Rodhe**
Prof. **F. Sherwood Rowland**

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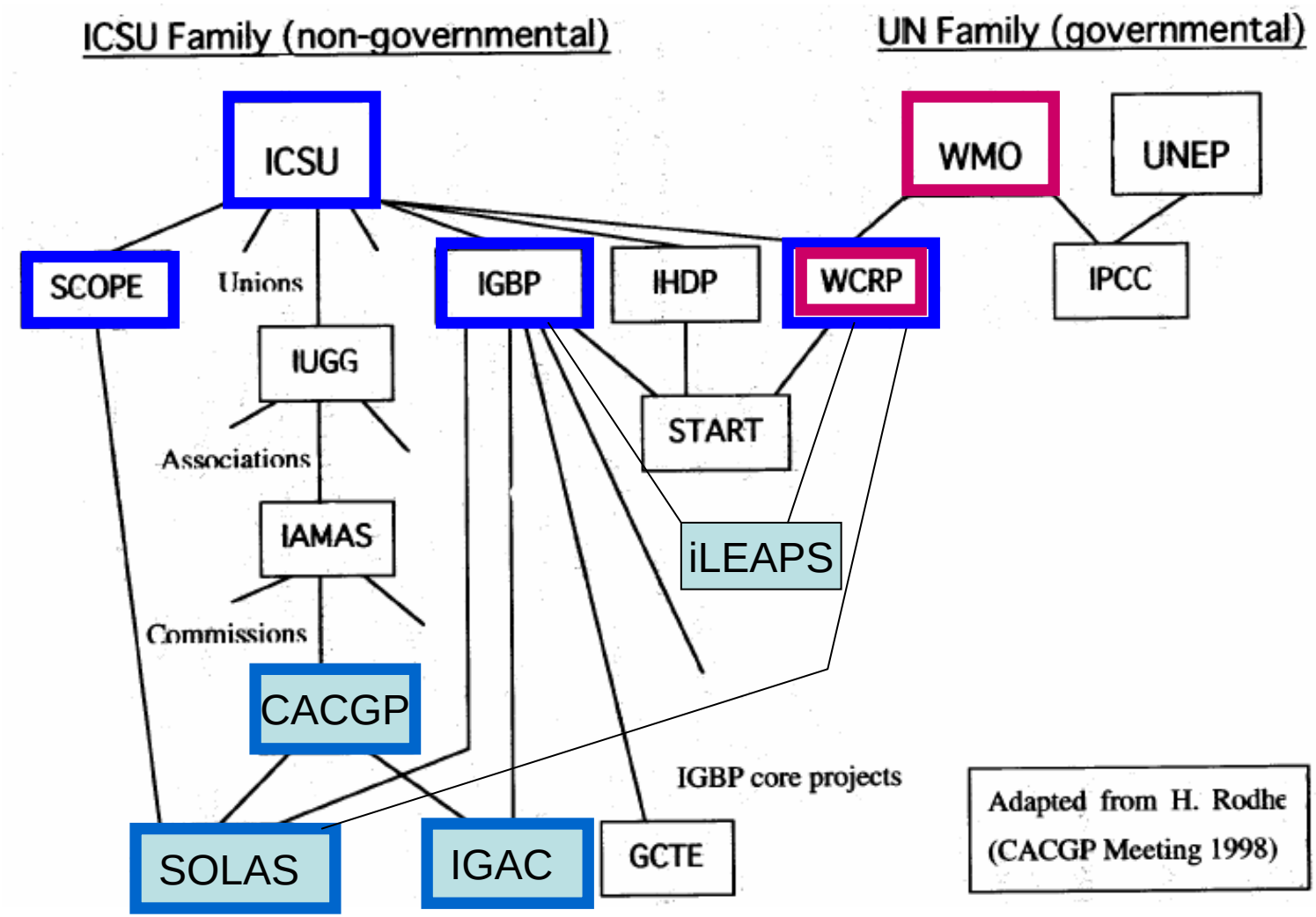


What does CACGP?

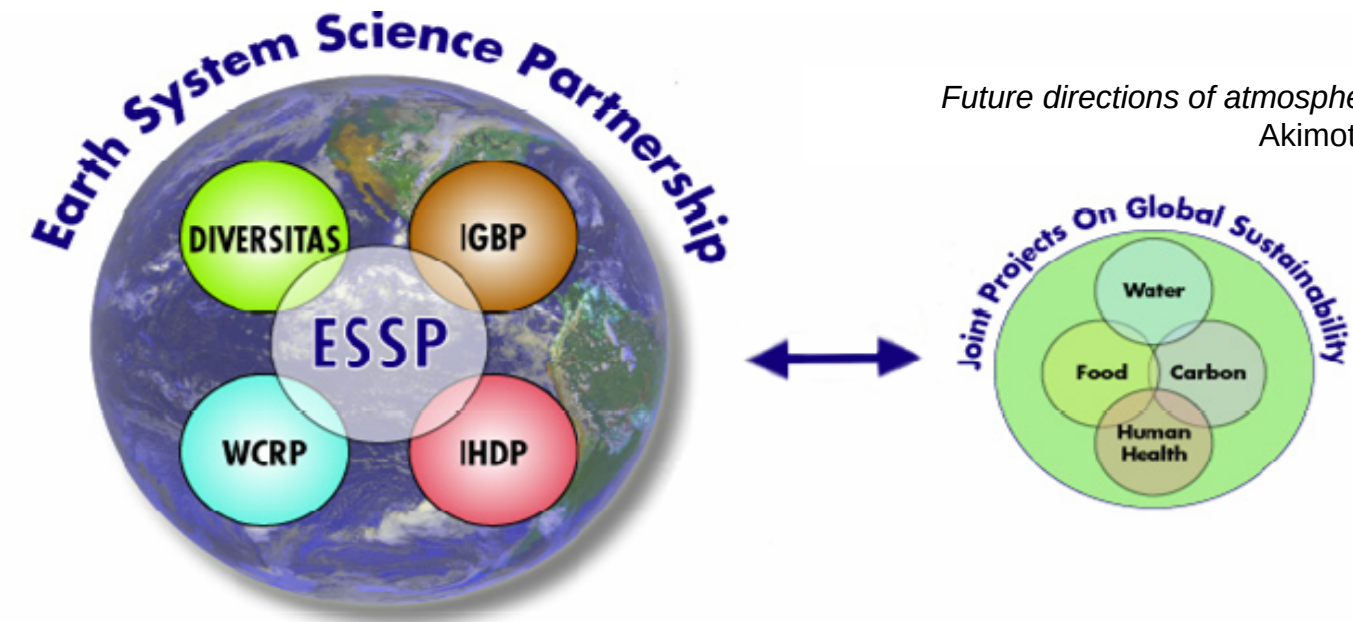
- ***supports research in atmospheric chemistry that contributes to basic science and to solving the societal issues, addressing water supply, food production and human/ecosystem health.***

- ***facilitates and stimulates an improved understanding of the fundamental mechanisms that control and determine atmospheric composition and development and evolution of improved predictive capabilities.***

stimulate atmospheric chemistry research

Key environmental issues and associated atmospheric chemical groups which are the focus of multidisciplinary research involving atmospheric chemistry

Water supply	Human health	Food production	Ecosystem health
GHGs	oxidants	oxidants	nutrients
Aerosols	Aerosols	Aerosols	acids
ozone	toxics		oxidants



Future directions of atmospheric chemistry research
Akimoto, Barrie, Artaxo, 2002

CACGP aims to

- Promote research on *chemistry and composition of troposphere related to global pollution and climate change*

- Initiate, facilitate and coordinate the research programs in this field which require international cooperation.

- Stimulate discussion and provide publication of the results of such research programs

aims of i CACGP

current main objectives of global atmospheric research

- provide a *fundamental understanding of the processes* that govern the behavior of *chemical compounds in the atmosphere and their impact on climate.*
- contribute with the partners of the international atmospheric chemistry research community to the *development of an integrating framework* describing the physical, chemical and biological *interactions between the different components of the Earth system*
- improve our *ability to predict atmospheric composition* over the coming decade through integrating models, with process studies and comprehensive data sets.
- *address societal needs* through application of atmospheric chemistry research and *development of research that integrates human dimensions into Earth System science.*

air pollution and climate
impact on ecosystems

Sponsored activties

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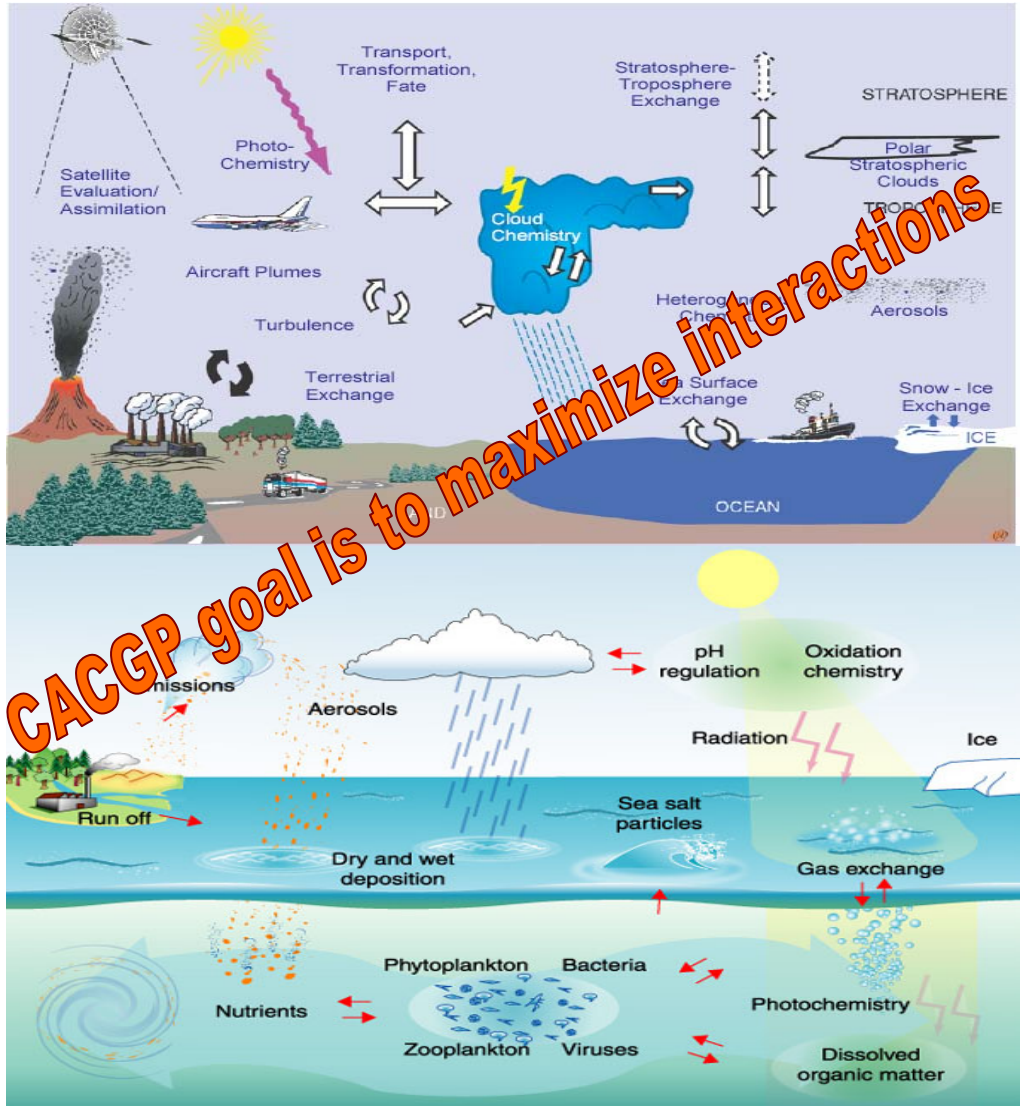
IGAC:
International Global Atmospheric Chemistry

Relevant IGBP project

iLEAPS

SOLAS:
Surface Ocean Lower Atmosphere Study



Overarching themes

Some pollution and climate relevant issues:

- Nutrient cycles / atmospheric deposition
- Aerosol, GHG & climate change ➔ impact via temperature and radiation changes / air sea fluxes / ocean productivity

Some pollution and chemistry relevant issues:

- Ice chemistry
- Halogen atmospheric cycles and gaseous and particulate air pollutants
- Recycling/loss of persistent pollutants

Future Directions

Topics

- Air pollution and climate changes

  Impact on ecosystems
- Fluxes at the interfaces : ocean/atmosphere, ice/atmosphere

  Terrestrial and marine biosphere/atmosphere

  chemistry/climate interactions – feedback mechanisms
- Time evolution

Research tools:

- Laboratory experiments
- Model simulations
- Field and satellite observations

towards an earth system modeling

towards an earth observing system

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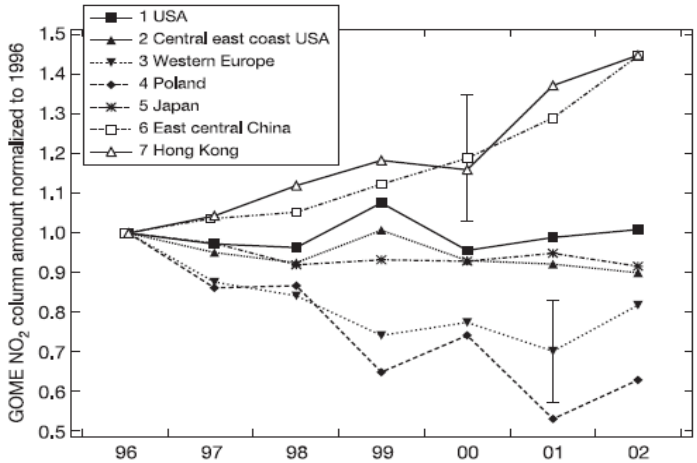
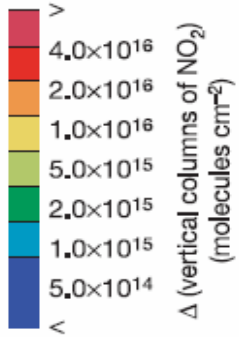
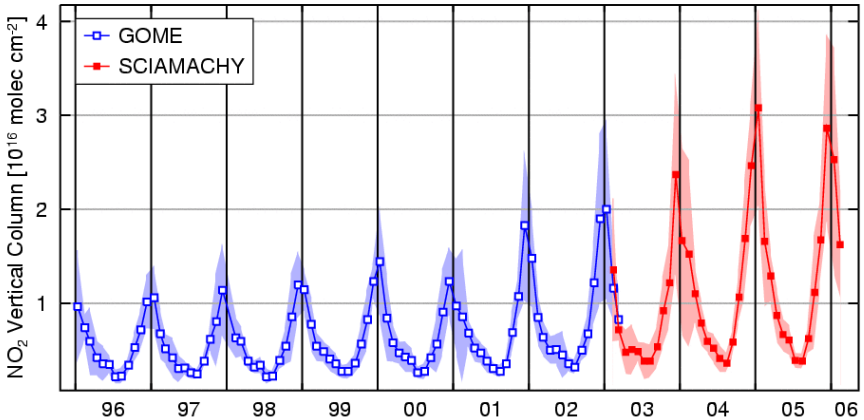
Increase in tropospheric nitrogen dioxide over China observed from space

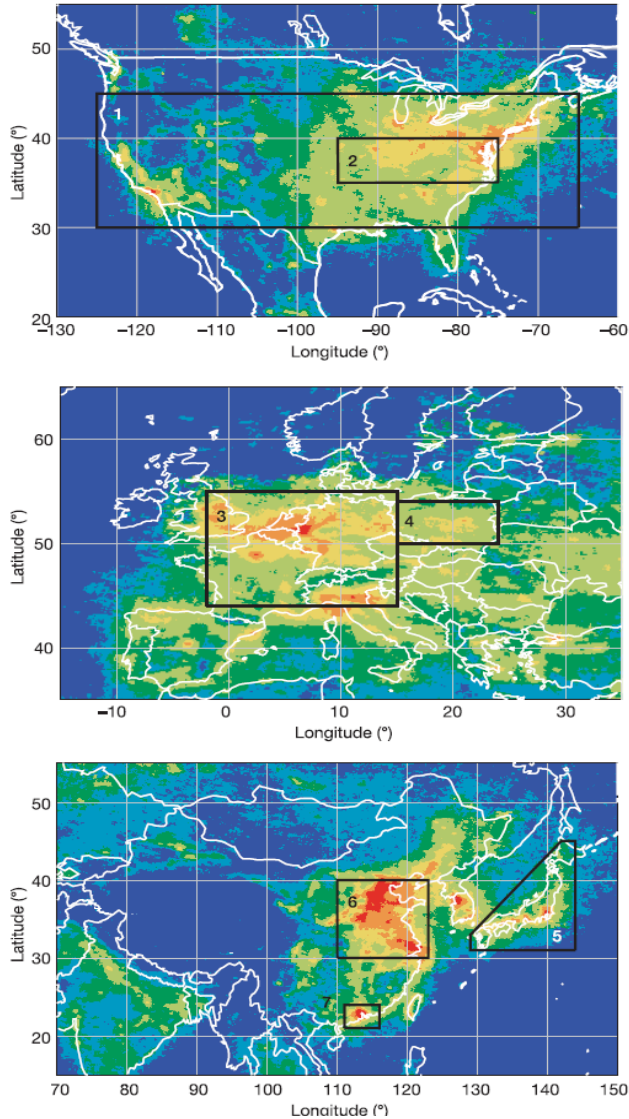
Andreas Richter[1], John P. Burrows[1], Hendrik Nüß[1], Claire Granier[2,3,4] & Ulrike Niemeier[2]

NATURE|Vol 437|1 September 2005







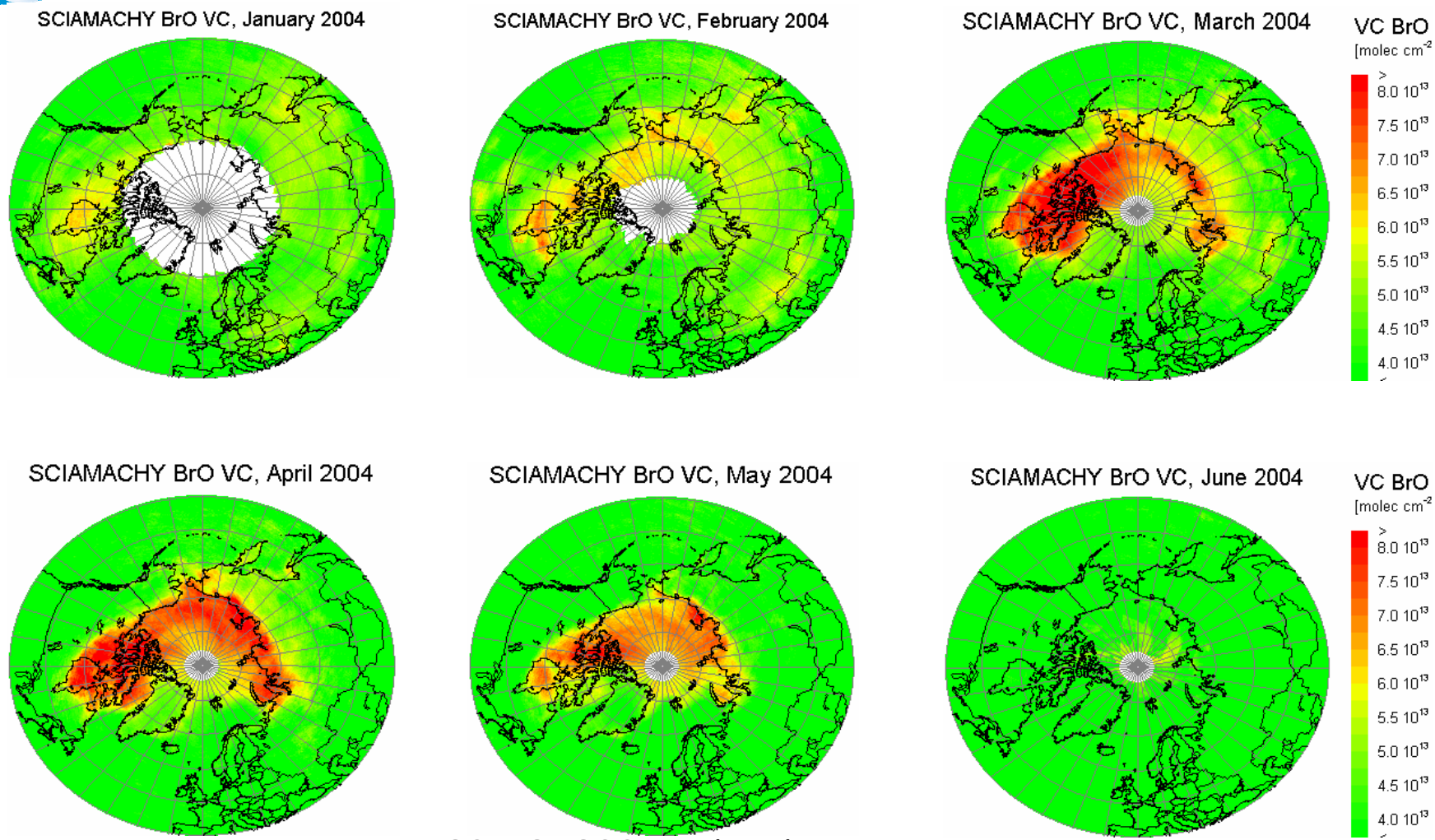


East Central China. A plot of the monthly mean of the three-day composite of the tropospheric NO_2 vertical column versus time is presented for the area defined by latitudes 30° N to 40° N and longitudes 110° E to 123° E. Both

Figure 2 | SCIAMACHY tropospheric NO_2 vertical columns averaged between December 2003 and November 2004 for selected industrial regions. SCIAMACHY measurements are taken close to 10.00 a.m. LT.

Scientific Highlights

SCIAMACHY Arctic 2004, University of Bremen



Maria Kanakidou
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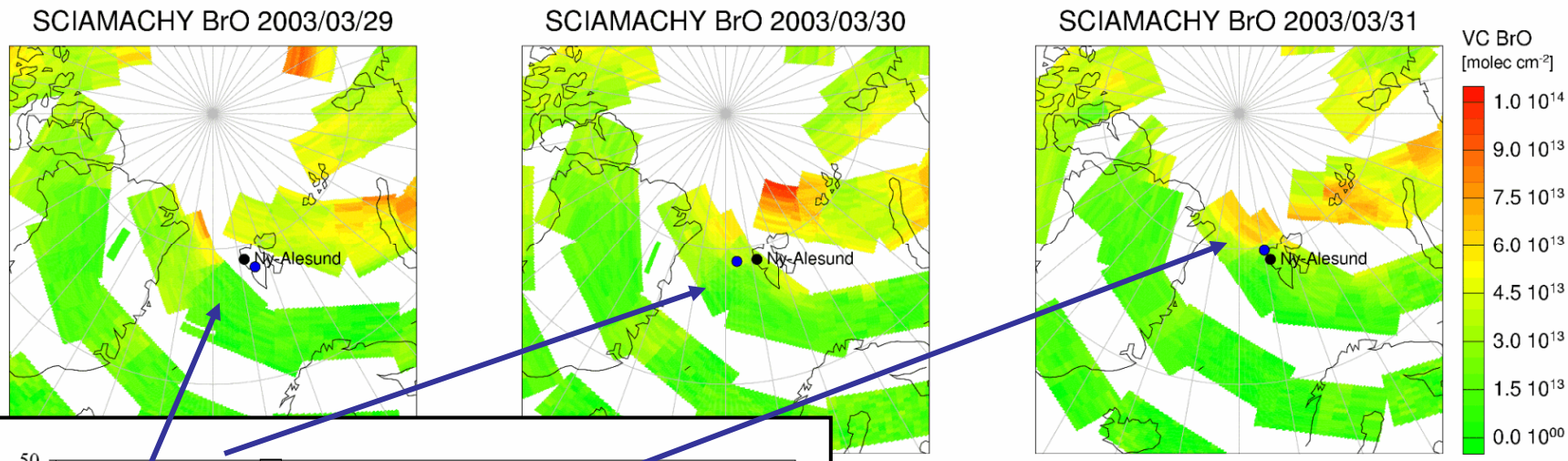
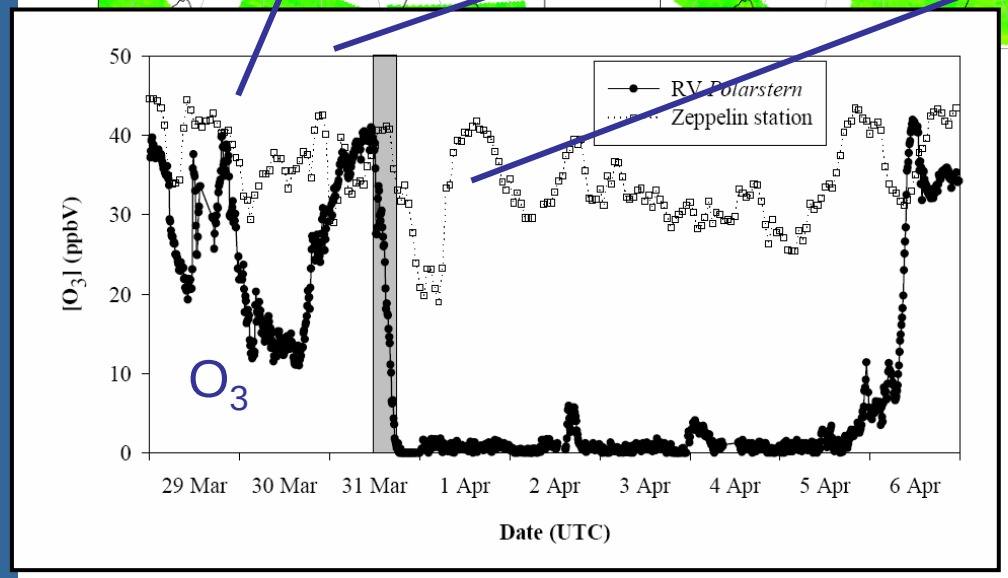
Scientific Highlights

BrO and Troposheric Ozone Depletion



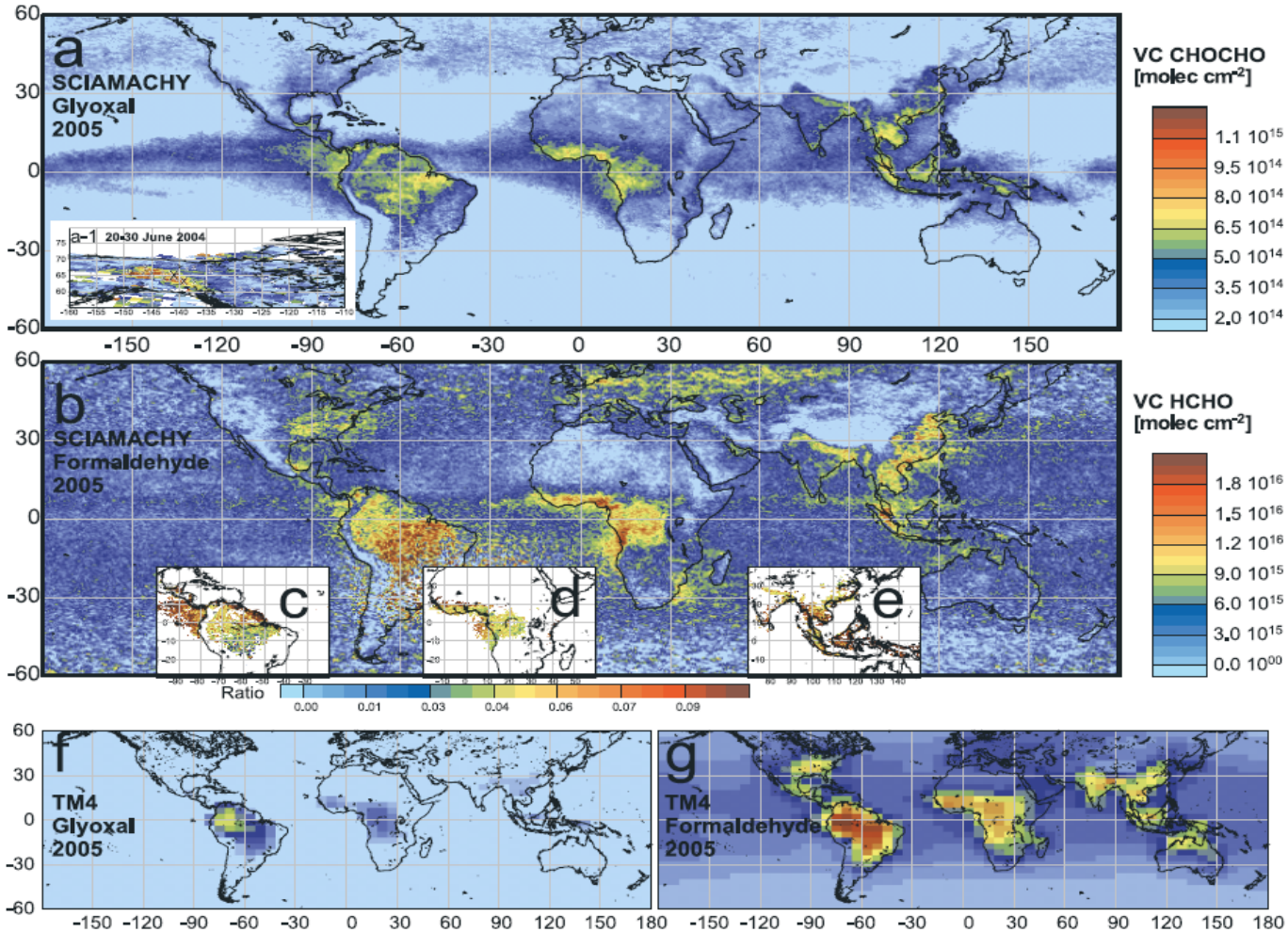


- observation of rapid O_3 depletion on Cruise of RV Polarstern
- good correlation with BrO fields from SCIAMACHY
- simultaneous observation of frost flowers!!!

H.-W. Jacobi et al., Observation of a fast ozone loss in the marginal ice zone of the Arctic Ocean , *J. Geophys. Res., in press*, *2006*

Scientific Highlights

- Formaldehyde and Glyoxal from space
- Oceanic sources? particles (primary, secondary) gaseous VOC?



Wittrock et al., GRL, 33, L16804 doi:10.1029/2006GL026310, 2006

Yearly mean for (a) glyoxal and (b) formaldehyde derived from SCIAMACHY observations in 2005. (c–e) Sub-figures illustrate the ratio between measured CHOCHO and HCHO while (f–g) show the global distribution as calculated by the model. In (Figure 2a (inset)), CHOCHO is shown during biomass burning in Alaska in June 2004. The area with biomass burning is marked with X signs applying distributions from AATSR (Advanced Along Track Scanning Radiometer) fire counts.

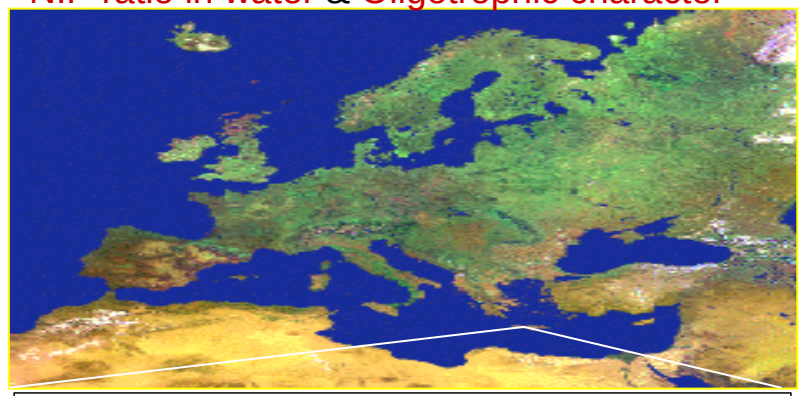
Scientific Highlights

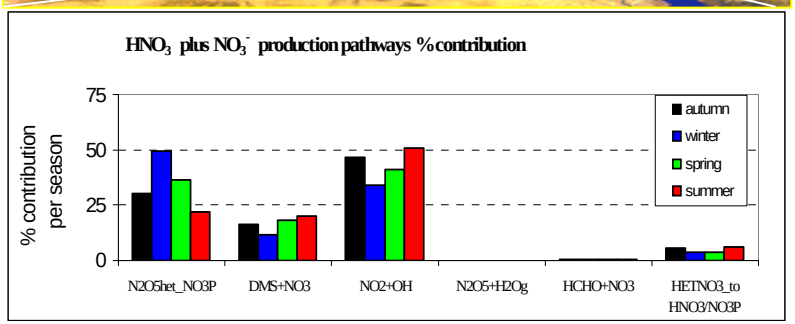
- Nutrient atmospheric deposition to the ocean enhanced by interactions between natural (DMS) and pollution compounds (NO_3)

- How large urban areas at coastal locations affect the atmosphere and the ocean ?
  - Nutrients (via the atmospheric + water pathways)
  - Aerosols, GHG, climate

increases towards the East

N:P ratio in water & Oligotrophic character



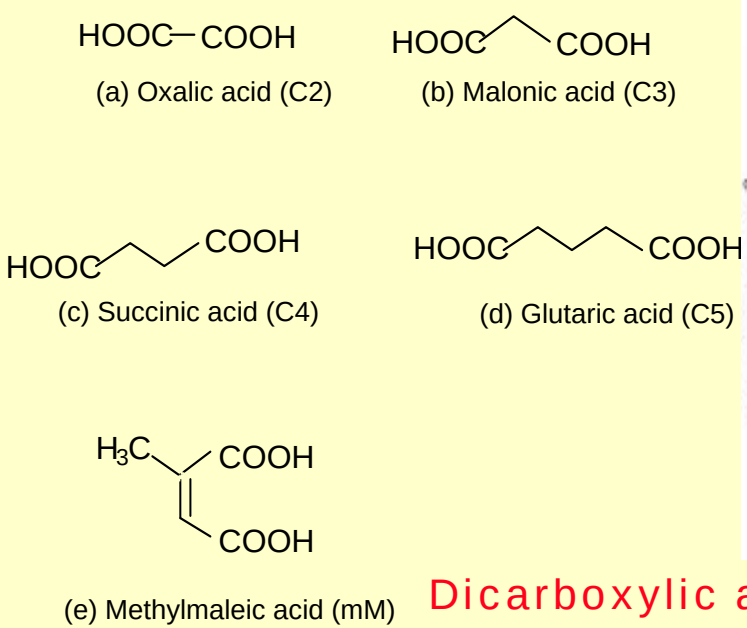


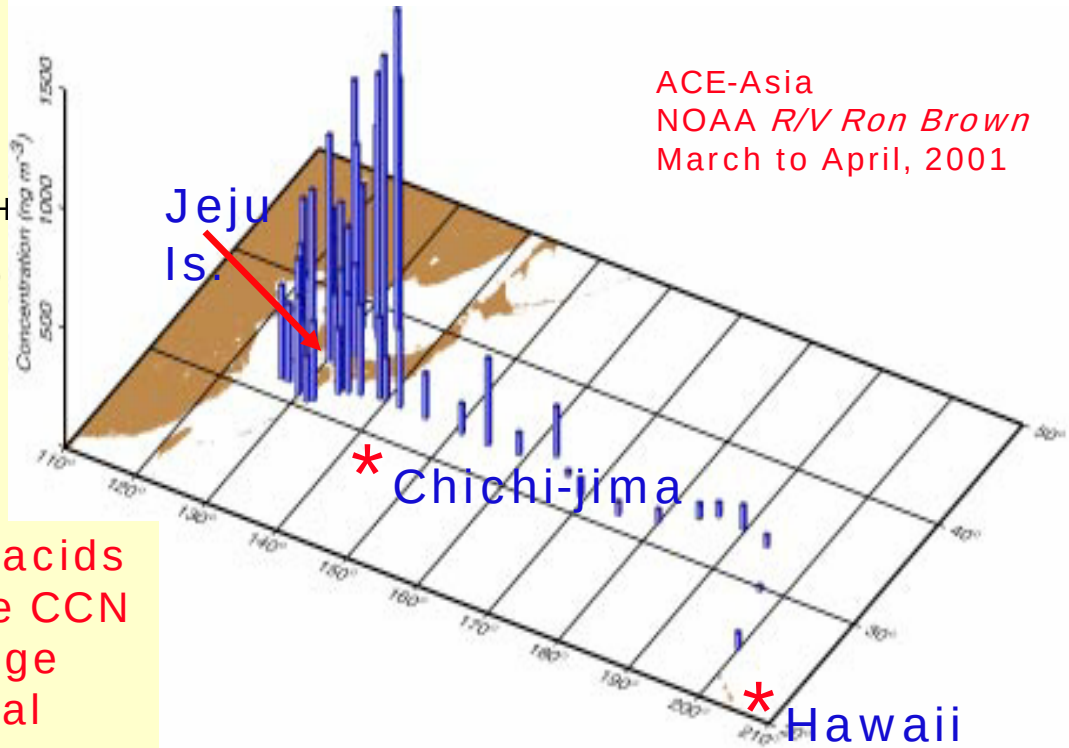
On an annual base, DMS contributes up to 20% to nutrient (N) formation highlighting the importance of the biogenic and anthropogenic compounds interaction.

Vrekoussis et al., GRL 33, L05811, 2006.

Scientific Highlights

Distributions of oxalic acid HOOC-COOH in the marine aerosols from the Western Pacific (Mochida et al., *J. Geophys. Res.*, 2003)

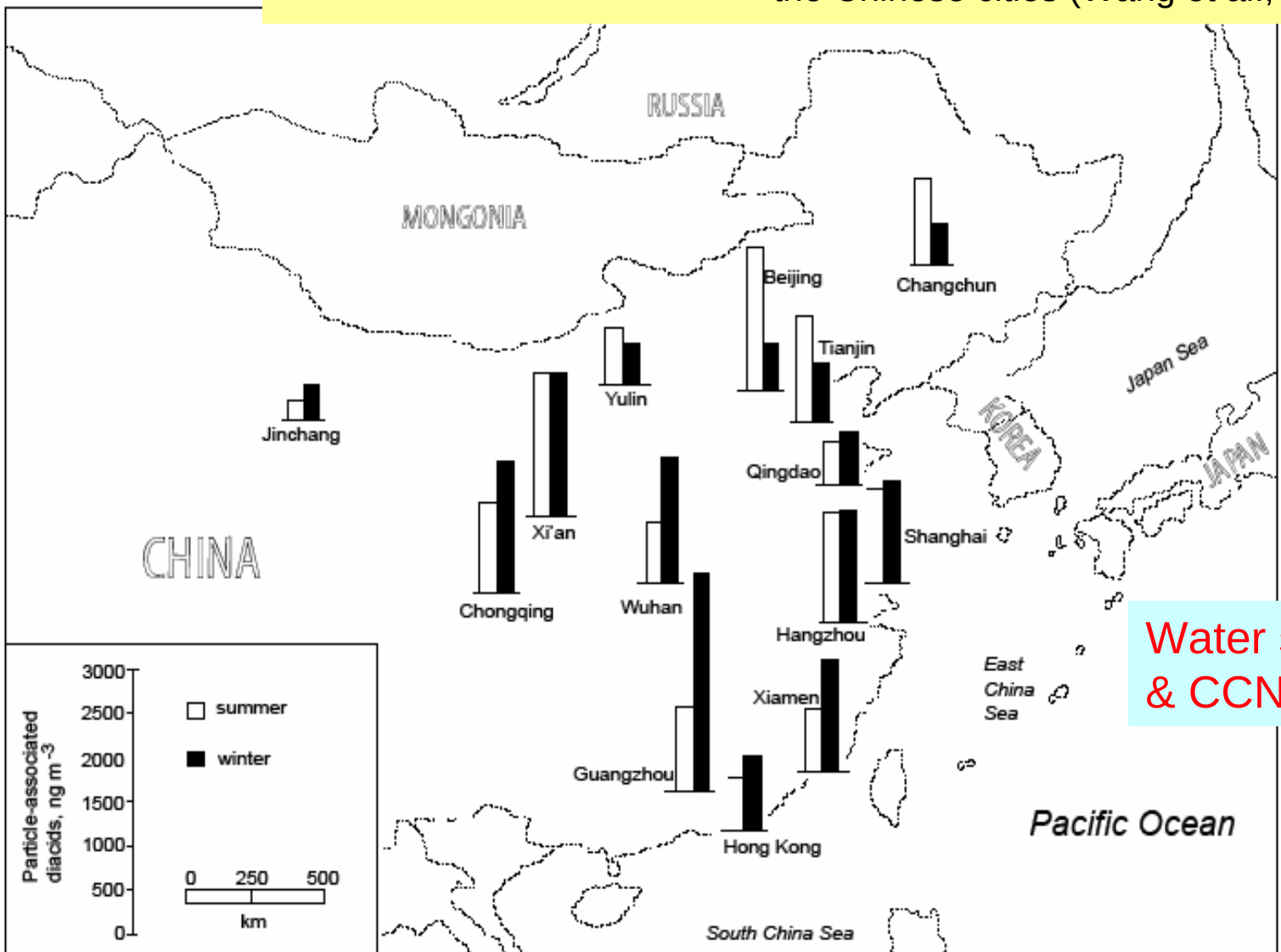




Dicarboxylic acids
Water soluble CCN
Climate change
Photochemical formation

Scientific Highlights

Spatial distributions of diacids (HOOC-(CH2)n-COOH; 500-2000 ngm^{-3}) in the Chinese cities (Wang et al., GRL, 2006)



Water soluble & CCN

Future Meetings

International Commission on Atmospheric Chemistry and Global Pollution
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Major task of CACGP is to organize discussion forums : Special sessions & Quadrennial Joint Symposium

Recent CACGP/IGAC(WMO) joint conferences *with SOLAS sessions*:

1994 Fuji-yoshida Japan *Global Atmospheric Chemistry (AE special issue)*

1998 Seattle, USA *Global Atmospheric Chemistry (JGR, special issue)*

2002 Heraklion, Greece *Atmospheric Chemistry in the Earth System: From Regional Pollution to Global Climate Change (ACP Special issues)*

2006 Cape Town, S. Africa *Atmospheric Chemistry at the interfaces*

Next IGAC Conference in France in 2008

SOLAS sessions?

Next joint Symposium in 2010

- *Location and scientific focus to be decided (in 2007)*

4 candidates to host it : *Canada, Chile, China, UK*