Integrated Analysis of Multiple Worldwide AMS Campaigns and Comparison with Global Models

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Motivation and Objectives

- Aerosol Mass Spectrometer (AMS) database:
  - Multidimensional and massive
  - Rich information on aerosol chemistry, microphysics and dynamics
    - Quantitative, chemically speciated, size-resolved, high time resolution
  - Dozens of field datasets in various environments (through collaboration with AMS user groups)

- Integrated analysis
  - Synthesize information for use in model testing and validation
  - Translate the rich AMS database into knowledge and model constraints that can improve quantification of aerosol climate forcing.

Ubiquity and dominance of oxygenated species in organic aerosols in anthropogenically-influenced Northern Hemisphere midlatitudes

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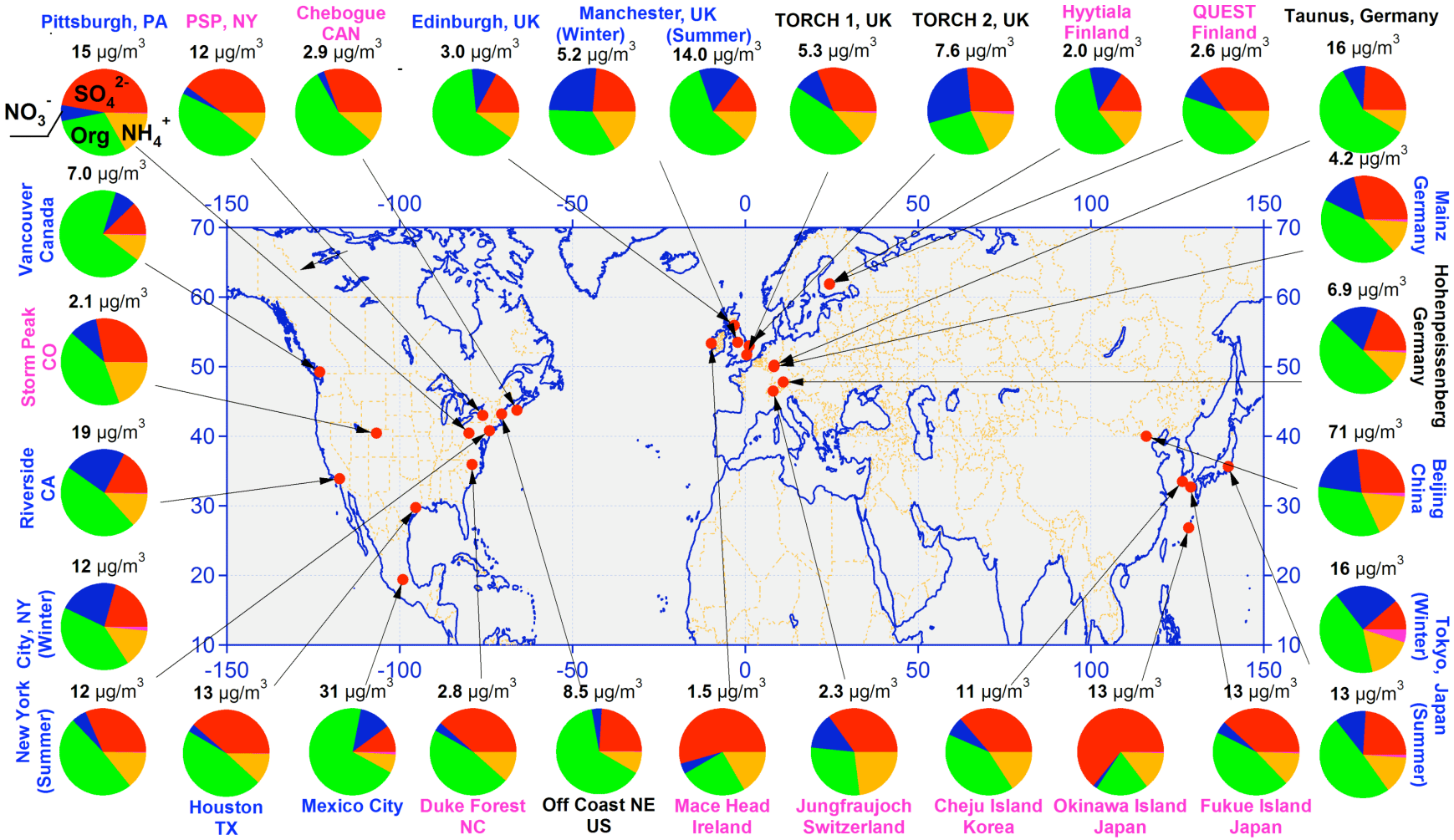
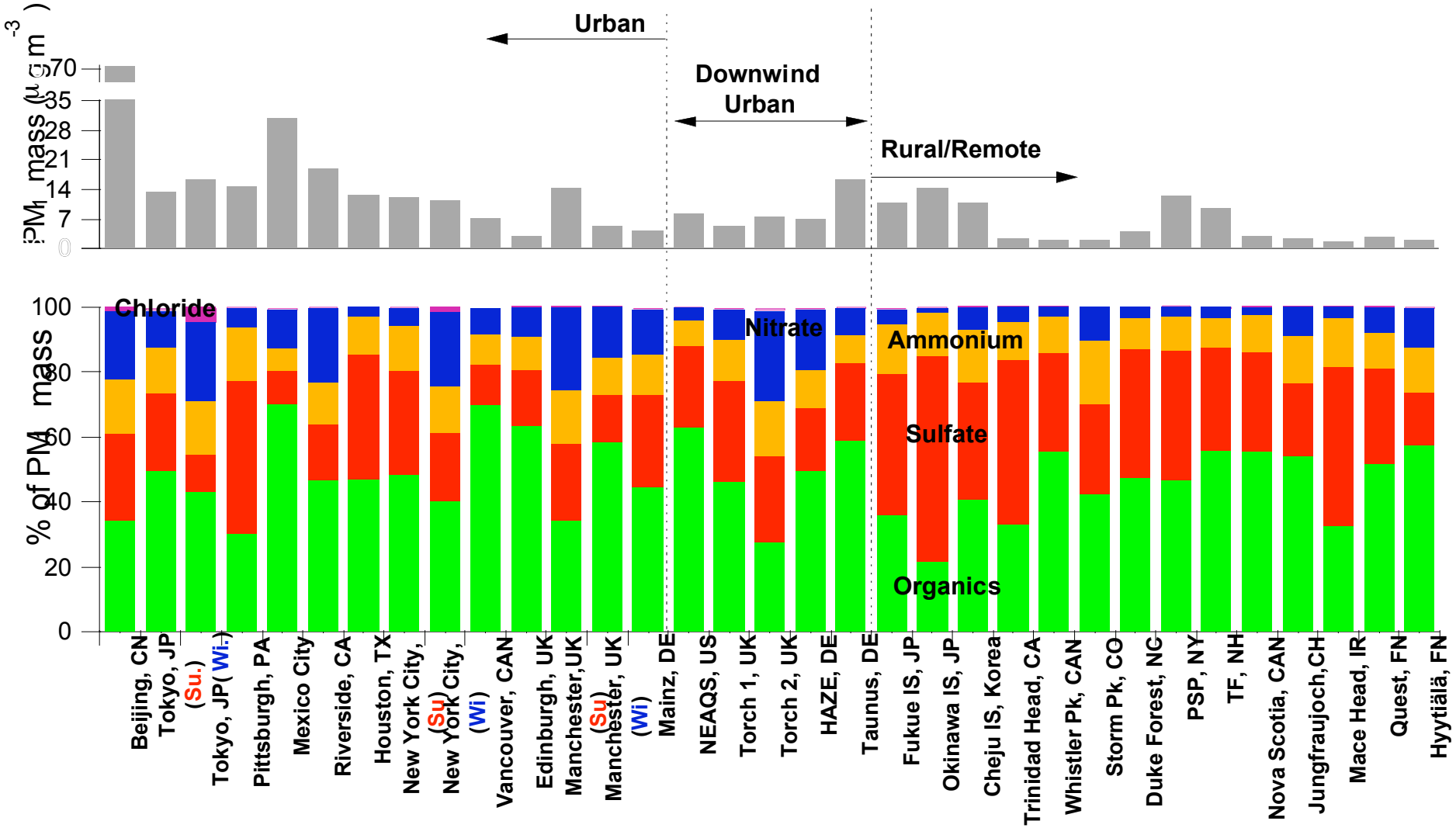


GEOPHYSICAL RESEARCH LETTERS, VOL. 34, L13801, doi:10.1029/2007GL029979, 2007

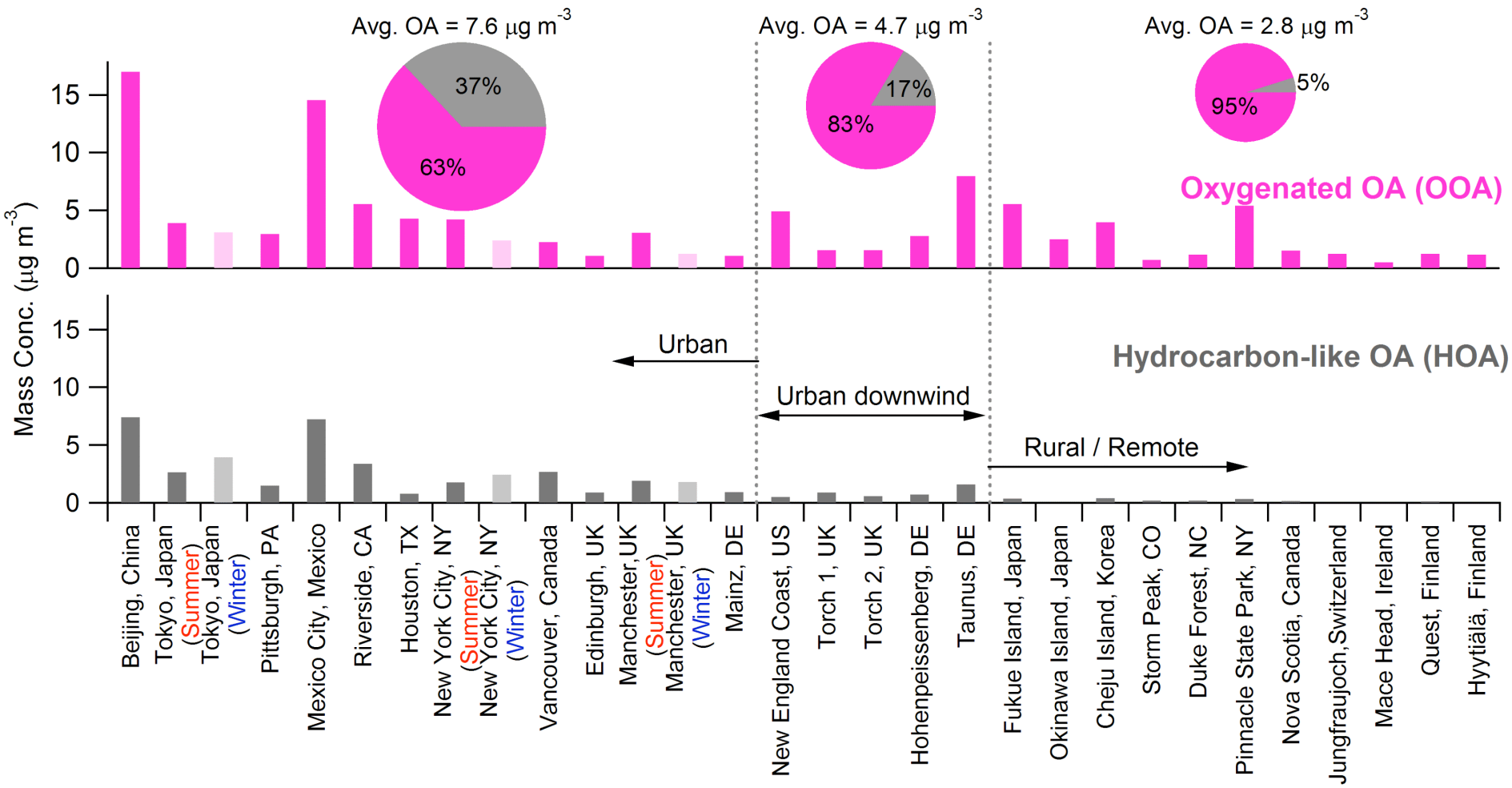
Integrated Analysis of AMS Data: ***Submicron Aerosol Composition***

NR-PM$_1$ Avg. Mass Conc. and % Contribution of Species



- Organics and sulfate dominate submicron aerosol composition
- Aerosol loading, composition highly variable

Integrated Analysis of AMS Data: ***HOA and OOAs***

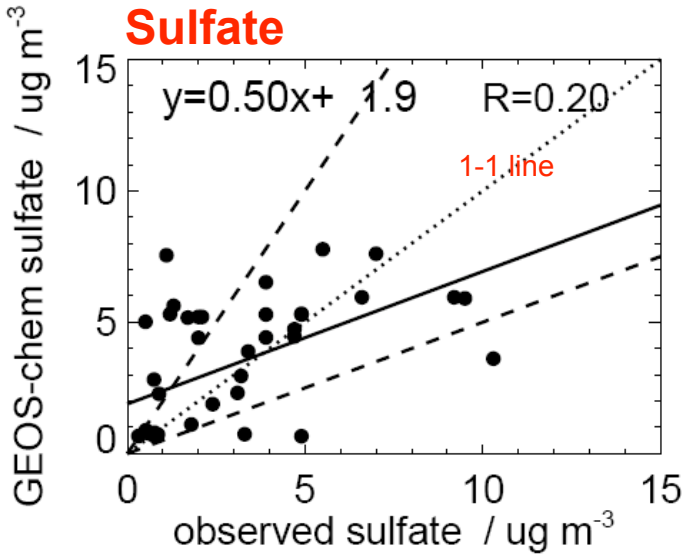


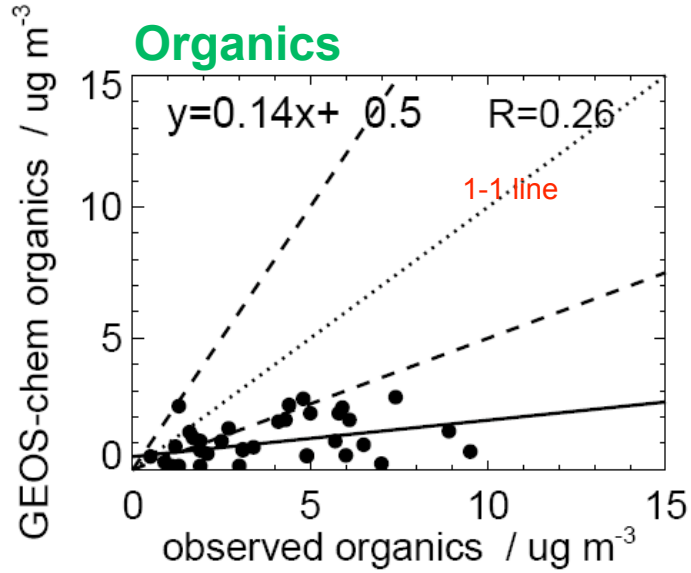
Zhang, Jimenez et al., *GRL*, 34, L13801, 2007

- OOA dominates
- HOA significant in cities but less so in rural/remote locations

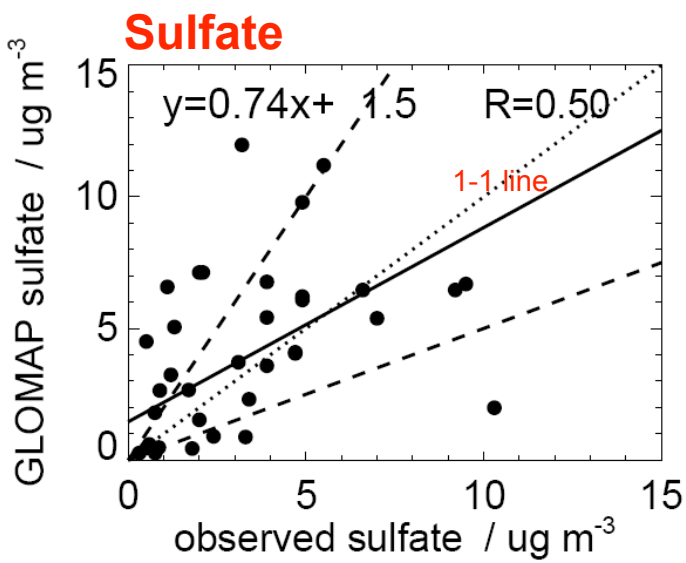
Comparison with Global Models: ***Speciated Mass Loadings***

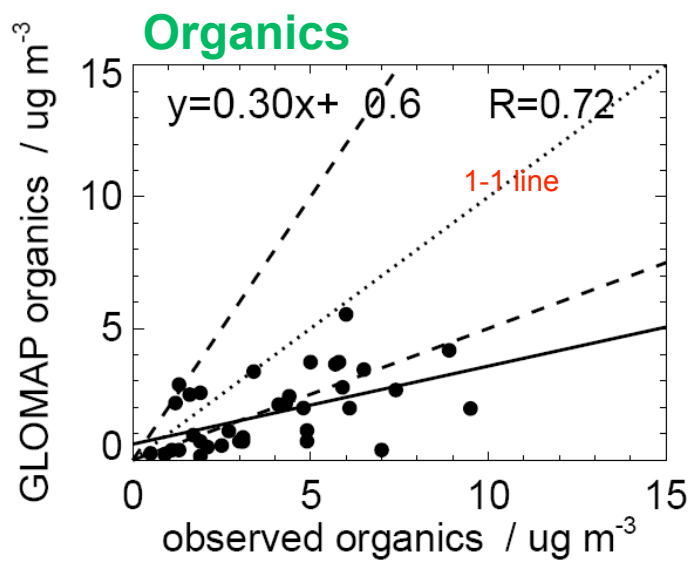
GEOS-Chem





GLOMAP

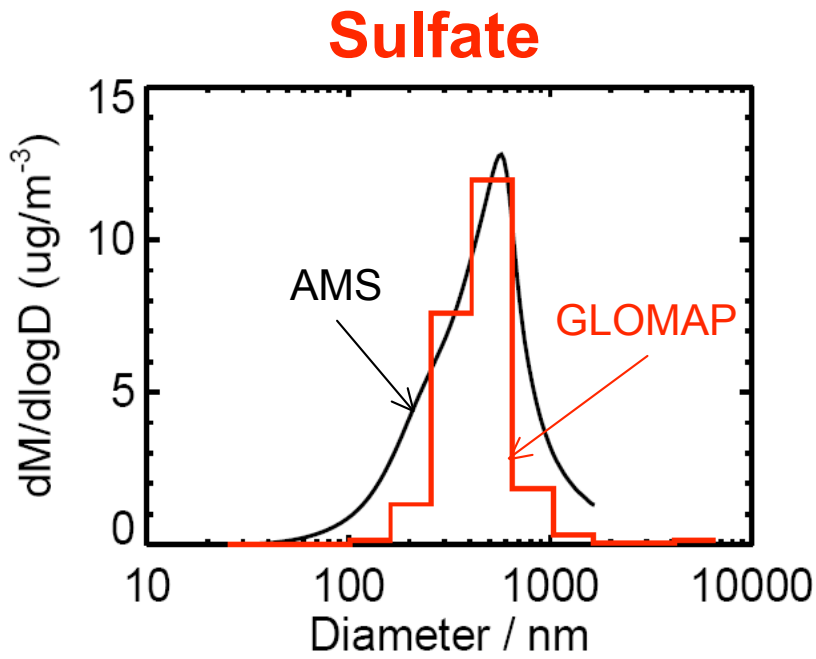


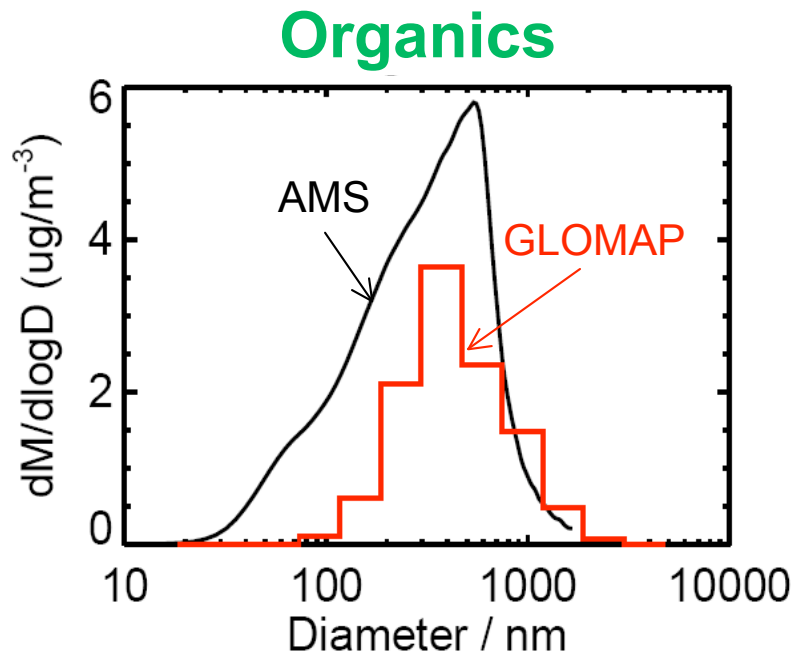


Model simulation by D. Spracklen & K. Carslaw, U. Leeds
AMS data from Zhang, Jimenez et al., GRL, 2007

Comparison with Global Models: ***Size Resolved Composition***

Pittsburgh, Sept. 2002





Model simulation by D. Spracklen & K. Carslaw, U. Leeds
AMS data from Zhang et al., JGR, 2005

AMS Global Database Webpage:

http://www.asrc.cestm.albany.edu/qz/AMS_global_database.html

AMS Global Database - Mozilla Firefox

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http://www.asrc.cestm.albany.edu/qz/AMS_global_database.html

Getting Started Latest Headlines

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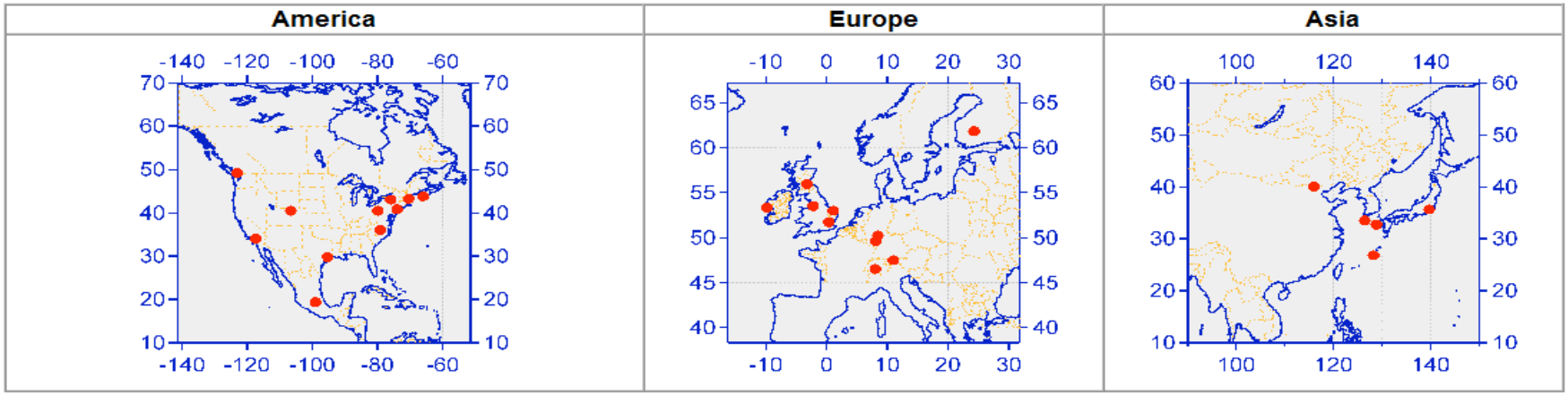
AMS Global Database

Homepage

This page is under construction. Currently we only have the Pittsburgh 2002 dataset posted. More datasets will be added in the future.

Click here to see a map of the datasets that we did a first integreted analysis.



Datasets available:

- Pittsburgh, USA, Sept. 2002

References:

Qi Zhang, J.L. Jimenez, M.R. Canagaratna, J.D. Allan, H. Coe, I. Ulbrich, M.R. Alfarra, A. Takami, A.M. Middlebrook, Y.L. Sun, K. Dzepina, E. Dunlea, K. Docherty, P.F. DeCarlo, D. Salcedo, T. Onasch, J.T. Jayne, T. Miyoshi, A. Shimono, S. Hatakeyama, N. Takegawa, Y. Kondo, J. Schneider, F. Drewnick, S. Weimer, K. Demerjian, P. Williams, K. Bower, R. Bahreini, L. Cotrell, R.J. Griffin, J. Rautiainen, J.Y. Sun, Y.M. Zhang, and D.R. Worsnop (2007) Ubiquity and Dominance of Oxygenated Species in Organic Aerosols in Anthropogenically-Influenced Northern Hemisphere Mid-latitudes, Geophysical Research Letters 34, L13801, doi:10.1029/2007GL029979 PDF, Download Figures 1&2, Dowload Table S1 & S2