

# **AMF-08 Deployment and Retrieval of Aerosol Single Scattering Albedo in China**

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# **GOALS**

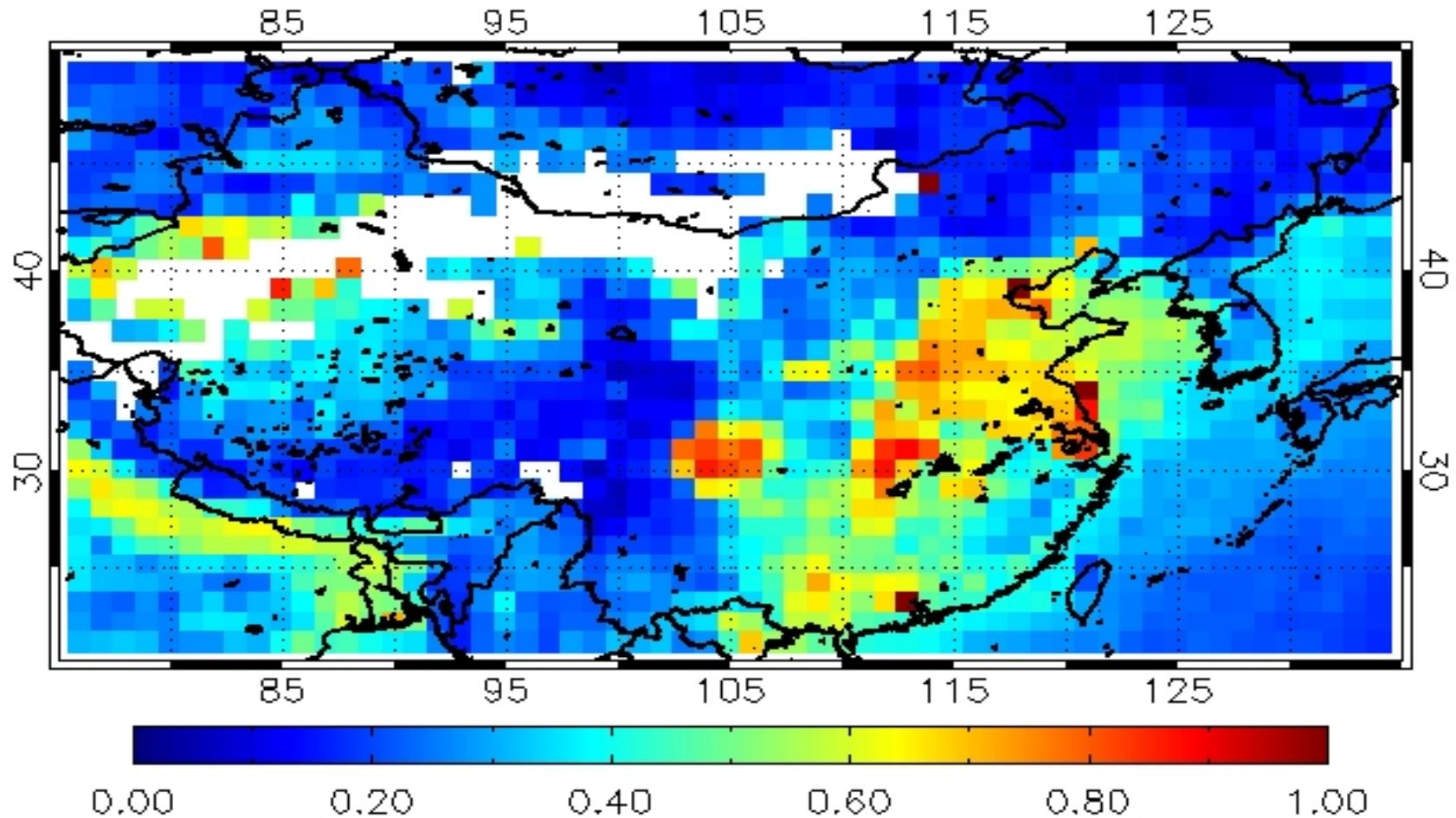
Gain a basic knowledge of the loading, physical, chemical and optical properties of aerosol;

Understanding their direct and indirect effects on regional climate, especially on cloud, precipitation, and radiation budget.

# Summary of Observational Programs in Asia in Support of AMY-08



# MODIS AOD Product (C005)



# Changes in Wind Speed

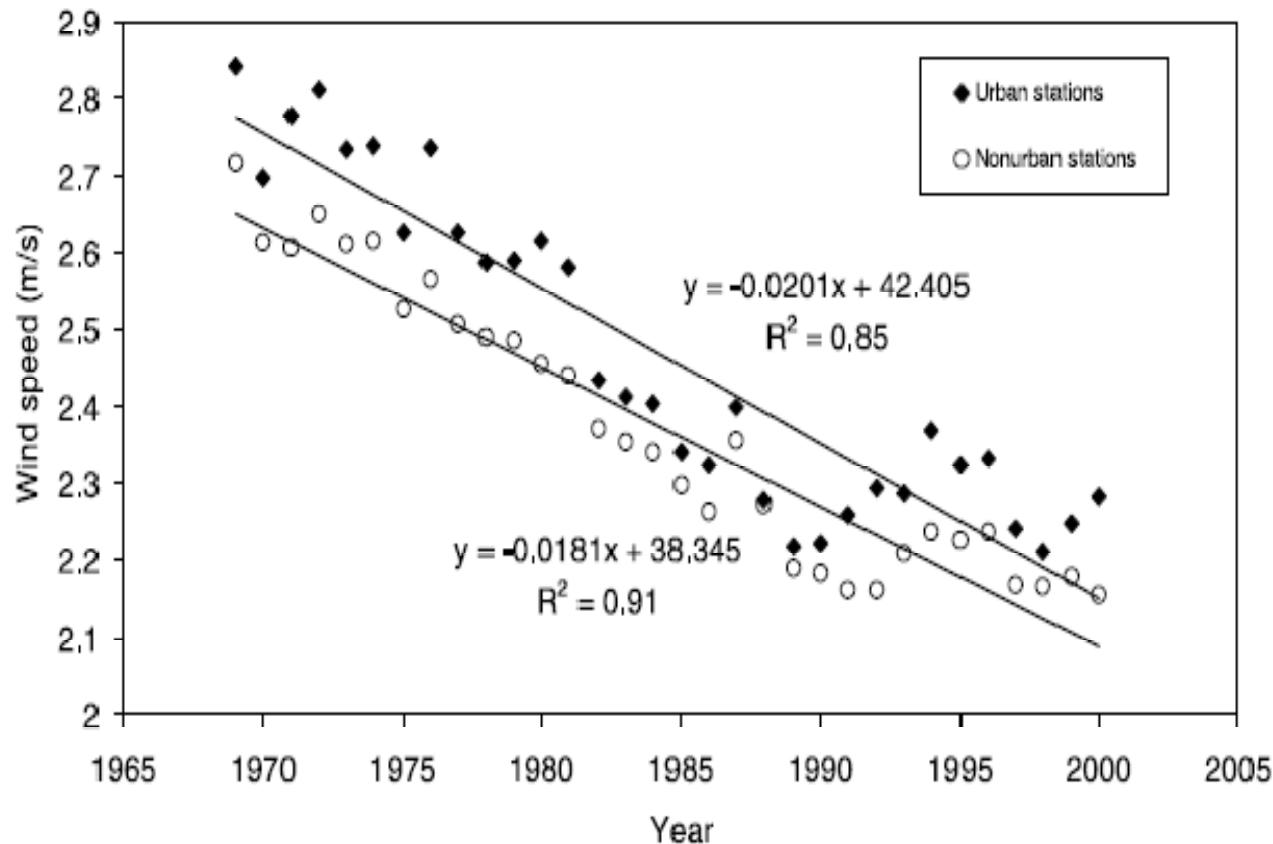
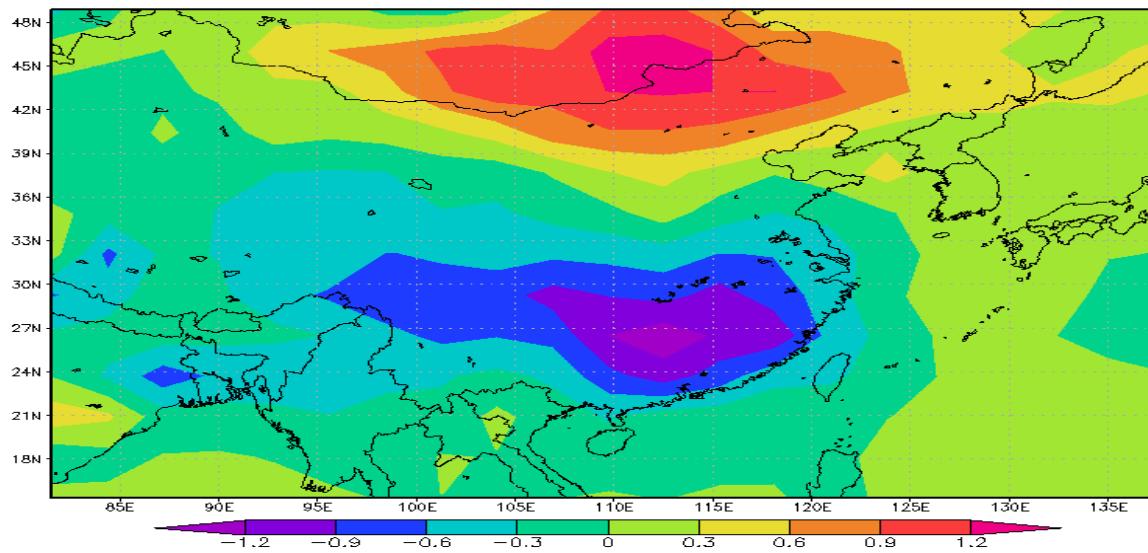
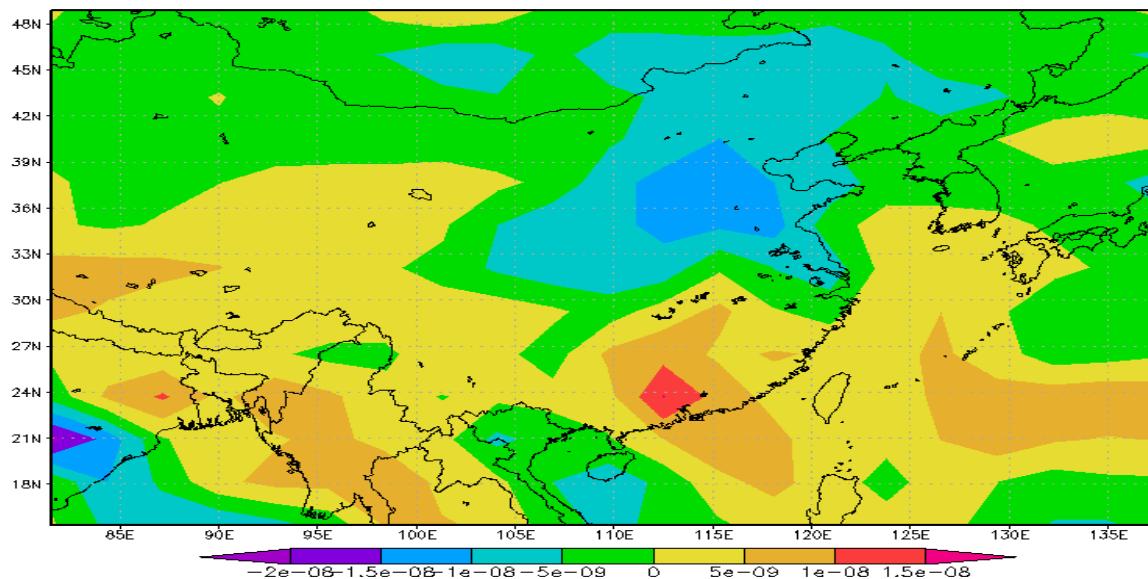
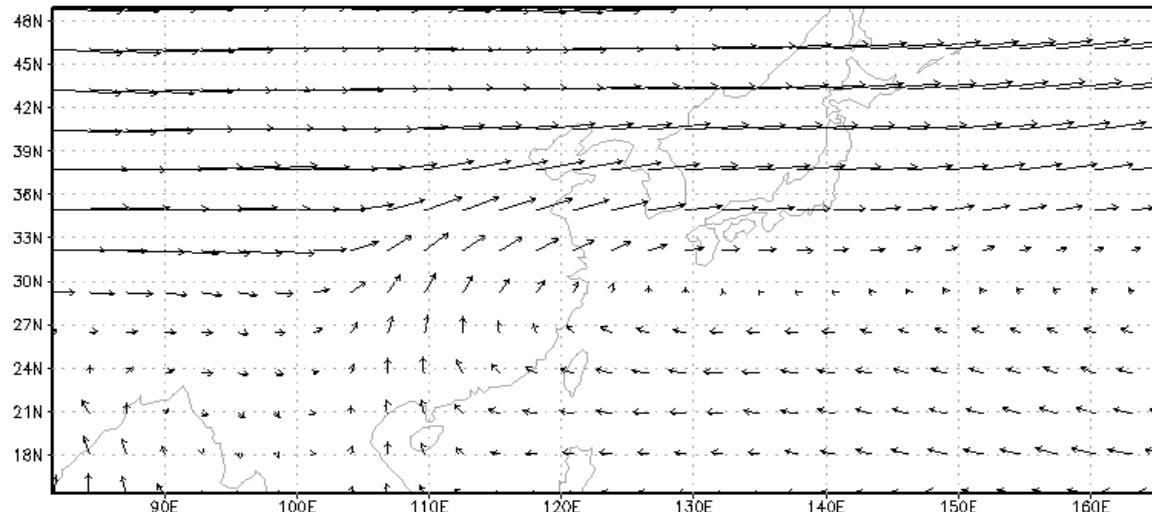


Figure 2. Urban stations including the top 30 largest cities in China and the “nonurban” stations totaling 275 first-class weather stations.

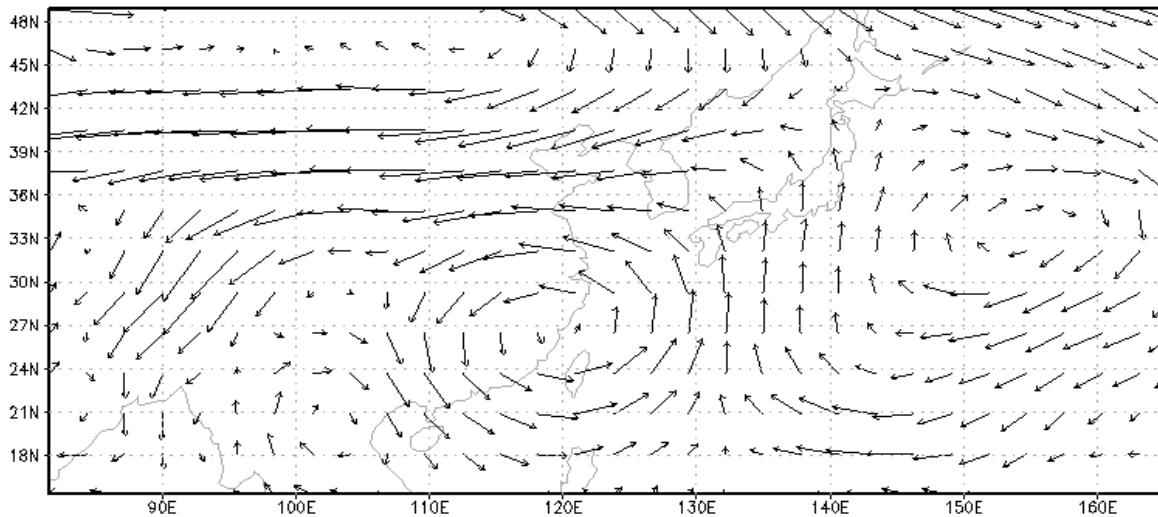
# Change in rainfall and temperature over EA



# Wind at 500 mb



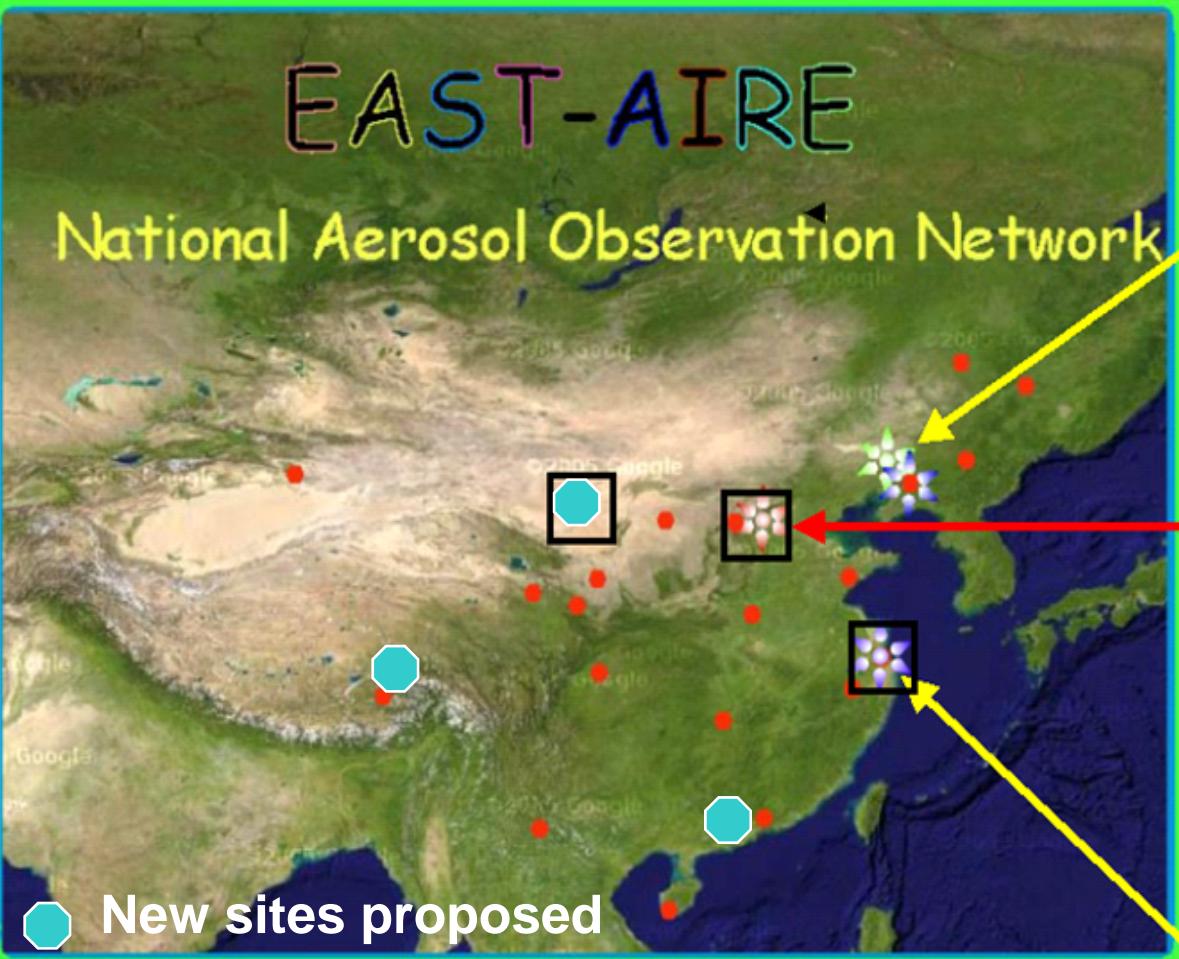
# Wind Change at 500 mb



# EAST-AIRE Observation

**EAST-AIRE**

National Aerosol Observation Network



New sites proposed

- Planned AMF and AAF deployment sites
- Existing extensive observation stations
- Nation-wide aerosol observation network

*Airborne and Ground IQP*

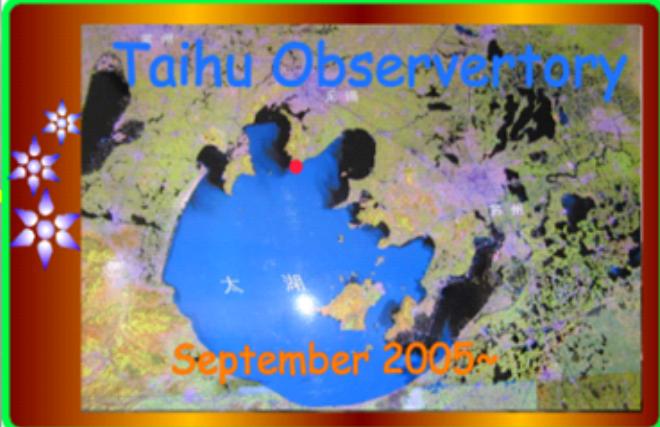


April 2005

Xianghe Observatory  
August 2004~~



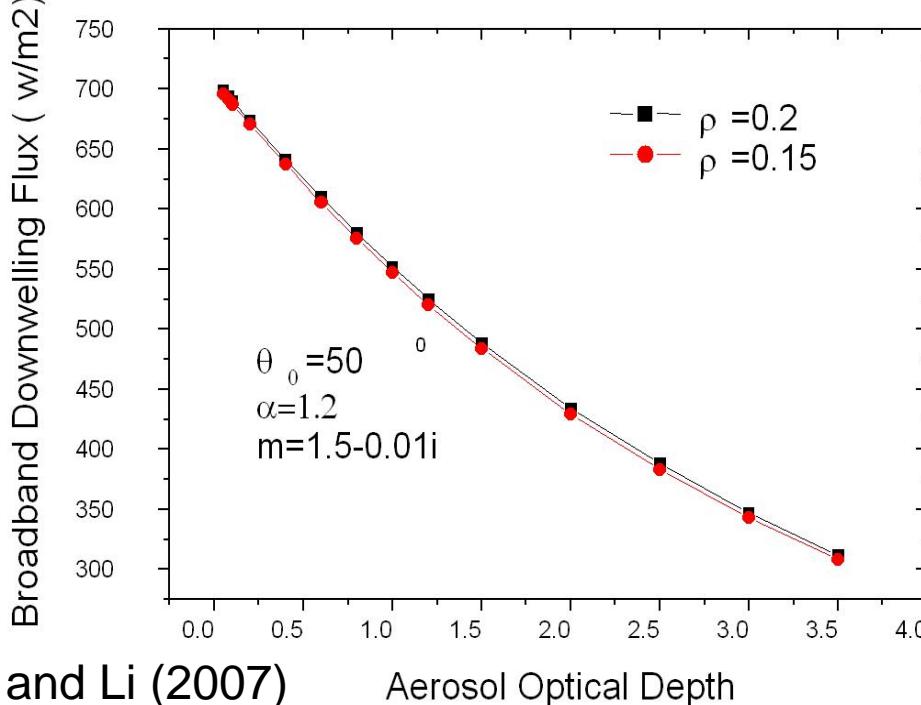
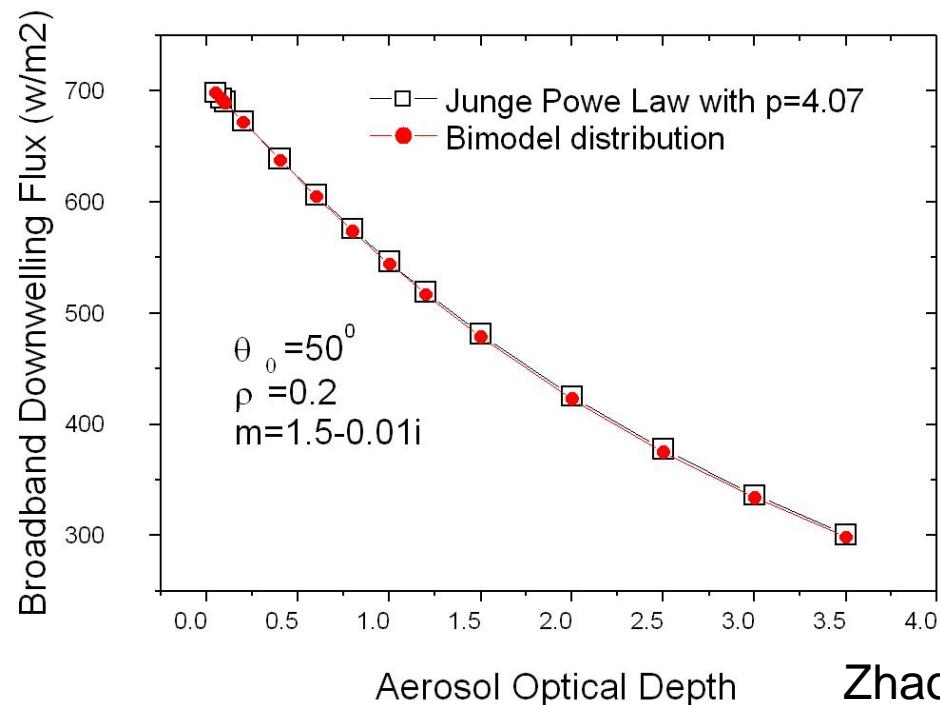
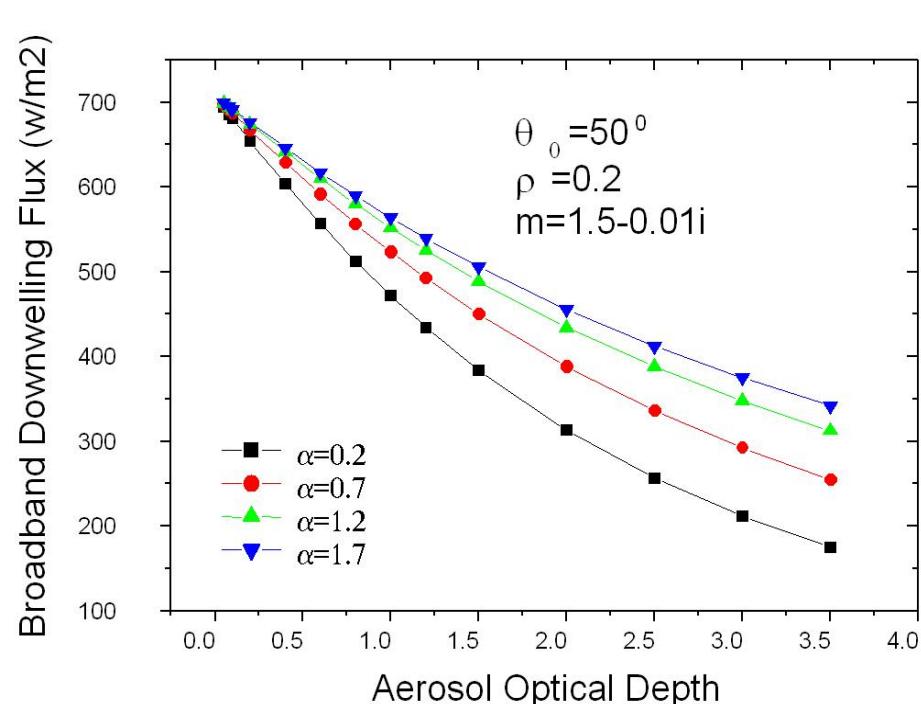
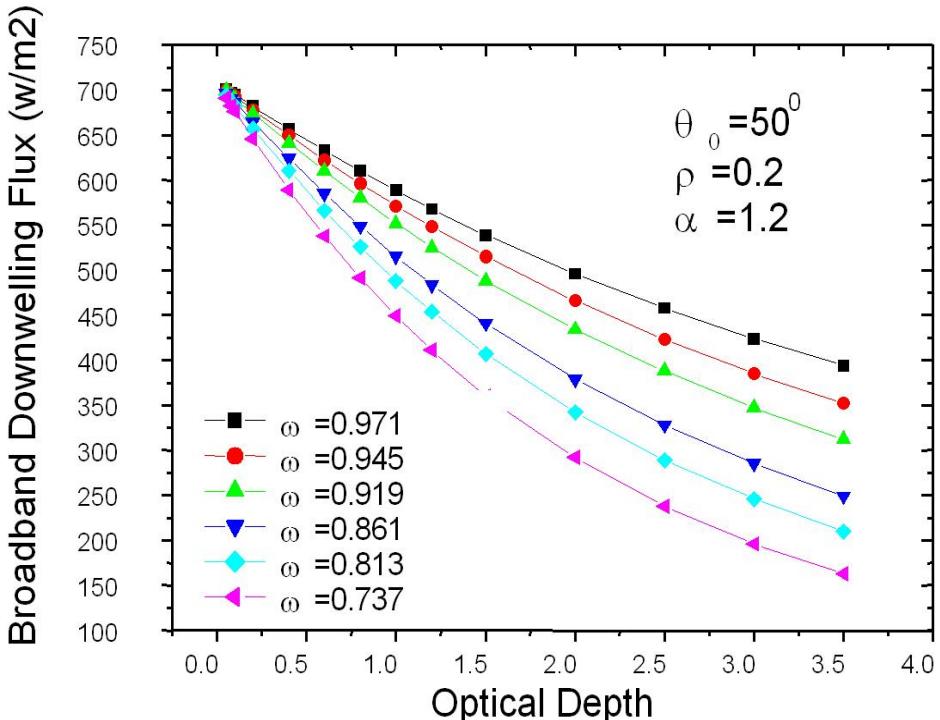
Taihu Observatory



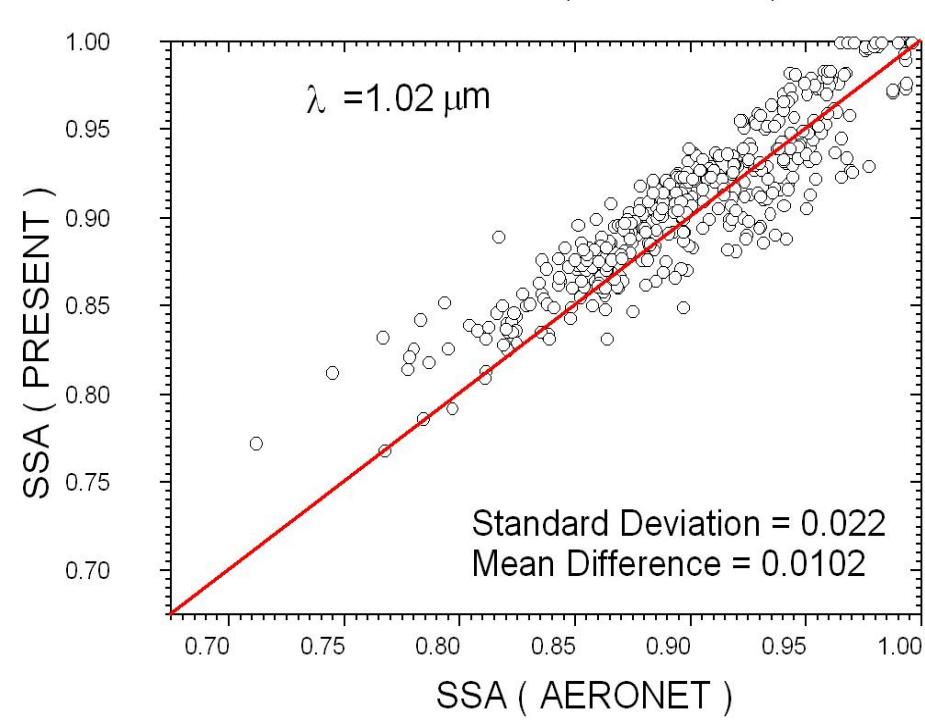
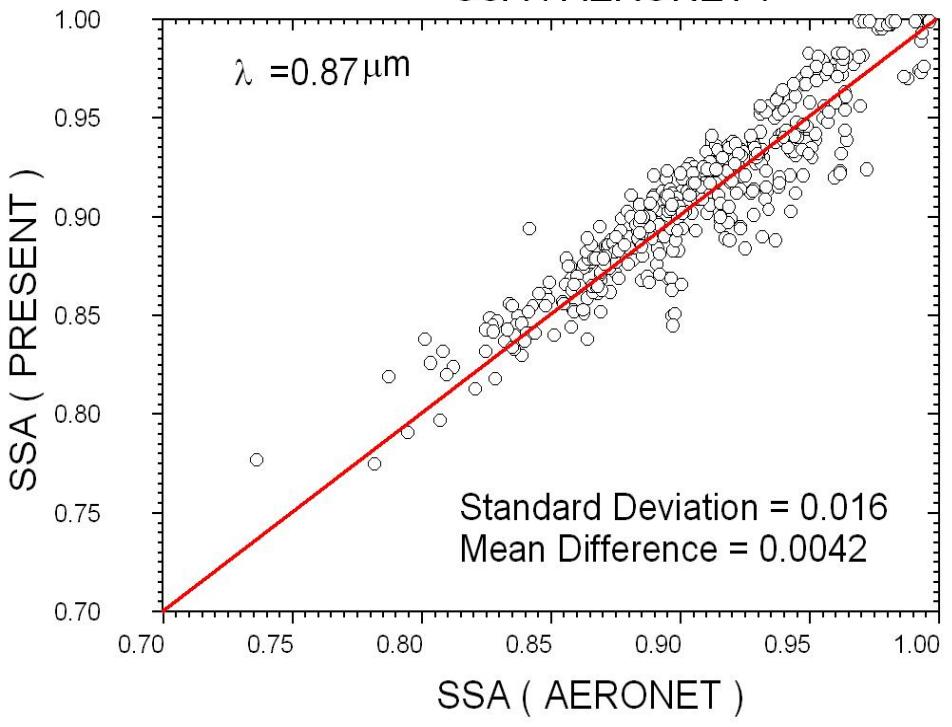
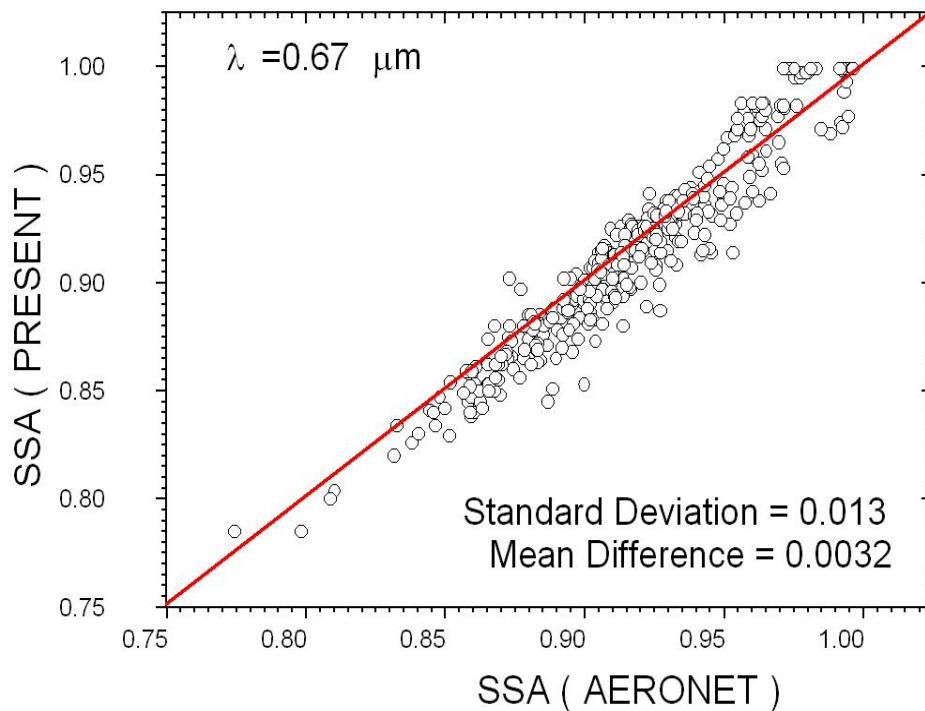
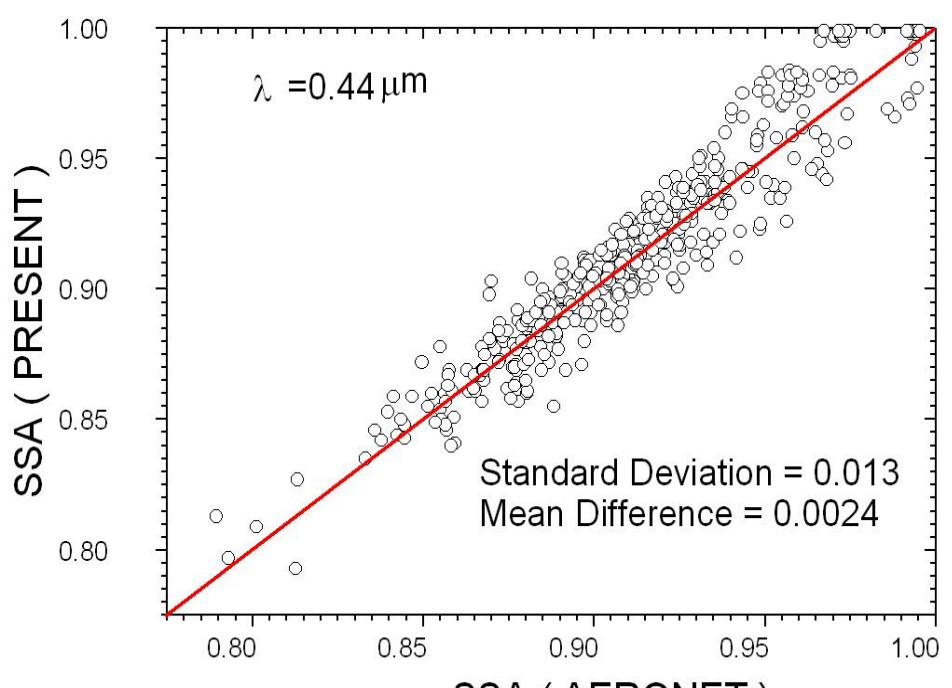
September 2005~

# Various Methods Determining Aerosol Single Scattering Albedo from

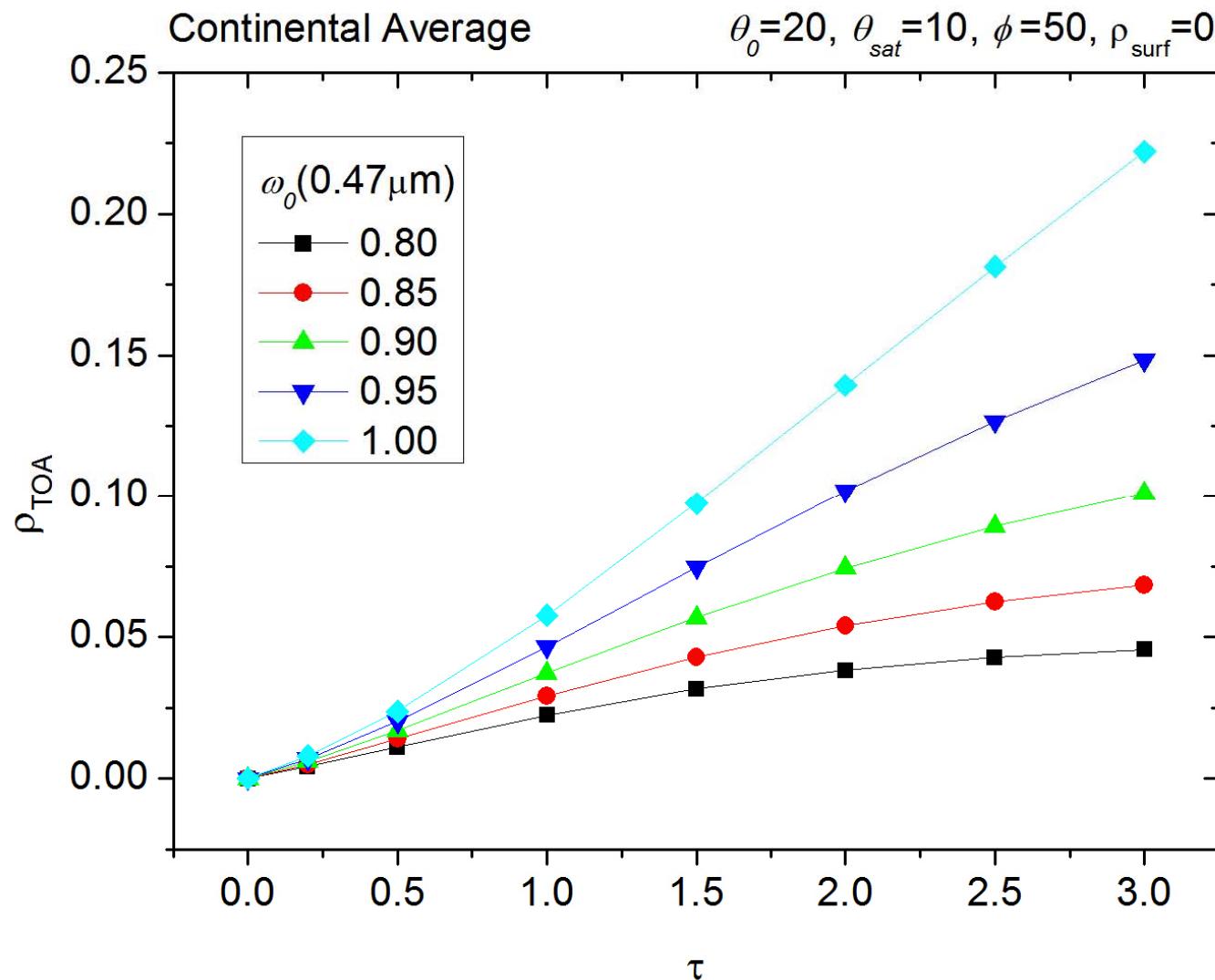
- 1) AERONET
- 2) AOD and surface broadband fluxes
- 3) TOA reflectance and surface transmittance
- 4) Aerosol filters + optical analysis

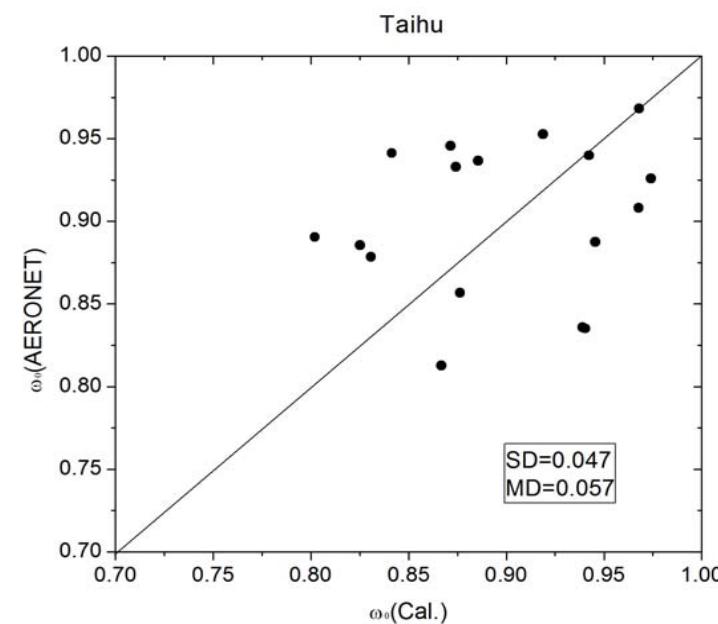
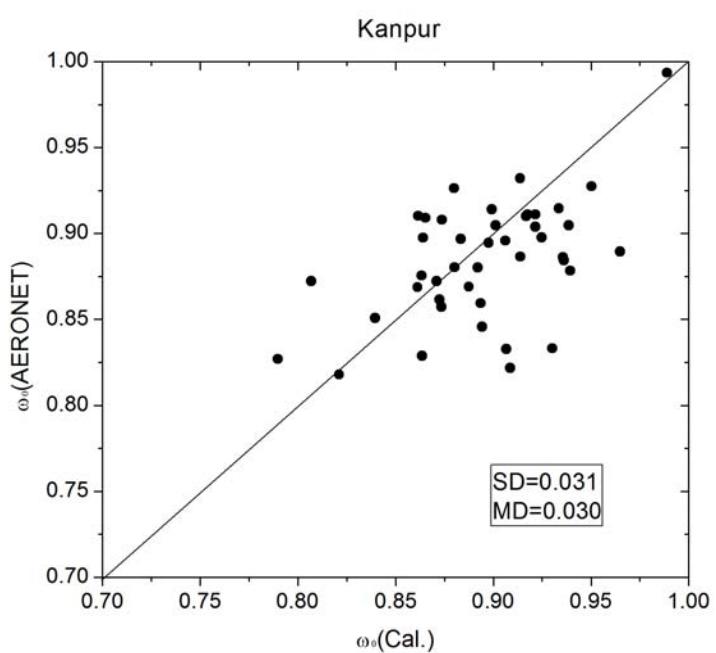
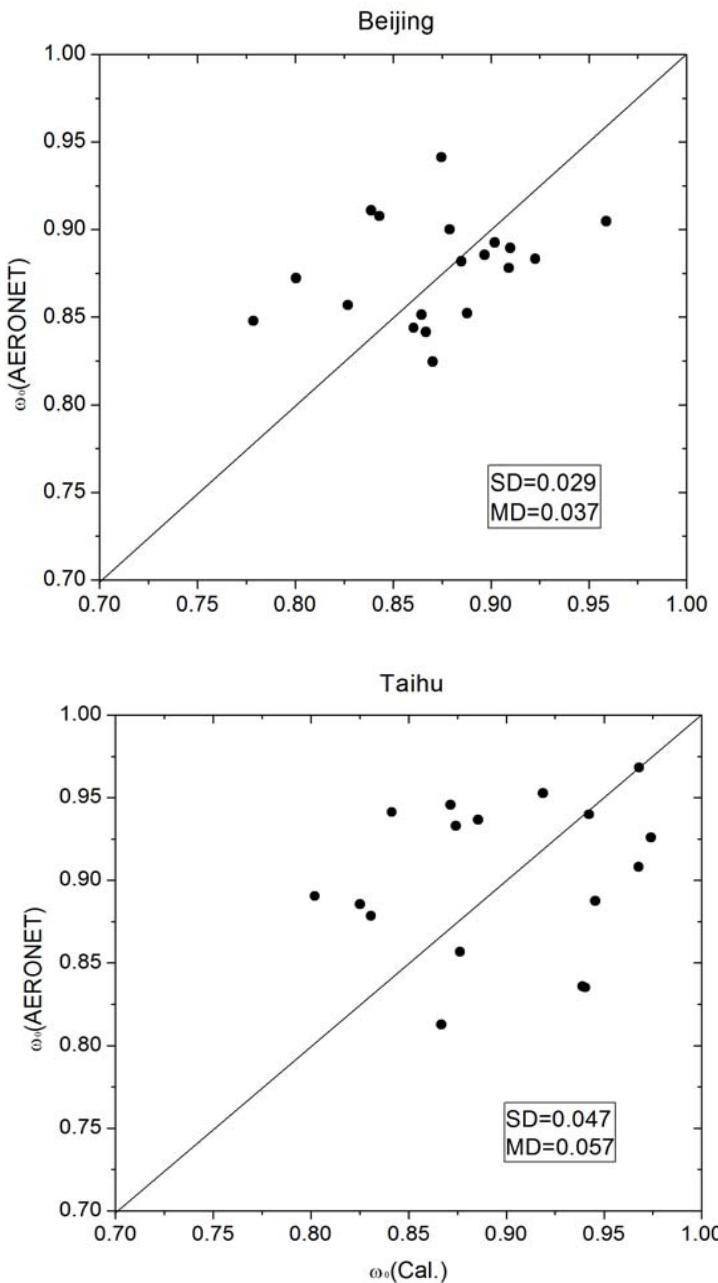
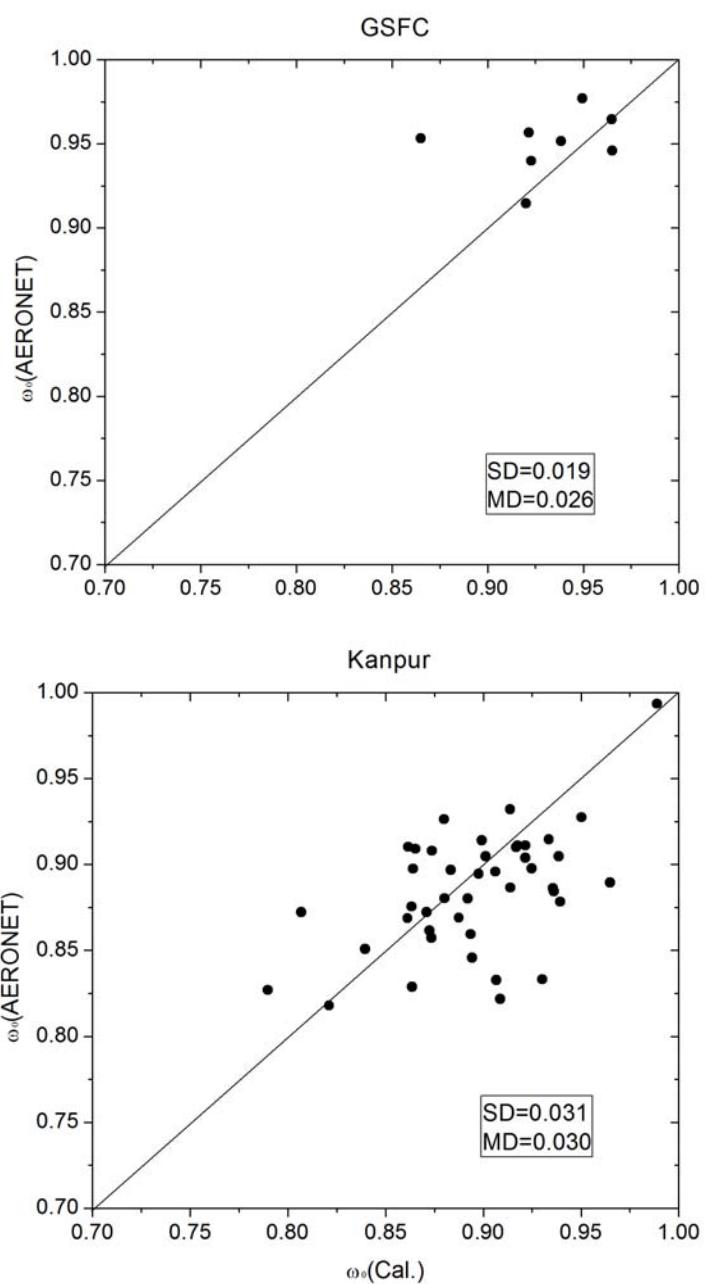


Zhao and Li (2007)

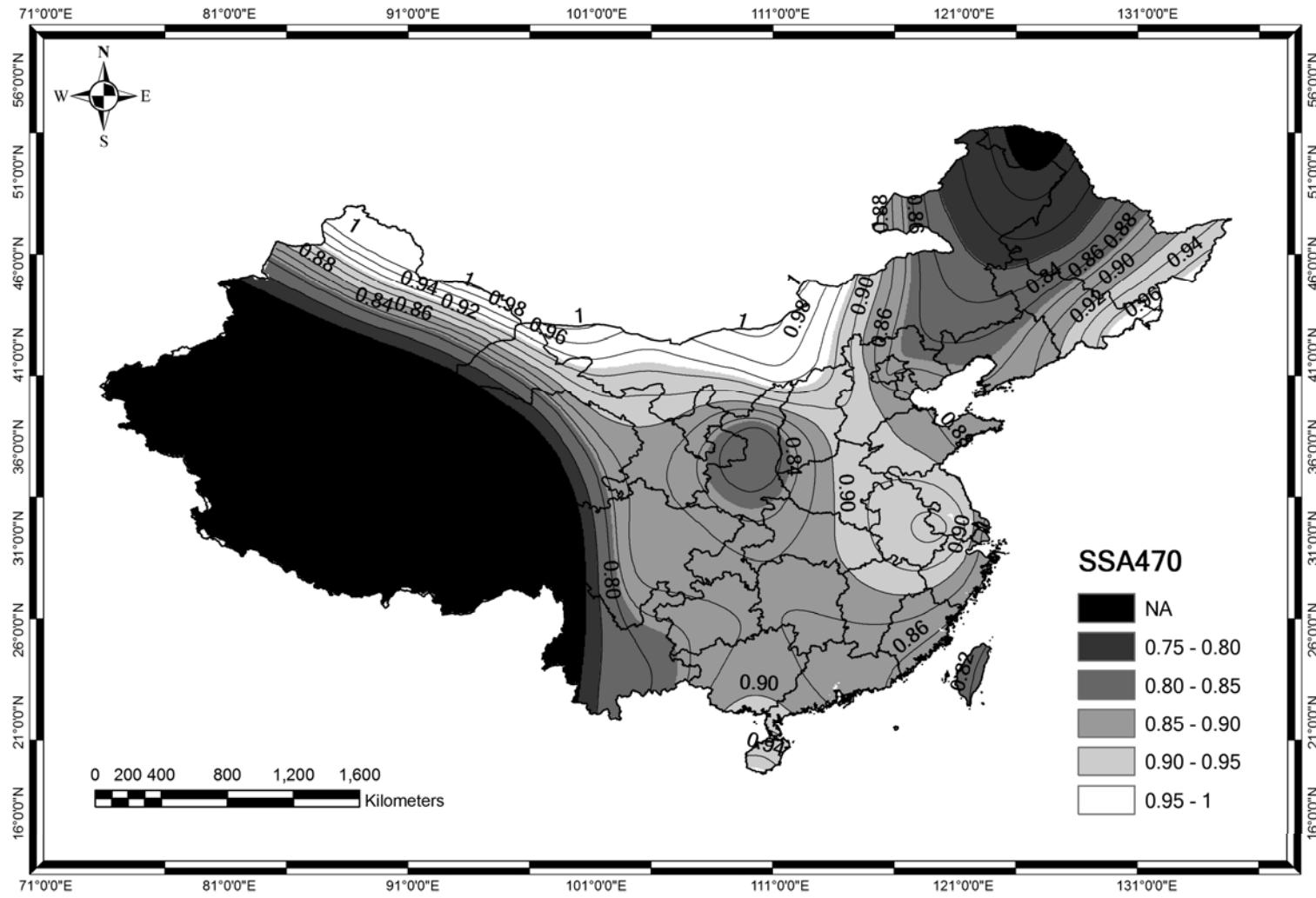


# TOA Reflectance vs AOT





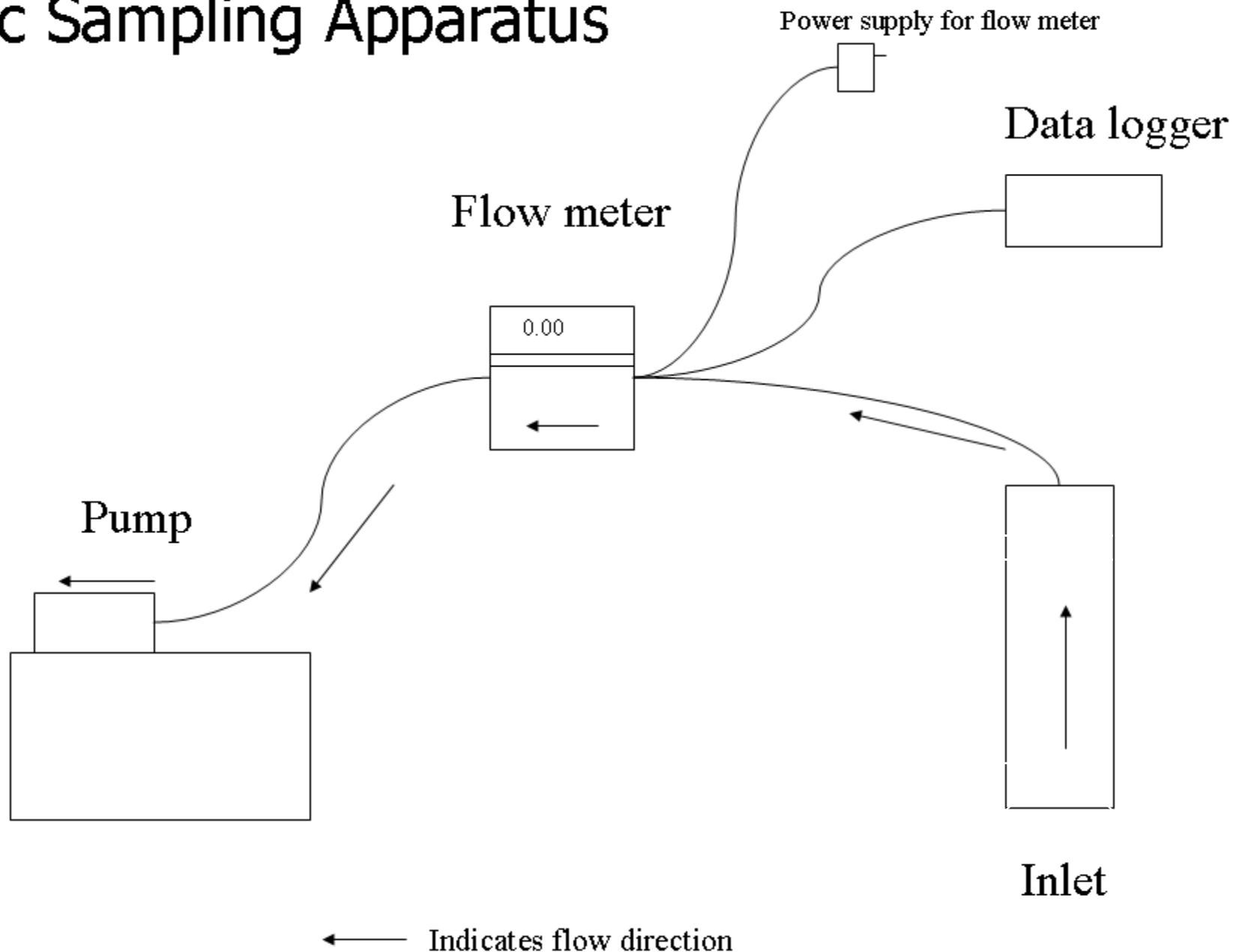
# Single Scattering Albedo Retrieved by Combing Ground and Satellite Data

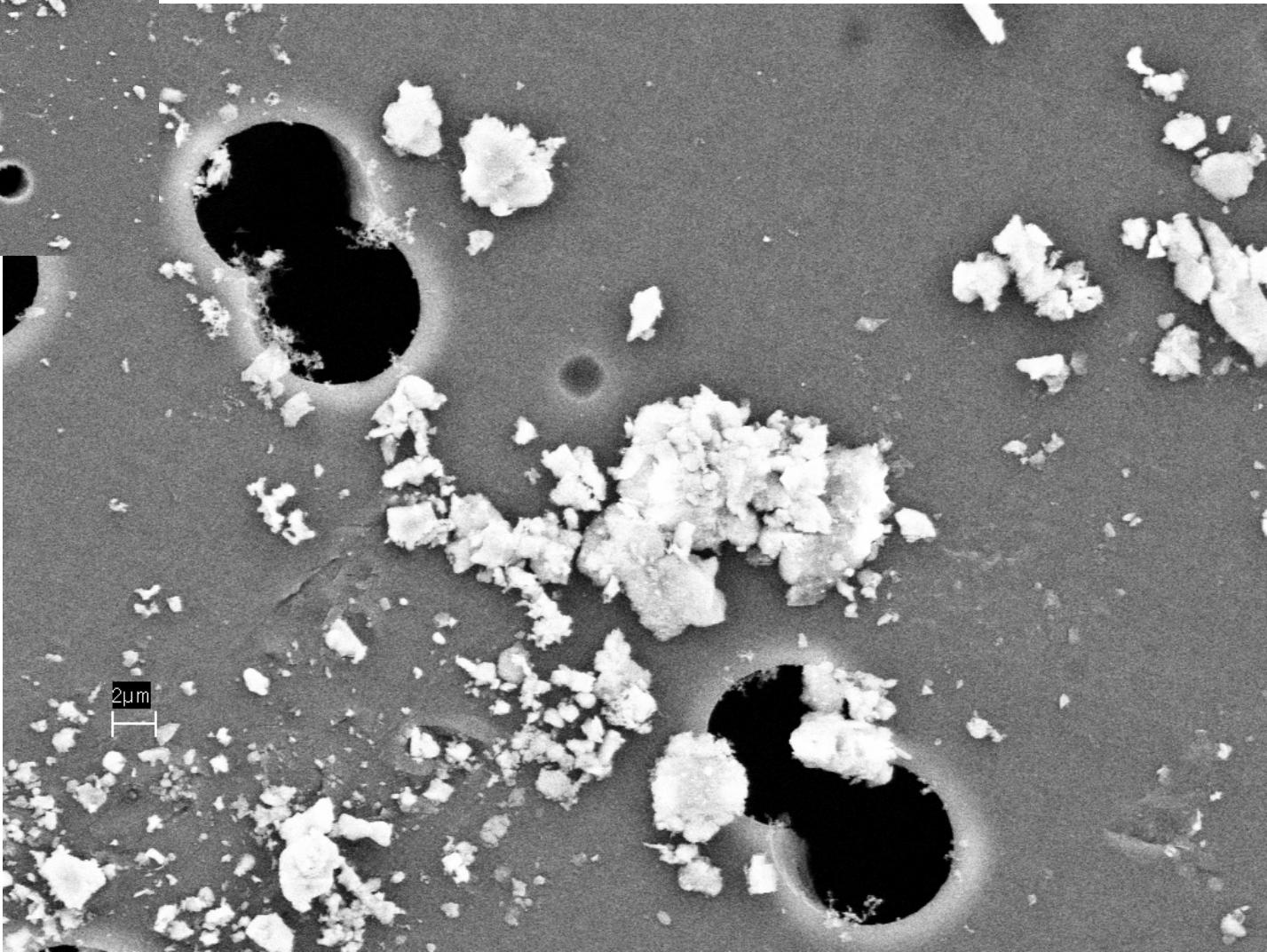
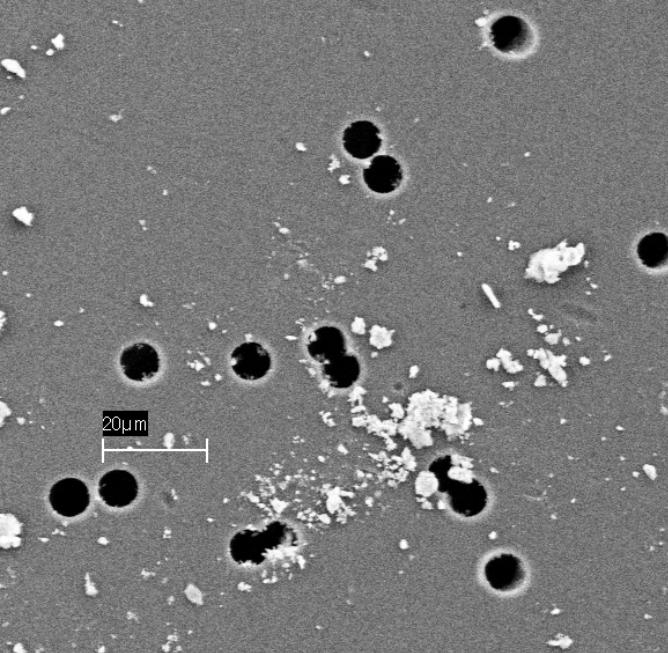


# Filter Sampling for EAST-AIRE

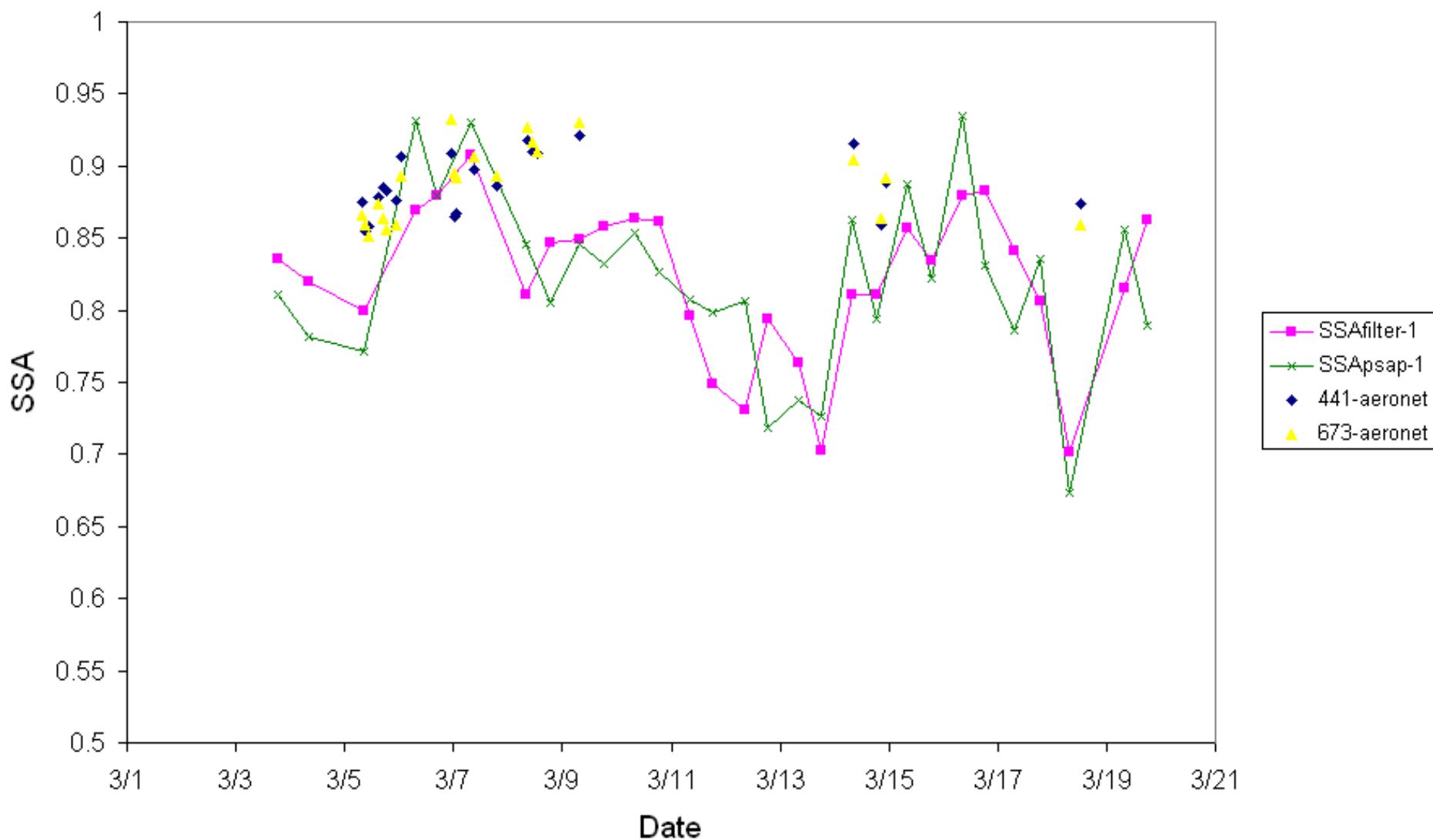
- Collected 12-hour samples in Xianghe from January-June, 2005
- Mass concentration:
  - filters are weighed before and after sampling
  - accurate flow data from datalogger and Hastings flowmeter
- Aerosol Absorption Efficiency:
  - optical reflectance measured using ASD spectrometer
- Single Scattering Albedo:
  - absorption coefficient with scattering coefficient from UMD Nephelometer

# Basic Sampling Apparatus

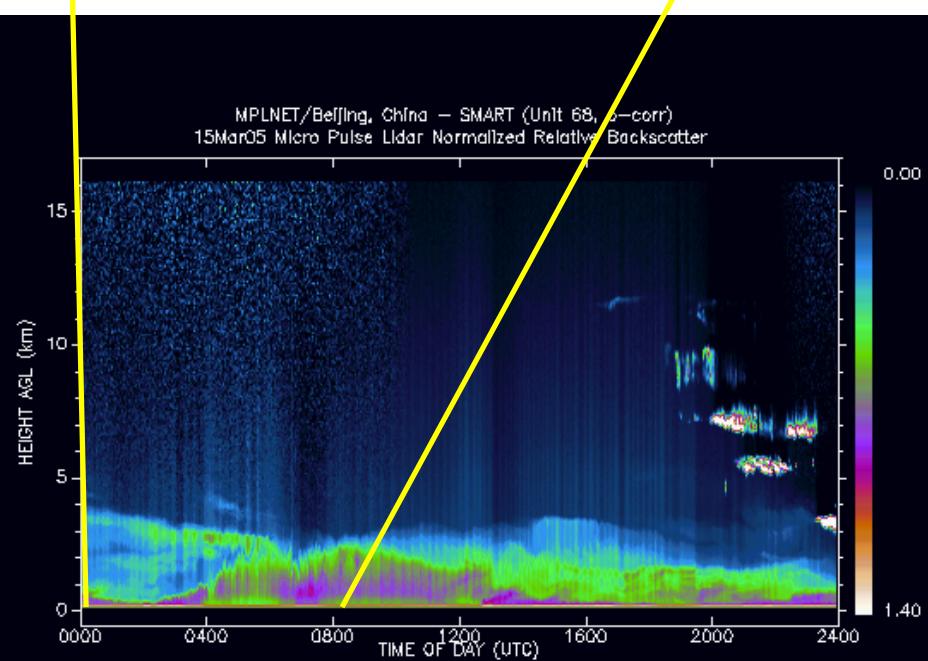
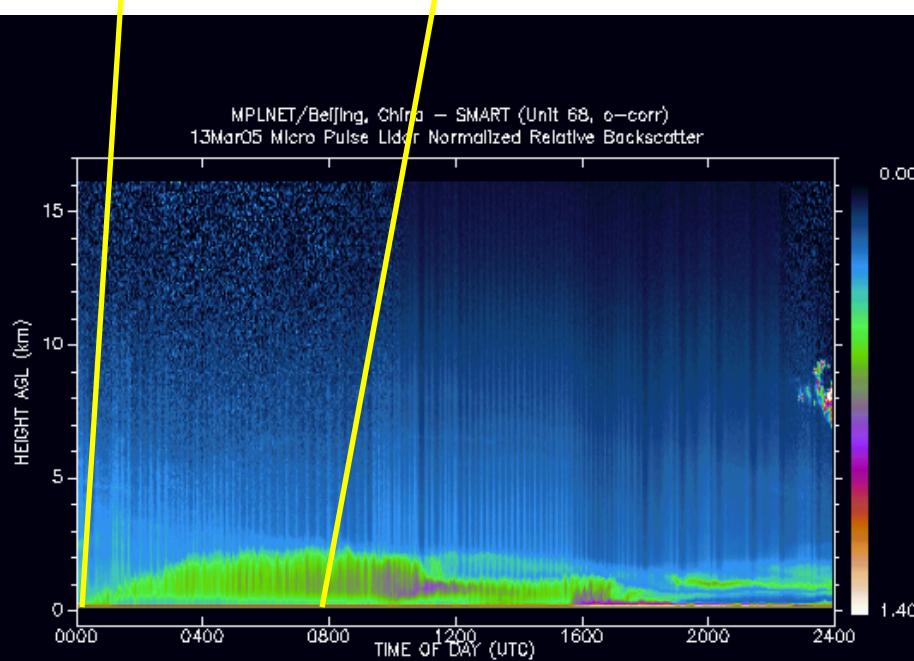
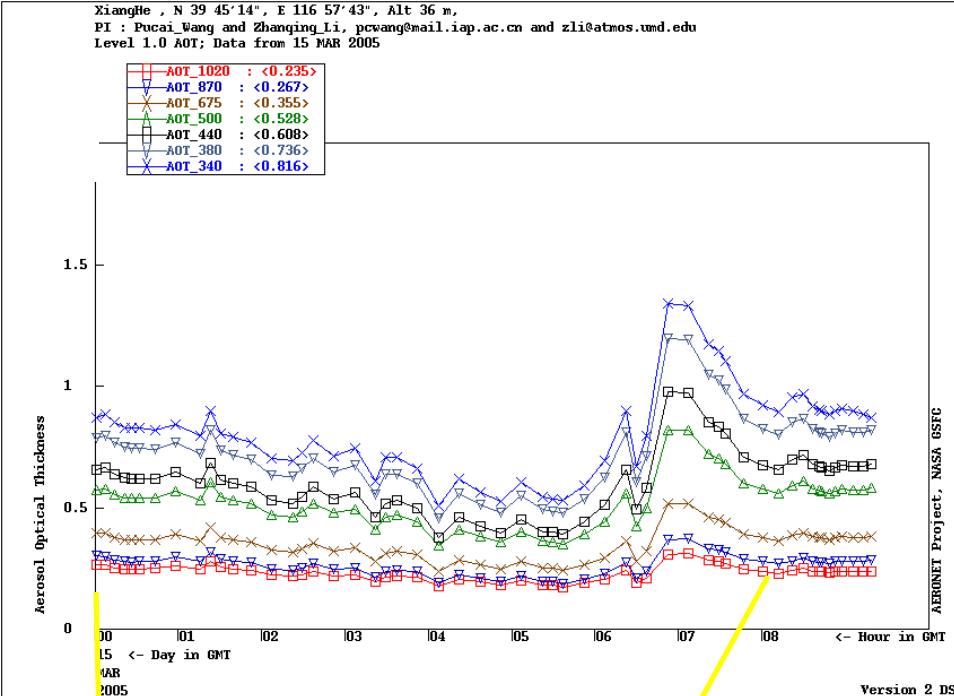
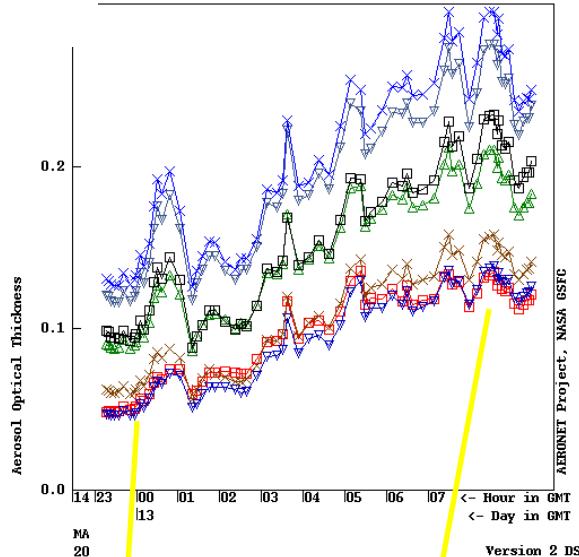




# Single Scattering Albedo from Reflectance, PSAP and Aeronet



Chaudry et al. (2007)



# Journal of Geophysics Research EAST-AIRE Special Issue (November 2007)

Z. Li , H. Chen , M. Cribb , R. Dickerson , B. Holben , C. Li , D. Lu , Y. Luo, H. Maring, G. Shi, S.-C. Tsay, P. Wang, Y. Wang, X. Xia, F. Zhao, Preface to special section: Overview of the East Asain Study of Tropospheric Aerosols: an International Regional Experiment (EAST-AIRE), *J. Geophys. Res. Special section on EAST-AIRE*, submitted.

Li, Z., X., Xia, M. Cribb, M. Wen, B. Holben, H. Chen, P. Wang, S.-C. Tsay, T.F. Eck, F. Zhao, E.G. Dutton, R.E. Dickerson, 2006, *Aerosol optical properties and its radiative effects in northern China*, *J. Geophys. Res.*, doi:10.1029/2006JD007382, in press..

Li, Z., F. Niu, K.-H. Lee, J. Xin, W.-M. Hao, B. Nordgren, Y. Wang, P. Wang, Validation and Understanding of MODIS Aerosol Products Using Ground-based Measurements from the Handheld Sunphotometer Network in China, *J. Geophys. Res. Special section on EAST-AIRE*, in press.

Li, C., L.T. Marufu, R. R. Dickerson, Z. Li, T. Wen, Y. Wang, P. Wang, H. Chen, J. W. Stehr, In-situ measurements of trace gases and aerosol optical properties at a rural site in northern China during EAST-AIRE IOP 2005. *J. Geophys. Res.* doi:10.1029/2006JD007592, in press.

Xin, J., Y. Wang, Z. Li, P. Wang, W.-M. Hao, B.L. Nordgren, S. Wang, G. Liu, L. Wang, Y. Sun, B. Hu, AOD and Angstrom exponent of aerosols observed by the Chinese Sun Hazemeter Network from August 2004 to September 2005, *J. Geophys. Res.*, 112, doi:10.1029/2006JD007075.

Zhao, Z., and Z. Li, 2006, *Estimation of aerosol single scattering albedo from solar direct spectral radiance and total broadband irradiances*. *J. Geophys. Res.* doi:10.1029/2006JD007384, in press.

Xia, X., H. Chen, Z. Li, P. Wang, J. Wang, *Significant reduction of surface solar irradiance induced by aerosols in a suburban region in northeastern China*, *J. Geophys. Res.* doi:10.1029/2006JD007562, in press.

Wang, K., J. Wang, P. Wang, and M. Sparrow (2007), *Influences of urbanization on surface characteristics from MODIS: A case study for the Beijing metropolitan area*, *J. Geophys. Res.*, doi:10.1029/2006JD007997, in press.

Lu, C., and H. Tian (2007), *Spatial and temporal patterns of nitrogen deposition in China: Synthesis of observational data*, *J. Geophys. Res.*, doi:10.1029/2006JD007990, in press.

Xia, X., Z. Li, P. Wang, H. Chen, M. Cribb, *Estimation of aerosol effects on surface solar radiation based on observations and radiative transfer model simulations at a suburban site in northern China*, *J. Geophys. Res.*, revised

Mi, W., Z. Li, X. Xia, B. Holben, R. Levy, F. Zhao, H. Chen, M. Cribb, *Evaluation of MODIS aerosol products at two AERONET stations in China*, *J. Geophys. Res.*, in press.

Chaudhry, Z., J.V. Martins, Z. Li, S.-C. Tsay, W. Nan, T. Wen, H. Chen, P. Wang, C. Li, R. Dickerson, *Situ measurements of aerosol mass concentration and spectral absorption during EAST-AIRE*. *J. Geophys. Res.*, revised.

Tian, 2006jd008521- Tropospheric ozone pollution and its influence on net primary productivity and carbon storage in terrestrial ecosystems of China, *Special section on EAST-AIRE*, under revision.

Dickerson, R.R., C. Li, Z. Li, J.W. Stehr, H. Chen, P. Wang, X. Xia, X. Ban, F. Gong, J. Yuan, J. Yang, *Aircraft observations of dust and pollutants over NE China: Insight into the meteorological mechanisms of long-range transport*, *J. Geophys. Res.*, revised.