

Song Guo

2005G Woodmar Dr.
Houghton, MI 49931
(906) 483-8283 (home)
(906)-487-3098 (office)
e-mail:sguo@mtu.edu

Dear Sir/Madam,

Attached are my CV, research interests, and list of referees. Thanks again for your time and consideration.

Song Guo

OBJECTIVE

To obtain the Wilkinson Fellowship in Scientific Computing (MCS#305721) at Argonne National Laboratory.

EDUCATION

Michigan Technological University, Houghton, MI 1999-Present
(Graduation date: September 2003)
- Ph.D., Computational Science and Engineering
Completed courses equivalent to the course option MS in Computer Science
- M.S., Environmental Engineering Science
1997-1999

University of Science and Technology of China, Hefei, China
1983-1988
B.S., Physics
Overall GPA at MTU: 3.73 / 4.0 basis

PROFESSIONAL EXPERIENCE**I. NASA/NSF FUNDED ATMOSPHERIC REMOTE SENSING PROJECTS**

09/1999 ~ present
Graduate Research Assistant, Michigan Technological University

ATHAM model simulation of atmospheric interaction of the volcanic clouds
Numerical simulation of interaction between volcanic plume/cloud and its
surrounding atmosphere, in which dynamic transport, turbulent, microphysical, and

gas scavenging processes are included. The parallel version of ATHAM has been implemented using MPI and has been run on MTU Beowulf Cluster and Cray T3E.

Satellite remote sensing study of the atmospheric and environmental effects of volcanic clouds

Satellite image processing, satellite data processing, retrieval algorithm development using NASA and NOAA's satellites (TOMS, TOVS, AVHRR, MODIS, etc).

NASA TOMSPLOT software package modification and improvement:

New image processing techniques are developed and new software interface is created using IDL (Interactive Data Language) to process NASA TOMS satellite data and images.

Digital image processing:

Image acquisition, image preprocessing (radiometric and atmospheric corrections, geometric rectification), enhancement, transformation, classification, accuracy assessment.

Numerical simulation of the air pollution movement using dynamic gridding points

The simulation work is done on dynamic gridding points which change with time (decide by the location of the pollutants).

II. NSF FUNDED ATMOSPHERIC CHEMISTRY PROJECTS

09/1997-09/1999

Graduate Research Assistant, Michigan Technological University

Atmospheric Chemistry Research Project (I):

The US NSF funded research project including field work at Summit, Greenland to measure atmospheric and snow firm air NO/NO₂/NO_x/NO_y, UV radiation, and meteorological parameters.

Data reduction codes written in IDL:

Thoroughly tested data reduction codes for our self-developed instrument are developed.

III. ATMOSPHERIC REMOTE SENSING AND ATMOSPHERIC CHEMISTRY RELATED RESEARCH PROJECTS 08/1988 ~ 08/1997

Engineer and Researcher, Institute of Atmospheric Chemistry, Chinese Academy of Meteorological Science

Atmospheric Chemistry Research Project (II):

Stationed in Chinese Antarctic Zhongshan facility from 1995-1996 measuring O₃/SO₂/NO₂ and UV radiation.

Atmospheric background monitoring:

Chief-scientist for Chinese atmospheric ozone/UV monitoring network, responsible for the quality assurance and quality control of the monitoring network from 1992-1994 and 1996-1997.

Atmospheric remote sensing and atmospheric chemistry instrument development
Deeply involved in the design, software development, data reduction algorithm development. Recipient of the second standard scientific award from China Meteorological Administration (CMA).

WORK EXPERIENCE

Institute of Atmospheric Chemistry (IAC), Chinese Academy of Meteorological Science (CAMS)

Assoc. Research Professor ('96-'97), Asst. Research Professor ('92-'96), Assist. Engineer ('88-'92)

SKILLS

Computer language: C/C++, Java, FORTRAN, HTML, IDL, Matlab, Grads, SQL, TCP/IP, Socket/Unix programming, MPI, OPEN_MP, Shell scripting, Visual Basic.

OS Platform: Unix, Linux, WINDOWS(98, NT, 2000).

Image Processing Tools: ERDAS IMAGINE, TeraScan 3.1, TOMSPLOT, ENVI, PCI, ArcView/ArcInfo.

Computer Science coursework completed at MTU

CS122 - Introduction to Computer Science II
CS425 - Introduction to Algorithms
CS440 - Operating Systems - CS4421 - Database Systems
CS4311 - Introduction to Computation Theory
CS5911 - Advanced Numerical Analysis
CS5321 - Advanced Algorithms
CS5331 - Parallel Algorithms
CS5441 - Distributed Systems
CS5990 - CS Reading and Research
CS5090 - Mobile Computing
CS5711 - Advanced Software Engineering
CS4431 - Advance Computer Architecture

KEY Atmospheric/Environmental Science coursework completed at MTU

CE558 - Atmospheric Chemistry
CE458 - Air Quality Engineering

CH421 - Instrument Analysis
PH660 - Atmospheric Physics
FW555 - Geographic Information System (GIS)
PH330 - Introduction to Remote Sensing
CE490 - Apps of Ana Tech for Env Eng
CE556 - Separation Oxidation Processes
CE452 - Environmental Water Chemistry
CE504 - Environmental Organic Chemistry I
CE553 - Environmental Process Engr
GE470 - Applied Geoscience Data Analysis
GE595 - Mathematical Mdlg of Earth Sys
FW556&558 -A Remote Sensing Perspective I & II

Computer Science Project

Nachos Projects: Multi-thread programming, Thread Synchronization, Interprocess Communication (IPC), Semaphore, Mutual Exclusion, Conditional Variable, Shared Memory

Distributed System-Reliable UDP: Message Acknowledge, Message Sending Retries, Message Sequential Number, Message Synchronization

A Self-Adaptive Routing Protocol for High-Density Mobil Ad-Hoc Network:
Route Construction, Route Maintenance, Simulation with ns-2 simulator

A Fast-response Dynamic Multicast Algorithm: Based on Bhat's static multicast heuristics, a new dynamic multicast algorithm is proposed and developed.

Shortest Path in multi-communication: Based on the classic shortest path algorithm, such as Dijkstra's, Floyd's algorithms, some new possible heuristics are proposed.

Software Measurement: A summary of all the existing software measurement tools and models.

Image Parallel Computing: A large programming project to parallel the image processing codes using MPI and OPEN_MP.

Database Project: An international student campground database is designed with Entity-Relationship model, ten queries are developed and implemented with mysql, the entity sets are also normalized into good forms (BCNF, 3NF, etc).

HONORS

- Graduate Student Council Poster Winner (1st place), awarded by -MTU 2001 Fall Poster Session,- Michigan Technological University, December, 2001.
- NASA Graduate Student Fellowship, 09, 2000 - 08, 2001.

- Second Standard Scientific Award from China Meteorological Administration (CMA), April, 1992.

KEY PUBLICATIONS

S. Guo, Gregg J.S. Bluth, William I. Rose, I. Matthew Watson, and A. J. Prata, 2003: Re-evaluation of SO₂ release of the climatic June 15, 1991 Pinatubo eruption using NASA TOMS and NOAA TOVS satellite data, about to submit soon.

S. Guo, William I. Rose, Gregg J.S. Bluth, I. Matthew Watson, 2003: Particles in the great Pinatubo volcanic cloud of late June 1991: the role of ice, about to submit soon.

R.E. Honrath, S. Guo, M.C. Peterson, M.P. Dziobak, J.E. Dibb, and M.A. Arsenault, 2000: Photochemical Production of Gas-phase NO_x from Ice-crystal NO₃-, Journal of Geophysical Research, Vol. 105, No. D19, p24,183-24,190

R.E. Honrath, M.C. Peterson, S. Guo, J.E. Dibb, P.B. Shepson, and B. Campbell, 1999: Evidence of NO_x Production Within or Upon Ice Particles in the Greenland Snowpack, Geophysical Research Letter, Vol. 26, No. 6, p695-698.

OTHER RELATED PUBLICATIONS

S. Guo, G.J.S. Bluth, Iain, M. Watson, William I. Rose, 2001, A re-evaluation of the 1991 Pinatubo SO₂ emission using TOMS, AGU Fall Meetings, poster presentation.

S. Guo, W.I. Rose, G.J.S. Bluth, C. Textor, and H-F Graf, 2000, ATHAM model simulation of 15 June 1991 Pinatubo Volcanic plume, AGU Fall Meetings, oral presentation.

Guo Song, Zhou Xiuji, Lu Longhua, Zheng Xiangdong, and Gao Xuejie, 1997: Measurement of NO₂ and Analysis of Relationship between Stratospheric NO₂ and O₃ over Zhongshan Station, Antarctica, Chinese Journal of Polar Science (English Version), Vol. 8, No. 1, 48-55.

Guo Song, Zhou Xiuji, Zheng Xiangdong, and Lu Longhua, 1997, The Measurement and Analysis of Ozone Profile During the -Ozone Hole- Period over Zhongshan Station, Antarctica, Chinese Journal of Polar Science (Chinese Version), Vol. 9, No. 1, 78-82.

Guo Song, Zheng Xiangdong, 1997, UV-B Radiation Measurement and Simulation over Tibetan Plateau, Atmospheric Trace Gases over China and West Pacific Region (Chinese Meteorological Press), 197-206.

Guo Song, Zhou Xiuji, 1997, Atmospheric Ozone Profile Measurement through Umkehr Method over Tibetan Plateau, Atmospheric Ozone and Its Influence to Climatological Environment (Chinese Meteorological Press), 79-84.

Guo Song, Zhou Xiuji, and Zhang Xiaochun, 1994, Preliminary Analysis of the Measurement Results of O₃ and UV-B Radiation in the Qinghai Plateau, Chinese Science Bulletin (English Version), Vol. 39, No. 12, 1011-1015.

Guo Song, Zhou Xiuji, 1994, Measurement and Analysis of Atmospheric Ozone Profile in Qinghai Plateau, Chinese Science Bulletin (English Version), Vol. 39, No. 19, 1671-1672.

Guo Song, Zhou Xiuji, and Zhang Xiaochun, 1993, O₃, SO₂, NO₂, and UV-B Measurements in Beijing and Baseline station of Northwestern Part of China, Proceeding of 1992 Ozone Symposium, 746-748.

Xue Qingyu, Guo Song, Niu Jianguo, 1993, Ozone Measurement with the Solar and Spectrophotometer, Quarterly Journal of Applied Meteorology, Vol. 4, No. 2, 138-144.

Xue Qingyu, Niu Jianguo, Zhao Xuepeng, and Guo Song, 1991 Remote Sensing of Atmospheric constituents and the Multi-function Spectrophotometer, ACTA Meteorological Sinica, Vol. 5, No. 3, 352-359.

Zhao Xuepeng, Zhou xiuji, Xue Qingyu, and Guo Song, 1991, Studying the Sky Radiance and Degree of Polarization and Sounding the Optical Characteristics of atmospheric Aerosol, ACTA Meteorological Sinica, Vol. 5, No. 3, 361-369.

Research Interests

Song Guo

Generally Speaking, I am interested in any multidisciplinary or interdisciplinary computationally intensive research works in the atmospheric science related research fields. I have background and interest in computational science and engineering, atmospheric remote sensing, atmospheric chemistry and physics, environmental engineering science, and computer science etc.

My primary research interest is in the computational science and engineering field as not only I am getting a CS&E Ph D degree at MTU but also I have completed courses equivalent to MS in Computer Science option. I have several years instrument and software (control and data reduction) development experience in China. I have been an expert on C, Assembly Language, Basic, and Fortran before I came to US. In my MS thesis work at MTU, IDL (Interactive Data Language) is used to develop data reduction codes. In my Ph D thesis work at MTU, both IDL and Fortran as well as C/C++ and Matlab are extensively used in processing the satellite data. The numerical model ATHAM (Active Tracer High Resolution Atmospheric Model), which I have used extensively for the passed few years, involves dynamic, turbulent, microphysical, and gas-scavenging and photo-chemical processes, especially the complicated full consideration of all phase changes of hydrometers make it unique. ATHAM has also been used to study the wildfire and atmospheric aerosol studies. ATHAM has also been parallelized and run on MTU Beowulf and Cray T3E clusters. Parallel computing with

the large numerical simulation on some parallel and distributed systems is also one of my potential initiatives for future research interest. I have done heavily parallel computing work on MTU's Beowulf and Cray T3E cluster systems, which are gifts from NASA Goddard. I am interested in how to make the efficiency serial code and optimize time cost for different numerical models as well as efficiently parallelize large numerical models, considering some issues, such as load balance and synchronization.

Another research interest is in the satellite remote sensing and numerical simulation areas as my Ph D thesis work focuses on studying the atmospheric and environmental effects of volcanic clouds using multi-satellite sensors (TOMS, TOVS/HIRS, AVHRR, MODIS, GOES, SEA_WIFES, ASTER, etc) and numerical simulation model ATHAM (Active Tracer High Resolution Atmospheric Model). In my Ph D thesis work, retrieval algorithm development and modification, satellite image processing, software development, and numerical simulation work are involved. What I am planning to do in the future is to study the atmospheric gases (O₃, NO_x, SO₂, etc.) and atmospheric aerosol through both remote sensing and numerical simulation methods. I am an expert of lots of programming languages (FORTRAN, C/C++, Java) and image processing languages (IDL, Matlab, and Grads). I am also deeply involved in using the parallel computing languages, such as MPI and Open_MP.

List of Referees

Dr. William Rose (Professor, advisor), raman@mtu.edu, 906-487-2367.

Dr. Gregg Bluth (Associate Professor, advisor), gbluth@mtu.edu, 906-487-3554.

Dr. I. Matthew Watson (Assistant Research Professor, same group), watson@mtu.edu, 906-487-2045.