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PROFESSIONAL FIELD

Atmospheric science, specializing in remote sensing of the Earth environment.

EDUCATION

1990: M. S. (Meteorology), University of Wisconsin-Madison.
1988: B. App. Sc. (Applied Physics Major), Curtin University of Technology.

PROFESSIONAL EXPERIENCE

October 1994 - Present
Researcher, Space Science and Engineering Center, University of Wisconsin-Madison
1225 W. Dayton St.
Madison WI 53706, USA

Responsible for science algorithm development and analysis and visualization software development in support of the NASA MODIS program. Converted existing HIRS and GOES sounding and cloud height retrieval algorithms to operate on simulated MODIS data. Standardized all source code (FORTRAN-77) to EOS coding standards, and utilized required EOS APIs for data input and output. Packaged and delivered science software to NASA GSFC and passed all acceptance and verification tests. Developed FORTRAN-77 software to unpack and resample NCEP analysis products to MODIS spatial resolution. Used NAG software engineering tools to polish and standardize 29000 lines of FORTRAN-77 code in ITPP5.0 retrieval package, and ported package from IBM AIX platform to SGI, HP, and Sun Unix platforms. Revised all documentation for ITPP5.0, developed simple install/compile/test sequence, and packaged code for distribution for international user community. Developed FORTRAN-77/C code to read MAS 50 channel flight data tapes, enabling ingest into McIDAS. Developed a suite of IDL tools to unpack, calibrate, and visualize MODIS simulated and MODIS Airborne Simulator (MAS) 50 channel data in a variety of formats. Developed IDL tools for image animation, image resampling to map projections, and HDF data import, and distributed these tools via the World Wide Web. Developed IDL software to process MAS spectral response data for background and atmospheric absorption correction, and delivered processed spectral response data to NASA GSFC where it is used in operational MAS data processing. Revised and updated peer-reviewed algorithm theoretical basis documents (ATBDs) for the NASA

MODIS program, and gave presentation to ATBD review panel in November 1996. Provided on-site data analysis and flight operations support for NASA ER-2 aircraft deployments in Houston TX and Salina KS in January 1995 and April 1996. Suggested, organized, and chaired a forum of MODIS programmers at the MODIS Science Team Meetings in November 1995 and November 1996. Continuing to maintain a World Wide Web site for dissemination of software and information to the MODIS and general science community. Advised the UW MODIS group on Unix workstation requirements and purchases.

December 1993 - August 1994
Senior Scientific Programmer, Applied Research Corporation
8201 Corporate Drive
Landover MD 20785, USA

Attached to the MODIS Cloud Retrieval Group in the Climate and Radiation Branch at NASA Goddard Space Flight Center. Primarily responsible for developing algorithms in FORTRAN and IDL to examine and analyze remotely sensed image data from the MODIS Airborne Simulator (MAS). Examples include comparison of MAS data with interferometer and lidar data to assess the detectability of thin cirrus clouds, development of MAS spectral indices which discriminate between water and ice clouds, and analysis of flood covered land surfaces using collocated MAS and Landsat data. Developing and testing decode and display software in IDL for the MAS 50 channel data system. Prepared and published a detailed Level-1B Data User's Guide for the MAS. Continuing to maintain an active role in MAS sensor characterization, calibration, and operations. Supported MAS flights during the MAST (Monterey, CA) flight experiment including flight planning, pilot briefing, and data quality monitoring. Developed and currently responsible for maintaining hypermedia information about the MAS project on the World Wide Web. Responsible for preparing and presenting papers which highlight research results at professional meetings. Responsible for administering and maintaining the group Silicon Graphics workstation and peripherals, and for advising the group on computer facility budgets, and equipment and software upgrades.

May 1991 - December 1993
Senior Analyst/Programmer, Research and Data Systems Corporation
7855 Walker Drive, Suite 460
Greenbelt MD 20770, USA

From January to December 1993, attached to the MODIS Cloud Retrieval Group in the Climate and Radiation Branch at NASA Goddard Space Flight Center. Primarily responsible for analyzing observational data from the MODIS Airborne Simulator (MAS). Examples included comparison of MAS and AVIRIS radiances to examine the calibration accuracy of the MAS, simulating MAS radiances using the DiSORT radiative transfer model with and without aerosol scattering over non-reflecting and Lambertian reflecting surfaces, and developing geometric corrections to remove scanner view-angle distortion from MAS images. Ported heritage cloud optical depth

retrieval code from an IBM mainframe to a Silicon Graphics workstation and advised the group on the steps necessary to implement the code as an operational MODIS product. Provided field support for MAS flights during TOGA/COARE (Australia), CEPEX (Fiji), and SCAR-A (USA) including data quality monitoring and MAS ground calibration. Responsible for preparing papers highlighting research results and presenting these at professional meetings. Responsible for administering and maintaining the group Silicon Graphics workstation and peripherals. From May 1991 to January 1993, member of the Moderate Resolution Spectroradiometer (MODIS) Science Data Support Team at NASA Goddard Space Flight Center. Designed, implemented and tested a ground processing system for the MODIS Airborne Simulator (MAS), which is used routinely to ingest, calibrate, geolocate, format, and store multi-gigabyte MAS datasets. Ported the MAS processing system from a DEC/VAX system to IBM/PC and Silicon Graphics Iris systems. Designed and implemented a data structure for MAS Level-1B datasets in the self-describing NetCDF format. Designed, implemented and tested automatic quicklook and metadata generation software to assist MAS users in data selection. Designed, implemented and tested software on the IBM/PC and Silicon Graphics Iris to decode data from a new MAS Exabyte recording system. Processed and quality-checked multiple MAS datasets. Provided support to external users in utilizing MAS data on their home systems. Provided field support for MAS flights during FIRE Cirrus II (USA), and ASTEX (Azores Islands). Co-developed and implemented a noise filtering system for MAS infrared imagery.

January 1990 - May 1991
Research Associate, Department of Applied Physics, Curtin University of Technology
GPO Box U1987
Perth WA 6001, Australia

Developed and tested an algorithm to estimate aerosol optical depths over the ocean using data from the Advanced Very High Resolution Radiometer (AVHRR). Responsible for a contract with the Defence Science and Technology Organisation to analyze data from the TIROS Operational Vertical Sounder (TOVS) to study the ducting of microwave beams in marine atmospheres. Developed and tested TOVS physical temperature and water vapor retrieval simulation software on mainframe and personal computers. Responsible for writing technical reports and papers, and advising graduate students.

August 1988 - January 1990
Research Assistant, Meteorology Department, University of Wisconsin-Madison
1225 West Dayton St.
Madison WI 53706, USA

Attached to Co-operative Institute for Meteorological Satellite Studies, Space Science and Engineering Center. Responsible for development and testing of an atmospheric correction algorithm for airborne multispectral scanner imagery in support of a Mississippi Delta geomorphology study. Developed and implemented algorithms to

estimate suspended sediment content of coastal waters. Utilized IBM personal computers and University of Wisconsin Man-Computer Interactive Data Access System (MCIDAS) for software development and image data analysis and display.

January 1988 - January 1990
Research Assistant, Department of Applied Physics, Curtin University of Technology
GPO Box U1987
Perth WA 6001, Australia

Responsible for software development relating to processing of TOVS data on mainframe and IBM personal computers. Developed and tested TOVS physical retrieval simulation package. Completed conversion of TOVS physical retrieval package to personal computer system. Responsible for software development and data processing in support of light detection and ranging (lidar) system. Participated in field experiments to collect tropospheric and stratospheric lidar data. Maintained and tested lidar laser, detector and computer systems. Wrote technical reports and papers.

January 1986 - December 1988
Technical Assistant, Department of Applied Physics, Curtin University of Technology
GPO Box U1987
Perth WA 6001, Australia

Assisted in operation of lidar system, field data acquisition programs, development of lidar detector system alignment procedures, and data processing. Participated as student assistant in undergraduate physics laboratories, and tutored individual students in physics.

COMPUTER EXPERIENCE

Expert scientific programmer in Interactive Data Language (IDL) and FORTRAN, particularly in software development for analysis and imaging of remotely sensed image and sounding data. Highly experienced in designing, developing, testing, debugging, porting, documenting, and running complex scientific codes on Unix workstations (SGI, Sun, IBM, HP, DEC), IBM compatible and Macintosh personal computers, DEC VAX and IBM mainframe systems, and the University of Wisconsin Man-Computer Interactive Data Access System (McIDAS) satellite data handling system. Highly experienced in evaluating and recommending computer hardware for installation in scientific research environments.

PUBLICATIONS

King, M. D., Menzel, W. P., Grant, P. S., Myers, J. S., Arnold, G. T., Platnick, S. E., Gumley, L. E., Tsay, S. C., Moeller, C. C., Fitzgerald, M., Brown, K. S., Osterwisch, F. G. (1996). Airborne scanning spectrometer for remote sensing of cloud, aerosol, water vapor and surface properties. J. Atmos. Oceanic Technol., 13, 777–794.

Gumley, L.E., King, M.D. (1995). Remote Sensing of Flooding in the US Upper Midwest During the Summer of 1993. Bulletin of the American Meteorological Society, 76, 933-943.

Gumley, L.E., Hubanks, P.A., Masuoka, E.J. (1994). MODIS Airborne Simulator Level 1B Data User's Guide. NASA Technical Memorandum 104594 Vol. 3, NASA Goddard Space Flight Center, Greenbelt MD.

Gumley, L.E., King, M.D., Tsay, S.C. (1994). Multi-Sensor Remote Observations of Thin Cirrus Clouds during FIRE Cirrus II. Paper presented at the 8th AMS Conference on Atmospheric Radiation, Nashville TN, January 1994.

Gumley, L.E., King, M.D., Tsay, S.C., Gao, B.C., Arnold, G.T. (1993). Intercomparison of MAS, AVIRIS, and HIS Data from FIRE Cirrus II. FIRE Cirrus Science Results 1993, NASA Conference Publication 3238.

Moeller, C.C., Huh, O.K., Roberts, H.H., Gumley, L.E., Menzel, W.P. (1993). Response of Louisiana Coastal Environments to a Cold Front Passage. Journal of Coastal Research, 9, 434-447.

Gumley, L.E., White, B.A. and Lynch, M.J. (1991). An evaluation of least squares algorithms used in atmospheric retrievals. Proceedings of the Sixth International TOVS Study Conference, Airlie VA, May 1991.

Gumley, L.E., Sansalone, J.M., Lynch, M.J. and Cutten, D.R. (1990). Aerosol optical depths measured by the NOAA AVHRR. Proceedings of the 5th Australasian Remote Sensing Conference, Perth WA, October 1990.

Gumley, L.E., Lynch, M.J. and White, B.A. (1990). An investigation of computational least squares algorithms used in atmospheric retrieval problems. Proceedings of the 5th Australasian Remote Sensing Conference, Perth WA, October 1990.

Gumley, L.E., Moeller, C.C. and Menzel, W.P. (1990). Monitoring of Mississippi Delta coastal geomorphology using high resolution Multispectral Atmospheric Mapping Sensor (MAMS) data. Proceedings of the 5th Australasian Remote Sensing Conference, Perth WA, October 1990.

Gumley, L.E., Lynch, M.J., Smith, W.L. and Woolf, H.M. (1989). A PC-based ITPP3 synthetic retrieval package. Proceedings of the Fifth International TOVS study conference, Igls, Austria.

Gumley, L.E. and Lynch, M.J. (1989). The study of maritime microwave ducting using ITPP3. Proceedings of the Fifth International TOVS study conference, Igls, Austria.

REFERENCES

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