

Dr. Shane D. Mayor

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Research Interests

Boundary layer meteorology. Development and application of atmospheric lidar systems. Aerosols and their impact on climate change, air quality, and national security.

Currently

Adjunct and Research professor in the Departments of Geosciences and Physics at California State University, Chico. Operate and maintain the Raman-shifted Eye-safe Aerosol Lidar (REAL). Conduct research in lidar, aerosols, and boundary layer meteorology.

Past Employment

2003—2008 Scientist, National Center for Atmospheric Research (NCAR)
2001—2003 NCAR Advanced Studies Program Postdoctoral Fellow
1996—2001 Graduate Student, University of Wisconsin Lidar Program
1994—1996 Associate Scientist, National Center for Atmospheric Research
1990—1993 Programmer/Analyst, Lidar Applications Group at NASA Langley
1989 Undergraduate student assistant, Research Aviation Facility, NCAR
1987—1988 Undergraduate student assistant, Control Data Corporation

Education

2001 Ph.D. in Atmospheric and Oceanic Sciences, University of Wisconsin–Madison
Dissertation: Volume Imaging Lidar Observations and Large-Eddy Simulations of Convective Internal Boundary Layers
Advisor: Dr. Edwin Eloranta
1995 M.S. in Meteorology, Saint Louis University
NCAR Cooperative Thesis: Evaluation of the NCAR Doppler Lidar and Applications to Measuring Boundary Layer Structure
Advisor: Dr. Donald Lenschow
1990 B.S. in Meteorology, Millersville University of Pennsylvania

Professional Memberships

American Meteorological Society (AMS)
American Geophysical Union (AGU)
Optical Society of America (OSA)
Society of Photo-Optical Instrumentation Engineers (SPIE)
The Institute of Electrical and Electronics Engineers (IEEE)

Professional Activities

Member of *Committee on Effectiveness of National Biosurveillance Systems: BioWatch and the Public Health System*. Institute of Medicine and National Research Council of the National Academies. July 2008—October 2009.

Co-host and co-chair of the [24th International Laser Radar Conference](#). 23-27 June 2008, Boulder, Colorado. Over 300 participants.

Chair of session on “Radar/Lidar Networks and Integration with other Instruments” at the Symposium on Recent Developments in Atmospheric Applications of Radar and Lidar. 88th Annual Meeting of the American Meteorological Society, New Orleans, 23 January 2008.

Member of the National Academies’ committee on Testing and Evaluation of Biological Stand-Off Detection Systems (2007).

Co-chair of session on “Boundary Layer and Mesoscale Studies” at the 7th International Symposium on Tropospheric Profiling. June 2006, Boulder, Colorado.

Co-chair of the American Meteorological Society’s 2nd Symposium on Lidar Atmospheric Applications. January 2005, San Diego.

Member of American Meteorological Society’s Committee on Laser Atmospheric Studies from 2003-2006.

American Meteorological Society Board Certified Consulting Meteorologist (#594) since 1999.

US Patents Issued

7,583,364 High pulse-energy, eye-safe lidar system, Mayor and Spuler
Filed 19 March 2004, Issued 1 September 2009.

7,580,127 Polarization lidar for the remote detection of aerosol particle shape
Mayor and Spuler, Filed 21 July 2006, Issued 25 August 2009.

US Patents Pending

11/291,505 Receiver for Eye-safe Lidar Systems, Spuler and Mayor
Filed 1 December 2005

11/459,269 Aerosol Backscatter Calibration Capability on REAL, Spuler and Mayor
Filed 21 July 2006

Journal Articles

De Wekker, S. F. J. and S. D. Mayor, 2009: Observations of atmospheric structure and dynamics in the Owens Valley of California with a ground-based, eye-safe, scanning aerosol lidar. *J. Appl. Meteor. Clim.*, **48**, 1483-1499.

Lothon, M., D. H. Lenschow, and S. D. Mayor, 2009: Doppler lidar measurements of vertical velocity spectra in the convective planetary boundary layer, *Bound. Layer Meteor.*, **132**, 205-226.

Doyle, J. D., V. Grubišić, W. O. J. Brown, S. F. J. De Wekker, A. Dörnbrack, Q. Jiang, S. D. Mayor, M. Weissmann, 2009: Observations and numerical simulations of subrotor vortices during T-REX. *J. Atmos. Sci.*, **66**, 1229-1249.

Refaat, T. F., S. Ismail, M. N. Abedin, S. M. Spuler, S. D. Mayor, and U. N. Singh, 2008: Lidar backscatter signal recovery from phototransistor systematic effect by deconvolution. *Appl. Optics*, **47**, 5281-5295, DOI:10.1364/AO.47.005281.

Mayor, S. D., P. Benda, C. Murata and R. J. Danzig, 2008: Lidars: A key component of urban biodefense. *Biosecur Bioterror*, **6**, 45-56, DOI: 10.1089/bsp.2007.0053.

Test and Evaluation of Biological Standoff Detection Systems, National Academy of Sciences, Washington, D.C. ISBN 13:978-0-309-11443-1 and 10:0-309-11443-8.

Mayor, S. D., S. M. Spuler, B. M. Morley, E. Loew, 2007: Polarization lidar at 1.54-microns and observations of plumes from aerosol generators. *Opt. Eng.*, **46**, 096201, DOI: 10.1117/12.781902.

Refaat, T. F., S. Ismail, T. L. Mack, M. N. Abedin, S. D. Mayor, S. M. Spuler, U. Singh, 2007: Infrared Phototransistor Validation for Atmospheric Remote Sensing Application using the Raman-Shifted Eye-Safe Aerosol Lidar (REAL). *Opt. Eng.*, **46**, 086001. (DOI: 10.1117/12.774553)

Spuler, S. M. and S. D. Mayor, 2007: Raman shifter optimized for lidar at 1.5-micron wavelength. *Appl. Optics*, **46**, 2990-2995.

Warner, T., P. Benda, S. Swerdlin, J. Knievel, E. Argenta, B. Aronian, B. Balsley, J. Bowers, R. Carter, P. A. Clark, K. Clawson, J. Copeland, A. Crook, R. Frehlich, M. L. Jensen, Y. Liu, S. Mayor, Y. Meillier, B. Morley, R. Sharman, S. Spuler, D. Storwold, J. Sun, J. Weil, M. Xu, A. Yates, and Y. Zhang, 2007: The Pentagon Shield Field Program Toward Critical Infrastructure Protection. *Bull. Amer. Met. Soc.*, **88**, 167-176. (DOI:10.1175/BAMS-88-2-167)

Lothon, M., D. H. Lenschow, and S. D. Mayor, 2006: Coherence and scale of vertical velocity in the convective boundary layer from a Doppler lidar, *Bound. Layer Meteor.*, **119**, DOI: 10.1007/s10546-006-9077-1.

Spuler, S. M. and S. D. Mayor, 2005: Scanning Eye-safe Elastic Backscatter Lidar at 1.54 microns, *J. Atmos. Ocean. Technol.*, **22**, 696-703.

Mayor, S. D., and S. M. Spuler, 2004: Raman-shifted Eye-safe Aerosol Lidar, *Appl. Optics*, **43**, 3915-3924.

Mayor, S. D., G. J. Tripoli, and E. W. Eloranta, 2003: Evaluating large-eddy simulations using volume imaging lidar data. *Mon. Wea. Rev.*, **131**, 1428-1453.

Mayor, S. D., P. R. Spalart, and G. J. Tripoli, 2002: Application of a perturbation recycling technique in a large-eddy simulation of a mesoscale convective internal boundary layer. *J. Atmos. Sci.*, **59**, 2385-2395.

Mayor, S.D. and E. W. Eloranta, 2001: Two-dimensional vector wind fields from volume imaging lidar data, *J. Appl. Meteor.*, **40**, 1331-1346.

Mayor, S. D., D. H. Lenschow, R. L. Schwiesow, J. Mann, C. L. Frush, and M. K. Simon, 1997: Validation of 10.6-micron CO₂ NCAR Doppler lidar radial velocity measurements and comparison with a 915-MHz profiler, *J. Atmos. Ocean. Technol.*, **14**, 1110-1126.

Senff, C. J., R. M. Hardesty, R. J. Alvarez, S. D. Mayor, 1998: Airborne lidar characterization of power plant plumes during the 1995 Southern Oxidants Study, *J. Geophys. Res.*, **103**, 31173-31189.

Banta, R. M., C. J. Senff, A. B. White, M. Trainer, R. T. McNider, R. J. Valente, S. D. Mayor, R. J. Alvarez, R. M. Hardesty, D. Parrish, F. C. Fehsenfeld, 1998: Daytime buildup and nighttime transport of urban ozone in the boundary layer during a stagnation episode, *J. Geophys. Res.*, **103**, 22519-22544.

Sullivan, P. P., C.-H. Moeng, B. Stevens, D. H. Lenschow, and S. D. Mayor, 1998: Structure of the entrainment zone capping the convective atmospheric boundary layer, *J. Atmos. Sci.*, **55**, 3042-3064.

Cohn, S. A., S. D. Mayor, C. J. Grund, T. Weckwerth, C. Senff, 1998: The Lidars in Flat Terrain (LIFT) Experiment, *Bull. Amer. Meteor. Soc.*, **79**, 1329-1343.

Higdon, N. S., E. V. Browell, P. Ponsardin, B. E. Grossmann, C. F. Butler, T. H. Chyba, M. N. Mayo, R. J. Allen, A. W. Heuser, W. B. Grant, S. Ismail, S. D. Mayor and A. Carter, 1994: Airborne differential absorption lidar system for measurement of atmospheric water vapor and aerosols, *Appl. Optics*, **33**, 6422-6438.

Schwiesow, R. L., S. D. Mayor, V. M. Glover and D. H. Lenschow, 1990: Intersection of a sloping aerosol layer observed by airborne lidar with a cloud-capped marine boundary-layer, *J. Appl. Meteor.*, **29**, 1111-1119.

Select Conference Papers

Mayor, S. D., 2008: Observations of sea-breeze fronts and turbulence near the surface during stable conditions. Oral presentation & paper S03O-01. 24th International Laser Radar Conference, 23-27 June 2008, Boulder, Colorado.

Mayor, S. D., 2008: Raman-shifted Eye-safe Aerosol Lidar (REAL) observations at the Canopy Horizontal Array Turbulence Study (CHATS). Oral presentation & paper 18A.6 in the American Meteorological Society's 18th Symposium on Boundary Layers and Turbulence. 9-13 June 2008, Stockholm, Sweden.

Mayor, S. D., S. M. Spuler, and B. M. Morley, 2008: Raman-shifted Eye-safe Aerosol Lidar. Poster presentation P1.1 in the Symposium on Recent Developments in Atmospheric Applications of Radar and Lidar. 88th Annual Meeting of the American Meteorological Society, 21-24 Jan. 2008, New Orleans.

Mayor, S. D., S. M. Spuler, B. M. Morley, T. W. Horst, E. G. Patton, and D. H. Lenschow, 2007: First comparison of products from the NCAR REAL and ISFF during the CHATS. Oral presentation A41E-06 at the Fall Meeting of the American Geophysical Union, 13 Dec. 2007, San Francisco.

Mayor, S. D., S. M. Spuler, B. M. Morley, S. C. Himmelsbach, R. A. Rilling, T. M. Weckwerth, E. G. Patton, and D. H. Lenschow, 2007: Elastic backscatter lidar observations of sea-breeze fronts in Dixon, California. Paper 8.5 in the Seventh Conference on Coastal Atmospheric and Oceanic Prediction and Processes, American Meteorological Society, 10-13 Sept. 2007, San Diego.

Mayor, S. D., B. M. Morley, S. M. Spuler, S. C. Himmelsbach, D. Flanigan, T. M. Weckwerth, and T. Warner, 2007: Elastic Backscatter lidar observations of a gust front passage over Washington D.C. on 7 May 2004. Paper 9.7 in the Seventh Symposium on the Urban Environment, American Meteorological Society, 10-13 Sept. 2007, San Diego.

Spuler, S. M. and S. D. Mayor, 2007: Eye-safe aerosol lidar at 1.5 microns: progress toward a scanning lidar network, SPIE Lidar Remote Sensing for Environmental Monitoring VIII, San Diego, CA, DOI: 10.1117/12.739519

Mayor, S. D., S. M. Spuler, B. M. Morley, E. Loew, T. M. Weckwerth, S. DeWekker, D. J. Kirshbaum, 2006: REAL: 1.5 micron wavelength scanning polarization lidar, 23rd International Laser Radar Conference, Nara, Japan, 24-28 July. Vol. 1, Pages 161-164. **(Best Poster Award)**

Spuler, S. M. and S. D. Mayor, 2006: High-energy multipass forward Raman shifter as an eye-safe laser source for lidar, 23rd International Laser Radar Conference, Nara, Japan, 24-28 July., Vol 1, Pages 133-136.

Mayor, S. D., S. M. Spuler, and B. M. Morley, 2006: Three Generations of Raman-shifted Eye-safe Aerosol Lidars, Poster 8.22-P. 7th International Symposium on Tropospheric Profiling, 11-17 June, Boulder, CO.

Mayor, S. D., S. M. Spuler, and B. M. Morley, 2005: Scanning eye-safe depolarization lidar at 1.54 microns and potential usefulness in bioaerosol plume detection. SPIE Lidar Remote Sensing for Environmental Monitoring IV, Paper 5887-23, San Diego, CA.

Mayor, S. D., S. M. Spuler, and B. M. Morley, 2004: NCAR's New Raman-shifted Eye-safe Aerosol Lidar (REAL). Paper S20-10 in ESA SP-561, Reviewed and Revised Papers Presented at the 22nd International Laser Radar Conference, Vol. 1, 12-16 July 2004, Matera, Italy. 53-56.

Mayor, S. D., S. M. Spuler, J. R. Fox, T. D. Rucker, and B. M. Morley, 2004: NCARs New Raman-shifted Eye-safe Aerosol Lidar, 16th Symp. on Boundary Layers and Turbulence, 9-13 August, Portland, ME, paper number 6.2.

Mayor, S. D., S. M. Spuler, and B. M. Morley, 2004: NCARs New Raman-shifted Eye-safe Aerosol Lidar (REAL), 22nd International Laser Radar Conference, Matera, Italy, 12-16 July, paper S20-10, ESA Publication SP-561, Vol. 1, 53-56.

Mayor, S. D. and D. H. Lenschow, 2002: Coherence of vertical velocity from a zenith-pointing Doppler lidar, 15th Symposium on Boundary Layers and Turbulence, 15-19 July, Wageningen, The Netherlands. 104-107.

Tripoli, G. J. and S. D. Mayor, 2000: Numerical simulation of the neutral boundary layer: A comparison of enstrophy conserving with momentum conserving finite difference schemes, 14th Symposium on Boundary Layers and Turbulence, 7-11 Aug., Aspen, CO. 376-379.

Mayor, S. D., E. W. Eloranta and G. J. Tripoli, 2000: Eddy resolving lidar measurements and numerical simulations of the convective internal boundary layer, 14th Symposium on Boundary Layers and Turbulence, 7-11 Aug., Aspen, CO. 271-274. (**First Place Student Poster Presentations**)

Mayor, S. D., E. W. Eloranta, R. Kuehn, P. Ponsardin, 1998: Summary of Volume Imaging Lidar (VIL) Preliminary Results from the Lake-Induced Convection Experiment (Lake-ICE). 19th International Laser Radar Conference, Annapolis, Maryland, 6-10 July. (**First Place Student Poster Presentations**)