

LUNG -WEN ANTONY CHEN
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Relevant Research Experience

Dr. L.-W. Antony Chen has 12 years of experience in atmospheric aerosol research, including 7.5 years at DRI. His research focuses on: 1) characteristics of particle matter (PM) and trace gas pollutants from combustion sources (e.g., fossil fuel and biomass burning) and in ambient air, 2) source apportionment by receptor or hybrid models, 3) novel techniques for quantifying aerosol light absorption, and 4) environmental and climate effects of PM. Dr. Chen is a known expert in the field of carbon analysis and PM source apportionment. He has more than 20 peer-reviewed publications in these areas, which have been cited > 400 times by October 2009. He has participated in several federal and state funded projects, including biomass burning studies sponsored by U.S. Forest Service through the Joint Fire Science Program (JFSP) and Southern Nevada Public Land Management Act (SNPLMA). Dr. Chen conducted the Maryland Aerosol Regional Characterization (MARCH-Atlantic) study between 1999 and 2002, wherein he studied regional haze and developed a source apportionment technique coupling factor and ensemble air parcel back trajectory analyses. In 2008 – 2009, he organized the El Paso Air Toxics Study, using an In-Plume system to assess the cross-border transport. Dr. Chen is currently involved in visibility, PM and volatile organic compounds (VOCs) source apportionment projects in the California central valley (California Regional PM Air Quality Study [CRPAQS]), Minnesota, Hong Kong, and China. He is also a co-PI for an EPA Science to Achieve Results (STAR) project to evaluate large-scale receptor models, and has been assisting the quality assurance of carbon analysis for the Interagency Monitoring of Protected Visual Environments (IMPROVE) network, which bears the objective of tracking changes in visibility and determining causal mechanism for the visibility impairment in the National Parks and Wilderness Areas. Dr. Chen has hands-on experience in modeling, field and laboratory measurement, method development, and instrumentation. He is familiar with C, Matlab, and Microsoft ACCESS database, and has experience creating and managing websites.

Professional Preparation

Postdoc.	Atmospheric Science	2004	Desert Research Institute, Reno, Nevada
Ph.D.	Chemical Physics	2002	University of Maryland at College Park (Advisors: B.G. Doddridge and R.R. Dickerson)
M.S.	Physics	1998	National Taiwan University, Taipei, Taiwan
B.S.	Physics	1994	National Taiwan University, Taipei, Taiwan

Professional Appointment

2009/7 – Present	Associate Research Professor, Division of Atmospheric Sciences, Desert Research Institute, Reno, NV
2006/8 – Present	Faculty, Atmospheric Science Program (ATMS), University of Nevada, Reno
2004 – 2009	Assistant Research Professor, Division of Atmospheric Sciences, Desert Research Institute, Reno, NV

2002 – 2004	Research Associate, Division of Atmospheric Sciences, Desert Research Institute, Reno, NV
1998 – 2002	Research/Teaching Assistant, Departments of Meteorology and Physics, University of Maryland, College Park, MD
1996 – 1998	Research Assistant, Institute for Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan

Synergistic Activities – Research

Measurement: conduct combustion source characterization studies including Hazardous Air Pollutants Emissions to Community Exposure in El Paso; Texas, Potential Nutrient Emissions from Prescribed Fire in the Lake Tahoe Basin; and Fire Lab at Missoula Experiment (FLAME). These projects represent collaborated effort among multiple institutes to examine combustion emissions, and Dr. Chen participated in experimental design, performance, quality assurance, and data analysis/interpretation activities.

Method Development: Involved in several studies to refine carbonaceous aerosol sampling and analytical techniques, including 1) Measurement, Modeling and Analysis Methods for Airborne Carbonaceous Fine Particulate Matter (EPA STAR); 2) Climate Change – Characterization of Black Carbon and Organic Carbon Air Pollution Emissions and Evaluation of Measurement Methods (California Air Resource Board); and 3) Assessment of Carbon Sampling Artifacts in the IMPROVE and STN Networks (National Park Service). Accomplishments include new analytical procedures (adopted by national observatory networks), numerical modeling tools, and assessments of analytical uncertainties.

Receptor Modeling: Complete several PM source apportionment tasks, such as 1) Evaluation of Regional Scale Receptor Models (EPA STAR); 2) Verification and Evaluation of Source Factors and Source Contribution Estimates (EPRI); Mid-Atlantic Aerosol Research and Characterization (EPRI/EPA); California Regional Particulate Air Quality Study (CARB); Minnesota PM_{2.5} Source Apportionment Study; and Las Vegas PM_{2.5} Source Apportionment Study. Dr. Chen’s approach emphasizes reconciling results from different models, obtaining feedbacks from measured source profiles, and extensive sensitivity tests.

Synergistic Activities – Service to the Community

Symposium Chair: AAAR Special Symposium: Recent Advances in Biomass Burning Emission Measurement and Modeling. Sponsored by Joint Fire Science Program and National Park Service and held at 28th AAAR (American Association for Aerosol Research) annual meeting in Minneapolis, MN, 10/26 – 10/30, 2009

Committee Member: Nevada Climate Change Advisory Committee (2007/4 – 2008/6). Named by Nevada Governor Jim Gibbon along with other 12 members to provide assessment and recommendations on state climate change and renewable energy policies

Review Panel: United States Department of Agriculture (USDA) National Research Initiative (NRI) Air Quality Research Proposal Review Panel (2003)

Membership: American Association for Aerosol Research (since 2003); American Geophysical Union (since 1999)

Synergistic Activities – Education and Outreach

Teaching: Instructor for ATMS 792: Special Problems in Atmospheric Chemistry Measurement, offered for DRI/UNR ATMS program

Outreach: Washoe County Science Student of the Month selection committee

Certificates, Patent, and Award

Patent: The “Dual Ion and Electron Source” (U.S. Patent 005977549) based on which a scanning electron/ion microscope was developed and applied to surface science and semiconductor research

Award: Mega Poster Session Award, 99th Annual Conference & Exhibition, New Orleans, 2006, Air and Waste Management Association

Selected Publications

Chen, L.-W.A., J.G. Watson, J.C. Chow, D.W. DuBois, and L. Herschberger, 2010: Chemical mass balance source apportionment for combined PM_{2.5} measurements from U.S. non-urban and urban long-term networks. *Atmos. Environ.*, 44, 4908-4918.

Chen, L.-W.A., D.H. Lowenthal, J.G. Watson, D. Koraćin, N. Kumar, E.M. Knipping, N. Wheeler, K. Craig, and S. Reid, 2010: Toward effective source apportionment using positive matrix factorization: Experiments with simulated PM_{2.5} data. *J. Air and Waste Manage. Assoc.*, 60(1), 43-54, doi:10.3155/1047-3289.60.1.43.

Chen, L.-W.A., P. Verburg, A. Shackelford, D. Zhu, R. Susfalk, J.C. Chow, J.G. and Watson, 2010: Moisture effects on carbon and nitrogen emission from burning of wildland biomass. *Atmos. Chem. Phys.*, 10, 6617-6625, doi:10.5194/acp-10-6617-2010.

Chakrabarty, R.K., H. Moosmüller, L.-W. A. Chen, K. Lewis, W.P. Arnott, C. Mazzoleni, M. Dubey, C.E. Wold, W.M. Hao, and S.M. Kreidenweis, 2010: Brown Carbon in Tar Balls from Smoldering Biomass Combustion. *Atmos. Chem. Phys.*, 10, 6363-6370.

Chow, J.C., J.G. Watson, D.H. Lowenthal, L.-W.A. Chen, and N. Motallebi 2010: Black and organic carbon emission inventories: Review and application to California. *J. Air Waste Manage. Assoc.*, 60(4): 497-507.

Chow, J.C., J.G. Watson, L.-W.A. Chen, J. Rice, and N.H. Frank 2010: Quantification of organic carbon sampling artifacts in U.S. non-urban and urban networks. *Atmos. Chem. Phys.*, 10: 5223-5239.

Lowenthal, D.H., J.G. Watson, D. Koraćin, L.-W.A. Chen, D. DuBois, R. Vellore, N. Kumar, Knipping, E.M., N. Wheeler, K. Craig, and S. Reid, 2010: Evaluation of regional scale receptor modeling. *J. Air Waste Manage. Assoc.*, 60, 26-42. doi:10.3155/1047-3289.60.1.26.

Chen, L.-W.A.; Watson, J.G.; Chow, J.C.; DuBois, D.; Herschberger, L. (2009). PM_{2.5} source apportionment in Minnesota, USA: Application of the chemical mass balance method to urban and rural monitoring networks. *Environ. Sci. Technol.*, submitted.

Chen, L.-W.A.; Lowenthal, D.H.; Watson, J.G., Koracin, D., Kumar, N., Knippin, E.M., Wheeler, N., Craig, K.; Reid, S. (2009). Towards effective source apportionment using positive matrix factorization: Experiments with simulated PM_{2.5} Data. *J. Air Waste Manage. Assoc.*, accepted.

- Watson, J.G.; Chow, J.C.; Chen, L.-W.A.; Frank, N. (2009). Methods to assess carbonaceous aerosol sampling artifacts for IMPROVE and other long-term networks. *J. Air Waste Manage. Assoc.*, **59**(8):898-911.
- Watson, J.G.; Chen, L.-W.A.; Chow, J.C.; Lowenthal, D.H.; and Doraiswamy, P. (2008). Source apportionment: Findings from the U.S. Supersite Program. *J. Air Waste Manage. Assoc.*, **58**(2):265-288.
- Obrist, D.; Moosmüller, H.; Schurmann, R.; Chen, L.-W.A.; and Kreidenweis, S.M. (2008). Particulate-phase and gaseous elemental mercury emissions during biomass combustion: Controlling factors and correlation with particulate matter emissions. *Environ. Sci. Technol.*, **42**:721-727.
- Chen, L.-W.A.; Moosmüller, H.; Arnott, W.P.; Chow, J.C.; and Watson, J.G. (2007). Emissions from laboratory combustion of wildland fuels: Emission factors and source profiles. *Environ. Sci. Technol.*, **41**(12):4317-4325.
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- Chow, J.C.; Watson, J.G.; Chen, L.-W.A.; Ho, S.S.H.; Koracin, D.; Zielinska, B.; Tang, D.; Perera, F.; Cao, J.J.; and Lee, S.C. (2006). Exposure to PM_{2.5} and PAHs from the Tong Liang, China, epidemiological study. *J. of Environ. Sci. Health Part A*, **A41**(4):517-542.
- Chow, J.C.; Chen, L.-W.A.; Watson, J.G.; Lowenthal, D.H.; Magliano, K.; Turkiewicz, K.; and Lehrman, D. (2006). PM_{2.5} chemical composition and spatiotemporal variability during the California Regional PM₁₀/PM_{2.5} Air Quality Study (CRPAQS). *J. Geophys. Res.*, **111**(D10):D10S04
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- Chow, J.C.; Watson, J.G.; Lowenthal, D.H.; Chen, L.-W.A.; Tropp, R.J.; Park, K.; and Magliano, K. (2006). PM_{2.5} and PM₁₀ mass measurements in California's San Joaquin Valley. *Aerosol Sci. Technol.*, **40**(10):796-810.
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