

Paulette Middleton

OVERVIEW I collaborate with diverse groups at home and around the world to create:

Assessments that illuminate complex interconnections among people and nature
Planning that helps individuals and organizations find and follow peaceful, sustainable paths
Outreach that uses video, internet and other media to bring people together for effective action
Inspirations in the form of positive, informative, and transformational concrete products

Expertise: Integrated assessments, sustainable development planning, complex system modeling, aerosol science, global emissions, strategic planning, multi-media (video, papers/presentations, internet, web sites) communication, program/project management, business development, facilitation, inspiration, and education. Special focus on air quality, climate change, and related environmental, energy, economic and social concerns

Experience: 30+ years linking science to decision making to create a better world

Accomplishments—assessments/outreach/planning that has resulted in major environmental policymaking, creative planning at multiple organizational levels, and better understanding of the issues and the science

Clients—environmental groups, local to national and international government agencies, Indian tribes, international organizations, businesses, professional and trade organizations, and multi-stakeholder public-private consortia and groups

Products—strategic planning guidelines, peer reviewed scientific articles, issue white papers, in-depth critical reviews and reports, educational and public information materials and videos, letters of advice to EPA Administrator, multi-dimensional system models, dynamic user-friendly web sites, e-networks, inspirational videos and commentaries, worldwide network of collaborators

AFFILIATIONS

- Panorama Pathways <http://PanoramaPathways.net> 2002-Present. Creator & President
- Aspen Hill Films <http://aspenhillfilms.com/> 2003-Present. Partner
- Positive Pace <http://positivepace.com/> 2005-Present Co-Creator
- American Solar Energy Society Board of Directors 2005-Present <http://ases.org/>
- International Solar Energy Society Board of Directors 2010-Present <http://www.ises.org/>
- EPA Science Advisory Board (Member, Consultant) <http://www.epa.gov/sab> 1992-Present Addressing Clean Air Act Benefits/Costs, Regulatory Environmental Models, Research Strategy, Clean Air Regulations, Environmental Futures, Scientific and Technical Awards
- Global Emissions Inventory Activity <http://www.geiacenter.org/> Center Director (1990-)
- RAND <http://rand.org> 1998-2003. Associate Director then Co-Director RAND Environment, RAND Graduate School Faculty, Adjunct Senior Scientist
- Science & Policy Associates, Inc. 1994-1998. Principal, Vice President
- Atmospheric Sciences Research Center, State University of New York at Albany: 1987-1994. Senior Research Associate, Program Leader
- National Center for Atmospheric Research: 1975-1990. Post Doctoral Fellow, Staff Scientist, (Environmental and Societal Impacts Group, Atmospheric Chemistry Division)
- University of Texas at Austin: 1973-81. Research Associate, Adjunct Professor

Education—University of Texas: Postdoctoral Fellow Chemical Engineering; PhD 1973, MA 1971, BA w/ Honors Chemistry, High School Chemistry Teacher Certification 1968

Personal: I particularly treasure opportunities to share life and work with my husband Dave Renné, and children (Maren and Erin Middleton, Chris and Jeannie Renné) and other family and friends.

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PROFESSIONAL EXPERIENCE HIGHLIGHTS

Creator & President, Panorama Pathways (2002-) **Stepping Stones to World Peace** <http://PanoramaPathways.net> Providing assessments, outreach, planning and inspirations to help clients create and pursue paths to peace . 2010 Highlight – Developed and presented expert testimonies on benefits of emissions reductions from coal fired power plants in Colorado.

Partner, Aspen Hill Films (2003-) **A window on the World of Positive Change** <http://aspenhillfilms.com/>

Co-Creator, Positive Pace (2005-) **Positive News for a Peaceful Future** <http://positivepace.com/>

Global Emissions Inventory Activity Coordinator and Director of NASA-sponsored virtual GEIA Center <http://geiacenter.org/> (1990-Present) GEIA is a cross-cutting activity of International Geosphere-Biosphere Program that brings together people, data and tools to create highest quality information on global exchange processes. Recent Presentations: “The GEIA Network” and “Suggestions for Future Activities” presented at the 2009 GEIA Open Conference, October 24-26, Oslo Norway.

“Enhancing communications on global emissions” presented at the EPA International Emissions Inventory Conference, April 2009, Baltimore MD.

CIERA (Community Initiative for Emissions Research and Applications) Data Base Development Working Group. CIERA is a new mainly US-based initiative aimed at improving research on emission inventory developments and evaluations. (2009-)

EPA Science Advisory Board Chair, Member and Consultant (1992-Present) Member of Scientific and Technological Achievement Awards (STAA) Subcommittee and Regulatory Environmental Modeling review panel; Past Chair and current member of the Air Quality Modeling Subcommittee evaluating EPA’s assessment of the benefits and costs of the Clean Air Act. Member of the Environmental Modeling Committee responsible for the recent review of the National Air Toxics Assessment, including an evaluation of mercury and toxic VOC risk assessment. Member of the Research Strategy Assessment Committee, providing direction to EPA on critical research needs. Member of the Clean Air Science Advisory Committee during its review of the earlier ozone and fine particulate matter standards and of the Environmental Futures Subcommittee developing guidelines for EPA foresight

International Solar Energy Society Board of Directors (2010-), Sustainability Chair (2007-), and a coordinator of the International Solar Energy Exchange initiative. Representing and coordinating society’s sustainable development interests, and working on membership growth, coordination among country sections, and educational programs

American Solar Energy Society Board of Directors (2005-2010) Representing society’s sustainability interests. Also, Sustainability Division Leader. Secretary and member of the ASES Board of Directors’ executive committee (2008-present)

Expert Testimonies on behalf of Western Resource Advocates and Environmental Defense (2010) addressing benefits of emissions reductions from coal fired power plants.

Project Director “Comprehensive Assessment of North American Air Emissions Inventories and Ambient Air Monitoring Networks (2008) and advisor on the 2010-2015 strategic plan (2009). Sponsored by the Commission on Environmental Cooperation. http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=2534

Invited Participant EPA Workshop on Integrating Climate Change Adaptation Considerations into Air Quality Decision Making (2007)

Coordinator – Sustainable America: Spotlight Colorado. (2007-8) Leading group promoting sustainable living in Colorado

Co-Chair Communications Task Team -- Greening the Democratic National Convention (2007-2008) held August 2008 in Denver Colorado

Collaborator EcoArts (2007-8) – EcoArts is a not-for-profit event assembling scientists, artists, activists and other in programs designed to inspire, educate and empower all on specific issues surrounding the planet <http://www.ecoartsonline.org/>

Sustainable Resources (2004-) Co-creator of promotional video <http://www.sustainablevillage.com/> under Sustainable Resources Video, conference organizer, collaborator on environmental and social value of micro-social venture investments

Lead Author USAID-sponsored “Towards a Secure and Renewable Hydrogen Economy for Asia” Anchor Document for December 2004 conference, Manila, Philippines
<http://www.nrel.gov/hydrogen/publications.html#recent>

Advisor, and Lead Author or Contributor to White Papers illuminating current understanding of pressing environmental issues. Done in collaboration with Environmental Defense, Earth Justice, and Western Resource Advocates (formerly Land & Water Fund) and other environmental groups (2001-Present) . For example:

“Forever Wild: Protecting the Adirondacks from Acid Deposition.”

“Clearing the Haze from Western Skies,”

http://www.environmentaldefense.org/documents/4481_ClearingHaze.pdf

“A Closer Look at Mercury in the West” available at <http://panoramapathways.net/mercuryinthewest.pdf>.

“The Path Forward,” available at <http://panoramapathways.net> under Assessments

“NOX – A Growing Air Quality Challenge in the West,” paper-presentation available at Western Regional Air Partnership site <http://www.wrapair.org/forums/ioc/meetings/030728/index.html> under Middleton

Mercury—A Local Concern: A Global Issue (2003) Available on request

Ammonia and Fine Particles

<http://www.environmentaldefense.org/pdf.cfm?ContentID=3845&FileName=AmmoniaPaperJuly2004%2Epdf>

Representing these and other environmental groups on the modeling panels and other groups charged with reviewing assessment of the modeling being done for the Denver area’s ozone Early Action Compact work and other work, and providing testimony to Air Quality Control Commission

Air Quality Expert, Northern Cheyenne Indian Tribe (2003-) Representing the tribe as part of a committee charged with using models to help develop air quality strategies to improve and prevent further deterioration of air quality on the reservation

Special Advisor, Yellowstone Coalition (2002) Developed documents informing general public and providing recommendation to agencies regarding environmental impacts of oil and gas drilling the Western US and how best to address these impacts.

Expert Advisor, EPA Region 8 and the Colorado Department of Public Health & the Environment (2003-), developed critical review of mercury pollution in Colorado and nearby areas. Report available at www.e3ventures.com/mercury/PDF/criticalReviewA.pdf

Expert Integrator & Coordinator, American Solar Energy Society (2003-) Prepared Renewable Hydrogen Report which required coordinating and integrating dozens of people and opinions. Report available at <http://www.ases.org/>

Expert Witness, Department of Justice (2002-2005) Advising on air quality impacts of pollution sources

Expert Advisor, State of New Jersey, Division of Law (2001-) Assisting with air quality issues.
2004-Reviewed Hudson Yards Environmental Impact Statement

Director, Modeling Assessments for MDI (1997-2002): Sponsored by the Alliance for the Polyurethanes Industry and the Chemical Manufacturers Association. Investigated and reported on the importance of MDI, a potentially hazardous by-product of plastics manufacturing and spray foam applications

Adjunct Senior Scientist RAND (2001-2002, Co-Director, RAND Environment (2000-2001) and Associate Director RAND Environmental Science & Policy Center (1998-2000)—*In residence BoulderCO* : Coordinated program development, creation of analysis teams and outreach in environment for RAND, a large Santa Monica CA-Washington DC based non-profit think tank

Faculty, RAND Graduate School (2000-2002)-Developed short course in topics related to environmental policy.

Technical Analyst, Assessment of Community Growth and Planning Tools (1999-2001): Assessing usefulness of analytical tools in decision making, sponsored by the White House Office of Science & Technology Policy. Community Growth & Planning Tools: A Resource Guide. RAND Report MR1345-OSTP (2001) In Press.

Project Lead, Climate-Conflict Relationships (2001-2002): “A Proposed Framework for Understanding Climate Change and Conflict,” RAND PM-1328-EPA with Anny Wong and Jonathan Kulick, sponsored by EPA, work in collaboration with Stratus Consulting.

Contributing Analyst, Science & Technology Issues of National Importance (2000-2001): Sponsored by the White House Office of Science & Technology Policy

Organizing Partner, Mansfield Asia-Pacific Retreat (2001): Assisting in organization of retreat on climate change for Asian country and US leaders in business and government

Organizing Partner, Western Regional Dialogue (2001). Assisted with invitations to the forum of western local, state and regional groups with federal representatives on environmental concerns.

Director, Visual Air Quality Assessment Project (1990-2000): Sponsored by the US Department of Energy. Developed and applied observation-based modeling system for evaluation of impacts of emissions changes on visibility throughout the U.S. Middleton, P. and N. Laulainen (2000). "Examining the impacts of visibility and PM strategies before implementation," *Journal of the Air and Waste Management Association.*, **50**: 875-889.

Technical Lead, Feasibility Study on the Use of Market Mechanisms to Achieve SO₂ Emissions Reduction in China (1999-2001): Sponsored by EPA

Communications Lead, Program Support for Natural Resource Damage Division of the US Coast Guard (1997-2000)

Technical Lead, Analytical Assessment of Air Quality Models Applicability to pressing complex air quality policy questions (1999-2000): Sponsored by EPA

Lead Analyst, Use of Models in Air Quality Policy Making (1998-1999): Critically reviewed current models being used in policy making, sponsored by the White House Office of Science & Technology Policy

Director, Carbon Sequestration in Consumer Products Feasibility Workshops (1998-1999): Sponsored by EPA, work in collaboration with the National Renewable Energy Laboratory.

Technical Lead, Development of *Ecological Assessment Handbook for States and Tribal Nation* (1997-2000): Sponsored by EPA

Lead, Assessment of Potential Impacts of Grandfathered Northeast Power Plants (1998-1999): Sponsored by the Clean Air Task Force.

Coordinator, Ongoing development of proposals for web-based communications which seek to provide unique opportunities for learning, planning and participating, using media that are easy to access and use (1997-2001) Work in collaboration with Denver Regional Council of Governments, county and city health departments and other interested groups.

Vice President, Science & Policy Associates, Inc. (1996-1998) and Principal (1996-1998): Conducted organization-wide strategic planning and business development, managed the Boulder office and directed environmental quality and integrated assessment efforts of S&PA, a Washington D.C.-based small business consulting firm dedicated to "Linking the minds of science to the needs of decision makers."

Project Director, Commission for Environmental Cooperation's North American air monitoring and modeling system evaluation project and data compatibility evaluation project. (1995-1997): Organized experts from the NAFTA countries in the evaluation of modeling and monitoring and recommending future efforts. In Collaboration with Radian (Mexico) and Bovair (Canada)

Lead Analyst, Western Mobile/LaFarge Citizen's Advisory Panel (1998): Designed a forum for addressing community and industry issues associated with new site development

Program Director, Assessment of Scenarios (1994-1996): Led the Grand Canyon Visibility Transport Commission multi-stakeholder integrated assessment program designed to assess the multiple social, economic and environmental impacts of emissions management scenarios in the western U.S. Sponsored by the Western Governors Association

Integrated Assessment Lead, UK Integrated Regional Climate Impacts Assessment Scoping Study (1995-1996): Worked with stakeholders in designing an integrated assessment program for the UK.

Project Manager, The Usefulness of Cost-Benefit Analysis and Risk Assessment for the Colorado Air Quality Control Commission (1996): Coordinated study reporting.

Program Director, Application of the Denver Air Quality Model (1995-1997): Applied model in long range planning, an assessment effort sponsored by the State of Colorado

Project Director, Development of Sustainability Indicators (1995-1996): Worked with the Boulder Healthy Communities Initiative on development of chemical based indicators.

Project Director, Marketing Tools (1997): Developed information and marketing packages for the University Cooperation for Atmospheric Research.

Director, Assessment/Communication Team (1991-1995) and Senior Research Associate, Atmospheric Sciences Research Center, State University of New York at Albany (1987-1995) *In residence at the University Corporation for Atmospheric Research, Boulder, Colorado.* Developed and led air quality modeling programs.

Director, Denver Air Quality Modeling Study (1990-1994): Led an interdisciplinary, policy-oriented program sponsored by Brown Cloud Inc., a public-private organization

Scientific Manager, Emissions development/evaluation activity (1991-1995): Worked with the Southern Oxidant Study, a multi-university, Environmental Protection Agency-sponsored program applying GIS to emissions modeling

Coordinator, Emissions information development and Model evaluation/assessment activities (1987-1990): Led these activities as part of the Acid Deposition Modeling Project sponsored by National Acid Precipitation Assessment Program and EPA

Scientist, National Center for Atmospheric Research (NCAR) (1975-1987)

Led and contributed to programs in atmospheric chemistry, model development and the interface of atmospheric science and policy

Emissions and Assessment Lead, Acid Deposition Modeling Project NCAR (1983-1987): Coordinated development of emissions information and model evaluation and assessment activities in the Acid Deposition Modeling Project, sponsored by National Acid Precipitation Assessment Program

Director, Visual Air Quality Project and Lead Scientist on a variety of air quality policy assessment activities in the Environmental and Societal Impacts Group NCAR (1979-1985): Conducted fundamental research leading to Colorado human-judgment based visibility standard. Developed approaches for quantitatively linking facts and values for environmental decision making, provided key policy analysis for links between acid rain and other air quality impacts, and produced ground breaking analysis on importance of considering relationships between air quality and climate issues

Special Project Scientist, Acid Precipitation Experiment NCAR (1978-1979): Linked observation and analysis of key atmospheric pollutants associated with acid rain

Scientific Visitor, Aerosol Project, Atmospheric Quality Division NCAR (1976-1978): Developed and applied dynamic aerosol and gas phase models for studying atmospheric chemical processes leading to air quality and climate change

Post Doctoral Fellow, Advanced Study Program NCAR (1975-1976): Developed innovative aerosol models and coordinated links with meteorological and climate groups

Postdoctoral Research Associate, Department of Chemical Engineering, the University of Texas at Austin, Austin, Texas. (1973-1975): Developed aerosol dynamics models for studying air quality

Instructor, Department of Chemistry, The University of Texas at Austin, Austin, Texas (1973-1974):
Developed computerized physical chemistry teaching modules

Research Fellow, Department of Chemistry, University of Texas at Austin, Austin, Texas (1968-1973):
Explained energy exchange in atom-molecule reactions by developing innovative computer models to describe the theories

Participant, Environmental Geology Project, Department of Geology, The University of Texas at Austin, Austin, Texas. (1972-1973)

Practice Teacher in Chemistry, Stephen F. Austin High School, Austin, Texas. (1967-1968)

SCIENTIFIC ADVISORY COMMITTEES and REVIEW RESPONSIBILITIES

Member and Committee Chair, EPA Science Advisory Board (1992-present): Chairperson, Air Quality Modeling Subcommittee and member of the Council (1996-2002) reviewing the 812 assessments of the benefits and costs of the Clean Air Act Amendments. Member of the Environmental Models Committee reviewing the National Air Toxics Assessment. Past Member of the Clean Air Science Advisory Committee reviewing the new ozone and fine particulate matter standards, the Environmental Futures Subcommittee developing guidelines for EPA foresight and the Research Strategies Advisory Committee developing guidelines for strategic planning within EPA's Office of Research and Development.

Colorado Modeling Review Panel (2003-4) Represented Environmental Defense and Sierra Club on the Panel charged with making sure that the best available methods are being applied for the development of the Denver Colorado area Early Action Compact dealing with achieving ozone compliance

Reviewer, Research proposals, projects and programs (1976-present): NSF, EPA, NASA, NOAA, DOE

Reviewer, Variety of air quality and atmospheric process journals (1976-present)

Associate Editor, Journal of Air and Waste Management Association (1995-2001)

Reviewer, Projects of the American Lung Association (1998-1999)

Reviewer, Air quality programs in greater Mexico City area (1993-1994).

Member, Department of Energy Fuel Cycle Peer Review Panel (1992-1993)

Member, National Academy of Sciences Committee on Haze in National Parks and Wilderness Areas (1990-1993)

Peer Reviewer, Visibility Assessment Aspects of National Acid Precipitation Assessment Program (1990)

Peer Reviewer, The 1987-1988 Metro Denver Brown Cloud Study (1987-1989)

Chairperson, Air Pollution Control Association Committee to develop standard methods document for visual air quality impacts measurements. (1985-1987)

Member, U.S.-Canadian Technical Committee on Regional Model Evaluation (1986-1987).

Advisor, EPA Mountain Cloud Chemistry Project. (1985-1987)

Advisor, EPRI deposition monitoring network. (1985-1987)

Chairperson, review panel for Urban Particulate Modeling Project of the Environmental Protection Agency. (1985)

Chairperson, Session on Economic and Psychological Aspects of Visual Air Quality, Air Pollution Control Association 1985 International Symposium (1984-1985)

Chairperson, Modeling Session, Air Pollution Control Association Specialty Conference on Environmental Impacts of Natural Emissions (1983-1984)

Chairperson, review panel for Assessment Task Group of the National Acid Deposition Assessment Program (1984)

Member, Chemistry and Physics Research Review Panel for the Environmental Protection Agency (1979-1984)

Contributor, U.S. National Academy of Sciences-Controlling Airborne Particles (1978-1979)

Member, U. S. National Academy of Sciences Climatological Effects Resource Group of the Committee on Nuclear and Alternative Energy Systems. (1976-1977)

EDUCATIONAL ACTIVITIES

Educational and training video development through Aspen Hill Films (2004-present)

Science Fair Judge (2000-2002)

Colorado Educational Standards Review Committee (1996)

Author (1991-present) Periodically develops articles for American Meteorological Society and various environmental groups

Teacher (1988-present) Periodically develops and presents air pollution information for K-12

Reviewer, National Wildlife Federation Educational Articles (1990)

Lecturer, International Summer School on Science & World Affairs, Princeton University (1990)

Leader, Workshop on environmental issues for teachers (grades K-12) as part of conservation teaching program sponsored by State of Colorado Agencies (1988)

Presenter, Mid-Career Education for Senior Federal Government Executives and Managers, a program of Western Executive Seminar Center, Denver, Colorado (1985-1990)

Facilitator, Colorado Department of Education Conferences on "Expanding Your Horizons in Science and Mathematics" for Girls (grades 6-9) (1986-1992)

Supervisor, Undergraduates Minority Program, NCAR (1975-1982)

Supervisor, Ph.D. students, University of Texas at Austin and at NCAR (1980-1985)

Instructor, University of Texas at Austin (1973-1974): Developed computerized educational projects for chemistry courses

Assistant, Geology Department (1972-1973) Developed curriculum for environmental issues, University of Texas at Austin

PUBLIC SERVICE COMMITTEES & ACTIVITIES

Delegate, County and District Democratic Assemblies and Conventions (2008)

Volunteer, Homeless Shelter (2003-2004)

Leader, Neighborhood Traffic Mitigation (2001)

YWCA Career mate Resource Person (1990-1994)

YMCA and City Soccer Coach (1994-1995)

Girl Scout leader (1989-1990)

Member, Technical Committee, Boulder County Clean Air Consortium (1988-1989)

Member, Clean Air Resource and Education Committee, Boulder, Colorado (1984-1986)

Member, Denver Area Air Pollution Discussion Group (1976-1978)

PERSONAL DEVELOPMENT COURSES & ACTIVITIES

Re-evaluation Counseling (<http://www.rc.org/>) Ongoing since 2006

PSI Seminars (<http://psiseminars.com>): Basic (Weekend Intensive March 2002), PSI 7 (Week-long personal growth training August 2002), Women's Leadership Seminar (9-day leadership seminar for women February 2003)

Transcendental Meditation Instruction and Practice (2005-)

Bikram and Iyengar Yoga Practices ((2005-)

Ongoing weight training, aerobics, swimming, jogging

SOCIETIES

American Solar Energy Society – Life Member

Board of Directors (2005-)

Vice Chair and then Chair Sustainability Division (2003-)

Session Chair, Forum Moderator, Video producers (2003-)

International Solar Energy Society – Sustainability Chair (2007-)

Colorado Renewable Energy Society

Air & Waste Management Association

Journal Associate Editor

American Association for the Advancement of Science

Iota Sigma Pi, Chemistry honorary

Pi Lambda Theta, Education honorary

MAJOR LISTINGS

Who's Who in American Women

Who's Who in American Technology

American Men and Women of Science

SELECTED REVIEWED PUBLICATIONS

Middleton, P., L. Molina, A. Garcia, D. Johnson, and D. McKay, (2009) Comprehensive Assessment of North American Air Emissions Inventories and Ambient Air Monitoring Networks http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=2534

Middleton, P. J. Ohi, D. Renné, C. Lowry, “Towards a Secure and Renewable Hydrogen Economy for Asia: Fundamentals, International Experience and Steps Forward.” December 2005. http://pdf.usaid.gov/pdf_docs/PNADF469.pdf

W. F. Dabberdt, M. A. Carroll, W. Appleby, D. Baumbardner, G. Carmichael, P. Davidson, J. C. Doran, T. G. Dye, S. Grimmond, P. Middleton, W. Neff and Y. Phang “Report of the USWRP Air Quality Forecasting Workshop” (2006) Bulletin American Meteorological Society. Vol 87, Issue 2, pp 215-221. <http://ams.allenpress.com/perlserv/?request=get-abstract&doi=10.1175%2FBAMS-87-2-215>

Middleton, P. “Ammonia contribution to fine particles,” Released July 2004 <http://www.environmentaldefense.org/pdf.cfm?ContentID=3845&FileName=AmmoniaPaperJuly2004%2Epdf>

Middleton, P. “Mercury-A Local Concern / An International Issue”. Released December 2003 Sponsored by Environmental Defense

Middleton, P., M. Nicklas, R. Larson and B. Collins (2003) “Renewable Hydrogen Forum—A Summary of Expert Opinion and Policy Recommendations,” Can be found at the American Solar Energy Society web site under Renewable Hydrogen Forum. <http://www.ases.org/>

Middleton, P. “NOX – A Growing Air Quality Challenge in the West,” paper and presentation can be found on the Western Regional Air Partnership web site at <http://www.wrapair.org/forums/ioc/meetings/030728/index.html> under Middleton in the first day agenda. Sponsored by Environmental Defense & Western Resource Advocates (formerly Land & Water Fund).

Middleton, P (2003) “Western Mercury Workshop Critical Review: Deposition of Mercury to Western Water Bodies.” www.e3ventures.com/mercury/PDF/criticalReviewA.pdf
Sponsored by the Colorado Department of Health & Region 8 EPA

Middleton, P (2003) “The Path Forward: Senate Bill 229” Available at Panorama Pathways web site under Assessments - Experience <http://panoramapathways.net>

Middleton, P (2002) “Mercury in the West.” Available at Panorama Pathways web site under Assessments - Experience <http://panoramapathways.net/mercuryinthwest.pdf>
Sponsored by Western Resource Advocates (formerly Land & Water Fund) & Environmental Defense

Middleton, P. (2002 and periodic updates) “Acid Rain and Society.” Chapter in Handbook of Weather, Climate and Water: chemistry, Impacts, and Applications, Editors-T. Potter and B Colman. John Wiley & Sons, Inc. New York.

Middleton, P., A. Wong, J. Kulick (2002) “A Proposed Framework for Understanding Climate Change and Conflict,” RAND PM-1328-EPA.

Middleton, P. and W. Benjey (2002) "Climate-Air Quality Continuum and GEIA," EPA International Emissions Conference (<http://www.epa.gov/ttn/chief/conferences.html>)

Presentation: <http://www.epa.gov/ttnchie1/conference/ei11/modeling/benjeypres.pdf>

Paper: <http://weather.engin.umich.edu/geia/workshops/5yr.html>

Bernabo, C., P. Middleton, K. Smythe, R. Diver, K. Gavin (2001) Community Growth & Planning Tools: A Resource Guide. RAND Report MR1345-OSTP (2001) In Press.

Middleton, P. and Meng Fan (2001) "Using Science to Set Environmental Goals and Understand Environmental Implications in China," to be included in Report on the Feasibility of SO₂ Market Trading in China.

Middleton, P. et al (2001) "Global Climate Change," Contribution to Science & Technology Issues of National Importance RAND Report DRR-2486/5-S&TPI.

Clancy, N., P. Middleton and A. Auclair,(2001) How to Measure the Effects of Acid Deposition: A Framework for Ecological Assessments. EPA 430-R-01-005.

Middleton, P., D. Cunnold, and J. Oliver (2000) "Global Emissions Inventory Activity Overview" in International Global Atmospheric Chemistry Newsletter.
http://www.igac.noaa.gov/newsletter/igac22/Dec_2000_IGAC_22.pdf

Dixon, L., I. Porche, P., Middleton, M. Bernstein, and S. Rattien (2000) The Economic Costs and Emission Benefits of the California Zero Emission Vehicle Mandate. Final Report to be published as a RAND Report.

Middleton, P and N. Clancy (2000) "Assessing Next Generation Air Quality Policy Questions: How Applicable are Our Current Modeling Tools?" In Progress.

Middleton, P. and N. Laulainen (2000). "Examining the impacts of visibility and PM strategies before implementation," *Journal of the Air and Waste Management Association.*, **50**: 875-889.

Middleton, P (2000), " Assessment of MDI Concentrations Associated with Spray Foam Applications." Review Report to the Alliance of Polyurethane Industries.

Middleton, P and K. Johnson (1999), "Air Quality Models in Policy Making," RAND Report DRR-2062-OSTP.

Middleton, P. (1999), "Northeast Power Plant Assessment," Final Report to the Clean Air Task Force.

Middleton, P (1998), "Modeling MDI Emissions," Report to the Chemical Manufacturers Association.

Middleton, P. (1997). "DAQM-Simulated Spatial and Temporal Differences Among Visibility, PM and Other Air Quality Concerns Under Realistic Emission Change Scenarios," *J. Air & Waste Management* **47**: 302-316.

Bernabo, J.C., Middleton, P et al, (1997) Integrated Regional Climate Change Impacts Assessment - Scoping Study., Report to UK Department of the Environment, London, UK

Middleton, P. (1997) Evaluation Protocol for the Denver Air Quality Model. Report to the Regional Air Quality Council.

Middleton, P. (1997) Users Guide for the Denver Air Quality Model, Report to the Regional Air Quality Council.

Middleton, P., (1997) Background Document on North American Data Compatibility Report to Commission on Environmental Cooperation, Montreal Canada.

Middleton, P. (1996) "Renewable Energy: A Key to Cleaner Air," Invited Plenary Paper to American Solar Energy Society Meeting.

Middleton, P., Science & Policy Associates, Inc. Options for Improving Western Vistas Volumes I-IV. (1995) Draft Contractor's Report prepared for the Grand Canyon Visibility Transport Commission. Available from the Western Governors Association, Denver Colorado. Final Recommendations <http://wrapair.org/WRAP/Reports/GCVTCFinal.PDF>

Middleton, P. and other members of the U.S. Environmental Protection Agency Science Advisory Board Environmental Futures Committee (1995). *Beyond the Horizon: Using Foresight to Protect the Environmental Future*. EPA-SAB-EC-95-007.

Middleton, P., (1995) Assessment of North American Air Modeling and Monitoring Report to the Commission on Environmental Cooperation, Montreal Canada.

Middleton, P. (1995). "Sources of Air Pollutants," in Composition, Chemistry, and Climate of the Atmosphere, Van Nostrand Reinhold, New York.

Middleton, P. (1994): Overview of the Global Emissions Inventory Activity, in Transactions of the AWMA conference on Regional Photochemical Measurement & Modeling Studies.

Middleton, P. and H. Lansford, Editors (1994). *Fourth Global Emissions Inventory Activity Workshop Summary*.

Graedel, T. E., T. S. Bates, A. F. Bouwman, D. Cunnold, J. Dignon, I. Fung, D. J. Jacob, B. K. Lamb, J. A. Logan, G. Marland, P. Middleton, J. M. Pacyna, M. Placet, and C. Veldt (1993): A Compilation of Inventories of Emissions to the Atmosphere. *Global Biogeochemical Cycles*. 7, 1-26.

Middleton, P., J. S. Chang, M. Beauharnois, and L. Hash (1993): The Role of Nitrogen Oxides in Oxidant Production as Predicted by RADM. *Water, Air, and Soil Pollution Journal.*, 67, 133-159.

Middleton, P. and members of the technical team (1993): Brown Cloud II: The Denver Air Quality Modeling Study Final Technical Report, released December 17, 1993.

Chang, J., P. Middleton, and L. Hash (1990): Simulations of Regional Sulfate Distributions with RADM. In Proceedings of AWMA/EPA Specialty Conference on Visibility and Fine Particles, Estes Park, Colorado, October 1989.

Chang, J. S., P. Middleton, F. S. Binkowski, N. Seaman, J. McHenry, W. Stockwell, C. Walcek, J. Pleim, and H. Lansford (1990): The Regional Acid Deposition Model and Engineering Model, State-of-Science/Technology Report 4, National Acid Precipitation Assessment Program, Washington, D. C.

Middleton, P., and other members of the Committee on Haze in National Parks and Wilderness Areas (1993): Haze in the Grand Canyon, An Evaluation of the Winter Haze Intensive Tracer Experiment, and Protecting

Visibility in National Parks and Wilderness Areas. National Research Council. National Academy Press, Washington, D.C. 1993.

Chameides, W. L., C. Cardelino, F. Fehsenfeld, J. Greenberg, D. Lawson, W. Lonneman, J. Martinez, P. Middleton, D. Parrish, R. Rasmussen, M. Rodgers, and P. Zimmerman (1992): Ozone Precursor Relationships in the Ambient Atmosphere. *J. of Geo. Res.* 97, 6037-6053.

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- Long, G. E., P. Middleton, R. L. Dennis and R. W. Miksad (1983): Carbon Monoxide Modeling for Urban Air Quality Management. *International J. of Envir. Studies*, 21, 215-228.
- Dennis, R. L. and P. Middleton (1982): Comment on Atmospheric Pollution 1980. *Climatic Change*.
- Laird, A. R., P. Middleton, and R. W. Miksad (1982): A Simple Model for Urban Ozone Impact Predictions. *J. Air Pollution Control Assn.*, 32, 1221-1225.
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Middleton, P., R. L. Dennis and T. R. Stewart (1981): Urban Visual Air Quality Modeled and Perceived. *Proc. of the 12th International Technical Meeting (NATO/CCMS) on Air Pollution Modeling and Its Applications*.

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Middleton, P., C. S. Kiang, and V. A. Mohnen (1981): Urban Sulfate Aerosol Production Mechanisms: a Theoretical Comparison. *Heterogeneous Atmospheric Chemistry, Geophysical Monograph 2b*, Ed. D. R. Schrayer, American Geophysical Union, Washington, D. C.

Middleton, P., C. S. Kiang and V. A. Mohnen (1980): Theoretical Estimates of Sulfate Levels in Atmospheric Urban Aerosols. *Proc. of the MASS-APCA Technical Conferences on the Question of Sulfates*, Philadelphia, PA.

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Middleton, P., C. S. Kiang and V. A. Mohnen (1980): Relative Importance of Various Urban Sulfate Aerosol Production Mechanisms. *Atmos. Env.*, 14, 463-472.

Middleton, P. (1980): A Reexamination of Atmospheric Sulfuric Acid Aerosol Formation and Growth. *J. Aerosol Sci.*, 11, 411-413.

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Middleton, P. and C. S. Kiang (1978). A Kinetic Aerosol Model for the Formation and Growth of Secondary Sulfuric Acid Particles. *J. Aerosol Sci.*, 9, 359-385.

Middleton, P. B. and C. S. Kiang (1978): Experimental and Theoretical Examination of the Formation of Sulfuric Acid Particles. *Atmos. Env.*, 12, 179-185.

Suck, S. H., P. Middleton and J. R. Brock (1977): On the Multimodality of Density Functions of Pollutant Aerosols. *Atmos. Env.*, 11, 251-255.

Kiang, C. S. and P. B. Middleton (1977): Formation of Secondary Sulfuric Acid Aerosols in Urban Atmosphere. *Geo. Phys. Letters*, 4, 17-20.

Middleton, P. B. and J. R. Brock (1977): Modeling the Urban Aerosol. *J. Air Poll. Control Assn.*, 27, 771-775.

Middleton, P., G. K. Yue and C. S. Kiang (1976): Kinetic model for sulfate aerosol. In *Proceedings of the 12th International symposium on Atmospheric Pollution*, published by Elsevier.

Middleton, P. and J. R. Brock (1976): Atmospheric Aerosol Dynamics: The Denver Brown Cloud, P. Russel, Ed., *Proc., Symposium on the Denver Urban Plume*, Vol. I, E.P. A. Ecological Research Series, 101-139.

Middleton, P. and J. Brock (1976): Simulation of Aerosol Kinetics. *J. Colloid and Interface Science*, 54, 249-264.

Middleton, P. and R. E. Wyatt (1973): Quantum Mechanical Study of a Reaction Path Bifurcation Mode. *Chem. Phys. Letters*, 21, 57-61.

Middleton, P. and R. E. Wyatt (1972): Broken Path Model of Reactive Collisions: Application of Collinear (H, H₂). *J. Chem. Phys.*, 56, 2702-2712.

SELECTED PRESENTATIONS

EPA International Emissions Inventory Conference. Enhancing communications on global emissions (April 2009)

Voices in the Light – Video on pathways to clean sustainable energy future. (May 2008) American Solar Energy Society SOLAR 2008. Done in collaboration with D. Renné

Coastal Bend College Guest Lecture Series (March 2007) “Can we address the global warming crisis without sacrificing our way of life?”

MIT Symposium on “Exporting & Importing Air Pollution,” (July, 2001) Boston, MA “US-Mexico air quality -- an example of unbounded pollution problems”.

Air & Waste Management Association Annual Conference (June, 2001) Orlando Florida “Business & the Environment: Creating High Value Strategies.”

11th International GEIA Workshop (June, 2001) Paris, France. “Future of GEIA”

Emission Inventory Conference: One Atmosphere, One Inventory, Many Challenges (May, 2001), Denver Colorado. “Overview of GEIA.”

Acid Rain: Are the Problems Solved? (May, 2001) “Acid Rain Linkages—Ozone, Mercury, Particulate Matter, Eutrophication and Climate Change.”

ARCO Presentation (May, 1998) “Climate Change and Regionall Air Quality.”

University of Colorado, “Finding Solutions Together: A Guide to Successful Multi-stakeholder Integrated Assessments of Complex Environmental Issues.” (February, 1998): Mini-educational presentation.

9th GEIA Workshop (August 1998) Seattle, WA “Expanding GEIA.”

RAND Seminar (March 1998) “Visibility Degradation: Not a Vision of Economic or Environmental Health.”

8th Global Emissions Inventory Activity Workshop Overview, The Netherlands (November November 1997). “Accomplishments of GEIA.”

Southwest Regional Climate Change Symposium (September 1997) "Linking Climate Change & Air Quality."

University of Colorado Workshop on Field Scientists and the Shaping of the American West (March 1996) "Assessing Future Western Air Quality."

Edison Electric Institute Environmental & Energy Committee Meeting (October 1995) "Assessing Future Western Air Quality."

Chemical Manufacturers Association Diisocyanates Panel Meeting (August 1995) "Aerosol Modeling of MDI."

Los Alamos National Lab Workshop on Mexico City Research Activities, Los Alamos (June, 1994), Workshop Participant.

4th Global Emissions Inventory Activity Workshop Summary, Boulder Colorado (December 1993), Workshop Director.

AWMA Specialty Conference, "Protecting Visibility in Western Canada and the Pacific Northwest", invited speaker on visibility modeling and assessment. Harrison Hot Springs, B.C. (March, 1993).

Grand Canyon Visibility Transport Commission, Workshop on "Options for Protecting and Improving Visibility", (April, 1993) Rapporteur and contributor to report synthesis.

Grand Canyon Visibility Transport Commission, Workshop on "Technical methods for examining Clean Air Corridors (CAC)," (August, 1993) Workshop Assistant and Lead author on report synthesis.

AWMA International Conference, "Visibility Impairment Assessment: Importance of Using Theoretically Derived Optical Characterizations" and "Denver Air Quality Modeling Study Overview," Denver, CO (June, 1993).

Walter Orr Roberts Institute, Intergenerational Symposium *Inherit the Earth* , Participant (July, 1993).

III International Symposium on Environmental Chemistry -- Topic: Ozone and The Ozone Problem in the Mexico City Metropolitan Area --Third International Technical Meeting, invited speaker and reviewer on air quality program development, Oaxaca (October, 1993).

AWMA Specialty Conference, "Regional Photochemical Measurement and Modeling Studies," invited speaker on DAQMS and GEIA programs, San Diego, CA (November, 1993).

Global Emissions Inventory Activity Workshops, Oslo, Norway (June, 1992) and Amersfort, The Netherlands (February, 1993), Boulder, CO (December 1993).

International Symposium on Emission Inventory and Protection Technology for the Atmospheric Environment, AIST Tsukuba, Japan (March 24-25, 1992), "Global Emissions Inventory Activity: Developing an International Network".

NAPAP II Workshop, Invited speaker on Visibility Impacts and Assessment Modeling, Raleigh, NC (September, 1992).

Canadian Institute for Research in Atmospheric Chemistry Workshop on Oxidant Model Evaluation and Application I. Development of Protocol, invited speaker on "Emissions Modeling." Montreal, Quebec (November, 1992).

AWMA International Meeting in Vancouver, British Columbia, Canada (June 17-21, 1991), "Denver Air Quality Modeling Study" and "Variations in Sulfate Levels in Eastern United States as Predicted by RADM."

CHEMRAWN II, A World Conference, Baltimore, Md. (December 2-6, 1991), "Global Emissions Data Management Update."

Regional Haze Workshop, Scottsdale, AZ. (December 10-12, 1991), "Overview of Workshop Findings."

NESCAUM, U.S. EPA, Ministries of the Environment for Ontario and Quebec and Environment Canada Symposium on The Role and Importance of Nitrogen Oxides Emissions on Ozone Attainment Strategies for Eastern North America, Boston, Massachusetts (May 30-June 1, 1990), "The Role of Nitrogen Oxides in Oxidant Production as Predicted by RADM."

7th Symposium of the Commission on Atmospheric Chemistry and Global Pollution in Chamrousse, France (Sept. 4-11, 1990), "Use of North American Inventories in Regional Studies: Indications for Global Modeling Applications."

Atmospheric Chemistry Conference, Boulder, Colorado (June 19-23, 1989), "Comment on the role of natural VOC emissions on determining regional oxidant levels."

AWMA/EPA International Specialty Conference on Visibility and Fine Particles, Estes Park, Colorado (October 16-19, 1989), "Simulations of regional sulfate distributions with RADM."

Global Tropospheric Chemistry Workshop, Boulder, Colorado (December 11-12, 1989), "Report from the Continental Field Measurement Program Working Group."

Brown Cloud Forum, Denver, Colorado (Feb. 8, 1988), "Understanding the causes."

Conservation Education Workshop for Teachers, Gunnison, Colorado (July 11, 1988), "Air quality and its impacts on forest ecosystems."

Ozone Trends Workshop, Chicago Ill. (Nov. 20-21, 1987), "Effect of interfering absorbing species on total ozone."

Air Pollution Control Association, 79th Annual Meeting and Exhibition, Minneapolis, Mn. (June 9-13, 1986), "Database priorities identified by regional modeling studies" and "Preliminary comparisons of RADM and OSCAR precipitation data."

Air Pollution Control Association, 80th annual Meeting and Exhibition, New York, N.Y. (June 22-26, 1987), "A comparison of RADM and OSCAR precipitation chemistry data."

Air Pollution Control Association, 78th Annual Meeting and Exhibition, Detroit, Michigan (June 17-21, 1985). "Chemical data requirements for NCAR acid deposition model."

Second Annual Acid Deposition Emission Inventory Symposium, Charleston, SC (November 12-14, 1985). "Application on the NAPAP emissions inventories to Eulerian modeling."

Air Pollution Control Association International Specialty Conference on Environmental Impacts of Natural Emissions, Research Triangle Park, North Carolina (March 7-9, 1984), Session Chairman and Contributor to "Development of a Eulerian Acid Deposition Model."

American Lung Association 'Clear the Air' Symposium, Colorado Springs, Colorado (May 9, 1984). "The scope of the problem: Air pollution, acid rain, and environmental impacts."

Air Pollution Control Association, 77th Annual Meeting and Exhibition, San Francisco, California (June 25-28, 1984). "Urban Visual air Quality Judgments: Theory, Method, and Results."

Ninth Annual Water Workshop, Acid Rain and the West: Direct and indirect impacts, Gunnison, Colorado (July 23-25, 1984). "How Effective Abatement?"

World Climate Program Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas, Mexico City (November 26-30, 1984). "Global distribution of air pollution-sensitive agricultural areas."

76th Annual Air Pollution Control Association Meeting and Exhibition, Atlanta, Georgia (June 1983). "Forecast ability of an urban carbon monoxide box model."

The American Society of Civil Engineers' National Conference on Environmental Engineering, Boulder, Colorado (July 6-8, 1983). "An urban air quality box model for ozone."

Visual Values Workshop, Keystone, Colorado (May 10-12, 1982). "Implications of NCAR's urban visual air quality assessment method for pristine areas."

American Geophysical Union Fall meeting, San Francisco, California (December 7-15, 1982). "An urban air quality box model for carbon monoxide."

Environmetrics 1981, Washington, D. C. (April, 1981). "Evaluation of a simplified air pollution simulation model for ozone."

Air Pollution Control Association 74th Annual Meeting and Exhibition, Philadelphia, Pennsylvania (June 21-26, 1981). "Urban visual air quality index."

12th International Technical Meeting (NATO/CCMS) on Air Pollution Modeling and its Applications, Palo Alto, California (August 25-28, 1981). "Urban visual air quality: modeled and perceived."

Symposium on Plumes and Visibility: Measurements and Model Components, Grand Canyon, Arizona (November 10-14, 1980). "Visual air quality assessment: Denver case study."

Division of Environmental Chemistry, American Chemical Society, Honolulu, Hawaii (April 2-6, 1979). "Relative importance of various urban sulfate aerosol production mechanisms."

Symposium on the Budget and Cycles of Trace Gases and Aerosols in the Atmosphere, Boulder, Colorado (August 12-18, 1979). "On the role of photo-induced solution reactions in determining atmospheric sulfate, nitrate and ammonium aerosol concentrations."

Air Pollution Control Association Specialty Conference on 'Ozone/Oxidants: Interactions with the Total Environment,' Houston, Texas (October 14-17, 1979). "Effect of cloud cover and temperature on predicted monthly average ozone concentrations in the Houston area."

Division of Environmental Chemistry, American Chemical Society, Anaheim, California (March 12-17, 1978). "Theoretical estimates of nitrate and sulfate levels in atmospheric urban aerosols."

Air Pollution Control Association Meeting on "The question of sulfates," Philadelphia, PA. (April 13-14, 1978). "Theoretical estimates of sulfate levels in atmospheric urban aerosols."

4th Biennial Rocky Mountain Regional Meeting, American Chemical Society, Boulder, Colorado (June 5-7, 1978). "Tropospheric sulfate aerosol formation mechanisms' and "Chemical and microphysical processes involved in stratospheric sulfate aerosol formation."

Symposium on the Transfer and Utilization of Particulate Control Technology, Denver, Colorado (July 24-28, 1978). "A kinetic aerosol model for the formation and growth of secondary sulfuric acid particles."

American Meteorological Society Meeting, San Francisco, CA., (December 5-10, 1978). "Tropospheric heterogeneous chemical processes I: method for evaluating natural tropospheric NO and NO₂" and "Tropospheric heterogeneous chemical processes II: a method for evaluating natural tropospheric NH₃ and SO₂."

Gordon Research Conference on Chemistry at Interfaces, Meriden, N.H. (July 19-24, 1977). "Experimental and theoretical examination of the formation of sulfuric acid particles."

International Association of Geomagnetism and Aeronomy/International Association of Meteorology and Atmospheric Physics Assemble, Seattle, WA. (August 22-September 3, 1977). "The formation and growth of secondary sulfuric acid aerosols."

Ninth International Conference on Atmospheric Aerosols, Condensation and Ice Nuclei, Galway, Ireland (September 1977). "The formation and growth of secondary sulfuric acid aerosols."

Workshop on the Chemistry of Atmospheric Sulfur, Philadelphia, PA. (October, 1976). "Sulfuric acid particulate formation in the atmosphere."

Symposium on the Measurement, Analysis and Control of Atmospheric Industrial Particulate, Denver Research Institute, Denver, CO. (June, 1976). "Modeling of aerosol sources."

Symposium on the Denver Urban Plume, Denver, CO. (March, 1975). "Atmospheric aerosol dynamics: the Denver brown cloud."

SELECTED INVITED LECTURES

Biosphere Atmosphere Research and Training Summer Presentation, Michigan Biological Station; U. S. Environmental Protection Agency, Research Triangle Park, North Carolina; Department of Civil Engineering and Department of Chemical Engineering, University of Texas at Austin, Austin, Texas; Department of Atmospheric Sciences, Colorado State University, Ft. Collins, Colorado; Department of Meteorology, University of Colorado, Boulder, Colorado; Institute for Theoretical Physics, University of Koln, West Germany Department of Chemistry, University of Missouri at St. Louis, St. Louis, Missouri; American Chemical Society; Center for Air Pollution Impact and Trend Analysis, Washington University, St. Louis, Missouri; Brookhaven National Laboratory, Upton NY; Los Alamos National Laboratory, Los Alamos, New Mexico; Claremont Colleges.