Invitation for Public Comment on the List of Candidates for the Clean Air Scientific Advisory Committee (CASAC) Secondary NAAQS Review Panel for Oxides of Nitrogen and Sulfur

January 13, 2015

The U.S. Environmental Protection Agency (EPA) Science Advisory Board (SAB) Staff Office announced in a Federal Register notice (Volume 79, Number 59, pages 17147-17149) published on March 27, 2014 that it was seeking public nominations of scientific experts to serve on a Panel under the auspices of the Clean Air Scientific Advisory Committee to review the technical and policy assessments supporting the EPA's review of the secondary National Ambient Air Quality Standards (NAAQS) for oxides of nitrogen and sulfur. The SAB Staff Office sought nominations of recognized experts in one or more of the following areas: (a) ecological effects of exposure to gas-phase oxides of nitrogen and sulfur and the deposition of nitrogen and sulfur on agricultural crops and natural ecosystems and their components; (b) other effects of oxides of nitrogen and sulfur and acid deposition on public welfare including damage to materials and the interactions of these pollutants to affect global climate conditions; (c) ecosystem exposure to oxides of nitrogen and sulfur and risk assessment/modeling to evaluate the effects of these pollutants; (d) ecosystem services and resource valuation; and (e) physical and chemical properties of oxides of nitrogen and sulfur, atmospheric processes involved in their formation and transport, evaluation of sources and emissions, and methods for monitoring these pollutants. The SAB Staff office identified 37 candidates for this Panel based on their relevant expertise and willingness to serve. Biosketches of these candidates are provided below.

The SAB Staff Office Director will make the final decision about who will serve on the Panel based on all relevant information. This information includes a review of the confidential financial disclosure form (EPA Form 3110-48), information independently gathered by staff, and public comments. For the EPA SAB Staff Office, a balanced Panel is characterized by inclusion of candidates who possess the necessary domains of knowledge, the relevant scientific perspectives (which, among other factors, can be influenced by work history and affiliation), and the collective breadth of experience to adequately address the general charge. Specific criteria to be used in evaluating a candidate include: a) scientific and/or technical expertise, knowledge, and experience; b) availability and willingness to serve; c) absence of financial conflicts of interest; d) absence of appearance of a lack of impartiality; e) skills working in committees, subcommittees, and advisory panels; and, for the panel as a whole, f) diversity of scientific expertise and viewpoints.

We hereby invite public comment on the attached List of Candidates for consideration by the SAB Staff Office in the formation of this Panel. Comments should be submitted to the attention of Dr. Thomas Armitage, Designated Federal Officer, no later than February 3, 2015. E-mailing comments (armitage.thomas@epa.gov) is the preferred mode of receipt. Please be advised that comments received are subject to release under the Freedom of Information Act.

Candidates for the CASAC Secondary NAAQS Review Panel for Oxides of Nitrogen and Sulfur

Allen, Edith

University of California Riverside

Dr. Edith B. Allen is Professor and Cooperative Extension Specialist in the Department of Botany and Plant Sciences, University of California, Riverside. She has a B.S. degree in Biology from Tufts University, and M.S. and Ph.D. degrees in Botany from Rutgers University and the University of Wyoming. For the last 20 years she has done research on ecosystem impacts of anthropogenic nitrogen deposition, including shifts in plant species diversity, soil microbial diversity and functioning, biogeochemical processes, and assessment of critical loads of nitrogen that affect these processes. She is a member of the U.S. Geological Survey (USGS) Powell Center Working Group on Diversity and Nitrogen Deposition. Additional research interests include restoration ecology, soil ecology, and invasive species ecology, and she has worked in boreal forest to tropical forest, shrublands, grasslands, and deserts, including sites disturbed by various anthropogenic activities, air pollution, invasive species and frequent fire. Dr. Allen has published over 160 research articles, and served as an editor for *Functional Ecology*, *Oecologia*, *Restoration Ecology*, and *Invasive Plant Science and Management*. She also served on grant review panels for the National Science Foundation (NSF), U.S. Department of Agriculture (USDA), U.S. Environmental Protection Agency (EPA), and other government and university research organizations. She has received funding from NSF (including a Biocomplexity grant on "Thresholds of Nitrogen Deposition"), U.S. Department of the Interior National Park Service, EPA, USDA, and state and local organizations. She was selected a Fellow of the American Association for the Advancement of Science (AAAS) in 2012 and received a Fulbright Specialist Award in 2013. She is a past president of the Soil Ecology Society (SES), and received the professional achievement award from the SES.

Amar, Praveen

Independent Consultant

Dr. Praveen Amar is an independent consultant in the areas of environment, energy, and climate science and policy. He is currently working as a member of the Technical Experts Panel (representing American and European NGOs) for the United Nations Environment Programme (UNEP) process relating to the implementation of UN treaty on the control of global mercury emissions ("Minamata Convention"). He is a member of the National Research Council (NRC) Board on Environmental Studies and Toxicology (BEST). He is also serving (since 1999) as an active member of the Scientific Advisory Committee for the State of New York's Environmental Monitoring Evaluation and Protection (EMEP) Program. From May 2011 to May 2013, he worked as a senior advisor, Technology and Climate Policy, with the Clean Air Task Force (CATF), an environmental organization with focus on protecting the environment through research, advocacy, collaboration, and innovation. His work at CATF involved investigation of the environmental impacts of natural gas development in Marcellus Shale in Pennsylvania as well as the climate change and public health benefits of lowering the emissions of black carbon from mobile and stationary sources. Before joining CATF, Dr. Amar worked with Northeast States for Coordinated Air Use Management (NESCAUM), a nonprofit association of air quality agencies in the Northeast, for 19 years including 16 years as its Director of Science and Policy, where his key role was to translate the implications of findings of science and developments in technology into workable and cost-effective policy options for the Northeast states. While at NESCAUM, his research projects focused on monetizing the public health benefits of controlling mercury emissions from coal-fired power plants in the U.S. and evaluating future impacts of global climate change on regional ground-level air quality in the U.S. (ozone and fine particles). While at NESCAUM, he testified before the U.S. House and Senate Committees on control of fine particles and the benefits of lowering mercury emissions from coal-fired power plants. Before working with NESCAUM Dr. Amar was affiliated with the California Air Resources Board (1977-1992), where he managed programs on air pollution research (including research on acid deposition, atmospheric processes, and ecological effects), strategic planning, and industrial source pollution control.

Dr. Amar is a current member of the U.S. EPA's Advisory Council on Clean Air Compliance Analysis. He was also a member of the recent NRC Committee on Scientific Tools and Approaches for Sustainability that produced a report advising the EPA on incorporating sustainability tools in its future decision making. From 2007-2011, he served as a member of EPA's Clean Air Scientific Advisory Committee (CASAC) panel on review of Secondary National Ambient Air Quality Standards (NAAQS) for SO_2 and NO_x. Dr. Amar received his Ph.D. in engineering from the University of California, Los Angeles (UCLA) and is a licensed professional engineer in the State of California. He has taught graduate courses in atmospheric processes and air pollution policy at the University of California, Davis; California State University, Sacramento; and at Tufts University in Boston. His current research funding is, as a sub awardee, through an EPA Science to Achieve Results (STAR) grant (expiring in July 2015) to the University of Illinois. He is also working as a paid consultant to the Natural Resources Defense Council (NRDC) as part of the UNEP treaty on global mercury emissions.

Boyd, James

Resources for the Future

Dr. James Boyd is a senior fellow at Resources for the Future (RFF), Washington D.C. and Director of RFF's Center for the Management of Ecological Wealth. He is also the Director of Social Science and Policy at the National Socio-Environmental Synthesis Center (SESYNC) in Annapolis Maryland. He received his Ph.D. in applied microeconomics from the Wharton School, University of Pennsylvania and his B.A. in history from the University of Michigan. Dr. Boyd has been a visiting professor at Stanford University and Washington University in St. Louis. An economist by training, his work focuses on the measurement and management of ecological wealth, goods and services. As a policy analyst, Dr. Boyd emphasizes the need to better coordinate economic and ecological research to improve the practical performance of environmental policies, markets, and investments. He has previously served on U.S. EPA Science Advisory Board and other government and private advisory panels, including the U.S. EPA's Committee on Valuing Ecological Systems and Services. Dr. Boyd's current sources of research funding include the Gordon and Betty Moore Foundation, the David and Lucile Packard Foundation, the U.S. Geological Survey, the U.S. EPA's Office of Research and Development, and the National Science Foundation.

Boyer, Elizabeth

Pennsylvania State University

Dr. Elizabeth W. Boyer is an Associate Professor of Water Resources in the Department of Ecosystem Science and Management at the Pennsylvania State University. She serves as Director of the Pennsylvania Water Resources Research Center, and as Assistant Director of Penn State Institutes of Energy and the Environment. Prior to her current position, Dr. Boyer served on the faculty at the State University of New York at Syracuse and at the University of California at Berkeley. She holds a B.S. degree in Geography from the Pennsylvania State University, and M.S. and Ph.D. degrees in Environmental Sciences from the University of Virginia. Dr. Boyer's work focuses on hydrological and biogeochemical processes that affect water resources. Her research explores the status and trends of water quality of streams, rivers, and estuaries in response to factors such as atmospheric deposition, climatic variability, and land-use. Dr. Boyer's recent research is funded by the Pennsylvania Department of Environmental Protection, the U.S. Geological Survey, the U.S. Environmental Protection Agency, and the U.S. National Science Foundation. Dr. Boyer serves on the Board of Directors of the Universities Council on Water Resources. She has chaired the American Geophysical Union's technical committee on Water Quality, and has chaired the international Gordon Research Conference on Catchment Science: Interactions of Hydrology, Biology and Geochemistry.

Burns, Douglas

U.S. Geological Survey

Dr. Douglas A. Burns is a Research Hydrologist at the U.S. Geological Survey, New York Water Science Center in Troy, NY. He holds a B.A. in Geology from Hope College, an M.S. in Environmental Sciences from the University of Virginia, and a Ph.D. in Water Resources Management from the State University of New York, College of Environmental Science and Forestry in Syracuse, NY. Dr. Burns' research focuses on the effects of human activities on water quality, hydrology, and ecosystems. His particular emphasis has been the effects of air pollutants on ecosystems and water quality. Dr. Burns served as the Director of the National Acid Precipitation Assessment Program (NAPAP) from 2006 – 2011, and in this capacity was lead author of the most recent NAPAP report to Congress. He has also served on several advisory and review panels at the state, national, and international levels including the U.S. EPA Clean Air Scientific Advisory Committee (CASAC) Air Monitoring and Methods Subcommittee. Dr. Burns is the author of more than 85 scientific papers and reports. He currently serves as Co-Chair of the 2015 International Acid Rain Conference to be held in Rochester, New York in October, 2015.

Chestnut, Lauraine

Stratus Consulting Inc.

Ms. Lauraine G. Chestnut is a Managing Economist at Stratus Consulting Inc. specializing in the quantification and monetary valuation of human health and environmental effects associated with environmental pollutants. She has an M.A. in economics from the University of Colorado, Boulder. Ms. Chestnut has over 25 years of experience with Stratus Consulting and its predecessors working for clients including the U.S. Environmental Protection Agency, California Air Resources Board, the National Park Service, Environment Canada, Health Canada, and The World Bank, quantifying and valuing the effects of environmental pollutants on human health, visibility aesthetics, materials, and crops. She has conducted original economic and survey research to estimate the economic value to the public of protecting human health, visibility aesthetics, and cultural materials from the effects of air pollution; and has conducted epidemiology studies of the effects of particulate matter on human health. She has developed quantification models to estimate the benefits of reductions in air pollutants and these models have been used to assess provisions of the Clean Air Act in the U.S., proposed Canadian air quality standards, air quality standards in Bangkok, and elsewhere. Ms. Chestnut has numerous publications on these topics in peer reviewed journals including *Contemporary Economic Policy*, *Journal of Environmental Managemen*t, *Archives of Environmental Health*, *Journal of the Air and Waste Management Association*, and *Journal of Policy Analysis and Management*. Ms. Chestnut served on the U.S. EPA Clean Air Science Advisory Committee NO_x and SO_x Secondary National Ambient Air Quality Standards (NAAQS) Review Panel in 2007-2011. She served in 2007-2008 on the National Research Council Committee on Mortality Risk Reduction Benefits from Decreasing Tropospheric Ozone Exposure. She also served on the U.S. EPA Science Advisory Board, Advisory Council on Clean Air Compliance Analysis and on the California Air Quality Advisory Committee. Ms. Chestnut's recent contracts are with Health Canada developing a stated preference instrument for estimating willingness to pay for improvements in life expectancy.

Driscoll, Jr., Charles T.

Syracuse University

Dr. Charles T. Driscoll is a Distinguished and University Professor at Syracuse University. Dr. Driscoll received his B.S. degree in Civil Engineering from the University of Maine in 1974, and his M.S. in 1976 and Ph.D. in 1980 in Environmental Engineering from Cornell University. Dr. Driscoll's teaching and research interests are in environmental engineering, environmental chemistry, biogeochemistry, soil chemistry and environmental quality modeling. An important component of Dr. Driscoll's research has been investigation of the impacts of air pollutants on ecosystems and their response to mitigation efforts. His early research, which continues today, involves characterizing the mechanisms by which acidic deposition (acid rain) acidifies soil and surface waters and the impacts of this disturbance on ecosystem structure and function. Dr. Driscoll's work was extended in the 1980s with a related line of research on the inputs, transport, fate and bioaccumulation of mercury from atmospheric deposition. In recent years his acidification research has focused on the recovery of ecosystems, including the development of critical loads and total maximum daily loads to use as tools to guide emission control strategies. He has provided expert testimony on air pollution effects on ecosystems to U.S. Congressional and State committees. Dr. Driscoll participated in the National Research Council committee on Air Quality Management (2004) which reviewed the Clean Air Act and made recommendations on how it should be restructured in the future. He served as a member of the U.S. Environmental Protection Agency Clean Air Scientific Advisory Committee (CASAC) panel reviewing the secondary National Ambient Air Quality Standard for Oxides of Nitrogen and Oxides of Sulfur (2007-2011), and the U.S. EPA Science Advisory Board committee reviewing the Mercury Risk Assessment for Coal-Fired and Oil-Fired Electric Generating Units (2011). Dr. Driscoll has authored or co-authored approximately 400 peer-reviewed articles, and has been acknowledged by the Institute for Scientific Information (ISI) as one of the most highly cited researchers in both engineering and environmental science. In 2007 he was elected to the National Academy of Engineering. Recent research funding sources include the National Science Foundation, New York State Energy Research and Development Authority, the National Park Service, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, the Surdna Foundation, the Grantham Foundation and the William and Flora Hewlett Foundation.

Edgerton, Eric

Atmospheric Research & Analysis, Inc.

Mr. Eric S. Edgerton is co-founder, President and Senior Scientist of Atmospheric Research & Analysis, Inc. He holds a B.A. in Organic Chemistry from Cornell University (1974) and an M.S. in Environmental Engineering from the University of Florida (1981). Mr. Edgerton has over 30 years of experience in the measurement of atmospheric particles and gases. From 1987 to 1997, he served as Project Manager for the U.S. EPA-sponsored Clean Air Status and Trends Network (CASTNet), during which time he led the selection, installation and operation of the first 50 CASTNet sites. Currently, Mr. Edgerton is Project Manager for the Electric Power Research Institute (EPRI) sponsored Southeastern Aerosol Research and Characterization (SEARCH) study. Among other things, SEARCH includes an 8-station research network of highly instrumented field sites across the Southeastern U.S. SEARCH sites provide continuous measurements of trace gases, including O_3, NO, NO_2, HNO_3, NO_2, CO, SO_2 and NH_3, surface meteorology and speciated $PM_{2.5}$. Under Mr. Edgerton's direction, SEARCH has developed techniques for measurement of various nitrogenous particles and gases, and is the only network in the U.S. that measures photolytic NO_2, NH_3 and HNO_3 on a continuous (1 hour or better) basis. Mr. Edgerton's research areas of interest include atmospheric chemistry, measurement of trace atmospheric species, and geochemical cycles of sulfur, nitrogen, and carbon.

Felton, Henry (Dirk)

New York State Department of Environmental Conservation

Mr. Henry (Dirk) Felton is currently employed by the New York State Department of Environmental Conservation (NYSDEC) as a Research Scientist III. He holds a B.A. in Physics from Kenyon College, Gambier Ohio (1987), and an M.S. in Environmental Engineering from Stevens Institute of Technology in Hoboken, New Jersey (1993). He is also a Civil Engineer licensed in the State of New York. Mr. Felton's professional work has been entirely focused on ambient air monitoring. His first independent work involved setting up a monitoring network for criteria, toxic, and tracer compounds around the Freshkills Landfill on Staten Island. Since then he has worked to optimize monitoring technology to operate a rural upwind Photochemical Assessment Monitoring Stations (PAMS) site for NARSTO-NE, conducted several experiments to evaluate new automated mass measurement technologies, initiated speciated Mercury and ultrafine monitoring programs, and has designed the $PM_{2.5}$ federal reference method (FRM) and PM speciation monitoring program in New York. Mr. Felton also was the lead for his Agency's participation in the New York PM Technology Assessment and Characterization Study (PMTACS) EPA SuperSite program, participated on the Board of Science Counselors review of the U.S. EPA Office of Research and Development's Clean Air Research program and was a two term member of the U.S. EPA Clean Air Scientific Advisory Committee (CASAC) Ambient Air Monitoring and Methods Subcommittee (AAMMs). Mr. Felton currently participates on the Northeast States for Coordinated Air Use Management (NESCAUM) Monitoring Assessment Committee (MAC), the National Association of Clean Air Agencies (NACAA) Monitoring Steering Committee (MSC) and recently was elected to his local school board.

Fenn, Mark

USDA Forest Service

Dr. Mark Fenn is a Research Plant Pathologist with the U.S. Department of Agriculture (USDA) Forest Service, Pacific Southwest Research Station. He received his Ph.D. from the University of Arizona. Dr. Fenn's research has focused on nitrogen (N) deposition effects in forests and other ecosystems of California and more broadly in western North America. His many studies have described how N pollutants are causing widespread changes to ecosystems in many parts of the western U.S. He has published over 130 scientific papers on various aspects of air pollution impacts, including: the establishment of N deposition thresholds for harmful effects, degraded water quality, effects on biodiversity and invasive species---sometimes leading to vegetation-type change, and the effects on forest health of multiple stressors such as long term fire suppression, drought, bark beetles, N excess, multiple pollutant effects, and climate change. He developed an effective "passive" ion exchange resin based method for measuring atmospheric deposition of nitrogen, sulfur, and base cations in remote areas. This method is now widely used and continues to expand the available data on atmospheric deposition inputs to wildland ecosystems. His research is currently funded by the Wood Buffalo Environmental Association (Alberta, Canada), the U.S. Forest Service (USFS) Forest Inventory and Analysis Program, and an internal competitive research grant from the USFS Pacific Southwest Research Station.

Dr. Fenn is recognized internationally as an expert on N deposition impacts on Mediterranean-type forests and other ecosystems, as an expert on N deposition in the western U.S. and Mexico, and as a leader in N critical loads research. He is an active member of the Critical Loads of Atmospheric Deposition (CLAD) and FOCUS working groups composed of scientists and air quality specialists from the U.S. Environmental Protection Agency (EPA), National Park Service (NPS), U.S. Geological Survey (USGS), USFS and several universities. Members of these groups are leading individuals involved in critical loads research, development, and policy application in the U.S. He is periodically called upon to review science and policy documents from EPA, NPS, and USGS. He has also worked on a number of research projects funded by the NPS and USGS and on multiagency synthesis projects and workshops that have led to applied products and peer-reviewed publications. Currently he is part of a Powell Center workshop developing continental scale relationships between N deposition and forest responses and another national group working on N deposition effects on ecosystem services. Dr. Fenn has published several review papers and book chapters with European colleagues on the subject of N deposition effects and critical loads; has been invited to give seminars and advise on critical loads projects in Spain, and has worked extensively on N deposition effects in forests near Mexico City (he edited a Springer-Verlag book on this topic). Dr. Fenn was elected a member of the National Academy of Sciences in Mexico. He is part of an international team of experts investigating the environmental and ecological effects of air pollution in the Athabasca Oil Sands Region in northern Alberta. Dr. Fenn is coordinator of a very active working group of the International Union of Forest Research Organizations (IUFRO), entitled "Atmospheric deposition, soils and nutrient cycles."

Fernandez, Ivan J.

University of Maine

Dr. Ivan J. Fernandez is a Professor and forest soil scientist at the University of Maine, Orono. He is a Distinguished Maine Professor and faculty member in the School of Forest Resources, the Climate Change Institute, and the School of Food and Agriculture. His expertise is in biogeochemical cycling in forested ecosystems, terrestrial-aquatic linkages, and biogeochemical responses to a changing chemical and physical climate. He is a member of numerous professional organizations such as the Society of American Foresters, Soil and Water Conservation Society, and a fellow and member of the Soil Science Society of America. He serves as a member of the National Council of Soil Science Examiners and the Maine Board of Certification for Professional Geologists and Soil Scientists. He is recognized for establishing or helping to establish several long-term ecosystem studies in Maine that include the Howland Research Forest, research watersheds in Acadia National Park, and the long-term whole ecosystem research program at the Bear Brook Watershed in Maine. He also serves as the External Science Advisor to the Hubbard Brook Ecosystem Study in New Hampshire and is the point of contact for the U.S. Department of Agriculture (USDA) Northeast Climate Hub at the University of Maine. His current research interests are in atmospheric deposition and climate change effects on forested ecosystems and watershed processes, bioenergy implications for forest management, and climate change adaptation. He was co-leader of the 2009 climate change assessment for Maine and the subsequent report *Maine's Climate Future*. Dr. Fernandez has funding from the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, the Northeastern States Research Cooperative and the National Science Foundation to study acidification and recovery, climate, and nitrogen effects on long-term forest biogeochemistry.

Galloway, James

University of Virginia

Dr. James N. Galloway is Sidman P. Poole Professor of Environmental Sciences at the University of Virginia. He received the B.A. degree in Chemistry and Biology from Whittier College. He received a Ph.D. degree in Chemistry from the University of California, San Diego. After a postdoctoral appointment with Gene Likens at Cornell University, he joined the faculty of the University of Virginia. He was the founding chair of the International Nitrogen Initiative from 2003 to 2008, and was a member of the U.S. Environmental Protection Agency Science Advisory Board from 2003 to 2009. Most recently he served as a lead author on the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment and as a coordinating lead author on the U.S. Third National Climate Assessment. His research on biogeochemistry includes the natural and anthropogenic controls on chemical cycles at the watershed, regional, and global scales. His current research focuses on beneficial and detrimental effects of reactive nitrogen as it cascades between the atmosphere, terrestrial ecosystems and freshwater and marine ecosystems, and on the interactions of sulfur, nitrogen, and carbon biogeochemical cycles. Dr. Galloway is currently funded by: the U.S. EPA (to develop nitrogen footprint tools for a number of stakeholders); The Organic Center (to include questions related to organic food production and the nitrogen footprint of food); and the Kaiteki Institute (to investigate how differing methods of manure treatment will impact nitrogen losses from the manure).

Gilliam, Frank

Marshall University

Dr. Frank S. Gilliam is a Professor in the Department of Biological Sciences at Marshall University. He received his Ph.D. from Duke University in plant ecology, with research focusing on the effects of fire on nutrient and herbaceous layer dynamics of a southeastern Coastal Plain pine flatwoods ecosystem. Although he has continued to publish work on the role of fire in old-growth longleaf pine ecosystems, most of his current work examines the effects of excess nitrogen (N) deposition on soil N and herb layer dynamics of Central Appalachian hardwood forests. His work has been funded by the National Science Foundation (NSF), U.S. Department of Agriculture (USDA), and the U.S. Forest Service. Dr. Gilliam's teaching responsibilities include introductory biology, general ecology, and plant ecology, in addition to mentoring undergraduate research, as well as graduate students pursuing the M.S. in biological sciences. He has been the recipient of numerous awards for both research and teaching at Marshall University, including twice receiving the MU Distinguished Artist and Scholars Award (2000 and 2011), the Hedrick Outstanding Faculty Award acknowledging both research and teaching (2002), and was a finalist for Professor of the Year in West Virginia in 1999. He has been asked to serve on review panels for NSF and USDA, and served as Program Chair for the 2010 Annual Meeting of the Ecological Society of America, Pittsburgh, Pennsylvania. He currently is associate editor for several ecological journals, including *Journal of Ecology*, *Journal of Vegetation Science*, *Journal of Plant Ecology*, and *Applied Vegetation Science*. Dr. Gilliam is the author of 59 peer-reviewed papers, 29 book/proceedings chapters, and three books, the most recent of which was published in March 2014: *The herbaceous layer in forests of Eastern North Americ*a, 2nd edition (New York, NY: Oxford University Press, Inc).

Goldstein, Robert

Electric Power Research Institute

Dr. Robert A. Goldstein is Senior Technical Executive for Water and Ecosystems in the Environment Sector at the Electric Power Research Institute (EPRI). Dr. Goldstein holds a Doctor of Engineering Science degree from Columbia University. His recent activities include planning and directing research on: cycling and fate of atmospherically deposited Hg, Se and As; atmospherically influenced Total Maximum Daily Loads (TMDLs) of mercury, nitrogen, and acidity; thermal TMDLs; the energy/water nexus; field studies of fish interactions with thermal plumes; and endangered species. Dr. Goldstein has conducted research and published papers on ecosystem analysis, biogeochemical cycling, environmental modeling, water resources, terrestrial ecology, watershed management, plant physiological ecology, and population dynamics. Dr. Goldstein represents EPRI on the Federal Advisory Committee Act (FACA) Advisory Committee on Water Information (ACWI). He has taught classes and lectured at universities and scientific societies worldwide. Prior to joining EPRI in 1975, Dr. Goldstein was a Systems Ecologist with the Oak Ridge National Laboratory. Dr. Goldstein's has recent sources of funding are the electric power sector and the U.S. Department of Energy.

Goodale, Christine

Cornell University

Dr. Christine Goodale is an Associate Professor in the Department of Ecology and Evolutionary Biology at Cornell University, where she is also a Faculty Fellow at Cornell's Atkinson Center for a Sustainable Future, and Director of the graduate program in Cross-Scale Biogeochemistry and Climate. She holds a B.A. from Dartmouth College in biology and environmental studies and a M.S. and a Ph.D. from the University of New Hampshire in natural resources. Dr. Goodale completed postdoctoral fellowships at the Carnegie Institution of Washington Department of Global Ecology and the Woods Hole Research Center. Her professional service has included the steering committee of the Northeastern Ecosystem Research Cooperative; Science Technology and Education Advisory Committee for the National Ecological Observatory Network (NEON – STEAC); session chair for the international Biogeomon and Acid Rain conferences; chair of the working group on Nitrogen Effects on Greenhouse Gas Balance for the U.S. EPA Workshop on Nitrogen and Climate Interactions; and the U.S. EPA's Ecological Effects Subcommittee of the Advisory Council on Clean Air Compliance. Her research examines the impact of nitrogen and sulfur air pollution on forest ecosystems, including assessments of the fate and effects of nitrogen deposition in forested catchments, the coupling of forest carbon and nitrogen cycles with each other and with other elements; and model simulations of the role of nitrogen deposition in driving ecosystem carbon storage and affecting future climate. Dr. Goodale's recent primary sources of research funding have been the U.S. National Science Foundation (NSF) and U.S. Department of Agriculture (USDA), with additional support from Cornell's Atkinson Center for a Sustainable Future (ACSF), and the New York State Water Resource Institute (NYS WRI).

Henze, Daven

University of Colorado

Dr. Daven Henze is an Assistant Professor and Charles C. Gates Faculty Fellow in the Department of Mechanical Engineering at the University of Colorado (CU) Boulder. He holds a Ph.D. in chemical engineering from the California Institute of Technology. Prior to joining the faculty at CU Boulder he was an Earth Institute Postdoctoral Fellow at Columbia University, where he worked at the National Aeronautics and Space Administration (NASA) Goddard Institute for Space Studies. Dr. Henze's research focuses on air quality, long-range pollution transport, and climate change. A large part of his research stems from chemical data assimilation, the process by which both models and observations are combined to produce estimates of the atmospheric state that are often more complete than those provided by either approach alone. This encompasses more specific interests in remote sensing, adjoint sensitivity analysis, inverse problems, and source apportionment. Dr. Henze has received a U.S. EPA Early Career award, a NASA New Investigator award, and multiple department and college level awards for teaching and research. He is the lead scientist for the GEOS-Chem adjoint model, a member of the GEOS-Chem Steering Committee, co-chair of the Hemispheric Transport of Atmospheric Pollutants (HTAP) Working Group on Source/Receptor relationships, and members of multiple NASA satellite science teams. In the past two years he has led NASA Air Quality Applied Sciences Tiger Team projects on source contributions to vegetative exposure to ozone and deposition of reactive nitrogen in the United States. Dr. Henze's research is funded by NASA, the U.S. EPA, National Oceanic and Atmospheric Administration (NOAA), and the National Science foundation (NSF).

Howarth, Robert

Cornell University

Dr. Robert W. Howarth is the David R. Atknson Professor of Ecology and Environmental Biology at Cornell University and an Adjunct Senior Scientist at the Ecosystems Center of the Marine Biological Laboratory in Woods Hole, MA. He holds a B.A. in Biology from Amherst College and a Ph.D. jointly from Massachusetts Institute of Technology and the Woods Hole Oceanographic Institution. Dr. Howarth's research focuses on the sources and effects of nutrient pollution in coastal marine ecosystems, the interactions of biogeochemical cycles from ecosystem to regional to global scales, and the environmental effects of energy systems (including biofuels and fossil fuels, with an emphasis on water quality and on greenhouse gas emissions). He is Editor-in-Chief of *Limnology and Oceanography*. He also is the Founding Editor of the journal *Biogeochemistry* and was Editor-in-Chief of the journal from 1983 to 2004. Dr. Howarth has served on 11 committees and panels of the National Academy of Sciences, including serving as chair for two of these: the Committee on Causes and Consequences of Coastal Marine Eutrophication from 1998-2000, and the Working group on Scientific Studies in Pristine Areas in 1995. He also served on the Panel on Fluxes of Trace Gases from Terrestrial Ecosystems of the Committee on Global Change (1989-1990) and the Panel on Ecological Effects, Committee on Fate and Effects of Oil in the Sea (1981-1984) of the Academy of Sciences. Dr. Howarth co-chaired the International SCOPE Nitrogen Project from 1992 to 2002, directed the North American Nitrogen Center of the International Nitrogen Initiative from 2003-2006, and was chair of the International SCOPE Biofuels Project on environmental effects of biofuels from 2007 to 2012. From 1989-1990, he was the lead consultant for the Attorney General of Alaska on the Exxon Valdez oil spill. Dr. Howarth also served as an expert witness in two federal court trials on pollution from oil and gas drilling. From 2000 to 2002, he directed the Oceans Program at Environmental Defense. Dr. Howarth was the co-lead author of the chapter on responses to nutrient pollution for the Millennium Ecosystem Assessment in 2005 and served as a consultant to the Pew Oceans Commission on nutrient pollution from 2002-2003. From 2006-2008, Dr. Howarth served as a member of the EPA's Science Advisory Board Panel on Hypoxia in the Northern Gulf of Mexico. From 2007 to 2008 he served as President of the Coastal & Estuarine Research Federation. From 2008-2010, Dr. Howarth served on the Board of Directors of the Council of Scientific Society Presidents (CSSP), an umbrella group representing 1.5 million scientists. He co-chaired the CSSP Committee on Energy & Environment in 2009 and 2010. Dr. Howarth also represented the State of New York on the Science and Technical Advisory Committee of the Chesapeake Bay Program from 2005 to 2013. He has authored one textbook (Begon, Howarth and Townsend, 2014, *Essentials of Ecology*), edited 7 books, and authored more than 200 papers. Over the past several years, Dr. Howarth's laboratory has been funded by grants from the National Science Foundation, the National Oceanic and Atmospheric Administration Coastal Ocean Program, Woods Hole Sea Grant, U.S. Department of Agriculture, Hudson River Foundation, Park Foundation, Packard Foundation, the Wallace Global Fund, and the University of Stockholm.

Johnson, Dale

University of Nevada, Reno

Dr. Dale W. Johnson is Professor Emeritus of Soils in the Department of Environmental and Resource Sciences, College of Agriculture, University of Nevada, Reno. Dr. Johnson received his Ph.D. from the University of Washington in Forest Soils in 1975. After a brief post-doc at the University of Washington, he joined the Environmental Sciences Division of Oak Ridge National Laboratory as a Research Associate in 1977, and eventually became a Biogeochemical Cycling Group Leader there. In 1989, he took a joint appointment with the Biological Sciences Center (BSC) at the Desert Research Institute (DRI) and the Department of Environmental and Resource Sciences, College of Agriculture, University of Nevada in Reno (UNR). He served as Deputy Director of BSC from 1990 to 1999. In September 2001, Dr. Johnson accepted a full-time position at UNR. He retired from UNR on 1 July 2013 with emeritus status. His research interests are in soil chemistry and nutrient cycling. His research has included studies on the effects acid deposition, fertilization, harvesting, municipal sludge application, CO_2 enrichment, nitrogen fixation, and fire on soils and forest ecosystems. He has been a Fellow of the American Association for the Advancement of Science since 1985 and a Fellow of the Soil Science Society of America since 1995. He received the Scientific Achievement Award from Environmental Sciences Division, Oak Ridge National Laboratory in 1983, Publication Awards from Martin Marietta Energy Systems in 1985 and 1987, Technical Achievement Award from Martin Marietta Energy Systems in 1986, the Dandini Medal of Science from the Desert Research Institute in 1993, the Regent's Researcher Award from the University and Community College System of Nevada in 1999, and outstanding Researcher of the Year, College of Agriculture, Biotechnology and Natural Resources, University of Nevada, Reno, 2001.

Kavouras, Ilias

University of Arkansas for Medical Sciences

Dr. Ilias G. Kavouras is Associate Professor of Environmental Health at the University of Arkansas for Medical Sciences Fay W. Boozman College of Public Health. He holds a Ph.D. in chemistry from University of Crete in Greece. He is serving on the editorial board of *Environmental Toxicology and Chemistry* and as a foreign expert for the French Public Safety, Nutrition, Environmental and Occupational Safety Agency. Dr. Kavouras's research concentrates on the coupling among atmospheric pollution, health, and ecosystems with special emphasis on gas/particle interactions. Relevant research includes the characterization of air pollutants emissions, atmospheric transformation, and impacts on regional haze in the western and midwestern United States, the impacts of wildfires on air pollution and human health on a local and regional scale, and the development of laboratory methods and atmospheric inverse modelling approaches. Dr. Kavouras' other current activities include outreach and education of K-12 educators and students using novel engagement approaches on indoor air quality, healthy homes, and use of chemicals and pesticides (funded by the U.S. Environmental Protection Agency).

Kenski, Donna

Lake Michigan Air Directors Consortium

Dr. Donna Kenski is the Director of Data Analysis at Lake Michigan Air Directors Consortium (LADCO) in Rosemont, IL. She was awarded a Ph.D. in Environmental and Occupational Health Sciences (1997) and an M.S. in Public Health (1992) from the University of Illinois at Chicago. Her responsibilities at LADCO require working closely with their member states to develop supporting information for State Implementation Plans. Tasks encompass planning and implementing special-purpose monitoring studies; developing and applying statistical models to examine relationships between air quality, meteorology, and emissions; and applying exploratory and graphical data analysis techniques. Her areas of expertise and research activities include source-receptor modeling and other observation-based models for source attribution of $PM_{2.5}$ and haze; ensemble trajectory analysis; conceptual model development integrating ambient data with theoretical and laboratory observations; visual display of quantitative data; and development and field testing of advanced monitoring technologies. In addition, Dr. Kenski's position at LADCO involves daily interaction with State, local, and Tribal monitoring personnel, such that she is well acquainted with their perspectives on air monitoring issues. She chairs a midwestern state data analysis workgroup, reviews journal articles for *Environmental Science and Technology*, *Journal of the Air and Waste Management Association*, *Journal of Environmental Engineering*, and *Atmospheric Environment*, and is frequently an invited speaker at regional and national air quality meetings. Dr. Kenski is also an Adjunct Associate Professor at the University of Illinois at Chicago and served for 3 years on U.S. EPA's Clean Air Scientific Advisory Committee. LADCO is a nonprofit organization funded by U.S. EPA and the states of Indiana, Illinois, Michigan, Minnesota, Ohio, and Wisconsin.

Knipping, Eladio

Electric Power Research Institute

Dr. Eladio M. Knipping is a Principal Technical Leader in the Environment Sector of the Electric Power Research Institute (EPRI), an independent, non-profit center for public interest energy and environmental collaborative research. His principal research activities focus on evaluating the origin and fate of environmental pollutants, with emphasis on gases, particulate matter and the atmospheric deposition of acids and nutrients. Dr. Knipping is also involved in several cross-discipline initiatives evaluating the impacts of emerging technologies, such as plug-in hybrid electric vehicles and distributed energy resources, on the electric sector and the environment. Dr. Knipping's most recent activities include the development of air dispersion modeling tools for use in permitting and compliance demonstration, working with the U.S. EPA and the academic community to introduce new modules for regional models used in State Implementation Plans and air regulations, exploring the atmospheric chemistry of amines used in carbon capture, and conducting a review of the science and policy documents of the previous proposal for a secondary National Ambient Air Quality Standard for oxides of nitrogen and sulfur (NO_x/SO_x). Dr. Knipping received his B.S. degree in civil engineering from the Instituto Tecnológico de Santo Domingo (Dominican Republic). He received both his M.S. degree in environmental engineering and his Ph.D. degree in mechanical and aerospace engineering from the University of California, Irvine. He is a member of the American Association for Aerosol Research (AAAR) and the American Geophysical Union (AGU). He has served on review panels for EPA's Science to Achieve Results (STAR) program. Dr. Knipping's recent research funding has been provided by EPRI.

Krabbenhoft, David

U.S. Geological Survey

Dr. David Krabbenhoft is a Research Supervisory Hydrologist/Geochemist with the U.S. Geological Survey (USGS) in Middleton, Wisconsin. He holds M.S. and Ph.D. degrees from the University of Wisconsin-Madison, and a B.S. from North Dakota State University. His general research interests are in environmental biogeochemistry. Dr. Krabbenhoft began working on environmental mercury cycling, transformations, and fluxes in aquatic ecosystems in1988 and he has continued to work on that topic. In 1994, Dr. Krabbenhoft established the USGS's Mercury Research Laboratory, which includes a team of multi-disciplinary mercury investigators and a state-of-the-art analytical facility strictly dedicated to low-level speciation analysis of mercury. In addition, his research team maintains and operates the USGS Mobile Atmospheric Mercury Lab, which has the capability for rapid deployment and advanced study of atmospheric mercury and air chemistry. In 1995 he initiated the multi-agency Aquatic Cycling of Mercury in the Everglades project, which is still ongoing. More recently, he has served as a Primary Investigator on the internationally conducted Mercury Experiment to Assess Atmospheric Loadings in Canada and the U.S. (METAALICUS) project, which is a novel effort to examine the ecosystem-level response to loading an entire watershed with mercury. Currently, Dr. Krabbenhoft's research team is active on projects that span environments as far ranging as the Pacific Ocean to freshwater systems in Alaska to Florida, from California to New England, and more recently across the Great Lakes. The topics of research conducted by his team are wide ranging, including: atmospheric mercury source assessments; cycling and fluxes of mercury in aquatic and terrestrial ecosystems; chemical controls on the bioavailability of mercury to methylating microbes; and most recently developing a large-scale (continental) understanding of mercury and methylmercury in freshwater systems across the U.S., as well as several of the world's ocean basins. Since 1990, he has authored or coauthored over 125 papers on mercury in the environment.

McDowell, William

University of New Hampshire

Dr. William H. McDowell is Professor of Environmental Science and former Chairperson in the Department of Natural Resources and the Environment at the University of New Hampshire, College of Life Sciences and Agriculture. He also serves as Director of the New Hampshire Water Resources Research Center. Dr. McDowell holds a B.A. in Biology from Amherst College and a Ph.D. in Aquatic Ecology from Cornell University. After two years at the University of Puerto Rico and four years at the State University of New York College at Oswego studying watershed biogeochemistry, he joined the University of New Hampshire faculty in 1989. He recently served as a rotating Program Officer in the Division of Environmental Biology at the National Science Foundation (NSF). Dr. McDowell studies contaminant and nutrient cycling in forested and urban streams at sites in New Hampshire and Puerto Rico. Dr. McDowell's teaching responsibilities include Watershed Management and Ecosystem Ecology. He currently serves as the U.S. co-chair of the NSF Long Term Ecological Research Network's International Committee, served as a member of the STREON working group for the National Ecological Observatory Network from its inception until 2013, and was a member of the Executive Committee of the Biogeosciences Section of the American Geophysical Union from 2002-2005. Dr. McDowell has served on review panels for U.S. Department of Agriculture (USDA), National Science Foundation, the European Union, Britain's Natural Environment Research Council (NERC), and the U.S. Fulbright Commission. He was awarded a Fulbright Fellowship in 1995-1996 to teach and conduct research in environmental sciences at Charles University, Prague, Czech Republic. He was named to a prestigious University of New Hampshire Presidential Chair in 2010. Dr. McDowell's research has recently been funded by the National Science Foundation, National Oceanic and Atmospheric Administration, New Hampshire Agricultural Experiment Station, USDA Forest Service, U.S. Geological Survey, and the U.S. Environmental Protection Agency.

Munger, J. William

Harvard University

Dr. J. William Munger is a Senior Research Fellow in the School of Engineering and Applied Sciences at Harvard University. Dr. Munger holds a Ph.D. in Environmental Engineering Science from the California Institute of Technology, an M.S. in Ecology from the University of Minnesota, and a B.S. in Biology from the University of Minnesota. Dr. Munger's research is focused on forest-atmosphere exchange and regional air quality. He has also conducted research on acid deposition and cloud water chemistry. In addition, Dr. Munger has worked extensively on carbon budgets in temperate, tropical, and boreal forests, with a focus on understanding long-term response to climate variability, successional change, and inputs of nutrients and pollutants. Dr. Munger is currently conducting research at field sites in Massachusetts, the Amazon forest, and rural Beijing. Dr. Munger's recent sources of research funding are the National Aeronautics and Space Administration (NASA), the Department of Energy (DoE), and National Science Foundation (NSF).

Nelson, Erik

Bowdoin College

Dr. Erik J. Nelson is an Assistant Professor in Economics at Bowdoin College. He holds a Ph.D. in applied economics from the University of Minnesota. Currently he is an assigning editor for the journal *Ecological Applications*. Dr. Nelson's research concentrates on the economics of ecosystem services, biodiversity conservation, and agriculture under climate change. His recent projects have included studies of how European farmers can better use soil resources to reduce nitrogen fertilizer use; how California almond and walnut farmers might respond to new opportunities to grown trees on their land in exchange for carbon credits; and the drivers of land use change in Sumatra and the impact that land-clearing fires on the island have on air quality in Indonesia and Singapore. Another current project uses data on land use change in U.S. Critical Habitat areas to determine some of the opportunity costs created by the U.S. Endangered Species Act. Dr. Nelson's recent sources of funding include the National Science Foundation, World Wildlife Fund, Resources for the Future, the U.S. Department of Agriculture, and the Centre for Environmental and Climate Research at Lund University, Sweden.

Paerl, Hans

University of North Carolina - Chapel Hill

Dr. Hans W. Paerl is Kenan Professor of Marine and Environmental Sciences at the University of North Carolina's Institute of Marine Sciences. Dr. Paerl holds a Ph.D. in Ecology-Limnology from the University of California, Davis. His research addresses freshwater and marine nutrient cycling and primary production dynamics, environmental controls and management of harmful algal blooms, and assessing effects of human and climatic alterations of water quality and sustainability of inland and coastal waters. His work has identified the importance of atmospherically-derived nitrogen as a significant and growing nutrient source supporting estuarine and coastal eutrophication. He has published over 250 peer reviewed articles and book chapters on these subjects. He received the 2003 G. Evelyn Hutchinson Award from the Association of the Sciences of Limnology and Oceanography, and the 2001 Odum Award from the Coastal and Estuarine Research Federation for addressing the causes, consequences and controls of eutrophication in aquatic ecosystems. His work is funded by the National Science Foundation, the North Carolina Sea Grant Program, Department of Defense (Strategic Environmental Research and Development Program), the University of North Carolina Water Resources Research Institute, the San Francisco Bay Delta Science Program, and the North Carolina Department of Environment and Natural Resources (EPA-supported 319 Program, North Carolina Recreational Fishing License Fund).

Poirot, Richard

Vermont Department of Environmental Conservation

Mr. Richard L. Poirot has worked as an Environmental Analyst in the Air Quality Planning Section of the Vermont Department of Environmental Conservation since 1978. Mr. Poirot holds a B.A. from Dartmouth College (1972), where he majored in geography and environmental studies. His responsibilities include developing the technical support for State Implementation Plans (SIPs) to ensure attainment and maintenance of federal and state standards for ozone, particulate matter, and regional haze. Mr. Poirot has also developed interests and expertise in drawing inference on the nature of pollution sources from analysis of ambient air quality and meteorological measurement data. He has been an active participant on the Acid Deposition Committee and the Ambient Monitoring and Assessment Committee for the Northeast States for Coordinated Air Use Management (NESCAUM); the U.S. Environmental Protection Agency (EPA) Acid Rain Advisory Committee; the Data Analysis Workgroup for the Ozone Transport Assessment Group (OTAG); the Science and Technical Support Workgroup for the Federal Advisory Committee on Ozone, Particulate Matter and Regional Haze (OPRHA); the Monitoring and Data Analysis Workgroup for the Mid Atlantic/Northeast Visibility Union (MANE-VU), the Steering Committees for the Interagency Monitoring of Protected Visual Environments (IMPROVE) and the Visibility Information Exchange Web System (VIEWS); the Subcommittee on Scientific Cooperation for the U.S./Canada Air Quality Agreement; the EPA Clean Air Scientific Advisory Committee (CASAC), the CASAC Ambient Air Monitoring and Methods Subcommittee and the CASAC Panels for Particulate Matter, Ozone, Lead, and Secondary SO_x and NO_x National Ambient Air Quality Standards Review; the NARSTO External Review Panel; the U.S. EPA Advisory Council on Clean Air Compliance Analysis and the Council Subcommittee on Ambient Air Modeling; and the Board on Environmental Studies and Toxicology (BEST) for the National Research Council. He is not currently a recipient of research grants from the Environmental Protection Agency, other federal agencies, or the private sector.

Russell, Armistead (Ted)

Georgia Institute of Technology

Dr. Armistead (Ted) Russell is the Howard T. Tellepsen Chair and Regents' Professor of Civil and Environmental Engineering at Georgia Tech, where his research is aimed at better understanding the dynamics of air pollutants at urban and regional scales and assessing their impacts on health and the environment to develop approaches to design strategies to effectively improve air quality. He earned his M.S. and Ph.D. degrees in Mechanical Engineering at the California Institute of Technology, conducting his research at Caltech's Environmental Quality Laboratory. His B.S. is from Washington State University. Dr. Russell was a member of U.S. EPA's Clean Air Scientific Advisory Committee (CASAC) and a member of the National Research Council's Board on Environmental Studies and Toxicology. He chaired the CASAC NO_x-SO_x, Secondary National Ambient Air Quality Standards (NAAQS) review panel (2007-2011), the Ambient Air Monitoring Methods Subcommittee and the Council on Clean Air Compliance Analysis' Air Quality Modeling Subcommittee, and is on the Health Effects Institute's Report Review Committee. He was an Associate Editor of the journal *Environmental Science and Technology*. He currently co-directs the Southeastern Center for Air Pollution and Epidemiology. Dr. Russell has recently received funding from the National Science Foundation, National Aeronautics and Space Administration, U.S. EPA, the state of Georgia, Phillips 66, Southern Company, the Electric Power Research Institute, Centers for Disease Control and Prevention, the Health Effects Institute and the National Institutes of Health.

Schichtel, Bret

National Park Service

Dr. Bret A. Schichtel is a Physical Scientist with the National Park Service Air Resource Division where he is the program coordinator for the visibility/particulate/nitrogen research and monitoring program involving federal and university scientists. He earned his B.S. in Mechanical Engineering (1989) from Virginia Polytechnic Institute and State University and his M.S. (1991) and D.Sc. (1996) from Washington University in Saint Louis. His research interests have focused on the understanding of the levels and origin of haze and excess nitrogen deposition in National Parks and other remote areas. He has initiated and helped carry out large field campaigns to measure and characterize particulate and gaseous pollutants contributing to these issues. He has helped pioneered hybrid-receptor modeling methodologies merging chemical transport modeling results with measured data to understand the origin and causes of the haze and nitrogen deposition. Recent activities include the measurement and modeling of the total reactive nitrogen deposition in sensitive Rocky Mountain National Park. This work revealed the importance of ammonia and organic nitrogen to the deposition budget and the regional nature of sources contributing to ammonia deposition in Rocky Mountain National Park. As part of these activities he serves on the International Monitoring of Protected Visual Environments (IMPROVE) steering committee and the National Atmospheric Deposition Program (NADP) Total Deposition science committee. In addition, he has served as the technical chair for scientific meetings; as a guest editor for the *Journal of the Air and Waste Management Association* (JAWMA); is on the editor board of *Aerosol and Aerosol Quality Research* (AAQR) and *The Scientific World* peer-reviewed journals; and has served on U.S. EPA, U.S. Department of Agriculture, National Park Service, and other federal, state and private review panels and committees.

Schwartz, Stephen

Brookhaven National Laboratory

Dr. Stephen E. Schwartz is a Senior Scientist at Brookhaven National Laboratory. His current research interest centers on the influence of energy related emissions on climate, with a focus on the role of atmospheric aerosols. Dr. Schwartz received his bachelor's degree in chemistry from Harvard University, in 1963, and his Ph.D. in chemistry from the University of California, Berkeley, in 1968. After postdoctoral research at the University of Cambridge, England, Dr. Schwartz joined the Chemistry Department at Stony Brook University. He joined Brookhaven National Laboratory (BNL) in 1975. Dr. Schwartz is a fellow of the American Association for the Advancement of Science and of the American Geophysical Union, and is recipient of the 2003 Haagen-Smit Award for an "outstanding paper" published in the journal *Atmospheric Environment*. In 2006 he received the BNL Science and Technology Award for distinguished contributions to the Laboratory's science and technology mission, and in 2010 he received an Outstanding Leadership Award from the U.S. Department of Energy. In his research at Brookhaven National Laboratory, Dr. Schwartz developed methods to describe the rates of reactions in clouds that lead to production of acid rain. Dr. Schwartz is author or coauthor of over 125 papers published in peer-reviewed scientific journals. He was editor of *Trace Atmospheric Constituents* published by Wiley in 1983 and was co-editor of a three volume series *Precipitation Scavenging and Atmosphere-Surface Exchange*, published by Hemisphere in 1992. He is coauthor of *Sea Salt Aerosol Production: Mechanisms, Methods, Measurements, and Models -- A Critical Review*, published by the American Geophysical Union in 2004. Dr. Schwartz has served on numerous national and international panels. As a member of the Committee on Atmospheric Chemistry of the American Meteorological Society he was principal author of that society's 1989 statement on Acid Deposition, and as a member of the Climate Change Panel of the American Geophysical Union he contributed to that organization's seminal 1998 Position Statement on Climate Change and Greenhouse Gases. He has been a contributing author to the 1992, 1995, 2001, and 2007 assessment reports of the Intergovernmental Panel on Climate Change. Dr. Schwartz served as chief scientist of the Department of Energy's Atmospheric Science Program from 2004 through 2009. Dr. Schwartz has served on the editorial boards of several atmospheric and chemical journals including *Atmospheric Environment* (of which he was North American editor for Urban Atmospheres), *The Journal of Geophysical Research: Atmospheres*, *Tellus B: Chemical and Physical Meteorology*, and the *International Journal of Chemical Kinetic*s. His research is supported by the Department of Energy's Office of Biological and Environmental Research.

Shaw, Bryan

Texas Commission on Environmental Quality

Dr. Bryan W. Shaw was appointed to the Texas Commission on Environmental Quality (TCEQ) by Governor Rick Perry on November 1, 2007. The Texas Senate confirmed his appointment on May 5, 2009 and he was appointed chairman on September 10, 2009. Dr. Shaw is an Associate Professor in the Biological and Agricultural Engineering Department of Texas A&M University (TAMU) with many of his courses focused on air pollution engineering. The majority of his research at TAMU concentrates on air pollution, air pollution abatement, dispersion model development and emission factor development. Dr. Shaw was formerly Associate Director of the Center for Agricultural Air Quality Engineering and Science, and formerly served as Acting Lead Scientist for Air Quality and Special Assistant to the Chief of the U.S. Department of Agriculture Natural Resources Conservation Service. Dr. Shaw served as a member of the U.S. Environmental Protection Agency (EPA) Science Advisory Board (SAB) Committee on Integrated Nitrogen, as well as the EPA SAB Environmental Engineering Committee and the Ad Hoc Panel for review of EPA's Risk and Technology Review Assessment Plan. Additionally, he is a member of the U.S. Department of Agriculture–Agricultural Air Quality Task Force. Since his appointment to the TCEQ, Dr. Shaw has served on the Texas Environmental Flows Advisory Group and as chair of the Texas Advisory Panel on Federal Environmental Regulations. Dr. Shaw received a bachelor's and master's degree in agricultural engineering from TAMU and a doctorate degree in agricultural engineering from the University of Illinois at Urbana-Champaign.

Shaw, David

New York State Department of Environmental Conservation

Mr. David J. Shaw is the Director of the Division of Air Resources at the New York State Department of Environmental Conservation. He has held that position since March 2004 and served as Acting Director from April 2003 until he was appointed in 2004. As Director, Mr. Shaw is responsible for developing and implementing the air quality programs at the New York State Department of Environmental Conservation. Mr. Shaw received his B.A. in 1976 from the State University College at Geneseo and his M.P.A. in 1982 from Harvard University. Presently, Mr. Shaw is the Air Pollution Program designee from New York to the Ozone Transport Commission. He is a member of the Board of Directors of the Northeast States for Coordinated Air Use Management (NESCAUM), serving as Chair for 2006 - 2007; and National Association of Clean Air Agencies (NACAA). He also served as a member of the Air Quality Management Workgroup which developed the Report: *Recommendations to the Clean Air Act Advisory Committee, Phase I and Next Steps I in 2005*. During his career at the Department of Environmental Conservation, Mr. Shaw has participated in the development of programs to address long range transport at both the regional and national level; the development of New York's State Implementation Plans to address 1-hour ozone and carbon monoxide nonattainment areas and a number of regulatory initiatives.

Smith, James

West Virginia University

Dr. James E. Smith is a Professor in the Mechanical and Aerospace Engineering Department and the Director of the Center for Industrial Research Applications at West Virginia University. He holds a B.S. and an M.S. in Aerospace Engineering and a Ph.D. in Mechanical Engineering, all from West Virginia University. His primary research area focuses on energy, its acquisition, and the effects of that acquisition and utilization. He has published over 250 referred journal and conference papers on a range of medical, mechanical and communication technologies but his primary interests and productivity have been related to energy. He has 34 U.S. Patents related to his work, with 25 more pending, plus a dozen enterprises that have been formed to commercialize his ideas and efforts. He has had an active professional career serving on the Board of Directors of SAE International, and then as its President. He has also been active in the American Society of Mechanical Engineers and the Institute of Mechanical Engineers from England and he has been awarded the Fellows distinction for these professional societies. Dr. Smith's most frequent research work has been on the development of energy utilization technologies to minimize both NO_x and SO_x emissions from stationary and mobile sources through the use of advanced hardware and software solutions. He has also participated in work on several energy savings technologies that will help reduce, and thus conserve, dwindling energy reserves while cleaning up the by-products of their utilization. Dr. Smith has served as a reviewer for several government programs, conference and journal papers and as an editor for several energy related publications. He is also a public speaker and written correspondent on topics related to innovation, leadership development, entrepreneurship and energy self-sufficiency.

Tonnessen, Kathy

University of Montana

Dr. Kathy Tonnessen is currently an affiliate faculty member with the College of Forestry and Conservation at the University of Montana, Missoula and is National Park Service (NPS) Scientist Emeritus. In this volunteer capacity she works with parks and NPS programs to organize research meetings and review and synthesize information on air quality and deposition in parks. Dr. Tonnessen received an M.S. and Ph.D. in energy and resources from the University of California, Berkeley, working on the impact of air pollution on lakes and watersheds in the Sierra Nevada. She holds an A.B. in biology and political science from Cornell University. She worked as a consultant in the Earth Sciences Division of Lawrence Livermore Laboratory, Livermore, California, where she was involved in environmental assessment of energy development projects, including oil and gas stimulation efforts in western Colorado, sponsored by the Department of Energy. She joined the California Air Resources Board in l982 and worked for nine years on their statewide acid deposition research and monitoring program. She was project manager for investigations of water quality, hydrology, aquatic biota, vegetation, soils, deposition, air quality at high elevations, and watershed modeling. From l991 - 2014 Dr. Tonnessen worked as a National Park Service scientist, first with the Air Resources Division in Lakewood, Colorado, and then with the Intermountain Regional Office. She established one of the first Cooperative Ecosystem Studies Units at the University of Montana in Missoula. In this position she coordinated research and technical assistance for the Rocky Mountain parks, while continuing her involvement with air issues. She has served as chair of the National Atmospheric Deposition Program and was a member of the International Air Quality Advisory Board of the International Joint Commission for 19 years. She worked with U.S. EPA scientists as the co-Chair of the PRIMENet UV-monitoring research and monitoring network and served on review panels for the National Acid Precipitation Assessment Program and the Southern Appalachian Mountains Initiative. Dr. Tonnessen initiated an NPS program to estimate critical loads of nitrogen and sulfur in deposition, and is a leader in measurement of snow chemical loading in the western U.S. She has been a member of the American Geophysical Union and the American Association for the Advancement of Science (AAAS) for more than 30 years and has served as a peer reviewer for many environmental journals. Over the years she has served as adjunct faculty with University of Colorado Boulder and Denver, and Colorado State University. She had sponsored a number of Ph.D. and M.S. students in both Montana and Colorado. Kathy currently serves on the Air Quality Advisory Council for the City and County of Missoula, Montana. During the past two years Dr. Tonnessen has received funding from the National Park Service for graduate student research but since retirement from federal service she no longer receives research funding.

Warheit, David

DuPont Haskell Laboratories

Dr. David B. Warheit is a Research Fellow at the Haskell Laboratory of E.I. du Pont de Nemours & Co., Inc. Dr. Warheit graduated from the University of Michigan in Ann Arbor with a B.A. in Psychology. He received his Ph.D. in Physiology from Wayne State University School of Medicine in Detroit. Subsequently, he was awarded a National Institutes of Health (NIH) Postdoctoral Fellowship, and 2 years later, a Parker Francis Pulmonary Fellowship, both of which he took to the National Institute of Environmental Health Sciences (NIEHS) to study mechanisms of asbestos-related lung disease. In 1984, he moved to DuPont Haskell Laboratory to develop a pulmonary toxicology research laboratory. His major scientific research interests include pulmonary toxicological mechanisms and corresponding hazards/risks related to inhaled particulates, fibers and nanomaterials. He is the author/co-author of more than 125 publications and has been the recipient of the International Life Sciences Institute (ILSI) Kenneth Morgareidge Award (1993 - Hannover, Germany) for contributions in Toxicology by a Young Investigator and the Robert A. Scala Award and Lectureship in Toxicology (2000). He has also attained Diplomat status of the Academy of Toxicological Sciences (2000) and the American Board of Toxicology (1988). He has served on NIH study section review committees (NIH Small Business Innovation Research, NIH Bioengineering) and has participated on working groups at the International Agency for Research on Cancer (IARC), European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC), the Organisation for Economic Cooperation and Development (OECD), the International Life Sciences Institute - Risk Science Institute (ILSI-RSI), International Life Sciences Institute - Health and Environmental Sciences Institute (ILSI-HESI) and the National Academy of Sciences, as well as several journal editorial boards (including currently, Associate Editor – *Inhalation Toxicology*, as well as *Toxicological Sciences*), *Particle and Fibre Toxicology*, *Toxicology Letters*, *Journal of Applied Toxicology*, *Critical Reviews in Toxicology* and *Nano Letters*. Recently he was the chairman of the ECETOC Task Force on Health and Environmental Safety of Nanomaterials, and formerly served on the National Academy of Sciences Committee to Develop a Research Strategy for Environmental, Health, and Safety Aspects of Engineered Nanomaterials. He presently serves on the National Center for Toxicological Research (NCTR) Science Advisory Board and the Science Advisory Board for two European-funded projects NANoREG and NanoMILE. He is a past President of the Nanotoxicology Specialty Section- (2010- 2011 - Society of Toxicology), and past member of the Society of Toxicology Program Committee (2009 – 2012).

Weathers, Kathleen

Cary Institute of Ecosystem Studies

Dr. Kathleen C. Weathers is a Senior Scientist at the Cary Institute of Ecosystem Studies (IES) in Milbrook, New York. Dr. Weathers received her M.F.S. degree from Yale University in 1983 and her Ph.D. in Ecology from Rutgers University in 1993. Dr. Weathers has been involved in air pollution research since the mid-1980s. She has published widely, including significant papers on modeling the effects of landscape features on patterns of atmospheric deposition, tracking the response of terrestrial ecosystems to nitrogen pollution, and illuminating the ecological importance of fog. Much of her research is focused on understanding atmospheric influences and controls on ecosystem processes and biogeochemical cycles in heterogeneous landscapes. Currently, she is working with colleagues and students in California, Chile, Mexico, New York, New England, and National Parks in the eastern U.S. Dr. Weathers has been elected a fellow of the American Association for the Advancement of Science (AAAS). She is co-Chair of the Global Lake Ecological Observatory Network (GLEON), chair of the 2015 Gordon Research Conference on Catchment Science, and Chair of the External Advisory Board for National Science Foundation's Socio-Environmental Synthesis Center (SESYNC). She currently serves on U.S. EPA Clean Air Scientific Advisory Committee (CASAC). She is a past chair of the National Atmospheric Deposition Program (NADP) Executive Committee, and a former member of the Public Affairs Committee of the Ecological Society of America (ESA). She has been a member of various National Science Foundation and American Association of University Women (AAUW) panels, the U.S. EPA's CASAC NO_x and SO_x Review Panel (2007-2011) as well the National Academy of Sciences/Transportation Research Board (NAS/TRB) Committee to evaluate the Congestion Mitigation Air Quality (CMAQ/TEA-21) program. She has co-led workshops and conferences on such topics as the ecological effects of air pollution; strategies for successfully bridging science, policy and management; and linking science, education and outreach. Dr. Weathers has recently received funding from the National Science Foundation, the Gordon and Betty Moore Foundation, and the Northeastern States Research Cooperative for research, training, and workshops.

Zhang, Yang

North Carolina State University

Dr. Yang Zhang is a Professor in the Department of Marine, Earth, and Atmospheric Sciences at North Carolina State University (NCSU), Raleigh, NC. She holds a Ph.D. degree in Chemical and Biochemical Engineering from the University of Iowa and a B.S. degree in Environmental Engineering from Tsinghua University, China. Before joining NCSU in 2003, she worked as a research scientist at Pacific Northwest National Laboratory during 1994-1997 and Atmospheric & Environmental Research, Inc. (AER) during 1997-2003. Her research interests include air pollution modeling and assessment, atmospheric chemistry and transport, cloud/aerosol chemistry and microphysics, sensitivity and uncertainty analysis, interactions among chemistry, meteorology, and climate change, and earth system sciences. Her research in the past two years has been funded by the National Science Foundation (NSF), U.S. Department of Agriculture (USDA), and the U.S. Department of Energy (DOE). She has led or contributed to the development/improvement, application, and evaluation of a number of major three-dimensional atmospheric models on urban, regional, and global scales, as well as global Earth system models. She also led several comprehensive reviews of major modules for aerosol dynamics and thermodynamics, probing tools (e.g., sensitivity, process analysis, and mass balance analysis) for air quality models, agricultural air quality, online coupled meteorology-chemistry models, and real-time air quality forecasting. Dr. Zhang authored or co-authored 117 peer-reviewed journal publications (106 published/in press and 11 in review), 148 conference papers and technical reports, and 354 conference presentations and invited seminars. She teaches graduate and undergraduate courses on atmospheric chemistry, air quality modeling and forecasting, and advanced air quality at NCSU. Dr. Zhang was a recipient of the U.S. National Science Foundation Career Award in Atmospheric Chemistry in 2004. She served on review panels for the NSF, U.S. EPA, and the USDA. She was a chairperson for the American Meteorological Society (AMS) Atmospheric Chemistry Committee during 2008-2011 and the American Association for Aerosol Research (AAAR) Membership Committee during 2006-2009. She has served on the editorial boards for *China Environmental Science* since December 2006 and *Climate* since March 2014.