



EMERGING SCIENCE FOR ENVIRONMENTAL HEALTH DECISIONS

Modeling the Health Risks of Climate Change

Speaker and Panelist Biographies

Session 1

William Farland*, PhD, is the Senior Advisor to the Executive Vice President, Colorado State University and a professor in the Department of Environmental and Radiological Health Sciences, School of Veterinary Medicine and Biomedical Sciences. Formerly, Dr. Farland served as Vice President for Research from 10/2006-9/2013. Dr. Farland holds a Ph.D. (1976) from UCLA in cell biology and biochemistry. In 2006, Dr. Farland was appointed Deputy Assistant Administrator for Science in the U.S. Environmental Protection Agency's Office of Research and Development (ORD). He had served as the Acting Deputy Assistant Administrator since 2001. In 2003, Dr. Farland was also appointed Chief Scientist in the Office of the Agency Science Advisor. He served as the EPA's Acting Science Advisor throughout 2005. Prior to that, he was the Director of the ORD's National Center for Environmental Assessment. Dr. Farland's 27 year federal career was characterized by a commitment to the development of national and international approaches to research, testing and assessment of the fate and effects of environmental agents. Dr. Farland serves on a number of executive-level committees and advisory boards at the state and federal level.

Jan C. Semenza, PhD, directs the work on environmental and social determinants of infectious diseases at the European Centre for Disease Prevention and Control (ECDC) in Stockholm. He was an Epidemic Intelligence Service Officer at the U.S. Centers for Disease Control and Prevention (CDC). He also worked with the World Health Organization (WHO) and conducted public health projects in Uzbekistan, Sudan, Egypt, Denmark, Brazil, and Haiti. Dr. Semenza was a faculty member at UC Berkeley, UC Irvine, Oregon Health and Science University, and at Portland State University where he taught in the Oregon Masters Program of Public Health. His interest in reducing climate risks for society at large, extends back almost 20 years; in July 1995, a record-breaking heat wave killed more than 700 people in Chicago. He led the CDC response to this environmental disaster and elucidated the

**Member of the NAS Standing Committee on Emerging Science for Environmental Health Decisions*

underlying environmental, societal, and behavioral causes of this tragic event. The findings of this study were immediately incorporated into an action plan for the city of Chicago with detailed measures to prevent future heat-related deaths. The heat wave emergency response plan for Chicago became a blueprint for other climate change adaptation policies in other metropolitan areas. He was subsequently awarded a Certificate of Commendation by the City of Chicago for this investigation. He is currently working on environmental and climatic drivers of vector-borne and water-borne disease transmission in Europe. His research has been published in high-impact journals such as *Cell*, *New England J of Medicine*, *Lancet ID*, *Science*, and *Nature Climate Change* and in several books.

Ben Zaitchik, PhD, is an assistant professor within the Earth and Planetary Sciences Department at Johns Hopkins University. His research is directed at understanding, managing, and building resilience to climatic and hydrologic variability and change. He looks for new approaches to controlling human influences on climate and water resources at local, regional and global scales, and explores improved forecast systems and methods of risk assessment. His work has received funding from NASA, the National Institutes of Health and the National Science Foundation, and appeared in the *Journal of Climate and Water Resources Research*, among others. Dr. Zaitchik is interested in helping provide new insights in such crucial areas as transboundary water management, climate-informed disease early warning systems, and adaptation strategies in subsistence agricultural communities. He received his PhD in climate science from Yale University.

George Luber, PhD, is an epidemiologist and the Associate Director for Climate Change in the Division of Environmental Hazards and Health Effects at the National Center for Environmental Health, Centers for Disease Control and Prevention. Since receiving his PhD in Medical Anthropology from the University of Georgia, and joining CDC in 2002, Dr. Luber has served as an Epidemic Intelligence Service (EIS) Officer and staff epidemiologist at the National Center for Environmental Health. His research interests in Environmental Health are broad and include the health impacts of environmental change and biodiversity loss, harmful algal blooms, and the health effects of climate change. Most recently, his work has focused on the epidemiology and prevention of heat-related illness and death, the application of remote sensing techniques to modeling vulnerability to heat stress in urban environments, and Climate Change adaptation planning. In addition to managing the Climate Change Program at CDC, Dr. Luber is a Co-Chair of the Climate Change and Human Health Interagency Workgroup at

the US Global Change Research Program, a Convening Lead Author and member of the Federal Advisory Committee (ex-officio) for the US National Climate Assessment, a member of the American Anthropological Association's Presidential Task Force on Climate Change, and a lead author for the Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report.

Session 2

Sari Kovats, PhD, is a Senior Lecturer in the Department of Social and Environmental Research in the Faculty of Public Health and Policy. She has been actively researching the effects of weather and climate on human health for more than 15 years and has published widely on this topic; including 60 peer-reviewed journal papers and more than 20 book chapters. Her particular areas of interest include health impact assessment of climate change and epidemiological studies of the effects of climate, weather and weather events in urban and rural populations. Dr. Kovats is currently the Health Fellow for the Living with Environmental Change (LWEC) Programme, the partnership of UK Government Departments, Agencies and Research Funders to address environmental change issues. At the international level, Sari has also represented the health research community at the Future Earth meetings and contributed to the scoping documents for the Future Earth research strategy. She was a member of the Scientific Steering Committee of the Global Environmental Change and Human Health project of the Earth System Sciences Partnership, 2008–2013. Dr. Kovats has a Master's Degree in Social Policy from the South Bank University in London and completed her PhD in epidemiology in 2010 at the London School of Hygiene and Tropical Medicine.

Linda Wennerberg, PhD, applies her 39 years of experience in the assessment, development, and integration of cost-effective and defensible environmental policies and strategies through the application of sound science. Dr. Wennerberg focuses on the interaction of scientific and technical issues with policy and management approaches, serving as a liaison between scientific and policy communities on chemical management. Her expertise reflects her integration of applicable aspects of environmental law, institutional economics, scientific information, and strategic planning to promote innovation and compliance. Her clients have included Federal (EPA, DoD, and DOE) and state agencies, as well as, large and small private sector firms and academic institutions. Dr. Wennerberg is a Senior Research Scientist in ESME at George Washington University, addressing emerging environmental policy issues facing federal agencies. Currently, Dr. Wennerberg provides expert advice to NASA on a variety of

strategic positioning issues to identify and address new or changing regulatory and policy requirements for chemicals of interest, nanomaterials and formulation of environmental risk management processes. Prior to joining NASA, she initiated DoD's efforts to identify and address scientific and policy issues related to cleaning up unexploded ordnance and evolving regulation of critical chemicals and emerging contaminants. She served on two National Academy of Science Committees investigating options and barriers to cleanup DOE Weapons Complex sites.

Michelle Bell, PhD, is Professor of Environmental Health at the Yale University School of Forestry and Environmental Studies, with secondary appointments at the Yale School of Public Health, Environmental Health Sciences Division and the Yale School of Engineering and Applied Science, Environmental Engineering Program. She is the recipient of the Prince Albert II de Monaco / Institut Pasteur Award, Rosenblith New Investigator Award, and the NIH Outstanding New Environmental Scientist (ONES) Award. Dr. Bell's research investigates how human health is affected by atmospheric systems, including air pollution and weather. Much of this work is based in epidemiology, biostatistics, and environmental engineering. The research is designed to be policy- relevant and contribute to well-informed decision-making to better protect human health. She received her PhD in Environmental Engineering from Johns Hopkins University.

Juli Trtanj, MS, is responsible for developing and implementing the National Oceanic and Atmospheric Administration (NOAA) Health Strategy across NOAA and with other federal, state, local and international Agencies, academic and private sector partners. She is the NOAA Lead for the Memorandum of Understanding between NOAA and the Centers for Disease Control (CDC), and coordinates a burgeoning NOAA One Health Working Group and related Ecological Forecasting efforts on pathogens. Ms. Trtanj co-chairs the US Global Change Research Program, Climate Change and Human Health Group (CCHHG); the United States/European Union Task Force on Biotechnology, Marine Genomics Working Group; and the CDC- supported Environment and Public Health Tracking Network, Climate Change Content Working Group. She is also the Water-Related Illness Component Lead for the Group on Earth Observations (GEO) and is directly involved with European, South African, Asian partners and the World Health Organization (WHO) in the development of the Early Warning Systems, specifically for cholera and other vibrios. Ms. Trtanj is an active collaborator in the NSF-funded Research Collaboration Network on Marine Emerging Diseases and is on the American

Meteorological Society Board on Health and the Environment. From 1996 to present she has developed and directed multidisciplinary and multi-partner programs on Oceans and Human Health, and Climate Variability and Human Health. She has contributed to, reviewed, or edited sections of several IPCC and US National Climate Assessment reports and authored several book chapters and journal articles. Ms. Trtanj earned her Master in Environmental Science from Yale School of Forestry and Environmental Studies in 1994, and her Bachelors in 1986 from the University of California Santa Barbara.

Nick Ogden, PhD, is Director of the Zoonoses Division at the Public Health Agency of Canada. He is a UK- trained veterinarian. After ten years of mixed clinical practice, he then received his PhD in Lyme disease ecology at the Department of Zoology, University of Oxford in 1996. During the six years he spent as a lecturer at the Faculty of Veterinary Science, University of Liverpool, he continued his research into the ecology and epidemiology of tick- borne diseases of public health importance in Europe and those of importance to livestock production in Africa. In 2002 he moved to Canada, where he continued research on the ecology of Lyme disease and other zoonoses and climate change as a research scientist at the Public Health Agency of Canada. As interim Director of the Environmental Issues Division of the Public Health Agency of Canada he directed a programme on climate change on vector and water-borne disease risks, and community adaptation to these risks. He is currently Director of Zoonoses Division of the Public Health Agency of Canada and is adjunct professor at the Faculté de médecine vétérinaire, Université de Montréal, and at McGill School of the Environment, McGill University

Charles Benjamin Beard, PhD, is Associate Director for Climate Change and Chief of the Bacterial Diseases Branch of CDC's Division of Vector-Borne Diseases in Fort Collins, Colorado, where he coordinates CDC's programs on Lyme disease, plague, and tularemia. DVBD is part of the National Center for Emerging and Zoonotic Infectious Diseases, which is a newly formed center in CDC (Centers for Disease Control and Prevention). Dr. Beard has a BS degree (1980, Auburn University), an MS degree (1983, Louisiana State University School of Medicine, and a PhD degree (1987, University of Florida). He served as a post-doctoral fellow and as an associate research scientist at Yale University School of Medicine from 1987 to 1991. In 1991, he joined the CDC's Division of Parasitic Diseases where he conducted applied research on the prevention and control of malaria and Chagas disease, and studied the epidemiology of *Pneumocystis pneumonia* in persons with AIDS. From 1999 to 2003 he served as Chief of the Vector Genetics Section in the Entomology Branch of the Division of Parasitic

Diseases before joining CDC's Division of Vector-borne Infectious Diseases in Fort Collins in 2003. From 2008 to 2009, he served additionally as the Associate Director for Vector-Borne Diseases in the National Center for Zoonotic, Vector-Borne, and Enteric Diseases at CDC. During his tenure at CDC, Dr. Beard has worked mostly in tropical medicine and international health. His scientific interests include public health and the biology, ecology, and genetics of insect-borne diseases and vectors. More recently he has been involved coordinating CDC's work in understanding and mitigating the potential impact of climate variability and change on infectious disease ecology. He has published over 100 scientific papers, books, and book chapters collectively, and has served on a variety of committees and panels both inside and outside of CDC. In 2002, he was awarded the CDC & ATSDR Honor Award in International Health. He is currently an Associate Editor for Emerging Infectious Diseases and past president of the Society for Vector Ecology.

Mary Hayden, PhD, is a behavioral scientist at the National Center for Atmospheric Research in Boulder, Colorado working on weather, climate and health related linkages. She received her Ph.D. in Health and Behavioral Sciences from the University of Colorado and is adjunct faculty at the University of Colorado School of Public Health as well as a Guest Researcher with the U.S. Centers for Disease Control and Prevention. Her primary research emphasis is on the human behavioral component of climate-sensitive health and disease issues, including community participatory research and the characterization of population vulnerability to weather and climate related health threats. Her current work focuses on improving health outcomes related to human plague in East Africa through enhanced surveillance; assessing the human behavioral role in the potential for the dengue vector mosquito *Aedes aegypti* to expand its range in the Americas; and addressing current adaptive capacity and future societal resilience to extreme heat in North America. Mary also works on projects that are focused on better understanding the transmission dynamics of meningitis in the Sahel of Africa and malaria in Kenya.

Erin Lipp, PhD, is an environmental microbiologist who has worked on issues of microbial ecology, water quality, and waterborne disease for over 15 years. Dr. Lipp is currently professor and graduate coordinator of environmental health science at the University of Georgia. Dr. Lipp's primary research focus is the ecology of human pathogens in coastal waters and the role of environmental exposures in disease transmission. Her research incorporates molecular biology, microbial ecology, epidemiology and climate research to better understand the fate of bacteria and viruses introduced from wastewater to

aquatic environments and their potential for transmission to humans and other hosts. She is also works with toxicologists to evaluate the combined effects of chemical contaminants on microbial (pathogen) persistence in the environment. Dr. Lipp is actively engaged in training of research scientists and was the director of the Georgia Oceans and Health Initiative, a NOAA funded training program for doctoral students and post-doctoral fellows. She has also worked with the IPCC and USGCRP on assessing impacts of climate change on human health, especially water and foodborne disease. She has testified before Congress on the health effects of sewage spills into our nation's waterways. She currently serves on the American Society for Microbiology committee for Environmental Microbiology and is on the inaugural committee on Eco-Forecasting for the American Meteorological Society. She has a PhD in Marine Science from the University of South Florida and completed a post-doctoral fellowship in biotechnology at the University of Maryland Center of Marine Biotechnology, before arriving at the University of Georgia in 2002.

Session 3

Gary Geernaert, PhD, is currently director, Climate and Environmental Sciences Division, at the US Department of Energy. In addition, he is the Vice Chair of the US Global Change Research Program (USGCRP), and the DOE principal to the US Interagency Arctic Research Policy Group. In previous appointments, Geernaert was director, Institute of Geophysics and Planetary Physics, Los Alamos National Laboratory (2002-2010); director of the Department of Atmospheric Environment, National Environmental Research Institute, Denmark (1994-2002); program manager, Office of Naval Research (1989 – 1994), and staff scientist and strategic planner at the US Naval Research Laboratory (1985-1990). In addition, Gerald Geernaert held several affiliate appointments, including national representative to the environmental policy group, Nordic Council of Ministers. With a background in meteorology and oceanography, he has produced more than 100 research articles, and he has edited four books. In addition, he developed numerous initiatives, supported by the Office of Naval Research, Department of Energy, and the European Union, related to air-sea interactions, marine meteorology, space-based remote sensing, environmental economics, infrastructure security, and climate change. Geernaert received his BS degree from University of California (Davis) in 1977 and the PhD from the University of Washington in 1983.

Georges Benjamin, PhD, has been the Executive Director of APHA since 2002 and is leading the Association's push to make America the healthiest nation in one generation. Dr. Benjamin is known as one of the nation's most influential physician leaders because he speaks passionately and eloquently about the health issues having the most impact on our nation today. From his firsthand experience as a physician, he knows what happens when preventive care is not available and when the healthy choice is not the easy choice. He came to APHA from his position as secretary of the Maryland Department of Health and Mental Hygiene. Dr. Benjamin became secretary of health in Maryland in April 1999, following four years as its deputy secretary for public health services. As secretary, Dr. Benjamin oversaw the expansion and improvement of the state's Medicaid program. Dr. Benjamin is a graduate of the Illinois Institute of Technology and the University of Illinois, College of Medicine. He is board-certified in internal medicine and a fellow of the American College of Physicians, a fellow of the National Academy of Public Administration, a fellow emeritus of the American College of Emergency Physicians and an honorary fellow of the Royal Society of Public Health. An established administrator, author and orator, Dr. Benjamin started his medical career in 1981 in Tacoma, Wash., where he managed a 72,000-patient visit ambulatory care service as chief of the Acute Illness Clinic at the Madigan Army Medical Center and was an attending physician within the Department of Emergency Medicine. A few years later, he moved to Washington, D.C., where he served as chief of emergency medicine at the Walter Reed Army Medical Center. After leaving the Army, he chaired the Department of Community Health and Ambulatory Care at the District of Columbia General Hospital. He was promoted to acting commissioner for public health for the District of Columbia and later directed one of the busiest ambulance services in the nation as interim director of the Emergency Ambulance Bureau of the District of Columbia Fire Department. At APHA, Dr. Benjamin also serves as publisher of the nonprofit's monthly publication, *The Nation's Health*, the association's official newspaper, and the *American Journal of Public Health*, the profession's premier scientific publication. He is the author of more than 100 scientific articles and book chapters. His recent book *The Quest for Health Reform: A Satirical History* is an exposé of the nearly 100-year quest to ensure quality affordable health coverage for all through the use of political cartoons. Dr. Benjamin is a member of the Institute of Medicine of the National Academies and also serves on the boards for many organizations including Research!America, the Reagan- Udall Foundation and the University of Maryland Medical System. In 2014 and 2008, he was named one of the top 25 minority executives in health care by *Modern Healthcare Magazine*, in addition to being voted

among the 100 most influential people in health care from 2007-2013 and one of the nation's most influential physician executives from 2009-2014.

Joshua Elliott, PhD, is a research scientist with the Computation Institute at the University of Chicago. He works on a variety of topics at the interface of global change, environmental, and social sciences through a variety of applied modeling and computational projects. He leads teams at the University of Chicago center for Robust Decision- making in Climate and Energy Policy (RDCEP) and in the Agricultural Modeling Intercomparison and Improvement Project (AgMIP; e.g. AgGRID). He produces tools for the assessment of global change using large- scale high-resolution models enabled by high-performance computing. Dr. Elliott also work on predictions of agricultural production at seasonal time scales, the effects of large-scale extreme events (such as droughts and heat waves), and with socio-economic modeling and scenario analysis in the context of integrated assessment models. Dr. Elliott received his PhD in high-energy theoretical particle physics from McGill University in 2008.

Molly Brown, PhD, is a Research Scientist at NASA Goddard Space Flight Center. She earned her Ph.D. in geography from the University of Maryland College Park, where she specialized in Remote Sensing, Economics, and Development. Her interests include sustainability and climate change adaptation, communicating knowledge and information across scientific disciplines, bridging the public and private sectors, and understanding how information gets from data producers to data users. Dr. Brown's time at NASA is divided into three areas – long term climate data records, applied science projects, and the impact of climate variability on health outcomes and food security in the developing world. As we become more aware of the causes and impact of climate change, we need to understand how climate variability affects the poor in agricultural regions to obtain enough food for an active and healthy life. Examining how climate interacts with food markets and government policies is central to understanding how climate data can most be of use. Satellite remote sensing can provide critical information for decision making in a wide variety of political and economic processes. Ensuring that the data is available and is used in the domains where it is most needed is the focus of applications programs at NASA. Dr. Brown and her colleagues at NASA Goddard work to extend the impact of the nation's investment in technology to new communities and arenas, including insurance, disaster response, drought monitoring, flooding in mountainous areas, food access, and others. At NASA, she works with Soil Moisture Active Passive (SMAP) and, ICESat-2 missions, running their applications programs with

Vanessa Escobar and other colleagues at Goddard. She also serves on the Science Team of the Carbon Monitoring System, focusing on applications. Through these roles, Dr. Brown works to ensure the usability and relevance of the satellite data to the broader science and end-user communities and has also begun working with the technology divisions of NASA on new sensors, such as sensors that can measure plant stress, crop residue, and crop yield.

Richard Jackson, MD, is a Professor at the Fielding School of Public Health at the University of California, Los Angeles. A pediatrician, he has served in many leadership positions in both environmental health and infectious disease with the California Health Department, including the highest as the State Health Officer. For nine years he was Director of the CDC's National Center for Environmental Health in Atlanta and received the Presidential Distinguished Service award. In October, 2011 he was elected to the Institute of Medicine of the National Academy of Sciences. While in California he was instrumental in conceptualizing laws to reduce risks from pesticides, especially to farm workers and to children. While at CDC he was a national and international leader, including leading the federal effort to "biomonitor" chemical levels in the US population. He has received the Breast Cancer Fund's Hero Award, as well as Lifetime Achievement Awards from the Public Health Law Association, and the New Partners for Smart Growth. In October, 2012 he received the John Heinz Award for Leadership in the Environment. Dr. Jackson co-authored two Island Press Books: *Urban Sprawl and Public Health* in 2004 and *Making Healthy Places* in 2011. He is host of a 2012 public television series *Designing Healthy Communities* which links to the J Wiley & Sons book by the same name. He has served on many environmental and health boards, as well as the Board of Directors of the American Institute of Architects. He is an elected honorary member of both the American Institute of Architects and the American Society of Landscape Architects. Dr. Jackson obtained his MPH in Epidemiology from the University of California, Berkeley and his MD from the University of California, San Francisco.

Gregory Glass, PhD, is pre-eminence professor in the Department of Geography and the Emerging Pathogens Institute at the University of Florida, Gainesville. He received his PhD from the Department of Systematics & Ecology at the University of Kansas developing mathematical models and trained as a post-doctoral fellow in Immunology & Infectious Diseases at Johns Hopkins School of Public Health. He joined the Departments of Molecular Microbiology & Immunology and Epidemiology where he studied transmission dynamics and spatially explicit risk models of zoonotic and other infectious diseases. Recently, he served as Director of the Global Biological Threat Reduction Program for Southern Research Institute in Eastern Europe assisting in laboratory and field training in human and veterinary health.

Session 4

Kristie Ebi, PhD, is a Professor in the Department of Global Health, University of Washington. She conducts research on the impacts of and adaptation to climate change, including on extreme events, thermal stress, foodborne safety and security, waterborne diseases, and vector borne diseases. Her work focuses on understanding sources of vulnerability and designing adaptation policies and measures to reduce the risks of climate change in a multi-stressor environment. She has worked on assessing vulnerability and implementing adaptation measures in Central America, Europe, Africa, Asia, the Pacific, and the US. She is co-chair with Tom Kram (PBL, The Netherlands) of the International Committee On New Integrated Climate change assessment Scenarios (ICONICS), facilitating development of new climate change scenarios. Dr. Ebi's scientific training includes an M.S. in toxicology and a Ph.D. and a Masters of Public Health in epidemiology, and postgraduate research at the London School of Hygiene and Tropical Medicine. She has edited four books on aspects of climate change and published more than 150 papers.

Anthony Janetos, PhD, recently joined Boston University as Director of the Frederick S. Pardee Center for the Study of the Longer-Range Future, and Professor of Earth and Environment. Dr. Janetos was most recently Director of the Joint Global Change Research Institute at the University of Maryland, and has held positions at The Heinz Center for Science, Economics and the Environment, WRI, NASA, and the EPA. Dr. Janetos received his A.B. in Biology from Harvard and his Master's and Ph.D. in Biology from Princeton. Dr. Janetos has written and spoken widely on the need to understand the scientific, environmental, economic, and policy linkages among the major global environmental issues. In addition to his research interests in the interaction of land systems with human needs and climate change, he has been an IPCC Lead Author and Coordinating Lead Author, and has served on multiple National Research Council Committees. His priorities for the Pardee Center are to foster the integration of natural and social sciences, so that it can continue its long tradition of “interdisciplinary, policy-relevant, and future-oriented research that contributes to long-term improvements in the human condition.

Stéphane Hallegatte, MS, joined the World Bank as senior economist in September 2012 after 10 years of academic research in environmental economics and climate science for Météo-France, the Centre International de Recherche sur l'Environnement et le Développement, and Stanford University. His research interests include environmental economics, risk management, adaptation to climate change, urban policy, climate change mitigation policies, and green growth. He has worked on natural disaster and risk-management policies at local and national scales, including cases in Europe (following the storm Xynthia in 2010), North Africa (Morocco, Tunisia), India (Mumbai), and the United States (New Orleans after Hurricane Katrina). He has worked extensively on decision-making under uncertainty, with applications for climate change adaptation in the water sector and risk management. He participated in the development of the French National Adaptation Plan to Climate Change and supported the application of the same development methodology in Vietnam. He is involved in World Bank projects that include decision-making under uncertainty, early warning and risk management and disasters, and strategies for green growth and climate change mitigation. Mr. Hallegatte is lead author of the IPCC chapter “the economics of adaptation” in the working group on impacts and adaptation and in the Synthesis Report that summarizes the 5th assessment report. He is the author of dozens of articles published in international journals in multiple disciplines and of several books, including *Green Economy and the Crisis: 30 Proposals for a More Sustainable France* and *Risk Management: Lessons from the*

Storm Xynthia. He also co-led the World Bank report *Inclusive Green Growth: The Pathway to Sustainable Development*, published in 2012, and was member of the core writing team of the 2014 World Development Report *Risk and Opportunity: Managing Risks for Development*. He has taught at the Ecole Polytechnique, Science Po Paris, the Ecole Nationale de la Météorologie, and the Normal University in Beijing, and is the editor in charge of economics for the international journal "WIREs Climate Change." He was a member of the French delegation for the approval plenary of the 4th assessment report of the IPCC in 2007, and for Conferences of Parties of the United Nations Framework Convention on Climate Change from 2008 to 2010. Mr. Hallegatte holds engineering degrees from the Ecole Polytechnique (Paris) and the Ecole Nationale de la Météorologie (Toulouse), a master's degree in meteorology and climatology from the Université Paul Sabatier (Toulouse) and a Ph.D. in economics from the Ecole des Hautes Etudes en Sciences Sociales (Paris).

John Balbus, M.D., M.P.H., serves as a senior advisor to the Director on public health issues and as NIEHS liaison to its external constituencies, stakeholders, and advocacy groups. He also leads NIEHS efforts on climate change and human health. In this capacity he serves as HHS principal to the U.S. Global Change Research Program, for which he also co-chairs the Interagency Cross-Cutting Group on Climate Change and Human Health. Dr. Balbus' background combines training and experience in clinical medicine with expertise in epidemiology, toxicology, and risk sciences. He has authored studies and lectures on global climate change and health, transportation-related air pollution, the toxic effects of chemicals, and regulatory approaches to protecting susceptible subpopulations. Before joining the NIEHS, Dr. Balbus was Chief Health Scientist for the non-governmental organization Environmental Defense Fund. He served on the faculty of The George Washington University, where he was founding Director of the Center for Risk Science and Public Health, founding co-Director of the Mid-Atlantic Center for Children's Health and the Environment, and Acting Chairman of the Department of Environmental and Occupational Health. He maintains an adjunct faculty appointment at the Johns Hopkins Bloomberg School of Public Health. Dr. Balbus received his A.B. degree in Biochemistry from Harvard University, his M.D. from the University of Pennsylvania, and his M.P.H. from the Johns Hopkins School of Public Health. In addition to current membership on the Institute of Medicine Roundtable on Environmental Health Sciences, Research and Medicine, Dr. Balbus has also served as a member of the EPA Science Advisory Board, the National Research Council's Board on Environmental Studies and Toxicology and the EPA Children's Health Protection Advisory Committee. He is a member of the American College of Physicians, the American Public Health Association, and the Society of Toxicology.

Anne Grambsch, MS, is the Staff Director of the Global Change Assessment Staff at the Environmental Protection Agency (EPA). Ms. Grambsch is an expert on the potential effects of climate change and climate variability on human health and was a Contributing Author to the 1997 Intergovernmental Panel on Climate Change (IPCC) assessment report, *The Regional Impacts of Climate Change*. She was a contributing author to the Health Sector Report of the 1st National Climate Assessment and was a Lead Author for SAP4.6: *Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems*. She is currently EPA's representative to the Interagency Working Group for the National Climate Assessment. While a member of the Climate and Policy Assessment Division, Ms. Grambsch managed the Office of Policy's Climate Change Health Initiative, and has written extensively on health effects, adaptation strategies, and co-control benefits of climate policies. Prior to working on climate change issues at EPA, Ms. Grambsch conducted research on implementing environmental accounting systems and a comprehensive benefit-cost assessment of the Clean Air Act, from 1970 to 1990. Ms. Grambsch received a Master of Science degree in Economics from the University of Wisconsin-Madison.

Robert Vallario, MS, is Program Manager for the Integrated Assessment Research Program (IARP) in the Climate and Environmental Sciences Division, Office of Science, U.S. Department of Energy. His 33 years' experience in managing and conducting research in environmental and energy-related science has been gained through senior research management and oversight positions held at a U.S. National Laboratory, a leading private sector science consulting firm, and most recently, at the U.S. DOE where he has been employed for the last 23 years. In his current capacity, Mr. Vallario manages an extensive portfolio of basic research activities in the field of Integrated Assessment and, increasingly impacts, adaptations, and vulnerabilities of global and regional change. He serves on a broad range of interagency committees and working groups, several housed within the U.S. Global Change Research Program. His interest in integrative modeling, although not principally focused on health, extends to health as a vital component of Integrated Assessment models and evolving cross-sectoral impact, adaptation, and vulnerability (IAV) models. Prior to his current role as the IARP Program Manager, Mr. Vallario distinguished himself as DOE's Office of Science lead strategic planner for nine years, and in prior management positions within the Office of Science and Technology in DOE's Policy and International Affairs. Mr. Vallario is particularly interested in the complex dynamics of human-Earth system interactions with recent focus on the coupled energy-water-land system, issues at the mitigation-adaptation interface, and urban systems and services and the role of energy and connected infrastructures. He holds a Master's degree from Northwestern University in Environmental Sciences and an Undergraduate Degree from the University of Florida in Environmental Engineering.

Peter Berry, PhD, is a Senior Policy Advisor with the Climate Change and Health Office in the Safe Environments Directorate at Health Canada where he has worked since 2001. While at Health Canada Dr. Berry has conducted research in several areas related to climate change including health risks to Canadians, adaptive capacity, health vulnerability assessment and communicating climate change risks to the public. As part of Health Canada's initiative to help Canadians protect themselves from extreme heat he co-authored a number of guidance documents for public health officials on communicating heat-health risks, assessing heat-health vulnerabilities and developing heat alert and response systems. He actively collaborates with researchers within and outside of Canada to facilitate public health adaptation. He is a contributing author for climate change and health vulnerability and adaptation assessment guidelines that were released by the World Health Organization in 2012 and to the Intergovernmental Panel on Climate Change Special Report on the Management of Extreme Weather Events. Most recently, Dr. Berry led development of the Health Chapter for Canada's national climate change impacts and adaptation assessment update report which was released in 2014.