



SYMPOSIA I: WATER ISSUES IN CLIMATE CHANGE

April 3–5, 2013

UCSD Campus, La Jolla, CA

Organizers:

Henry Abarbanel, Joshua Graff Zivin, UC San Diego
Juergen Kurths, Potsdam Institute for Climate Impact Research
Brian Hoskins, Grantham Institute for Climate Change

PARTICIPANT BIOGRAPHIES

HENRY D. I. ABARBANEL is IGCC Research Director for Science and Security. Abarbanel received his B.S. in physics from Caltech and his PhD in physics from Princeton University. He has served on the faculties at Princeton, Stanford, Northwestern, the University of Chicago, UC Berkeley, UC Santa Cruz and, since 1982, at UC San Diego. He presently has appointments as professor of physics at UC San Diego and research physicist at the Marine Physical Laboratory, Scripps Institution of Oceanography. His research interests have ranged from elementary particle physics to the nonlinear dynamics of biological and physical systems. In that regard he was the founding director of UC San Diego's Institute for Nonlinear Science and served from 1986 through 2007. In 2000–01 he served as a member of the University of California's Academic Council, the governing body of UC's faculty senate.

Since 1974, Abarbanel has been a member of JASON, a consulting group to the U.S. Government on technical matters. In 1992 he became a member of the City Council of Del Mar, California, serving as mayor in 1995–96. In that role he has served on numerous regional bodies concerned with energy, wastewater, infrastructure, and quality of life in the San Diego region. He is a member of the San Diego Regional Water Quality Control Board, by appointment of Governor Jerry Brown.

DR. NEWSHA AJAMI is a Senior Research Associate with the Pacific Institute's Water and Sustainability Program. She is a hydrologist specializing in sustainable water resource management, hydrological modeling, flood and water supply forecasting, and advancing uncertainty assessment techniques impacting hydrological predictions. Prior to joining the Institute, Dr. Ajami served as a Science and Technology fellow at the California State Senate committee on Natural Resources and Water, collaborated as a consultant with Berkeley Economic Consulting, and was a post doctorate researcher with the Berkeley Water Center, UC Berkeley. She also served as an engineering analyst to develop decision support systems to manage multiple reservoirs in various parts of Iran.

Dr. Ajami received her PhD in Civil and Environmental Engineering from UC Irvine, an MS in Hydrology and Water Resources from the University of Arizona, and a BS in Civil and Environmental Engineering from Tehran Polytechnic. She has published many highly cited peer-reviewed papers in predominant journals and was the recipient of 2010 William R. Gianelli Water Leaders scholarship, 2005 NSF funding

for AMS Science and Policy Colloquium and ICSC-World Laboratory Hydrologic Science and Water Resources Fellowship from 2000–2003.

MAXIMILIAN AUFFHAMMER joined the faculty at UC Berkeley in 2003. Professor Auffhammer received his BS in environmental science from the University of Massachusetts at Amherst in 1996, a MS in environmental and resource economics at the same institution in 1998 and a PhD in economics from UC San Diego in 2003. His research focuses on environmental and resource economics, energy economics and applied econometrics. He is a Research Associate at the National Bureau of Economic Research in the Energy and Environmental Economics group, a Humboldt Foundation Fellow, and a lead author for the Intergovernmental Panel on Climate Change (IPCC). Professor Auffhammer serves on the editorial board of the *Journal of Environmental Economics and Management*. His research has appeared in the *American Economic Review*, *Review of Economics and Statistics*, *Economic Journal*, *Proceedings of the National Academies of Sciences*, *Journal of Environmental Economics and Management*, *Energy Journal* and other academic journals. Professor Auffhammer is the recipient of the 2007 Cozzarelli Prize awarded by the National Academies of Sciences, the 2009 Campus Distinguished Teaching Award and the 2007 Sarlo Distinguished Mentoring Award.

JENNIFER BURNEY is an environmental scientist whose research focuses on simultaneously achieving global food security and mitigating climate change. She designs, implements, and evaluates technologies for poverty alleviation and agricultural adaptation, and she studies the links between energy poverty and food and nutrition security, the mechanisms by which energy services can help alleviate poverty, the environmental impacts of food production and consumption, and climate impacts on agriculture. Much of her current research focuses on the developing world.

RICHARD T. CARSON is professor in and former chair of the Department of Economics at UC San Diego. He is also a Distinguished Research Professor at the University of Technology, Sydney's Centre for the Study of Choice. Carson served as president of the Association of Environmental and Resource Economists (AERE). He is an elected Fellow of AERE and of the Agricultural and Applied Economics Association. Carson previously served as Research Director for International Environmental Policy at the University of California's Institute on Global Conflict and Cooperation and as a Senior Fellow at the San Diego Supercomputer Center.

Carson received a PhD in resource economics and MA in statistics from UC Berkeley in 1985 and an MA in international relations from George Washington University in 1979. Carson has extensive experience in assessing the benefits and costs of environmental policies. His specialty is valuing non-marketed goods and new commercial products using a wide array of techniques. He has estimated the benefits of the U.S. Clean Water Act, removing low-level carcinogens from drinking water, protecting groundwater aquifers, economic impacts associated with fisheries management practices and health and visibility improvements due to air quality changes. In other studies, he has examined the benefits of visibility improvements in the Grand Canyon, preventing residential water shortages in California cities, restoring Everglades National Park, and the addition of the Kakadu Conservation Zone to Kakadu National Park in Australia.

ARIEL DINAR is a professor of environmental economics and policy and the director of Water Science and Policy Center at the Department of Environmental Sciences, UC Riverside. He teaches, conducts research and publishes on water economics, economics of climate change, strategic behavior and the environment, and regional cooperation in natural resources. In 1984 he received his PhD from the Hebrew University of Jerusalem within Agricultural and Resource Economics; his MsC in 1974, in the area of Agricultural Economics (with Distinction) and his BsC in 1972 in Agricultural Economics, all degrees from the Hebrew University of Jerusalem.

Dinar worked as an economist with the World Bank from 1993 to 1998 in Washington, D.C. in the Agriculture and Natural Resources Department (Agricultural Policy Division). In the latter years (1996–1998) he worked as a Senior Economist within the Rural Development Department. Dinar was Principal Economist from 1998 to 2000 for the World Bank, and later Lead Economist within the Agriculture and Rural Development Department in the years 2000–2006. In 2006–2008, Dinar worked as a Lead Economist and Coordinator of Climate Change and Water Economics Research, for the Development Economics Research Group at the World Bank.

TIM FOSTER is a PhD researcher at the Grantham Institute for Climate Change in London. His research focuses on integrated modeling of irrigation decision-making, with an emphasis on identifying opportunities for adaptation to climate change and water scarcity among U.S. corn farmers.

INEZ FUNG is a professor of atmospheric science at UC Berkeley. She received her ScD in Meteorology from the Massachusetts Institute of Technology and now studies the interactions between climate change and biogeochemical cycles. Her research focuses on the processes that maintain and alter the composition of the atmosphere, and hence the climate. A question driving her research is how atmospheric CO₂ and climate co-evolve, and what can be done about it. She continues to analyze atmospheric, land and ocean observations pertinent to the carbon cycle, and to synthesize them in atmospheric transport models to infer how CO₂ sources and sinks have been changing. In her work using the coupled carbon-climate model at NCAR to project how land and ocean carbon sinks will change with accelerating global warming, she found that the land response is contingent upon the simulation of soil moisture. Consequently, she initiated a field study in the Angelo Coast Range Reserve in Northern California to study the life cycle of water and the connection between precipitation, transpiration, rock moisture, groundwater and stream flow.

ALEXANDER (SASHA) GERSHUNOV is a researcher at the Climate, Atmospheric Science and Physical Oceanography (CASPO) Division at the Scripps Institution of Oceanography, UC San Diego. Gershunov's research focuses on interrelated aspects of weather, climate and society. His research interests include understanding the links between regional weather extremes and large-scale climate variability and change; hydroclimatology; coupled ocean-land-atmosphere dynamics; teleconnections; long-range seasonal predictability and prediction of daily weather statistics; extreme events; climate model validation, downscaling and statistical correction; applications of climate information; climate and wildfire; fire weather; climate impacts on public health and energy; climatic history and future change; climate influence on society and human influence on climate.

Gershunov received a BS in mathematics at UC Irvine in 1986, an MS in applied probability and statistics (1989) and a PhD in geography (1996), both at UC Santa Barbara. Gershunov taught at UC Santa Barbara as well as at the University of Alcalá de Henares, Spain. He has served extended terms as visiting researcher at the Laboratoire de Météorologie Dynamique (LMD) of the French National Scientific Research Center (CNRS), and at the Centre National de Recherches Météorologiques (CNRM), Meteo-France, the French meteorological service. Gershunov is involved in interdisciplinary applied climate research and educational efforts focused on the southwestern United States and more regionally on Southern California. He enjoys working with friends and has strong global research collaborations.

DR DIETER GERTEN is head of the flagship project “Planetary Opportunities and Planetary Boundaries” in Research Domain I (Earth System analysis) at the Potsdam Institute for Climate Impact Research (PIK). Before joining PIK in 2001, he completed his PhD in freshwater ecology at the University of Potsdam and the Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany. Dr Gerten is scientist in charge of the renowned global biosphere model LPJmL hosted at PIK. His research is focused on topics as diverse as global water resources and scarcities, water-vegetation interactions, climate change impacts on terrestrial and aquatic ecosystems, and also water/climate change and religion. He has

(co)authored more than 80 peer-reviewed papers in scientific journals and more than a dozen book chapters on these topics, and has edited two books. Gerten was expert reviewer for several IPCC Assessment Reports and Technical Reports and is now contributing author for the upcoming Fifth Assessment Report of IPCC Working Group II. Gerten is also engaged in teaching courses on global hydrogeography, water management and Earth system modeling at the University of Potsdam, the University of Basel (Switzerland), and the Humboldt University of Berlin, where he is currently completing his ‘habilitation.’

JOSHUA GRAFF ZIVIN is professor of economics at UC San Diego, where he holds faculty positions in the School of International Relations and Pacific Studies and the Department of Economics. He is also a Research Associate at the National Bureau of Economic Research and Research Director for International Environmental and Health Studies at the Institute for Global Conflict and Cooperation. In 2004–2005, he served as Senior Economist for Health and the Environment on the White House Council of Economic Advisers. Prior to joining UCSD in 2008, he was an Associate Professor of Economics in the Mailman School of Public Health and the School of International and Public Affairs at Columbia University, where he served as the Director of the PhD Program in Sustainable Development.

He has published numerous articles on a wide range of topics in top economic, policy, and medical journals. His research interests are broad and include the areas of environmental, health, development, and innovation economics. Policy relevance serves as a guiding force behind all of this work. Much of his current work is focused on three distinct areas of research. His work on the impacts of poor environmental quality examines the relationship between the environment, health, and human capital formation, with a particular eye towards behavioral responses to mitigate adverse consequences. His work on the economics of innovation explores the role of institutions, social networks, and financial incentives in the production of new scientific knowledge within the life sciences. His research in developing countries is focused on the design of health interventions and their economic impacts.

DR. JOBST HEITZIG is a senior researcher at PIK currently focusing on modeling prospects of international cooperation on climate issues. He was trained as a mathematician and has served as a scientific officer, data analyst, and trainer on statistical methods with the German National Statistical Office working on statistical confidentiality protection, and as a systems analyst and IT trainer with the German development bank. He has published in high-impact journals on nonlinear dynamics, complex networks, group decision making, and game theory, and serves as expert reviewer for the upcoming IPCC Assessment Report.

SIR BRIAN HOSKINS became the first director of the Grantham Institute for Climate Change at Imperial College London in January 2008, and now shares his time between Imperial and Reading University, where he is Professor of Meteorology. His degrees are in mathematics from the University of Cambridge and he spent post-doc years in the United States before moving to Reading, where he became a professor in his thirties and was a head of department for six years. For the 10 years up to September 2010 he held a Royal Society Research Professorship. His research is in weather and climate, in particular the understanding of atmospheric motion from frontal to planetary scales. His international roles have included being vice-chair of the Joint Scientific Committee for the World Climate Research Programme, President of the International Association of Meteorology and Atmospheric Sciences and involvement in the 2007 IPCC international climate change assessment. He has also had numerous UK roles, including membership of The Royal Commission on Environmental Pollution, and is currently a member of the UK Committee on Climate Change. He is a member of the science academies of the UK, United States, China and Europe and has received a number of awards including the top prizes of the UK and U.S. Meteorological Societies, honorary DScs from the Universities of Bristol and East Anglia, and honorary fellowships of a number of institutions. He was knighted in 2007 for his services to the environment.

SOLOMON M. HSIANG combines data with mathematical models to understand how society and the environment influence one another. In particular, he focuses on how policy can encourage economic development while managing global climate change, how natural disasters impact societies and the effectiveness of associated policy responses, and how environmental conditions influence social instability and violence. Hsiang earned a BS in Earth, Atmospheric and Planetary Science and a BS in Urban Studies and Planning from the Massachusetts Institute of Technology, and he received a PhD in Sustainable Development from Columbia University. He was a post-doctoral fellow in Applied Econometrics at the National Bureau of Economic Research and is currently a post-doctoral fellow in Science, Technology and Environmental Policy at the Woodrow Wilson School at Princeton University. He will be joining the faculty at UC Berkeley in the fall of 2013.

JÜRGEN KURTHS received his PhD in 1983 at the GDR Academy of Sciences and his Dr. habil. in 1990. He was full Professor at the University of Potsdam from 1994–2008 and has been Professor of Nonlinear Dynamics at the Humboldt-Universität zu Berlin and co-chair of the research domain Transdisciplinary Concepts and Methods of the Potsdam Institute for Climate Impact Research since 2008. He is a fellow of the American Physical Society, of the Fraunhofer Society (Germany), of the Academia Europaea and of the Makedonian Academy of Science and Arts. He got a Humboldt-CSIR research prize in 2005 and a Dr. h.c. in 2008 and another one in 2012. He was awarded the L. F. Richardson medal of the European Geophysical Society in 2013. His main research interests are synchronization phenomena, emergent behaviour in complex networks, time series analysis and their applications in sustainability research, and life science. He has published more than 500 papers in peer-reviewed journals and two monographs, which have been cited more than 19,000 times. His H-factor is 58. He has coordinated the RTN “COSYC of SENS” within FP5, has been an area head in the NoE BIOSIM (FP6), the vice speaker of SFB 555 Complex Nonlinear Processes (DFG), and Cocomordinator of SPP 1114 Time Series Analysis and Image Processing (DFG) and is the speaker of the German-Brazilian IRTG 1740 (DFG and FAPESP) on Complex Networks.

PETER JOHANNES MENCK is a PhD candidate working with Prof. Dr. Juergen Kurths at the Potsdam Institute for Climate Impact Research and Humboldt University of Berlin. He received his Diploma in Physics in 2010. In 2010 he received the Berliner-Ungewitter-Award of the University of Goettingen. His publications include “How Basin Stability Complements the Linear-Stability Paradigm,” *Nature Physics* 9 (2013) and “Avoiding Dead Ends to Boost Stability.” His research interests include complex systems and networks, multi-stability, and power grids.

GORDON MCCORD is an assistant professor at the UC San Diego’s School of International Relations and Pacific Studies. His interests include economic growth and poverty reduction, health systems in resource-constrained settings, the role of geography in economic dynamics, and the interaction of epidemiology and poverty (particularly in the case of malaria). Prior to his doctoral work in sustainable development, McCord worked as special assistant to Jeffrey Sachs at Columbia University’s Earth Institute and at the United Nations Millennium Project. He completed his PhD degree in sustainable development from Columbia University in May 2011.

WOLFRAM SCHLENKER teaches classes in environmental and natural resource economics. His research interests include the economics of climate change with a focus on the effects of changing weather conditions on agricultural output. He holds a PhD in Agricultural and Resource Economics from the UC Berkeley (2003) and a master of engineering and management sciences from the University of Karlsruhe, Germany (2000), as well as a master of environmental management from Duke University (1998).

RACHEL SCHWARTZ is a Scripps Institution of Oceanography (SIO) graduate student and NASA Earth and Space Science Fellow. She is in the Climate-Ocean-Atmosphere program and is advised by Dr. Alexander Gershunov. She received her MS in Earth Sciences from SIO in 2010 and her BS in Chemistry

from UC San Diego in 2008. She has conducted applied research on temperature extremes and regimes across the Northern Hemisphere as a part of SPHEAR (Scripps Partnership for Environmental Hazards and Environmental Applied Research).

Schwartz's PhD dissertation topic is "Marine Layer Clouds and California Coastal Climate: Behavior, Evolution, and Consequences". She is interested in coastal climate variability and change and, in particular, the role marine layer clouds play in modulating climate and extreme heat in coastal California. Understanding marine stratus variability is also critical to improving solar power forecasting and management, a focus Schwartz has explored in conjunction with San Diego Gas and Electric. Marine stratus and fog also critically provide summertime water and shade to iconic and endemic species, such as the coast redwoods and Torrey pines.

RICHARD SOMERVILLE is Distinguished Professor Emeritus and Research Professor at Scripps Institution of Oceanography, UC San Diego. He is a theoretical meteorologist and an expert on computer simulations of the atmosphere. He received a BS in meteorology from Pennsylvania State University in 1961 and a PhD in meteorology from New York University in 1966. He has been a professor at Scripps since 1979. Somerville is an authority on the prospects for climate change in coming decades. He is an author, co-author or editor of more than 200 scientific publications. He has received awards from the American Meteorological Society for both his research and his popular book, *The Forgiving Air: Understanding Environmental Change*, a new edition of which was published in 2008. Among many honors, he is a fellow of both the American Association for the Advancement of Science and the American Meteorological Society. Somerville is a coordinating lead author of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The IPCC shared the 2007 Nobel Peace Prize equally with Al Gore.

ALAN SWEEDLER is the Assistant Vice President for International Programs at San Diego State University, where he also is a professor of physics and director of the Environmental Sciences Program and the Center for Energy Studies. Sweedler has been a leader in developing energy policy and researching energy issues for over 30 years, especially in the greater San Diego Region. He was a major participant in the development of regional energy plans for the greater San Diego Region and was a founding Board member and Chair of the San Diego Regional Energy office, now the California Center for Sustainable Energy. He is currently on the Board of Directors of Clean Tech San Diego and is Director of the California Energy Commission's Energy Innovation Small Grants Program, a \$5 million program that awards grants for new, innovative research in the area of energy technologies.

Before joining SDSU in 1980, Sweedler was a research physicist at Brookhaven National Laboratory working in the area of radiation effects on superconductors. In 1985 he was selected as one of two nationally chosen Congressional Science Fellows by the American Physical Society and he worked in the US Senate on issues of energy, water and national security. In 1987 he was awarded a Carnegie Foundation Science Fellowship at Stanford's Center for International Security and Arms Control and was a visiting scholar at the University of California's Institute on Global Conflict and Cooperation in the early 1990s. In recent years he has focused on the environmental impacts of energy use, the energy-water nexus, climate change and international security, as well as the development of renewable energy technologies in the greater San Diego region. He holds a Bachelor of Science degree from the City University of New York and a PhD in physics from the University of California, San Diego.

DAVID G. VICTOR is a professor at the School of International Relations and Pacific Studies and director of the school's [Laboratory on International Law and Regulation](#). His research focuses on how the design of regulatory law affects issues such as environmental pollution and the operation of major energy markets. He is author of *Global Warming Gridlock*, which explains why the world hasn't made much diplomatic progress on the problem of climate change while also exploring new strategies that would be

more effective. Prior to joining the faculty at UC San Diego Victor served as director of the Program on Energy and Sustainable Development at Stanford University, where he was also a professor at Stanford Law School. At Stanford he built a research program that focused on the energy markets of the major emerging countries—mainly Brazil, China, India, Mexico and South Africa. Earlier in his career he also directed the science and technology program at the Council on Foreign Relations in New York, where he directed the Council’s task force on energy and was senior adviser to the task force on climate change. At Stanford and the Council he examined ways to improve management of the nation’s \$50 billion strategic oil reserve, strategies for advancing research and regulation of technologies needed for “geoengineering,” and a wide array of other topics related to technological innovation and the impact of innovation on economic growth. He earned his PhD in political science from Massachusetts Institute of Technology and his BA in history and science from Harvard University.

FRANK WECHSUNG is a senior researcher and research leader at the Potsdam Institute of Climate Impact Research. As a member of the research domain he heads the research field ‘Regional Impacts and Strategies.’ Wechsung is the current research leader of the GLOWA-Elbe Project. His scientific work covers crop modeling, the physiological impact of higher CO₂ on root-shoot relationships and photosynthesis, the climate impact on regional crop yields and the water household. Wechsung received his diploma in crop science at Humboldt University in 1987. In 1991 he defended his PhD in agricultural operation research at the same university. Since 1992 he has been a member of PIK.

JUNJIE ZHANG is an assistant professor of environmental economics at the School of International Relations and Pacific Studies at UC San Diego. He is also a senior advisor of the Asia Society. He currently serves as an associate editor of the journal *Marine Resource Economics*. Zhang holds a PhD in environmental and resource economics from Duke University. He also holds a MS and a BS (minor) in environmental engineering from Tsinghua University, and a BA (major) in environmental economics and management from Renmin University of China. His research centers on empirical issues in environmental and resource economics. His research topics cover climate change, water resources, and fisheries.