

Modernizing Probable Maximum Precipitation Estimation

Committee

James A. Smith

Chair

James Smith is Research Scientist and Professor Emeritus in the Department of Civil and Environmental Engineering at Princeton University. He joined Princeton University in 1990 after working in the Radar Hydrometeorology program at the National Oceanic and Atmospheric Administration. His research has focused on the hydrometeorology and hydrology of extreme floods. Research interests have centered on measurement and analysis of extreme rainfall and on estimating the upper tails of flood frequency distributions. Urban environments have been a special interest in studies of extreme rainfall and flooding. Smith is a Fellow of the American Meteorological Society (AMS) and American Geophysical Union. He received the AMS Hydrologic Sciences Medal in 2019. He received his Ph.D. in environmental engineering and an M.S.E. in mathematical sciences, both from Johns Hopkins University. Smith served on the National Academies of Sciences, Engineering, and Medicine's Committee on Meteorological Analysis, Prediction, and Research.

Daniel Cooley

Member

Daniel Cooley is Professor and Graduate Director in the Department of Statistics at Colorado State University (CSU). He has been a faculty member at CSU since 2007, and prior to that was a postdoctoral researcher both in CSU's Statistics Department and at the National Center for Atmospheric Research (NCAR). Cooley's research is in methodological development for and application of extreme value statistics. Much of his research aims to understand and model tail dependence, which is essential for understanding risk associated with extreme events arising from multiple variables. His research is largely motivated by problems from atmospheric and climate science and he has collaborated with atmospheric scientists from places such as NCAR and Lawrence Berkeley National Laboratory. Cooley is a member of the American Statistical Association (ASA), the ASA's Section on Statistics and the Environment, the International Environmetrics Society, and the Institute for Mathematical Statistics. He was a Professor Laureate of CSU's College of Natural Sciences from 2017 to 2019. Cooley received his Ph.D. in applied mathematics from the University of Colorado at Boulder. He served on the National Academies of Sciences, Engineering, and Medicine's Committee on Anthropogenic Methane Emissions in the United States.

John England

Member

John England is a Lead Civil Engineer with the U.S. Army Corps of Engineers Risk Management Center. From 1997-2015 he conducted flood hazard, storm rainfall, and dam safety risk studies at the US Bureau of Reclamation (Reclamation) and was the flood hydrology technical specialist. He previously conducted extreme storm rainfall and flood research at the U.S. Geological Survey and Colorado Climate Center. His work centers on extreme storm rainfall, precipitation frequency, paleoflood hydrology and flood hazards to assess risks and designs for dams and critical infrastructure. England performed research on extreme storm rainfall and probable maximum precipitation changes for the Nuclear Regulatory Commission and reviewed extreme precipitation studies for Colorado and New Mexico. He was awarded the Reclamation Engineer of the Year in 2008 and was the lead author of Bulletin 17C – Federal guidelines for determining flood flow frequency. He is a registered Professional Hydrologist, a registered Professional Engineer, and a Board-Certified Water Resources Engineer. He is a Fellow of the American Society of Civil Engineers and serves on the American Academy of Water Resources Engineers Board of Directors. England received his M.S. and Ph.D. in hydrology and water resources from Colorado State University.

Efi Foufoula-Georgiou

Member

Efi Foufoula-Georgiou is a Distinguished Professor and the Samueli Endowed Chair in Civil and Environmental Engineering and Earth System Science at the University of California, Irvine. From 1989-2016 she was a McKnight Distinguished Professor at the University of Minnesota, Director of the St. Anthony Falls Laboratory and of the National Center for Earth-surface Dynamics. Foufoula-Georgiou studies hydrology and geomorphology with an emphasis on understanding the space-time organization and multiscale structure of precipitation and landforms for improving modeling and prediction. She has served in the NSF Advisory Council for Geosciences, NASA Earth Sciences Subcommittee, and as president of American Geophysical Union's (AGU) Hydrology Section. Her awards include the European Geophysical Union John Dalton Medal, American Meteorological Society (AMS) Hydrologic Sciences Medal, and AGU Robert Horton Medal. She is a fellow of AGU, AMS, American Association for the Advancement of Science and member of the European Academy of Sciences, and the American Academy of Arts and Sciences. She received a diploma in Civil Engineering from the National Technical University of Athens, Greece, and a Ph.D. (1985) in Environmental Engineering from the University of Florida, Gainesville. She is a member of the National Academy of Engineering (NAE), and the National Academies of Sciences, Engineering, and Medicine's Board on Atmospheric Sciences and Climate and a former member of the Water Science and Technology Board.

Kathleen Holman

Member

Kathleen (Katie) Holman is an atmospheric scientist working at the Bureau of Reclamation's (Reclamation) Technical Service Center in Denver, Colorado. Her professional expertise falls within two primary categories: hydrologic hazard analyses for dam safety and water resources planning studies. Holman often leads one component of the complex hydrologic hazard analyses to support risk analyses, which are completed as part of the Safety of Dams program in Reclamation's Dam Safety Office. The water resources planning studies are often driven by local and regional questions and needs, including trying to better quantify and understand reservoir evaporation. Her graduate research focused on understanding extreme precipitation events in a changing climate and connections between large-scale atmospheric circulation patterns and regional precipitation in the Midwest. Holman is a member of the American Meteorological Society and American Geophysical Union. Prior to joining Reclamation, she earned a B.S. in mathematics from Lake Superior State University and a M.S. and Ph.D. in atmospheric and oceanic sciences from the University of Wisconsin, Madison.

Shih-Chieh Kao

Member

Shih-Chieh Kao is a Senior Research Staff and Group Leader of the Water Resource Science and Engineering Group within the Environmental Science Division at Oak Ridge National Laboratory (ORNL). He also serves as the Program Manager of the ORNL Water Power Program that oversees dozens of research projects supported by the Department of Energy (DOE) Water Power Technologies Office (WPTO). His areas of research include hydrologic modeling, flood simulation, hydro-climate impact assessment, high-performance computing, and hydropower resource evaluation. He has been the principal investigator of the DOE WPTO "Effects of Climate Change on Federal Hydropower - SECURE Water Act Section 9505 Assessment" project since 2011. Kao supported the Nuclear Regulatory Commission on the review of multiple site-specific probable maximum precipitation studies. He received the 2008 Purdue Civil Engineering Best Dissertation Award, 2009 Journal of Hydrologic Engineering Outstanding Reviewer Award, 2013 ICSH Statistical Hydrology Best Paper Award, and 2020 Platform for Advanced Scientific Computing Best Paper Award. Kao received a Ph.D. from Purdue University in hydraulic and hydrologic engineering.

Ruby Leung

Member

L. Ruby Leung is a Battelle Fellow at Pacific Northwest National Laboratory. She is the Chief Scientist of the Department of Energy (DOE) Energy Exascale Earth System Model (E3SM), a major effort to develop state-of-the-art capabilities for modeling human-Earth system processes on DOE's high performance computers. Her research cuts across multiple areas in modeling and analysis of climate and water cycle including orographic precipitation, monsoon climate, extreme events, land surface processes, land-atmosphere interactions, and aerosol-cloud interactions. Leung is an Advisory Board member of the National Center for Atmospheric Research's Mesoscale and Microscale Meteorology Laboratory Division and a Council member of the American Meteorological Society. She is an elected member of the National Academy of Engineering and Washington State Academy of Sciences and a fellow of the American Meteorological Society (AMS), American Association for the Advancement of Science, and American Geophysical Union (AGU). She is the recipient of the AGU Global Environmental Change Bert Bolin Award and Lecture in 2019, the AGU Atmospheric Science Jacob Bjerknes Lecture in 2020, and the AMS Hydrologic Sciences Medal in 2022, and was awarded the DOE Distinguished Scientist Fellow in 2021. Leung received an M.S. and Ph.D. in atmospheric sciences from Texas A&M University.

Robert Mason

Member

Robert Mason was the Extreme Hydrologic Events Coordinator and Senior Science Advisor for Surface Water in the U.S. Geological Survey (USGS) until his retirement in December 2022. In the recent past, Mason served as the Chief, USGS Office of Surface Water and as Delaware River Master. He chaired the former Advisory Committee on Water Information, Subcommittee on Hydrology from 2014 until 2016 and was one of the authors of "Bulletin 17C," the Federal guidelines for flood-frequency analysis. He served on various other federal councils and interagency committees that have made recommendations related to probable maximum precipitation, including the Federal Emergency Management Agency's Technical Mapping Advisory Council (2014-2022). He has a professional passion for statistical hydrology, flood-frequency analysis, and streamflow data-collection techniques and records uncertainty. Mason received a B.S. and M.S. in civil engineering from North Carolina State University and is a registered Professional Engineer.

John W. Nielsen-Gammon

Member

John Nielsen-Gammon is the Texas State Climatologist, Director of the Southern Regional Climate Center, and Regents Professor in the Department of Atmospheric Sciences, Texas A&M University, where he joined the faculty in 1991 after a postdoctoral research position at the State University of New York at Albany. He is President of the American Association of State Climatologists and has served as President of the International Commission for Dynamical Meteorology and Chair of the American Meteorological Society's (AMS) Board on Higher Education. After being appointed Texas State Climatologist in 2000, Nielsen-Gammon has focused his attention on weather and climate issues affecting the state, with particular emphasis on droughts, heavy rainfall, and implications of climate change. His research interests also include sea breezes and air pollution, computer modeling, and improving the value of climate information. He was named a Presidential Faculty Fellow by the National Science Foundation and the White House in 1996 and became a Fellow of the AMS in 2011. He received S.B. in Earth and Planetary Sciences, and S.M. and Ph.D. degrees in Meteorology from the Massachusetts Institute of Technology.

Jayantha Obeysekera

Member

Jayantha Obeysekera is a Research Professor and the Director of the Sea Level Solutions Center in the Institute of Environment at Florida International University. He has national and international experience in the planning and management of water resources systems, with particular emphasis on both deterministic and stochastic modeling in hydrology, and implications of climate change and sea level rise. His current research interest is in the development of nonstationary approaches for infrastructure design, projections of extreme rainfall and sea levels associated with climate change, and understanding uncertainties of climate models. He served as a member of the federal advisory committee associated with the 2014 National Climate Assessment and is a recipient of the national 2015 Norman Medal of the American Society of Civil Engineers. Recently he was appointed to the California Bay-Delta Independent Science Board. He holds a B.S. in civil engineering from the University of Sri Lanka, an M. Eng. from the University of Roorkee, India, and a Ph.D. in civil engineering from Colorado State University. He served on the National Academies of Sciences, Engineering, and Medicine's Committee on Sustainable Water and Environmental Management in California Bay-Delta and the Committee to Review the Edwards Aquifer Habitat Conservation Program.

Christopher J. Paciorek

Member

Christopher Paciorek is an Adjunct Professor, as well as a research computing consultant, in the Department of Statistics at the University of California, Berkeley. Before coming to Berkeley, he was an Assistant Professor in the Biostatistics Department at the Harvard School of Public Health. His statistical expertise is in the areas of Bayesian statistics and spatial statistics, with primary application to environmental and public health research. Paciorek's work in recent years has focused on methodology and applied work in a variety of areas, in particular quantifying trends in extreme weather, quantifying millennial-scale changes in vegetation using paleoecological data, and developing computational software for hierarchical modeling (the NIMBLE project). He has also worked on measurement error issues in air pollution epidemiology, Bayesian methods for global health monitoring with a focus on combining disparate sources of information, and spatio-temporal modeling of air pollution. He received a B.A. in biology from Carleton College, and M.S. in ecology from Duke University, and a Ph.D. in statistics from Carnegie Mellon University.

Russ Schumacher

Member

Russ Schumacher is Professor of Atmospheric Science at Colorado State University and serves as the Colorado State Climatologist and Director of the Colorado Climate Center. He was Assistant Professor at Texas A&M University from 2009 to 2011 before joining the faculty at Colorado State. Along with serving as the state climate office, the Colorado Climate Center operates and manages two weather data networks that are part of the National Mesonet Program: the Community Collaborative Rain, Hail, and Snow (CoCoRaHS) network, an international citizen science initiative, and the Colorado Agricultural Meteorological network (CoAgMET), a statewide network of automated weather stations. Since 2016, Schumacher has served as an Editor for the journal *Monthly Weather Review*. His research and teaching focuses on understanding and predicting high-impact weather systems, especially those that produce extreme precipitation. He received the CAREER award from the National Science Foundation in 2010 and was selected as Outstanding Professor of the Year by the students of the department in 2012. He received the Clarence Leroy Meisinger Award for early-career research from the American Meteorological Society in 2021. Schumacher received his Ph.D. in atmospheric science from Colorado State University.

Schumacher served on a project review board for a regional extreme precipitation study, and publicly supported updates to state policy consistent with the recommendations of that report.