

EPA RESEARCH FORUM: Extreme Event Impacts on Air Quality and Water Quality with a Changing Global Climate

February 26-27, 2013

Arlington, Virginia

AGENDA

Day 1: February 26, 2013

8:30 – 9:00 a.m. Registration

INTRODUCTION AND WELCOME

EPA's National Center for Environmental Research supports high-quality, cutting-edge research by the nation's leading scientists to improve EPA's basis for decisions on national environmental issues. The Science to Achieve Results (STAR) grants featured here support the EPA mission within the Office of Research and Development, Office of Air and Radiation, and Office of Water. These first speakers will highlight priorities and key research questions within these programs.

9:00 – 10:00 a.m. John Dawson and Michael Hiscock, EPA
National Center for Environmental Research
Office of Research and Development

Darrell Winner, EPA
National Center for Environmental Research Deputy Director
Office of Research and Development

Tim Watkins, EPA
Deputy National Program Director
Air Climate and Energy Research Program
Office of Research and Development

Chuck Noss, EPA
Senior Science Advisor
Safe and Sustainable Water Resources Research Program
Office of Research and Development

PREDICTING THE EFFECTS OF EXTREME WEATHER, HEAT WAVES AND WILDFIRES ON AIR QUALITY

Is it possible to predict the relationship between extreme air quality events and simulated climate change? The next set of speakers will explore the predictability of extreme weather events and effects of those events on ozone, airborne particulate matter, heat waves, wildfires, air pollution and human health.

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| 10:00 – 10:25 a.m. | <p>Colette Heald, Massachusetts Institute of Technology
Dan Cooley, Colorado State University</p> <p>“Using advanced statistical techniques to identify the drivers and occurrence of historical and future extreme air quality events in the United States from observation and models”</p> <p><i>Dr. Heald and Dr. Cooley lead a team of atmospheric chemists and statisticians who are developing advanced statistical techniques to investigate the causes of observed air quality extremes in the United States, and testing if and how these relationships are represented in regional and global climate models.</i></p> |
| 10:25 – 10:55 a.m. | <p>BREAK</p> |
| 10:55 – 11:20 a.m. | <p>Yuhang Wang, Georgia Institute of Technology</p> <p>“Air quality impacts of extreme weather events: Historical analysis and future projection”</p> <p><i>Dr. Wang investigates how extreme weather events effect air quality on a regional scale, focusing on the effects on ozone and PM both historically and in future climate projects.</i></p> |
| 11:20 – 11:45 a.m. | <p>Peter Hess, Cornell University</p> <p>“Extreme Air Quality Events Using a Hierarchy of Models: Present and Future”</p> <p><i>Dr. Hess applies extreme value theory to simulations of future climate conditions and future emissions scenarios to develop a surrogate model of extreme events. He investigates the relationship and feedbacks between extreme pollution events and heat waves.</i></p> |
| 11:45 – 12:10 p.m. | <p>Shilang Wu, Michigan Technological University</p> <p>“Impacts of Climate-Induced Changes in Extreme Events on Ozone and Particulate Matter Air Quality”</p> <p><i>Dr. Wu quantifies the effects of climate change on temperature inversions, lightning-associated wildfires, heat waves and atmospheric stagnation. The consequential effects on ozone and PM air quality associated with any long-term changes in extreme events are evaluated.</i></p> |

12:10 – 12:30 p.m. Rona Birnbaum, EPA
Climate Science and Impacts Branch Chief
Climate Change Division, Office of Air and Radiation

12:30 – 2:00 p.m. LUNCH (on your own)

RESILIENCE IN THE FACE OF EXTREME EVENTS

Predicting the effects of climate change on extreme events provides a window into our future. In order to protect air quality and water quality it is necessary to deliver decision support tools and actionable information to decision makers and resources managers. The next speakers highlight prediction tools, policy needs, and projects to bridge the gap between climate scientists and decision makers.

2:00 – 2:20 p.m. Jeff Peterson, EPA
Senior Policy Advisor, Office of Water

2:20 – 2:45 p.m. Frank Muller-Karger, University of South Florida
“Ecological Assessment of Generalized Littoral Environments Decision-Support System (EAGLE/DS)”
Dr. Muller-Karger works closely with regional stakeholders and committed local partners, such as the Tampa Bay Estuary Program, to develop decision-support tools to understand past changes in climate, the occurrence of extreme events, and their impacts on water quality. The outcomes of this work will include predictions of water quality degradation, a decision-support system that integrates real-time environmental and satellite observations, and a strategy to educate the public and professionals engaged in coastal planning and development.

2:45 – 3:10 p.m. Karen Metchis, EPA
Office of Water
"Water Utilities and Extreme Events: Case Studies of Communities in Six Watersheds"

3:10 – 3:40 pm BREAK

- 3:40 – 4:05 pm Jason Rohr, University of South Florida
“The hazards of extreme climatic events: predicting impacts on water quality and wildlife and human disease risk”
Dr. Rohr investigates the increased emergence of water-borne diseases due to climate change increases in extreme climatic events. Rohr and colleagues hypothesize that the faster metabolism and smaller size of parasites, compared to their hosts, allows them to acclimate more quickly to unpredictable temperature shifts and extremes, providing parasites with an advantage in a more climatically variable environment. Rohr develops tools to predict how climatic variability and extremes will affect water quality by altering water-borne disease risk for wildlife and humans.
- 4:05 – 4:30 pm Anne Grambsch, EPA
Global Change Research Program
National Center for Environmental Assessment, Office of Research and Development
- 4:30 – 4:55 pm Louise Bedsworth, Public Policy Institute of California
“Integrating Information from Climate Scientists and Resource Managers: Informing Preparedness and Adaptation to Extreme Event Impacts on Air and Water Quality in California”
Dr. Bedsworth integrates top-down information from climate scientists regarding the historical, current and future impacts of climate change and extreme events, with survey-based data and analysis of how air and water quality managers understand the vulnerability of their systems to extreme events. This research will provide critical insights regarding how managers understand, classify, prepare for and respond to extreme events, and will work toward the development of indicators that more closely meet the needs for actionable information in response to climate-induced extreme events.

ADJOURN DAY 1

Day 2: February 27, 2013

8:30 – 9:00 a.m. Conference Registration

COMBINED SEWER OVERFLOWS, SEDIMENT AND POLLUTANT TRANSPORT – BEST MANAGEMENT PRACTICES AND TOOLS FOR RESILIENT INFRASTRUCTURE

The predicted changes to water quality and water quantity, particularly the increased likelihood of more severe precipitation events, will have dramatic effects on the Nation's infrastructure and waterways. The next speakers will discuss the implication of climate change and extreme events on storm water management, combined sewer overflow events and flood induced pollution. Their research emphasizes modeling tools, Best Management Practices, and applications for retrofitting resilient infrastructure.

- 9:00 – 9:20 a.m. Jason Berner, EPA
Economics and Environmental Assessment Branch
Office of Science and Technology, Office of Water
"Office of Water/ORD Stormwater Calculator and Stormwater Management Model
Climate Assessment Tools"
- 9:20 – 9:45 a.m. Arturo Leon, Oregon State University
"Prediction and quantification of CSOs under extreme storm events: Flow dynamics and
Reduction of CSOs"
*Dr. Leon is developing a model for predication and quantification of Combined Sewer
Overflows (CSOs) due to the highly dynamic flows of extreme weather conditions. An
outcome will be an open source model that can be used by Federal Agencies,
Municipalities and practitioners for predicting their own vulnerabilities to CSO events
due to extreme events and various climate change scenarios. The model will assess the
impacts of CSOs on the water quality of receiving water bodies such as streams, rivers
and lakes. The model will also provide users the ability to model, manipulate and modify
existing combined sewer system frameworks for assessing various proposed
modifications and for developing cost-effective retrofitting strategies for critical areas in
the system.*
- 9:45 – 10:05 a.m. Matthew Magnuson, EPA
Water Infrastructure Protection Division
National Homeland Security Research Center, Office of Research and Development

10:05 – 10:30 a.m. Jeffery Hatten, Oregon State University
“Role of land use and Best Management Practices (BMPs) in reducing the effect of extreme magnitude events on sediment and pollutant transport in the SE US Coastal Plain and Mississippi Alluvial Valley”
Dr. Hatten investigates the role of Best Management Practices (BMPs) and land use decisions on water quality in the face of climate change. Hatten explores the degree to which extreme storms will decrease the effectiveness of BMPs and change sediment and pollutant transport.

10:30 – 11:00 a.m. BREAK

COASTAL WATER QUALITY, URBAN STREAMS, AND HARMFUL ALGAL BLOOMS – TOOLS FOR RESOURCE MANAGERS

Predictable effects of extreme weather will be changes in water quality in our urban streams and coastal waters, and harmful algal blooms in our national lakes. The next speakers are building tools for predicting changes to water quality to help resource managers protect drinking water and avoid waterborne pathogens.

11:00 – 11:20 a.m. Amy Posner, EPA
Office of Ground Water and Drinking Water, Office of Water
“Preparing for Extreme Weather Events: Workshop Planner for the Water Sector”

11:20 – 11:45 a.m. Dennis Lettenmaier, University of Washington
“Prediction of Effects of Changing Precipitation Extremes on Urban Water Quality”
Dr. Lettenmaier is developing models to predict how the physical and chemical quality of urban streams will be affected due to extreme climate. The project is nationally scalable and investigates the extremes in precipitation, temperature, sediment loading, waterborne pathogens, and nutrients.

11:45 – 12:10 p.m. Jiyoung Lee, Ohio State University
“Ensuring Safe Drinking Water in Lake Erie: Quantifying Extreme Weather Impacts on Cyanobacteria and Disinfection Byproducts”
Dr. Lee uses molecular tools and satellite remote sensing to quantify water quality and human health risks of harmful algal blooms (HABs) and disinfection byproducts associated with extreme weather in Lake Erie drinking water. This research will investigate the impacts of extreme precipitation on urban runoff and urban water quality by integrating a set of models that will down scale climate simulations to spatial scales relevant to urban hydrology and land cover products. Products of this work will include molecular tools for quantifying cyanotoxins; remote sensing indicators for modeling water quality and human health; and visualization products that will

demonstrate future changes in drinking water quality (in both long-term forecasting predictions, and short-term forecasts immediately following an extreme event).

- 12:10 – 12:35 p.m. R. Jan Stevenson, Michigan State University
“Forecasting and Evaluating Vulnerability of Watersheds to Climate Change, Extreme Events, and Algal Blooms”
Dr. Stevenson quantitatively establishes the relationship between extreme events and Harmful Algal Blooms (HABs) and uses this information to predict the effects of future climate change on HABs and the associated vulnerability of watersheds on a national scale. This proposal will leverage recent developments in satellite remote sensing and water quality modeling to enable quantification of empirical relationships between changes in water quality and extreme events at scales that can inform long-term water quality management. Outputs of this research will include decision support tools for informing water quality management strategies under different climate change scenarios. The tools would be designed to provide mechanisms to link water quality and algae bloom responses to extreme events; evaluate historic changes in the frequency and intensity of such events; and manage future threats of algal blooms in the face of projected climate change.

12:35 – 2:00 p.m. LUNCH

ASSESSING THE IMPACT OF EXTREME EVENTS ON AIR & WATER QUALITY

Climate change induced extreme events will lead to predictable changes in air quality and water quality. The next speakers highlight the interaction of air quality and water quality changes and the resulting consequences on agriculture, national air pollution events, and human health.

- 2:00 – 2:25 p.m. Glynis Lough, U.S. Global Change Research Program
National Climate Assessment Chief of Staff
- 2:25 – 2:50 p.m. Arlene Fiore, Columbia University
“Combining Empirical Orthogonal Function and Extreme Value Theory Methods to Characterize Observed and Future Changes in Extreme U. S. Air Pollution Events”
Dr. Fiore uses extreme value theory to characterize changes in extreme ozone and PM events on a national scale. Using several pollution emission scenarios, Fiore predicts the probability of frequency, duration, and intensity of extreme air pollution and extreme precipitation events due to climate change.
- 2:50 – 3:15 p.m. David Allen, University of Texas at Austin
“Response of regional air quality to severe drought”
Dr. Allen investigates the air quality effects of severe drought in Texas due to climate change. He develops tools to assess the impacts of severe droughts on ozone and PM

due to climate change induced changes in land use, plant stomatal resistance, soil moisture and agriculture operations.

3:15 – 3:40 p.m. Daven Henze, University of Colorado Boulder
“Source attribution of radiative forcing from short lived climate forcing agents”

3:40 – 4:00 p.m. Terry Keating, EPA
Office of Policy Analysis and Review, Office of Air and Radiation

CLOSING REMARKS & ADJOURN