U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

8th Annual Probabilistic Flood Hazard Assessment Research Workshop
March 21-24, 2023 (Hybrid)
- *NRC HQ, One White Flint North
  11555 Rockville Pike, Rockville, MD 20852*
- *MS Teams (see daily MS Teams links)*

Daily Start time: 10:00AM Eastern Time

FINAL AGENDA

Day 1 (March 21, 2023)

Session 1A: Introduction
Session Chair: Joseph Kanney, NRC/RES

1A-0	10:00 - 10:10	Meeting and Webinar Logistics	*Kenneth Hamburger*, NRC/RES*
1A-1	10:10 - 10:20	Opening Remarks	*Ray Furstenau*, Director, NRC Office of Research*
1A-2	10:20 - 10:35	NRC PFHA Research Program Update	*Tom Aird*, NRC/RES*
1A-3	10:35 - 11:00	Presentation and Training: Resilience Analysis and Planning Tool (RAPT)	*Karen Marsh, Benjamin Rance, Scott Mahlik*; Federal Emergency Management Agency (FEMA)*
1A-4	11:00 - 11:25	Committee on the Safety of Nuclear Installations (CSNI) Working Group on External Events (WGEV)	*Minkyu, Kim*, Korea Atomic Energy Research Institute, Division of Structural and Seismic Safety (WGEV Chair)*
	11:25 - 11:40	**Break**	

Session 1B: Climate and Weather
Session Chair: Elena Yegorova, NRC/RES

1B-1	11:40 - 12:05	Overview of the U.S. Global Change Research Program	Michael Kuperberg*, Executive Director, U.S. Global Research Program
1B-2	12:05 - 12:30	A Coastal Flood Regime Shift Is on the Horizon	William Sweet*, NOAA National Ocean Service
	12:30 - 13:30	**Lunch**	
1B-3	13:30 - 13:55	Observation-based Trajectory of Future Sea Level for the Coastal United States Tracks Near High-end Model Projections	Benjamin Hamlington*[1], Don Chambers[2], Thomas Frederikse[1], Soenke Dangendorf[3], Severine Fournier[1], Brett Buzzanga[1,2], R. Steven Nerem[4]; [1]NASA Jet Propulsion Laboratory, [2]University of South Florida, [3]Tulane University, [4]University of Colorado, Boulder

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1B-4	13:55 - 14:20	National Weather Service Forecasts for the late December 2022 to mid-January 2023 West Coast Atmospheric Rivers	Mark Fresch*[1], Alex Lamers*[2]; [1]NOAA National Weather Service Office of Water Prediction, [2]NOAA National Weather Service Weather Prediction Center
	14:20 - 14:30	**Break**	
1B-5	14:30 - 14:55	Sharpening of cold-season storms over the western United States	Xiaodong Chen, L. Ruby Leung*, Yang Gao, Ying Liu, Mark Wigmosta; Pacific Northwest National Laboratory
1B-6	14:55 - 15:20	2022 U.S. Billion-dollar Weather and Climate Disasters Analysis and Tools	Adam Smith*, NOAA National Centers for Environmental Information (NCEI)
1B-7	15:20 - 15:40	Climate and Weather Panel Discussion	All Presenters
1C	15:40 - 15:50	Day 1 Wrap-up	

Day 2 (March 22, 2023)

Session 2A: Precipitation
Session Chair: Joseph Kanney, NRC/RES

2A-1	10:00 - 10:25	NOAA's Exploration of Future Probable Maximum Precipitation Datasets and Methods	Kelly Mahoney*[1], Janice Bytheway[2], Diana Stovern[2], James Correia[3], Sarah Trojniak[3], Ben Moore[1]; [1]NOAA Physical Sciences Laboratory (PSL), [2]NOAA PSL/University of Colorado Boulder & Cooperative Institute for Earth System Research and Data Science (CIESRDS), [3]University of Colorado Boulder & CIESRDS, NOAA/NWS/Weather Prediction Center
2A-2	10:25 - 10:50	The "Perfect Storm": Can Atmospheric Models Improve Confidence in Probable Maximum Precipitation (PMP)?	Emilie Tarouilly*, University of California, Los Angeles

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2A-3	10:50 - 11:15	Improving the Reliability of Stochastic Modeling of Short-Duration Precipitation by Characterizing Spatiotemporal Correlation Structure and Marginal Distribution	Giuseppe Mascaro*[1], Simon Papalexio[2], Daniel Wright[3]; [1]Arizona State University, [2]University of Calgary, [3]University of Wisconsin-Madison
	11:15 - 11:25	Break	
2A-4	11:25 - 11:50	Stochastic Design Storm Sequence in the Lower Mississippi River Basin	Yuan Liu*, Daniel Wright; University of Wisconsin-Madison
2A-5	11:50 - 12:15	An Update to the NOAA Atlas 14 National Precipitation Frequency Standard	Michael St Laurent*, Sandra Palovic, Carl Trypaluk, Dale Unruh, Fernando Salas; NOAA National Weather Service Office of Water Prediction
2A-6	12:15 - 12:35	Precipitation Panel Discussion	All Presenters
	12:35 - 13:30	Lunch	

Session 2B: Riverine Flooding
Session Chair: Joseph Kanney, NRC/RES

2B-1	13:30 - 13:55	Lowering the Barriers to Process-Based Probabilistic Flood Frequency Analysis using the NextGen Water Modeling Framework	Daniel, Wright*[1], Ankita Pradhan[1], Mohammad Sadegh Abbasian[1], Benjamin Fitzgerald[1], Gary Aaron[1], Fred Ogdan[2], Mathew Williamson[2]; [1]University of Wisconsin-Madison, [2]NOAA National Water Service Office of Water Prediction
2B-2	13:55 - 14:20	Towards the Development of a High-Resolution Historical Flood Inundation Reanalysis Dataset for the Conterminous United States	Sudershan Gangrade*[1], Ganesh Ghimire[1], Shih-Chieh Kao[1], Mario Morales-Hernandez[2], Michael Kelleher[1], Alfred Kalyanapu[3]; [1]Oak Ridge National Laboratory, [2]University of Zaragoza (Spain), [3]Tennessee Technological University

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2B-3	14:20 - 14:45	Quantifying Uncertainty for Local Intense Precipitation and Riverine Flooding PFHA at Critical Structures on the Idaho National Labs Property	Ryan Johnson*[1], Shaun Carney[1], Paul Micheletty[1], Debbie Martin[1], Bruce Barker[2]; [1]RTI International, [2]MGS Engineering	
	14:45 - 14:55	Break		
2B-4	14:55 - 15:20	Back to the Future: Paleoflood Hydrologic Analyses Provide Insights into Extreme Flood Risk in the Tennessee River Basin	Lisa Davis*[1], Ray Lombardi[2], Matthew Gage[1]; [1]University of Alabama, [2]University of Memphis	
2B-5	15:20 - 15:45	Testing New Approaches to Integrating Sediment-Based Flood Records into Flood Frequency Models	Ray Lombardi*[1], Lisa Davis[2], Tessa Harden[3,4], John F. England, Jr.[5]; [1]University of Memphis, [2]University of Alabama, [3]Thomas College, [4]U.S. Geological Survey, [5]U.S. Army Corps of Engineers, Risk Management Center	
2B-6	15:45 - 16:10	Using Paleoflood Analyses to Improve Hydrologic Loading for USACE Dam Safety Risk Assessments: A Nationwide Approach	Keith Kelson*[1], Justin Pearce[2], Amy LeFebvre[2], Ryan Clark[3], Bryan Freymuth[4], Nathan Williams[5], John England[2]; [1]US Army Corps of Engineers (USACE), South Pacific Division Dam Safety Production Center, [2]USACE Risk Management Center, [3]USACE Dam Safety Modification Mandatory Center of Expertise, [4]USACE Northwest Division Risk Cadre, [5]USACE Lakes and Rivers Division Risk Cadre	
2B-7	16:10 - 16:30	Riverine Flooding Panel Discussion	All Presenters	
2C	16:30 - 16:40	Day 2 Wrap-up		

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Day 3 (March 23, 2023)

Session 3A: Posters
Session Chair: Thomas Aird, NRC/RES

3A-1	10:00 - 10:15	Identifying and Cataloging Major Storm Events from Gridded Quantitative Precipitation Estimates for use in Stochastic Storm Transposition	Alyssa Dietrich*, Eric King, Seth Lawler; Dewberry
3A-2	10:15 - 10:30	A Bayesian Network and Monte Carlo Simulation PRA Approach for External Flood Probabilistic Risk Assessments at Nuclear Power Plants	Joy Shen*, Michelle Bensi, Mohammad Modarres; University of Maryland, College Park
3A-3	10:30 - 10:45	Probabilistic Compound Flood Hazard Assessment Using Two-Sided Conditional Sampling	Somayeh Mohammadi*[1], Ahmed Nasr[2], Muthukumar Narayanaswamy[1], Celso Ferreira[1], Arslaan Khalid[1]; [1]Michael Baker International Inc, [2]University of Central Florida
3A-4	10:45 - 11:00	Estimation of Probabilistic Flood Hazard Curve at the NPP Site Considering Storm Surge	Beom-Jin Kim*, Minkyu, Kim; Korea Atomic Energy Research Institute (KAERI)
3A-5	11:00 - 11:15	Compound Flood Risk Assessment of the Coastal Watersheds of Long Island and Long Island Sound in Connecticut and New York	Liv Herdman*, Robert Welk, Robin Glas, Salme Cook, Kristina Masterson; U.S. Geological Survey New York Water Science Center
	11:15 - 11:25	Break	
3A-6	11:25 - 11:40	Steps Toward Extensions of Existing Probabilistic Coastal Hazard Analysis for Coastal Compound Flood Analysis Leveraging Bayesian Networks	Ziyue Liu*[1], Michelle, Bensi[1], Meredith Carr[2], Norberto Nadal-Caraballo[2], Madison Yawn[2], Luke Aucoin[2]; [1]University of Maryland, College Park, [2]U.S. Army Corps of Engineers, Engineer R&D Center, Coastal & Hydraulics Laboratory

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3A-7	11:40 - 11:55	Assessing Uncertainty Associated with Hurricane Predictions and Duration to Inform Probabilistic Risk Assessments for Nuclear Power Plants	Kaveh Faraji Najarkolaie*, Michelle Bensi; University of Maryland, College Park
3A-8	11:55 - 12:10	Assessment of Uncertainty Associated with the Development of Intensity Duration Frequency Curves under Changing Climate for the State of Maryland	Azin Al Kajbaf*[1], Michelle Bensi[2], Kaye Brubaker[2]; [1]Johns Hopkins University, [2]University of Maryland, College Park
	12:10 - 13:10	Lunch	

Session 3B: Coastal Flooding
Session Chair: Joseph Kanney, NRC/RES

3B-1	13:10 - 13:35	Flood Inundation Modelling on Nuclear Power Plant Site due to Complex Disasters	Byunghyun Kim*[1], Jaewan Yoo, Beomjin Kim[2], Minkyu Kim[2]; [1]Kyungpook National University, [2]Korea Atomic Energy Research Institute
3B-2	13:35 - 14:00	Probabilistic Flood Hazard Assessment for a Coastal Nuclear Power Plant Using Climate Change Projections	Gorkem Gungor*, Zeynep Arslan; Minstry of Energy and Natural Resources, Turkey
3B-3	14:00 - 14:25	Probabilistic Coastal Compound Flood Hazard Analysis Pilot Study	Victor M. Gonzalez[1], Meredith L. Carr*[1], Luke Aucoin[1], T. Chris Massey[1], Ning Lin[2], Dazhi Xi[2], Norberto C. Nadal Caraballo[1], Karlie Wellls[1]; [1]U.S. Army Corps of Engineers, Engineer Research and Development Center, Coastal and Hydraulics Laboratory, [2]Princeton University
	14:25 - 14:35	Break	

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3B-4	14:35 - 15:00	HEC-RAS Modeling Framework and Lessons Learned from Coastal Flooding PFHA Pilot Study: Coupling and Automation of HEC-HMS and ADCIRC Outputs to 2D HEC-RAS Model Using Python	Kathleen Harris*, Chase Hamilton, Weleska Echevarria-Doyle, Meredith Carr, Victor Gonzales Nieves; U.S. Army Corps of Engineers, Engineer Research and Development Center, Coastal and Hydraulics Laboratory
3B-5	15:00 - 15:25	An Overview of a Multi-Agency Modeling Effort to Quantify Future Conditions in the Great Lakes	Margaret Owensby*[1], T. Chris Massey[1], Robert Jensen[1], Norberto Nadal-Caraballo[1], Madison Yawn[1], David Bucaro[2], Johnna Potthoff[2], Kaitlyn McClain[2]; [1]U.S. Army Corps of Engineers, Engineer Research and Development Center, Coastal and Hydraulics Laboratory, [2]U.S. Army Corps of Engineers, Chicago District
3B-6	15:25 - 15:45	Coastal Flooding Panel Discussion	All Presenters
3C	15:45 - 15:55	Day 3 Wrap-up	

Day 4 (March 24, 2023)

Session 4A: Operational Experience
Session Chair: Tom Aird, NRC/RES

4A-1	10:00 - 10:20	PRA Modeling the FLEX Strategies for External Hazards	John Hanna*, U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation
4A-2	10:20 - 10:40	Failure to Verify Flood Restoration Times at Millstone Unit 2	Dave Werkheiser*, U.S. Nuclear Regulatory Commission, Region 1
4A-3	10:40 - 11:00	Impact of the 2022 Lake Erie Seiche the Davis-Besse Nuclear Power Station	Daniel Mills*[1], Russ Cassara[1], John Hanna[2]; [1]U.S. Nuclear Regulatory Commission, Davis Bessie Resident Inspector, [2]U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation
4A-5	11:00 - 11:15	Operational Experience Panel Discussion	All Presenters

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| | 11:15 - 11:25 | **Break** | |

Session 4B: Wrapping Up
Session Chair: Tom Aird, NRC/RES

4B-1	11:25 - 11:50	On Fuzzy-Systems Modeling of Ponded Infiltration, as Analogue to Flooding, in Fractured-Porous Subsurface Media	Boris Faybishenko*; Lawrence Berkeley National Laboratory
	11:50 - 13:00	**Lunch**	
	13:00 - 13:25	Probabilistic Flood Hazard Assessment for Local Intense Precipitation at Nuclear Power Plant Sites – A Pilot Study	Rajiv Prasad*[1], Arun Veeramany[1], Rajesh K. Singh[1], Joseph Kanney[2]; [1]Pacific Northwest National Laboratory, [2]U.S. Nuclear Regulatory Commission
	13:25 - 13:50	Research Activities on Extreme External Hazard Risk Assessment of Korean NPP	Minkyu Kim*, Daegi, Hahm; Korea Atomic Energy Research Institute (KAERI)
	13:50 - 14:00	**Break**	
	14:00 - 14:25	External Flooding PRA Guidance	Marko Randelovic*[1], Raymond Schneider*[2]; [1]Electric Power Research Institute, [2]Westinghouse Company
	14:25 - 14:50	A Proposal for Paradigm Shift in Hydrological Ensemble Predictions: From Parameter Inference to Probabilistic Error Estimation	Vinh Ngoc Tran*[1], Valeriy Y. Ivanov[1], Donghui Xu[1], Jongho Kim[2]; [1]University of Michigan, [2]University of Ulsan, South Korea
4D	14:50 - 15:10	Workshop Wrap-up Discussion	