HEPEX Workshop and Anniversary!
Shaping the Future of Hydrological Forecasting
25-27th March 2025
The University of Alabama, Tuscaloosa, Alabama, United States

WORKSHOP AGENDA

(update: 10 March 2025)

**All times shown are in the local time zone of the workshop location.*

Day 1: 25th March 2025 (Tuesday)		
08.30 - 09.00	**Registration**	
09.00 - 09.10	**Welcoming note from The University of Alabama**	Hamid Moradkhani
09.10 - 09.20	**Welcoming note from the Alabama Water Institute and CIROH**	Steven Burian and Ed Clark
09.20 - 09.30	**Presentation of HEPEX / EC-HEPEX and workshop aims**	Ilias Pechlivanidis
Session 1: Meteorological advancements driving hydrological forecasts at different time scales Chair: Andy Wood		
09.30 - 09.40	Deep diffusion model-based precipitation ensemble prediction	Wentao Li
09.40 - 09.50	Towards seamless rainfall forecasts for flood early warning in fast-responding basins - (Online)	Ruben Imhoff
09.50 - 10.00	Correcting spurious “rain bombs” (localized high rainfall) in ERA5 for improved hydrological simulations	Nikolaos Mastrantonas
10.00 - 10.10	Innovations toward enhanced ensemble streamflow predictions in NOAA’s NextGen framework	Mimi Abel
10.10 - 10.20	Open Discussion	
10.20 - 10.30	**Presentation of posters (2 minutes each) - Block 1**	See list of posters
10.30 - 11.00	**Coffee break / Poster display**	
Session 2: Forecasting at different time scales addressing sectoral needs Chair: Louise Arnal		
11.00 - 11.30	**Keynote talk #1 HEPEX: Meeting the promise and challenges of probabilistic streamflow forecasting**	Rob Hartman
11.30 - 11.40	Challenges in operational prediction of high flow events at small basin scales across United States	Felipe Quintero
11.40 - 11.50	Advancing real-time flood and drought forecasting in Germany: Insights from the IFS-mHM modeling system - (Online)	Husain Najafi
11.50 - 12.00	Hydrological forecasting in Central Asia: challenges, experiences and future needs - (Online)	Abror Gafurov

12.00 - 12.10	Improving process understanding/representation in (fast) high resolution distributed hydrological model for forecasting, climate scenarios and digital twin applications	Albrecht Weerts
12.10 - 12.25	Open Discussion	
12.25 - 13.30	**Group Photo and Lunch**	
13.30 - 14.45	**Breakout group discussions**	
14.45 - 15.00	**Presentation of posters (2 minutes each) - Block 2**	See list of posters
15.00 - 15.30	**Coffee break / Poster display**	
Session 3: Recent advances in impact-based forecasting and system evaluations Chair: Claudia Bertini		
15.30 - 15.50	**Reporting back from the breakout group discussions**	
15.50 - 16.00	Real-time use of short-range hydrologic ensemble forecasts in the Eastern US and potential near-term improvements - (Online)	Seann Reed
16.00 - 16.10	A community protocol for short-range streamflow forecast evaluation across CONUS headwater catchments: Examples from the CIROH hydrologic prediction testbed	Josh Sturtevant
16.10 - 16.20	Advancing hydrological forecasting through multi-model evaluation of conceptual functional equivalent models and the national water model	Sifan A. Koriche
16.20 - 16.30	Open Discussion	
16.30 - 16.40	Hazard mapping framework: Generating clear and focused alerts while incorporating spatial rainfall uncertainty	Tali Horowitz
16.40 - 16.50	Evaluating hydrologic model oerformance toward advancing the national water model operational forecast within the NextGen framework	Xia Feng
16.50 - 17.00	A data-driven approach for impact-based forecasting and early warnings	Akshay Singhal
17.00 - 17.10	Integrating social and physical aspects for advanced flood impact forecasting: A transdisciplinary and co-production effort	Emixi Valdez
17.10 - 17.20	Open Discussion	
17.20 - 19.00	**Free time**	
19.00 - 22.00	**Dinner (at own expense)**	

Day 2: 26th March 2025 (Wednesday)		
Session 4: Novelties in probabilistic modelling, prediction, uncertainty quantification and communication Chair: Hamid Moradkhani		
09.00 - 09.10	Probabilistic predictions across large geographical domains	Martyn Clark
09.10 - 09.20	Dynamic combination of a multi-model ensemble for improved streamflow prediction	Cyril Thébault

09.20 - 09.30	Assessing the seasonal forecastability of harmful algal blooms in Lake Champlain	Rakhshinda Bano
09.30 - 09.40	Hydrologic ensemble data assimilation for the Next Generation Water Resource Modeling Framework (NextGen)	Ehsan Foroumandi
09.40 - 09.50	2D probabilistic flood forecasting with Torrent: A Lagrangian rivulet-based approach – (Online)	Brent Daniel
09.50 - 10.00	Using science communication and user-centric strategies to improve hydrologic science dissemination	Lakelyn Taylor
10.00 - 10.15	Open Discussion	
10.15 - 10.30	**Presentation of posters (2 minutes each) - Block 3**	See list of posters
10.30 - 11.00	**Coffee break / Poster display**	
Session 5: Enhancing early warnings and hydro-climate services Chair: Edward Clark		
11.00 - 11.30	**Keynote talk #2** **Global Efforts to Enhance Hydrologic Forecasting** – (Online)	Stefan Uhlenbrook and Hwirin Kim
11.30 - 11.40	Lessons for service delivery: Increasing the utility and accessibility of the National Water Model for capacity limited end users	Kristin Raub
11.40 - 11.50	Improving operational ensemble hydrologic forecasting in the USA with NextGen capabilities	Louise Arnal
11.50 - 12.00	Seasonal streamflow predictions with a fully coupled Global Climate Model	Gabriel Narvaez-Campo
12.00 - 12.10	Decision-timelines: A participatory tool to help understand the decisions users take and value hydrological (ensemble) predictions	Micha Werner
12.10 - 12.20	Strategic innovations in research-to-operations hydrological forecasting: Enhancing value across spatial scales and time horizons	Ilias Pechlivanidis
12.20 - 12.30	Open Discussion	
12.30 - 13.30	**Lunch**	
13.30 - 13.40	The integrating prediction of precipitation and hydrology for early actions (InPRHA) project at WWRP WMO and how the HEPEX community can contribute to it - (Online)	Rachel Carr
13.40 - 13.50	20-Year of Global Flash Flood Guidance – lessons learned and way forward.	Eylon Shamir
13.50 - 14.00	Delft-FEWS and HEPEX: Celebrating 20 years of synergy and success	Albrecht Weerts
14.00 - 14.10	A look back into 20 years after introducing ensemble predictions for flood warning	Maria-Helena Ramos
14.10 - 14.20	Advancing hydrological research through the WMO Research Board Task Team on Hydrology Research	Ilias Pechlivanidis
14.20 - 14.30	Open Discussion	
14.30 - 18.30	**Field visit – Moundville Archeological Park**	
18.30 - 19.30	**Free time**	
19.30 - 22.00	**Dinner (at own expense)**	

Day 3: 27th March 2025 (Thursday)		
Session 6: AI-enhanced hydrological forecasting across time horizons Chair: Ilias Pechlivanidis		
09.00 - 09.30	**Keynote talk #3 ML advances, from theory to applications to operations, improved predictions and understanding our physical world**	Jonathan Frame
09.30 - 09.40	Machine-Learning-aided forecasting of drought-related extremes (MaLeFiX) - (Online)	Massimiliano Zappa
09.40 - 09.50	ML-based regionalization for enhanced hydrological modeling in ungauged basins - (Online)	Yiheng Du
09.50 - 10.00	Optimizing regional hydrological forecasting with AI-driven ensemble learning: Lessons from rainfall-runoff modeling - (Online)	Farzad Hosseini
10.00 - 10.10	Exploring hybrid forecasting frameworks for subseasonal low flow predictions in the European Alps - (Online)	Annie Chang
10.10 - 10.25	Open Discussion	
10.25 - 10.40	**Presentation of posters (2 minutes each) - Block 4**	See list of posters
10.40 - 11.10	**Coffee break / Poster display**	
Session 7: Advances in using probabilistic predictions for risk-based decision-making Chair: Nathalie Voisin		
11.10 - 11.20	Using Gradient Boosting Regressor to Quantify the Impact of Snow Water Equivalent on Spring-Summer Water Supply Forecasts in the Western U.S.	Haowen Yue
11.20 - 11.30	AI-based seasonal streamflow forecasts for Europe	Claudia Bertini
11.30 - 11.40	Leveraging AI to identify extreme hurricane flood scenarios	Karthik Balaguru
11.40 - 11.50	Enhancing Risk-Based Decision Making and Disaster Preparedness through High-Resolution and Impact-Based Flood Early Warning Systems - (Online)	Husain Najafi
11.50 - 12.00	Open Discussion	
12.00 - 12.10	Supporting Forecast Informed Reservoir Operation Studies Through Hydrologic Ensemble Hindcasting (HEFS) - (Online)	Brett Whitin
12.10 - 12.20	Advancements and prospects in probabilistic forecasting: some perspective from CNR - (Online)	Laurie Caillouet
12.20 - 12.30	An Ensemble Hydrological Prediction System for Water Management in the US Pacific Northwest	Andy Wood
12.30 - 12.40	Evaluating a Decade of Progress: Characterizing Improvements in Hydrologic Ensemble Forecast Service (HEFS) Skill in the Western US	Madeline Allen
12.40 - 12.50	Open Discussion	
12.50 - 13.05	**Presentation of posters (2 minutes each) - Block 5**	See list of posters
13.05 - 14.00	**Lunch**	
Session 8: Forecast advances to support reservoir and infrastructure operations Chair: Steven Burian		
14.00 - 14.10	Russian River Forecast Informed Reservoir Operations – (Online)	Chris Delaney

14.10 - 14.20	Enhancing hydrological ensemble forecasting for Uruguay's electric system simulator - (Online)	Alejandra De Vera
14.20 - 14.30	Synthetic ensemble forecasts: development, operational evaluation, and inter-model comparison for stylized reservoir systems across California	Zach Brodeur
14.30 - 14.40	Advances in developing business cases and value streams for hydro-climate services dedicated to the power grid	Nathalie Voisin
14.40 - 14.50	Hydropower Scheduling Oriented Inflow Forecast Evaluation for Great River Hydro	Cameron Bracken
14.50 - 15.00	Open Discussion	
15.00 - 15.30	**Coffee break / Poster display**	
15.30 - 16.30	**Early Career Panel: Discussion on tools, resources, and skill gaps in hydrological forecasting**	
16.30 - 17.00	**Closing of the workshop - Ideas for the next HEPEX workshop**	
17.00 - 19.00	**Free time**	
19.00 - 22.00	**Dinner (at own expense)**	

List of Posters		
#	**Title**	**Presenter**
Block 1 (Day 1)	Climate Change Effects on Groundwater Recharge and Yield	Deen Islam
	Potential of two Statistical Post Processing Techniques in Improving Predictive Skills of Heavy Rainfall – Case Studies over Texas and California	Nasrin Fathollahzadeh Attar
	Optimizing Groundwater Management in Coastal Alabama: A Multi-Objective Approach for Mitigating Seawater Intrusion	Olaoluwa Oluwaniyi
	Predicting Seawater Intrusion in Baldwin County, Alabama: Impact of Storm Surges and Human Activities Using Physical and Machine Learning Models	Hossein Gholizadeh
	Ensemble-Based Forecasting of cyanoHABs: Challenges and Opportunities Using an Integrated Early Warning System in Northeastern Lake Champlain	Panagiotis Oikonomou
Block 2 (Day 1)	Performance of Rain-on-Snow Flood Forecasts from Two Operational Hydrologic Models During the 2022 Montana Floods	Siwei He
	Integrating Operational Forecast Products for Probabilistic Flood Inundation Mapping in Compound Flood Event	Francisco Gomez
	fimserve: A Python Package for Operational Flood Inundation Mapping across CONtiguous United States	Anupal Baruah
	A Python-Based Automated Framework for Evaluating Flood Inundation Mapping Predictions Across Diverse Benchmark Datasets	Dipsikha Devi
	Toward Robust Evaluations of Flood Inundation Predictions Using Remote Sensing Derived Benchmark Maps	Sagy Cohen
Block 3 (Day 2)	Socio-Hydrological Vulnerability and the Role of Radar Coverage in Flood Risk Management	Mohamed Abdelkader

	Integrating SUMMA and Evolutionary Particle Filter Data Assimilation for Enhanced Streamflow Forecasting	Fatemeh Rezaei Aderyani
	The role of Hyperparameter Optimization in Data Assimilation for Uncertainty-Aware Hydrologic Forecasting	Ali Takallou
	Predicting flow and transport in heterogeneous geological media using fractional calculus: A review and future perspectives	Yong Zhang
	Groundwater Drought Monitoring using Data Assimilation	Parnian Ghaneei
Block 4 (Day 3)	Assessing the effectiveness of flood forecasts and warnings in small, ungauged basins impacted by Hurricane Helene	Katie van Werkhoven
	Decision Calendars and Open FEWS Development to Advance Cold Regions Research to Operations	Dave Casson
	Assessing Water Resource Vulnerability to Human Activity and Climate Change in Alabama's Gulf Coastal Plain: An Integrated Modeling Study	Md Riad Arefin
	Enhancing hydroclimatic projections in Southern Quebec with multiple hydrological models	Louise Arnal
	Analyzing the June 2024 Flood Event in Northwest Iowa: Challenges and Opportunities for Improved Warning Lead Times	Humberto Vergara
	Using Remote Sensing of Glacial Lake Outburst to Improve Downstream Flood Prediction	Qiuhong Tang
	Development of an under-ice river discharge forecasting system in Delft-Flood Early Warning System (Delft-FEWS) for the Chaudière River based on a coupled hydrological-hydrodynamic modelling approach.	Kh Rahat Usman
Block 5 (Day 3)	Enhancing Flood Forecasting Using Time Generative Adversarial Network	Ali Sattari
	Coupling Artificial Intelligence Methods to Provide Robust but Flexible Enhancements to Ensemble Streamflow Prediction for Extreme Events	Taylor Dixon
	Machine Learning-Based Analysis of Surface Water-Groundwater Interactions and Nitrate Dynamics Under Variable Hydroclimatic Conditions	Bahareh Karimidermani
	Niagara Hydroelectric Production System (NHPS)	Arnejan van Loenen
	A Generative AI Framework for Probabilistic Blending of Multi-source Hydrometeorological Datasets	Nischal Karki
	Understanding the dynamics of hydrologic risk to distributed stormwater infrastructure	Omar Wani

Partnership with: CIROH, World Meteorological Organization, University of Alabama, Pacific Northwest National Laboratory

WORLD METEOROLOGICAL ORGANIZATION

THE UNIVERSITY OF ALABAMA

Pacific Northwest NATIONAL LABORATORY

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