



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

WORKSHOP AGENDA

(update: 11 February 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 CIROH consortium	Steven Burian
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	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 Start of HEPEX and evolution of ensemble 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: Stefan Uhlenbrook		
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	Seann Reed
16.00 - 16.10	The Hydrologic Ensemble Forecast Service Improvements - 2025 Update	Mark Fresch
16.10 - 16.20	A Community Protocol for Short-Range Ensemble Streamflow Forecast Evaluation across CONUS Headwater Catchments: Examples from the CIROH Hydrologic Prediction Testbed	Josh Sturtevant
16.20 - 16.30	Advancing Hydrological Forecasting through Multi-Model Evaluation of Conceptual Functional Equivalent Models and the National Water Model	Sifan A. Koriche
16.30 - 16.40	Open Discussion	
16.40 - 16.50	Hazard Mapping Framework: Generating Clear and Focused Alerts While Incorporating Spatial Rainfall Uncertainty	Tali Horowitz
16.50 - 17.00	Evaluating Hydrologic Model Performance Toward Advancing the National Water Model Operational Forecast within the NextGen Framework	Xia Feng
17.00 - 17.10	A data-driven approach for impact-based forecasting and early warnings	Akshay Singhal
17.10 - 17.20	Integrating Social and Physical Aspects for Advanced Flood Impact Forecasting: A Transdisciplinary and Co-production Effort	Emixi Valdez
17.20 - 17.30	Open Discussion	
17.30 - 19.00	Free time	
19.00 - 22.00	Dinner	

Day 2: 26th March 2025 (Wednesday)		
Session 4: Novelty 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	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 and Claudia Bertini		
11.00 - 11.30	Keynote talk #2 Global Efforts to Enhance Hydrologic Forecasting	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	Decision-Timelines: A participatory tool to help understand the decisions users take and value hydrological (ensemble) predictions	Micha Werner
11.50 - 12.00	Strategic innovations in research-to-operations hydrological forecasting: Enhancing value across spatial scales and time horizons	Ilias Pechlivanidis
12.00 - 12.15	Open Discussion	
12.15 - 12.30	Presentation of posters (2 minutes each) - Block 4	See list of posters
12.30 - 13.30	Lunch	
13.30 - 13.40	Seasonal streamflow predictions with a fully coupled Global Climate Model	Gabriel Narvaez-Campo
13.40 - 13.50	Improving Operational Ensemble Hydrologic Forecasting in the USA with NextGen Capabilities	Louise Arnal
13.50 - 14.00	The Integrating Prediction of Precipitation and Hydrology for Early Actions (InPRHA) project at WWRP WMO and how the HEPEX community can contribute to it	Rachel Carr
14.00 - 14.10	Open Discussion	
14.10 - 14.20	A look back into 20 years after introducing ensemble predictions for flood warning	Maria-Helena Ramos
14.20 - 14.30	20-Year of Global Flash Flood Guidance – lessons learned and way forward.	Eylon Shamir
14.30 - 14.40	Delft-FEWS and HEPEX: Celebrating 20 Years of Synergy and Success	Albrecht Weerts
14.40 - 14.50	Advancing Hydrological Research through the WMO Research Board Task Team on Hydrology Research	Ilias Pechlivanidis
14.50 - 15.00	Open Discussion	
15.00 - 15.30	Coffee break / Poster display	
15.30 - 19.00	Visit and Free time	
19.00 - 22.00	Dinner	



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 AI/ML Revolution	TBC
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 5	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 - 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	Chris Delaney
14.10 - 14.20	Enhancing hydrological ensemble forecasting for Uruguay's electric system simulator	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	Group Activity / Serious Gaming	
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	

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)	Towards best practices for evaluating hydrometeorological models used in decision making	James Brown
	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	Sergio Herazo



	Integrating SUMMA and Evolutionary Particle Filter Data Assimilation for Enhanced Streamflow Forecasting	Fatemeh Rezaei Aderyani
	Challenges of Quantifying and Communicating the Uncertainty of Evaluation Metrics for a Continental-scale Hydrological Model	Jason Regina
	The role of Hyperparameter Optimization in Data Assimilation for Uncertainty-Aware Hydrologic Forecasting	Ali Takallou
	Enhancing Arctic Sea Ice Forecasts through a Multi-Model Ensemble Framework	Sean Horvath
	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 2)	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	Qihong 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)	A Machine Learning Approach for Streamflow Forecast in Montane Catchments in the Northeastern US	Mirce Morales Velazquez
	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



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