Water Challenges in a Changing World

JANUARY NEWSLETTER

Welcome to the January 2025 edition of the Water Challenges theme newsletter! **Happy New Year!** As we welcome 2025, we want to take a moment to thank you for being part of the Water Theme community. Your contribution to our events and newsletter is much appreciated.

This year, we look forward to bringing you more exciting events, including World Water Day 2025, Water Seminar Series and more workshops to benefit you, your students and the theme - keeping you informed, inspired, and connected.

Here's to a year filled with new opportunities, meaningful moments, and shared success. Let's make 2025 a fantastic journey together!

CHRISTMAS GET TOGETHER

All members of the water theme were invited to join us for our end of year/ Christmas get together. We went for a Lebanese cuisine and members of the

group also brought in their own delicacies which were enjoyed by all, followed by a fantastic quiz, organised by Lee Haverson. Thank you, Lee. It's always great to get the group together and we encourage you to join us next year!

SUCCESSFUL VIVA

We are thrilled to congratulate Dr Grace Davies on successfully passing her viva and earning her PhD! Grace's PhD looked at the suitability of currently used standardised test methods for measuring the biodegradation of polymers in soils. Grace is moving to The University of Queensland, Australia for a postdoctoral research position looking into future methodologies to identify nanoplastics in complex human samples.

This achievement is a testament to her dedication and expertise. We wish Grace the best of luck with all of her future endeavours. Well done, Dr Grace Davies.

WATER SEMINAR SERIES – FEBRUARY

You are warmly invited to join us for the first two Water Seminar Series talks of the year. The first one is by guest speaker, Prof Daniel Parsons from Loughborough University on the **12th February**, taking place in Room G08 at Elm House. The talk will take place slightly earlier than normal, from **10:30am to 11:30am** followed by a networking lunch in GO5 at Elm House. Talk details can be found below. Suman has sent out a calendar invite but please let her know if you wish to be added or if you would like to add anyone else.

Water Challenges in a Changing World

Title: Assessment of evolving flood hazard and risk: the role of channel morphodynamics

Abstract: Flooding is the most destructive natural hazard that humanity faces. Over a billion people globally are already exposed to the risk of flooding, but by 2050 this number is expected to double as a result of anthropogenic climate change, population growth, and encroachment into at-risk areas. Global Flood Models (GFMs) are vital tools for producing flood hazard maps supporting impact estimates, planning and policy interventions. GFMs typically assume that the bankfull flow-carrying capacity (channel conveyance) equates to a flow discharge with a specified return period (typically once in two years) that is spatially and temporally invariant. However, in reality, conveyance capacity is determined by the river channel size, shape and roughness and so varies in response to erosion and sedimentation - change that is presently unrepresented, which biases GFM predictions to unknown magnitudes. Herein we address and evaluate these questions by applying the Fathom GFM to estimate inundated areas and population exposure across a 135,000 km2 region of the Mississippi River floodplain by forcing the model with an empirically-constrained range of space-time varying conveyance capacities. We find that these estimated conveyance capacities (typical RPs < 1yr) differ substantially from the 2-year RP often assumed, leading to substantial underestimates of flood hazard predictions (up to 20%) and consequent underestimates of population exposure (up to 52%). These results indicate how geomorphological variability is a first order control in estimating flood hazard and risk, and that it is therefore vital such changes are included in flood hazard and risk formulations and predictions into the future.

Biography: Daniel Parsons, Professor of Geosciences and Pro-Vice-Chancellor for Research and Innovation at Loughborough University in the UK, awardee of the prestigious European Research Council Consolidator Award, current President of the Division for Geomorphology of the European Geosciences Union, internationally renowned for his work on flow processes and sediment transport in rivers, coasts, and estuaries, and the deep sea, including work addressing flood hazard and risk.

The second talk will take place by UoB's Dr James White on the 6th March at 12pm in Room G08 at Elm House. This will be followed by a networking lunch at 1pm. The calendar invite for this seminar talk will be sent soon.

Title: Flows Hot and Cold: Examining long-term rapid river water temperature fluctuations across the conterminous US.

Abstract: River water temperature (T_w) regimes are fundamental to freshwater ecosystem health, but rates of thermal change have been understudied despite its ecological importance. Rapid T_w increases ('surges') or decreases ('plummets') have been observed across individual catchments and short-term periods, but have been seldom characterized across broader space-time domains. Moreover, how multiple environmental drivers governing surges and plummets have been sparsely examined. To address this, we collated and cleaned high-resolution T_w data spanning the conterminous United States (US) between 2008-2023. We demonstrated the national-scale prevalence of surges (n = 6507) and plummets (n = 4787) that were recorded at 88 of the 102 monitoring stations. Both event types spanned freezing (snowmelt-fed systems) to extremely hot (>40 °C - geothermal influences) conditions. Successive transitions between rapid T_w warming and cooling occurred mostly in regulated systems, indicating dam-induced T_w volatility. Spatial and temporal analyses highlighted that surges were most frequently observed in the Southeast US and recurred every summer, while the same was true for plummets in the Southwest US; both were less prevalent in the West and Northwest US. Random forest models evidenced that surges were more sensitive to urbanisation, while plummets were strongly associated with minimum air temperature; both event types were driven by catchment properties like land cover, slope, soil properties and dam influences. This research provides a critical step in characterizing rapid T_w changes across vast spatial and temporal scales, as well key hydrometeorological conditions and catchment characteristics governing surges and plummets. Such insights are critical for informing evidence-based management solutions targeting extreme T_w variations and volatility.

Biography: Dr James C. White is a research fellow in Geography, Earth and Environmental Sciences at UoB, and affiliate of the Birmingham Institute of Sustainability and Climate Action (BISCA). He is an interdisciplinary research scientist whose research broadly entails characterizing freshwater ecosystem dynamics and pressures in the context of global environmental change. He works closely with non-academic partners including water companies, charities and volunteer groups to deliver applied research on managing freshwater ecosystems to benefit wildlife and people.

CATCHMENT SCIENCE SUMMER SCHOOL

The 16th Annual Catchment Science Summer School will be running from the **31st August until the 5th September 2025**. It is designed for PhD students and postdocs in catchment science. The course is taught by ***Jeff McDonnell*** (University of Saskatchewan and University of Birmingham) ***Dr. Chris Soulsby***, ***Dr. Jan Seibert***, ***Dr. Ilja van Meerveld***, ***Dr. David Hannah***, ***Dr. Stefan Krause*** and ***Dr. Dorthe Tetzlaff***. It is co-hosted by the University of Birmingham and the University of Aberdeen, University of Zurich, TU Berlin and the Global Institute for Water Security.

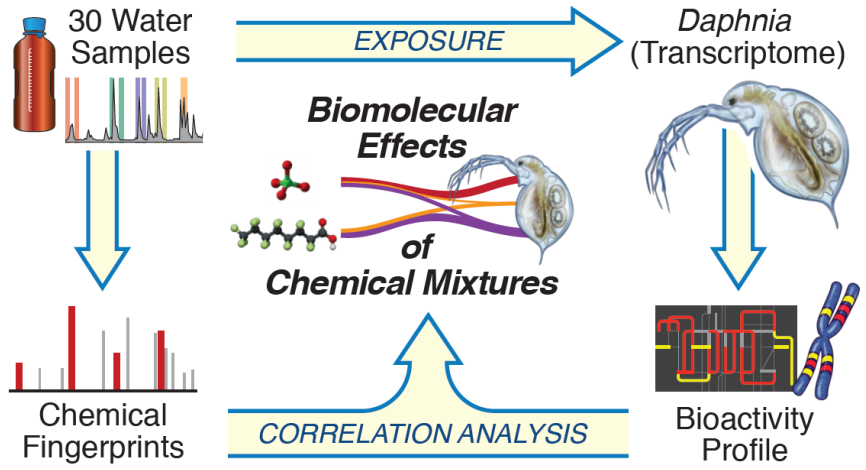
The Catchment Science Summer School is a 5-day short course that is intended for post-graduate students and post-docs interested in a hands-on catchment science curriculum, focusing on northern catchments, runoff processes and combined hydrometric, isotope/chemical tracer and modeling techniques in catchment hydrology. The learning objectives for this short course are to understand:

- Rainfall-runoff processes
- Rainfall-runoff model development, use, and testing
- Hydrochemical and isotopic measurement and analyses
- Linking field experiments with modeling approaches
- Evolution of empirical and theoretical understanding of runoff processes
- Landscape analysis, land-use and climate change impacts on streamflow

Tickets will be released on the 1st February. Buy tickets for this course here. Tickets will sell out, so if you are interested in attending, please purchase tickets soon.

PAPER PUBLISHED IN ENVIRONMENTAL SCIENCE & TECHNOLOGY

We are pleased to announce the publication of the paper 'Bioactivity Profiling of Chemical Mixtures for Hazard Characterization' in Environmental Science & Technology. This study, led by the Centre for Environmental Research and Justice (CERJ), was conducted in collaboration with the Research Centre for Eco-Environmental Sciences (RCEES) in China and the Helmholtz Centre for Environmental Research (UFZ) in Germany. The paper addresses a critical question in environmental health: how do chemical mixtures impact living organisms? Using a data-driven, hypothesis-free methodology, the study integrates bioactivity profiling with chemical fingerprinting to explore the biomolecular effects of a defined number of chemical substances in river waters. This innovative approach leverages gene expression analysis in the sentinel species Daphnia to provide insights into the potential environmental hazards posed by chemical mixtures.



For the full article, please see here

AGU 2024 – WHAT'S NEXT FOR SCIENCE?

The American Geophysical Union's 2024 Annual Meeting (AGU24) took place from the 9th to 13th December 2024 at the Walter E. Washington Convention Centre in Washington, D.C.

This event brought together over 25,000 Earth and space scientists from more than 100 countries to share their latest research findings and discuss pressing scientific issues.

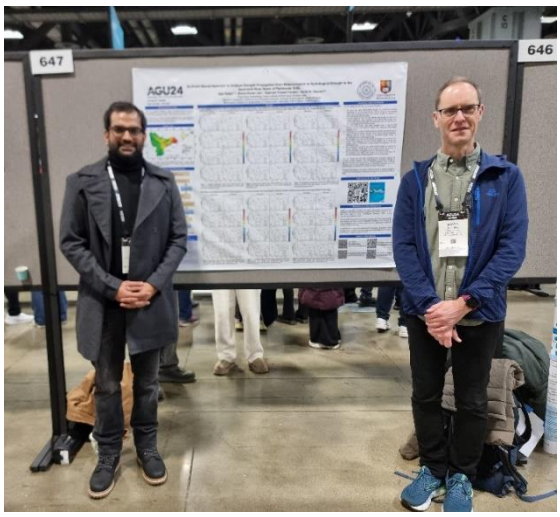
AGU24 centred around the theme "What's Next for Science," encouraging participants to explore future directions in scientific research and collaboration.

Many members of the water theme travelled to Washington including Prof David Hannah and Prof Stefan Krause. Prof Hannah convened sessions relating to River Temperature in a Changing World, Development of Agrohydrology in Relation to Critical Zone and Leveraging Sensor Technologies, Networks and tools to rethink space-time Dynamics in River Quality. He also presented at the Transdisciplinary Practice in Sociohydrology session.

AGU24 offered various session formats, including oral, poster, and eLightning sessions, to facilitate diverse scientific exchanges.

AGU25 is scheduled to be held in New Orleans, Louisiana, from 15 to 19 December 2025. The submission period for session, town hall, and workshop proposals will open in March 2025.

AGU 2024 – AJAY GUPTA



I had a great learning experience presenting my research work at the AGU Fall Meeting 2024 held at Washington, D.C., USA, 9-13 December 2024, on 'An event-based approach to analyse drought propagation from meteorological to hydrological drought in the semi-arid river basin of Peninsular India'. I also connected with researchers and experts from around the world and engaged in thought-provoking discussions.

I would like to thank my supervisors, Prof. Manoj Jain, Dr. Rajendra Prasad Pandey, and Prof. David M. Hannah, for their constant support and guidance throughout. It was also a privilege to meet Prof. Sumit Sen, Prof. Stefan Krause, and colleagues from the Indian Institute of Technology Roorkee and the University of Birmingham.

I sincerely thank the UK Commonwealth Scholarship Commission (CSC) for supporting me to attend the AGU Fall Meeting 2024

Written by Ajay Gupta

EMSL SELECTS 15 PROJECTS FOR EXPLORATORY RESEARCH IN 2025

Fifteen researchers from across the world were selected by the Environmental Molecular Sciences Laboratory (EMSL) to conduct nine-month Exploratory Research projects in 2025.

The call sought proposals that address at least one of EMSL's three scientific focus areas: Environmental Transformations and Interactions, Functional and Systems Biology, and Computing Analytics and Modeling. EMSL used an anonymized peer review process for this call.

EMSL, a Department of Energy Office of Science user facility, offers more than 150 instruments, resources, and expertise at no cost to proposal awardees. EMSL is sponsored by the Office of Science's Biological and Environmental Research program.

Leveraging EMSL's capabilities, including mass spectrometry, artificial intelligence, and microfluidic technologies, the principal investigators and their teams will take on some of the greatest challenges facing biological and environmental science.

The awarded projects include Sophie Comer – Warner from the Water Institute at UoB:

Unravelling Drivers of Stream Microbial-Biogeochemical Cycling Along a Land-Use Gradient: From Localized Processes to Ecosystem-Wide Effects

There is a lack of research on how land-use gradients affect dissolved organic matter chemodiversity and create subsequent changes to the microbial community structure and riverine greenhouse gas fluxes. Additionally, the association between riparian zones and in-stream processes is not generally considered so that riparian and hyporheic sediments, which are both hotspots of river corridor biogeochemical turnover, are rarely studied together at the same site. In this project, researchers aim to disentangle these complex drivers of biogeochemical cycles by generating in-depth characterization of the dissolved

organic matter and metabolite pools available for biogeochemical cycling. Read the full article here.

WATER THEME PUBLICATIONS

Wazne et al. (2025): Does what we find depend on how we sample? Measured streambed microplastic concentrations can be affected by the choice of sampling method
https://www.sciencedirect.com/science/article/pii/S0048969724082548

UPCOMING GRANTS

IISD – Global Framework for Chemicals (GFC) Fund
Deadline to apply: 31/01/2025
Award amount: $800k
Eligible projects must focus on green and sustainable solutions and channel actions to prevent and minimize harm from chemicals and waste in developing countries.

HORIZON-MISS-2024-CIT-01 — Changing urban spaces and mindsets to accelerate the transition to climate neutrality
Deadline to apply: 11/02/2025
Award amount: €15M
This supports proposals that set out a credible pathway to urban climate neutrality and enable cities to roll out their climate action plans and achieve climate neutrality by 2030. Funding is available under the following topics.

STFC - Nucleus Public Engagement Awards 2025
Deadline to apply: 20/03/2025
Award amount: £20-100k
Apply for funding to engage the public with Science and Technology Facilities Council (STFC) supported science, technology or facilities.

AGU – Horton Research Grant
Deadline to apply: 27/03//2025
Award amount: $11k
The Horton Research Grant is awarded to up to three Ph.D. students studying hydrology, water resources, or a closely related field each year and is made possible through the generosity of the Robert E. Horton Fund for Hydrologic Research. The purpose of the award is to promote excellence by encouraging the next generation of professionals in the hydrological sciences.

Blaustein Center for Scientific Cooperation Postdoctoral Fellowships
Deadline to apply: 31/03/2025
Award amount: $29k
Every year, the BCSC proudly awards 4-5 fellowships to exceptional postdoctoral scholars from all corners of the world. Our Blaustein Postdoctoral Fellows undertake fundamental and applied studies in various fields related to drylands, including desert ecology, solar energy, environmental physics, rainfed and irrigated agriculture, soil-plant-atmosphere interactions, hydrology, aquaculture, environmental microbiology, desalination and water treatment, and biotechnology.

JSPS-UNU Postdoctoral Fellowship Programme
Deadline to apply: 31/03/2025
Award amount: JPY 8.8M
Jointly organized by the UNU and the Japan Society for the Promotion of Science (JSPS), the JSPS–UNU Postdoctoral Fellowship Programme is designed to provide promising, highly qualified young researchers with the opportunity to conduct advanced research in sustainability under host researchers at domestic universities and research institutions across Japan in cooperation with UNU-IAS.

Royal Society of Chemistry – Water Science Bursary
Deadline to apply: 31/03/2025
Award Amount: £2k
The Royal Society of Chemistry's Water Science Forum invites applications for its water science bursary. This supports researchers engaged in projects that involve the application of chemical sciences in the management of the water cycle, and the impact these activities have on the environment.

NERC - Opening up the Environment 2025
Deadline to apply: 01/04/2025
Award amount: £62,500
Apply for funding to:1) explore the potential your organisation or department has to increase diversity of representation attracting a wider talent pool into NERC science, 2) generate partnerships that identify, include and showcase a broad range of people and skillsets that contribute towards NERC science

NERC – Independent Research Fellowship 2024
Deadline to apply: 03/04/2025
Award amount: £600-800k
Apply for funding to further your career through an independent research fellowship.

National Geographic - Request for Proposals: Freshwater Storytelling
Deadline to apply: 22/04/2025
Award amount: $20k, £100k
In partnership with the Conrad Hilton Foundation's Safe Water Initiative, The National Geographic Society seeks submissions from storytellers interested in creating and disseminating content that raises public awareness and engagement of important issues around the sustainable use of freshwater resources.

UKRI – Proof of Concept
Deadline to apply: 29/05/2025
Award amount: £100-250k
Apply for proof of concept to support the commercialisation of research to enable spinouts or social ventures, licencing or other commercialisation pathways. Applications from any disciplines are welcomed. No pre-existing UK Research and Innovation (UKRI) funding is required. The programme will not support discovery-driven research. You must be based at a UK research organisation

HORIZON-EIT-2025-KIC-WATER — call for proposals
Deadline to apply: 17/06/2025
Award amount: €5M
The new "Water" EIT KIC (Knowledge and Innovation Community) will address critical challenges related to the relevant fields of the water, marine and maritime sectors and ecosystems, and demonstrate excellence in each activity area (innovation, entrepreneurship and skills education and business creation / acceleration) to build on and upscale innovative solutions developed under existing programmes and initiatives such as Horizon Europe and EU Missions. The EIT KIC will develop an integrated approach across water, marine and maritime sectors and ecosystems and will address the following challenges and opportunities through the EIT's innovation model:

Open Calls with no closing date:

IGB: Leibniz Institute of Freshwater Ecology and Inland Fisheries – Senior Fellows
We invite excellent established scientists to apply for a research visit at IGB. We offer stays for 3 to 12 months to enable senior scientists to contemplate and pursue new inspiring research ideas in collaboration with scientific staff at IGB. At the time of application, successful candidates can be based at institutions in any country worldwide except Germany. Scientists residing in Germany are not eligible to apply, independent of their nationality.

NERC Urgency Fund (£100k)
Apply for funding to respond quickly to transient and unexpected scientific opportunities.

UKRI – Knowledge Transfer Partnership

Open for business and not-for-profit organisations. Partnerships can last between 12 and 36 mounts. Business provide one-third to half the project cost depending on their size.

NERC - Work with US-based researchers on environmental science research

Award amount: £300k Apply for funding to work with US-based researchers on an environmental science application. Collaborative work is governed by an agreement between NERC and NSF.

Work with Brazilian researchers: NERC FAPESP lead agency

This opportunity allows UK-based researchers and researchers in the State of São Paulo, Brazil to submit a collaborative proposal under existing NERC funding opportunities. This will go through a single review process.

UKRI - Collaborate with researchers in Norway

UK Research and Innovation (UKRI) and Research Council of Norway (RCN) have signed a Money Follows Cooperation agreement to reduce barriers to cross-border collaboration.

UKRI - Collaborate with researchers in Luxembourg

UK Research and Innovation (UKRI) and FNR have signed a memorandum of understanding (MoU) to welcome and support collaborative applications. The MoU provides for a lead agency agreement whereby UKRI will receive and assess joint applications from eligible UK and Luxembourg applicants on behalf of both organisations