WATER INFORMATICS
SCIENCE & ENGINEERING
EPSRC CENTRE FOR DOCTORAL TRAINING

EPSRC Centre for Doctoral Training in Water Informatics: Science and Engineering (WISE CDT)

FINAL REPORT 2022/24

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University of Exeter · University of Bath · University of Bristol · Cardiff University / Prifysgol Caerdydd · UKRI Engineering and Physical Sciences Research Council · CIWEM Chartered Institution of Water and Environmental Management Accredited Course

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Foreword: CDT Director

It has been a privilege to lead the Centre for Doctoral Training in Water Informatics: Science and Engineering (WISE CDT) since I took over as Director in October 2022. I am proud to present the ninth - and final - CDT Report.

As the CDT training grant comes to an end, this report focuses on our recent highlights and presents the CDT's considerable impacts. The report also offers a summary of the programme, its evolution and challenges - including how we navigated the substantial consequences of the Coronavirus pandemic. Happily, as you will read in this latest report, our students have shown amazing resilience in persevering with their doctoral studies and - as we go to print - WISE has generated 58 PhD awards and one MPhil award, with six students still working towards PhD thesis submission.

It was a joy to witness all the WISE cohorts reunited at the CDT's Celebration Event in April 2023. Find out more about this occasion - and other recent highlights - on pages 2-7.

Find out about our alumni and what they are doing now on pages 10-16.

Learn more about our remaining students and their PhD research projects on page 17.

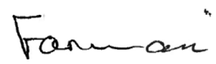
Read about the CDT programme and its evolution on pages 18-29.

Discover the CDT's impacts and legacy on pages 30-37.

I would like to thank everyone who has been part of the WISE CDT's journey:

- The Engineering and Physical Sciences Research Council (EPSRC), whose funding made this programme possible and whose training grant extensions have allowed WISE to use our existing resources to support students impacted by the Coronavirus pandemic.
- The CDT Programme Management Group, which has been a strong, supportive and effective leadership team, delivering all the elements that have made the CDT a success.
- Advisory Board Chair, Professor John Banyard OBE, and all current and former Advisory Board members, for their guidance, unstinting support and valuable engagement with students.
- The CDT's external examiners, Professor Arthur Mynett and Professor Ana Mijic, for their inputs to the first year taught programme and their interaction with students to receive and report feedback.
- Our administrator, Debbie Ford, for her dedication and unfaltering support to students, academics and CDT stakeholders.
- All industry partners and organisations who have hosted CDT events such as Industry Days and site visits and who have generously shared access to facilities, data and expertise, thereby engaging students in real-world challenges.
- Research visit, placement and internship hosts in the UK and across the globe, who have given students unforgettable professional and personal experiences through working with new teams in different surroundings.
- All our academic and industry PhD supervisors, for their guidance to students and for encouraging them to take up the opportunities available to them as EPSRC-funded postgraduate researchers.
- The Chartered Institution of Water and Environmental Management (CIWEM) and Joint Board of Moderators (JBM), for accrediting the WISE CDT, thereby providing external validation of the quality of the programme, but also enhancing students' professional development.
- University colleagues, who supported us through creating modules and navigating funded extension and accreditation processes – and especially our CDT administrative and finance colleagues across the partnership for their amazing teamwork.
- Everyone who has shared their knowledge, expertise and passion with students through delivering a lecture, seminar, presentation, workshop, module or team challenge.
- And, most importantly, all of our students, who have taught **us** so much along the way.

I trust you will enjoy reading this final WISE CDT Report and will find it an interesting and informative review of the CDT's evolution, highlights and impacts.



Professor Raziyeh Farmani
Director, EPSRC Centre for Doctoral Training in Water Informatics: Science and Engineering

Recent Highlights

PHD SUCCESSES

The WISE CDT is proud and delighted to promote our students' PhD outcomes. Since our last report, the following students have successfully defended their theses:

Cohort 1

Dr Josie Ashe (Exeter)

Cohort 3

Dr Benjamin Beylard (Cardiff)

Cohort 4

Dr David Birt (Bath)
Dr Jamie Brown (Bristol)
Dr Elisa Coraggio (Bristol)
Dr Vasilis Koukoravas (Exeter)
Dr Catherine Leech (Cardiff)
Dr Jessica Penny (Exeter)
Dr Bikash Ranabhat (Cardiff)
Dr Debbie Shackleton (Exeter)
Dr Bert Swart (Bath)

Cohort 5

Dr William Addison-Atkinson (Exeter)
Dr Arran Cooper-Davis (Exeter)
Dr Laura Devitt (Bristol)
Dr Nicolas Hanousek (Cardiff)
Dr Daisy Harley-Nyang (Exeter)
Dr Juliana Marcal (Bath)
Dr Santiago Martelo (Cardiff)
Dr Daniel Power (Bristol)
Dr James Rand (Bath)
Dr Georgios Sarailidis (Bristol)

For our full list of PhD and MPhil theses to date, and to download available theses, see pages 38-42.

CDT POSTER EVENT NOVEMBER 2022

The final WISE CDT poster event took place in November 2022 on the University of Bath campus. Hosted by Co-Director **Dr Tom Arnot**, the event generated extensive water science and engineering discussion, plus a valuable opportunity for the cohorts to get together again. WISE is grateful to Programme Management Group members, academic supervisors, graduates and students for taking part. **Dr Laura Devitt** (Bristol, Cohort 5) was awarded best poster as voted by staff, with **Dr Juliana Marcal** (Bath, Cohort 5), presenting her fellow students' favourite poster. This occasion was also used to discuss and develop plans for our 2023 Celebration Event in collaboration with students and graduates.

CDT CELEBRATION EVENT APRIL 2023

The WISE CDT was delighted to organise a two-day Celebration Event in Bristol in April 2023, which served to reunite all the WISE cohorts. We were honoured to share this precious time with graduates, students, academics, Advisory Board members and industry partners to reflect on the CDT's journey and achievements. WISE is grateful to everyone who took time out to join the event from all over the UK, mainland Europe and even Canada!

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Day 1 was open to all, with participants including external academic and industry experts from the water, environmental, information technology and engineering sectors. We welcomed around 120 delegates and showcased our innovative and wide-ranging PhD research spanning the themes of Water Resources: Supply and Quality, Flood Risk and Prevention, Coastal and Marine Processes and Enhancing Infrastructure Resilience. It was gratifying to welcome so many people who had shared the CDT's journey and who had supported WISE - plus those guests who were unfamiliar with the programme and who had come to find out more!

Delegates were treated to an inspirational keynote speech on *'Nature Based Solutions at Scale'* from CDT Advisory Board member, **Dr Mark Fletcher**, Arup Fellow, Arup Global Water Business Leader and Chair of British Water. The afternoon then featured uplifting and entertaining presentations from a selection of WISE CDT graduates, who spoke about their PhD experiences and career pathways:

Dr Olivia Bailey (Bath, Cohort 2), Senior Digital Water Consultant, Arup
Dr Paul Bayle (Bath, Cohort 2), Postdoctoral Researcher, TU Delft
Dr Anna Lo Jacomo (Bristol, Cohort 2), Hydroinformatics Developer, Jacobs
Dr Wouter Knoben (Bristol, Cohort 1), Senior Research Associate, University of Calgary
Dr Rosanna Lane (Bristol, Cohort 2), Hydrological Modeller, UK Centre for Ecology and Hydrology
Dr Nejc Coz (Cardiff, Cohort 1), Research Assistant, Research Centre of the Slovenian Academy of Sciences and Arts
Dr Nefeli Makrygianni (Cardiff, Cohort 4), Marine Scientist, Met Office
Dr Laura Ramsamy (Exeter, Cohort 3), Senior Flood Scientist, Climate X
Dr Joshua Myrans (Exeter, Cohort 1), UKRI Future Leaders Fellow, South West Water.

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An engaging poster session followed to promote the latest PhD research of our final-year students and recent graduates, providing plentiful opportunities for interaction and networking.

Dr David Birt (Bath, Cohort 4)
Oliver Foss (Bath, Cohort 5)
Vivien Maertens (Bath, Cohort 5)
Dr Juliana Marcal (Bath, Cohort 5)
Dr James Rand (Bath, Cohort 5)
Dr Ioanna Stamataki (Bath, Cohort 1)
Dr Laura Devitt (Bristol, Cohort 5)
Dr Daniel Power (Bristol, Cohort 5)
Dr Catherine Leech (Cardiff, Cohort 4)
Dr Nicolas Hanousek (Cardiff, Cohort 5)
Ceri Howells (Cardiff, Cohort 5)
Samuel Rowley (Cardiff, Cohort 5)
Damian Staszek (Exeter, Cohort 2)
Dr William Addison-Atkinson (Exeter, Cohort 5)
Cristina Coker (Exeter, Cohort 5)
Dr Daisy Harley-Nyang (Exeter, Cohort 5).

Huge thanks go to all our amazing presenters.

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> *"I really enjoyed the talks from WISE graduate students - it was great to hear what everyone is up to now and to see the diverse career paths we have taken."*
> Graduate delegate

Day 2 was a closed session for WISE CDT graduates, students, academics and our Advisory Board. The day focused on Team Challenges covering the four CDT research themes. WISE is indebted to the Team Challenge leaders and their colleagues for devising the challenges and for their inputs and support to the teams throughout the day:

Richard Brown, Associate Director, Arup (Enhancing Infrastructure Resilience)

Helen Wakeham, Deputy Director of Water Quality, Groundwater and Contaminated Land, Environment Agency (Water Resources: Supply and Quality)

Dr Charlie Thompson, Director, Channel Coastal Observatory, National Oceanography Centre (Coastal and Marine Processes)

Professor Rob Lamb, Managing Director, JBA Trust (Flood Risk and Prevention).

The aim was to generate an additional legacy for the CDT, beyond its already considerable impact that has delivered new collaborations, successful research projects, high-quality journal and conference publications, nearly 60 PhD theses so far and flourishing graduate careers. However, given that WISE is now at the end of its grant period, this work will have to be progressed through the individual CDT partner universities.

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> *Very nice opportunity for knowledge exchange, experience sharing and social connecting.*
> External delegate

AWARDS AND PRIZES

Dr Wouter Knoben (Bristol, Cohort 1) was awarded the STAHY Best Paper Award 2023. The STAHY award is made by the International Commission on Statistical Hydrology, a commission of the International Association for Hydrological Sciences, and is awarded to the best paper in the field of Statistical Hydrology. Wouter's award-winning paper, for work published in the period 2019-2021, was for his 2019 *Hydrology and Earth System Sciences* (HESS) paper on *'Inherent benchmark or not? Comparing Nash–Sutcliffe and Kling–Gupta efficiency scores'.*

Dr Jessica Penny (Exeter, Cohort 4) was nominated by the University of Exeter's Centre for Water Systems for the 2023 Water Conservation Trust Dissertation Prize. The Water Conservation Trust is The Worshipful Company of Water Conservators' charity and undertakes valuable work supporting access to water and environmental education, which includes providing student bursaries and prizes. Jess received her prize in London in early 2024. Jess was also part of the winning team in the 2023 Water Industry Forum Team Challenge for Young Water Professionals, with the theme of *'The importance of nature-based solutions for a sustainable society'.* Jess' team worked on creating innovative ideas for introducing nature-based solutions to school children.

Dr Ioanna Stamataki (Bath, Cohort 1) is a Senior Lecturer in Civil Engineering at the University of Greenwich. Ioanna received the Inspirational Teaching Award in the University's Student Led Teaching Awards 2023.

Dr Andrew Barnes (Bath, Cohort 4) is a Lecturer in Artificial Intelligence at the University of Bath. Andy received the Most Inspirational Lecturer award (Meme Supreme) in April 2024.

Dr Olivia Milton-Thompson (Exeter, Cohort 2), a Principal Geochemist at WSP, was honoured by her colleagues in WSP's November 2024 Excellence Awards ceremony, winning the Technical Excellence award.

EXETER CENTRE FOR WATER SYSTEMS 25TH ANNIVERSARY EVENT

Several Exeter WISE CDT academics, graduates and students presented at the University's Centre for Water Systems' 25th Anniversary event in September 2023. **Dr James Webber** (Cohort 1), now Lecturer in Water Systems Engineering at Exeter, chaired a workshop on *'Economics and engineering for stormwater management'.* Research posters were presented by **Dr Jessica Penny** (Cohort 4) on *'The impact of land use changes on Hydrological Regimes',* **Dr Daisy Harley-Nyang** (Cohort 5) on *'Microplastics in Wastewater Treatment Works'* and **Cristina Coker** (Cohort 5) on *'Can We Improve Current Estimates of Coastal Cliff Retreat? An Open-Source Approach to Building A 3D Inventory of Rockfalls and Landslides'.* Presenters, and session and workshop chairs, also included CDT Programme Management Group members **Professor Raziyeh Farmani, Professor David Butler, Professor Slobodan Djordjević** and **Professor Dragan Savić.**

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INTERNATIONAL RESEARCH VISITS

Five Cohort 5 students - **Dr William Addison-Atkinson, Cristina Coker** (Exeter), **Oliver Foss, Vivien Maertens** (Bath) and **Roberto Quaglia** (Bristol) – have benefited from international research visits since our last report, with destinations encompassing Spain, Portugal, the Netherlands and the United States of America. Read more on pages 8-9.

CONFERENCES, SYMPOSIA AND SUMMITS

The 2023 International Water Association's (IWA) Water and Development Congress & Exhibition took place in December 2023 in Kigali, Rwanda on the theme of 'Water, sanitation, and climate resilience – keys to a water-wise future'. **Dr Juliana Marcal** (Bath, Cohort 5) presented a poster on a *'Spatial analysis of water security inequalities in Mexico city'*, while CDT Co-Director **Professor Jan Hofman** ran a workshop on water security with Juliana's industrial supervisor, **Dr Blanca Antizar-Ladislao** of Isle Utilities. Meanwhile, CDT Director, **Professor Raziyeh Farmani** chaired IWA's Intermittent Water Supply Specialist Group's Management meeting and the Distribution System Assessment and Performance Technical Session.

Dr Juliana Marcal, Professor Jan Hofman and **Dr Blanca Antizar-Ladislao** subsequently presented a series of IWA webinars in June 2024 on *'Water Security, Inclusivity and the SDGs'* as a follow-up to their article on *'How to Address Water Security'* in IWA's April 2023 *The Source* magazine.

Dr Sabrina Draude (Exeter, Cohort 3) is a Postdoctoral Research Fellow at the University of British Columbia, currently working in association with Natural Resources Canada on the impact of pluvial flash floods on differing land cover scenarios. Sabrina is on the Water Distribution Systems Analysis (WDSA) Graduate Students Task Committee. The WDSA Committee hosted three events at the May 2024 World Environmental & Water Resources Institute Congress in Milwaukee, with Sabrina also being part of the Congress Career Panel.

Bath Cohort 5 student **Vivien Maertens** attended her first International Network on Offshore Renewable Energy (INORE) symposium in 2019. Following the 2023 symposium in Portugal, Vivien became INORE's Events Co-ordinator (EU) and was on the organising team for the August 2024 symposium that took place in Aberdeen.

The 4th UK National Climate Impacts Meeting took place at Newcastle University in September 2024. Bristol Cohort 5 graduate **Dr Georgios Sarailidis** was there representing JBA Risk Management and the University of Bristol in his role as a Catastrophe Modelling Knowledge Transfer Partnership (KTP) Associate.

Exeter Cohort 5 graduate **Dr Arran Cooper-Davis** is Lead Developer at Our Rainwater, which aims to 'transform the future of rainwater management'. Ari delivered a keynote at the October 2024 Water, Wastewater and Environmental Monitoring Conference and Exhibition in Birmingham, presenting on smart rainwater management at the Demonstration Forum and running an hour-long workshop.

Bath Cohort 2 graduate **Dr Olivia Bailey** is a Senior Digital Water Consultant at Arup. Olivia delivered the closing keynote speech on *'How can digital tools support systematic change in the water sector?'* at the November 2024 IWA Digital Water Summit in Bilbao.

Cardiff Cohort 4 graduate **Dr Nefeli Makrygianni** is a Marine Scientist at the Met Office. Nefeli represented the Met Office at the November 2024 OceanPredict Symposium 2024 (OP24) in Paris and presented a poster on *'Sea-state clustering using k-means'.*

CDT Co-Director **Dr Tom Arnot** is on the programme committee for the 2026 IWA World Water Congress, which will be hosted by the UK in Glasgow.

PUBLIC ENGAGEMENT

Dr Andrew Barnes ran a successful project over the summer of 2023 with a team from the University of Bath, to introduce and engage older people in AI. Demystif-AI: Reducing the Digital Divide ran a series of workshops for members of the University of the Third Age (u3a), which aimed to help participants develop their perceptions and reservations regarding AI. The project received extremely positive feedback, with over 85% of respondents assessing that the workshops had helped them develop informed perceptions and over 70% subsequently feeling more comfortable discussing AI.

Dr David Birt (Bath, Cohort 4) has also recently engaged with u3a, giving a one-hour talk about his PhD research and delivering insights into potential risks to future water quality.

REUNIONS AND COLLABORATIONS

Several Bristol WISE CDT graduates from cohorts 1-4 had their own, unofficial WISE reunion in May 2023. **Dr Ludovica Beltrame, Dr Anna Lo Jacomo, Dr Sebastian Gnann, Dr Lina Stein, Dr Charles West** and **Dr Giulia Giani** took time out to go hiking together in Italy - experiencing both glorious sunshine and flooding.

© Lina Stein 2023

More recently, **Dr Ioanna Stamataki, Dr Laurence Hawker, Dr Wouter Knoben** and **Dr Barnaby Dobson** met up together in Vienna, Austria for the EGU24 General Assembly.

© Ioanna Stamataki 2024

Dr Mikkel Lykkegaard (Exeter, Cohort 5) presented a seminar to the University of Bath's ART-AI CDT in May 2023. Mikkel is Principal Scientist at Exeter-based tech start-up company digiLab and spoke on *'From Deterministic to Probabilistic: Confidence and Credibility in Data-Driven Models'.* The invitation had been extended by WISE CDT graduate **Dr Andrew Barnes**, who also chaired the session.

Dr Ioanna Stamataki authored a September 2023 article in *The Conversation* in collaboration with fellow Bath graduate, **Dr Andrew Barnes**. The article reflected on the causes and impacts of 2023 Storm Daniel in the eastern Mediterranean, pointing to a trending broader pattern of extreme weather in the Mediterranean region and highlighting required future actions. In November 2024 ENA Institute for Alternative Policies published Ioanna's analysis of the catastrophic flooding in Valencia province, Spain only one year later.

Dr Charles West (Bristol, Cohort 3), now a Hydrologist at Mott MacDonald, collaborated with WISE CDT Programme Management Group members **Professor Slobodan Djordjević** and **Professor Reza Ahmadian** to co-author a January 2024 *Science of the Total Environment* publication on *'A combined stability function to quantify flood risks to pedestrians and vehicle occupants'*: https://doi.org/10.1016/j.scitotenv.2023.168237.

Dr Georgios Sarailidis (Bristol, Cohort 5) re-visited the University of Bristol in May 2024 to talk to Master's and PhD students about his PhD research into flood modelling and his transition to applying research to develop innovative solutions in the insurance industry.

Dr William Addison-Atkinson (Exeter, Cohort 5), a Flood Risk Analyst at JBA Consulting, returned to the University of Exeter in October 2024 to deliver a seminar to current students, postdoctoral researchers and academics on his PhD research and experience of undertaking a PhD through the WISE CDT.

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It is gratifying to witness the enduring friendships and professional networks that have been cultivated through the WISE CDT.

ROYAL ACADEMY OF ENGINEERING REPORT: TESTING THE WATERS

Exeter WISE CDT Co-Investigator, **Professor David Butler**, chaired the Royal Academy of Engineering's National Engineering Policy Centre Working Group on Wastewater & Public Health and has co-authored a pivotal report, *Testing the waters: Priorities for mitigating health risks from wastewater pollution* (May 2024). David presented a Centre for Water Systems seminar explaining the process, the investigation and the report's findings in December 2024. This seminar was opened out to the whole WISE CDT community and was also publicised through the Institute of Water (IWater) to enable wider participation.

EPSRC DEPUTY EXECUTIVE CHAIR

Bath WISE CDT Co-Investigator, **Professor Jonathan Dawes**, is EPSRC's Deputy Executive Chair. Jonathan had previously been a member, then chair, of EPSRC's Strategic Advisory Team for Mathematical Sciences between 2018-21 and was subsequently a member of the EPSRC Strategic Advisory Network between 2021-23.

Research Visits

OLIVER FOSS

DELTARES

Bath Cohort 5 student **Oliver Foss** made the most of his month in the Netherlands during the autumn of 2022. Ollie was hosted by Deltares, an independent institute for applied research in the field of water and subsurface. He was based with the Coastal Hazards Team in Delft, where he worked closely with **Robert McCall**, an expert on coastal hazards and nearshore hydro-morphodynamics.

While not a formal collaboration with Deltares, Ollie's PhD research into *'Dynamic Revetments and Composite Beaches - Coastal Protection Inspired by Nature'* has benefited from the close links forged during the project's development. This became particularly evident in relation to his project's required modifications during the Coronavirus pandemic. While at Deltares, Ollie worked with Robert on refining his PhD thesis chapter on the application of the XBeach model to dynamic revetments. He greatly appreciated the opportunity to work with an expert in the XBeach modelling software and through this was able to further his understanding of the model's capabilities and assess its potential application to composite beaches.

Ollie considered that both the University of Bath and Deltares benefited from the collaboration and envisaged that research links between the institutions will continue. Personal benefits included expanding his knowledge of current coastal engineering projects and making new contacts within the wider coastal research community. Ollie found his time at Delft a fulfilling experience, especially given the constraints he had experienced during the pandemic.

ROBERTO QUAGLIA

IIHR - HYDROSCIENCE & ENGINEERING, UNIVERSITY OF IOWA

Bristol Cohort 5 student **Roberto Quaglia** was hosted by IIHR - Hydroscience & Engineering at the University of Iowa, USA from September-December 2022. IIHR is a renowned centre on fluids-related research and here Roberto worked closely with **Professor Gabriele Villarini**'s team of PhD students and postdoctoral researchers.

Roberto reported that the expected outputs from his research visit were fully achieved. His investigations at IIHR enabled him to answer two research questions for his PhD thesis. He benefited from access to the centre's high performance computing facilities, the close support provided by Professor Villarini and regular feedback from team members through presentations and informal discussion. The personal benefits for Roberto were living and working in another country with a new research group, where he experienced a different culture and working practices. He also greatly expanded his personal and professional networks.

Roberto rounded off his time in the USA by participating in the 2022 American Geophysical Union (AGU) Fall Meeting in Chicago, where he showcased the conclusions of his research visit and networked with fellow researchers engaged in earth and space sciences.

DR WILLIAM ADDISON-ATKINSON

UNIVERSITY OF A CORUÑA

© William Addison-Atkinson 2022

Exeter Cohort 5 graduate **Dr William Addison-Atkinson**'s research visit destination in September-November 2022 was Galicia in north-west Spain. Will was hosted by **Professor José Anta Álvarez** in the Centre for Technological Innovations in Construction and Civil Engineering at the University of A Coruña.

Will's PhD research focused on *'An Integrated Approach to Health Risk Assessment for Sewer Flooding'*. The primary aim of his visit was to carry out numerical modelling of an urban drainage system - and he met all his visit objectives. Will built his numerical model, carried out simulations and validated his results against a dataset collected in the water laboratory. His model successfully replicated gully pot discharges for all non-uniform sediment classes and the University of A Coruña's 'amazing' laboratories and facilities gave Will an understanding of how sediments affect urban drainage systems.

Will assessed that both Exeter and A Coruña universities benefited from his visit, which strengthened and widened existing links between the two institutions, with further collaborations envisaged. Will also gained personally from his time in Galicia, learning about local culture, Spain and the Spanish language. One highlight from his free time was watching a football match at Deportivo de La Coruña's Estadio Riazor against Galician rivals Pontevedra CF.

VIVIEN MAERTENS

UNIVERSITY OF PORTO

© Vivien Maertens 2023

Bath Cohort 5 student **Vivien Maertens**' research visit destination in summer 2023 was Porto in Portugal, where she was hosted by **Professor Paulo Rosa Santos** and **Professor Tiago Ferradosa** in the University of Porto's Faculty of Engineering. Vivien's PhD is on *'Optimisation of Deep-Water Offshore Wind Systems'* with a special focus on internal waves (which can occur off the coast near Porto) acting on floating offshore wind turbines. This visit enabled her to benefit from the University's research expertise in mooring lines and semi-submersible floating offshore wind turbines. Vivien was able to build on her PhD research to date and to obtain data for new papers and chapters for her PhD thesis.

Vivien assessed her visit to be extremely beneficial, both personally and professionally. She relished experiencing a different university campus environment and working with new PhD students. She learnt more about breakwaters and renewables infrastructure in Portugal, considerably expanded her professional networks and went on a site visit to the company that had installed floating offshore wind turbines and wave energy converters off the northern Portuguese coast. Vivien made many new friends, learnt basic Portuguese and embraced both Portuguese and Brazilian cultures through her social contacts in Porto.

Vivien decided to extend her research visit for an additional month at her own expense to continue working on her PhD at the University of Porto. This extra time in Portugal enabled her to participate in the INORE symposium for young researchers, as the 2023 event was taking place in northern Portugal. This opportunity generated yet more professional connections, particularly in the offshore wind industry. Future collaborations with the University of Porto, and between the universities of Bath and Porto, are envisaged and the University of Porto is continuing to share wind and surface waves data with Vivien for her PhD.

CRISTINA COKER

SCRIPPS INSTITUTION OF OCEANOGRAPHY

Exeter Cohort 5 student **Cristina Coker** benefited from a brief research visit to Scripps Institution of Oceanography at the University of California San Diego in August 2024. This connection had arisen through an approach from Scripps researcher **Dr Adam Young**, who was interested in Cristina's PhD research into *'Hazards and Drivers of Coastal Cliff Retreat in England'*. Adam acted as host supervisor during her visit, which aimed to share knowledge and skills in the field of cliff erosion, discuss technical advancements and suggest improvements on workflows developed during her PhD research.

Cristina's time at Scripps offered wide-ranging discussion on research projects (including her own), delivering an understanding of the research being carried out by the Centre for Coastal Studies (CCS) into hazard mapping, high temporal resolution coastal monitoring and 3D change analysis on point cloud data. Cristina discovered that many aspects of Scripps' research aligned with her own PhD research, with a surprising number of similarities in the workflows developed and challenges encountered. Cristina joined visits to several CCS field study sites, where she learned about the challenges faced in relation to erosion risk, coastal management, hazard mapping, and survey equipment.

Cristina assessed her visit to be extremely beneficial. It provided a valuable opportunity to meet other researchers actively studying coastal cliffs and to share approaches, techniques and challenges. Additionally, visiting some of the southern California field study sites added a depth of understanding about coastal cliff research in California which could not be conveyed through publications or conference talks. Cristina relished the chance to find out about the wider research conducted by the CCS and to observe how a different world-class institute was structured and managed.

Cristina considered the whole experience extremely worthwhile, with benefits for both the University of Exeter and Scripps. It gave her an overview of the cutting-edge research on coastal retreat in California and insights into the water and environmental challenges faced by another country. It enabled her to address some of the technical problems encountered throughout her PhD and to obtain validation on some of her work. Crucially, she realised how much work still needed be done in this field of research, both on a national and international level, and how important international collaborations were to progress.

© Cristina Coker 2024

Our Alumni

COHORT 1

Dr Josie Ashe, Exeter (2014-22)

PhD Thesis: Extracting Value from Patterns in Routinely Collected, High-Frequency Water Quality Data in Rivers Supplying Drinking Water Treatment Works
Supervisors: Prof Dragan Savić and Prof Richard Brazier
LinkedIn: josieashe

Josie is a Researcher in the Centre for Resilience in Environment, Water and Waste (CREWW) at the University of Exeter.

Dr Ludovica Beltrame, Bristol (2014-18)

PhD Thesis: Simulating the Risk of Liver Fluke Infection in the UK through Mechanistic Hydro-Epidemiological Modelling
Supervisors: Prof Thorsten Wagener and Prof Eric Morgan
LinkedIn: ludovica-beltrame

Ludo is co-founder and board member of Digital Drop Srl in Milan, Italy, a spin-off company of the University of Milan and a Business Developer for Eni energy.

Dr Olivia Cooke, Bath (2014-18)

PhD Thesis: Assessment and Mitigation of Stormwater Runoff in an Informal Settlement
Supervisors: Dr Lee Bryant, Dr Thomas Kjeldsen and Prof Wesaal Khan (Stellenbosch University)
LinkedIn: olivia-cooke

Olivia is a Data Analyst in the Civil Service.

Dr Nejc Coz, Cardiff (2014-18)

PhD Thesis: Numerical and Experimental Modelling of Tidal Range Structures with Focus on Conservation of Momentum through Hydraulic Structures
Supervisors: Prof Reza Ahmadian and Prof Roger Falconer
LinkedIn: coznejc

Nejc is a Research Assistant at the Research Centre of the Slovenian Academy of Sciences and Arts (ZRC SAZU).

Dr Barnaby Dobson, Bristol (2014-18)

PhD Thesis: Uncertainty in Modelling and Optimising Operations of Reservoir Systems
Supervisors: Dr Francesca Pianosi and Prof Thorsten Wagener
Industrial Supervisor: Dr Chris Hutton (Wessex Water)
LinkedIn: barnaby-dobson

Barney is a Research Associate in Water Systems Integration at Imperial College London.

Dr Laurence Hawker, Bristol (2014-18)

PhD Thesis: Regional Flood Models and Digital Elevation Model (DEM) Uncertainty
Supervisors: Prof Paul Bates and Dr Jeff Neal
LinkedIn: laurence-hawker

Laurence is a Senior Research Associate in the School of Geographical Sciences at the University of Bristol.

Dr Jonathan King, Cardiff (2014-18)

PhD Thesis: Investigation and Prediction of Pollution in Coastal and Estuarine Waters, using Experimental and Numerical Methods
Supervisors: Prof Reza Ahmadian and Prof Roger Falconer
LinkedIn: kingja

Jonathan is a Principal Engineer at JBA Consulting.

Dr Wouter Knoben, Bristol (2014-18)

PhD Thesis: Investigating Conceptual Model Structure Uncertainty: Progress in Large-Sample Comparative Hydrology
Supervisors: Dr Ross Woods and Prof Jim Freer
LinkedIn: wouter-knoben

Wouter is a Senior Research Associate at the University of Calgary in Canada.

Dr Mariano Marinari, Bath (2014-18)

PhD Thesis: Quantification and Valorisation of Agricultural Bioresource Residues in England
Supervisors: Dr Tom Arnot and Dr Marcelle McManus
Industrial Supervisor: Ian Law (Wessex Water)
LinkedIn: marianomarinari

Mariano is an Environmental Engineer at ARPA Lombardia in Italy, the Regional Agency for the Environmental Protection.

Dr Elli Mitrou, Cardiff (2014-18)

PhD Thesis: Large-Eddy Simulations of Multi-Phase Plumes in Crossflow and Stratified Flow
Supervisors: Prof Shunqi Pan and Prof Zhihua Xie
LinkedIn: elli-mitrou

Elli is a Senior Environmental Consultant at chapmanbdsp.

Dr Joshua Myrans, Exeter (2014-18)

PhD Thesis: Automated Analysis of Sewer CCTV Surveys
Supervisors: Prof Zoran Kapelan and Prof Richard Everson
LinkedIn: joshua-myrans

Josh is a Future Leaders Fellow at South West Water and an Honorary Research Fellow at the University of Exeter.

Dr Ioanna Stamataki, Bath (2014-18)

PhD Thesis: Experimental and Numerical Investigation of Flash Floods and their Interaction with Urban Settlements
Supervisors: Prof Jun Zang and Dr Thomas Kjeldsen
LinkedIn: ioanna-stamataki

Ioanna is a Senior Lecturer in Civil Engineering at the University of Greenwich.

Dr James Webber, Exeter (2014-18)

PhD Thesis: Reliable and Resilient Surface Water Management through Rapid Scenario Screening
Supervisors: Prof David Butler and Prof Guangtao Fu
LinkedIn: james-webber

James is a Lecturer in Water Systems Engineering at the University of Exeter.

COHORT 2

Dr Olivia Bailey, Bath (2015-19)

PhD Thesis: Sewer Systems of the Future: Developing a Stochastic Sewer Model to Support Design of Sustainable Wastewater Systems
Supervisors: Prof Jan Hofman and Dr Tom Arnot
LinkedIn: olivia-bailey

Olivia is a Senior Digital Water Consultant at Arup.

Aidan Barry, Bath (2015-22)

MPhil Thesis: Identification & Characterisation of Luxury Uptake Proteins in Chlamydomonas for Enhanced Wastewater Phosphorus Removal
Supervisors: Dr James Doughty and Dr Tom Arnot
LinkedIn: aidan-barry

Aidan is an Area Scientist at Wessex Water.

Dr Stamatis Batelis, Bristol (2015-19)

PhD Thesis: The Impact of Groundwater Representation in Land Surface Models under Current and Future Scenarios in Great Britain
Supervisors: Dr Rafael Rosolem and Dr Mostaquimur Rahman
LinkedIn: batelis

Stamatis is a Lead Data Scientist at Plum.

Dr Paul Bayle, Bath (2015-19)

PhD Thesis: Coastal Protection and Nearshore Evolution under Sea Level Rise
Supervisors: Dr Christopher Blenkinsopp, Dr Alan Hunter and Prof Gerd Masselink
LinkedIn: paul-bayle

Paul is a Postdoctoral Researcher at TU Delft in the Netherlands.

Dr Stephen Clee, Cardiff (2015-19)

PhD Thesis: 3D Hydrodynamic and Morphodynamic Modelling of Offshore Sandbanks
Supervisors: Prof Shunqi Pan and Prof Catherine Wilson
LinkedIn: stephen-clee

Stephen works for South Wales Police in a civilian role.

Dr Arthur Hajaali, Cardiff (2015-19)

PhD Thesis: Flow Separation Characteristics within Rectangular and Conical Diffusers
Supervisors: Prof Shunqi Pan and Dr Zhihua Xie
LinkedIn: arthur-hajaali

Arthur is a Research Fellow at University College London.

Dr Rosanna Lane, Bristol (2015-19)

PhD Thesis: National-Scale Hydrological Modelling of High Flows Across Great Britain: Multi-Model Structures, Regionalisation Approaches and Climate Change Analysis with Uncertainty
Supervisors: Prof Jim Freer, Prof Thorsten Wagener and Dr Gemma Coxon
LinkedIn: rosannalane

Rosie is a Hydrological Modeller at the UK Centre for Ecology & Hydrology (UKCEH).

Dr Anna Lo Jacomo, Bristol (2015-19)

PhD Thesis: Multi-Hazard Exposure of Cities and Implications for Urban Infrastructure
Supervisors: Prof Dawei Han and Prof Alan Champneys
LinkedIn: anna-lo-jacomo

Anna is a Hydroinformatics Developer at Jacobs.

Dr Olivia Milton-Thompson, Exeter (2015-19)

PhD Thesis: Developing a Risk Assessment Model using Fuzzy Logic to Assess Groundwater Contamination from Hydraulic Fracturing
Supervisors: Prof Akbar Javadi and Prof Zoran Kapelan
LinkedIn: olivia-milton-thompson

Olivia is a Principal Geochemist at WSP.

Dr Cain Moylan, Bristol (2015-19)

PhD Thesis: Sensitivity, Uncertainty and Refinement of a Global Flood Model
Supervisors: Dr Jeff Neal and Prof Jim Freer
LinkedIn: cain-moylan

Cain is a Chartered Senior Flood Consultant at Mott MacDonald.

Dr Alex Stubbs, Cardiff (2015-19)

PhD Thesis: The Physical and Numerical Representation of Turbulent Flow over a Porous Riverbed
Supervisors: Dr Michaela Bray and Prof Shunqi Pan
LinkedIn: alexstubbs

Alex is a part-time Research Fellow at University College London and a self-employed Fluid Dynamicist.

Dr Maria Xenochristou, Exeter (2015-19)

PhD Thesis: Water Demand Forecasting using Machine Learning on Weather and Smart Metering Data
Supervisors: Prof Zoran Kapelan and Prof Jan Hofman
Industrial Supervisor: Dr Chris Hutton (Wessex Water)
LinkedIn: mariaxeno

Maria is a Senior AI Researcher at Fujitsu Research in the USA.

COHORT 3

Dr Benjamin Beylard, Cardiff (2016-22)

PhD Thesis: Morphodynamic Modelling of a Nourished Beach using a Mixed Sediment Approach
Supervisors: Prof Shunqi Pan and Prof Roger Falconer
LinkedIn: benjaminbeylard

Ben is an Environmental Study Manager at the Gironde Department Council in France.

Dr Sabrina Draude, Exeter (2016-22)

PhD Thesis: Optimised Maintenance Scheduling for Wastewater Systems
Supervisors: Prof Ed Keedwell and Prof Zoran Kapelan
Industrial Supervisor: Rebecca Hiscock (Dŵr Cymru Welsh Water)
LinkedIn: sabrina-draude

Sabrina is a Postdoctoral Research Fellow at the University of British Columbia in partnership with Natural Resources Canada.

Dr Sebastian Gnann, Bristol (2016-21)

PhD Thesis: Baseflow Generation at the Catchment Scale – An Investigation using Comparative Hydrology
Supervisors: Dr Nicholas Howden and Dr Ross Woods

Seb is a Chair of Hydrology at the University of Freiburg in Germany.

Dr Dolores González Olías, Bath (2016-20)

PhD Thesis: Self-Powered Biosensors for Water Quality Monitoring: Sensor Development and Signal Treatment
Supervisors: Dr Mirella Di Lorenzo, Dr Petra Cameron and Prof Jan Hofman
LinkedIn: dolores-gonzalez

Dolores is a Postdoctoral Researcher at the Rey Juan Carlos University in Spain.

Dr Simbi Hatchard, Bristol (2016-21)

PhD Thesis: Modelling the Viability of Small Hydroelectric Power on the Zambezi Basin
Supervisors: Prof Paul Bates, Dr Francesca Pianosi and Dr Sam Williamson
LinkedIn: simbi-hatchard

Simbi is a Senior Scientific Developer at Fathom.

Dr Giovanni Musolino, Cardiff (2016-21)

PhD Thesis: Flood Modelling and Hazard Assessment for Extreme Events in Riverine Basins
Supervisors: Prof Reza Ahmadian and Prof Roger Falconer
LinkedIn: giovanni-d-musolino

Giovanni is a special needs teacher in Italy.

Dr Eirini Nikoloudi, Exeter (2016-20)

PhD Thesis: Event Management and Post Event Response Planning for Smart Water Networks
Supervisors: Prof Zoran Kapelan and Prof Fayyaz Memon
Industrial Supervisor: Dr Michele Romano (United Utilities)
LinkedIn: eirini-nikoloudi

Eirini is a Civil Engineer working in the public sector for the Region of Crete, Greece.

Dr Laura Ramsamy, Exeter (2016-22)

PhD Thesis: Flood Forecasting in a Large Catchment with Limited Data
Supervisors: Prof Slobodan Djordjević and Prof Albert Chen
LinkedIn: laura-ramsamy

Laura is a Senior Flood Scientist at Climate X.

Dr Lina Stein, Bristol (2016-21)

PhD Thesis: Using Hydrological Process Knowledge to Assess Flood Generation and Changes on a Global Scale
Supervisors: Dr Ross Woods and Dr Francesca Pianosi
LinkedIn: lina-stein

Lina is a Postdoctoral Research Scientist in the Analysis of Hydrologic Systems Department of the University of Potsdam in Germany.

Dr Charles West, Bristol (2016-21)

PhD Thesis: Investigating Groundwater Recharge and Dynamics at Continental Scales using Comparative Hydrology
Supervisors: Dr Rafael Rosolem and Prof Thorsten Wagener (University of Potsdam)
LinkedIn: charles-west

Charlie is a Hydrologist at Mott MacDonald.

COHORT 4

Dr Andrew Barnes, Bath (2017-21)

PhD Thesis: Machine Learning Methods for the Analysis of Precipitation Patterns
Supervisors: Dr Thomas Kjeldsen and Dr Nick McCullen
LinkedIn: andy-barnes

Andy is a Lecturer in Artificial Intelligence at the University of Bath.

Dr David Birt, Bath (2017-22)

PhD Thesis: Drinking Water Reservoir Resiliency in a Changing Climate
Supervisors: Prof Jun Zang, Dr Lee Bryant, Dr Danielle Wain (7 Lakes Alliance/Colby College) and Dr Rupert Perkins
LinkedIn: david-birt

David is a KTP Research Associate at Lancaster University, working in partnership with Thames Water.

Dr Jamie Brown, Bristol (2017-22)

PhD Thesis: Assessing the Combined Effect of Carbon-Water Dynamics on Hydrological Processes in Brazil
Supervisors: Dr Rafael Rosolem and Dr Ross Woods
LinkedIn: jrcbrown

Jamie is an Environmental Hydrologist at Hydrology.UK.

Dr Elisa Coraggio, Bristol (2017-22)

PhD Thesis: Investigation of High Frequency Water Quality Monitoring and Prediction
Supervisors: Prof Dawei Han, Prof Theo Tryfonas and Dr Claire Gronow
LinkedIn: elisa-coraggio

Elisa is a Senior Water Resources Planner at Wessex Water.

Dr Giulia Giani, Bristol (2017-21)

PhD Thesis: On the Objective Characterization of the Rainfall Runoff Transformation
Supervisors: Dr Miguel Rico-Ramirez and Dr Ross Woods
LinkedIn: giulia-giani

Giulia is a Senior Catastrophe Research Analyst at Gallagher Re.

Dr Vasilis Koukoravas, Exeter (2017-23)

PhD Thesis: Hydraulic Modelling, Sectorisation, Interventions for Assessment and Improvement of Equity in Intermittent Water Supply Systems
Supervisors: Prof Raziyeh Farmani and Prof Zoran Kapelan (TU Delft)
LinkedIn: vasilis-koukoravas

Vasilis is a Water Modeller/Engineer at Qatium.

Dr Catherine Leech, Cardiff (2017-22)

PhD Thesis: An Experimental Study of the Hydrodynamic Impact of Turbine Layout and Design Considerations in Tidal Range Schemes
Supervisors: Prof Reza Ahmadian and Prof Roger Falconer
LinkedIn: catherine-leech

Catherine is a Project Manager at Josiah Venture in the Czech Republic.

Dr Nefeli Makrygianni, Cardiff (2017-21)

PhD Thesis: Evaluation of the Performance of the Wave Boundary Layer Model with the OpenIFS
Supervisors: Prof Shunqi Pan and Dr Michaela Bray
Industrial Supervisor: Dr Jean Bidlot (ECMWF)
LinkedIn: nefeli-makrygianni

Nefeli is a Marine Scientist at the Met Office.

Dr Stephanie Müller, Cardiff (2017-21)

PhD Thesis: Impact of Leaky Barriers and Hydrokinetic Turbines on Channel Hydrodynamics and Fish Movement
Supervisors: Prof Catherine Wilson and Dr Pablo Ouro (University of Manchester)
LinkedIn: stephanie-müller

Stephanie is a Research Engineer at Vattenfall in Sweden.

Dr Jessica Penny, Exeter (2017-22)

PhD Thesis: Impact of Land-Use Changes on Hydrological Regimes
Supervisors: Prof Slobodan Djordjević and Prof Albert Chen
LinkedIn: jessica-penny

Jess is a Postdoctoral Research Fellow at the University of Exeter.

Dr Bikash Ranabhat, Cardiff (2017-22)

PhD Thesis: Parametric Optimisation of a Vertical Axis Hydrokinetic Turbine with Shallow Water Application
Supervisors: Prof Reza Ahmadian, Dr Allan Mason-Jones and Prof Roger Falconer
LinkedIn: bikash-ranabhat

Bikash is a Dams Engineer at Arup.

Dr Debbie Shackleton, Exeter (2017-23)

PhD Thesis: Investigating the Relationship between Climate and Cholera
Supervisors: Prof Fayyaz Memon and Prof Albert Chen
LinkedIn: debbie-shackleton

Debbie is a Research Associate in the School of Public Health at Imperial College London.

Dr Bert Swart, Bath (2017-22)

PhD Thesis: In Situ Image Analysis for the Investigation of Microbubble Size, Rise Velocity and Microbubble-Microparticle Interaction during Flotation
Supervisors: Dr Jannis Wenk and Prof John Chew
LinkedIn: bert-swart

Bert is a Water Resources Engineer at Hydrology.UK.

COHORT 5

Dr William Addison-Atkinson, Exeter (2018-23)

PhD Thesis: An Integrated Approach to Health Risk Assessment for Sewer Flooding
Supervisors: Prof Albert Chen and Prof Fayyaz Memon
LinkedIn: williamaddison-atkinson

Will is a Flood Risk Analyst at JBA Consulting.

Dr Arran Cooper-Davis, Exeter (2018-22)

PhD Thesis: Flow Timeseries Forecasting in Urban Drainage Networks using Artificial Neural Network Models
Supervisors: Prof Slobodan Djordjević and Prof David Butler
Industrial Supervisor: Dr Ole Mark (Krüger A/S)
LinkedIn: aricooperdavis

Ari is a Lead Developer at Our Rainwater.

Dr Laura Devitt, Bristol (2018-23)

PhD Thesis: Estimating Flood Risk under Climate Change
Supervisors: Prof Jeff Neal, Prof Thorsten Wagener (University of Potsdam) and Dr Gemma Coxon
LinkedIn: laura-devitt

Laura is a Postdoctoral Research Associate in the School of Geographical Sciences at the University of Bristol, currently engaged on the Natural Environment Research Council (NERC) FUTURE-FLOOD project.

Dr Nicolas Hanousek, Cardiff (2018-23)

PhD Thesis: Numerical Modelling of Tidal Energy Devices and Structures as part of Net Zero
Supervisors: Prof Reza Ahmadian and Prof Roger Falconer
LinkedIn: nicolas-hanousek

Nick is a Graduate Engineer at WMS in Brisbane, Australia.

Dr Daisy Harley-Nyang, Exeter (2018-23)

PhD Thesis: A Study of Microplastics in Wastewater, Sludge and Biosolids
Supervisors: Prof Fayyaz Memon and Prof Tamara Galloway OBE
Industrial Supervisor: Nina Jones (UKWIR)
LinkedIn: daisy-harley-nyang

Daisy is a Deployable Project Scientist at the Met Office.

Dr Mikkel Bue Lykkegaard, Exeter (2018-22)

PhD Thesis: Multilevel Delayed Acceptance MCMC with Applications to Hydrogeological Inverse Problems
Supervisors: Prof Tim Dodwell and Prof David Moxey (King's College London)
LinkedIn: mikkelbue

Mikkel is a Principal Scientist at digiLab.

Dr Juliana Marcal, Bath (2018-2023)

PhD Thesis: Urban Water Security Assessment: A Downscaled Approach
Supervisors: Prof Jan Hofman, Dr Junjie Shen and Prof David Butler (University of Exeter)
Industrial Supervisor: Dr Blanca Antizar-Ladislao (Isle Utilities)
LinkedIn: juliana-marcal

Dr Santiago Martelo, Cardiff (2018-22)

PhD Thesis: Large Eddy Simulations of Two-Phase Flows around Complex 3D Geometries
Supervisors: Dr Zhihua Xie and Prof Shunqi Pan
LinkedIn: santiago-m

Santi is a freelance Naval Architect and Data Scientist.

Dr Daniel Power, Bristol (2018-23)

PhD Thesis: Investigating Opportunities for Global Scale Soil Moisture Studies using Cosmic-Ray Neutron Sensors
Supervisors: Dr Rafael Rosolem and Dr Miguel Rico-Ramirez
LinkedIn: dan-power

Dan is a Postdoctoral Researcher at the Helmholtz Centre for Environmental Research (UFZ) in Germany.

Dr James Rand, Bath (2018-23)

PhD Thesis: Autonomous Monitoring of Lakes and Other Water Bodies using Micro-Underwater Vehicles
Supervisors: Dr Alan Hunter, Dr Lee Bryant and Dr Danielle Wain (7 Lakes Alliance/Colby College)
LinkedIn: james-rand

James is a Postdoctoral Researcher at the University of Bath.

Dr Georgios Sarailidis, Bristol (2018-23)

PhD Thesis: Uncertainty Quantification and Attribution in Flood Risk Modelling
Supervisors: Dr Francesca Pianosi, Prof Thorsten Wagener (University of Potsdam) and Dr Ross Woods
Industrial Supervisor: Prof Rob Lamb (JBA Consulting)
LinkedIn: georgios-sarailidis

George is a Catastrophe Modelling KTP Associate at JBA Risk Management.

Our Students

Richard Rees, Cardiff (Cohort 3)

PhD Project: Numerical Investigation into the Effect of Dynamic Pore Water Pressure on Slope Stability
Supervisors: Prof Shunqi Pan and Dr Michaela Bray

Richard's academic background is an MSc in Applied Environmental Geology from Cardiff University and a BSc Hons. in Environmental Earth Sciences from Aberystwyth University. His most recent professional experience on joining WISE was as Junior Project Engineer for ITM Monitoring, providing a key interface with Network Rail on asset management requirements and projects having the potential ability to impact track safety and performance.

Richard is currently an engineer at JBA.

Cristina Coker, Exeter (Cohort 5)

PhD Project: Hazards and Drivers of Coastal Cliff Retreat in England
Supervisors: Prof Akbar Javadi, Dr Steven Palmer and Dr Barend Van Maanen
LinkedIn: cristina-coker

Cristina has an MSc in Applied Marine Science from Plymouth University and a BSc in Environmental and Land Planning Engineering from Politecnico di Milano. Prior to joining the WISE CDT she was working as a Senior Coastal Process Scientist for the Plymouth Coastal Observatory.

Cristina is now a Coastal Scientist at Moffatt & Nichol.

Oliver Foss, Bath (Cohort 5)

PhD Project: Dynamic Revetments and Composite Beaches – Coastal Protection Inspired by Nature
Supervisors: Dr Chris Blenkinsopp and Prof Jun Zang
LinkedIn: olliefoss

Ollie joined the WISE CDT on completion of his MSc in Mathematics from Swansea University. He also has a BSc in Mathematics from Swansea University.

Ollie is currently a Research Assistant in the Engineering Department at the University of Aberdeen.

Vivien Maertens, Bath (Cohort 5)

PhD Project: Optimisation of Deep-Water Offshore Wind Systems
Supervisors: Dr Chris Blenkinsopp, Prof Paul Milewski and Prof Jun Zang
LinkedIn: vivien-m

Vivien came to the WISE CDT programme with an MSc in Modern Applications of Mathematics from the University of Bath. She also has a BSc in Mathematics with Advanced Proficiency in French from the University of Exeter.

Vivien is now an Offshore Wind Engineer at Offshore Renewable Energy Catapult.

Roberto Quaglia, Bristol (Cohort 5)

PhD Project: Statistical Characterisation of Catchment Rainfall and its Connection to Flood Response
Supervisors: Dr Ross Woods and Prof Dawei Han
LinkedIn: roberto-quaglia

Roberto joined the WISE CDT with a Master's degree in Environmental Engineering from the University of Bologna. He also has a Bachelor's degree in Environmental Engineering from the University of Trento.

Roberto is currently a Hydrologic Technician at ARPAV, the Regional Agency for Environmental Prevention and Protection of Veneto in Italy.

Samuel Rowley, Cardiff (Cohort 5)

PhD Project: Flood Risk Modelling and Management in the Middle Severn Catchment
Supervisors: Prof Shunqi Pan and Dr Zhihua Xie
LinkedIn: samuel-rowley

Sam joined the WISE CDT with a BSc in Physics from Cardiff University. His final year project on 'Water Vortices 2 – The Ranque-Hilsch Effect In Water' involved analysing heat flows in a variety of water vortices, using thermal imaging and computer analysis.

Sam is now a Hydraulic Flood Modeller at JBA Consulting.

About the WISE CDT

WHAT IS A CDT?

CDTs have been one of the routes through which UK Research and Innovation (UKRI) has supported PhD programmes. The WISE CDT has been funded through EPSRC, the principal UK government agency funding research and training in engineering and physical science disciplines. EPSRC-funded CDTs have brought together diverse areas of expertise to train engineers and scientists 'in areas of national need'. The aim has been to equip students with the skills, knowledge and confidence to tackle evolving issues and future challenges.

CDTs offer the opportunity for universities to create new working cultures, build relationships between teams - both within and across institutions - and forge lasting links with industry. CDT students are fully funded for the equivalent of four years' full-time study. The first year gives a grounding in the research area and allows students to build expertise in their 'home' discipline, while developing the skills and knowledge to cross disciplinary boundaries. A formal programme of taught coursework develops and enhances technical knowledge and skills across a range of relevant disciplines. For the remaining three years, students develop their doctoral research, while continuing to join together as a cohort for CDT events and training courses, including technical and transferable skills training.

The benefits to students include:

- competitive stipends;
- an innovative, supportive and engaging student experience gained through training as a cohort;
- opportunities to engage in research collaborations with leading researchers across the CDT partnership;
- integral involvement of leading industry, business, government and other stakeholders in both training and research.

The WISE CDT was one of 115 centres funded through EPSRC's 2013 CDT Call. The WISE EPSRC bid application cited recent reports by the Council for Science and Technology (2009), the Royal Academy of Engineering (2012) and the Institution of Civil Engineers (2012), highlighting a shortage of engineers and scientists in industries of national importance, including the energy, water, sanitation, communication and IT sectors. The stated aim of the WISE CDT was 'to meet the growing need for training of a new breed of engineers and scientists - 'hydroinformaticians' - capable of working at the interface of traditionally separate informatics, science and engineering disciplines to manage the water cycle effectively and sustainably'. WISE sought to fill this skills gap 'by offering a postgraduate programme that fosters new levels of innovation and collaboration and trains a cohort of engineers and scientists at the boundary of water informatics, science and engineering', including linking with 'other traditionally separate disciplines, which are relevant to sustainable water management, ranging from statistics to social sciences, geography, psychology and economics'.

The WISE CDT has been a partnership between the University of Exeter (the EPSRC training grant holder), the University of Bath, the University of Bristol and Cardiff University. EPSRC funding has been supported by resources from the WISE partner universities and external collaborators. The four WISE universities together comprise the GW4 Water Security Alliance, a research consortium that pursues a common vision of 'addressing the impact of global change on water to benefit people and ecosystems'.

> *"It's immensely satisfying that WISE students continue to support the economic, environmental and social strategies of business with their cutting edge bespoke research."*
>
> Professor John Banyard OBE, WISE CDT Advisory Board Chair

THE WISE CDT PROGRAMME

Student Recruitment

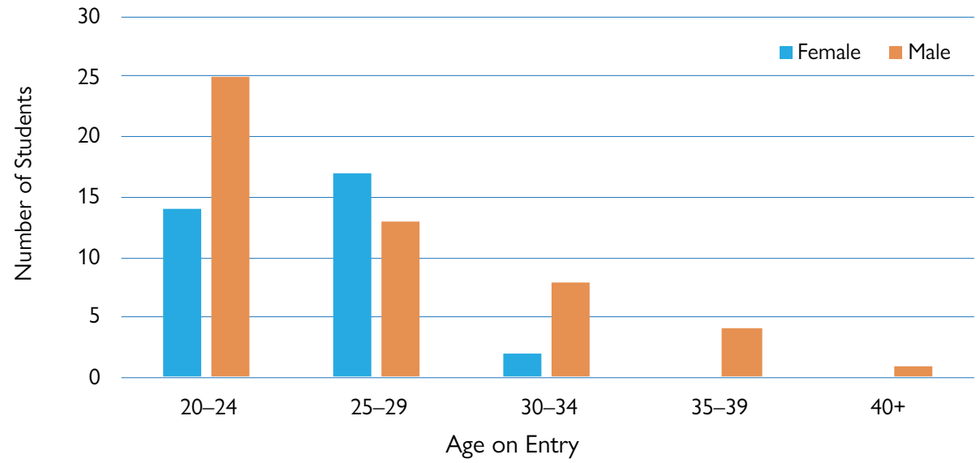
WISE enrolled 84 students in total across five annual cohorts, with each cohort numbering between 15-18 entrants. 39.3% of recruited students were female and 60.7% were male. The proportion of females recruited to the WISE CDT is pleasingly high compared with an average of around 25%-28% for engineering and technology postgraduate research degree programmes*. Students' ages on entry ranged from 21 to 50. 59.5% of successful applicants were UK nationals, with 40.5% coming from mainland Europe (Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Slovenia and Spain).

Entrants' backgrounds and academic qualifications have been varied, covering engineering (civil, chemical, environmental) and related disciplines such as biochemistry, environmental science, geography, hydrology, mathematics, physics, and robotics. Some students joined the programme with previous industry experience (e.g. Chemical Engineer, Repsol; Flood Risk and Drainage Engineer, WYG Group; Senior Engineer, Hydroplan), while others came directly from academia.

*https://www.hesa.ac.uk/data-and-analysis/sb265/figure-17

Two recruited WISE CDT students in Cohort 4 were subsequently transferred to an EPSRC National Productivity Investment Fund (NPIF) training grant, so do not appear in the formal statistics that WISE reports to EPSRC. However, as these two 'WISE-aligned' students followed exactly the same programme as our other students and contributed fully to WISE, they are included in the CDT's own reporting data.

RECRUITED STUDENTS: GENDER AND AGE ON ENTRY



YEAR ONE CO-LOCATION

The WISE CDT recruited five annual cohorts between September 2014 and September 2018. Student recruitment administration was co-ordinated centrally at the University of Exeter, ensuring that applicants had a single point of contact throughout the process. A bespoke CDT application form was used, covering educational background, research interests, research experience and motivation to undertake a PhD with the WISE CDT. Applicants were also asked to indicate their desired 'home' PhD research university in order of preference.

> *"Being part of WISE and Cohort 3 specifically has been one of the best experiences of my life."*
>
> Cohort 3 student

The four WISE universities subsequently considered and interviewed their allocated applicants, with each successful applicant then formally registering at that university. Once a WISE university had filled its own studentship allocation for the year, it was possible for remaining applicants to be considered and interviewed by their second or third choice PhD research university.

The WISE CDT programme for each cohort commenced with a week-long induction at the University of Exeter. All entrants were located together at Exeter for the first year Postgraduate School and shared a dedicated office space. Beyond year one, students were based full-time at their registered university to work on their PhD project for the following three years. WISE students report benefiting greatly from belonging to a cohort with varied backgrounds and experiences. Students' co-location for their first year has proved to be fundamental to cohort-building, enabling them to support one another and learn from others' knowledge and experience, while at the same time building long-standing friendships.

> *"The cohort of people on the CDT became friends and were an excellent source of support throughout the PhD."*
>
> Cohort 4 student

Postgraduate School

The Postgraduate School in Water Informatics ensured that students gained a solid understanding of water informatics and wider research methodology before they began their PhD research project. This was particularly important given WISE students' varied academic backgrounds and experience. In designing the CDT programme, a key aim was to develop students' skills and understanding in addition to furthering their knowledge, including an appreciation of both present and future needs of the water industry.

The Postgraduate School in Water Informatics programme accounted for 120 credits of taught Master's level modules (National Qualification Framework Level 7). The eight modules covered Hydroinformatics Tools, Urban Drainage and Waste Water Management, Water Supply and Distribution Management, Environmental and Computational Hydraulics, Computational Hydrology, Mathematical Modelling of Wastewater Treatment Processes, Programming for Engineering and Research Methodology. The modules on Environmental and Computational Hydraulics, Computational Hydrology and Mathematical Modelling of Wastewater Treatment Processes were created specifically for the WISE CDT and were only available to WISE students, being delivered by academics from Cardiff, Bristol and Bath respectively. All other modules were shared with students following the University of Exeter's MSc in Water Engineering and other MSc/MEng programmes, giving WISE students wider educational and social interactions.

New entrants to the WISE CDT developed their PhD project proposal during their first year. Students presented their research proposals to the CDT management group and Advisory Board members at Summer School following completion of their Postgraduate School modules and examinations. The PhD research projects were then developed and refined during years two-four. However, the CDT programme ensured that students continued to join up as a cohort for regular training and activities, plus for multi-cohort events, throughout their studentship.

> *The cohort culture gave great support and companionship throughout the programme.*
> Cohort 5 student

Transferable Skills

Transferable skills training has been an essential component of the WISE CDT programme. Key generic skills such as communication, commercial awareness, negotiation, problem solving and teamwork have been invaluable for students' development and their future careers, whether in industry or academia. In each year students completed a Transferable Skills and Engineering Leadership module, with all four partner universities designing and delivering a module. Modules were designed to be distinct, build on earlier learning and align to students' PhD progression:

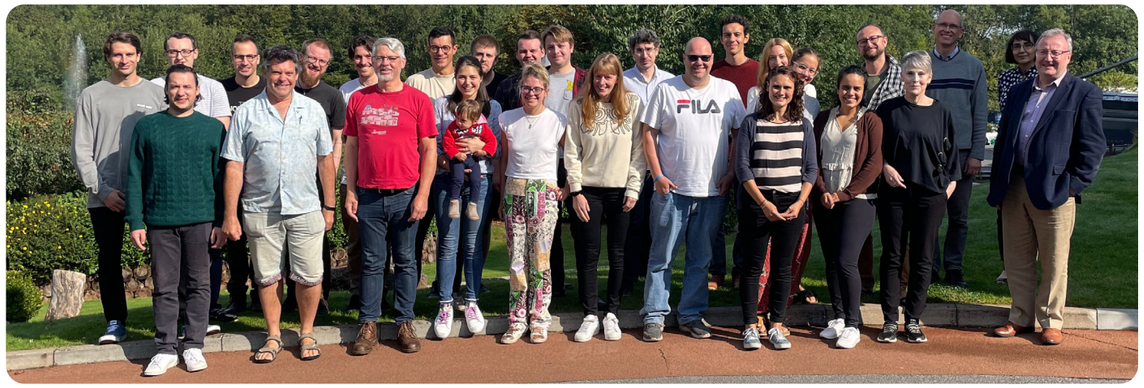
Year 1 (Exeter): Acquisition of a deeper understanding of the research process and methodology. Communication, including supervisory relationships, science communication and public engagement, and overseas collaboration. Patenting and intellectual property, negotiating and influencing skills, and developing a business model. This module was conducted jointly with Stream Industrial Doctorate Centre (IDC) students to widen the mix of participants' backgrounds and experiences.

Year 2 (Bristol): Maintaining motivation and independence; visualising data; preparation and delivery of conference papers and posters; writing and refereeing of journal articles and grant applications.

Year 3 (Cardiff): Developing resilience; reducing stress; excelling as a researcher; leadership, management and team skills; professional etiquette; planning and writing a thesis; thinking of one's career; entrepreneurship and leadership skills.

Year 4 (Bath): PhD thesis writing and completion; Viva preparation; career opportunities and career development.

> *I wanted to share how useful the WISE transferable skills courses really are!...I was chosen to role play a situation with the presenter from VOX coaching where I had to practise speaking to someone who would be influential to my career but I might find it difficult to start a conversation with. I chose to act out an interaction with the Scientific Director at the Department for Business, Energy and Industrial Strategy and whilst on my placement I got to have the conversation for real!.*
> Cohort 4 student



Research Culture

WISE students have been able to pursue specialist skills training through attending taught Master's level modules relevant to their research, either at their registered university or at another WISE partner university. They have participated in a variety of additional activities at their registered university, including seminars, research group events and teaching, and have been an integral part of an active water engineering research community:

- University of Bath's Water Innovation & Research Centre
- University of Bristol's Cabot Institute for the Environment's Water Theme
- Cardiff University's Hydro-environmental Research Centre
- University of Exeter's Centre for Water Systems

> *I am extremely grateful for the support, guidance, resources, funding, and opportunities provided by the WISE CDT.*
> Cohort 5 student

Summer School

The WISE CDT programme has incorporated a mix of cohort and multi-cohort events to encourage students from all universities to interact, supporting discussion and exchange of ideas across disciplinary boundaries. WISE has run six residential Summer Schools for its students, organised by each of the partner universities in turn. Summer Schools have also hosted the CDT Advisory Board meeting of industrial and academic partners and Board of Examiners' meetings, which have reviewed Postgraduate School marks and annual progression for all students.

Summer Schools have incorporated student research presentations and poster displays, water-themed team challenges, site visits and talks from leading water industry figures. Recent team challenges have encompassed:

- creating an educational board game, designed to enable players to explore the issues surrounding water resources management, the challenges and possible solutions.
- developing a new business plan for a water utility company, anticipating future demands and climate change effects, in order to achieve a significant reduction in water abstraction from natural resources and increase water efficiency;
- in the role of a consultancy company, developing and presenting proposals for intervention to improve resilience to flooding to different clients and stakeholders.

The final planned Summer School, organised by Bristol's **Dr Ross Woods** and **Dr Rafael Rosolem**, had to be postponed in 2020 due to Coronavirus pandemic restrictions. However, it successfully took place a year later in September 2021. This was the first in-person WISE event following the pandemic and was designed with this in mind. Participants expressed their appreciation for the relaxed atmosphere and looser scheduling, which enabled everyone to get used to being in a large group again and to have the chance to reconnect. Students also greatly valued the WISE alumni panel session, where graduates shared their experiences and answered the many questions posed by current students.

> *The Summer Schools were great to socialise and learn from the older cohorts. Also really enjoyed the challenges and team building exercises that were involved.*
> Cohort 4 student

Industry Engagement

Integral, ongoing engagement with industry has been essential to the WISE CDT, with its aim of being a postgraduate programme that would fill the skills gap by fostering new levels of innovation and collaboration. In establishing a vibrant research and learning community, the CDT has provided training at the boundary of water informatics, science and engineering. Central to both the training programme and to students' research projects has been the involvement of leading industry, business, government and other stakeholders. Students' exposure to real industry challenges and projects - and the networking and career development opportunities arising from engagement with industry - have therefore been highly valuable and necessary components of the programme.

Industry engagement for all students has included:

- A series of seminars and invited lectures from industry and water stakeholders during the first year Postgraduate School;
- Regular Industry Days, where students have presented their research to water industry and practitioner stakeholders via poster and networking sessions. Industry Day hosts have included Atkins, HR Wallingford and Arup, while the 2020 event was run in conjunction with Wet Networks Bristol;
- Engagement with Advisory Board members at Summer Schools, including presentations of PhD research project proposals and poster sessions displaying current research and emerging results;
- Engagement with key professional organisations such as CIWEM, IWater, British Hydrological Society, UK Water Industry Research (UKWIR), International Association for HydroEnvironment Engineering and Research (IAHR), and the IWA.

In December 2017, WISE CDT students were joined by University of Exeter MSc Water Engineering students for an evening Enrichment Event focusing on careers in the water industry. Hosted by IWater, 'A Life in Water' gave students an insight into the many challenges and opportunities within the sector and the range of jobs on offer. Students also benefited from the chance to meet local employers and a broad range of industry professionals to find out more about specific roles.

Smaller groups of WISE students, meanwhile, have taken up opportunities to participate in significant industry gatherings, such as annual Dŵr Cymru Welsh Water Annual Innovation Events, and to network with industry speakers and delegates at conferences.

See page 30 to learn about the CDT's industrial partnerships and impacts.

Research Visits

The universities of Bath, Bristol, Cardiff and Exeter have strong links with the international academic community, as well as with consulting engineering and IT companies, water companies, government departments and agencies involved in managing and improving the water environment. All WISE CDT students have been strongly encouraged to undertake a research visit of up to three months as they developed their PhD project. Before undertaking a research visit, students were required to complete a bespoke application form in liaison with their primary supervisor. To maintain CDT oversight, applications were scrutinised and approved by Cardiff University - or by the University of Exeter for Cardiff applications - to ensure that each visit would be beneficial, that the costs were appropriate and that the student would receive sufficient support and contact whilst away.

Research visits have been funded by the CDT, some with supplementary support from the host organisation or the British Council, and have been made either to a UK-based industrial or government agency partner or to an overseas academic institution. During their visit students have worked on their research under the guidance of their primary PhD supervisor, the supervisor at the host institution and experts in their research area. On their return, students have written and submitted a report evidencing the impact and outcomes of their visit. The WISE CDT Programme Management Group has reviewed research visits at each meeting, with a report on applications and outcomes being presented by Cardiff's **Professor Shunqi Pan**.

See pages 8-9 to learn about students' recent research visit experiences. See pages 31-32 to discover more about WISE CDT research visit destinations and the institutions and supervisors who have hosted these visits.

Public Engagement

One of EPSRC's key objectives is to 'generate public awareness; communicate research outcomes; encourage public engagement and dialogue; and disseminate knowledge'. EPSRC therefore expects and encourages its researchers to engage with the public. The WISE CDT has achieved this in a variety of ways, with the aim of both stimulating interest and educating. Public outreach activities have enabled students to develop their communication skills through disseminating their research in an understandable way to very different audiences. Students have found these experiences extremely enjoyable and wholly worthwhile.

WISE students have participated in annual festivals such as FUTURES science events, Festivals of Nature, British Science Weeks, National Engineering Days and World Water Days. In addition to in-person participation, students have engaged through a variety of channels, including online presentations and discussions, radio, acting, puppetry and volunteering. The WISE CDT also joined forces with the Stream IDC at New Scientist Live 2019 in London. Students from both CDTs managed an exhibition stand - under the umbrella of 'EPSRC Water Engineering' - to share their research with the public via a wealth of engaging posters, demonstrations and experiments.

Competitions and Conferences

The CDT has deliberately incorporated an element of competition within the programme, setting both group and individual challenges. These have included 'best poster' and 'best presentation' competitions, as well as varied Summer School group challenges in association with industry partners. In going on to submit papers or posters to journals and conferences, WISE students have been exposed to competition at a national or international level.

WISE students have attended and presented at many significant UK and overseas conferences. This has offered superb networking opportunities and valuable preparation for future careers, as well as recognition for the quality of their posters and presentations.

Guided Freedom

The WISE CDT's philosophy of 'guided freedom' has given students the responsibility and resources to influence their training programme, thereby gaining valuable skills, exploring innovative ideas and methodologies and creating new contacts. Supporting this principle has been students' generous financial support, comprising a stipend and fees for the equivalent of four years' full-time study, plus a Research Training Support Grant to cover additional training costs, such as conferences and the research visit.

> *"I really like the concept of CDTs, allowing networking, training and meeting like-minded peers and researchers. It therefore was a great pleasure to be part of such a well organised PhD program."*
> Cohort 4 student

MANAGEMENT AND GOVERNANCE

CDT Management

The CDT's EPSRC training grant has been held by the University of Exeter. The WISE CDT's management team has comprised the Principal Investigator (CDT Director) from the University of Exeter, plus Co-Directors and Co-Investigators from all the WISE partner universities. The management team has met formally as the Programme Management Group at least four times a year to plan, implement and review strategic and operational matters. Student representatives have sat on this group to ensure students have had a direct line of communication with the management team. Student representatives have been able to feed in comments and questions from their peers, propose ideas and contribute to planning and programme improvement discussion.

Professor Reza Ahmadian
Cardiff University

Professor Slobodan Djordjević
University of Exeter

CDT Director:

Professor Raziyeh Farmani
University of Exeter

CDT Co-Directors:

Dr Tom Arnot
University of Bath

Dr Rafael Rosolem
University of Bristol

Professor Dragan Savić
University of Exeter

Professor Shunqi Pan
Cardiff University

Dr Ross Woods
University of Bristol

Professor David Butler
University of Exeter

CDT Administrator:

Debbie Ford
University of Exeter

CDT Co-Investigators:

Professor Jan Hofman
University of Bath

Professor Jonathan Dawes
University of Bath

The WISE CDT is also grateful to former management team members:

Professor Roger Falconer, now an Independent Water Consultant,
Professor Zoran Kapelan, now Delft University of Technology,
Professor Thorsten Stoesser, now University College London,
Professor Thorsten Wagener, now University of Potsdam.

Administration and Support

WISE has had a full-time administrator (Postgraduate Research Support Officer), based at the University of Exeter. Students and graduates across the WISE partnership have been able to contact the administrator at any time for advice, guidance, assistance or information. This CDT model of a full-time administrator differs from many standard postgraduate researcher programmes, where student support teams cover a large number of students and are not involved directly in a student's programme or research area. This function has therefore provided a valuable additional layer of support for WISE students.

WISE students have additionally had access to a comprehensive range of support through their own registered university (encompassing student support services, wellbeing resources and services, training resources, careers services, student union).

WISE has also operated an Administrative/Finance group, comprising postgraduate research administrators and finance officers from each of the CDT universities. This group has met regularly to scrutinise the budget, to consider student-related matters and to review and develop policy and procedures, thus ensuring that key information has been shared effectively across the partnership.

> *"It is great to have such a supportive, helpful and friendly person in WISE."*
> Cohort 3 student

Progress Monitoring

Each student has had a minimum of two academic supervisors overseeing their PhD research. Supervisory teams have sometimes included a supervisor from another WISE university to provide a complementary skill set or expertise. Projects developed with industry have additionally included an industry partner supervisor.

The CDT has required all students to complete a WISE Annual Progress Review to evidence their development and progression, including any problems encountered, plus a self-assessment of their satisfaction with their PhD. The student's primary supervisor, and industry supervisor where relevant, have contributed comments and a recommendation on progression. Annual Progress Reviews have been scrutinised by the CDT Programme Management Group, allowing WISE to maintain an overview of all students across the partnership and to monitor trends over time.

WISE students have moreover been required to comply with all mandatory monitoring and review procedures at their registered university. This has ensured that oversight of WISE students' progress has also been maintained independently of the CDT.

> *"It offered a clear pathway, encouragement, and guidance that made me believe that I could get a PhD, which is something that I lacked before (and occasionally during) my studies."*
> Cohort 5 student

Advisory Board

The WISE CDT Advisory Board has been chaired throughout by **Professor John Banyard**, OBE. With members spanning national and international universities plus UK water companies, public bodies, research organisations, consultancies, businesses and EPSRC, the Advisory Board has delivered insight and challenge, guiding the CDT's strategic development. The Advisory Board has met formally once a year, but Board members have been kept informed of CDT activity and planning on an ongoing basis and have also engaged with students and academics in regular CDT events such as Industry Days, poster events and Summer Schools.

Our grateful thanks go to Advisory Members, both present:

Dr Helena Alegre, LNEC, Portugal
Professor Ruth Allen, Independent Consultant
Professor John Banyard, OBE, Independent Consultant
Andrew Burrows, PA Consulting
Dr Maria Calderon Munoz, EPSRC
David Evans, Independent Consultant
Dr Mark Fletcher, Arup
David Fortune, independent consultant
Dr Dan Green, Wessex Water
Dr Tony Harrington, Dŵr Cymru Welsh Water (deceased)
Tony was a staunch champion of the WISE CDT and not only supported the bid but was a committed and valued member of the Advisory Board throughout. He is sadly missed.
Professor Rob Lamb, JBA Trust
Dr Sean Longfield, Environment Agency
Professor Ana Mijic, Imperial College London
Professor Patrick Reed, Cornell University
Professor Elena Toth, University of Bologna
Dr Jon Wicks, Jacobs

and past:
Professor Alistair Borthwick, University of Edinburgh
David Elliott, independent consultant
Erwin Frank-Schultz, IBM
Professor Orazio Giustolisi, Technical University of Bari
Steve Legg, Analytics Consultant
Andy Moores, CIRIA
Robert Muir-Wood, Risk Management Solutions.

External Examiners

The WISE CDT has had two external examiners during the course of the programme: **Professor Arthur Mynett** from IHE Delft Institute for Water Education and more recently **Professor Ana Mijic**, from Imperial College London's Centre for Systems Engineering and Innovation. The WISE external examiner role initially focused on the Postgraduate School taught programme, with a formal Board of Examiners meeting taking place each summer. However, with no student intakes beyond 2018-19, the external examiner role evolved to embrace the wider CDT programme, with Professor Mijic joining the CDT Advisory Board and feeding back her insights from speaking with students to management group and Advisory Board colleagues.

External Monitoring

The WISE CDT has been monitored and evaluated by EPSRC throughout its lifetime. In its mid-term review WISE was awarded the highest possible assessment ('good'), with EPSRC commenting that 'this CDT has been successfully managed across multiple institutions with effective management and governance and a strong emphasis on cohort development'. Highlights noted by EPSRC were 'the industrial engagement and the additional leveraged funding secured; the cohort development across multiple institutions; and the interaction with the Stream IDC'.

EPSRC CDT training grant holders are required to submit an Annual Monitoring Survey to the research council. The Annual Monitoring submission incorporates recruitment data, financial information, case studies, achievements and the CDT's impact. This data supplements information available to EPSRC via other mechanisms (such as Je-S for student details and Researchfish for research outcomes). Together, this evidence helps EPSRC evaluate the impact of its investment and collect evidence to inform future strategies. The most recent Annual Monitoring Survey submissions have covered the Coronavirus pandemic and its impacts on students and delivery of the training grant.

As a PhD programme accredited by CIWEM (see next page), WISE has additionally been required to submit an Annual Review Report to CIWEM, summarising any changes to the programme or developments implemented since accreditation.

> *"The incredible opportunities and resources that were made available to us, such as the travel grant, CWS seminars, and research environment, made it very easy for me to do things that I would never have been able to do otherwise."*
> Cohort 5 student

PROGRAMME ACCREDITATION

The WISE CDT pursued CIWEM accreditation to meet the needs of its students who did not have a formal engineering academic background. Accreditation was awarded in June 2018 and covered all student intakes. This was CIWEM's first accreditation of a PhD programme. Areas of good practice highlighted by the accreditation panel included the relationships with and between student cohorts, the CDT's industry links and the ability of students to draw on academic expertise and facilities across the four universities. Membership of CIWEM has been an important core strand of students' professional development, offering many advantages such as networking through branch meetings and events.

The four CDT partner universities have additionally pursued JBM accreditation of the PhD programme. WISE JBM accreditation had to be actioned by each university individually and therefore took place over an extended period. Exeter, Cardiff and Bath universities obtained JBM accreditation for all their WISE student intakes. Additionally, Bristol recently obtained JBM accreditation for its 2018-19 intake. JBM accreditation means that the WISE PhD programme is accredited by the Institution of Civil Engineers, the Institution of Structural Engineers, the Institute of Highway Engineers, the Chartered Institution of Highways & Transportation and the Permanent Way Institution as meeting the requirements for Further Learning for a Chartered Engineer for candidates who have already acquired a Chartered Engineer accredited Bachelor's undergraduate first degree.

Accreditation has been important to the WISE CDT, providing external validation of the quality of the programme and assurance to UK and international applicants. Accreditation also supports the aim of raising professional standards in the water and environment sector by ensuring that the skill sets of students meet the demands of the profession. Furthermore, following an accredited programme enhances students' career prospects by facilitating their path to Chartership.

> *"As a student member of CIWEM it is great to see the WISE CDT programme acknowledged as a CIWEM accredited course. It demonstrates to future employers that CIWEM recognises the course content is relevant to the professional disciplines in the water and environmental management sector, where many of us aspire to end up working."*
> Cohort 3 student

THE CORONAVIRUS PANDEMIC

As conveyed to both EPSRC and CIWEM through the CDT's annual reporting mechanisms, the Coronavirus pandemic years (2020-2022) considerably impacted students' experience and progress. WISE had to adapt the programme during this period and recognises the significant challenges that its students faced in both their professional and personal lives.

During the pandemic the CDT's primary focus was on supporting students and on maintaining the CDT in order to provide the best training and learning experience possible in the circumstances. The global public health situation impacted students in a variety of ways. Direct impacts on PhD research projects included cancellation of fieldwork, data collection and research visits and closure or restricted access to laboratories and facilities. Personal impacts on students encompassed increased caring responsibilities, unsuitable homeworking environments, social isolation and wellbeing and mental health challenges - including for some the resurgence of historical conditions or onset of long-term illness.

While throughout the pandemic the WISE training programme continued without detriment to academic standards, delivery primarily had to be online. CDT meetings similarly moved online. The CDT Programme Management Group met regularly to consider strategy and operational matters, with events planning, scheduling and delivery methods being reviewed frequently with student representatives. Academic supervision and research group meetings also took place online and students' access to university offices and facilities had to be managed in accordance with COVID-19 safety measures, which included extended periods of campus closures.

Students' experience during the pandemic was therefore contrary to the philosophy behind CDTs in offering 'an innovative, supportive and engaging student experience gained through training as a cohort'. The loss of these collaborative elements - together with the inability to travel overseas for research visits or international conferences - was keenly felt and means that students' CDT experience was inevitably vastly different because of Coronavirus. The CDT was also aware from student feedback during the pandemic that - because their working lives were totally 'virtual' - there was little appetite for participating in additional non-mandatory online events, even if these were designed to promote engagement and socialising.

Throughout the Coronavirus pandemic WISE engaged with UKRI and university colleagues on support for students whose projects and progress had been impacted by COVID-19. This support included the provision of funded extensions for those students needing additional time to complete their research projects to a doctoral level. In accordance with UKRI policy, in the latter stages of the pandemic WISE managed new requests for funded extensions as part of its 'business as usual', using this process and other university mechanisms to support students whose academic progress continued to be impacted.

> *Although pandemic restrictions changed my PhD timeline and meant I was unable to carry out a research visit, I was extremely grateful for the opportunity to undertake a policy internship. It was great to be able to take part in such a scheme, even online, and although it was not directly related to my research it was an invaluable experience.*
> Cohort 4 student

Happily, the 2021-22 academic year onwards brought a return to normality for universities following the disruption, delays and uncertainties posed by the pandemic. For WISE students this meant a welcome return to campus working and a resumption of in-person supervisory meetings, laboratory work, engagement with research groups and participation in events. WISE students were also able to travel once more, presenting at international conferences and embarking on overseas research visits. Student feedback has highlighted how much these experiences have been appreciated since the pandemic.

Nevertheless, the CDT knows from our interactions with students that some continued to be affected - physically and mentally - and that their experience of doing a PhD has been different from cohorts graduating before the pandemic. One key difference is the impact on the cohort experience. Pre-COVID-19, when students in a cohort generally had the same funding end date and were at the same stage of progress, the group could encourage and support each other in the months leading up to thesis submission. However, with a diverse range of funding end dates within a single cohort, students have been at different stages of their PhD journey. Those unable to submit before their funding end date have then had to juggle employment alongside finalising their PhD thesis, causing further delay. An additional impact on the cohort experience is that people's working patterns and time on campus has changed since the pandemic, meaning less opportunity for casual interaction than previously.

> *I think the Covid pandemic was managed extraordinarily well, all things considered – it did have a negative impact, but that was across the board, and it was reasonably well accounted for.*
> Cohort 5 student

TRAINING GRANT EXTENSIONS

The CDT's EPSRC training grant was originally due to end in September 2022, as the expectation was that all cohorts would have finished their PhD projects by this date. However, due to students' COVID-19 funded extensions and some interruptions of study for personal reasons (e.g. maternity leave, ill health), WISE ended up with the equivalent of an entire cohort whose funded studentships continued beyond September 2022. The CDT therefore asked EPSRC for a twelve-month 'no-cost' training grant extension to 30 September 2023, which was approved in July 2022.

WISE then sought a second training grant extension to cover the new circumstances of its remaining funded students, which was approved by EPSRC in July 2023. This took the CDT's grant end date to 31 December 2024. While an EPSRC grant extension comes with no additional funding, it has allowed the CDT to use its existing resources to support its remaining students to maximise their CDT training experience and achieve doctoral training outcomes.

STUDENT EVALUATION

The WISE CDT has sought feedback from students on an ongoing basis, both informally and formally. Methods have been varied, including surveys, polls, evaluation forms, suggestion boxes, cohort and group meetings, sessions with the CDT's external examiner, individually and via the cohort representatives.

Results from end of programme surveys have shown high satisfaction ratings. Based on graduate returns each cohort has rated its WISE CDT experience at least 4.1 out of 5 ('good' to 'excellent'). The most frequently cited best elements have been the cohort ('community') experience, the funded research visit and the opportunity throughout the programme to present work and engage with other researchers both in the UK and internationally. These results are pleasing, as they represent areas not generally available on a standard PhD programme. Areas cited as learning points for the CDT have been more varied, generally reflecting individuals' preferences about the composition of their own training programme, their personal experience at their registered university and the fact that the partner universities' policies and procedures outside those specific to the CDT were not always consistent. The CDT Programme Management Group recognised this latter issue, but acknowledged that it was not feasible to seek to align university policies to suit a time-limited PhD programme.

© Bhagesh Sachania Photography 2023

The CDT has explicitly sought feedback on areas for improvement in order to develop the programme for subsequent cohorts. WISE can evidence how it has acted in response to such feedback, for example making changes to the first year taught programme, pursuing CIWEM accreditation to recognise that not all entrants had a formal engineering academic background and providing enhanced CDT administrative support for students. The presence of a dedicated CDT administrator, who has functioned as a point of contact for all WISE students and graduates, plus for academic and support staff across the partnership, has been welcomed. Students have appreciated being able to raise questions or seek guidance from a person independent of their PhD supervisory team who is knowledgeable about the programme.

> *Having people outside of the university checking in with you to see how things are has been really encouraging.*
> Cohort 4 student

In response to a request from the CDT's Advisory Board, a 'happiness index' question was incorporated into students' 2018–19 Annual Progress Review forms and was used since then. This asked students to rate their general happiness in their PhD on a scale from one to five (from 'very unhappy' to 'very happy'). From 2021-22 the happiness index form was distributed as a standalone document, with students' responses only being viewed by the CDT administrator and no individuals being identified when reporting the results.

The majority of WISE students each year have rated themselves 'happy' or 'very happy' (2018-19: 69.8%, 2020-21 68.8%, 2021-22 70.8%). However, the impacts of the Coronavirus pandemic on students' experience were evident in 2019-20, when only 61.4% assessed themselves as 'happy' or 'very happy'. In the final 2022-23 survey, 66.7% rated themselves 'happy' or 'very happy', reflecting the fact that respondents were primarily students who were beyond their funding period or nearing their funding end date, probably evidencing the pressures of finishing writing a PhD thesis, particularly where this was alongside managing a job.

> *Thank you to everyone at WISE for giving me this opportunity, I've felt like part of the family from day one, and I hope our paths cross again in the future!'*
> Cohort 5 student

Impact and Legacy

INDUSTRY PARTNERSHIPS

Several WISE CDT PhD projects have been co-developed in association with industry or practitioner partners. This has ensured a route to impact and some real-world relevance to the project when delivered. As a result of events such as CDT Industry Days WISE has seen a growth in collaborative project development and - increasingly - internships and co-funding of projects.

WISE secured a number of industry co-funded studentships with UK water companies (Bristol Water, Dŵr Cymru Welsh Water, South West Water, United Utilities, Wessex Water) and with UKWIR, which involved an industrial partner joining the PhD supervisory team. Other collaborative projects have encompassed the British Geological Survey, European Centre for Medium-Range Weather Forecasts, Isle Utilities and JBA Consulting in the UK and Luxembourg Institute of Science and Technology, Krüger A/S and Deltares in mainland Europe.

Additionally, valuable in-kind contributions from industry have been ongoing throughout the CDT's existence and across multiple PhD projects, covering staff time and advice, invited seminars, site visits, access to data, opportunities for in-company or on-site trials, and access to facilities and infrastructure.

WISE CDT students have also benefited from other opportunities to collaborate with industry during their studentships. For example, **Dr Nicolas Hanousek** (Cardiff, Cohort 5) was approached by the Liverpool City Region (LCR) to conduct a modelling assessment of several proposed tidal range energy schemes for the Mersey area. The aim of the project was to provide validation of prior modelling undertaken by engineering consultancies and to introduce a technically developed approach to gain deeper insight into the behaviour of the proposed schemes. Nick developed a close working relationship with LCR, presenting on progress and findings at monthly meetings. He achieved a highly detailed result and delivered some thought-provoking insights into the effects of the proposed schemes.

The CDT's impact is evident through graduates' involvement in initiatives such as Innovate UK KTPs, which are 'collaborative, transformative, three-way partnerships creating positive impact and driving innovation'.

- In October 2022 **Dr Joshua Myrans** (Exeter, Cohort 1) was nominated for an Annual Innovate UK KTP Award and won the Technical Excellence Award category for his collaboration between South West Water and the University of Exeter. Josh's pioneering critical work uses AI to detect and code faults in sewer networks, to avoid blockages and pollutions, ultimately contributing to a cleaner and greener world. This KTP project arose from Josh's PhD research on *'Automated Analysis of Sewer CCTV Surveys'*. Josh is now a Future Leaders Fellow at South West Water.

- **Dr David Birt** (Bath, Cohort 4) is a KTP Associate at Lancaster University, working with Thames Water as a Freshwater Reservoir Floating Solar Impact Modeller. David's PhD thesis was on *'Drinking Water Reservoir Resiliency in a Changing Climate'* and his KTP role is a natural progression of his PhD research, as he is developing a model that assesses the impacts of floating solar arrays on water quality.

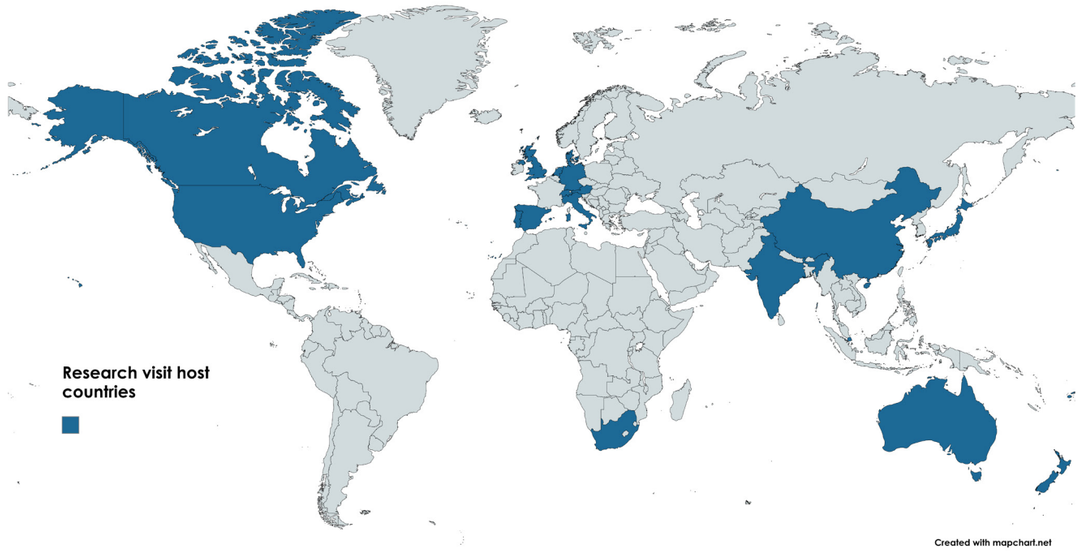
- **Dr Georgios Sarailidis** (Bristol, Cohort 5) is continuing the links made with JBA Consulting during his PhD research on *'Uncertainty Quantification and Attribution in Flood Risk Modelling'*. Georgios is a Catastrophe Modelling KTP Associate at JBA Risk Management, focusing on uncertainty and sensitivity analysis of flood catastrophe models. He co-authored a 2023 JBA White Paper on *'How Catastrophe Models Can Help Reduce The Protection Gap At Scale'*, written in collaboration with Gallagher Re and the University of Bristol. George has also returned to the University to speak to PhD and Master's students about his transition from flood risk modelling research to innovation in the insurance industry.

Around 90% of WISE CDT graduates are currently working in the water, environmental and energy sectors. See pages 10-16 for further details.

RESEARCH VISIT COLLABORATIONS

Research visits have enabled students to profit from research facilities or resources not available locally, to obtain new insights through working with a different research group and to create new networks. Personal benefits have included experiencing life and work in a different culture, confidence-building and making new friends. WISE students' programme evaluation forms consistently rate the research visit as one of the best elements of the CDT. The requirement for returning students to produce a formal research visit report was introduced in late 2018. All completed reports affirm that students consider their visit beneficial to both their research and to them personally, with the vast majority of visits also generating new links or furthering existing collaborations between the student's home university and the visit host institution.

The Coronavirus pandemic impacted greatly on students' ability to undertake a research visit. Three WISE CDT students were overseas on visits in early 2020 as the pandemic took hold and had to return home prematurely. With international travel opportunities limited throughout the pandemic, several students were unable to undertake their planned research visit before their funded studentships ended. The impact of Coronavirus on research visit take-up is clear, with 80.8% of Cohort 1 and 2 students pursuing a research visit, compared with 48.8% of those in Cohorts 3-5 whose studentships coincided with the pandemic. While throughout the pandemic WISE encouraged students to explore possibilities for local or virtual collaborations where international travel could not be pursued, it was acknowledged that such alternatives could not replicate the 'real' experience. Happily, since late 2021 students have been able to benefit from research visits once more, albeit through shortened trips in some cases.



> *The continuation of exchanges and collaborations between the two institutions should persist, to expand this research field… My visit strengthened the links and included more people than previously.*
>
> Cohort 5 student

> *The opportunities to live in different places, meet new people/colleagues and get close to different cultures/work environments shape a better human being/professional. I had the chance to apply my own work habits into a different environment and learn from others how to face day-by-day work challenges differently.*
>
> Cohort 5 student

WISE is extremely grateful to its partners for hosting these research visits, as the benefits to students - both professionally and personally - have been immense. The above map (courtesy of mapchart.net) shows the range of destinations visited by WISE CDT students, who have been hosted by the following institutions and supervisors:

RESEARCH VISIT HOST INSTITUTION	HOST INSTITUTION SUPERVISOR
7 Lakes Alliance and Colby College, Belgrade/Waterville, Maine, USA.	Dr Danielle Wain
Centre of Ecology and Hydrology, HR Wallingford, Wallingford, UK	Dr Cecilia Svensson
Columbia University, New York, USA	Professor Pierre Gentine
Cornell University, Ithaca, USA	Professor Patrick Reed
Delft University of Technology, Delft, Netherlands	Professor Jan Peter van der Hoek
Deltares, Delft, Netherlands	Dr Robert McCall
Dept for Environment and Water, Govt of South Australia, Adelaide, Australia	Steve Barnett & Dr Carlos Miraldo Ordens
European Centre for Medium-Range Weather Forecasts (ECMWF), Reading, UK	Dr Jean Bidlot
Harvard University, Cambridge, Massachusetts, USA	Professor Petros Koumoutsakos
Hohai University, Nanjing, China	Professor Yongpin Chen
Hohai University, Nanjing, China	Professor Pei Xin
Hohai University, Nanjing, China	Dr Jing Huang
IIHR - Hydroscience & Engineering, University of Iowa, Iowa City, Iowa, USA	Professor Gabriele Villarini
International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria	Dr Yoshihide Wada
KWR Water Research Institute, Utrecht, Netherlands	Dr Mirjam Blokker
Kyoto University, Kyoto, Japan	Professor Yasuto Tachikawa
Laval University, Quebec, Canada	Professor Sebastien Houde
Leibniz University Hannover, Germany	Dr Stefan Schimmels
Luxembourg Institute of Science and Technology, Luxembourg	Dr Stan Schymanski
Nanjing Normal University, Nanjing, China	Professor Qiang Dai
National Institute of Cholera and Enteric Diseases (NICED), Kolkata, India	Dr Shanta Dutta
National University of Singapore (NUS), Singapore	Professor Vladan Babovic
San Diego State University, USA	Professor Hilary McMillan
Scripps Institution of Oceanography, University of California San Diego, USA	Dr Adam Young
Singapore Centre for Environmental Science and Engineering (SCELSE), Singapore	Dr Jamie Hinks
Stellenbosch University, Stellenbosch, South Africa	Dr Wesaal Khan
Technical University of Denmark (DTU), Copenhagen, Denmark	Dr Ole Mark
Texas A&M University, College Station, USA	Professor Scott Socolofsky
Tsinghua University, Beijing, China	Professor Binliang Lin
University of A Coruña, A Coruña, Galicia, Spain	Professor José Anta Álvarez
University of Auckland, Auckland, New Zealand	Dr Heide Friedrich
University of Bologna, Bologna, Italy	Professor Alberto Montanari
University of British Columbia, Vancouver, Canada	Dr Aaron Cahill
University of California, Irvine, California, USA	Professor Brett Sanders
University of Canterbury, Christchurch, New Zealand	Professor Roger Nokes
University of Melbourne, Melbourne, Australia	Professor Tim Fletcher
University of Melbourne, Melbourne, Australia	Dr Murray Peel
University of Porto, Porto, Portugal	Dr Tiago Fazeres Ferradosa
University of Saskatchewan, Canmore, Canada	Professor Martyn Clark
University of Waterloo, Waterloo, Ontario, Canada	Professor Bryan Tolson
University of Zurich (UZH), Zurich, Switzerland	Professor Jan Seibert
Wuhan University, Wuhan, China	Professor Junqiang Xia

INTERNSHIPS AND PLACEMENTS

The WISE CDT has encouraged students to apply for UKRI Policy Internships during their programme. The UKRI Policy Internships scheme provides a valuable opportunity for UKRI-funded doctoral students to be placed with an influential policy organisation for three-months, with their funded studentship being extended by the same period. The aim is to offer students the chance to experience the process of developing and shaping research evidence into policy. **Dr Catherine Leech** (Cardiff, Cohort 4) and **Dr James Rand** (Bath, Cohort 5) were both successful in their applications and found the experience extremely worthwhile. Catherine's internship was at the Government Office for Science (GO-Science), while James was based at the Department for Environment, Food & Rural Affairs (DEFRA).

At GO-Science Catherine worked with the Science Network and Chief Scientific Advisers Capability Team to learn how science informs policy at the heart of government. Go-Science supports the Government Chief Scientific Adviser in ensuring that the government has access to the best scientific evidence to inform policy and long-term decision making. During her internship, Catherine worked closely with the Chief Scientific Advisers network, providing a secretariat function for meetings as well as working on her primary task: developing a coherent induction process for incoming Chief Scientific Advisers. Subsequent to her Policy Internship, Catherine continued her collaboration with GO-Science through part-time employment:

'I would highly recommend a policy internship to anyone who is wanting to add an extra string to their bow and learn about science in government, offering a different perspective to our work in academia and applying research in a different way.'

DEFRA aligned James' internship with his PhD topic area and placed him with their water evidence team. The purpose of this group is to research and provide evidence so that water-related policy can be developed and presented to government. During his placement James predominantly collaborated with researchers from the Environment Agency:

'I was given an independent and self-contained task to examine government funded, water related research over the last 10 years in order to pull out relevant evidence to support "The Water Story". "The Water Story" is an evidence-based narrative of everything concerning water quality, from international agreements, results of policy decisions, blue space initiatives, working practices, intended and unintended consequences from the past, present and future.'

WISE students have also pursued other opportunities to gain valuable work experience. In 2021, during the height of the Coronavirus pandemic, **Dr Debbie Shackleton** (Exeter, Cohort 4) took a break from her PhD studies to join the UK Joint Biosecurity Centre (JBC) as an Early Career Researcher. In this role Debbie used the expertise acquired from her PhD research into modelling cholera outbreaks to help develop models to better understand the COVID-19 outbreak and so inform policy development. Debbie's time at JBC included contributing to a project developing an algorithm to determine the Coronavirus risk of individual countries, which was used to support the decision-making process of placing countries on an international 'Green List'. Another project involved the development of a spatio-temporal model for tracking the geographical spread of new variants of concern within the UK. Debbie assessed that she greatly benefited from her JBC placement and was grateful for the opportunity to work on a very current issue. She is currently a Research Associate at Imperial College London, modelling malaria transmission.

COMPLETION RATES

To date, the WISE CDT has produced 58 PhD graduates and one MPhil graduate. Our remaining six students are now beyond their EPSRC funding periods and are working towards PhD thesis submission, the progress of their research having been delayed by the impacts of the Coronavirus pandemic and/or for personal circumstances, resulting in extended studentship registration periods.

19 students - 13 males, 6 females - have withdrawn from the programme, with 18 withdrawals being voluntary. While initially withdrawals were primarily in respect of students in the early years of their funded studentship, the pandemic has seen similar numbers withdrawing beyond their funded studentship period, with health conditions being a significant contributory factor. 15 students left to pursue employment, with Brexit considered a likely impact on EU students' decision-making, while three students started a PhD in a different subject area. The WISE withdrawal rate of 22.6% of all students recruited – i.e. a projected 77.4% completion rate - does not look unreasonable given that the CDT was operating during the pandemic and in the absence of recent comparative data. Pre-pandemic published data on UK PhD shows a completion rate of around 75-80%*.

**https://www.vitae.ac.uk/doing-research/are-you-thinking-of-doing-a-phd/what-is-it-like-doing-doctoral-research-in-the-uk/the-uk-doctoral-research-experience;*

**https://ukcge.ac.uk/news-and-blog/postgraduate-research-degree-qualification-rates-improving*

WISE CDT students withdrawing from the programme subsequent to successful completion of the first year Postgraduate School have been eligible for a Postgraduate Diploma (PGDip) exit award.

The WISE CDT is aware from ongoing contacts with students who decided not to complete their PhD that many are working in the water, environmental and energy sectors. For example, **Joseph Shuttleworth** (Cardiff, Cohort 2) is Digital Lead - Water at Arup and recently had a laboratory named after him at Bangor University in recognition of his and Arup's work developing the field of wastewater-based epidemiology. **Zara Visanji** (Exeter, Cohort 4) initially worked for Thames21 as Thames Monitoring Officer then as Evidence Project Manager, and is now Shop Window Project and Engagement Manager at Anglian Water Services. **Ceri Howells** (Cardiff, Cohort 5) is a Lecturer in Engineering & Entrepreneurship at the University of Exeter and additionally is currently Director of Education - Engineering (Stage 1). EU student **Federica Michelotti** (Bath, Cohort 4), who returned to her native Italy, is a Project Engineer at A2A Ambiente, the largest Italian company operating in the environmental sector. Meanwhile, **Aidan Barry** (Bath, Cohort 2) was awarded an MPhil for his thesis on *'Identification & characterisation of luxury uptake proteins in Chlamydomonas for enhanced wastewater phosphorus removal'*. On completing his MPhil Aidan worked as an Environmental Data Analyst for Thames Water and is currently an Area Scientist for Wessex Water.

The WISE CDT's current position on student progress and outcomes is as follows:

COHORT & YEAR OF ENTRY	STUDENTS RECRUITED	COMPLETED: PHD AWARD	COMPLETED: MPHIL AWARD	SUBMITTED PHD THESIS, AWAITING VIVA	WORKING TOWARDS PHD SUBMISSION	NON-COMPLETION
Cohort 1: 2014-15	15	13	0	0	0	2
Cohort 2: 2015-16	18	11	1	0	0	6
Cohort 3: 2016-17	15	10	0	0	1*	4
Cohort 4: 2017-18	18	13	0	0	0	5
Cohort 5: 2018-19	18	11	0	0	5*	2
Totals	**84**	**58**	**1**	**0**	**6***	**19**

**Students still working towards PhD submission due to extended registration periods (e.g. interruptions of study for personal reasons and UKRI funded extensions during Coronavirus pandemic).*

Data as at 31 December 2024

Details of PhD and MPhil awards, together with hyperlinks to available published theses, are shown on pages 38-42.

GRADUATE DESTINATIONS

The vast majority of WISE CDT graduates - around 90% overall, with similar percentages for male and female graduates - are currently working in the water, environmental and energy sectors, most frequently in universities, consultancies, research institutes and government agencies. University roles cover both postgraduate researcher posts and lectureships. Other employers within the above sectors include water companies, energy companies, climate risk management organisations and the Met Office. A further group of graduates are working as data scientists and analysts in other sectors, using the transferable skills developed during their PhDs.

WISE CDT graduates have helped to inspire current doctoral students through employment in the higher education sector or by returning to their registered university to give talks and present seminars on their PhD experience and working life after WISE.

Find out more by reading our alumni profiles on pages 10-16.

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PUBLICATIONS

WISE students have been encouraged and supported to present conference papers during their studentships and to have journal papers accepted for publication prior to being awarded their degree. Publications produced by CDT students on their research are detailed on pages 43-59.

To date, student publications attached to the WISE CDT training grant have been cited more than 3,000 times (over 2,960 times excluding self-citations), with over 2,600 citing articles, and have an H-index of 29. This has increased from around 1,200 citations and an H-index of 18 at the time of the previous CDT Report. See Web of Science citation report for grant EP/L016214/1.

Several WISE CDT students have received recognition for their publications, including editor's choice awards and awards for being among the most downloaded articles in the first 12 months of publication. In addition to **Dr Wouter Knoben**'s 2023 STAHY Best Paper Award (see 'Recent Highlights' section), other examples are:

In 2020, **Dr Olivia Bailey** (Bath, Cohort 2) was awarded the 23rd Water Science & Technology editor's choice award for her paper on *'Predicting Impacts of Water Conservation with a Stochastic Sewer Model'*.

Recent awards from Wiley Publishing have gone to three Bristol WISE students for works published in *Hydrological Processes and Water Resources Research:*

- **Dr Lina Stein** (Bristol, Cohort 3): *Hydrological Processes* (work published between 1 January 2020–31 December 2020.)

  Stein L, Pianosi F, Woods R. Event based classification for global study of river flood generating processes. *Hydrological Processes*. 2019;1–16. https://doi.org/10.1002/hyp.13678

- **Dr Wouter Knoben** (Bristol, Cohort 1): *Water Resources Research* (work published in an issue between 1 January 2021-31 December 2021).

  Knoben, W. J. M., Freer, J. E., Peel, M. C., Fowler, K. J. A., & Woods, R. A. (2020). A brief analysis of conceptual model structure uncertainty using 36 models and 559 catchments. *Water Resources Research*, 56, e2019WR025975. https://doi.org/10.1029/2019WR025975

- **Dr Giulia Giani** (Bristol, Cohort 4): *Water Resources Research* (work published in an issue between 1 January 2022–31 December 2022).

  Giani, G., Tarasova, L., Woods, R.A., & Rico-Ramirez, M. A. (2022). An objective time-series-analysis method for rainfall-runoff event identification. *Water Resources Research*, 58, e2021WR031283. https://doi.org/10.1029/2021WR031283

Wouter additionally received the *Water Resources Research* 2020 Editors' Choice award for this paper, which was his final PhD paper.

In 2021 the WISE CDT published a paper about its programme in the international open-access journal *Hydrology and Earth System Sciences*. Authored by then Bristol Co-Director **Professor Thorsten Wagener** with Programme Management Group colleagues, *'Hydroinformatics Education - the Water Informatics in Science and Engineering (WISE) Centre for Doctoral Training'* discusses the need for this type of postgraduate training, the CDT's structure and approach, and the results and lessons learned up to that point. Read more here: https://hess.copernicus.org/articles/25/2721/2021/.

OTHER AWARDS AND RECOGNITION

WISE CDT students and graduates have been recognised in numerous and diverse ways. In addition to the examples described in the Recent Highlights section of this report on pages 2-7, a selection of earlier cases spanning the four WISE CDT partner universities is provided below:

The Guardian highlighted England's river water quality in a September 2022 article, which featured an interview with **Dr Barnaby Dobson** (Bristol, Cohort 1) in relation to his research at Imperial College London. Barney commented on water quality risks and the hot topics of testing, sampling and monitoring. *The Guardian* article also cited Barney's new publication, produced as part of the NERC-funded CAMELLIA project and co-authored with Imperial College colleagues, who include WISE External Examiner **Professor Ana Mijic**.

Dr Olivia Bailey (Bath, Cohort 2) featured on a World Water Week 2022 talk show on improving global public health alongside her Arup colleague, **Joseph Shuttleworth**. Olivia and Joe discussed the step-change that wastewater-based epidemiology could offer for enhanced insight and equality in health monitoring, improving public health across the globe. The World Water Week talk show followed on from Arup's report, *Wastewater for Health*, a guide to implementing wastewater monitoring in low-resource settings, which was project managed by Olivia.

The University of Exeter's Student Employee of the Year award aims to recognise and celebrate students who successfully combine study with part-time or temporary work. **Cristina Coker** (Exeter, Cohort 5) was nominated under the 2022 'Community' award category for improving community engagement.

Dr Nicolas Hanousek (Cardiff, Cohort 5) was awarded 3rd place in the John F Kennedy Student Paper Competition at the 39th IAHR World Congress, held in June 2022. Nick was one of 12 finalists, shortlisted from a total of 91 applicants, who presented their work at a special IAHR Congress session and were all acknowledged by the jury for their achievements. Nick's paper was entitled *'Assessing the Sensitivity of Tidal Range Energy Models to Water Level Accuracy'*.

The Young Hydrologic Society (YHS) is a bottom-up initiative that aims to stimulate interaction and active participation of young hydrologists within the hydrological community. **Dr Lina Stein** (Bristol, Cohort 3) was appointed by her fellow board members as 2021-22 YHS Chair and served a two-year term. Lina now works as a Postdoctoral Research Scientist in the Analysis of Hydrologic Systems Department at the University of Potsdam. She has continued her involvement with YHS, serving as President and as a Board member, and YHS' reach is expanding globally, with initiatives now also in India, the USA, Brazil and Morocco.

Dr James Rand (Bath, Cohort 5) was awarded a Kenneth H Reckhow Student Scholarship in December 2021 by the North American Lake Management Society (NALMS), a non-profit organisation focusing on the management and protection of lakes and reservoirs. James was one of the first recipients of this scholarship, awarded to graduate students to support their research. James benefited from his scholarship through undertaking a 2022 research visit to 7 Lakes Alliance and Colby College in Maine, USA, where he spent a month conducting experiments, learning the practical craft of lake science, and meeting up with research groups.

In November 2021 **Dr Sebastian Gnann** (Bristol, Cohort 3) was awarded a University of Bristol Doctoral Dissertation Prize for his PhD thesis *'Baseflow Generation at the Catchment Scale - An Investigation using Comparative Hydrology'*. The University's Research Degrees Examination Board awards an annual prize for outstanding excellence within each faculty. The six winners for 2021 were picked from a pool of 510 submissions, with Sebastian winning the Faculty of Engineering prize.

Dr Stephanie Müller (Cardiff, Cohort 4) was awarded 'Best Paper' at the 9th International Symposium on Environmental Hydraulics in July 2021, for her 'outstanding' extended abstract on *'Fish Swimming Behaviour and Kinematics in the Wake of a Vertical Axis Turbine'*.

The 21st IWA Young Water Professionals Conference (IWA YWP) ran an online poster competition in 2020, with the aim of bringing together members of the IWA YWP research community to share their research, network and engage in scientific debate. The award for 'best interaction' - the poster stimulating the greatest online audience participation, including the quality of questions and answers - was awarded to **Dr Catherine Leech** (Cardiff, Cohort 4). Catherine's poster was judged to have 'demonstrated an exceptional level of engagement'.

A group of WISE CDT students - as 'Team Coronasaurus' - participated in a week-long NERC COVID-19 Digital Sprint Hackathon in June 2020. **Dr Arran Cooper-Davis, Dr Mikkel Lykkegaard** and **Cristina Coker** (all Exeter, Cohort 5) and **Dr James Rand** (Bath, Cohort 5) were tasked with using NERC and other publicly available databases to better understand the impact of the COVID-19 lockdown and recovery measures on meeting the Paris Agreement and net zero targets. Looking at the way many organisations and companies had rapidly adapted to alternative and home working practices, the team proposed a blended 2+2 working week - longer working days with two days in the office and two at home, plus an extra day off per week - which achieved a reduction in UK CO_2 emissions by 10-20%. Commended for their analysis, modelling and informative YouTube video, Team Coronasaurus were awarded 3rd place overall.

Dr Bikash Ranabhat (Cardiff, Cohort 4) was awarded Best Poster Prize at the 6th Partnership for Research in Marine Renewable Energy (PRIMaRE) Conference held at Cardiff University in July 2019. Bikash's poster was entitled *'Experimental testing and numerical study of a turbine for hydroelectricity'*.

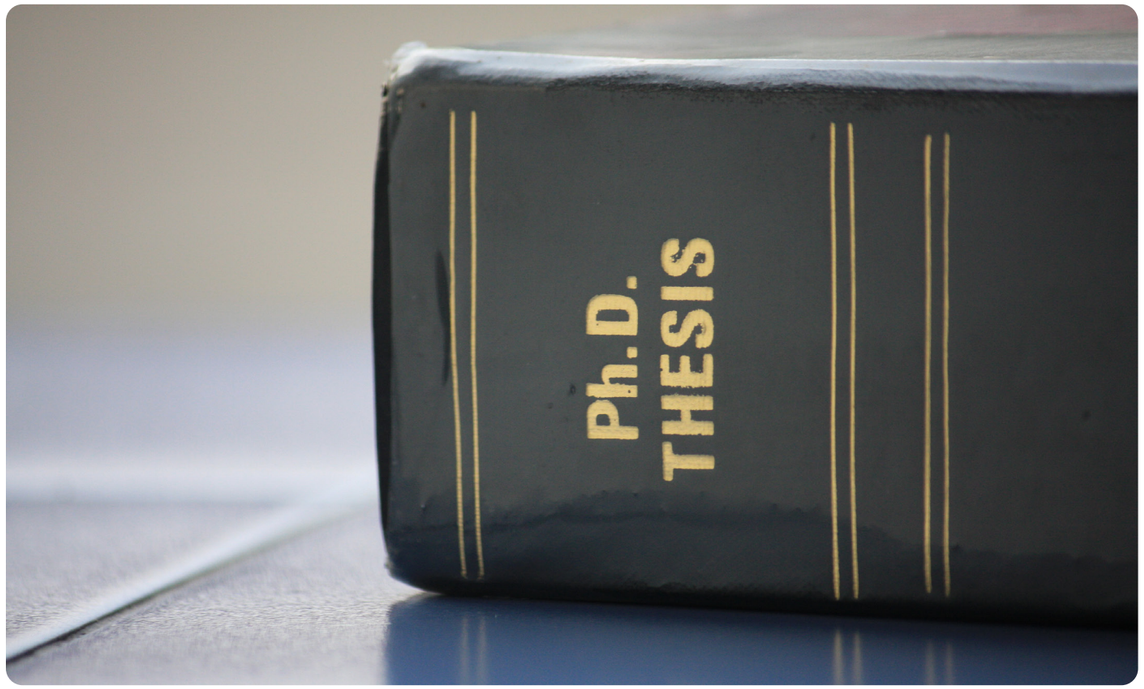
Dr Olivia Cooke (Bath, Cohort 1) was awarded Best Presentation Prize at the 13th British Hydrological Society National Symposium in September 2018.

Dr Rosanna Lane (Bristol, Cohort 2) was awarded Best Poster Presentation at the British Hydrological Society Peter Wolf Symposium 2017. This event took place at the UK Centre for Ecology & Hydrology (UKCEH) in Wallingford, where Rosanna now works as a Hydrological Modeller.

CDT LEGACY WEBSITE

The WISE CDT is creating a legacy website, hosted on the University of Exeter's Centre for Water Systems webpages with open access. This is replacing the CDT's previous standalone WordPress website. The WISE CDT legacy website can be accessed here: https://www.exeter.ac.uk/research/centres/cws/education/wisecdt/.

Research Outputs: Theses



PHD AWARDS

Dr James Rand

Autonomous Monitoring of Lakes and Other Water Bodies using Micro-Underwater Vehicles

University of Bath

Dr Juliana Marcal

Urban Water Security Assessment: A Downscaled Approach

University of Bath

Dr Josie Ashe

Extracting Value from Patterns in Routinely Collected, High-Frequency Water Quality Data in Rivers Supplying Drinking Water Treatment Works

University of Exeter, October 2024

Download thesis

Dr Vasilis Koukoravas

Hydraulic Modelling, Sectorisation, Interventions for Assessment and Improvement of Equity in Intermittent Water Supply Systems

University of Exeter, October 2024

Download thesis

Dr William Addison-Atkinson

An Integrated Approach to Health Risk Assessment for Sewer Flooding

University of Exeter, September 2024

Download thesis

Dr Elisa Coraggio

The Investigation of High Frequency Water Quality Monitoring and Prediction

University of Bristol, June 2024

Download thesis

Dr Daisy Harley-Nyang

A Study of Microplastics in Wastewater, Sludge and Biosolids

University of Exeter, April 2024

Download thesis

Dr Nicolas Hanousek

Numerical Modelling of Tidal Energy Devices and Structures as Part of Net Zero

Cardiff University, March 2024

Download thesis

Dr Bikash Ranabhat

Parametric Optimisation of a Vertical Axis Hydrokinetic Turbine with Shallow Water Application

Cardiff University, February 2024

Download thesis

Dr Daniel Power

Investigating Opportunities for Global Scale Soil Moisture Studies using Cosmic-Ray Neutron Sensors

University of Bristol, January 2024

Download thesis

Dr Laura Devitt

Estimating Flood Risk under Climate Change

University of Bristol, January 2024

Download thesis

Dr Debbie Shackleton

Investigating the Relationship between Climate and Cholera

University of Exeter, January 2024

Download thesis

Dr David Birt

Drinking Water Reservoir Resiliency in a Changing Climate

University of Bath, December 2023

Download thesis

Dr Santiago Martelo López

Large Eddy Simulations of Two-Phase Flows around Complex 3D Geometries

Cardiff University, November 2023

Download thesis

Dr Arran Cooper-Davis

Flow Timeseries Forecasting in Urban Drainage Networks using Artificial Neural Network Models

University of Exeter, October 2023

Download thesis

Dr Jamie Brown

Assessing the Combined Effect of Carbon-Water Dynamics on Hydrological Processes in Brazil

University of Bristol, October 2023

Download thesis

Dr Bert Swart

In Situ Image Analysis for the Investigation of Microbubble Size, Rise Velocity and Microbubble-Microparticle Interaction during Flotation

University of Bath, September 2023

Download thesis

Dr Benjamin Beylard

Morphodynamic Modelling of a Nourished Beach

Cardiff University, June 2023

Download thesis

Dr Georgios Sarailidis

Uncertainty Quantification and Attribution in Flood Risk Modelling

University of Bristol, June 2023

Download thesis

Dr Jessica Penny

Impact of Land-Use Changes on Hydrological Regimes

University of Exeter, June 2023

Download thesis

Dr Catherine Leech

An Experimental Study of the Hydrodynamic Impact of Turbine Layout and Design Considerations in Tidal Range Schemes

Cardiff University, May 2023

Download thesis

Dr Simbi Hatchard

Modelling the Viability of Small Hydroelectric Power on the Zambezi Basin

University of Bristol

Dr Laura Ramsamy

Flood Modelling in Large Catchments using Open-Source Data and Data-Driven Techniques

University of Exeter, April 2023

Download thesis

Dr Mikkel Bue Lykkegaard

Multilevel Delayed Acceptance MCMC with Applications to Hydrogeological Inverse Problems

University of Exeter, August 2022

Download thesis

Dr Stephanie Müller

Impact of Leaky Barriers and Hydrokinetic Turbines on Channel Hydrodynamics and Fish Movement

Cardiff University, July 2022

Download thesis

Dr Nefeli Makrygianni

Evaluation of the Performance of the Wave Boundary Layer Model with the OpenIFS

Cardiff University, July 2022

Download thesis

Dr Sabrina Draude

Optimised Maintenance Scheduling for Wastewater Systems

University of Exeter, May 2022

Download thesis

Dr Giulia Giani

On the Objective Characterization of the Rainfall-Runoff Transformation

University of Bristol, March 2022

Download thesis

Dr Andrew Barnes

Machine Learning Methods for the Analysis of Precipitation Patterns

University of Bath, March 2022

Download thesis

Dr Giovanni Musolino

Flood Modelling and Hazard Assessment for Extreme Events in Riverine Basins

Cardiff University, January 2022

Download thesis

Dr Arthur Hajaali

Flow Separation Characteristics within Rectangular and Conical Diffusers

Cardiff University, January 2022

Download thesis

Dr Charles West

Investigating Groundwater Recharge and Dynamics at Continental Scales using Comparative Hydrology

University of Bristol, December 2021

Download thesis

Dr Eirini Nikoloudi

Event Management and Event Response Planning for Smart Water Networks

University of Exeter, October 2021

Download thesis

Dr Alex Stubbs

The Physical and Numerical Representation of Turbulent Flow over a Porous Riverbed

Cardiff University, September 2021

Download thesis

Dr Dolores Gonzalez Olias

Self-Powered Biosensors for Water Quality Monitoring: Sensor Development and Signal Treatment

University of Bath, July 2021

Download thesis

Dr Lina Stein

Using Hydrological Process Knowledge to Assess Flood Generation and Changes on a Global Scale

University of Bristol, June 2021

Download thesis

Dr Sebastian Gnann

Baseflow Generation at the Catchment Scale – An Investigation using Comparative Hydrology

University of Bristol, June 2021

Download thesis

Dr Elli Mitrou

Large-Eddy Simulations of Multi-Phase Plumes in Crossflow and Stratified Flow

Cardiff University, May 2021

Download thesis

Dr Cain Moylan

Sensitivity, Uncertainty and Refinement of a Global Flood Model

University of Bristol, May 2021

Download thesis

Dr Stephen Clee

3D Hydrodynamic and Morphodynamic Modelling of Offshore Sandbanks

Cardiff University, May 2021

Download thesis

Dr Anna Lo Jacomo

Multi-Hazard Exposure of Cities and Implications for Urban Infrastructure

University of Bristol, January 2021

Download thesis

Dr Rosanna Lane

National-Scale Hydrological Modelling of High Flows across Great Britain: Multi-Model Structures, Regionalisation Approaches and Climate Change Analysis with Uncertainty

University of Bristol, January 2021

Download thesis

Dr Stamatis Batelis

The Impact of Groundwater Representation in Land Surface Models under Current and Future Climate Scenarios in Great Britain

University of Bristol, January 2021

Download thesis

Dr Paul Bayle

Coastal Protection and Nearshore Evolution under Sea Level Rise

University of Bath, October 2020

Download thesis

Dr Olivia Bailey

Sewer Systems of the Future: Developing a Stochastic Sewer Model to Support Design of Sustainable Wastewater Systems

University of Bath, September 2020

Download thesis

Dr Olivia Cooke

Assessment and Mitigation of Stormwater Runoff in an Informal Settlement

University of Bath, July 2020

Download thesis

Dr Ioanna Stamataki

Experimental and Numerical Investigation of Flash Floods and their Interaction with Urban Settlements

University of Bath, June 2020

Download thesis

Dr Olivia Milton-Thompson

Developing a Risk Assessment Model using Fuzzy Logic to Assess Groundwater Contamination from Hydraulic Fracturing

University of Exeter, March 2020

Download thesis

Dr Ludovica Beltrame

Simulating the Risk of Liver Fluke Infection in the UK through Mechanistic Hydro-Epidemiological Modelling

University of Bristol, January 2020

Download thesis

Dr Maria Xenochristou

Water Demand Forecasting using Machine Learning on Weather and Smart Metering Data

University of Exeter, November 2019

Download thesis

Dr Nejc Coz

Numerical and Experimental Modelling of Tidal Range Structures with Focus on Conservation of Momentum through Hydraulic Structures

Cardiff University, October 2019

Download thesis

Dr Jonathan King

Investigation and Prediction of Pollution in Coastal and Estuarine Waters, using Experimental and Numerical Methods

Cardiff University, October 2019

Download thesis

Dr Laurence Hawker

Regional Flood Models and Digital Elevation Model (DEM) Uncertainty

University of Bristol, June 2019

Download thesis

Dr Wouter Knoben

Investigating Conceptual Model Structure Uncertainty: Progress in Large-Sample Comparative Hydrology

University of Bristol, June 2019

Download thesis

Dr Mariano Marinari

Quantification and Valorisation of Agricultural Bioresource Residues in England

University of Bath, May 2019

Download thesis

Dr James Webber

Reliable and Resilient Surface Water Management through Rapid Scenario Screening

University of Exeter, April 2019

Download thesis

Dr Barnaby Dobson

Uncertainty in Modelling and Optimising Operations of Reservoir Systems

University of Bristol, March 2019

Download thesis

Dr Joshua Myrans

Automated Analysis of Sewer CCTV Surveys

University of Exeter, March 2019

Download thesis

MPHIL AWARDS

Aidan Barry

Identification and Characterisation of Luxury Uptake Proteins in Chlamydomonas for Enhanced Wastewater Phosphorus Removal

University of Bath, November 2022

Download thesis

Research Outputs: Publications

2025

Title: Modelling of Hurricane Dorian via the Implementation of Wave Boundary Layer Model (WBLM) within the OpenIFS

Authors: **Nefeli Makrygianni**, Shunqi Pan, Michaela Bray, Jean R. Bidlot

Source: Ocean Modelling

DOI: 10.1016/j.ocemod.2024.102469

Published: APRIL 2025

2024

Title: A Smoothed Particle Hydrodynamics Method for Vertical Axis Turbine Design and Assessment

Authors: **Nicolas Hanousek**, **Bikash Ranabhat**, Aaron English & Reza Ahmadian

Source: Journal of Hydrodynamics

DOI: 10.1007/s42241-024-0074-y

Published: 04 DECEMBER 2024

Title: Repeatability of Beach Morphology Change under Identical Wave Forcing

Authors: Chris E. Blenkinsopp, Alan J. Hunter, Tom E. Baldock, **Paul M. Bayle**, Judith Bosboom, Daniel Conley, Gerd Masselink

Source: Coastal Engineering

DOI: 10.1016/j.coastaleng.2024.104485

Published: APRIL 2024

Title: Urban Water Security Assessment: Investigating Inequalities using a Multi-Scale Approach

Authors: **Juliana Marcal**, Junjie Shen, Blanca Antizar-Ladislao, David Butler, Jan Hofman

Source: AQUA - Water Infrastructure, Ecosystems and Society

DOI: 10.2166/aqua.2024.307

Published: 29 FEBRUARY 2024

Title: A New Ghost-Cell/Level-Set Method for Three-Dimensional Flows

Authors: **Santiago Martelo Lopez**, Aristos Christou, Shunqi Pan, Thorsten Stoesser, Zhihua Xie

Source: Journal of Computational Physics

DOI: 10.1016/j.jcp.2023.112710

Published: 15 FEBRUARY 2024

Title: Assessing Inequalities in Urban Water Security through Geospatial Analysis

Authors: **Marçal J**, Shen J, Antizar-Ladislao B, Butler D, Hofman J

Source: PLOS Water

DOI: 10.1371/journal.pwat.0000213

Published: 01 FEBRUARY 2024

Title: Investigation of Uniform and Graded Sediment Wash-Off in an Urban Drainage System: Numerical Model Validation from a Rainfall Simulator in an Experimental Facility

Authors: W. Addison-Atkinson, A.S. Chen, F.A. Memon, J. Anta, J. Naves, L. Cea

Source: Journal of Hydrology

DOI: 10.1016/j.jhydrol.2023.130561

Published: FEBRUARY 2024

Title: Future Change in Urban Flooding using New Convection-Permitting Climate Projections

Authors: L. Archer, S. Hatchard, L. Devitt, J. C. Neal, G. Coxon, P. D. Bates, E. J. Kendon, J. Savage

Source: Water Resources Research

DOI: 10.1029/2023WR035533

Published: 05 FEBRUARY 2024

2023

Title: Colour as a Behavioural Guide for Fish near Hydrokinetic Turbines

Authors: Guglielmo Sonnino Sorisio, Stephanie Müller, Catherine A.M.E. Wilson, Pablo Ouro, Jo Cable

Source: Heliyon

DOI: 10.1016/j.heliyon.2023.e22376

Published: DECEMBER 2023

Title: Investigation of the Influence of Sinusoidal Internal Waves on a SPAR Buoy Structure

Authors: Vivien Maertens, Chris Blenkinsopp, Paul Milewski

Source: Journal of Physics, Conference Series

DOI: 10.1088/1742-6596/2626/1/012052

Published: 2023

Title: Integrated Assessment of Flood and Drought Hazards for Current and Future Climate in a Tributary of the Mekong River Basin

Authors: Jessica Penny; Dibesh Khadka; Mukand Babel; Priscila Alves; Slobodan Djordjević; Albert S. Chen; Ho Huu Loc

Source: Water & Climate Change

DOI: 10.2166/wcc.2023.252

Published: 04 NOVEMBER 2023

Title: Providing Distributed Electrical Generation through Retrofitting Disused Docks as Tidal Range Energy Schemes

Authors: Nicolas Hanousek, Reza Ahmadian, Emma Lesurf

Source: Renewable Energy

DOI: 10.1016/j.renene.2023.119149

Published: NOVEMBER 2023

Title: The Dual-Risks Context: A Systematic Literature Review for the Integrated Management of Flood and Drought Risks

Authors: Priscila B.R. Alves, Ho Huu Loc, Yenushi De Silva, Jessica Penny, Mukand Babel, Slobodan Djordjević

Source: International Journal of Disaster Risk Reduction

DOI: 10.1016/j.ijdrr.2023.103905

Published: 01 OCTOBER 2023

Title: Peatland Restoration Increases Water Storage and Attenuates Downstream Stormflow But Does Not Guarantee an Immediate Reversal of Long-Term Ecohydrological Degradation

Authors: Gatis N., Benaud P., Karen Anderson K, Ashe J., Grand-Clement E., Luscombe D.J., Alan Puttock, Brazier R.E.

Source: Scientific Reports

DOI: 10.1038/s41598-023-40285-4

Published: 22 SEPTEMBER 2023

Title: Variation in Microplastic Concentration, Characteristics and Distribution in Sewage Sludge & Biosolids around the World

Authors: Daisy Harley-Nyang, Fayyaz Ali Memon, Andrea Osorio Baquero, Tamara Galloway

Source: Science of The Total Environment

DOI: 10.1016/j.scitotenv.2023.164068

Published: 15 SEPTEMBER 2023

Title: The Changing Relationship between Cholera and Interannual Climate Variables in Kolkata over the Past Century

Authors: Debbie Shackleton, Fayyaz Ali Memon, Albert Chen, Shanta Dutta, Suman Kanungo & Alok Deb

Source: Gut Pathogens

DOI: 10.1186/s13099-023-00565-w

Published: 13 SEPTEMBER 2023

Title: Seasonality of Cholera in Kolkata and the Influence of Climate

Authors: Debbie Shackleton, Theo Economou, Fayyaz Ali Memon, Albert Chen, Shanta Dutta, Suman Kanungo & Alok Deb

Source: BMC Infectious Diseases

DOI: 10.1186/s12879-023-08532-1

Published: 02 SEPTEMBER 2023

Title: Swash-by-Swash Morphology Change on a Dynamic Cobble Berm Revetment: High-Resolution Cross-Shore Measurements

Authors: Paul M. Bayle, Chris E. Blenkinsopp, Kévin Martins, George M. Kaminsky, Heather M. Weiner, David Cottrell

Source: Coastal Engineering

DOI: 10.1016/j.coastaleng.2023.104341

Published: SEPTEMBER 2023

Title: Simultaneous Monitoring of Flow Patterns, and Bubble, and Plastics Micro-Particle Characteristics in Dissolved Air Flotation (DAF)

Authors: Bert Swart, Y.M. John Chew, Jannis Wenk

Source: Chemical Engineering Research and Design

DOI: 10.1016/j.cherd.2023.07.027

Published: SEPTEMBER 2023

Title: Vineyards, Vegetables or Business-as-Usual? Stakeholder-Informed Land Use Change Modelling to Predict the Future of a Groundwater-Dependent Prime-Wine Region under Climate Change

Authors: Jessica Penny, Carlos M. Ordens, Steve Barnett, Slobodan Djordjević, Albert S. Chen

Source: Agricultural Water Management

DOI: 10.1016/j.agwat.2023.108417

Published: 01 SEPTEMBER 2023

Title: Using Multi Criteria Decision Analysis in a Geographical Information System Framework to Assess Drought Risk

Authors: Jessica Penny, Dibesh Khadka, Priscila B.R. Alves, Albert S. Chen, Slobodan Djordjević

Source: Water Research X

DOI: 10.1016/j.wroa.2023.100190

Published: 01 SEPTEMBER 2023

Title: Comparison of Dynamic Cobble Berm Revetments with Differing Gravel Characteristics

Authors: Ollie Foss, Chris E. Blenkinsopp, Paul M. Bayle, Kévin Martins, Stefan Schimmels, Luis Pedro Almeida

Source: Coastal Engineering

DOI: 10.1016/j.coastaleng.2023.104312

Published: AUGUST 2023

Title: Strategic Siting and Design of Dams Minimizes Impacts on Seasonal Floodplain Inundation

Authors: Simbidzayi Hatchard, Rafael J P Schmitt, Francesca Pianosi, James Savage, Paul Bates

Source: Environmental Research Letters

DOI: 10.1088/1748-9326/ace122

Published: 14 JULY 2023

Title: Flood Hazard Potential Reveals Global Floodplain Settlement Patterns

Authors: Laura Devitt, Jeffrey Neal, Gemma Coxon, James Savage, Thorsten Wagener

Source: Nature Communications

DOI: 10.1038/s41467-023-38297-9

Published: 16 MAY 2023

Title: Fish Response to the Presence of Hydrokinetic Turbines as a Sustainable Energy Solution

Authors: Stephanie Müller, Valentine Muhawenimana; Guglielmo Sonnino-Sorisio; Catherine A. M. E. Wilson; Joanne Cable; Pablo Ouro

Source: Scientific Reports

DOI: 10.1038/s41598-023-33000-w

Published: 08 MAY 2023

Title: Quantifying Flood Model Accuracy under Varying Surface Complexities

Authors: W. Addison-Atkinson, A.S. Chen, M. Rubinato, F.A. Memon, J.D. Shucksmith

Source: Journal of Hydrology

DOI: 10.1016/j.jhydrol.2023.129511

Published: MAY 2023

Title: A Day-Ahead Scheduling Model of Power Systems Incorporating Multiple Tidal Range Power Stations

Authors: Zhang, T; **Hanousek, N**; Qadrdan, M; Ahmadian, R

Source: IEEE TRansactions on Sustainable Energy

DOI: 10.1109/TSTE.2022.3224231

Published: APRIL 2023

Title: Small-Scale Land Use Change Modelling using Transient Groundwater Levels and Salinities as Driving Factors – An Example from a Sub-Catchment of Australia's Murray-Darling Basin

Authors: **Jessica Penny**; Carlos M. Ordens, Steve Barnett, Slobodan Djordjević, Albert S. Chen

Source: Agricultural Water Management

DOI: 10.1016/j.agwat.2023.108174

Published: 31 MARCH 2023

Title: Analysis of Potential Nature-Based Solutions for the Mun River Basin, Thailand

Authors: **Jessica Penny**; Priscila B R Alves, Yenushi De-Silva, Albert S Chen, Slobodan Djordjević, Sangam Shrestha, Mukand Babel

Source: Water Science & Technology

DOI: 10.2166/wst.2023.050

Published: 15 MARCH 2023

Title: MultiLevel Delayed Acceptance MCMC

Authors: **Lykkegaard, MB**; Dodwell, TJ; Fox, C; Mingas, G; Scheichl, R

Source: SIAM/ASA Journal on Uncertainty Quantification

DOI: 10.1137/22M1476770

Published: 2023

Title: Household Flow Detection using FEAT (Flow Estimating Accelerometer-Thermometer) Device

Authors: **Paul Wills**; Fayyaz Ali Memon, Yulei Wu, Paul Merchant, Malcolm Roberts

Source: Flow Measurement and Instrumentation

DOI: 10.1016/j.flowmeasinst.2022.102280

Published: MARCH 2023

Title: Ground Truthing Global-Scale Model Estimates of Groundwater Recharge across Africa

Authors: **Charles West**, Robert Reinecke, Rafael Rosolem, Alan M. MacDonald, Mark O. Cuthbert, Thorsten Wagener

Source: Science of The Total Environment

DOI: 10.1016/j.scitotenv.2022.159765

Published: 01 FEBRUARY 2023

Title: Mechanisms of Cholera Transmission via Environment in India and Bangladesh: State of the Science Review

Authors: **Debbie Shackleton**, Fayyaz A. Memon, Gordon Nichols, Revati Phalkey and Albert S. Chen

Source: Reviews on Environmental Health

DOI: 10.1515/reveh-2022-0201

Published: 16 JANUARY 2023

Title: Integrating Scientific Knowledge into Machine Learning using Interactive Decision Trees

Authors: **Georgios Sarailidis**, Thorsten Wagener, Francesca Pianosi

Source: Computers & Geosciences

DOI: 10.1016/j.cageo.2022.105248

Published: JANUARY 2023

2022

Title: Influence of Channel-Spanning Engineered Logjam Structures on Channel Hydrodynamics

Authors: **S. Müller**, E. M. Follett, P. Ouro, C. A. M. E. Wilson

Source: Water Resources Research

DOI: 10.1029/2022WR032111

Published: DECEMBER 2022

Title: Review of Hydraulic Modelling Approaches for Intermittent Water Supply Systems

Authors: Dondu Sarisen, **Vasilis Koukoravas**, Raziyeh Farmani, Zoran Kapelan, Fayyaz Ali Memon

Source: Aqua - Water Infrastructure Ecosystems and Society

DOI: 10.2166/aqua.2022.028

Published: 01 DECEMBER 2022

Title: Microbubble-Microplastic Interactions in Batch Air Flotation

Authors: **Bert Swart**, Arto Pihlajamäki, Y.M. John Chew, Jannis Wenk

Source: Chemical Engineering Journal

DOI: 10.1016/j.cej.2022.137866

Published: 01 DECEMBER 2022

Title: Modelling Urban Sewer Flooding and Quantitative Microbial Risk Assessment: A Critical Review

Authors: **William Addison-Atkinson**, Albert S. Chen, Fayyaz A. Memon, Tsang-Jung Chang

Source: Journal of Flood Risk Management

DOI: 10.1111/jfr3.12844

Published: 09 AUGUST 2022

Title: Forecasting Seasonal to Sub-Seasonal Rainfall in Great Britain using Convolutional-Neural Networks

Authors: **Barnes, A.P.**, McCullen, N. & Kjeldsen, T.R

Source: Theoretical and Applied Climatology

DOI: 10.1007/s00704-022-04242-x

Published: 19 NOVEMBER 2022

Title: A Large-Sample Investigation into Uncertain Climate Change Impacts on High Flows across Great Britain

Authors: **Rosanna A. Lane**, Gemma Coxon, Jim Freer, Jan Seibert, and Thorsten Wagener

Source: Hydrology and Earth System Sciences

DOI: 10.5194/hess-26-5535-2022

Published: 07 NOVEMBER 2022

Title: Wave Runup on Composite Beaches and Dynamic Cobble Berm Revetments

Authors: C.E. Blenkinsopp, **P.M. Bayle**, K. Martins, **O.W. Foss**, L.-P. Almeida, G.M. Kaminsky, S. Schimmels, H. Matsumoto

Source: Coastal Engineering

DOI: 10.1016/j.coastaleng.2022.104148

Published: SEPTEMBER 2022

Title: Understanding Process Controls on Groundwater Recharge Variability across Africa through Recharge Landscapes

Authors: **Charles West**, Rafael Rosolem, Alan M. MacDonald, Mark O. Cuthbert, Thorsten Wagener

Source: Journal of Hydrology

DOI: 10.1016/j.jhydrol.2022.127967

Published: SEPTEMBER 2022

Title: Heuristic-Based Approach for Near-Optimal Response to Water Distribution Network Failures in Near Real Time

Authors: **Eirini Nikoloudi**, Michele Romano, Fayyaz Ali Memon and Zoran Kapelan

Source: Journal of Water Resources Planning and Management

DOI: 10.1061/(ASCE)WR.1943-5452.0001582

Published: AUGUST 2022

Title: Are Moments of Rainfall Spatial Variability Useful for Runoff Modelling in Operational Hydrology?

Authors: **Giulia Giani**, Miguel Rico-Ramirez & Ross A. Woods

Source: Hydrological Sciences Journal

DOI: 10.1080/02626667.2022.2092405

Published: 27 JULY 2022

Title: An Inertial Mechanism behind Dynamic Station Holding by Fish Swinging in a Vortex Street

Authors: Tucker Harvey, S., Muhawenimana, V., **Müller, S.**, Wilson, C. A. M. E., and Denissenko, P.

Source: Scientific Reports

DOI: 10.1038/s41598-022-16181-8

Published: 25 JULY 2022

Title: Where to Drill Next? A Dual-Weighted Approach to Adaptive Optimal Design of Groundwater Surveys

Authors: **Mikkel B. Lykkegaard**, Tim J. Dodwell

Source: Advances in Water Resources

DOI: 10.1016/j.advwatres.2022.104219

Published: JUNE 2022

Title: Investigation and Analysis of Microplastics in Sewage Sludge and Biosolids: A Case Study from One Wastewater Treatment Works in the UK

Authors: Daisy Harley-Nyang, Fayyaz Ali Memon, Nina Jones, Tamara Galloway

Source: Science of The Total Environment

DOI: 10.1016/j.scitotenv.2022.153735

Published: 01 JUNE 2022

Title: Large Scale Evaluation of Relationships between Hydrologic Signatures and Processes

Authors: Hilary K. McMillan, Sebastian J. Gnann, Ryoko Araki

Source: Water Resources Research

DOI: 10.1029/2021WR031751

Published: JUNE 2022

Title: Evaluation of Reanalysis Soil Moisture Products using Cosmic Ray Neutron Sensor Observations across the Globe

Authors: Yanchen Zheng, Gemma Coxon, Ross Woods, Daniel Power, and Rafael Rosolem

Source: EGU General Assembly 2022

DOI: 10.5194/egusphere-egu22-3206

Published: 2022

Title: The Human Factor: Weather Bias in Manual Lake Water Quality Monitoring

Authors: James M. Rand, Mirjam O. Nanko, Mikkel B. Lykkegaard, Danielle Wain, Whitney King, Lee D. Bryant, Alan Hunter

Source: Limnology and Oceanography: Methods

DOI: 10.1002/lom3.10488

Published: MAY 2022

Title: Multi-Objective Optimisation of Sewer Maintenance Scheduling

Authors: Sabrina Draude, Ed Keedwell, Zoran Kapelan, Rebecca Hiscock

Source: Journal of Hydroinformatics

DOI: 10.2166/hydro.2022.149

Published: 01 MAY 2022

Title: North Atlantic Air Pressure and Temperature Conditions Associated with Heavy Rainfall in Great Britain

Authors: Andrew Paul Barnes, Cecilia Svensson, Thomas Rodding Kjeldsen

Source: International Journal of Climatology

DOI: 10.1002/joc.7414

Published: APRIL 2022

Title: Video Based Convolutional Neural Networks Forecasting for Rainfall Forecasting

Authors: Andrew Paul Barnes, Thomas R Kjeldsen, Nick McCullen

Source: IEEE Geoscience and Remote Sensing Letters

DOI: 10.1109/LGRS.2022.3167456

Published: 14 APRIL 2022

Title: Flow Separation Dynamics in Three-Dimensional Asymmetric Diffusers

Authors: Arthur Hajaali, Thorsten Stoesser

Source: Flow, Turbulence and Combustion

DOI: 10.1007/s10494-021-00307-5

Published: 2022

Title: Enhancing Pedestrian Evacuation Routes during Flood Events

Authors: Musolino, G, Ahmadian, R & Xia, J

Source: Natural Hazards

DOI: 10.1007/s11069-022-05251-9

Published: 19 FEBRUARY 2022

Title: COSMOS-Europe: A European Network of Cosmic-Ray Neutron Soil Moisture Sensors

Authors: Heye Reemt Bogena et al; contributors include Daniel Power

Source: Earth System Science Data

DOI: 10.5194/essd-14-1125-2022

Published: 2022

Title: An Objective Time-Series-Analysis Method for Rainfall-Runoff Event Identification

Authors: G. Giani, L. Tarasova, R. A. Woods, M. A. Rico-Ramirez

Source: Water Resources Research

DOI: 10.1029/2021WR031283

Published: FEBRUARY 2022

Title: Water Quality Sampling Frequency Analysis of Surface Freshwater: A Case Study on Bristol Floating Harbour

Authors: Elisa Coraggio, Dawei Han, Claire Gronow and Theo Tryfonas

Source: Frontiers in Sustainable Cities

DOI: 10.3389/frsc.2021.791595

Published: 31 JANUARY 2022

Title: Using Public Participation within Land Use Change Scenarios for Analysing Environmental and Socioeconomic Drivers

Authors: Jessica Penny, Slobodan Djordjević and Albert S Chen

Source: Environmental Research Letters

DOI: 10.1088/1748-9326/ac4764

Published: 21 JANUARY 2022

Title: Remote Sensing of Wave Overtopping on Dynamic Coastal Structures

Authors: Blenkinsopp, C.E., Baldock, T.E., Bayle, P.M., Foss, O., Almeida, L.P., Schimmels, S

Source: Remote Sensing

DOI: 10.3390/rs14030513

Published: 02 JANUARY 2022

Title: Assessing the Sensitivity of Tidal Range Energy Models to Water Level Accuracy

Authors: Nicolas Hanousek, Reza Ahmadian

Source: Proceedings of the 39th IAHR World Congress

DOI: 10.3850/IAHR-39WC252171192022369

Published: 2022

Title: Large-Eddy Simulation of Two-Phase Flows over Different Cylinder Configurations

Author: Santiago Martelo

Source: Proceedings of the 39th IAHR World Congress

DOI: 10.3850/IAHR-39WC2521711920221726

Published: 2022

Title: Computational Modeling of Coastal Flooding in Torquay due to Wave-Overtopping

Authors: Santiago Martelo, Aristos Christou; Shunqi Pan; Thorsten Stoesser; Zhihua Xie

Source: Proceedings of the 39th IAHR World Congress

DOI: 10.3850/IAHR-39WC252171192022323

Published: 2022

2021

Title: GMD Perspective: The Quest to Improve the Evaluation of Groundwater Representation in Continental- to Global-Scale Models

Authors: Juliana Marcal, Blanca Antizar-Ladislao and Jan Hofman

Source: Sustainability

DOI: 10.5194/gmd-14-7545-2021

Published: DECEMBER 2021

Title: Addressing Water Security: An Overview

Authors: Tom Gleeson et al; contributors include Charles West

Source: Geoscientific Model Development

DOI: 10.3390/su132413702

Published: 11 DECEMBER 2021

Title: Evidence of Shorter More Extreme Rainfalls and Increased Flood Variability under Climate Change

Authors: Conrad Wasko, Rory Nathan, Lina Stein, Declan O'Shean

Source: Journal of Hydrology

DOI: 10.1016/j.jhydrol.2021.126994

Published: DECEMBER 2021

Title: From Pollutant Removal to Resource Recovery: A Bibliometric Analysis of Municipal Wastewater Research in Europe

Authors: Juliana Marcal, Toby Bishop, Jan Hofman, Junjie Shen

Source: Chemosphere

DOI: 10.1016/j.chemosphere.2021.131267

Published: DECEMBER 2021

Title: Cosmic-Ray Neutron Sensor Python Tool (Crspy 1.2.1): An Open-Source Tool for the Processing of Cosmic-Ray Neutron and Soil Moisture Data

Authors: Daniel Power, Miguel Angel Rico-Ramirez, Sharon Desilets, Darin Desilets, and Rafael Rosolem

Source: Geoscientific Model Development

DOI: 10.5194/gmd-14-7287-2021

Published: 30 NOVEMBER 2021

Title: Experimental Investigation of the Wake Characteristics behind Twin Vertical Axis Turbines

Authors: Stephanie Müller, Valentine Muhawenimana, Catherine A.M.E. Wilson, Pablo Ouroa

Source: Energy Conversion and Management

DOI: 10.1016/j.enconman.2021.114768

Published: NOVEMBER 2021

Title: Stratification in a Reservoir Mixed by Bubble Plumes under Future Climate Scenarios

Authors: David Birt, Danielle Wain, Emily Slavin, Jun Zang, Robert Luckwell and Lee D. Bryant

Source: Water

DOI: 10.3390/w13182467

Published: 08 SEPTEMBER 2021

Title: Towards More Realistic Runoff Projections by Removing Limits on Simulated Soil Moisture Deficit

Authors: Keirnan J.A. Fowler, Gemma Coxon, Jim E. Freer, Wouter J.M. Knoben, Murray C. Peel, Thorsten Wagener, Andrew W. Western, Ross A. Woods, Lu Zhang

Source: Journal of Hydrology

DOI: 10.1016/j.jhydrol.2021.126505

Published: SEPTEMBER 2021

Title: Accelerating Uncertainty Quantification of Groundwater Flow Modelling using a Deep Neural Network Proxy

Authors: Mikkel B. Lykkegaard, Tim J. Dodwell, David Moxey

Source: Computer Methods in Applied Mechanics and Engineering

DOI: 10.1016/j.cma.2021.113895

Published: SEPTEMBER 2021

Title: Incorporating Uncertainty into Multiscale Parameter Regionalization to Evaluate the Performance of Nationally Consistent Parameter Fields for a Hydrological Model

Authors: Rosanna A. Lane, Jim E. Freer, Gemma Coxon, Thorsten Wagener

Source: Water Resources Research

DOI: 10.1029/2020WR028393

Published: 31 AUGUST 2021

Title: Identifying and Interpreting Extreme Rainfall Events using Image Classification

Authors: Andrew Paul Barnes, Nick McCullen and Thomas Rodding Kjeldsen

Source: Journal of Hydroinformatics

DOI: 10.2166/hydro.2021.030

Published: 27 AUGUST 2021

Title: Behaviour and Performance of a Dynamic Cobble Berm Revetment during a Spring Tidal Cycle in North Cove, Washington State, USA

Authors: Paul M. Bayle, George M. Kaminsky, Chris E. Blenkinsopp, Heather M. Weiner, David Cottrell

Source: Coastal Engineering

DOI: 10.1016/j.coastaleng.2021.103898

Published: AUGUST 2021

Title: Experimental Investigation of Physical Leaky Barrier Design Implications on Juvenile Rainbow Trout (Oncorhynchus mykiss) Movement

Authors: Stephanie Müller, Catherine A. M. E. Wilson, Pablo Ouro, Joanne Cable

Source: Water Resources Research

DOI: 10.1029/2021WR030111

Published: JULY 2021

Title: On Doing Hydrology with Dragons: Realizing the Value of Perceptual Models and Knowledge Accumulation

Authors: Thorsten Wagener, Tom Gleeson, Gemma Coxon, Andreas Hartmann, Nicholas Howden, Francesca Pianosi, Mostaquimur Rahman, Rafael Rosolem, Lina Stein, Ross Woods

Source: Wiley Interdisciplinary Reviews - Water

DOI: 10.1002/wat2.1550

Published: 18 JULY 2021

Title: Detecting Ground Level Enhancements using Soil Moisture Sensor Networks

Authors: A. D. P. Hands, F. Baird, K. A. Ryden, C. S. Dyer, F. Lei, J. G. Evans, J. R. Wallbank, M. Szczykulska, D. Rylett, R. Rosolem, S. Fowler, D. Power, E. M. Henley

Source: Space Weather

DOI: 10.1029/2021SW002800

Published: 2021

Title: Uncertainty in the Extreme Flood Magnitude Estimates of Large-Scale Flood Hazard Models

Authors: Laura Devitt, Jeffrey Neal, Thorsten Wagener, Gemma Coxon

Source: Environmental Research Letters

DOI: 10.1088/1748-9326/abfac4

Published: 20 MAY 2021

Title: HydroInformatics education – the Water Informatics in Science and Engineering (WISE) Centre for Doctoral Training

Authors: Wagener, Thorsten; Savić, Dragan; Butler, David; Ahmadian, Reza; Arnot, Tom; Dawes, Jonathan; Djordjević, Slobodan; Falconer, Roger; Farmani, Raziyeh; Ford, Debbie; Hofman, Jan; Kapelan, Zoran; Pan, Shunqi; Woods, Ross

Source: Hydrology and Earth System Sciences

DOI: 10.5194/hess-25-2721-2021

Published: 20 MAY 2021

Title: Hydro-Epidemiological Modelling of Bacterial Transport and Decay in Nearshore Coastal Waters

Authors: Jonathan King, Reza Ahmadian & Roger A. Falconer

Source: Water Research

DOI: 10.1016/j.watres.2021.117049

Published: 15 MAY 2021

Title: Developing a Fuzzy Logic-Based Risk Assessment for Groundwater Contamination from Well Integrity Failure during Hydraulic Fracturing

Authors: Olivia Milton-Thompson, Akbar A. Javadi, Zoran Kapelan, Aaron G. Cahill, Laurie Welch

Source: Science of the Total Environment

DOI: 10.1016/j.scitotenv.2021.145051

Published: 15 MAY 2021

Title: Microbial Fuel Cells for In-Field Water Quality Monitoring

Authors: Lola Gonzalez Olias and Mirella Di Lorenzo

Source: RSC Advances

DOI: 10.1039/D1RA01138C

Published: 2021

Title: TOSSH: A Toolbox for Streamflow Signatures in Hydrology

Authors: Sebastian J. Gnann, Gemma Coxon, Ross A. Woods, Nicholas J.K. Howden, Hilary K. McMillan

Source: Environmental Modelling & Software

DOI: 10.1016/j.envsoft.2021.104983

Published: APRIL 2021

Title: Short-Term Forecasting of Household Water Demand in the UK using an Interpretable Machine-Learning Approach

Authors: Maria Xenochristou, Chris Hutton, Jan Hofman, Zoran Kapelan

Source: Journal of Water Resources Planning and Management

DOI: 10.1061/(ASCE)WR.1943-5452.0001325

Published: APRIL 2021

Title: Discovering Environmental Management Opportunities for Infectious Disease Control

Authors: Beltrame, L., Rose Vineer, H., Walker, J. G., Morgan, E. R., Vickerman, P. T., & Wagener, T

Source: Scientific Reports

DOI: 10.1038/s41598-021-85250-1

Published: 19 MARCH 2021

Title: Leaky Barriers: Leaky Enough for Fish to Pass?

Authors: **Stephanie Müller**, Catherine A. M. E. Wilson, Pablo Ouro and Joanne Cable

Source: Royal Society Open Science

DOI: 10.1098/rsos.201843

Published: 03 MARCH 2021

Title: Mapping Groundwater Recharge in Africa from Ground Observations and Implications for Water Security

Authors: Alan M MacDonald, R Murray Lark, Richard G Taylor, Tamiru Abiye, Helen C Fallas, Guillaume Favreau, Ibrahim B Goni, Seifu Kebede, Bridget Scanlon, James P R Sorensen, Moshood Tijani, Kirsty A Upton and **Charles West**

Source: Environmental Research Letters

DOI: 10.1088/1748-9326/abd661

Published: 16 FEBRUARY 2021

Title: How do Climate and Catchment Attributes Influence Flood Generating Processes? A Large-Sample Study for 671 Catchments across the Contiguous USA

Authors: **L. Stein**, M. P. Clark, **W. J. M. Knoben**, F. Pianosi, R. A. Woods

Source: Water Resources Research

DOI: 10.1029/2020WR028300

Published: 04 FEBRUARY 2021

Title: A Practical, Objective and Robust Technique to Directly Estimate Catchment Response Time

Authors: **G. Giani**, M. A. Rico-Ramirez, R. A. Woods

Source: Water Resources Research

DOI: 10.1029/2020WR028201

Published: FEBRUARY 2021

Title: High-Resolution, Large-Scale Laboratory Measurements of a Sandy Beach and Dynamic Cobble Berm Revetment

Authors: Chris E. Blenkinsopp, **Paul M. Bayle**, Daniel C. Conley, Gerd Masselink, Emily Gulson, Isabel Kelly, Rafael Almar, Ian L. Turner, Tom E. Baldock, Tomas Beuzen, Robert T. McCall, Huub Rijper, Ad Reniers, Peter Troch, David Gallach-Sanchez, Alan J. Hunter, Oscar Bryan, **Gwyn Hennessey**, Peter Ganderton, Marion Tissier, Matthias Kudella & Stefan Schimmels

Source: Scientific Data

DOI: 10.1038/s41597-021-00805-1

Published: 20 JANUARY 2021

Title: Flood Spatial Coherence, Triggers, and Performance in Hydrological Simulations: Large-Sample Evaluation of Four Streamflow-Calibrated Models

Authors: Brunner, M. I., Melsen, L. A., Wood, A. W., Rakovec, O., Mizukami, N., **Knoben, W. J. M.**, and Clark, M. P.

Source: Hydrology and Earth System Sciences

DOI: 10.5194/hess-25-105-2021

Published: 06 JANUARY 2021

2020

Title: Beaver Dams Attenuate Flow: A Multi-Site Study

Authors: Puttock, A, Graham, HA, **Ashe, J**, Luscombe, DJ, Brazier, RE

Source: Hydrological Processes

DOI: 10.1002/hyp.14017

Published: 21 DECEMBER 2020

Title: Flexible Vector-Based Spatial Configurations in Land Models

Authors: Shervan Gharari, Martyn P. Clark, Naoki Mizukami, **Wouter J. M. Knoben**, Jefferson S. Wong, Alain Pietroniro

Source: Hydrology and Earth System Sciences

DOI: 10.5194/hess-24-5953-2020

Published: 16 DECEMBER 2020

Title: Comparing Earth Observation and Inundation Models to Map Flood Hazards

Authors: **Laurence Hawker**, Jeffrey Neal, Beth Tellman, Jiayong Liang, Guy Schumann, Colin Doyle, Jonathan A Sullivan, James Savage and Raphael Tshimanga

Source: Environmental Research Letters

DOI: 10.1088/1748-9326/abc216

Published: 04 DECEMBER 2020

Title: Interactive Decision Support Methodology for Near Real-Time Response to Failure Events in a Water Distribution Network

Authors: **E. Nikoloudi**, M. Romano, F. A. Memon, Z. Kapelan

Source: Journal of Hydroinformatics

DOI: 10.2166/hydro.2020.101

Published: 02 DECEMBER 2020

Title: Digital Elevation Models for Topographic Characterisation and Flood Flow Modelling Along Low-Gradient, Terminal Dryland Rivers: A Comparison of Spaceborne Datasets for The Río Colorado, Bolivia

Authors: Jiaguang Lia, Yang Zhao, Paul Bates, Jeffrey Neal, Stephen Tooth, **Laurence Hawker**, Carmine Maffei

Source: Journal of Hydrology

DOI: 10.1016/j.jhydrol.2020.125617

Published: DECEMBER 2020

Title: Drain Blocking has Limited Short-Term Effects on Greenhouse Gas Fluxes in a Molinia Caerulea Dominated Shallow Peatland

Authors: N. Gatis, D.J. Luscombe, P. Benaud, **J. Ashe**, E. Grand-Clement, K. Anderson, I.P. Hartley, R.E. Brazier

Source: Ecological Engineering

DOI: 10.1016/j.ecoleng.2020.106079

Published: 01 DECEMBER 2020

Title: Use of Reservoir Operation Optimization Methods in Practice: Insights from a Survey of Water Resource Managers

Authors: Francesca Pianosi, **Barnaby Dobson** and Thorsten Wagener

Source: Journal of Water Resources Planning and Management

DOI: 10.1061/(ASCE)WR.1943-5452.0001301

Published: 01 DECEMBER 2020

Title: Comparison of Flood Hazard Assessment Criteria for Pedestrians with a Refined Mechanics-Based Method

Authors: **G. Musolino**, R. Ahmadian, R.A. Falconer

Source: Journal of Hydrology X

DOI: 10.1016/j.hydroa.2020.100067

Published: 17 NOVEMBER 2020

Title: Including Regional Knowledge Improves Baseflow Signature Predictions in Large Sample Hydrology

Authors: **Sebastian J. Gnann**, Hilary McMillan, Ross A. Woods, Nicholas J. K. Howden

Source: Water Resources Research

DOI: 10.1029/2020WR028354

Published: 05 NOVEMBER 2020

Title: In Situ Characterisation of Size Distribution and Rise Velocity of Microbubbles by High-Speed Photography

Authors: **Bert Swart**, Yubin Zhao, Mohammed Khaku, Eric Che, Richard Maltby, Y.M. John Chew, Jannis Wenk

Source: Chemical Engineering Science

DOI: 10.1016/j.ces.2020.115836

Published: 02 NOVEMBER 2020

Title: Emergency Flood Bulletins for Cyclones Idai and Kenneth: A Critical Evaluation of the Use Of Global Flood Forecasts for International Humanitarian Preparedness and Response

Authors: Rebecca Emerton, Hannah Cloke, Andrea Ficchi, **Laurence Hawker**, Sara de Wit, Linda Speight, Christel Prudhomme, Philip Rundell, Rosalind West, Jeffrey Nealf, Joaquim Cuna, Shaun Harrigan, Helen Titley, Linus Magnusson, Florian Pappenberger, Nicholas Klingaman, Elisabeth Stephens

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Title: Unanswered Questions on the Budyko Framework

Authors: Wouter R. Berghuijs, **Sebastian J. Gnann**, Ross A. Woods

Source: Hydrological Processes

DOI: 10.1002/hyp.13958

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Title: A New Approach for Scaling Beach Profile Evolution and Sediment Transport Rates in Distorted Laboratory Models

Authors: **Paul Maxime Bayle**, Tomas Beuzen, Christopher Edwin Blenkinsopp, Tom E Baldock, Ian Lloyd Turner

Source: Coastal Engineering

DOI: 10.1016/j.coastaleng.2020.103794

Published: 29 OCTOBER 2020

Title: CAMELS-GB: Hydrometeorological Time Series and Landscape Attributes for 671 Catchments in Great Britain

Authors: Gemma Coxon, Nans Addor, John P. Bloomfield, Jim Freer, Matt Fry, Jamie Hannaford, Nicholas J. K. Howden, **Rosanna Lane**, Melinda Lewis, Emma L. Robinson, Thorsten Wagener and Ross Woods

Source: Earth System Science Data

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Authors: **Webber, J.L.**, Fletcher, T.D., Cunningham, L., Fu, G., Butler, D., Burns, M.J.

Source: Urban Water Journal

DOI: 10.1080/1573062X.2019.1700286

Published: 08 AUGUST 2020

Title: A Brief Analysis of Conceptual Model Structure Uncertainty using 36 Models and 559 Catchments

Authors: **W. J. M. Knoben**, J. E. Freer, M. C. Peel, K. J. A. Fowler, R. A. Woods

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Published: 06 JULY 2020

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Authors: **Xenochristou, M.**, Hutton, C., Hofman, J., & Kapelan, Z.

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Title: Mapping the Danger to Life in Flash Flood Events Adopting a Mechanics Based Methodology and Planning Evacuation Routes

Authors: **Musolino, G.**, Ahmadian, R., Xia, J.Q., Falconer, R.A.

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Published: 26 MAY 2020

Title: Beach Profile Changes under Sea Level Rise in Laboratory Flume Experiments at Different Scale

Authors: **Paul M. Bayle**, Tomas Beuzen, Chris E. Blenkinsopp, Tom E. Baldock, and Ian L. Turner

Source: Journal of Coastal Research

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Published: 26 MAY 2020

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Authors: Martins, K., Bonneton, P., **Bayle, P.M.**, Blenkinsopp, C.E., Mouragues, A., Michallet, H.

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Authors: **Bayle, P.**, Blenkinsopp, C., Conley, D., Masselink, G., Beuzen, T. & Almar, R

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Authors: **Xenochristou, M.**, Kapelan, Z.

Source: Urban Water Journal

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Authors: Fowler, K., **Knoben, W.J.M.**, Peel, M.C., Peterson, T.J., Ryu, D., Saft, M., Seo, K.W., Western, A.

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Authors: **Bailey, O.**, Zlatanovic, L., van der Hoek, J. P., Kapelan, Z., Blokker, M., Arnot, T. & Hofman, J.,

Source: Water

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Title: Interlinking Bristol Based Models to Build Resilience to Climate Change

Authors: Stevens J, Henderson R, **Webber J**, Evans B, Chen A, Djordjević S, Sánchez-Muñoz D, Domínguez-García J.

Source: Sustainability

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Authors: **Batelis, S.C.**, Rahman, M., Kollet, S., Woods, R., Rosolem, R.

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Authors: **Stein, L.**, Pianosi, F., Woods, R.

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Authors: **Barnes, A.P.**, Santos, M.S., Garijo, C., Mediero, L., Prosdocimi, I., McCullen, N., Kjeldsen, T.R.

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Authors: **Gnann, S.J.**, Howden, N.J.K., Woods, R.A.

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Authors: **Visanji, Z.**, Sadr, S.M.K., Johns, M.B., Savić, D., Memon, F.A.

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Authors: **Bailey, O.**, Arnot, T.C., Blokker, E.J.M., Kapelan, Z., Hofman, J.A.M.H.

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Authors: **Webber, J.L.**, Fu, G.T., Butler, D.

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Authors: **Hawker, L.**, Neal, J., Bates, P.

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Authors: **Lane, R.A.**, Coxon, G., Freer, J.E., Wagener, T., Johnes, P.J., Bloomfield, J.P., Greene, S., Macleod, C.J.A., Reaney, S.M.

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Authors: Bloschl, G. et al; contributors include **Knoben, W., Stein, L.**

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Authors: **Bailey, O.**, Arnot, T.C., Blokker, E.J.M., Kapelan, Z., Vreeburg, J., Hofman, J.A.M.H.

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Authors: **Beltrame, L.**, Dunne, T., Vineer, H.R., Walker, J.G., Morgan, E.R., Vickerman, P., McCann, C.M., Williams, D.J.L., Wagener, T.

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University of Exeter
North Park Road
Exeter EX4 4QF
United Kingdom

Email: cws-admin@exeter.ac.uk

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