

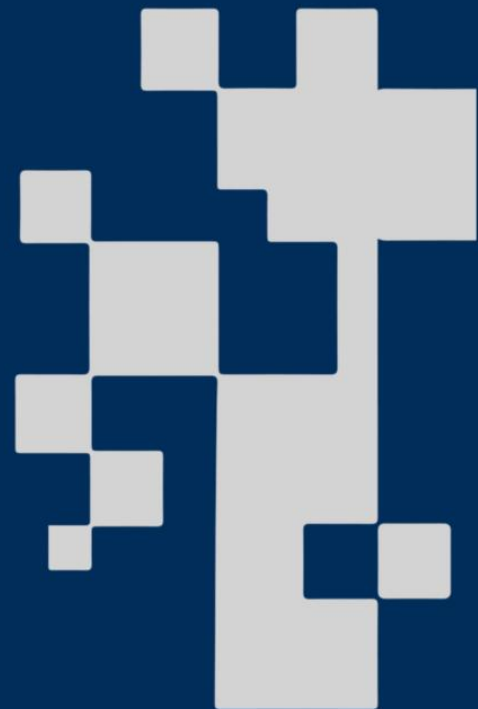


National Framework
for Climate Services



NFCS Workshop Report:

The Role of AI in Climate Services



NFCS Workshop Report:

The Role of Artificial Intelligence in Climate Services

Workshop Details

Title:	NFCS Workshop: The Role of AI in Climate Services
When:	2 nd December 2025
Where:	Hilton Hotel, Kilmainham, Dublin
Agenda:	See Appendix B (page 9)

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1. Introduction

The accelerating impacts of climate change have increased the demand for accurate, timely, and actionable decision relevant climate information and services. As governments, industries, and communities seek better tools to anticipate climate risks and support local and national resilience planning, the integration of advanced technologies has become essential. In this context, the workshop **“The Role of AI in Climate Services”** was convened to explore how emerging artificial intelligence methods can enhance the development, interpretation, and delivery of climate data, information and services.

The workshop brought together experts from across climate science, state, semi-state and private sectors, and the field of AI, to discuss current opportunities and challenges in applying AI to climate services. Participants examined how AI methods such as machine learning, predictive modelling, and data-driven decision-support tools can inform the development of climate services. By creating a platform for knowledge exchange and collaboration, the workshop aimed to strengthen understanding of AI’s potential, identify gaps in existing climate service frameworks, and outline actionable pathways for responsible and effective adoption.

This report presents a summary of the workshop’s objectives, discussions, findings, and recommendations, offering an introduction of how AI can contribute to more responsive, accessible, and impactful climate services.

1.1 Workshop Aims

- Facilitate a cross-community discussion on how AI could effectively inform Climate Services.
- Develop an understanding of the opportunities and challenges of utilising AI within Climate Services.
- Identify potential collaboration opportunities across the Climate – AI – User interface.
- Identify any barriers to potential collaborations.
- Identify next steps across the community.

1.2 Workshop Overview

The event was attended by a wide range of stakeholders from across the climate research, climate services and the AI communities. These included representatives from academic institutions, research groups, government agencies, government departments, local authorities, the finance sector and private sector consultancies.

The day was split into three themed sessions:

1. An Introduction to AI
2. AI in Action
3. Developing AI Driven Climate Services

Workshop activities and presentations were interspersed throughout the day and “real time” participant feedback via Slido was captured at key intervals. All presentations are available on request.

2. Session Descriptions

2.1 Session 1: Introduction to AI

In this session participants were introduced to the core concepts of AI, exploring both opportunities and limitations. A keynote presentation delivered by Prof. Andrew Parnell of the AIMSIR research institute in UCD, offered key insights into some of the fundamentals of AI as well as insight into how AI is currently being utilised to inform weather and climate applications in Ireland. This was followed by the first workshop activity aimed at further grounding participants on the core basic concepts off AI. Discussions were focused on the following themes:

1. What AI is and What AI is not
2. How AI works
3. Limitations, Opportunities & Challenges
4. How AI can inform Climate Services

It was evident from this session that a key priority from the workshop participants was the need for effective cross community engagement (Climate – AI – User interface) to ensure effective knowledge transfer to inform decision relevant climate services.

2.2 Session 2: AI in Action

While the contribution of AI to date within weather science has been notable, the role AI can play within climate services remains relatively novel and unexplored. In this session early adopters of AI within the climate services community in Europe and nationally showcased how they are and are planning to use AI as a tool that underpins their climate service. Each presenter offered insights into the benefits of using AI as well as challenges and barriers associated with its use and integration.

Dr. Marek Jacobs, the session's first speaker gave an overview of the pan-European strategic programme he steers that brings together European meteorological services, and external partners such as ECMWF and EUMETSAT, to advance the application of Artificial Intelligence and Machine Learning in weather, climate, and environmental services. The programme prioritises themes such as data curation, modelling/post-processing, and product development — alongside capacity building and open-source collaboration.

Next a selection of Irish speakers showcased the role AI plays in the development of their services and spoke of future AI integration. Dr. Anna Molter from UCD described the role AI will play developing climate services for the health sector. Dr. Payam Sajadi (Maynooth University) described how his team are using machine learning and AI-based modelling to undertake urban flood analysis, with applications across catchment hydrology, micro-scale land-cover mapping, and flood-risk assessment.

Gerard O'Dea from Transport Infrastructure Ireland (TII) showcased their RoadAI service which uses AI methods to analyse road surface and cycleway deterioration and degradation to inform maintenance planning. Satvik Sethi from UCD showcased the AI2Peat programme which uses AI to analyse the effectiveness of Irish bogs as carbon sinks. Finally, Dr. John Hanley offered insights into how Met Éireann's modelling team plan to use AI to downscale a greater number of model simulations in a more computationally efficient way, resulting in a greater number of targeted scenarios which will feed into the [TRANSLATE programme](#) – Ireland's standardised national climate change scenarios dataset.

It was evident from this session that despite challenges around using AI within climate service development, 74% of the workshop participants said they had identified opportunities for AI within their organisations.

2.3 Session 3: Developing AI Driven Climate Services

The final session of the day was structured as a mini hackathon. The participants were split into groups consisting of at least one climate and AI expert alongside a number of stakeholders. Each group then had to work together to develop a decision relevant climate service which had an element of AI. Working alongside Met Éireann's facilitators the participants were guided through a climate service

template which was designed alongside Met Éireann's AI team. The participants were asked to consider the following while developing their service:

- Why is this service needed and who is it for?
- What is the main output and delivery mode?
- Why is the choice of AI appropriate for this proposal?
- What data is required and is it accessible?
- What are the main barriers, challenges and potential solutions?

In total 6 climate services were proposed:

1. Localised rainfall estimation
2. Probabilistic prediction of inflow volume for wastewater treatment plants using ML/AI
3. Analogues for drought events – providing context for current conditions
4. Building resilience in supply chains against climate emergencies
5. Generalisable frameworks for health impacts
6. AI evaluation of the impact of climate change on already vulnerable waterbodies

Each of these proposals will be presented to Met Éireann's and UCD's AI teams for future project consideration. For example, these may be suitable as Masters projects or form elements of PhDs or postdoctoral research. Once each project is presented and undergone more formal consideration, potential collaborators could be linked to the Met Éireann and UCD AI teams for further input.

3. Key Findings and Outcomes

Each of the expert speakers at the workshop highlighted how AI is already being utilised within climate services around Europe and in Ireland, supporting climate data rescue, quality control and climate model downscaling for example. Following a very insightful and engaging day exploring the role AI can play in informing climate services there were several key learnings from the workshop.

1. Participants felt positive about AI. When asked to describe one word that comes to mind terms such as “much needed”, “efficient”, “exciting”, “potential”, “opportunity”, “efficient”, “game changer”, “useful”, “tool” were offered. Despite this there was an air of caution and participants felt that better communication and transparency around its use would dispel concerns over trust and accuracy.
2. 75% of participants identified opportunities for AI within their organisations, however all saw potential barriers that would be difficult to overcome.
3. Some of the biggest perceived barriers to using AI effectively to co-develop services were the following:
 - i. The scale of computational resources required. Many participants said they just did not have the internal capacity for or access to the required computational resources to develop AI powered services.
 - ii. Lack of expertise (in particular subject matter knowledge from the user side). It's often difficult to engage across multiple sectors, in this case the AI-Climate-User interface. All participants acknowledged that user subject matter expertise

- was essential for service development but is often difficult to access. It was noted that Ireland's National Framework for Climate Services (NFCS) could play an important role in facilitating these connections.
- iii. Lack of available training at the required level. Many participants felt that while training in AI was available it was aimed more at academic students rather than the workforce. Tailored training in the fundamentals of AI and its application for users and climate service providers would be beneficial.
 - iv. Access to AI ready data. It was noted that data comes in different formats and resolutions and certain data can be difficult to locate and access. The time required to get data into an AI ready state is seen as an impediment to integrating AI into services.
 - v. Corporate policy and governance. There was a lot of uncertainty around how AI use should be used and if it should be standardised. It was mentioned that there has been very little communication around ethical and just use of AI in general within their organisations.
4. There was a broad consensus that climate models and services should not just be rebuilt in a kneejerk reaction to sudden influx of AI models. Participants felt that there needs to be more consideration on how AI might support or enhance your product, or even part of it. AI can be utilised across the climate service community, but it may not be the best fit in all cases. It is important to ensure it is 'fit for purpose' when considering its use.
 5. Participants believe that more case studies of AI in action alongside better communication of real-life applications would help them integrate AI better into their climate related services.

4. Conclusion

This national workshop acted as the first stage to help understand the potential role AI could play within the context of the Irish climate services landscape. The workshop focused on fostering open dialogue around AI, its opportunities and challenges enabling participants to address barriers to engagement while balancing long-term resilience goals. It show-cased many AI early adopters (internationally and nationally) and their approach to engaging effectively with AI as a tool to power climate services. Each offered practical examples of how AI can be successfully used within sectors and climate services to enhance climate-based decision-making.

Clear barriers and challenges were identified throughout the process which the NFCS can seek to coordinate a response to. There is a clear need for more effective communication and knowledge transfer across the entire community around the use of AI and climate service development. Also evident is the need for a tailored approach to training depending on the target audience. Technical gaps were also a clear priority, with computational resources and AI ready data a clear barrier to implementation.

The NFCS, through its many supporting organisations and members, will continue to support and progress the discussion on the role of AI in climate services.



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A huge thank you to all participants, presenters and facilitators for making this a successful workshop. The NFCS secretariat will now merge these identified user and provider needs into existing development plans to further help support and streamline the provision and use of climate services here in Ireland.

For more information on this workshop or the NFCS, please contact nfcs@met.ie.

Appendix A: Workshop Speakers

Andrew Parnell

Andrew Parnell is the Met Éireann Professor of Data Science for Climate and Weather at University College Dublin and Director of the AIMSIR research institute for Artificial Intelligence in Meteorological Services, Innovation and Research. His research is in machine learning and statistical modelling applied to many different climate and ecological areas. He is currently Principal Investigator and Deputy Director of the Research Ireland Co-Centre in Climate, Biodiversity and Water, and a funded investigator in the SFI Insight Centre for Data Analytics.

Marek Jacob

In his role as E-AI coordinator, Marek Jacob helps steer a five-year strategic programme (started January 2024) that brings together European meteorological services, and external partners such as ECMWF and EUMETSAT, to advance the application of Artificial Intelligence and Machine Learning in weather, climate, and environmental services. The programme aims at data curation, modelling/post-processing, and product development — alongside capacity building and open-source collaboration.

Anna Molter

Dr Anna Mölter is a Lecturer/Assistant Professor in Environmental Modelling in the College of Architecture and Engineering at University College Dublin. Her research lays at the intersection of environment, health and technology. She is a multi-disciplinary researcher with core skills in pollution modelling, exposure assessment, epidemiology, and spatial analysis. A large proportion of her previous work has focused on the effects of air pollution on children's health, but she is interested in a wide range of environmental issues, including both urban and rural problems, and how they relate to human health.

Payam Sajadi

Dr. Payam Sajadi is a remote sensing and geospatial scientist working at the interface of Earth Observation, machine learning/AI, IOT, and digital hydrology. He is currently Principal/Senior Remote Sensing & GIS Specialist at AtkinsRéalis and has recently joined Maynooth University as Assistant Professor in Remote Sensing/GIS for Hydrology and Climate Adaptation. His work focuses on high-resolution EO, ML/AI-based modelling, IOT and urban flood analysis, with applications across catchment hydrology, micro-scale land-cover mapping, and flood-risk assessment. He has led and contributed to national and EU-funded projects such as RESTORATION and INHERITANCE (Funded by Research Ireland and UCD sustainability) that integrate advanced remote sensing, ML/AI, citizen science, and nature-based solutions to support urban flood resilience and climate resilience.

Gerard O’Dea

Gerard is a Chartered Civil Engineer, graduating from the University of Galway in 2011. He has 14 years’ experience across areas of engineering design and consultancy, major road planning, strategic asset management, pavement condition assessment, GIS, data analytics and climate adaptation. He joined TII Network Management in 2022 as a Senior Engineer in Asset Management having previously worked as a consultant in the private sector with Arup and PMS Ltd. He is currently Group lead for Strategic Asset Management of Roads and Active Travel, and he holds responsibilities for delivering a pavement renewals programme on the High-Speed Pavement Network in region west.

Satvik Sethi

Satvik Sethi holds a Master’s degree in Strategic Management from University College Dublin and serves as the Research Project Administrator for the Ai2Peat project. He oversees the business and operational aspects of the initiative, ensuring smooth execution and strategic alignment.

John Hanley

John has a background in atmospheric physics with a PhD in extreme European windstorms and has been working in the research division at Met Éireann as a climate modeler since 2020 with a focus on regional climate modelling.

Appendix B: Workshop Agenda

09:00 – 09:30	Opening Remarks <i>Keith Lambkin (Met Éireann)</i>
Session 1:	Introduction to AI and its Role in Climate Services
09:45 - 10:15	Introduction to AI and its Applications <i>Andrew Parnell (AIMSIR)</i>
10:15 – 11:10	Workshop Activity <i>NFCS Facilitated</i>
11:10 – 11:30	Coffee Break
Session 2:	AI in Action
11:30 – 12:00	European Perspective, <i>Marek Jacob, (Coordinator E-AI EUMETNET)</i>
12:00 – 12:15	<i>Paul Hynds (TU Dublin)</i>
12:15 – 12:25	<i>Anna Molter (UCD)</i>
12:25 – 12:35	<i>Payam Sajadi (Adjunct Research Fellow, UCD)</i>
12:35 – 12:45	<i>Gerard O’Dea (TII)</i>
12:45 – 12:55	<i>Satvik Sethi (AI2Peat)</i>
12:55 – 13:05	<i>John Hanley (Met Éireann)</i>
13:05 – 13:15	Panel Discussion
13:15 – 14:15	Lunch
Session 3:	Creating an AI Powered Climate Service
14:15 – 15:45	Workshop Activity <i>NFCS Facilitated</i>
15:45 – 16:00	Closing Remarks