



National Framework  
for Climate Services



# Workshop Report

## Addressing Climate Uncertainty

# NFCS Workshop Report:

## Addressing Climate Uncertainty

### Workshop Details

<b>Title:</b>	<b>NFCS Workshop: Addressing Climate Uncertainty</b>
<b>When:</b>	<b>26<sup>th</sup> November 2024</b>
<b>Where:</b>	<b>Hilton Hotel, Kilmainham, Dublin</b>
<b>Agenda:</b>	<b>Available in the Appendix A with Speaker Bios</b>

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## 1. Introduction

### 1.1 Description

The National Framework for Climate Services, (NFCS), is the coordinating body in Ireland for climate services and information. It is a permanent, operational service and brings together the climate services community in partnership with its many members to facilitate, support and coordinate collaborative, standardised and effective climate services development. It aims to promote and facilitate knowledge and information exchange across the community, as well as coordinating the most robust information and emerging science to support national climate goals for a climate resilient Ireland. The NFCS serves to promote existing information and services. It also signposts all relevant climate information for the Irish climate services community. It is primely positioned to identify priority climate service requirements and gaps and facilitate a coordinated response from the national community to these. One such priority theme identified during the NFCS annual meeting was the inherent uncertainty in handling climate information. Handling uncertainty within climate information is not a unique topic to Ireland and in the past few years this conversation has gained prominence across the international community. It was also identified as a priority theme from the Irish Climate Change Advisory Council's Adaptation Committee, (CCAC), this year.

Users of climate information must deal with multiple strands of uncertainty when planning for future resilience. Uncertainty is inherent within climate data and providers of climate information and services need to enable users to understand this uncertainty and how it might impact decision-making across different time horizons. This will enable users to effectively identify the information they need when making decisions in the face of an uncertain future.

To support this endeavour the NFCS hosted a national forum, bringing the climate services community together to discuss uncertainty within climate information and how best to support climate service development and decision-making given this uncertainty. This workshop explored strategies for integrating uncertainty into climate-related decision-making and adaptive planning. It also explored some best practices to communicate this uncertainty, focusing on the effectiveness of different methods. Through expert presentations and collaborative discussions, participants gained an enhanced understanding of the causes of uncertainty within climate information, as well as practical tools to address these uncertainties.



The workshop focused on fostering resilience by embracing uncertainty, enabling participants to address climate risks while balancing long-term resilience goals.

## 1.2 Workshop Aims

- Facilitate a cross-community discussion on uncertainty within climate information.
- Develop an understanding of the uncertainty landscape within the climate services community.
- Identify barriers within climate service development and decision-making because of uncertainty.
- Identify next steps across the community.

## 1.3 Key Findings

- Most participants had a negative impression of uncertainty.
- How uncertainty is handled within climate extremes is important to all stakeholders.
- Communication is a primary barrier to handling uncertainty across the community.
- Communication should be dependent on target group with certain approaches more appealing than others – there is no “catch all” approach.
- The community has confidence in climate information and are often more concerned with external (non-climate) sources of uncertainty.
- Cascading uncertainty is currently not handled in most instances.
- Handling uncertainty is equally important for researchers and other stakeholders alike.
- Tailored case studies showcasing the application of climate information under uncertainty would be useful for all stakeholders.

## 2.0 Summary

### 2.1 Summary of the Day

The day was attended by a wide range of stakeholders from across the climate services community. These included representatives from academic institutions, research groups, government agencies, government departments and private sector consultancies, capturing the main national climate service researchers, producers and users. For the first time at an NFCS workshop attendance was split equally between researchers/producers and users/policy makers, highlighting the importance of handling uncertainty for the entire community.

The day was split into three themed sessions, session 1: “Understanding and characterising uncertainty”, session 2: “Communicating uncertainty” and session 3: “Decision-making under uncertainty”. Each session consisted of presentations alongside activities/discussions to facilitate and promote engagement and collaboration. All presentations are available upon request.

### **Session 1 – Understanding and Characterising Uncertainty**

This session introduced the inherent uncertainty within climate information, how it is characterised and how different strands of uncertainty become more or less impactful across time. Drawing from national and international experiences, Dr. Markus Todt from Met Éireann provided insights into the challenges faced by researchers handling and presenting uncertainty in an effective way. This was followed by an activity introducing and exploring key themes for this session. These included: characterising uncertainty, constraining uncertainty, cascading uncertainty, applications despite uncertainty and quantifying uncertainty. Here participants were asked to consider 1. What we currently do well, 2. What are the main challenges and 3. What are the gaps and how can we address them.

It was evident from this session that the priority from across the community was the need to effectively use climate information despite the uncertainty and how to achieve this effectively.

### **Session 2 – Communicating Uncertainty**

This session focused on how uncertainty is handled within climate services and different approaches to communicating uncertainty. The session began with two international guest speakers. Grantham Professor of Climate Science, Prof. Ted Shepherd from the University of Reading spoke on “Decision-making under uncertainty” focusing on a climate storyline approach for communication. This was followed by Professor of Climate Literacy at the Amsterdam University of Applied Sciences, Prof. Janette Bessembinder who spoke on “Tailoring climate data under uncertainty”. Here Prof. Bessembinder explored the use of language in communication approaches and how climate information could be effectively tailored to a target audience. Finally, the session ended with an activity exploring language and some approaches currently used nationally and internationally to communicate climate information to different target groups. These included percentiles (maps of projections for the 10<sup>th</sup>, 50<sup>th</sup>, 90<sup>th</sup> percentiles), sensitivities (maps of projections for low, medium and high temperature

sensitivities across the climate scenarios), persona-based climate storylines, event-based climate storylines and dynamic adaptive pathways – examples from this activity can be seen in the appendix. The participants were asked to examine each approach and discuss the following: 1. How are these to interpret, 2. What was good about the approach, 3. What was not good about the approach, 4. Who would the target audience be and 5. Could any improvements be made.

It was clear from the discussion that improvements could be made across all approaches and that each approach would need to be tailored differently depending on the target group. Percentiles and both storyline approaches were the most appealing to the participants, while sensitivities in particular were deemed overly complicated to be useful. It should be noted that participants had more familiarity with percentiles and storylines than with sensitivities and dynamic adaptive pathways which may have influenced the outcomes of this activity.

### **Session 3 – Decision-making under Uncertainty**

The final session focused on national approaches of using climate information effectively under uncertainty. This session began with a presentation from Dr. Stephen Flood from the Climate Change Advisory Council on “Practitioner needs to support decision making”. Here Dr. Flood highlighted the important role climate services can play in advancing the understanding of uncertainty. This was followed by a presentation from Dr. Conor Quinlan from the EPA speaking on “the role of the [National Climate Change Risk Assessment \(NCCRA\)](#) in decision-making for adaptation”. Dr. Quinlan spoke of the approach to handling and communicating uncertain climate information from the perspective of the NCCRA. Presentations concluded with Dr. Paul Holloway from University College Cork, co-PI on the TRANSLATE project, showcasing a practical application of understanding changing risk to climate change under uncertainty. Dr. Holloway drew from an example within the NCCRA and illustrated how the [TRANSLATE](#) risk framework can be used as one approach to understanding risk as directed by the NCCRA. The session finished with an activity focused on navigating uncertainty: a climate services challenge. Here participants explored hypothetical real-world scenarios tied to climate uncertainty in Ireland. Drawing on the discussions from the previous sessions the participants critically examined each scenario focusing on aspects such as data, gaps, communication challenges and predictive uncertainty. Finally, the day concluded with a discussion on where to go from here.

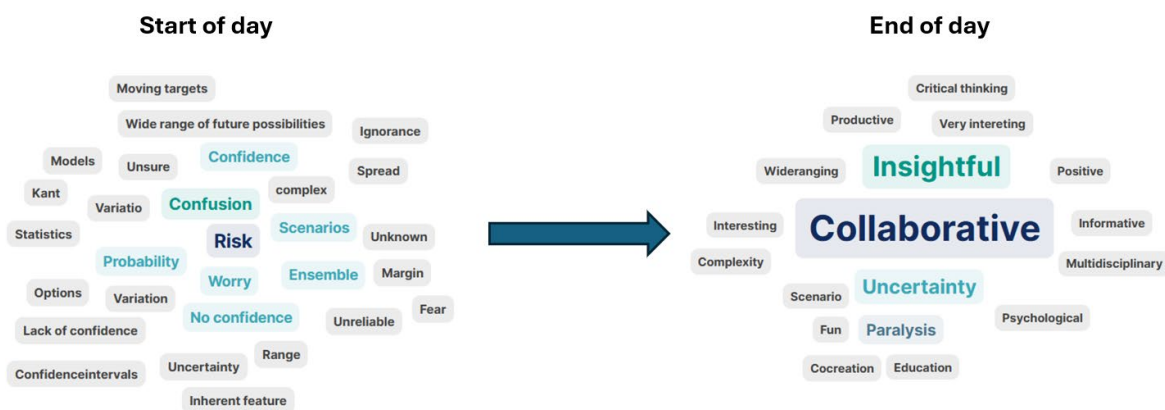
As in previous sessions, communication challenges were at the forefront of the discussions. It is evident that tailored approaches dependent on target groups was seen as essential as well as tailored case studies showcasing the application of climate information under uncertainty in a meaningful way.

### 3.0 Outcomes and Conclusions

### 3.1 Outcomes

Following a very insightful and engaging day exploring uncertainty within climate information in the context of the Irish climate services landscape, there are several key learnings or outcomes from the workshop.

1. Communication is a primary barrier to effectively using climate information under uncertainty. However, using Slido questioning throughout the day it was clear that through understanding and effective communication the impression of uncertainty from the participants can change from negative to positive. Word clouds below demonstrate the shift in language from the start to the end of the workshop.



Effective and tailored uncertainty communication products targeted across the community are required. The NFCS can play a clear role in coordinating and developing such materials to facilitate the use of climate information through effective messaging.

2. Access to practical examples of using climate information under uncertainty are considered the most effective methods of establishing user confidence in information.

Here the NFCS can showcase examples of climate information “in action” and point to useful tools and approaches.

3. Accessible information targeted at an introductory level is seen as a critical gap by end users. Participants expressed frustration at a lack of coordinated approach to basic climate information and definitions. Here the NFCS can coordinate amongst members to develop and gather relevant introductory materials hosted within a thematic hub.
4. Further applied research is required on a number of topics such as: understanding the effect of uncertainty on climate extremes, how AI could be useful in handling uncertainty within climate services and how to incorporate cascading uncertainty. Here the NFCS can facilitate further conversations with the community on priority topics and engage with members and funders to establish research opportunities where appropriate.
5. External barriers often play a role in constraining action by the community. For example, it was noted that often policy or legislation is a barrier to action. Siloed approaches are also seen as a barrier to communication. For example, engaging with social scientists and communication experts could greatly improve the engagement with climate information under uncertainty. It could also improve how climate information is conveyed for policy. Here the NFCS has the opportunity to engage with external actors to positively enhance the user experience with climate information and build cross disciplinary approaches for more effective communication.

### 3.2 Conclusions

This national forum acted as the first stage to understanding how climate uncertainty is understood and engaged with, within the context of the Irish climate services landscape. The workshop focused on fostering resilience by embracing uncertainty, enabling participants to address climate risks while balancing long-term resilience goals. It show-cased many approaches to handling uncertainty currently in use today, both nationally and internationally and offered practical examples of how uncertain climate information can be effectively used within risk frameworks.

Clear barriers and gaps were identified throughout the process which the NFCS can seek to coordinate a response to. An initial next step will be to gather further external evidence to



support the findings from this workshop to further support recommended actions. This evidence can be gathered via several routes such as interviews, international evidence gathering and national workshops.

The NFCS, through its many supporting organisations and members, will continue to support and progress the discussion on uncertainty within climate information and development of effective climate services under uncertainty.

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](mailto:nfcs@met.ie).

## Appendix A: Agenda and Speaker Bios



### NFCS Workshop Addressing Climate Uncertainty



**Date:** 26 November 2024  
**Location:** Hilton, Kilmainham.

**Background:** Users of climate information have to deal with uncertainties when planning for future resilience. Concurrently, providers of climate services need to enable users to identify the information they require when making decisions in the face of climate uncertainty. This workshop will explore strategies for integrating uncertainty into climate-related decision-making and adaptive planning, as well as exploring the best practices to communicate this uncertainty. Through expert presentations and collaborative discussions, participants will gain an enhanced understanding of the causes of climate uncertainty, as well as practical tools to address these uncertainties. The workshop will focus on fostering resilience by embracing uncertainty, enabling participants to address climate risks while balancing long-term sustainability goals across different sectors.

#### Agenda

**9.00 AM – 9:30 AM: Registration and Coffee**

**9:30 AM – 9:45 AM: Welcome and Opening Remarks**  
**Speaker:** Keith Lambkin (NFCS)

**9:45 AM – 10:15 AM: Talk: Sources of Climate Uncertainty**  
**Speaker:** Dr Markus Todt (Met Éireann)

**10:15 AM – 11:00 AM: Interactive discussion around uncertainty.**  
**Description:** Participants will have the opportunity to discuss sources of uncertainty from the perspective of both researchers and users in a carousel setting.  
**Facilitators:** The NFCS team.





## NFCS Workshop Addressing Climate Uncertainty

### Agenda

11.00 AM – 11.30AM: Morning Break

11.30 AM – 12.00 PM: Talk: Decision making under uncertainty.  
Speaker: Prof. Ted Shepherd (University of Reading)

12.00 PM – 12.30 PM: Talk: Tailoring climate data under uncertainty .  
Speaker: Prof. Janette Bessembinder (AUAS/KNMI)

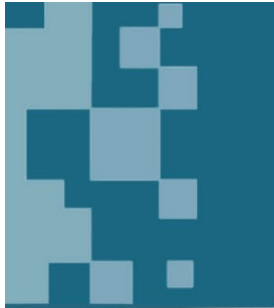
**12:30 PM – 1:15 PM: Interactive Session: Communication of uncertainty.**  
**Description:** Participants will discuss best practices for communicating the complexities of climate data and uncertainty to policymakers and the public. This session will focus on the importance of ‘clarity of language’, contextualising uncertainty (i.e. uncertainty doesn’t have to mean inaction) and the use of visualisations to help users comprehend the inherent uncertainties.  
**Facilitators: The NFCS team**

**1:15 PM – 2:15 PM: Lunch and Networking**  
Opportunity for informal discussions, networking, and sharing insights from the morning sessions.

2:15 PM – 2.30 PM: Talk: Practitioner needs to support decision making.  
Speaker: Dr. Stephen Flood (CCAC)

2:30 PM – 2.45 PM: Talk: The role of the NCCRA in decision-making for adaptation.  
Speaker: Dr. Conor Quinlan (EPA)





## NFCS Workshop Addressing Climate Uncertainty

### Agenda

**2.45 - 3.00 PM: Talk: Case study from the TRANSLATE project.**  
**Speaker: Dr. Paul Holloway (UCC)**

**3:00 PM – 3:45 PM: Activity: Navigating Uncertainty: A Climate Services Challenge**

**Description:** In this activity, participants will explore real-world challenges tied to climate uncertainty in Ireland. Facilitators will guide participants to explore different scenarios, focusing on critical aspects of climate services such as data gaps, communication challenges, and predictive uncertainty. Participants will collaborate to analyse the scenario, propose solutions, and build upon the ideas of others.

The session will be closed out by addressing the question: Where do we go from here?

**Facilitators: The NFCS team.**

**3.45 PM – 4:00 PM: Closing Remarks: Speaker: Claire Scannell (NFCS)**

Contact Information: [NFCS@met.ie](mailto:NFCS@met.ie)







## NFCS Workshop Addressing Climate Uncertainty



### Speakers

**Prof. Janette Bessembinder** is professor Climate Literacy at the Amsterdam University of Applied Sciences (AUAS) since May 2022. She also still works at KNMI (Royal Netherlands Meteorological Institute; since 2005) as senior advisor climate services. She is involved in climate services development, inventories of users' requirements related to climate (change) data and information, and tailoring of climate data for users ranging from impact/adaptation researchers, companies to policy makers. Her research at the AUAS focusses on the use of climate data and communication on climate change by professionals.

**Dr. Stephen Flood** currently leads the Resilience Team at the Irish Climate Change Advisory Council Secretariat and is a Visiting Scholar at ICARUS, Maynooth University. He has over 16 years' experience in climate change, environmental policy and social science research.

**Dr. Paul Holloway** is a senior lecturer in GIS and Spatial Ecology at University College Cork. His interests include the application and development of GIS and spatial modelling to address a suite of social and environmental issues. He is the UCC Co-PI of the Met Éireann funded Translate project, working to develop and present climate services for different sectors, as well as leading the development of the GIS framework and toolkit for semi-quantitative risk assessment.

**Dr. Conor Quinlan** is the Senior Manager for EPA Climate Services, and is responsible within the EPA for climate adaptation, including delivering the National Climate Change Risk Assessment, the national adaptation platform – Climate Ireland, and the Climate Ireland Adaptation Network (CIAN), climate-related behavioural insights, including the Climate Change in the Irish Mind Study, and the providing the secretariate to the National Dialogue on Climate Action. Conor has a PhD in hydrology and hydrogeology, and an MA in Public Management. Before joining the EPA, Conor spent seven years working in environmental consultancy.





## NFCS Workshop Addressing Climate Uncertainty



### Speakers

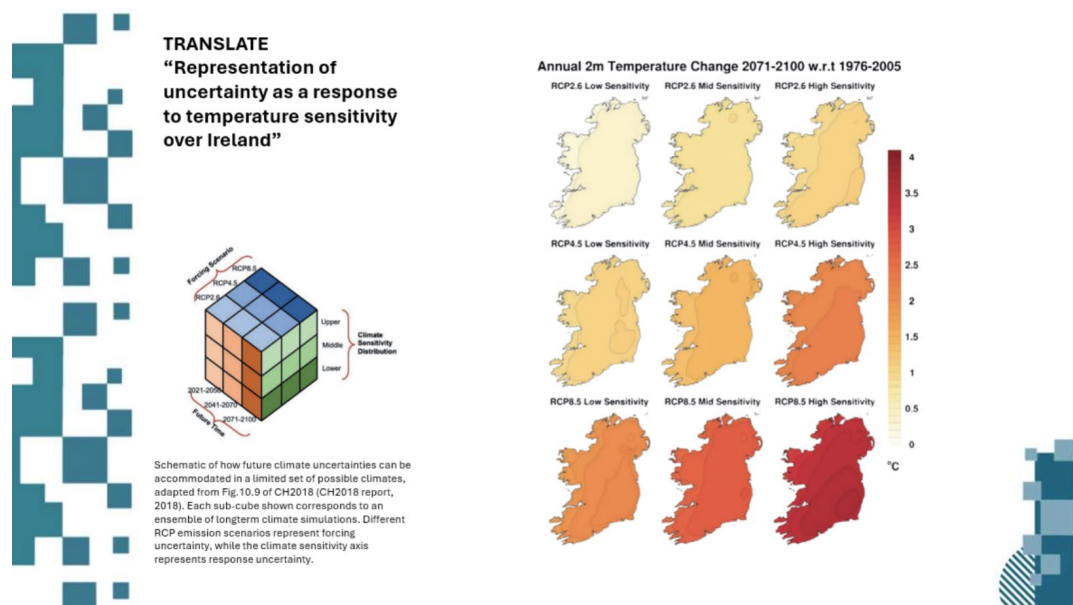
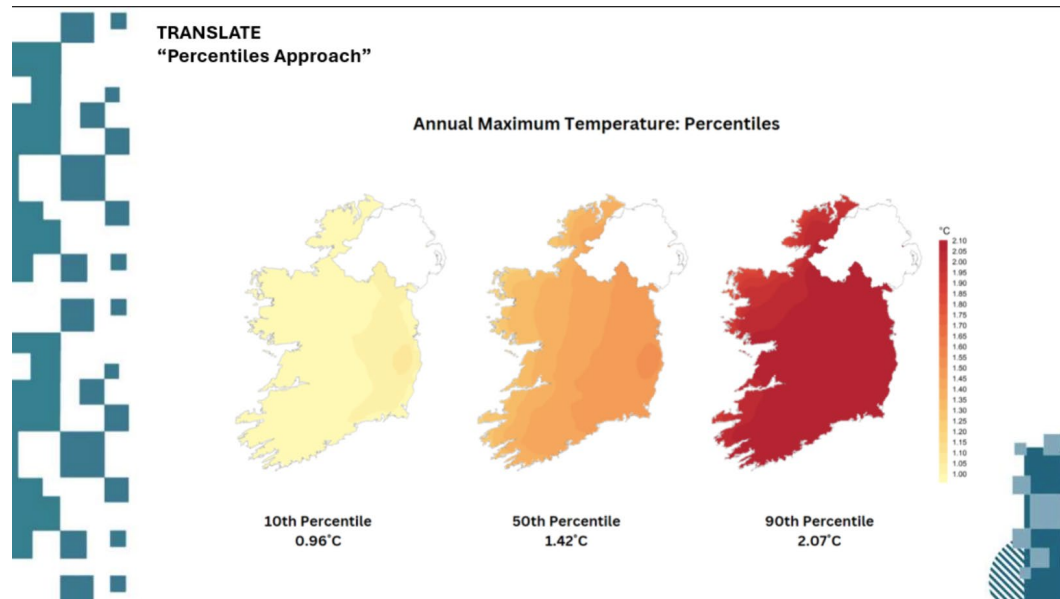
**Prof. Ted Shepherd** is Grantham Professor of Climate Science in the Meteorology Department at the University of Reading, and Senior Scientist at the Jülich Supercomputing Centre. Ted is a specialist in large-scale atmospheric dynamics and circulation and its role in climate change, including extreme events. He co-authored the US National Academy of Sciences report on Extreme Weather Events and Climate Change Attribution (2016) and chaired the Science Review Group of the UK Met Office Hadley Centre (2017-2021), among many other scientific leadership roles, and is a Fellow of the Royal Society. Ted's recent research has pioneered a 'storyline' approach to representing the deep uncertainty in aspects of climate change related to atmospheric circulation, including extreme events. This has motivated him to begin engaging with stakeholders (e.g. on drought risk), and in inter-disciplinary collaborations (with philosophers of science, psychologists, and anthropologists). He currently co-chairs the World Climate Research Programme's Lighthouse Activity 'My Climate Risk'.

**Dr Markus Todt** studied Physical Oceanography at the University of Hamburg. He obtained a PhD from Northumbria University researching snow-vegetation interactions in a global land model. He then became a post-doctoral researcher at the University of Reading being involved in various land-modelling projects, before joining Met Éireann in autumn 2022.

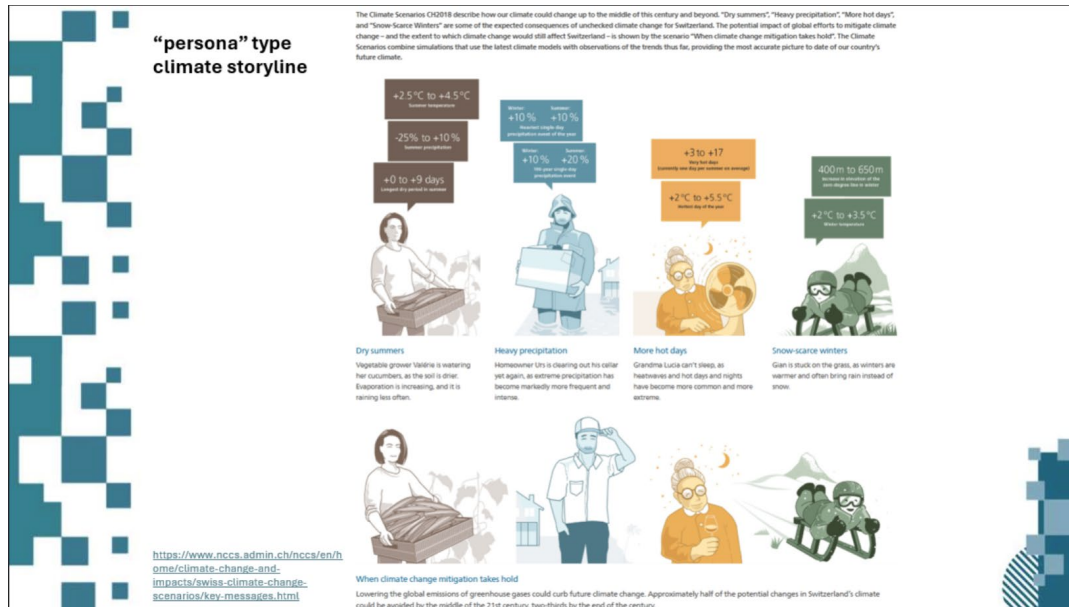


## Activity 2: Examples of communicating uncertainty

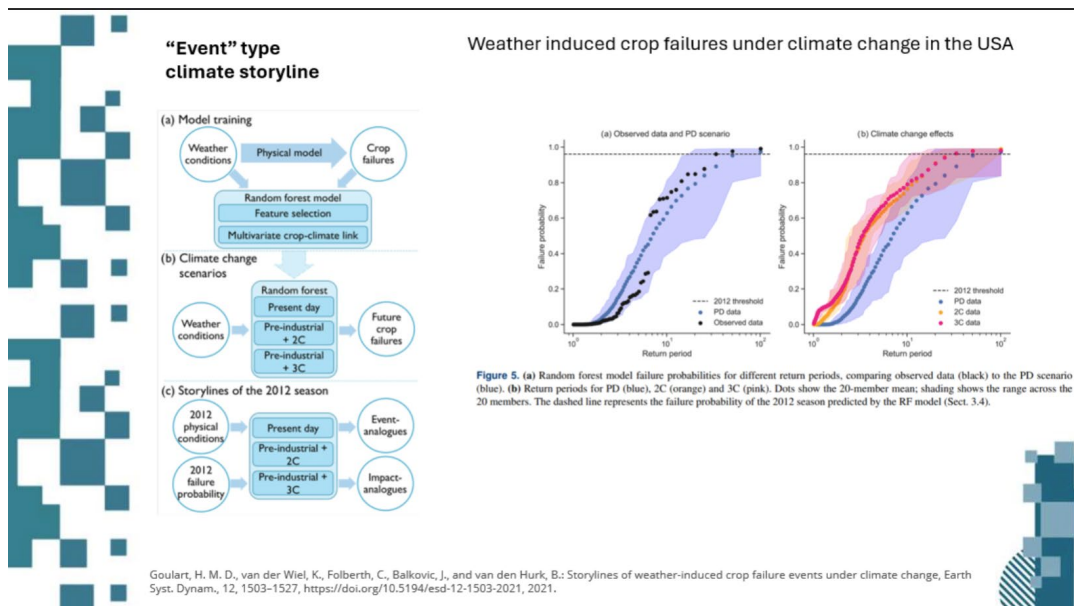
### Percentiles approach



## “Persona based” storyline approach



## “Event based” storyline approach





## Adaptive Pathways approach

