



## Beyond UKCP18 – A community Call for Evidence



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Met Office



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Met Office

### Details

A UK National Climate Science Partnership (UKNCSP) has been formed, to connect and leverage the climate research capability of the NERC-supported Research Centres and the Met Office, with a shared vision to see the UK as a global leader in climate science for climate solutions.


UKNCSP are pleased to invite you to a new webinar series, the purpose of which is to share plans and progress with UKNCSP, and to engage the community concerning opportunities as our activities develop.

In this first seminar, the Joint Directors of UKNCSP will briefly summarise the goals of the Partnership, and in particular introduce its new *shift strategy*, in which we are seeking feedback and engagement.

The major part of our first seminar in July will be about climate information 'beyond UKCP18'.

Climate information for both present day and the future has been provided over a number of iterations of the UK Climate Projections, most recently as UKCP18. There is extensive evidence of this being used, for instance by the risk assessment and adaptation community, but the limitations of UKCP18 have also been reported. Since the launch of UKCP18 several aspects have changed. Firstly, there are more users and potential users, often with different levels of experience with using climate data. Secondly, climate science has continued to advance, with new approaches and techniques becoming available. Thirdly, there are a growing number of problems of climate hazard and risk data for the UK.

 Met Office

 National Centre for  
Atmospheric Science  
NATURAL ENVIRONMENT RESEARCH COUNCIL

 National  
Oceanography  
Centre

 UK Centre for  
Ecology & Hydrology

 British  
Antarctic Survey  
NATURAL ENVIRONMENT RESEARCH COUNCIL

 BGS  
British  
Geological  
Survey

 National Centre for  
Earth Observation  
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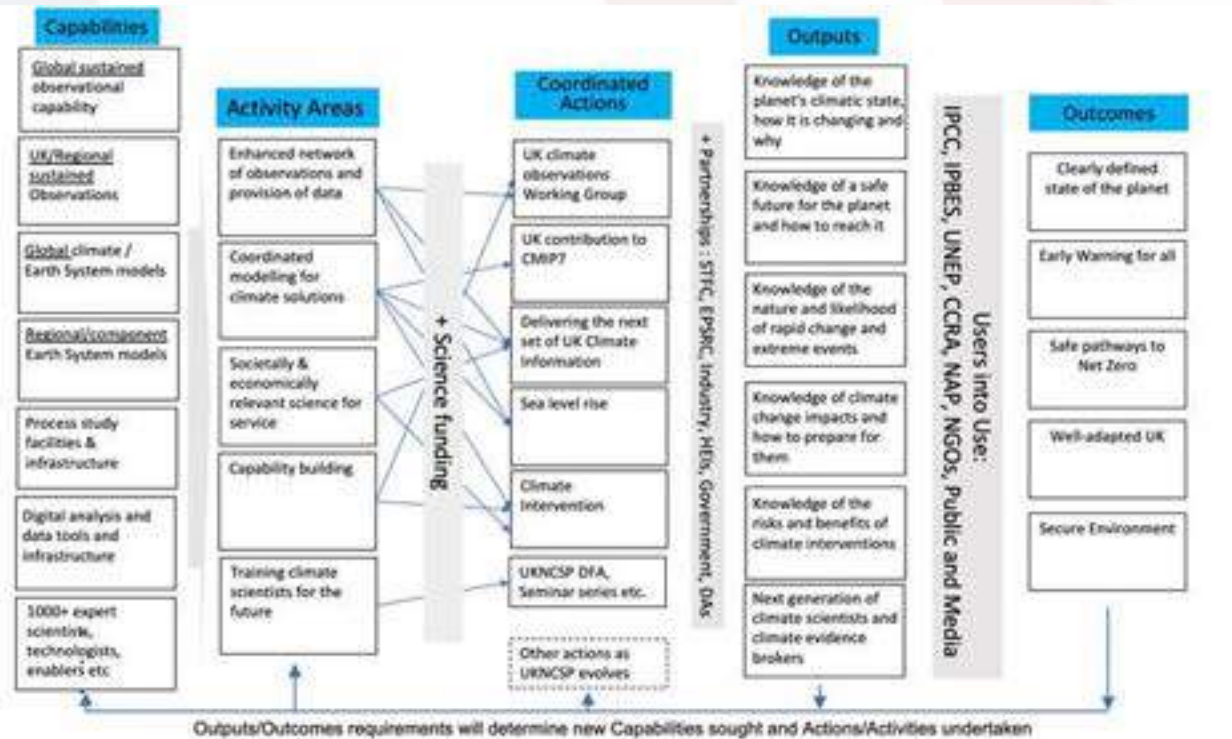
## What is UKNCSP?

- New national initiative leveraging the climate science capability of seven of the leading UK research institutes.
- Emphasis on enhancing solutions and optimising key evidence delivered to consumers of climate information.
- Spans research community and connects to key stakeholders.
- Unique selling point is large-scale, long-term capability and hosting of key infrastructure.

Contact: Prof. Michael Meredith ([mmm@bas.ac.uk](mailto:mmm@bas.ac.uk)) or Prof. Catherine Senior ([cath.senior@metoffice.gov.uk](mailto:cath.senior@metoffice.gov.uk))

## Draft UKNCSP Strategy for consultation

- Develop end-to-end value chains for climate evidence.
- Identify key needs of stakeholders and create actions/outputs to optimise delivery.
- Identify gaps/weaknesses where chain should be strengthened and seek to address with e.g. funding bids.
- Etc.

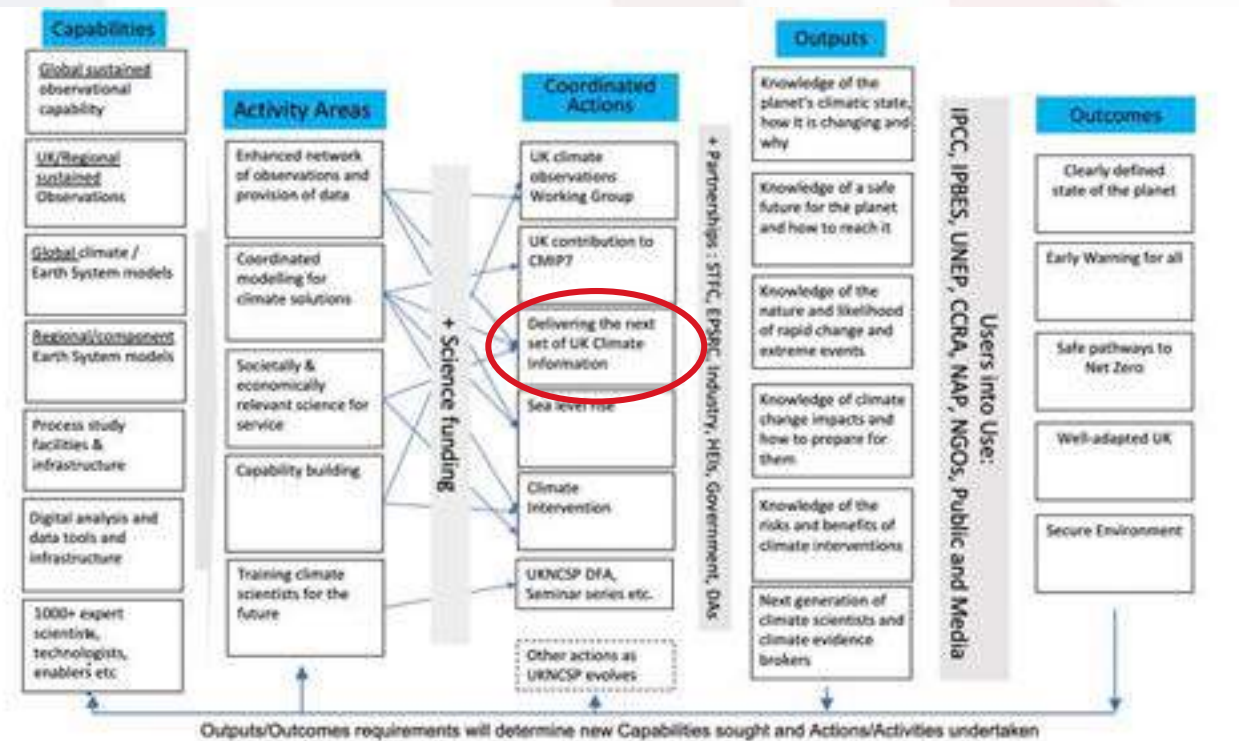


## Draft UKNCSP Strategy for consultation

- What are the biggest opportunities that you foresee in this area – where can we help most?
- Who are the key partners that should be drawn in?
- How best to translate knowledge for stakeholders?
- Areas on which you would be keen to engage?
- Etc...!

Feedback and engagement  
is warmly invited:

<http://tiny.cc/u3oyyz>



# Beyond UKCP18 – A community Call for Evidence

*Jason Lowe and Carol McSweeney*

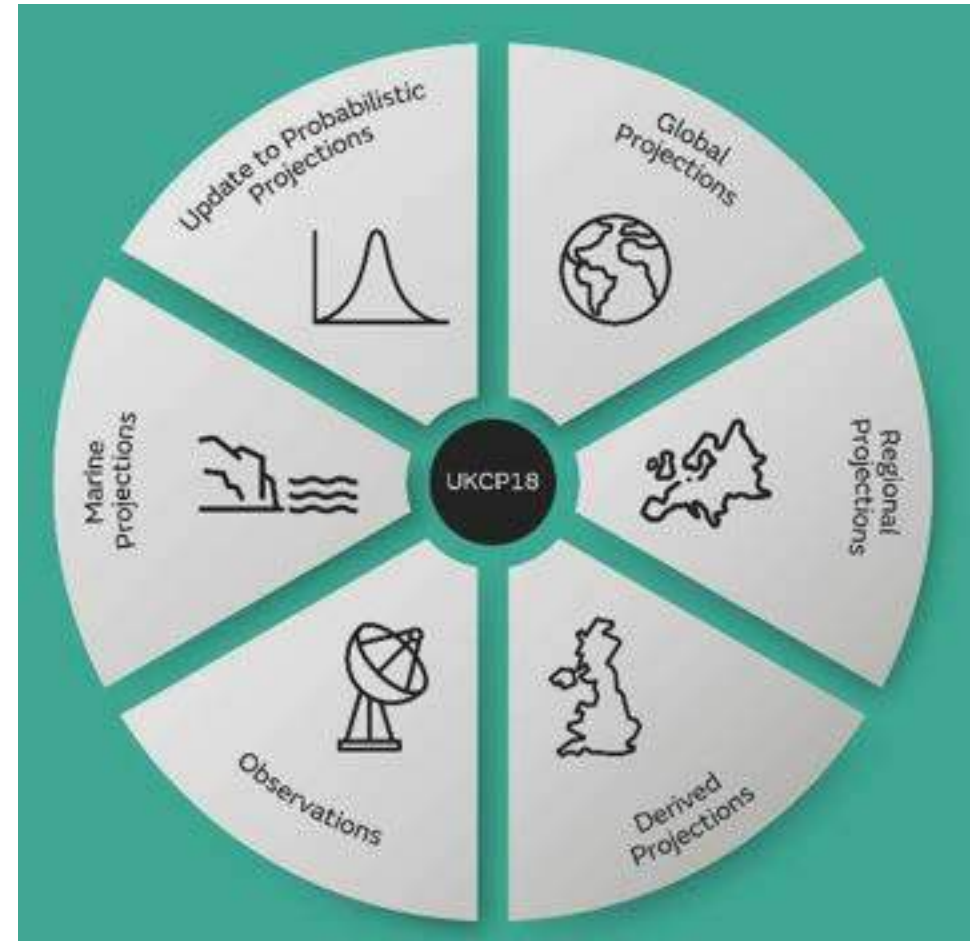
*with Fai Fung, James Murphy, Ségolène Berthou,  
Len Shaffrey and Gillian Kay*

*Friday 19<sup>th</sup> July, 2024*

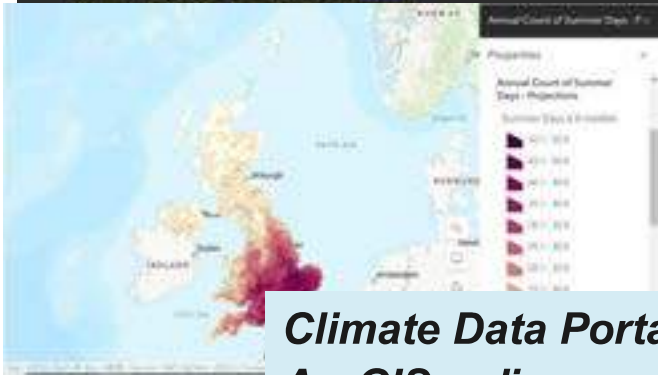


# UKCP18 – where are we now?

“A greater chance of warmer, wetter winters and hotter, drier summers”



# Applying UKCP18

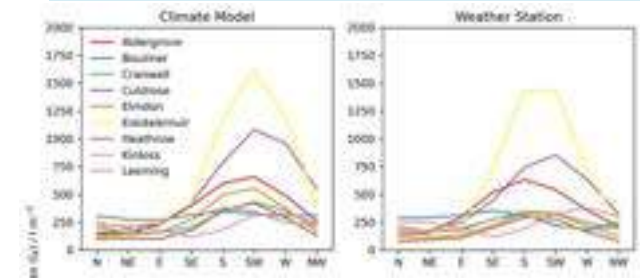


**Climate Data Portal - ArcGIS online**

UKCP Storms Guide	Accessing the Data	Further Information
<b>1. UKCP: The Priority</b> Understand the risks to your business from the UKCP.	<b>2. Planning UKCP Data: Real-time, Online, &amp; API Results</b> The real-time data is available via the UKCP API.	<b>3. Accessing UKCP Data: UKCP API Results</b> How to access UKCP data via the UKCP API.
<b>2. Using UKCP: What information do you need?</b> How to use the UKCP data to inform your business.	<b>4. Accessing UKCP Data: UKCP API Results</b> How to access UKCP data via the UKCP API.	<b>3. Further Learning</b> How to learn more about UKCP and how to use the data.

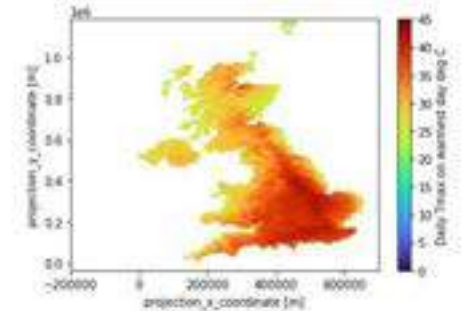
**New guidance documents and open seminar series**

## NAP3 led applications for Government



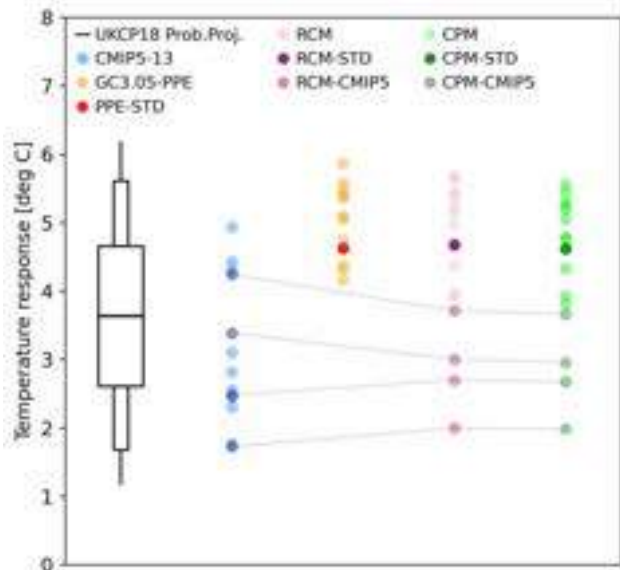
Annual Index (IA) of wind driven rain as a function of wall orientation

## Storylines for National Infrastructure

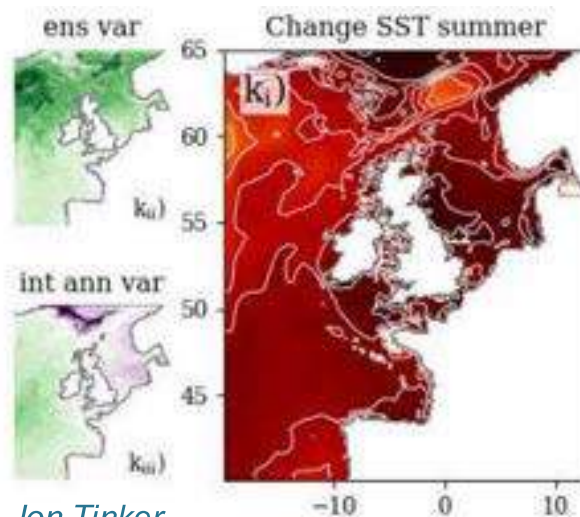


# Updates towards CCRA4

Chris Short

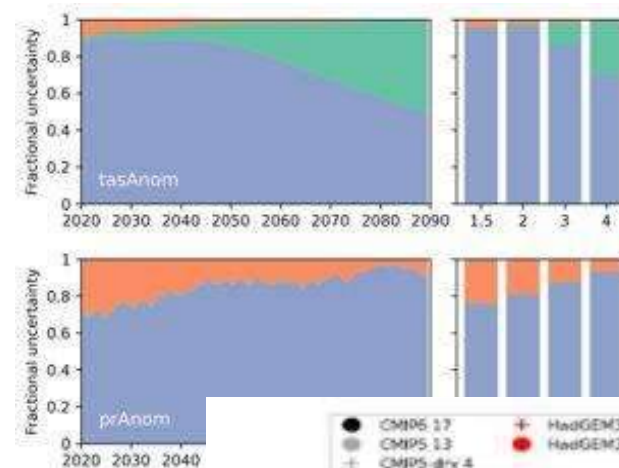


**UKCP Local transient projections driven by CMIP5 models**



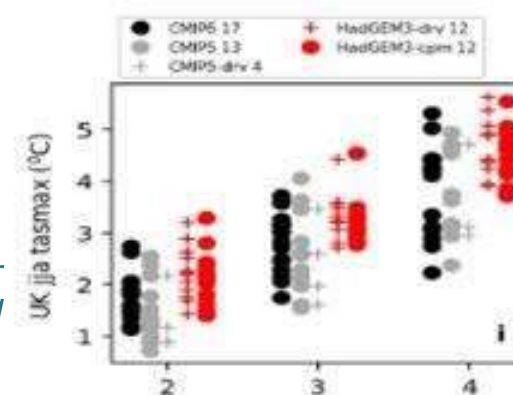
Jon Tinker

**NW Europe Shelf Seas driven by 12-member PPE (Tinker at al.)**



Hamish Steptoe

Peter Good



**More information on GWLs & Assessment of spread of UKCP\_local vs. CMIP6**





# Beyond CCRA4 – Future sources of UK climate information



Users of climate information



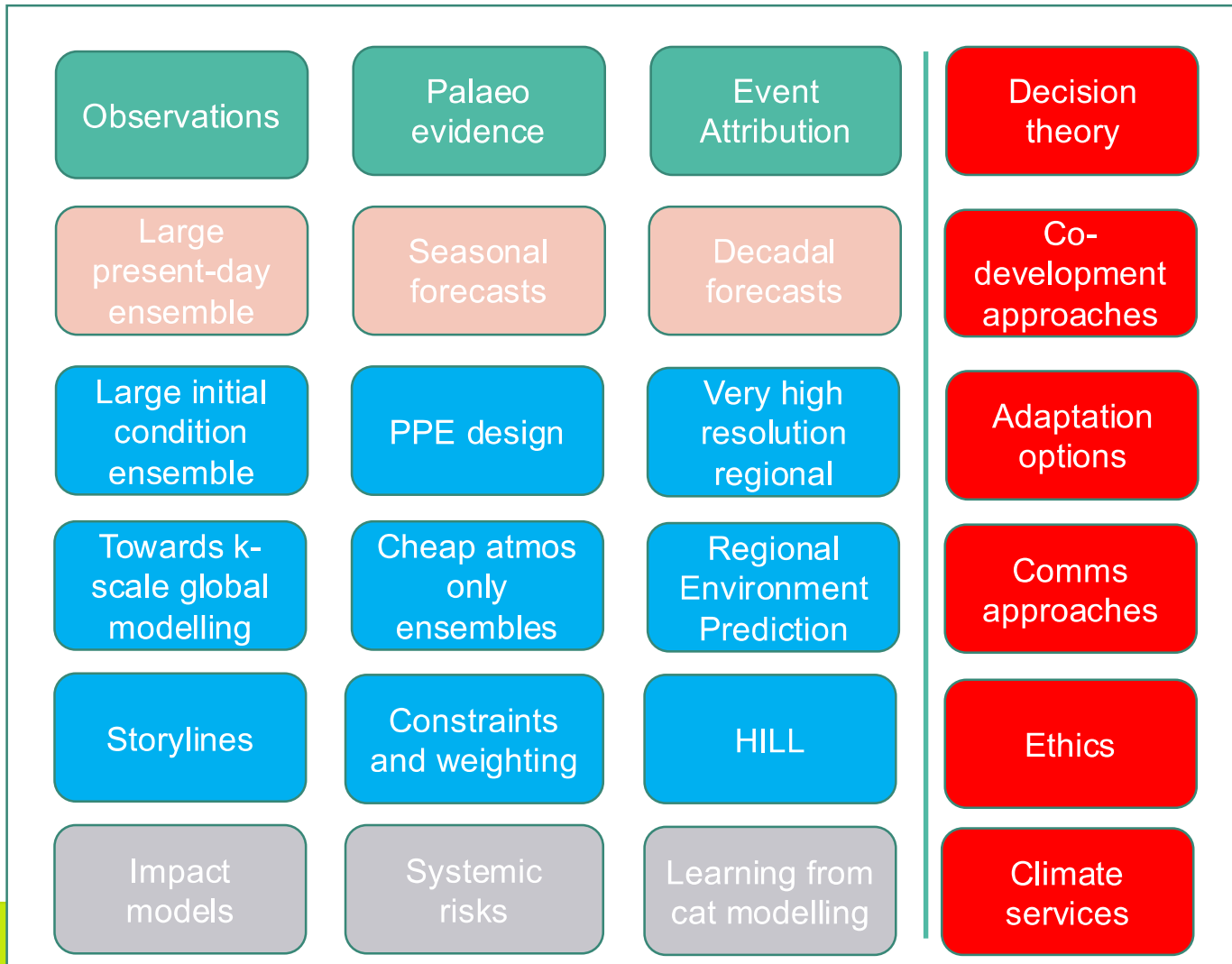
Providers of climate information



Climate science

What has changed?

# What might be the scientific building blocks?

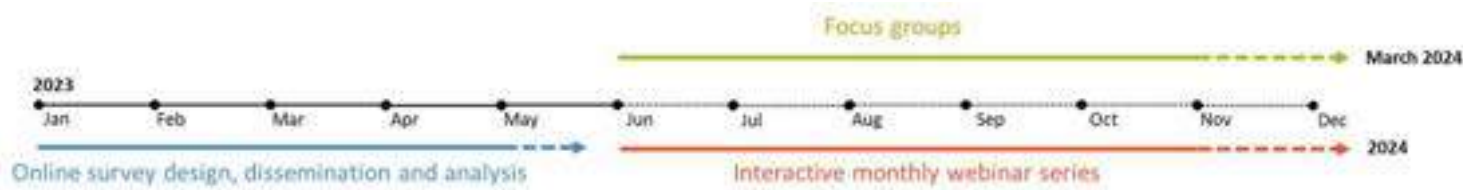


- Many new datasets and tools across time-scales
- Some approaches are still in their infancy – experimental and not fully established in the literature
- Some methods are very computationally expensive
- **It is not only physical climate science that has progressed**

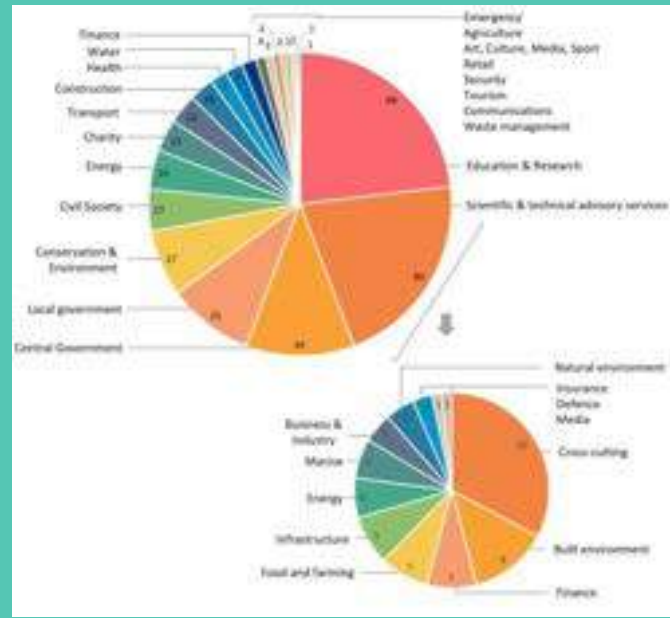
# What have we learned about UKCP18 Users?

*Fai Fung, Met Office & University of Bristol*

# UKCP18 User Consultation 2023-2024



## Online survey (n=380)



## Example free-text responses around uncertainty

“Convey the **degree of uncertainty** (and certainty!), where the uncertainty lies and **WHY!**”

“Be firm in communicating what model output are and give **advice** on what models cannot do”

“More guidance on how to **translate** emissions scenarios into storylines which can be understood by decision makers, and on how to relate these to global warming levels”



Courtesy of Neha Mittal

Working together on

# UK Climate Projections

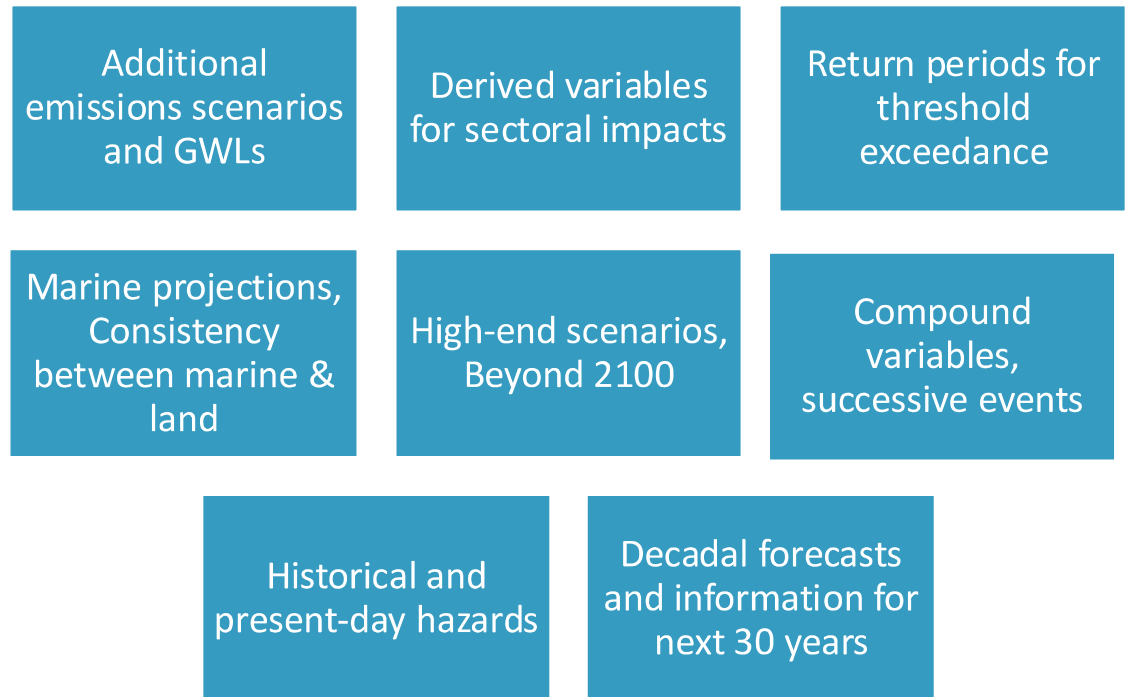


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# Data use

# Emerging needs



Courtesy of Neha Mittal

Working together on

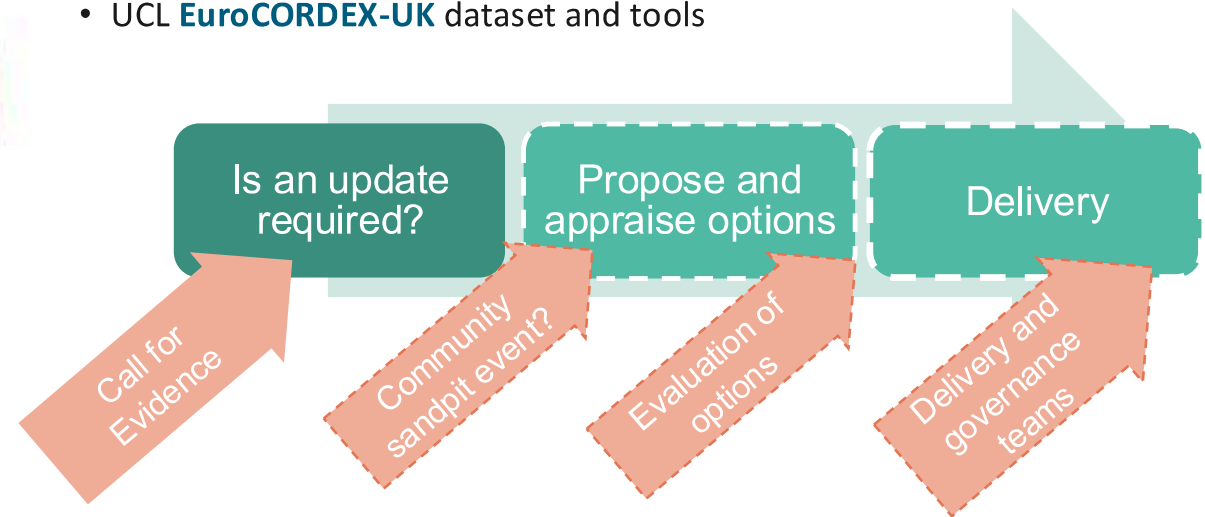
# UK Climate Projections

# Next steps

*Carol McSweeney, Met Office*

# Beyond UKCP18: Next steps....

- Partners have contributed to UKCP18, and also delivered a number of key projects applying and extending products in UKCP18 e.g.
  - CEH/BGS/HR Wallingford **eFlag** Future Flows and Groundwater
  - Newcastle university, JBA, Loughborough **Future-Drainage** extreme rainfall uplifts
  - UCL **EuroCORDEX-UK** dataset and tools



# Is an update to UKCP18 required? A community Call for Evidence

## Science Triggers

Have there been changes in **scientific understanding** that would potentially have a material impact on decisions made with the current data?

Have there been developments in **scientific methods** that have evolved to a point where significant known but unmet user needs can be addressed?

## User Triggers

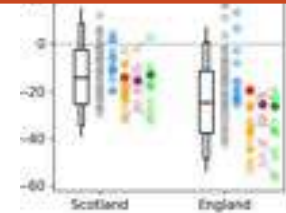
Have **user needs** evolved to a point where there is a significant new requirement that can't be addressed with the current data but could be addressed with an upgraded package of UK climate information?

*What are the triggers for a major update, or are existing products still fit for purpose? Please submit your evidence.*

....??



Opportunity to offer more consistent, CMIP6-based projections products

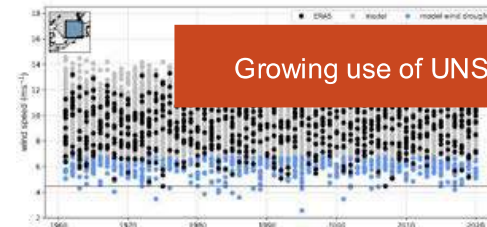


Growing use of single-model large ensembles

New coupled regional modelling capability

e.g.

Growing use of UNSEEN





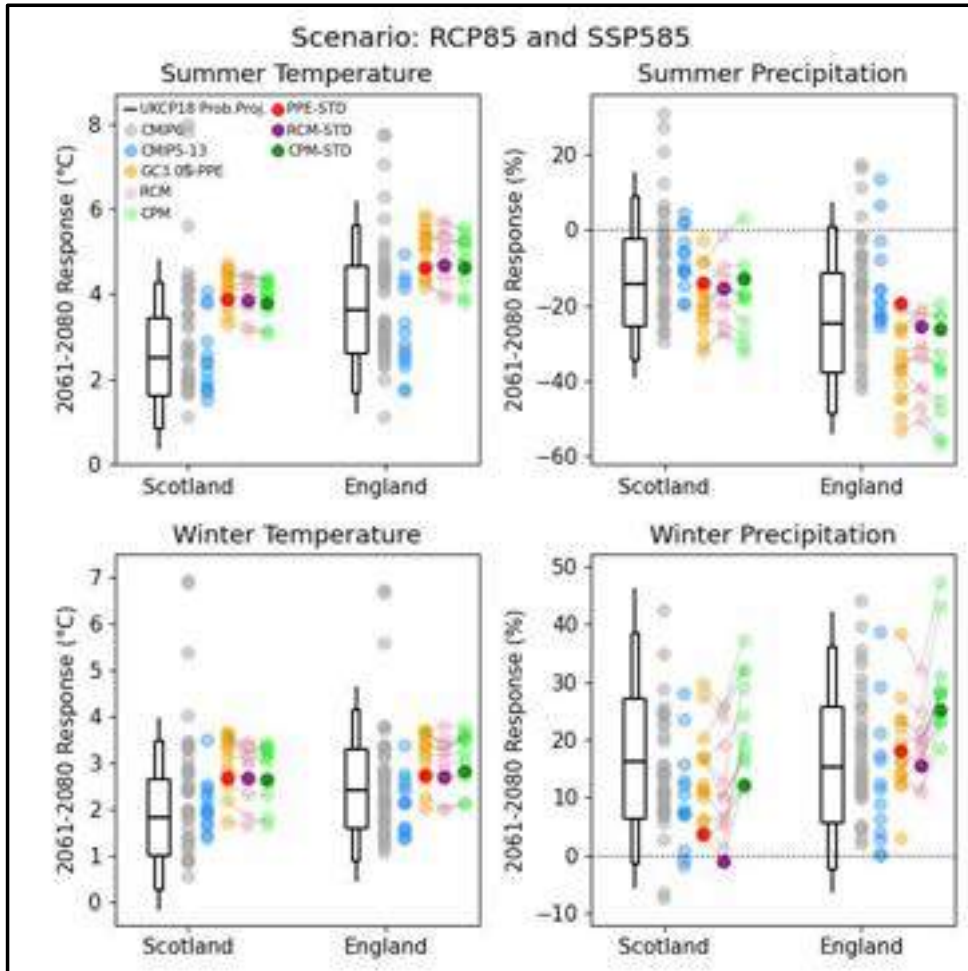
# Potential Science Triggers

*James Murphy, Met Office*

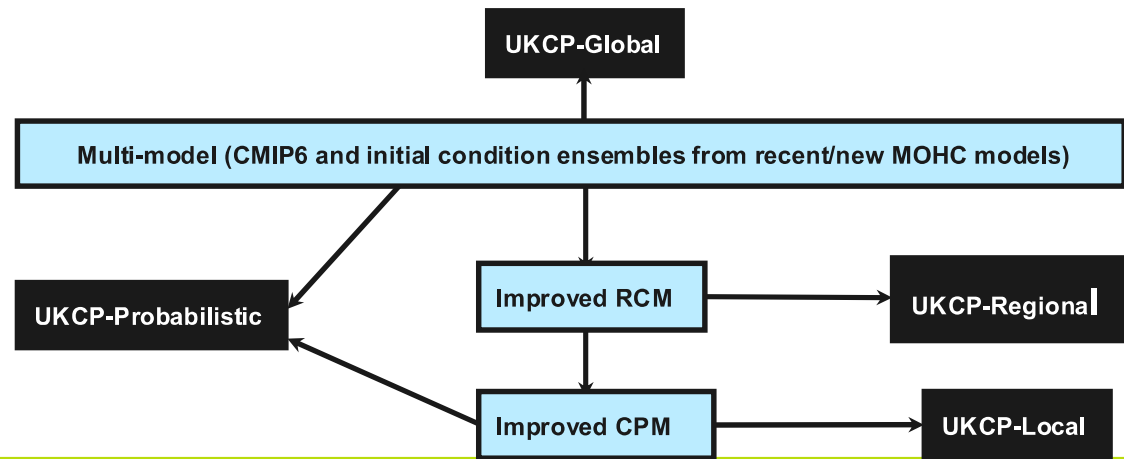
*Ségolène Berthou, Met Office*

*Len Shaffrey, NCAS*

*Gillian Kay, Met Office*



- UKCP18 is a rich dataset, but a cleaner design could remove disjoints arising from use of different modelling components in different strands.
- Upward shift in winter precipitation response in UKCP-Local due to advection of maritime showers over land
  - Should be included in UKCP-Probabilistic
- UKCP-Regional/Local in summer:
  - Narrow range of high warmers, and summer rainfall changes all show strong drying over England
  - A new design could achieve more balanced sampling using a mix of CMIP- and MOHC-driven regional runs that avoids clumping
- CMIP6 is a diverse ensemble that could underpin such a design.



National changes for 2061-80 relative to 1981-00:  
UKCP18 and CMIP6

# Regional Environmental Prediction

*Ségolène Berthou, Met Office*

**CHEMISTRY  
& AEROSOLS:**

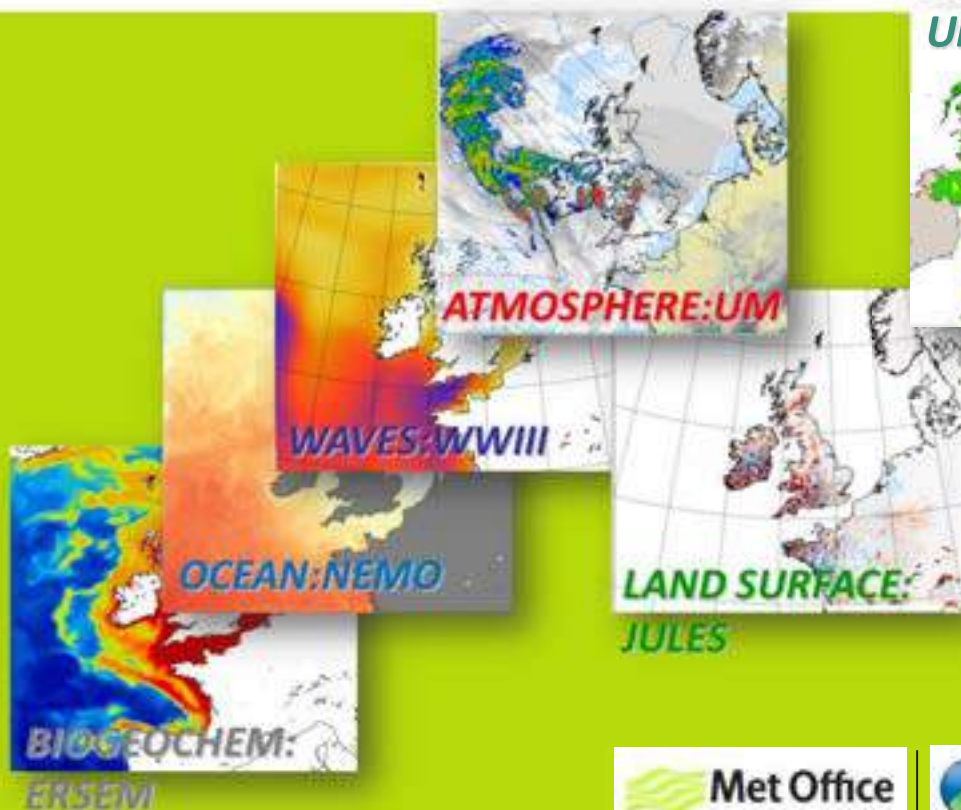


Understanding regional  
coupled feedbacks

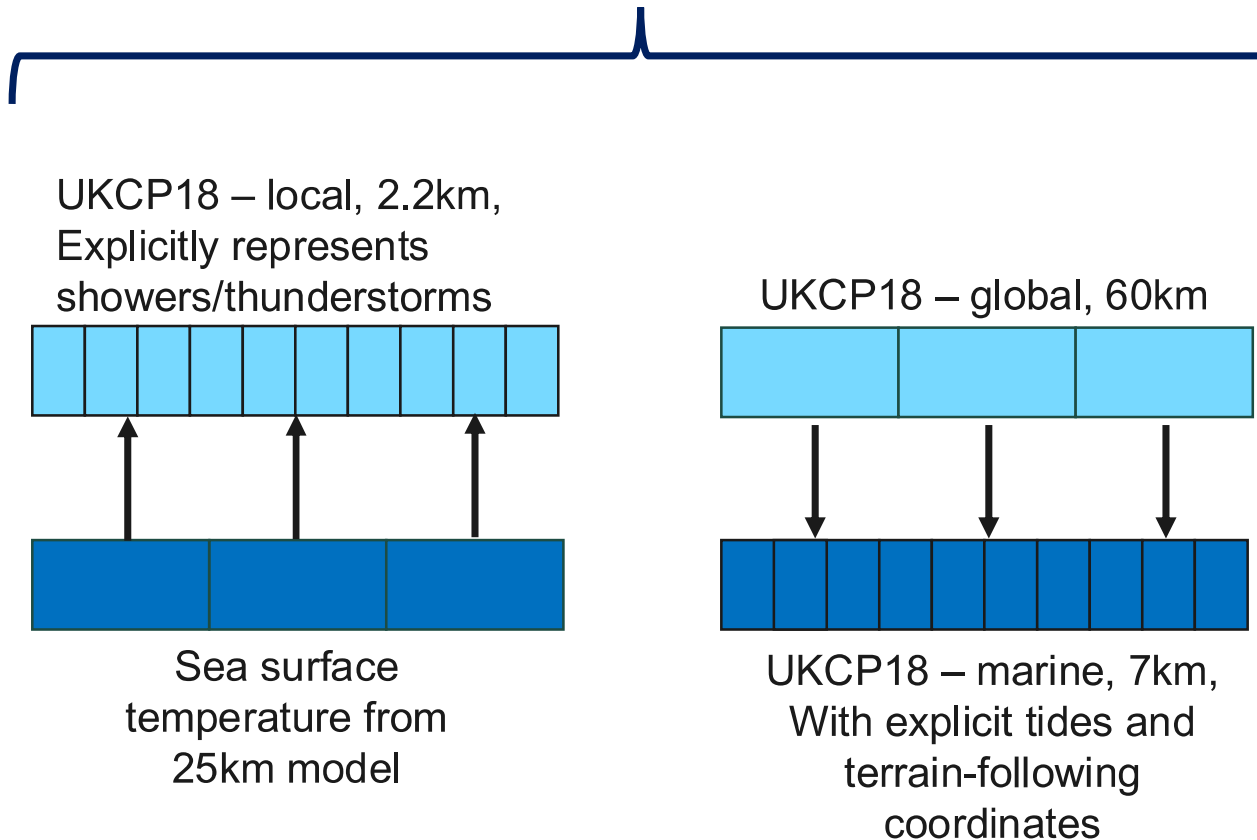
Better predicting multi-hazard  
compound events

Linking research communities  
together

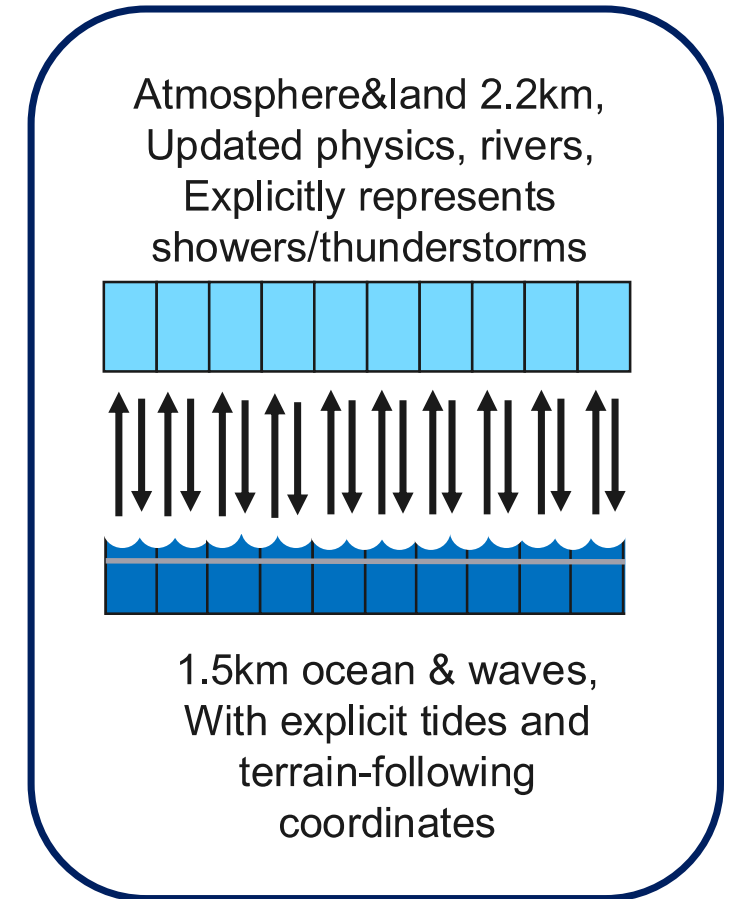
Consistent marine and land  
projections



**UKCP18**

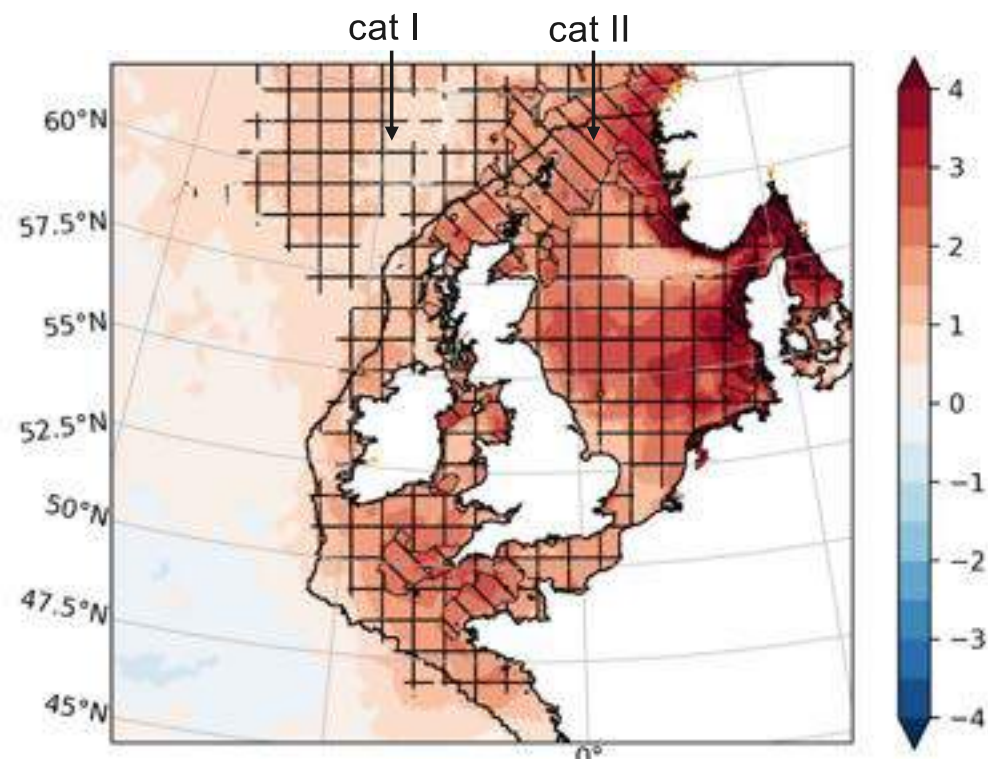
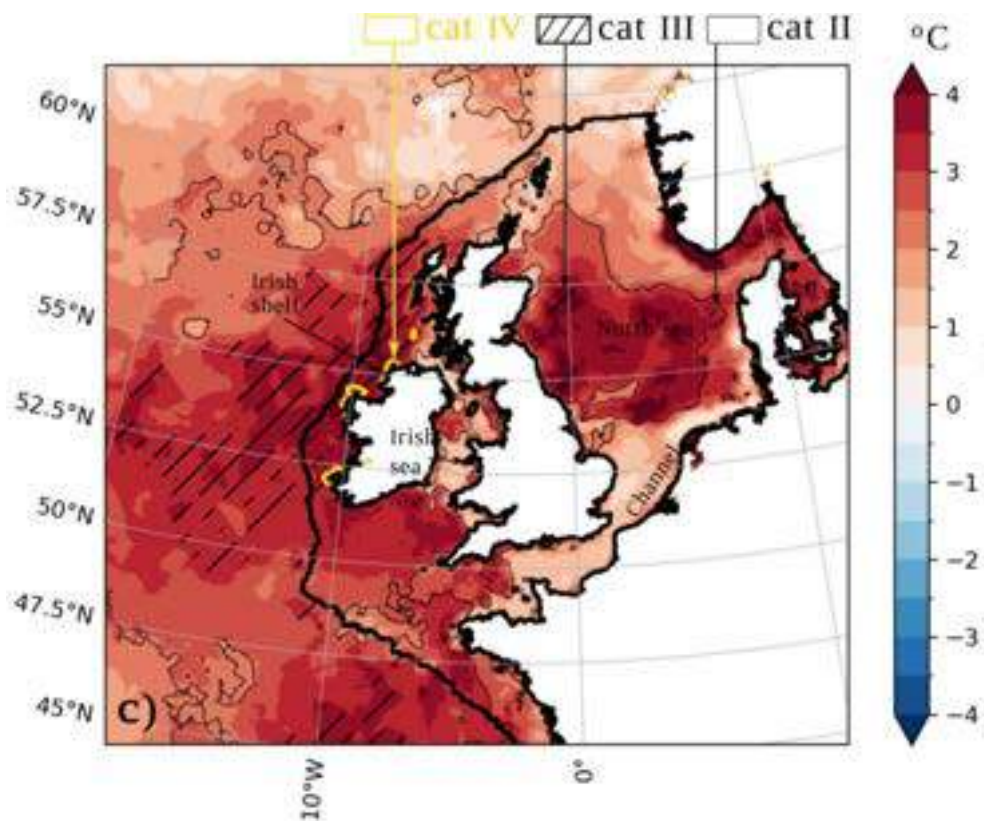


**New regional coupled model**



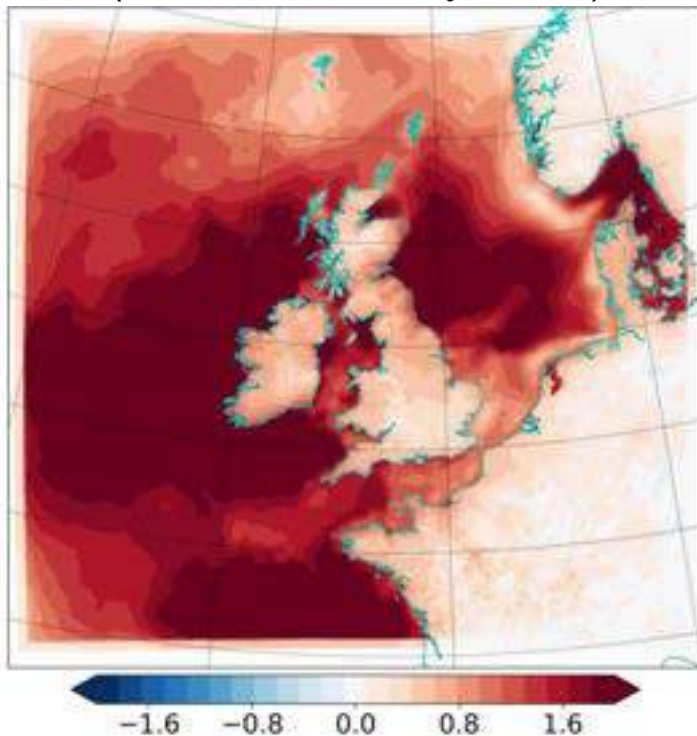
Peak week, June 2023

Peak week, May 2024

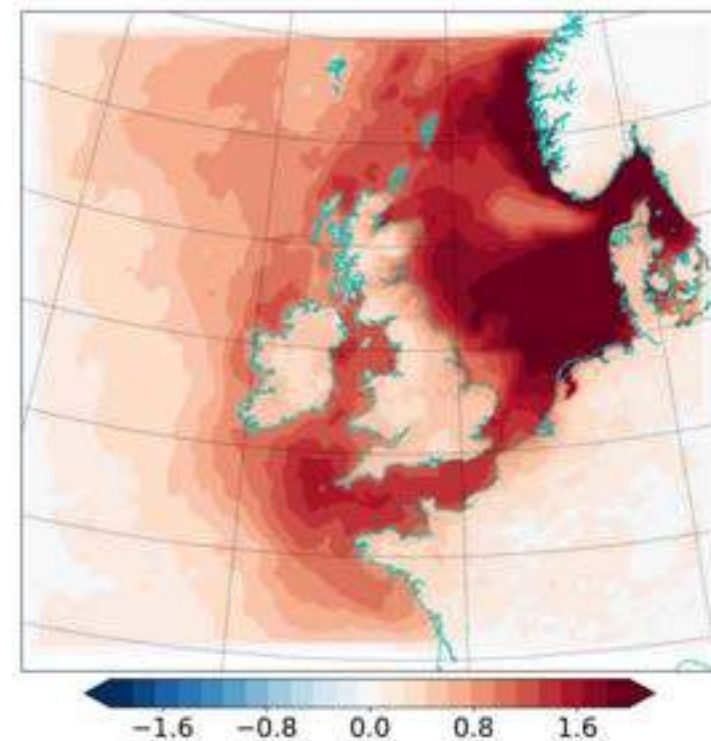


Sea surface temperature anomalies at peak week

UK June 2023: +0.6 °C  
(UK record broken by 0.9°C)  
(Record broken by 0.9°C)



UK May 2024: +0.55°C  
(UK record broken by 1°C)



Monthly-mean air temperature anomaly due to the marine heatwave

# Large ensembles: decision-relevant information

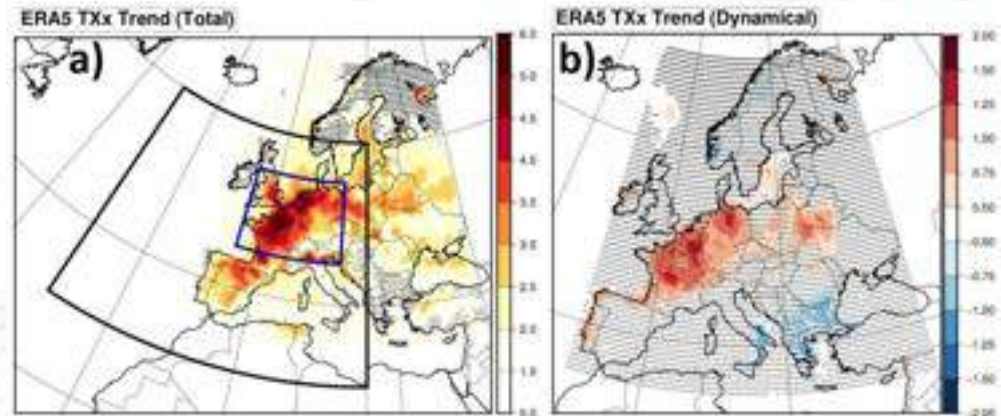
**Len Shaffrey, National Centre  
for Atmospheric Science**

**Large ensemble - running a climate  
model many times**

Q1. How large is climate change compared  
to internal variability?

Q2. How will climate change affect  
weather extremes?

Large ensembles used in other contexts  
e.g. attribution in DAMIP, LESFMIP

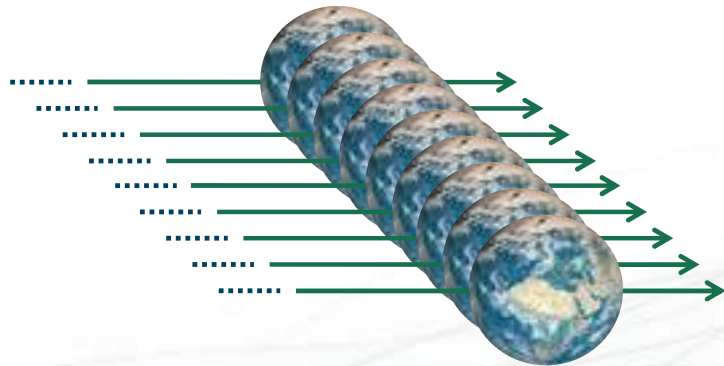


Total and dynamical summer trends in Maximum  
ERA5 Daily Max Temperatures, Vautard et al. (2023)

Approx. third of observed trend in temperature  
extremes associated with more frequent southerly  
atmospheric flow over Western Europe

# CANARI Large Ensemble

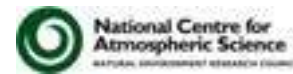
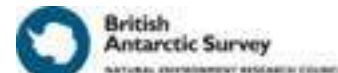
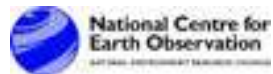
## Q2. How will climate change affect weather extremes?



- Large Ensemble HadGEM3-GC3.1 at N216-ORCA0.25
- 40 members x 1950 – 2100 simulations (6000 years)
- Future forcing using SSP3-7.0
- Regional modelling in CANARI and other projects



Contact: [Reinhard.Schiemann@ncas.ac.uk](mailto:Reinhard.Schiemann@ncas.ac.uk)

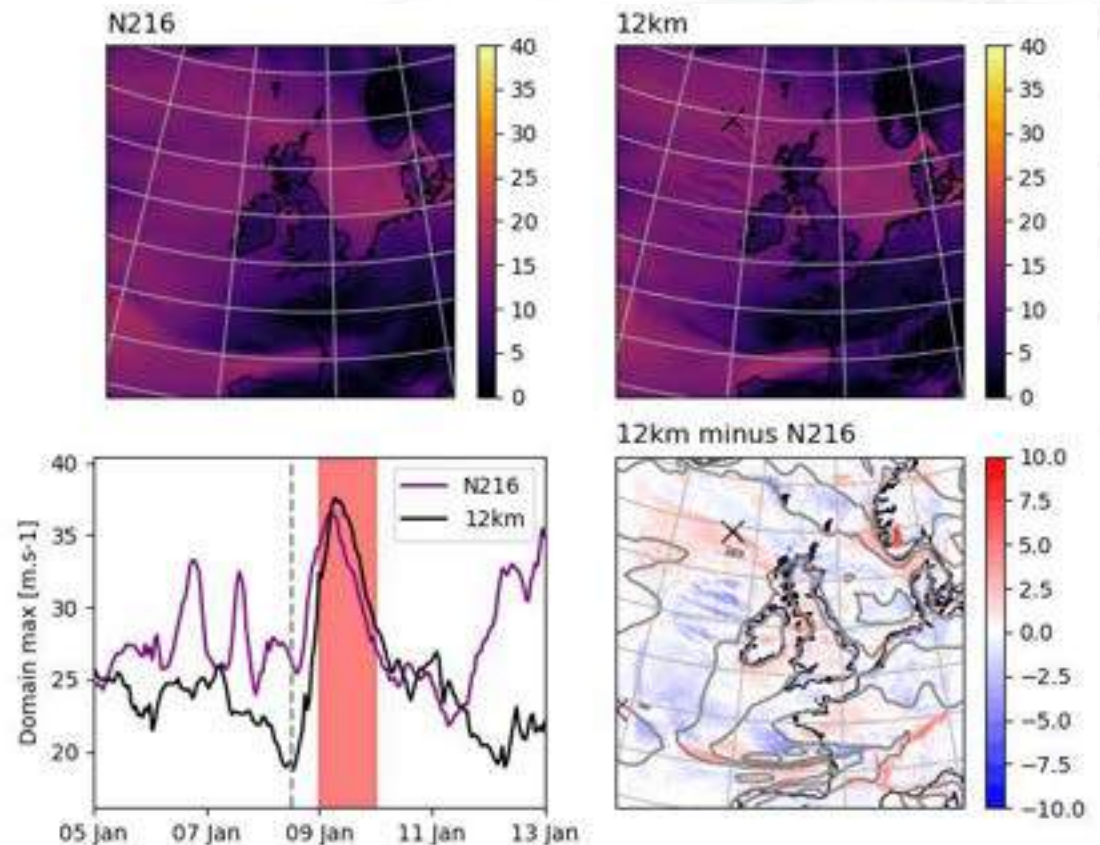




# CANARI Regional Model

## Q2. How will climate change affect weather extremes?

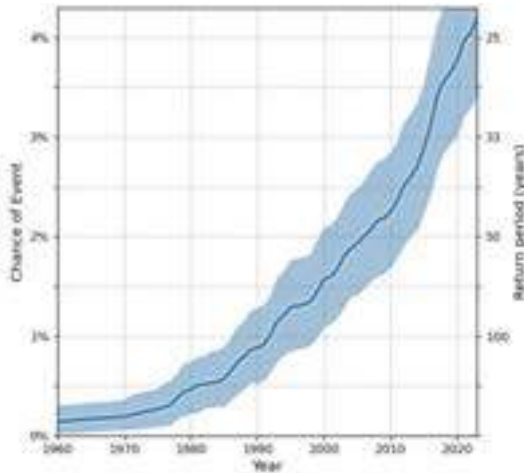
- Downscale storms with extreme UK winds and rainfall from the CANARI LE to 12km and 2.2km using the HadGEM3 regional model
- Performed for present & future storms
- Right: 10m winds from most intense UK windstorm in 2,600 years of historical CANARI LE data
- Cold conveyor belt is more intense and sharper at 12km resolution



High summer temperatures

Chance of > 40°C in today's climate; Heatwave story-lines

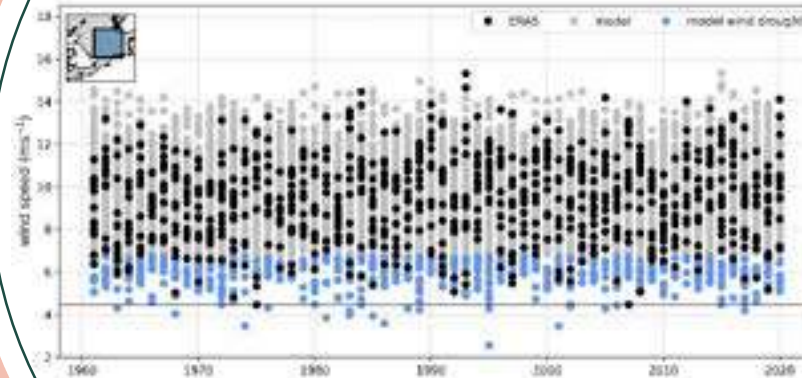
Chance of > 40°C by year



Rainfall, flooding and drought

Plausible scenarios for impacts modelling

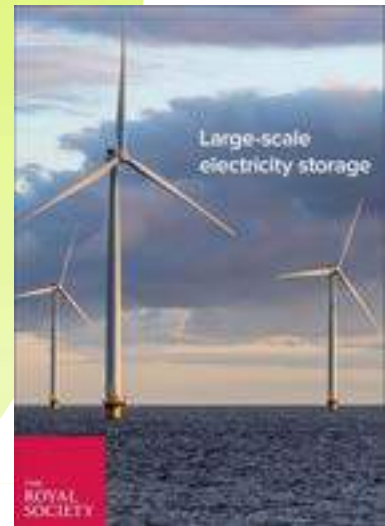
# UNSEEN



UNprecedented Simulated Extremes using ENsembles

North Sea wind drought

Duration and severity  
→ Understanding requirements for storage



# Questions



***Is an update to UKCP18 required?  
A community 'Call for Evidence'***

***Open until Friday 16<sup>th</sup> August***



**UK National Climate  
Science Partnership**

***To read and  
feedback on the  
UKNCSP strategy.***



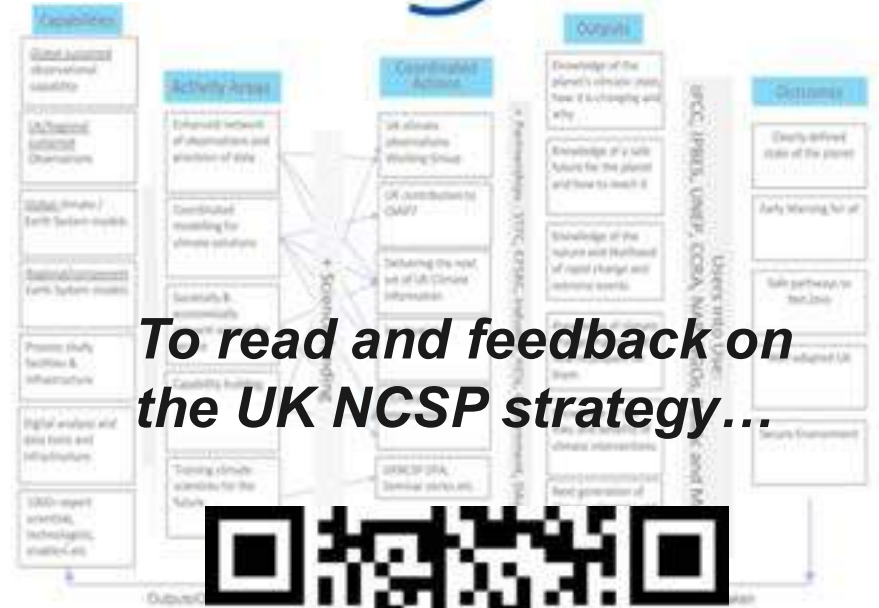
# Spare slides



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*What are the triggers for a major update, or are existing products still fit for purpose?  
Please submit your evidence.  
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**To read and feedback on  
the UK NCSP strategy...**

