Scoping of the Requirements for Climate Information to inform UK Decision-Making

6th July 2022

Met Office

UK Research and Innovation

UK CLIMATE RESILIENCE PROGRAMME

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Project overview

Aim of the project

To produce recommendations for the next steps needed to produce climate information to inform UK climate risk assessments and adaptation decisions over the next decade.

Climate information

Data, models, forecasts and projections relating to the observed historical, or current, climate as well as the simulated future climate over different time horizons and spatial scales.

Provided in numerical or graphical format, based on observations or model simulations for different spatial and temporal resolutions over different time horizons and geographical domains.

Derived products and impact assessments not included.

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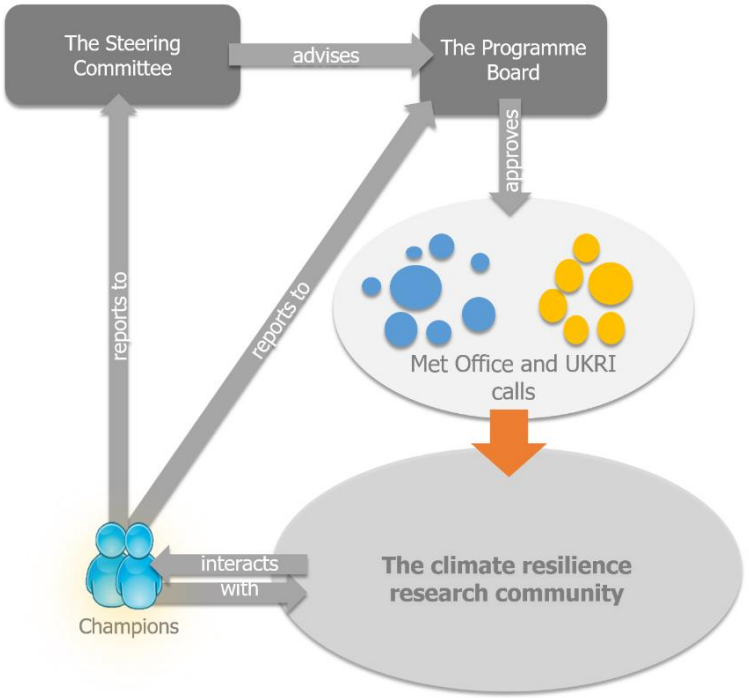
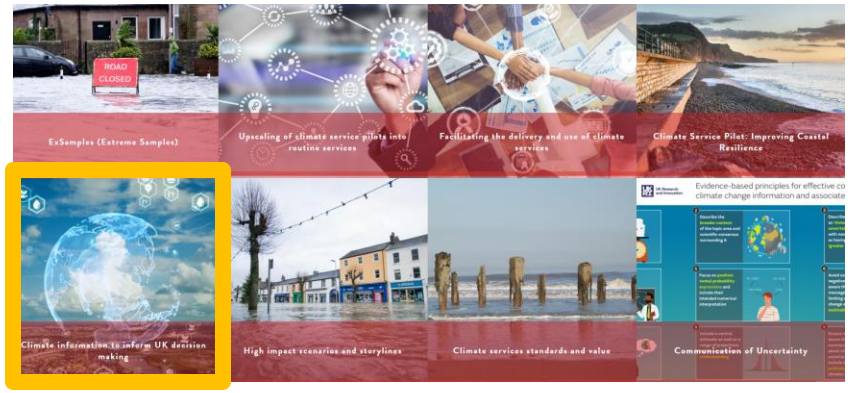
Delivery team

JBA team: Murray Dale, Rachelle Ngai, Rachel Brisley, Emma Brook; Dr Marie Ekström, Becky Venton

Collaboration with UKCR Steering Committee, especially: Professor Rowan Sutton, Dr Harriet Orr, Dr Katy Peat, Professor Paul Bates

Met Office team: Zorica Jones, Jason Lowe, Simon Brown, Peter Stott





https://www.ukclimateresilience.org/about/management/steering-committee/

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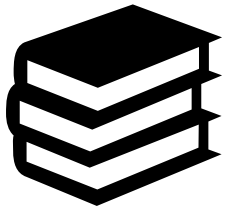
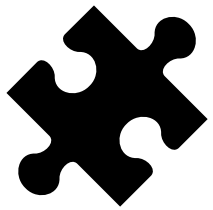
Overall programme of research

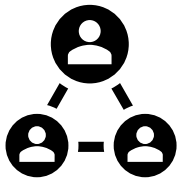
Inception & Scoping
Mar – Apr '21



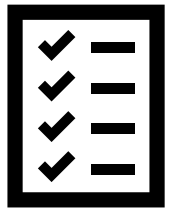
Step 1 - User Assessment of Current Needs Apr – Jun '21



Step 2 - Climate Science 'Ask' Jun – Aug '21



Step 3 - Option Development: Aug – Apr '22



Step 4 - Option Prioritisation & Reporting
Apr – July '22

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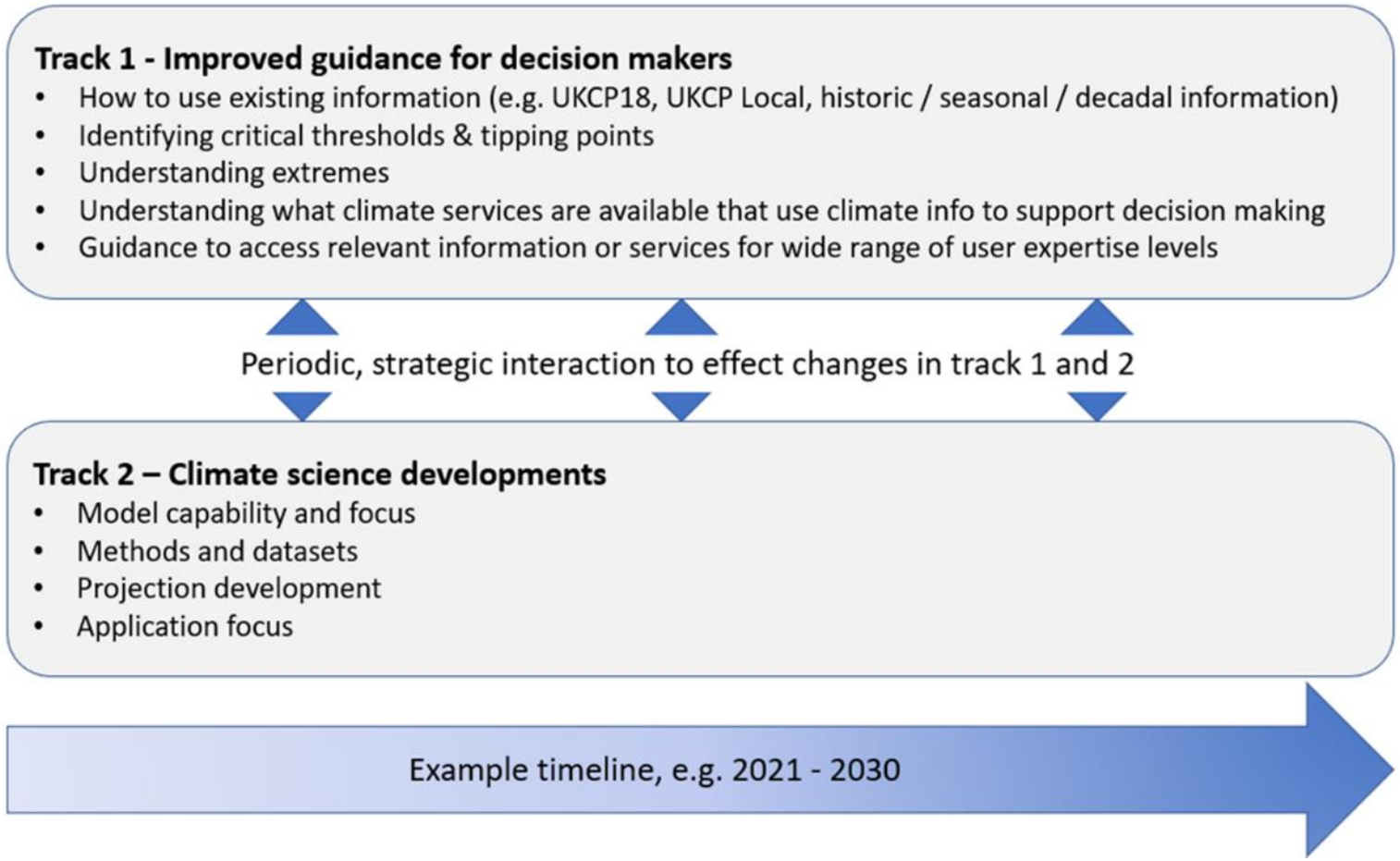
Twin track concept



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Survey of climate information providers

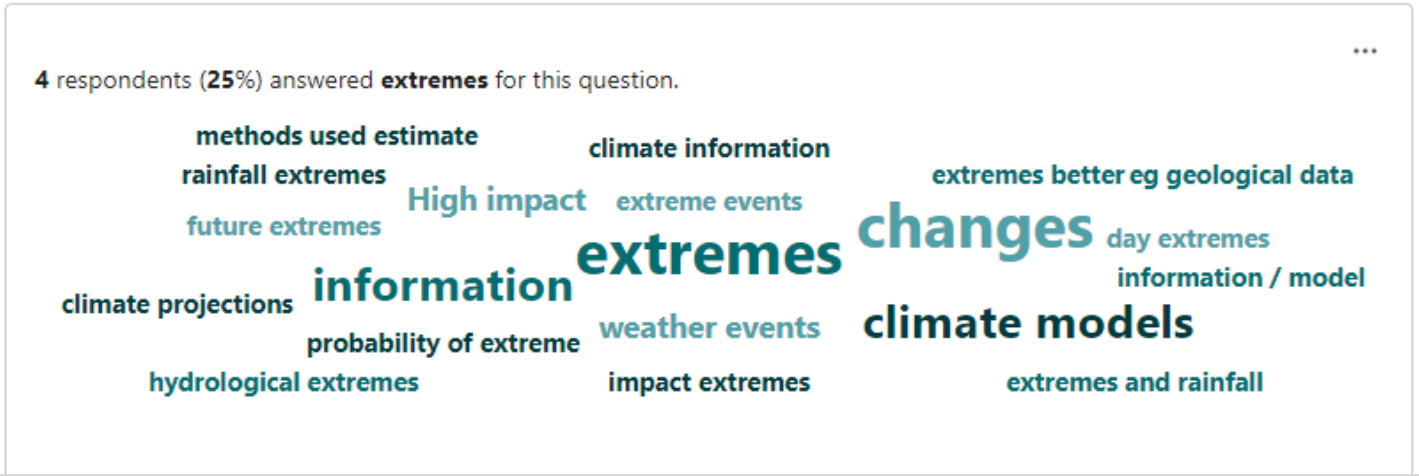
Views elicited on:

- Series of climate science questions (i.e. trade-offs/tensions)
- Climate science and modelling topics identified from July workshop
- UK CCRA3 identified climate risks

Issued to 67 UK and International climate information providers in December to February. Split into 4 sections:

1. Understanding climate information provider priority research or areas of interests and how they relate to UKCCRA3 risks
2. Model development
3. How models are used
4. Options for exploring uncertainty

Information provider elicitation – **Highest priority climate science or modelling areas**



Highest priority climate science or modelling areas categories:

- Probability, extremes and impacts
- Temporal/spatial resolution and probability, extremes and impacts
- Interfaces and interactions (land, sea, coast, socio-economic)
- Uncertainty (relating to model inputs, processes and outputs)
- Model inputs, errors and biases

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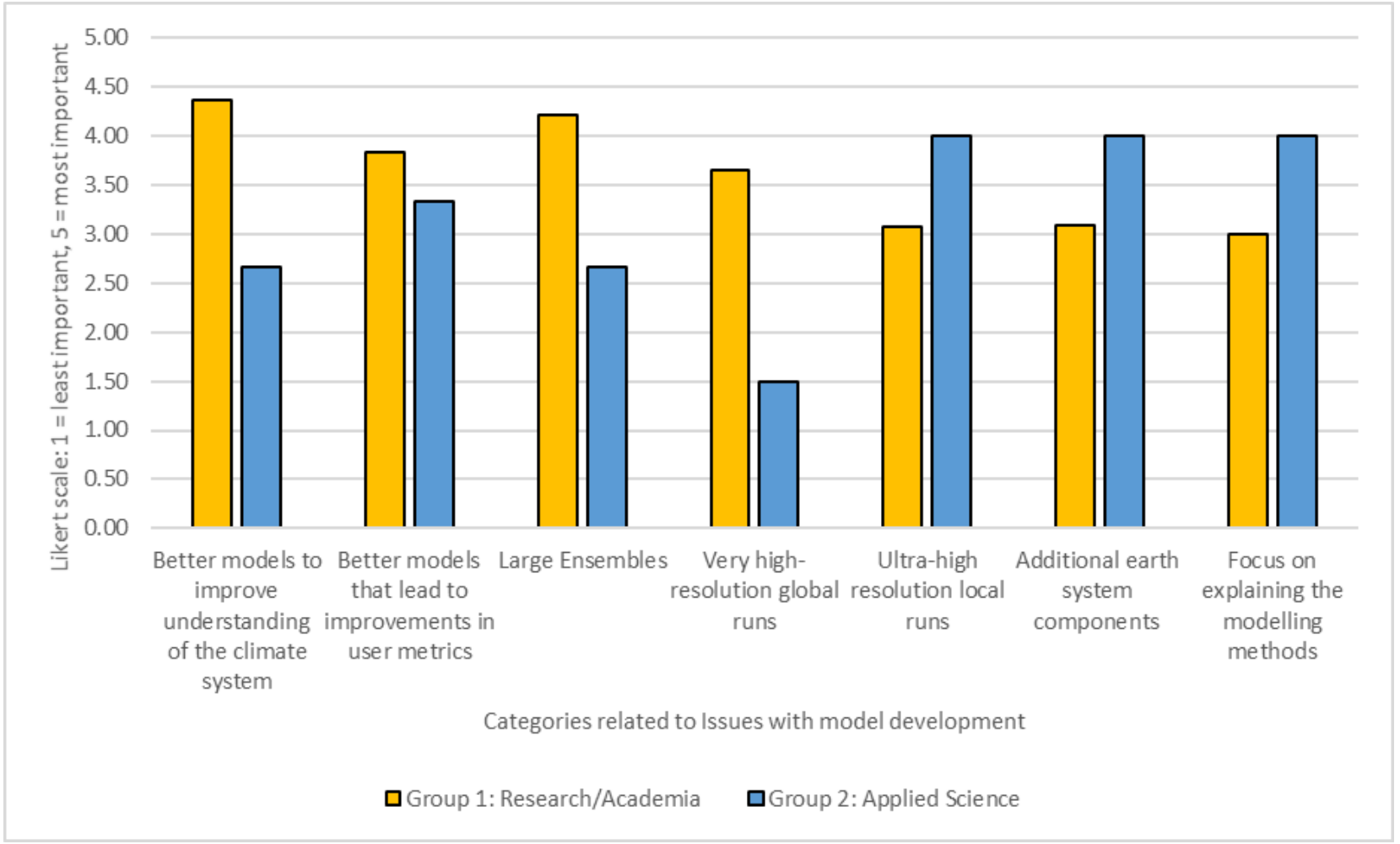
Results related to model development options



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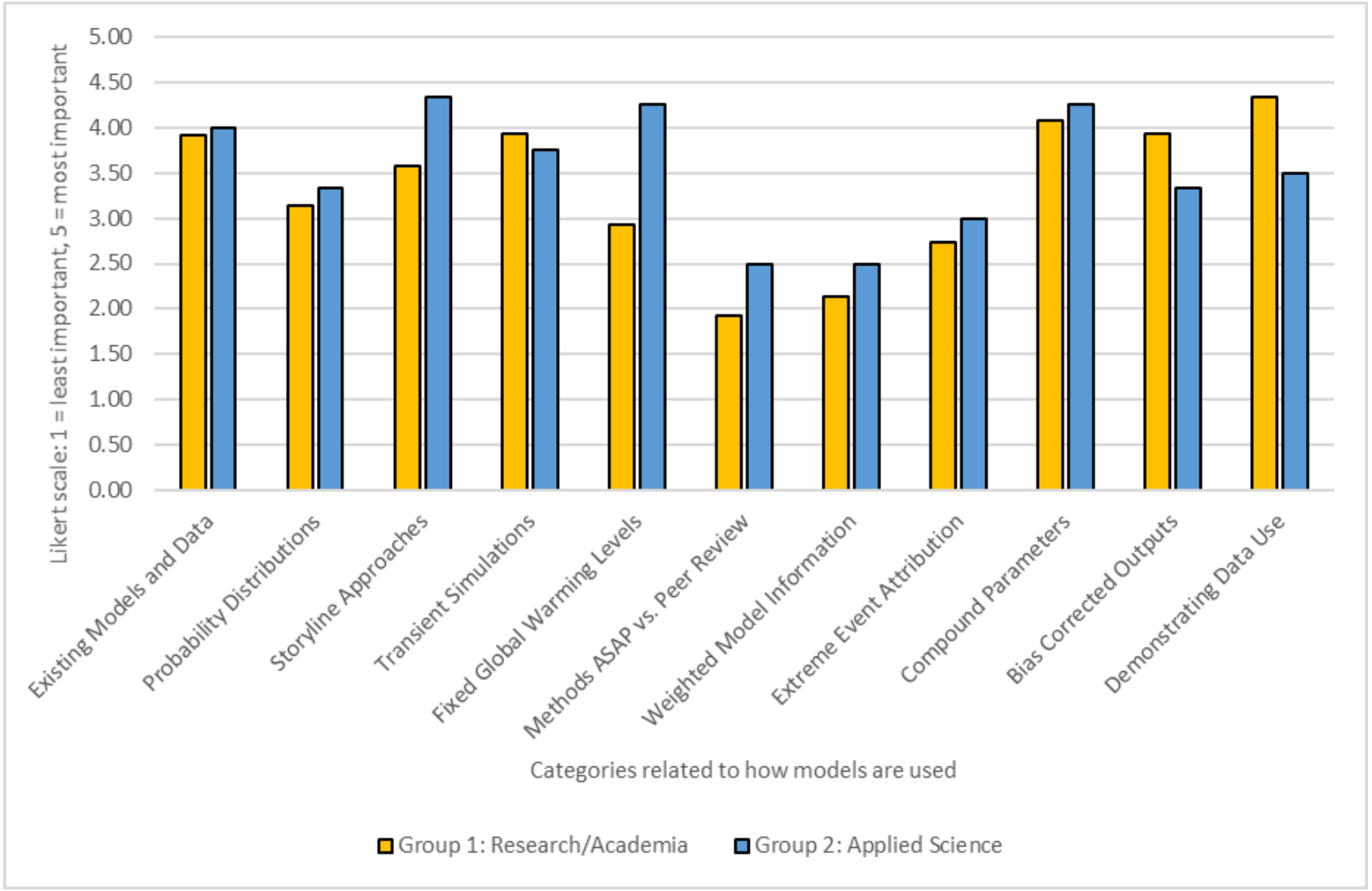
Results related to options for how models are used



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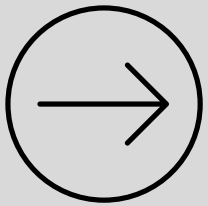
Deeper dive – workshop exploration topics

User need 1:
Tipping points / Thresholds

User need 2:
Rainfall extremes



User need 3:
Moving from current to near-term future climate hazards

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User need 1: User-focussed thresholds

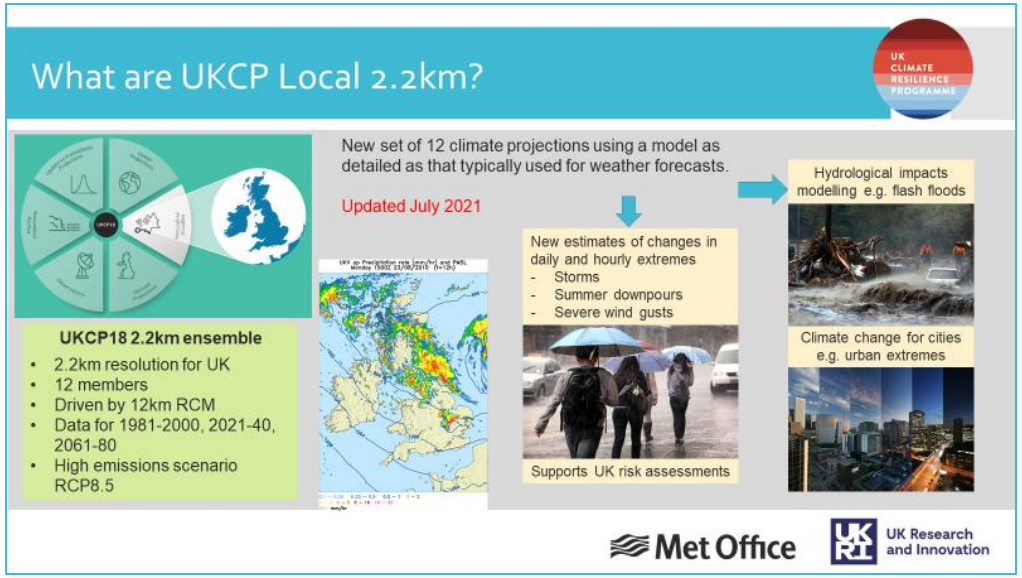
Examples:

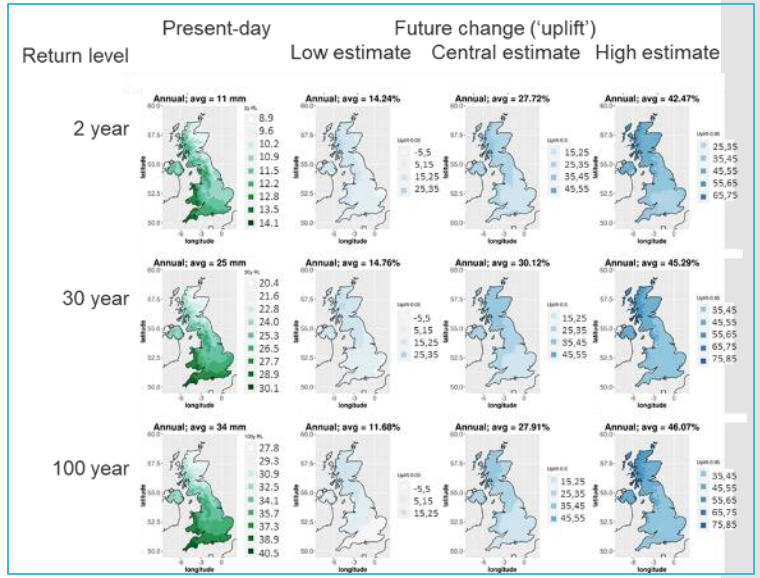
1. "Daily maximum temperatures in excess of 32 degrees C and minimum temperatures in excess of 15 degrees C over most of London for at least 5 consecutive days"

2. "Extreme drought events across Scotland could increase from an average of one every 20 years to one every 3 years"

3. Water companies "must limit pollution from storm overflows …The Environment Agency classes storm overflows as unsatisfactory when they [*inter alia*]: cause or significantly contribute to a deterioration in the biological or chemical status of the receiving water"

User need 2: Rainfall extremes






Todmorden Reservoir, 2019

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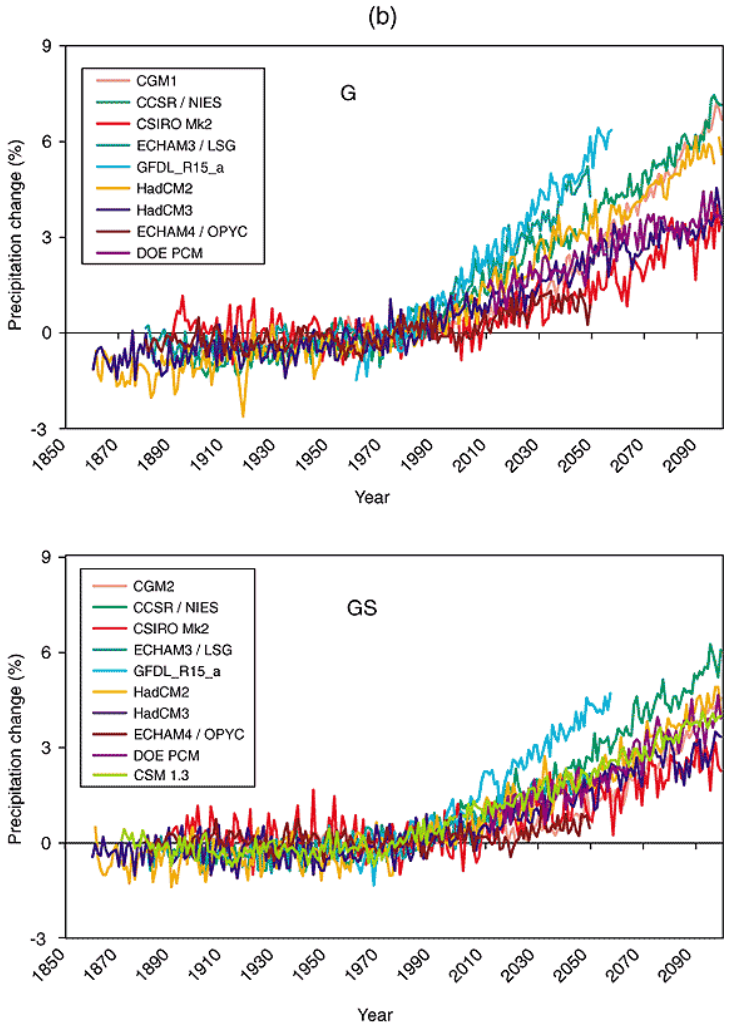
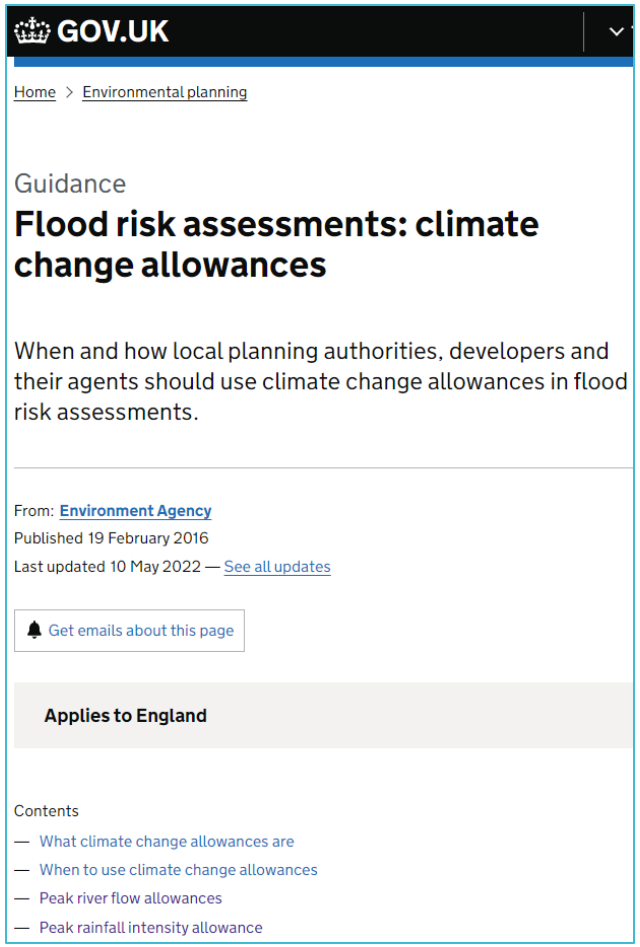
User need 3: Moving from current to near-term future hazard



Source: IPCC (https://www.ipcc.ch/report/ar3/wg1/chapter-9-projections-of-future-climate-change/)



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Guidance

Flood risk assessments: climate change allowances

When and how local planning authorities, developers and their agents should use climate change allowances in flood risk assessments.

From: Environment Agency
Published 19 February 2016
Last updated 10 May 2022 — See all updates

Get emails about this page

Applies to England

Contents

- What climate change allowances are
- When to use climate change allowances
- Peak river flow allowances
- Peak rainfall intensity allowance

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Final (draft) recommendations

Need: To better understand **extremes** and the transition along the continuum from historic through current to future climate.

Addressed by: Continued use of **large ensembles**.

Need: **Validate CPM projections**, especially of rainfall extremes at short (e.g. 1- 6-hour or shorter)and long (e.g. 24-hour +) durations, against observations.

Addressed by: Validation to **provide confidence limits** in estimates of current and future projections.

Need: Better understand **important compound parameters**, to identify and provide estimates of current and future likelihood of extremes and 'threshold breaking' events

Addressed by**: Interaction between users and providers** of climate information.

Need: **Estimate very extreme** (i.e.>100-year return period) and **probable maximum precipitation** values in current and future climate across the UK, needed for highly vulnerable locations e.g. reservoir safety and other vulnerable infrastructure

Addressed by: Use of **CPM modelling**, possibly with UNSEEN approaches, to estimate these high extremes better.

Need: Understand **user impact thresholds** better.

Addressed by: Ensuring ongoing, **close engagement between users and providers** of climate information as well as 'science translators'. Science translators are key intermediaries who can translate climate science for appropriately for users and also inform providers of evolving user needs that might inform future science.

Need: Clearer information on the **skill in seasonal to decadal climate predictions**.

Addressed by: Closer **collaboration between users and providers** to extract decision-relevant information from these.

Need: Maximising use of **existing models and model outputs**.

Addressed by: **Exhaustively testing and assess existing models** to better understand model sensitivities before new sets of climate integrations designed to inform adaptation planning are initiated.

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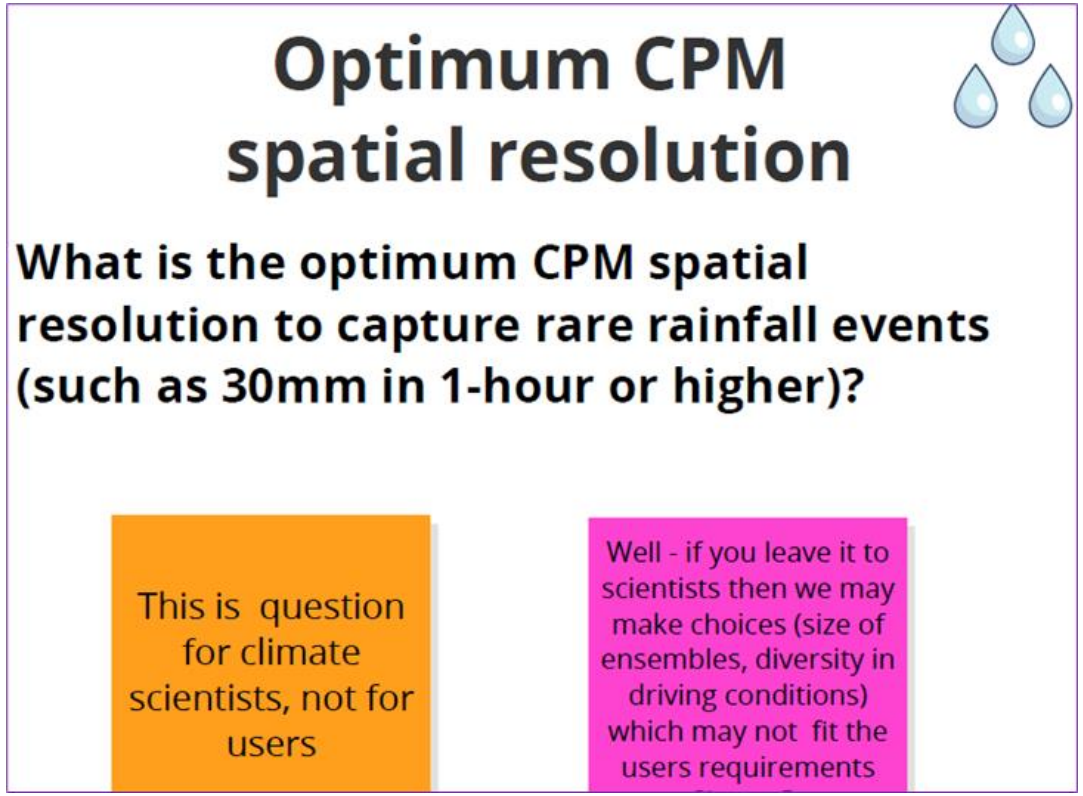
Collaboration



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Collaboration

Scientists / modellers

Science translator / ‘boundary manager’

Users / industry Govt.

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Collaboration

Coordinator / Facilitator

Scientists / modellers

Users / industry Govt.

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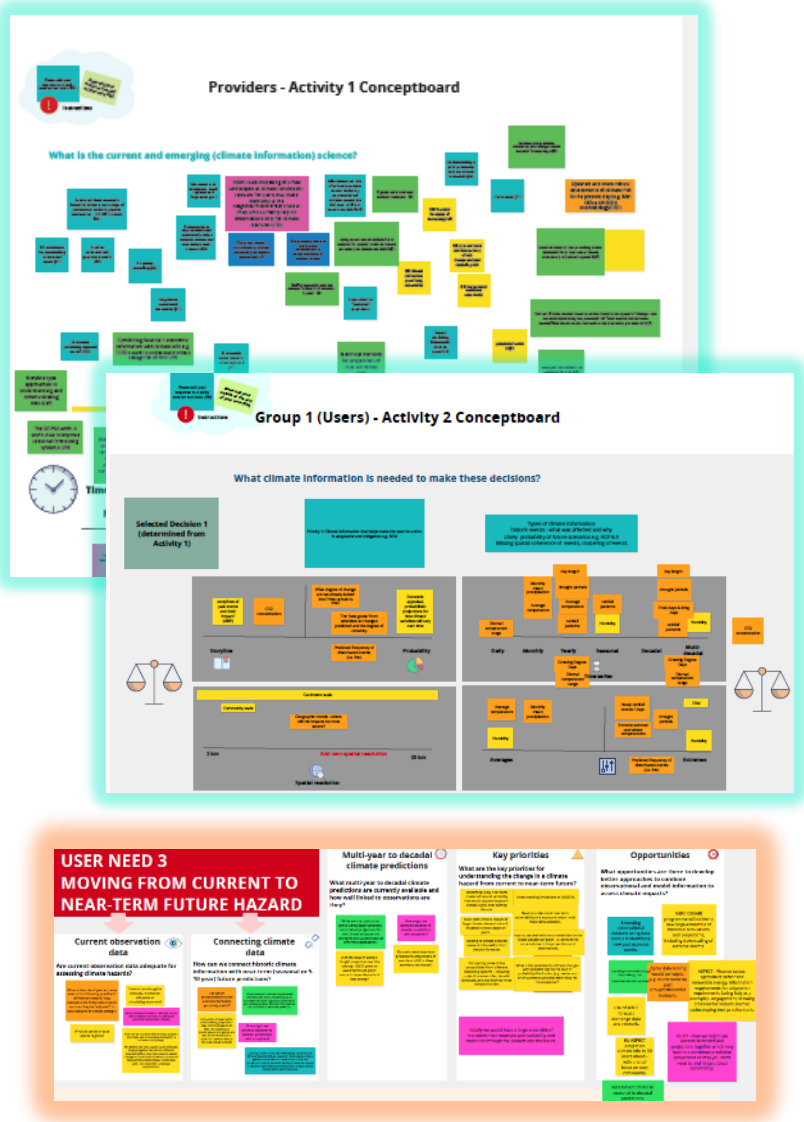
Conclusions

- 6-month project that has lasted 15-months
- Challenging area to work in as a wide range of views on requirements for climate information
- Project has arrived at consensus with agreed recommendations for providers of climate information to support user need
- Evident need for closer collaboration between users and providers



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Department for Environment Food & Rural Affairs

Government User Perspective

Katy Peat, Head of Adaptation Science

Forestry Commission England | NATURAL ENGLAND | Environment Agency

Utilising UKCP18

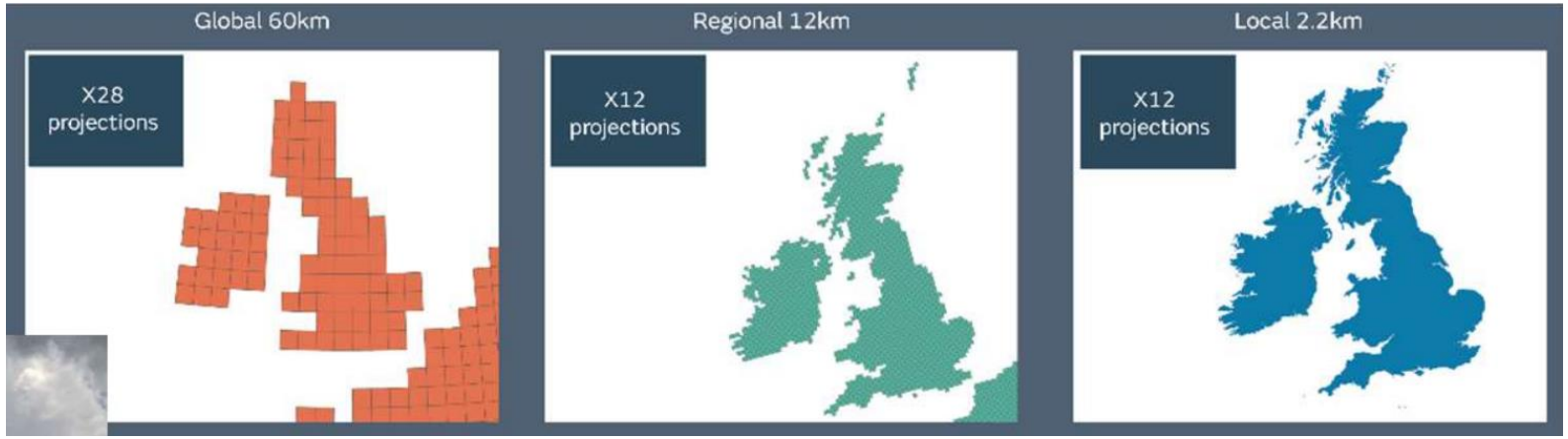
Knowledge sharing

Improving understanding

Improving access

Additional datasets

Considering CCRA4



- How can we better include:
  - Spatial considerations
    - How does risk vary regionally/locally?
    - How should a national assessment incorporate local risk?
  - Economic analysis
    - Can we compare cost-benefit analysis across risks and sectors?
    - How do we measure the cost effectiveness of interventions?
    - How do we value mid to longer term benefits of adaptation?
- How effective are adaptation actions?
- How can we maximise the utility of the CCRA?

Dealing with warming scenarios

2 degrees

4 degrees

Enhanced capability

- Timeframes
- Early warning signals
- Extremes
- High-Impact, Low-Likelihood (HILL) Scenarios
- Storylines

Contact details

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Website: www.ukclimateresilience.org

Twitter: @UKCRP_SPF

YouTube: UK Climate Resilience programme

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The UK Climate Resilience programme is supported by the UKRI Strategic Priorities Fund.
The programme is co-delivered by the Met Office and NERC on behalf of UKRI partners AHRC, EPSRC, ESRC.

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Additional slides if required

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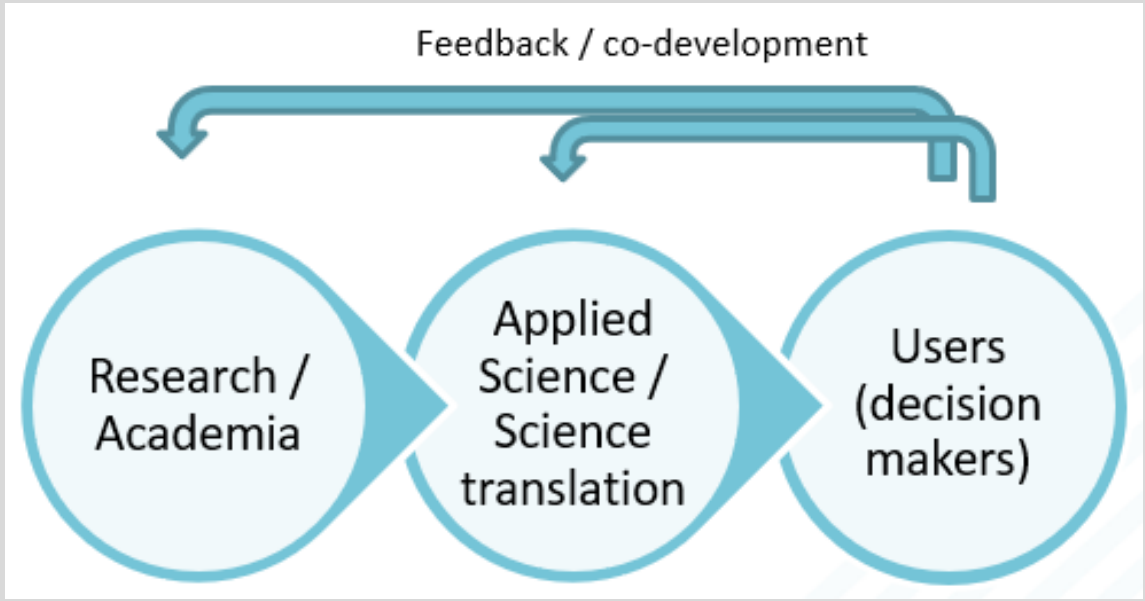
Feedback / co-development



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Options for interaction between tracks 1 & 2

- Periodic & strategic:
  - At times when there are step changes in the science that result in important changes in impacts on users
  - With enough frequency that users get an update on general progress / development (e.g. biannual or annual?)
- Management
  - Interaction organised by one body, e.g. Met Office or Defra
  - User group and Provider Group make-up
  - Communication formats: emailing groups; periodic (e.g. annual) collaboration fora (e.g. online events)
- Technical
  - Science 'triggers' to instigate new interaction
  - User need 'triggers' to instigate feedback from Tack 1 to 2

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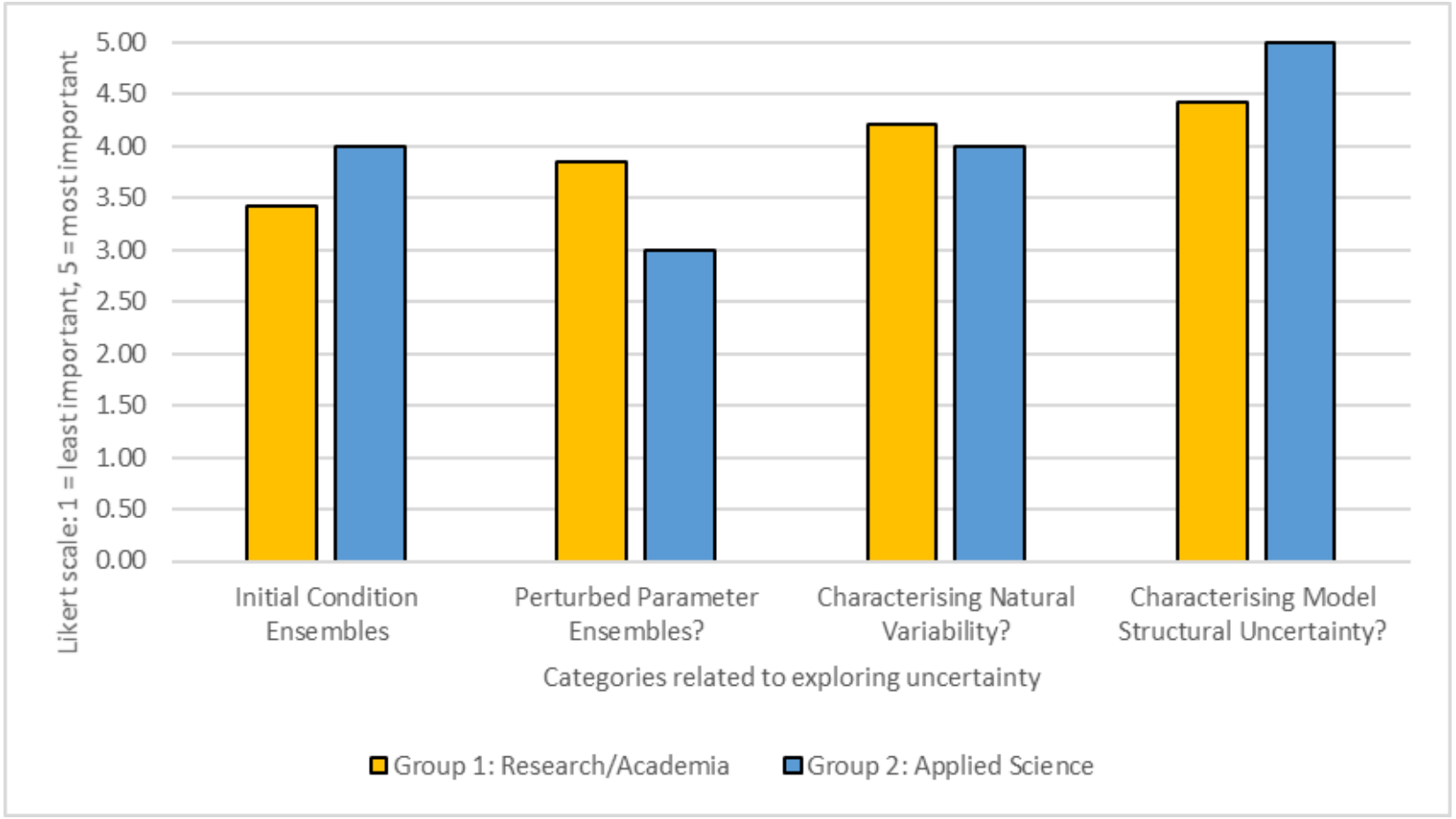
Results related to uncertainty exploration options



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Preferred Options – Exploring uncertainty

- Characterising model structural uncertainty
- Characterising natural variability

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