Department for Environment Food & Rural Affairs | Department for Business, Energy & Industrial Strategy | Met Office Hadley Centre | Environment Agency

UK Climate Projections Project

Newsletter - March 2018

2018 has arrived! A big year for the UKCP18 project.

This edition of the newsletter has the latest project news, including information on upcoming events. In our regular features we focus on another aspect of the project science with a description of the probabilistic projections from Met Office scientist Glen Harris. The user view comes from the Climate Resilience team at the Ministry of Defence, describing the challenges of understanding and managing climate risk across their wide range of facilities. And, we summarise the final three demonstration projects which provide examples of how the projections might be applied to particular use cases and sectors. In this edition:

We hope you find the content helpful and your feedback is welcome, so please send us your comments and ideas.

Editorial from Kathryn Brown

Head of Adaptation at the Committee on Climate Change

Over the years my role in UK Climate Projections has shifted from being a user of UKCIP02, to project manager of UKCP09, to chair of the Government User Panel and Governance Board member for UKCP18. I remember very clearly my very first UKCP09 meeting with Roger Street from UKCIP back in 2006. I was utterly bemused and sat there asking how we expected users to get to grips with Bayesian statistics and 10,000 member ensembles, whatever they were. I learned as much as my small head could handle, with some very patient explanations from the technical team; David Sexton, James Murphy, Jason Lowe, Phil Jones and Chris Kilsby. Ag Stephens taught me what a user interface was and exactly how difficult it was to develop. The team at UKCIP literally spent years working out how to explain the outputs of UKCP09 to users. Roger's favourite saying – "don't get lost in the numbers!" – still rings true now.

What I've noticed most about the development of UKCP18 is both how far we've come and how similar the issues are to UKCP09. What has changed is that users now have no problem with the concept of probabilistic scenarios and relative probability. Most of you have been using this sort of data in some way for at least five years. The questions we get asked are sophisticated and users are more aware of what they want, and why.

Higher resolution, annualised projections, more information on extremes and global data are all big steps forward from UKCP09. At the same time, the project team are still grappling with the best way to present the wealth of information to suit a range of users, how they can offer the best bespoke functionality from the user interface, how to present the uncertainties and clearly explain what UKCP18 is and is not.

What I have enjoyed most is the same as UKCP09 - the dedication, expertise and fantastic humour of the project team, who make working on the project an absolute pleasure. I can't wait to see how everything comes together for the launch this year.

The next phase of UKCP18: testing and evaluation

As the first sets of climate change projections data start to emerge in the spring, UKCP18 is moving into its next phase of delivery: testing and evaluation of the projections and their delivery systems (such as the website, science reports, data access and guidance). Climate science and data sets will be subject to an additional period of focussed climate science analysis. Whilst this means the core dataset won't be made public until November, it will ensure that the data, when released, is more extensively evaluated and accompanied by the interpretation and guidance to support its use.

Meet the scientist - Glen Harris (Met Office), Senior Climate Scientist

Probabilistic projections in UKCP18

Probabilistic projections enable risk-based assessments of future climate change to be made. These projections will once again be produced for UKCP18, providing a more comprehensive sampling of uncertainty than is possible with the 20 global projections that are also a component of UKCP18 (the July newsletter contained an article on the global projections).

The UKCP18 probabilistic projections will be provided for the four Representative Concentration Pathway (RCP) scenarios that characterise plausible future climates relating to different emissions scenarios. To emphasize the importance of variability in climate change projections, single-year projections will replace the 30-year mean projections of UKCP09. This approach enables the projections to be expressed in terms of the extreme hot, cold, wet or dry seasons that impact society, providing a better idea of adaptation needs.

The methods used to produce these new projections are based on the methodology developed and published for UKCP09 (Harris et al, 2010), but upgraded to take advantage of new models and additional observational data. UKCP18 uses a new 57-member Earth System (ES) ensemble to sample uncertainty. The ES ensemble models the atmosphere, ocean, carbon-cycle, aerosols and the interactions between these components. Key parameters of each component are varied simultaneously to sample uncertainty. The ES ensemble provides one source of model uncertainty; additional information on model uncertainty is obtained from the CMIP5 models, a collection of coordinated climate model experiments that explore different aspects of climate model uncertainty and were used as input to the IPCC 5th Assessment Report. The uncertainty information obtained from CMIP5 will be used to calibrate the probabilistic projections. This approach takes better account of interactions between ES components and provides a more robust assessment of the uncertainty in future model predictions of CO_2 uptake by the biosphere.

UKCP probabilistic projections are further enhanced by the use of more recent observations and observed trends in variables such as CO2 and ocean heat content, which better contrains the projections. The application of this innovative new approach will enable projections of absolute future values of extreme weather events, such as the hottest summer day or the greatest 5-day rainfall accumulation, to be provided.

G.R. Harris, M. Collins, D.M.H. Sexton, J.M. Murphy, and B.B.B. Booth (2010), Probabilistic projections for 21st century European climate, Natural Hazards and Earth System Sciences 10, 2009-2020, doi: 10.5194/nhess-10-2009-2010

Demonstration projects - the details

October's newsletter contained summaries of three of the demonstration projects. These projects have brought together small groups of users to explore and identify how UKCP18 data might be used to address specific challenges that require climate projection information. The outcomes of the work have indicated some of the activities that users are likely to perform on UKCP18 data, helping to inform the design of the data interface, web site and guidance material.

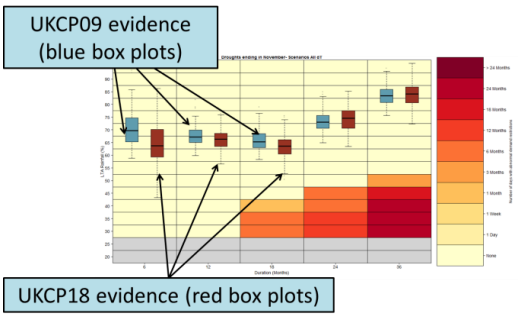
Use of high resolution climate projections for sub-daily rainfall within national scale pluvial flood hazard maps - SEPA

SEPA wants to know what actions are needed: when, where and how much Scotland may need to invest to achieve our desired outcome that flood risk in Scotland is reducing. To do this we need projections for future flood risk. Surface water flooding is typically caused by heavy rainfall lasting a few hours or less. Previous UK climate projections only provided projections for daily rainfall; now UKCP18 high resolution climate model projections will, for the first time, provide information on short duration rainfall suitable for improving our understanding of surface water flood risk.

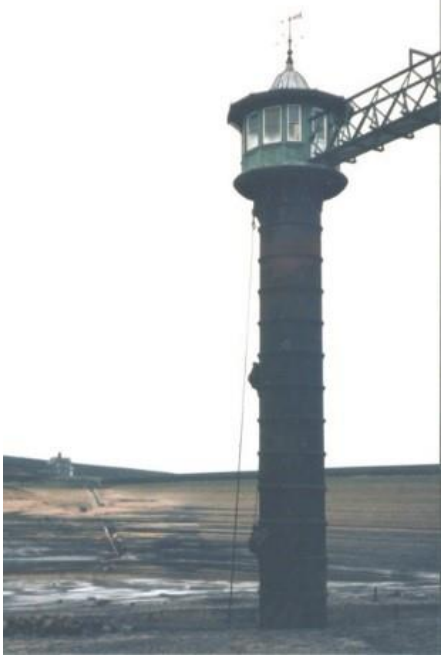
SEPA's national surface water hazard maps are produced using 2D models of how rainfall spreads over the land surface before it enters the drainage system or rivers. The demonstration project looked at the practicalities of how the UKCP18 high-resolution projections could be used with this type of national scale surface water flood hazard mapping in order to inform Scotland's next and Surface Water Management Plans.

Water resources and drought planning – HR Wallingford

The UKCP18 water resources demonstration project aligns with ongoing industry research on planning for climate change and drought resilience. The demonstration project highlighted how the UKCP18 projections could be practicably integrated as part of the wider planning process and considered key issues for the industry. These included: climate change impacts on droughts; estimation of changes to potential evapotranspiration (a key input variable for the industry); scaling of impacts through the planning horizon and the potential use of UKCP18 indices with stochastic weather generators. The demonstration project focused on the UKCP18 probabilistic projections and the transient, spatially-coherent global projections but did not cover use of high resolution or marine projections.



Assessing climate change risk in Yorkshire – University of Leeds



The University of Leeds conducted a UKCP18 demonstration project that sought to prepare organisations in Yorkshire for the arrival of new national climate projections. Led by Suraje Dessai, Professor in Climate Change Adaptation at the University of Leeds, the project gathered information on the preferred presentation of climate information, embedded knowledge of the forthcoming UKCPs within key departments and rehearsed organisations in the most effective way to put novel climate projections to use.

This project feeds into a 5-year NERC-funded programme of work, the Yorkshire Integrated Catchment Solutions Programme (iCASP). As a whole, the programme is a translation exercise that will enable scientists to communicate and collaborate with government authorities, businesses and charitable organisations in order to improve responses and long-term resilience to floods and droughts in the Yorkshire region.

The project made use of the iCASP network of regional stakeholders and brought together a diverse group spanning local government, major infrastructure owners and technical specialists, including Yorkshire Water, Leeds City Council, Yorkshire Wildlife Trust, JBA Consulting, National Farmers Union and the Environment Agency.

Twitter Webpage Contact

The user view

Begonia Pedreira-Regueira - MoD Climate Resilience Team

We are a Climate Resilience team working within the Ministry of Defence (MOD) tasked with identifying climate risks to the MOD estate and informing the adaptation of its infrastructure. The MOD estate covers approximately 1% of UK land area and encompasses a wide variety of infrastructure facilities: offices, housing, barracks, airfields and ports to name a few.

Our role includes working to embed climate resilience into site management processes and collaborating with other teams to develop adaptation policy. One of our key responsibilities is conducting climate impact risk assessments on a site-by-site basis across our estate. To do this it is essential that we support our analysis of climate risk with science.

The comparison of 25km model climate data and observed climate data extracted from the UKCP09 user interface helps us to understand what global climate change may mean locally. The use of maps has helped us to communicate with others what the projections may mean for them.

We also use this data when providing project support. Once UKCP18 is published, we will be updating our methodology to incorporate the upgraded set of climate projections.

One difficulty that has arisen using UKCP09 is the training and support of others less familiar with climate data. We have used this experience to input into the development of UKCP18 and specifically the web site and data interface through the Government User Group and as test users for the project. We anticipate that the new data interface will be easier to use, the guidance clearer and the efficiency and options for data download will be improved. We are also keen to explore the use of the projections for assessing future extreme weather, the development of impact datasets and consideration of how MOD might use these to make informed decisions about adaptation.

The main challenge we expect from moving to UKCP18 is getting to grips with some of the new features and updating our guidance to reflect these changes for use at establishment level.

Credit to Louise Buckley

Project News

Non-Government User Group October meeting

The Non-Government User Group met at the Met Office in Exeter at the end of October. They were welcomed by Peter Stott, Acting Director of the Hadley Centre. The meeting included an overview of project progress from Jason Lowe, Head of Climate Services for Government at the Met Office, a presentation from David Sexton (Met Office) on the global projections, a session on the Derived Products from Harriet Orr (Environment Agency, chair of the User Group) and a session seeking feedback from users on the demonstration project posters and some new visualisation ideas. As always, the users provided valuable feedback to the project team which will be incorporated into future project outputs.

Update on User Panels

There are two groups of users providing the Project Team with additional input to help develop: a) the data interface (DI); b) the website and guidance (W&G). A prototype web site with some example guidance material will be shared with the W&G user panel in the coming weeks as we work towards an initial web site.

The DI user panel tested the latest prototype in October. We asked members to explore the new functions available such as the interactive map selection, selecting plume plots and automated data downloading through scripting. We also asked users about the information on the web pages such as the home and “My Jobs” pages. We are using this feedback to help further develop the prototype and will have a final prototype early in 2018 for testing with the user panel.

Your questions answered

Question: what sort of user engagement will there be between now and launch?

A: There will be a range of activities during the coming months. The user panels will continue to help in the definition and development of the data interface, web site and guidance. The full User Groups (Government and Non-Government) will continue to have a key role in informing their communities about UKCP18 and providing valuable feedback to the project team on a range of issues. There will be UKCP18 general introduction webinars for newsletter subscribers and there is an intention to present to industry groups and sector-specific communities through existing meetings and conferences. Further details of these opportunities to engage will be advertised as they are confirmed.

Question: what are the attributes of the different projections (e.g. resolution, emissions scenarios) and when will they become available?

A: The table at the end of the Project Description document has just been updated with the latest information on the projections. The core dataset will be made public in November.

If you have any queries relating to this newsletter, please contact the Project Team.

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