

UK Climate Projections Project

Newsletter - October 2017

With the summer break now behind us, the UKCP18 project is entering an exciting phase of development. In this newsletter, you can read about some of the ways in which users are getting more involved in the project. Small groups of users – our user panels – are helping to test and validate the ways of interacting with the new climate projections, through the web site, the data interface and the guidance material. Some users have also been working on targeted demonstration projects that will provide a showcase on specific applications of the projections in distinct areas of interest and industry sectors.

In this month's regular features, Professor Stephen Belcher, Met Office Chief Scientist, provides his perspective on the project in the editorial. We meet another of the science team, Matt Palmer, who is leading the work on UKCP18 marine projections, and we get the viewpoint from another UKCP user, Scottish Environment Protection Agency (SEPA). Plus, we provide an explanation of one of the key project topics, Representative Concentration Pathways (RCPs), and all the latest project news. In this edition:

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As always your [feedback](#) is welcome, please send us your comments and ideas.

Editorial from Stephen Belcher

Met Office Chief Scientist and member of UKCP18 Governance Board

One of the pleasures of being a Met Office scientist is getting to see our intellectually satisfying research feeding into practical applications. We want to see that the findings of our research are heard beyond those who read scientific journals. In particular, as a government Trading Fund, it's particularly satisfying when our work is valuable to policy-makers in Whitehall and our wider stakeholder community.

UKCP18 is a great example of how world-class scientific research can be carried out with a strong policy driver.



The results of the project will directly inform UK government decisions and policy as the key evidence base underlying the next UK Climate Change Risk Assessment (CCRA) and National Adaptation Programme (NAP). It is also a project that has pushed the boundaries of what we can achieve with regional climate projections, which has resulted in a number of other governments looking on with interest.

Work on UKCP18 was initiated while I was the director of the Met Office Hadley Centre, so I look on with great pride and satisfaction as it enters the final stages. Release of the different products will take place at different points over 2018 with the core raw data products coming out in May 2018, followed by a launch of the full UKCP18 data interface and support products in November 2018.

Releasing the core set of UKCP18 data in May 2018 will allow academics and other researchers to use it to support the next CCRA. Following feedback from the Peer Review Panel this will now include a new downscaled product at 12km resolution.

The November launch will provide a package of products designed to meet the needs of a wide range of users and will complement the data released in May to provide up-to-date information on how the climate of the UK may change over the rest of the century.

In addition, the cutting edge high resolution (2.2km) projections, which are intended to provide information on high impact events such as localised heavy rainfall in summer, will be delivered in a similar timescale as the November launch.

Meet the scientist

Matt Palmer (Met Office), Manager of the UKCP18 sea level projections

Projections of mean water level and exploring potential changes in storm surges



As the Earth gets warmer, land-based ice melts and flows into the ocean. In addition, the warming of the ocean leads to expansion of the water, so that the same amount of water takes up more space. These two effects are the primary reason for the observed global sea level rise.

My team is working on state-of-the-art projections of sea level rise for the UK coastline, which will continue for centuries into the future, and investigating the potential for changes in storm surges under future climate change. As we focus down from the global scale to the UK region we need to take into account additional processes, including the pattern of changes in ocean density and circulation, the effect of melting ice on Earth's local gravity and ongoing vertical land movement associated with the Earth's response to the last de-glaciation (often referred to as post-glacial rebound). We are currently working with international colleagues to include these different aspects for our sea level rise projections for the UK, building on the work that was included in the last [IPCC assessment report](#).

While climate change will bring about a steady rise in the mean water level around the UK, there are important natural variations that occur year-to-year and on longer timescales. Superimposed on these water levels, there are other processes that can temporarily raise local sea level, such as tides, waves and storm surges. In UKCP18, we are using model simulations to assess the potential for changes in storm surges under climate change and the effect on coastal flood risk. A new strand of work for UKCP18 is the use of historical case studies, such as the coastal flooding in Dawlish in February 2014. We will perform simulations of these past surge events with and without future sea level rise included, in order to understand how similar storms might affect coastal water levels in the years to come.

Demonstration projects - the details

In February, users were encouraged to submit proposals for demonstration projects that would be used to provide some examples of the application of UKCP18 outputs to meet particular customer requirements. These projects are now well underway and a list of select projects was included in the last newsletter. Here we describe three of the projects and the remaining project descriptions will be included in the next newsletter.

Coastal Erosion – Mike Walkden (WSP)

This project is closely linked to the Environment Agency-funded project “Cliff and Shore Erosion under Accelerated Sea Level Rise” and explores how coastal erosion may change in response to the sea level rise projected in UKCP18. A shore profile will be simulated in two-dimensions so that future erosion can be projected under alternative sea level rise scenarios. The simulations will be adapted to explore features such as sensitivity to uncertainty in the marine projections.

Resilience of the built environment – Anastasia Mylona (CIBSE) and Matt Eames (University of Exeter)

The imminent release of the UKCP18 projections will be used to explore how existing methodologies and resources deployed in modelling the impacts of climate change on the built environment will be affected by the new data and how new products could be utilised to enable the building industry to assess resilience.

Forests of the Future – Stephen Bathgate and Michal Petr (Forest Research)

Since the late 1990s UKCP outputs have been used to inform the forestry sector of the opportunities and threats from climate change. Building on recent work, using probabilistic projections to evaluate drought risk to major tree species, the new higher spatial and temporal resolution data sets provided by UKCP18 will be used to explore return periods of damaging events such as winter cold, summer drought and windstorms) to enable advice to nurseries, foresters and policy makers on tree species suitability and diversification to be reframed.

The user view



Fiona McLay



Findochty Harbour. Credit Moray Council



Marion Shoote

Fiona McLay (Senior Specialist Scientist) & Marion Shoote (Senior Policy Officer) – Scottish Environment Protection Agency (SEPA).

What is your organisation’s role and how are climate projections important to it?

SEPA is Scotland’s national flood forecasting, flood warning and strategic flood risk management authority. We have a statutory duty to produce Scotland’s Flood Risk Management Strategies. These strategies use a risk-based approach based on the best available evidence to identify the most sustainable combination of actions to reduce flood risk. We are also a statutory consultee in the land-use planning process, providing flood risk advice in relation to development plans and proposals across Scotland.

How do you currently use climate projections and what are your experiences?

Up-to-date climate projections are integral to planning how we manage future flood risk. We used the UKCP09 climate projections to carry out a strategic-level assessment of future flood risk to inform Scotland’s first Flood Risk Management Strategies, and to provide guidance to land use planners. This work involved translating the probabilistic climate projections from UKCP09 into guidance for land use planners and flood risk management practitioners, which proved challenging given that recipients were used to using a single allowance for climate change.

While we used UKCP09 sea level rise projections directly, a separate study was commissioned to provide projections for flood flows in rivers based on changes in rainfall.

How will you use the UKCP18 projections?

UKCP18 projections will be used to update our future flood hazard and risk data for fluvial, coastal and surface water flooding across Scotland. Improved understanding of future flood risk will ensure that Scotland's flood risk management authorities can plan appropriately for future changes in risk and sustainable actions to manage flooding in the long-term.

Many communities in Scotland are at risk from surface water flooding or flooding from small watercourses that respond to short duration heavy rainfall. There were no projections for this in UKCP09 so the new climate projections for short duration heavy rainfall will enable us to understand how surface water flood risk may be affected by climate change for the first time, and to plan for this. The demonstration project being undertaken by SEPA is looking at how to use the new data efficiently and effectively once it is published.

What do you expect to be the biggest challenges in moving from using UKCP09 to UKCP18 projections?

Scotland's Flood Risk Management Strategies have been prepared by SEPA in collaboration with other responsible authorities, and give individuals, communities and businesses the information they need to better manage their own responsibilities concerning flooding. As our data evolves and improves in each flood risk management planning cycle, key challenges include retaining consistency and continuity, as well as effective communication and sharing our new understanding with the public and our partners. SEPA recognises that effective and sustainable flood risk management planning needs to move beyond consideration of only one aspect of future change, and a single emissions scenario and probability level. We need to make better use of the probabilistic information from UKCP18 by considering a range of possible future climate scenarios and combining these with other factors that will affect future flood risk such as population growth, demographic change and urban creep.

Representative Concentration Pathways

Fundamental to generating plausible projections of future climate are the concentrations of greenhouse gases in the atmosphere. A wide range of physical, social and economic factors influence the change in emissions of greenhouse gases. Representative Concentration Pathways (RCPs) were first introduced in the most recent Intergovernmental Panel on Climate Change (IPCC) report as a means of encapsulating a broad set of assumptions into four specific emissions scenarios.

The RCPs are built to describe four distinct evolutions of the physical, ecological and economic factors that determine emission levels of greenhouse gases through the 21st Century. By including the implications of mitigation strategies on possible future emissions, the RCPs are intended to facilitate improved interactions between climate scientists and the mitigation and adaptation communities.

There are four RCPs, specified by the total radiative forcing in watts per square metre by 2100, and named accordingly: RCP2.6, RCP4.5, RCP6.0 and RCP8.5. Each RCP results in a different trajectory of global mean temperature.

The four RCPs are not intended to model all future possible climate states, but to provide sufficient information on the uncertainties in future climate to enable robust decision making to be made. More information is available in our [RCP guide](#) and the associated references.

Project News

As highlighted in [Stephen Belcher's editorial](#), we are now in a position to provide further details of the release schedule of UKCP18 project outputs. The project will have a phased release, with the core raw data products coming out in May 2018, followed by a launch of the full UKCP18 data interface and support products in November 2018.

User Groups and User Panels

Earlier this year, we set up two user panels to test UKCP18 prototypes with members recruited from the Non-Government and Government User Groups. The first panel has been testing the data interface - a web portal

where users will be able to download UKCP18 data and customise visualisations. The second panel has been testing a new set of web pages and informing the scope and content of the user guidance. The detailed feedback from the panels are fundamental in guiding how we've approached the design of UKCP18 products.

The next meeting of the Non-Government User Group takes place at the Met Office in Exeter on 31 October 2017 and the Government User Group on 2 November 2017. We will be sharing the latest news on the project and results of the demonstration projects as well as test our latest visualisations.



If you have any queries relating to this newsletter, please [contact](#) the Project Team.

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