

UK Climate Projections Project Newsletter - July 2018

Welcome to the latest UKCP18 newsletter. This edition features an editorial from Glenn Watts, Deputy Director of Research at the Environment Agency. He talks about his experience and the importance of using UK climate projections. In addition, we have some familiar features from project scientists and users.

Ag Stephens from the Science and Technology Facilities Council's Centre for Environment Data Analysis, hosts of the UKCP18 user interface, explains how users will be able to access the project's data, plus all the latest project news.

In our regular 'Meet the Scientist' feature, Mark McCarthy, Manager of the UKCP18 baseline observations at the Met Office talks about the development of the new gridded high-resolution observation dataset HadUK-Grid for UKCP18 and the importance of having this baseline observational data in order to place future predictions in to perspective.

Two of the User Group members, Murray Dale and David Viner, describe how their work as consultants has benefited from the UK climate projection data.

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

Editorial from Glenn Watts

Deputy Director of Research at the Environment Agency

I've been using UK climate projections for around 20 years, mainly to examine the impact of climate change on water. UKCIP98 and UKCIP02 were widely used not only in research but also by practitioners: for example, UK water companies have been considering the impact of climate change on water supplies for over 20 years. When UKCP09 brought a much more sophisticated approach to uncertainty, there was a ready-made user community prepared to get to grips with this new information.

It's almost impossible to overstate the importance of UK climate projections in facilitating debate and action on adapting to climate change. Easy access to consistent, reliable projections means that UK practitioners can concentrate their efforts on understanding the range of possible impacts, rather than worrying about which projections to use or how to reformat data for their own analyses. Importantly, using consistent climate projections



means that impact assessments are comparable between places and sectors.

Each new generation of UK climate projections has brought improvements in our understanding of the impact of climate change on the UK. UKCP18 promises further insight, with new emissions scenarios, improved climate models and high-resolution runs that will help to understand convective rainfall events. As a member of the UKCP18 Governance Board, I've been very impressed with the project team's focus on users and usability, and the way user groups have worked to make sure UKCP18 will support their work. As we near the launch, I'm looking forward now to perhaps the most exciting part of the project: seeing people using UKCP18 to develop an even better understanding of the impact of climate change.

Meet the scientist - Mark McCarthy

Manager of the UKCP18 baseline observations, Met Office

Historical and contemporary UK climate change

The UK is an island nation located in the midlatitudes with the Atlantic Ocean to our west, the Arctic to the north and continental land masses to the east and south. The consequence of this is that our climate is highly variable as the battle of competing air masses plays out over our heads at the whims of the meandering atmospheric jet stream and slowly evolving oceanic currents.

This variability has meant that the UK have had a very long fascination with the weather, and have been systematically observing and measuring it for centuries. The Met Office maintain historical observational climate data records from the 17th Century onwards, and a national network of observations have been maintained since the establishment of the Met Office in the late 19th Century.

A vital component of our understanding of UK climate, and the future risks and opportunities from a changing climate is to understand our contemporary vulnerabilities and design constraints in relation to present day climate and the recent past. My team work on the development of authoritative observational climate datasets to support this work. The vast array of observational data available through a very long historical period, made with an ever-evolving observational network is a challenge. It is our role to produce useful baseline observational data to place future projections into perspective and provide routine monitoring of our climate.

Our [State of the UK Climate](#) series of publications provide a definitive source of statistics, trends and analysis of UK climate variability and change and is published annually to provide the latest data and headline statements.

A key product that we have been developing for UKCP18 and for future routine monitoring of our changing climate is a new gridded high-resolution observation dataset HadUK-Grid. This dataset will provide daily temperature and precipitation data along with monthly and climatological reference long term averages for a wider set of climate metrics. The dataset provides a number of major improvements compared to previous datasets of this type. Firstly, the digitisation of more historical paper records has allowed us to produce gridded temperature and rainfall data from the late 19th Century providing over 150 years of rainfall observations covering the whole UK. Updated processing methods have improved the homogeneity of the data (i.e. reducing the influence of non-climatic factors relating to the opening and closing of specific stations over time). Finally, updated topographical data provides better representation of altitude, coastal and urban climate effects.



We plan to publish the State of the UK Climate 2017 report at the end of July 2018 on the [Met Office Website](#)

The user view - consultants

Murray Dale, Technical Director, JBA Consulting

As Technical Director in the fields of hydrometeorology and hydroclimatology, I work in three broad areas: climate resilience, flood forecasting and hydrometeorology capacity building.



In my climate resilience work, climate projections are very important for estimating the impacts on our clients' infrastructure, assets and operations, as well as impacts to business and the public. Flooding is a key impact and flood risk management is a core business for JBA. We carry out many analyses that use climate model projections on rainfall, sea level rise and coastal storm surge in the UK and globally.

For UK projects, my colleagues and I have used climate projections and derived guidance for many years (from both UKCP09 and UKCIP02) in a wide range of impact studies – flood risk is just one of these. The projections provide estimates of change in key variables, which we use in risk-based climate resilience planning. The results of climate change risk assessments often need to be communicated to a non-technical audience.

We envisage using UKCP18 projections for further analyses of future flood risk and impacts from other weather variables (e.g. storminess, temperature, soil moisture). We will also have a better capability to develop impacts scenarios that evolve coherently over time, and over different geographical scales, to support a wide range of adaptation planning studies.

Particularly exciting is the high-resolution output at 2.2km resolution for analyses of changes in rainfall intensity, given that this now provides an ensemble of projections, allowing for some measure of uncertainty. Finally, new global projections will help with JBA projects internationally.



The move from UKCP09 to UKCP18 will involve challenges in managing the differences between the projections and how these differences should inform or alter any existing guidance used in engineering design and planning.

Another challenge is understanding how UKCP18 output differs in format and structure from UKCP09. UKCP18 needs to be well communicated to wider non-technical audiences particularly regarding the higher resolution outputs: higher resolution output still requires an understanding of uncertainty surrounding the projections. Despite the challenges, we welcome the new projections, have enjoyed being part of the decision-making process in shaping the UKCP18 output, and recognise the benefit that the new projections, built on the latest science, will bring.

David Viner, Global Practice Leader, Mott MacDonald

Mott MacDonald is global advisory and consulting business and we are involved in delivering major infrastructure projects across the world.

My role as the Global Practice Leader for Climate Resilience is to ensure that our work meets the highest standards, uses the most up to date scientific and technical information and that we are leading on developing and increasing our understanding of climate risk to deliver a resilient society.

We use climate projections for informing our scientifically based climate change risk assessment toolkit across a range of major infrastructure projects in the UK, from flood defences, power systems roads, rail and water supply and treatment, for example Crossrail 2.



I have been constructing and applying climate change projections for over 25 years in a national and international context and was involved in the early days of UKCP. More recently, I have been using this information to help inform my role as Convening Lead Author for the Intergovernmental Panel on Climate Change (IPCC). This wealth of knowledge and expertise enables Mott MacDonald to apply climate projections in a robust, thorough way across a range of sectors and geographies. Applying the full range of future potential climate change is the pre-requisite for understanding climate risk and subsequently what resilience measures are needed.

In a UK context the UKCP provide a suite of data that are based upon extensive research and are regarded as the most sophisticated projections that are made available. This gives us a great deal of confidence in their use.

An exciting new development in UKCP18 is the Convective Permitting Model. Flooding from intense precipitation events is a major hazard and coupled to what can be seen as an increasingly exposed society the risks are high. I hope that the UKCP18 projections will be able to provide our clients with more robust projections of extreme precipitation events.

The UKCP09 projections have been used extensively and are embedded into policy and operations. It will be an exciting process to inform our colleagues and clients about the new developments, however this will require an investment of time to ensure a smooth transition to the UKCP18 projections.

The Clean Air Strategy Bill Parish, Defra

Air pollution is a significant threat to public health, comparable to cancer, obesity and heart disease. It is also a risk to our natural environment, damaging our waterways and biodiversity. Natural and anthropogenic pollutants are emitted from a range of sources, mixing and reacting with each other in the atmosphere, leading to ground level concentrations and deposition rates that humans and the environment are being exposed to. This conceptual pathway may be simple but as we know, it is far from it.

In May, Defra published a consultation on a world leading [Clean Air Strategy](#) (which closes on 14 August). This Strategy sets out the comprehensive action required across all parts of Government to tackle the emissions part of this pathway and achieve our emissions ceilings by 2030. The draft Strategy focuses on the 5 most damaging air pollutants; Ammonia, Fine particulate matter, Nitrogen oxides, Sulphur dioxide, Non-methane volatile organic compounds. Going beyond our EU obligations, the Strategy sets out a commitment to halve the number of people living where concentrations of particulate matter are above the WHO guideline limit of 10 ug/m3 by 2025.



In driving further improvements in air quality, we face a number of key challenges. The most straightforward interventions have all been implemented and we now need to manage increasingly diverse and diffuse sources of air pollutants. Achieving our emissions ceilings will be a strategy of "marginal gains" across all activities. We will also need a significant change in public attitudes and behaviours to achieve some of the more challenging emissions targets.

Our atmosphere is a complex and dynamic entity and every intervention we make changes the pollutant mix and how it behaves, and therefore, the impacts it has. On a day-to-day basis, the weather has a profound influence on background pollution and the frequency of episodes. Climate change projections are therefore important in shaping our long-term ambitions to reduce the health and environmental impacts of air pollution.

UKCP18 provides Defra with an opportunity to take the latest climate projections and incorporate them with our plans for delivering emissions reductions to better understand what that means for our health and environment in 2030 and beyond.

[Click](#) for more information.

Data Release

Ag Stephens, Head of Partnerships (STFC CEDA)

In November at launch, you will be able to access the knowledge and data from the next generation of UK climate projections via four entry points:

- UKCP18 web pages containing high-level statements on future climate, guidance notes on climate metrics and how to use the different products as well as detailed science reports.
- UKCP18 User Interface (UI) for tailoring data and visualisation products. The UI provides easy access to maps, graphs and data products. For example, visualisations will include "plume" plots showing time series of projected changes in temperature over the 21st Century. For more advanced applications, you will be able to sample the uncertainty in the probabilistic projections to inform your analyses and select input scenarios for impact models.
- CEDA Data Catalogue for searching, browsing and downloading full data files or access to subsets of data. This multi-terabyte projections dataset will be available via the catalogue in netCDF format and aimed at those who are familiar with coding and handling large datasets.
- Application Programming Interface (API) enabling scientists and developers to build tools that talk directly to the data service. The UI employs a Python framework built on the Open Geospatial Consortium (OGC) Web Processing Service standard, making it easier to add new products.

This site is under construction

UK Climate Projections User Interface



- What can you do with the UKCP UI?
- Before you start - you'll need an account
- Get started
- Data licence conditions and citation
- Caveats and limitations
- Other features

The UI, Data Catalogue and API are being developed by the Science and Technology Facilities Council (STFC) Centre for Environmental Data Analysis (CEDA). During the past 1.5 years, we have been developing prototypes and improving the UI as well as testing it with the UKCP18 User Interface in preparation for the launch later this year.

All data will be subject to the Open Government Licence, i.e. available to both commercial and non-commercial users: all you will need to do is register.

Project News

Storylines Workshop



One approach to communicating complex climate information is to use a narrative method, sometimes referred to as “storylines”.

To help understand how this might be useful in communicating UK climate projections, UKCP18 brought together practitioners and academics for a meeting held in the ECMWF Council Chamber in Reading in March.

The wide-ranging debate covered aspects of climate and social science in considering effective ways of communicating climate information qualitatively. Many participants had experience of implementing and testing communication methods in specific sectors and/or regions.

Some headlines messages identified from the discussion were:

- Qualitative communication has a role to play alongside use of quantitative climate information
- Storylines should have a clear aim and audience
- Two main approaches were identified: storylines built from a physical understanding of climate variability and those that are built from the perspective of the users' vulnerabilities.
- To ensure successful communication, users should be involved in the development, testing and evaluation of storylines

Attendees were asked to propose how the work should proceed during the remainder of the UKCP18 project and beyond. Watch this space for progress updates.

Demo Projects

The [March newsletter](#) referenced a set of six projects that demonstrate how different sectors may use the new set of UK climate projections, UKCP18.

The leaflets are based on a set of demonstration projects led by sector specialists and were written for their sector. The leaflets describe how existing methods/risk assessments can still be used and where new methods need to be developed to exploit the opportunities that the UKCP18 dataset brings.

The sectors include:

- Future surface water flood hazard risk: SEPA (Scottish Environment Protection Agency)
- Thermal performance of buildings: University of Exeter
- Assessing climate change risk in Yorkshire: University of Leeds
- Forests for the future: Forest Research
- Coastal cliff recession under climate change: WSP Group
- Water resources and drought planning: HR Wallingford

These demonstration projects are now available on the [Met Office Website](#).

The collage displays nine project leaflets, each with a title and a brief description of the project's focus. The projects are:

- Forests for the future:** Creating future tree growth and species suitability maps for forests.
- Assessing climate change risk in Yorkshire:** Picking new climate change projections with regional stakeholders in Yorkshire catchments.
- Thermal performance of buildings:** Proving future weather files to building professionals to assess thermal comfort and energy performance.
- Coastal cliff recession under climate change:** How UKCP18 sea level rise data can be used to better understand increase in shoreline erosion.
- Future surface water flood hazard risk:** Using high-resolution sub-daily climate projections at the national scale.
- Water Resources and drought planning:** Future water resources and a bottom-up approach.
- Shoreline Management:** Local authorities normally have to deal with a changing coastal environment under the current of the European Agency for the protection of the environment's (EMSA) coastal protection through broader strategic studies to regional Shoreline Management Plans (SMPs) and national policies. It is normal for each study to include mapping of the future position across different aspects extending 100 years into the future, usually using the best available data. Planning activities will typically refer to SMP mapping to check whether a new coastal development is allowable.
- Exploiting UKCP18 data:** The UKCP18 data provides a range of information that can be used to inform decision-making. This includes:
 - High-resolution sub-daily climate projections at the national scale.
 - High-resolution monthly climate projections at the regional scale.
 - High-resolution monthly climate projections at the local scale.
 - High-resolution monthly climate projections at the global scale.
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Moving from UKCP09 to UKCP18

The UK Climate Projections 2018 (UKCP18) will be available in November 2018 at launch. At the end of December 2018, the current service providing UKCP09 will close. The UKCP09 website will still be available in an archived format after this date, with the underlying UKCP09 data available from the CEDA catalogue. After December 2018, no material on the UKCP09 website will be updated and there will be no further access to the UKCP09 helpdesk or User Interface.

If you currently use the User Interface, or have run jobs on the User Interface in the past, please save any outputs that you need to keep to your own drive or workspace before the end of December 2018.



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

Issued on behalf of Defra, BEIS and Environment Agency by the Met Office



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