

National Climate Monitoring Products for the UK

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National Climate Information Centre

The NCIC exists to help government, public, academic and commercial customers understand and manage the risks and opportunities arising from climate variability and change. NCIC aim to provide an authoritative source of historical observational climate data products.

This poster outlines some of the core national climate data products derived from the in-situ land surface meteorological observing network. We also highlight ongoing work to ensure that our national climate monitoring is fully **traceable**, **reproducible** and pulling through the latest **underpinning science**.

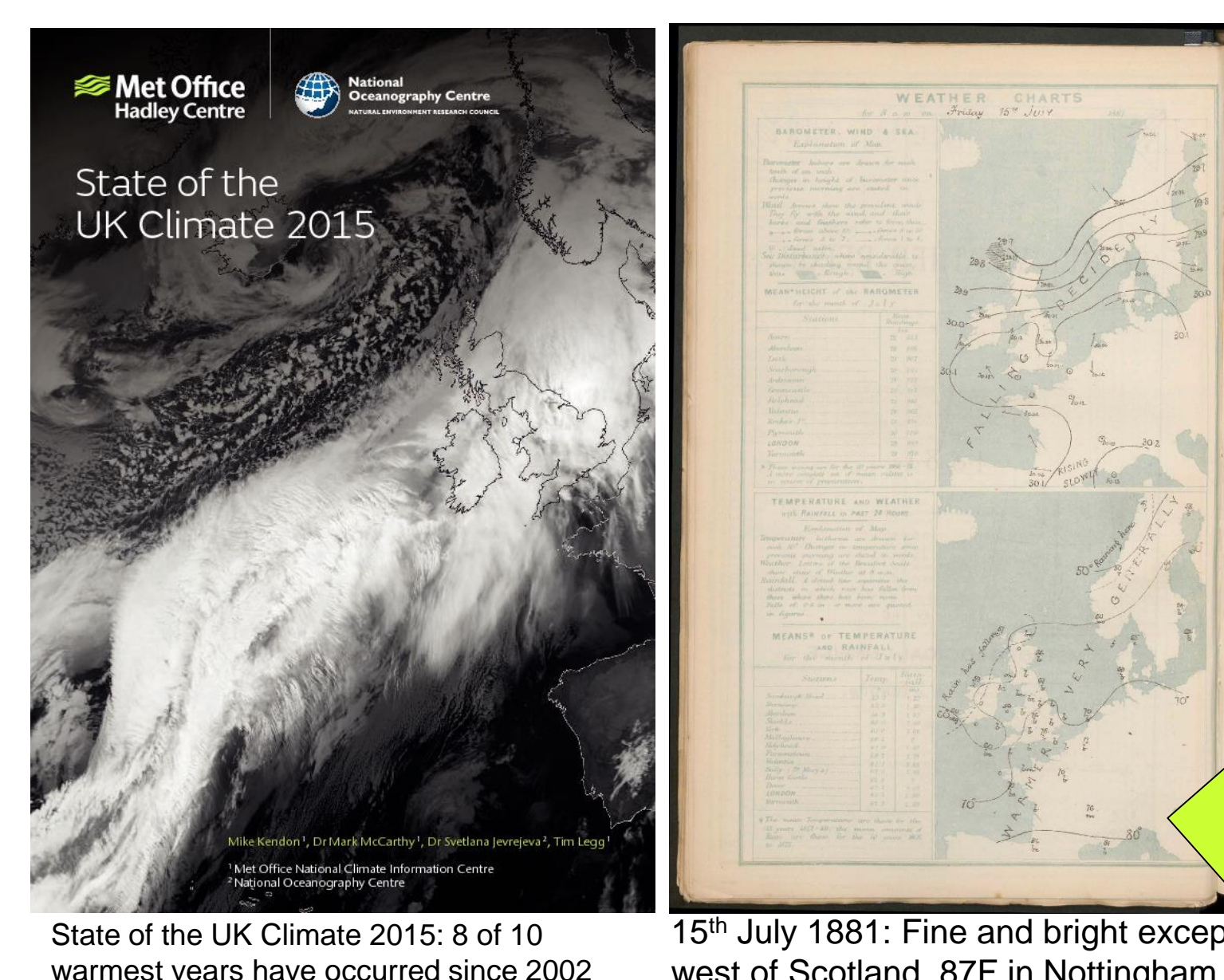
Unless stated otherwise all NCIC data products are provided under an Open Government Licence to promote their wide application and to support development of climate services. To find out more visit: www.metoffice.gov.uk/climate

Climate Summaries

The Met Office have produced a mix of daily, weekly, monthly and annual weather and climate summaries since the 1860s. They provide contextual overviews, key statistics and visualisations to place recent events into historical context.

What's new:

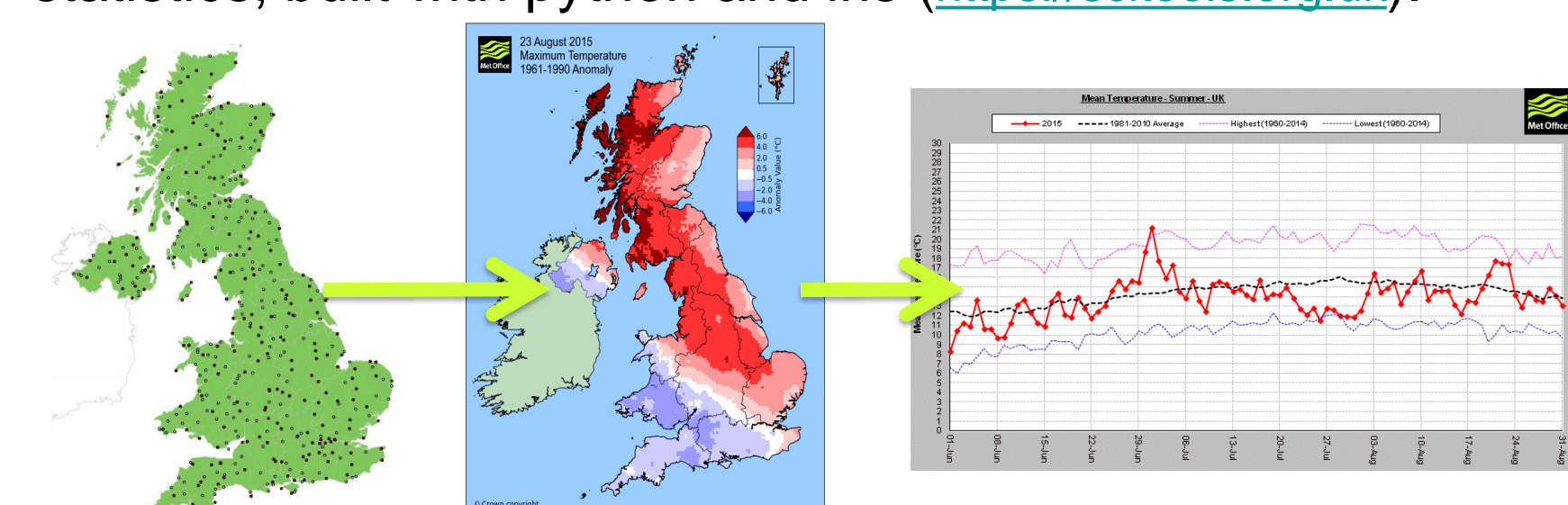
- State of the UK Climate: an annual publication providing the most up-to-date assessment of UK climate change and variability. (Kendon et al. 2016)
- Met Office library and archive provides open online access to a wide range of historical summaries. <https://digital.nmla.metoffice.gov.uk>



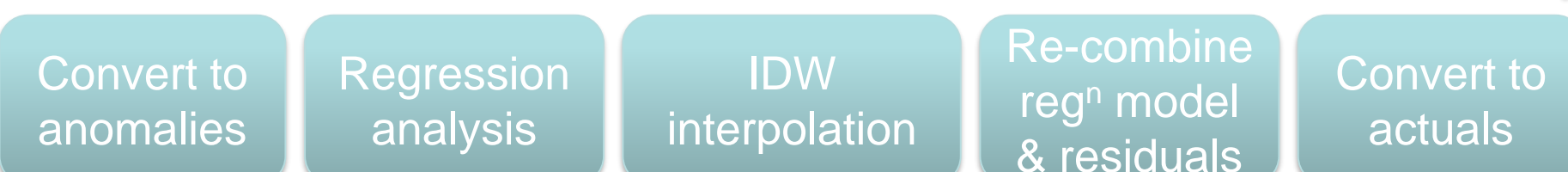
ClimateGrid



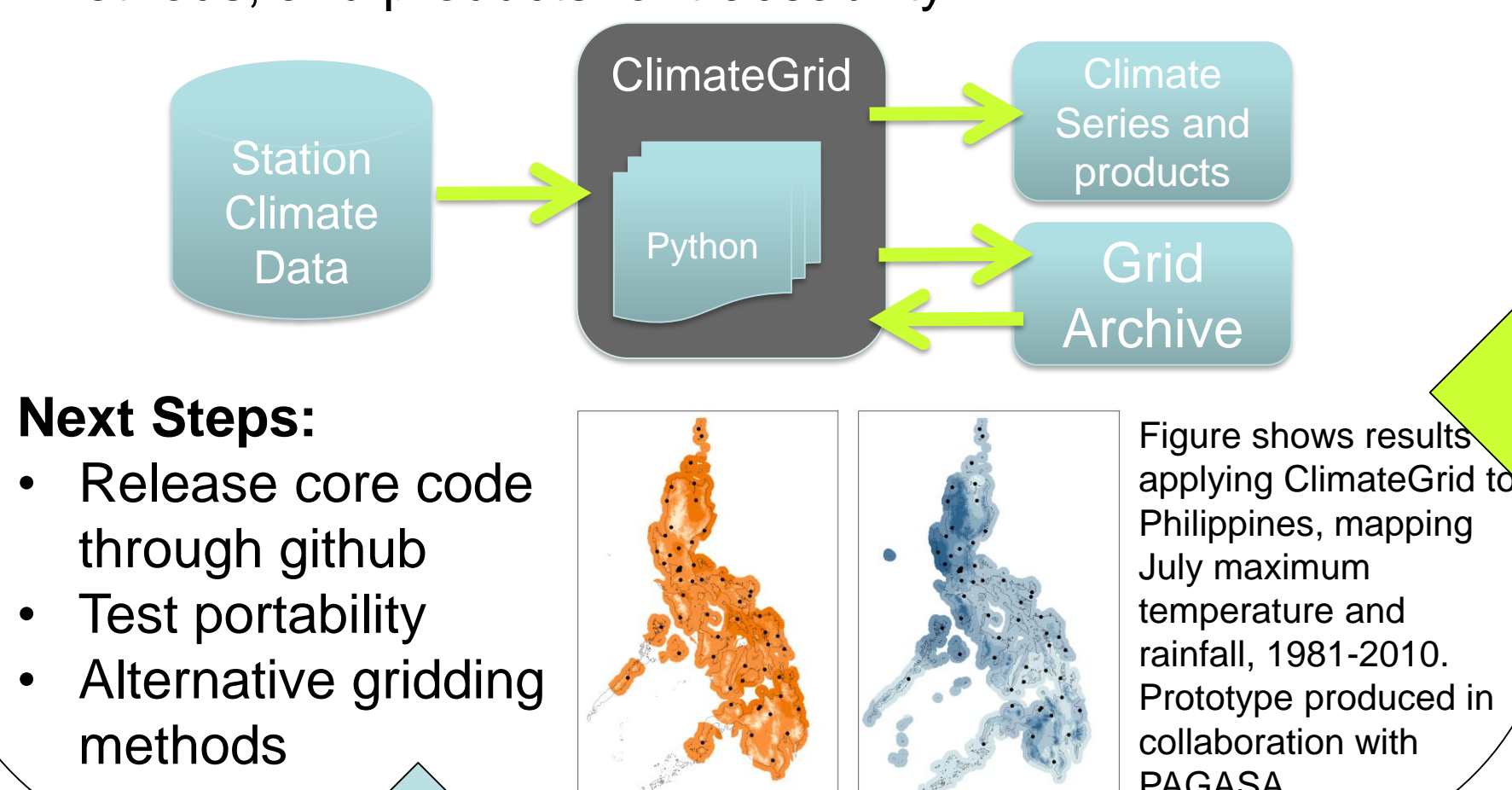
A **portable**, **modular** and **traceable** code base following **open** software standards to provide a tool kit for the generation, exploration and visualisation of UK climate statistics, built with python and iris (<https://scitools.org.uk>).



ClimateGrid interpolation transforms data through an (optional) process of conversion to anomalies and multiple linear regression model using a set of topographic predictors, before inverse distance weighted interpolation. See Perry and Hollis (2005).



ClimateGrid manages the end-to-end production of datasets and suite of pre-defined monitoring products. Version control provides reproducibility. Configuration files control metadata, methods, and products for traceability.



Next Steps:

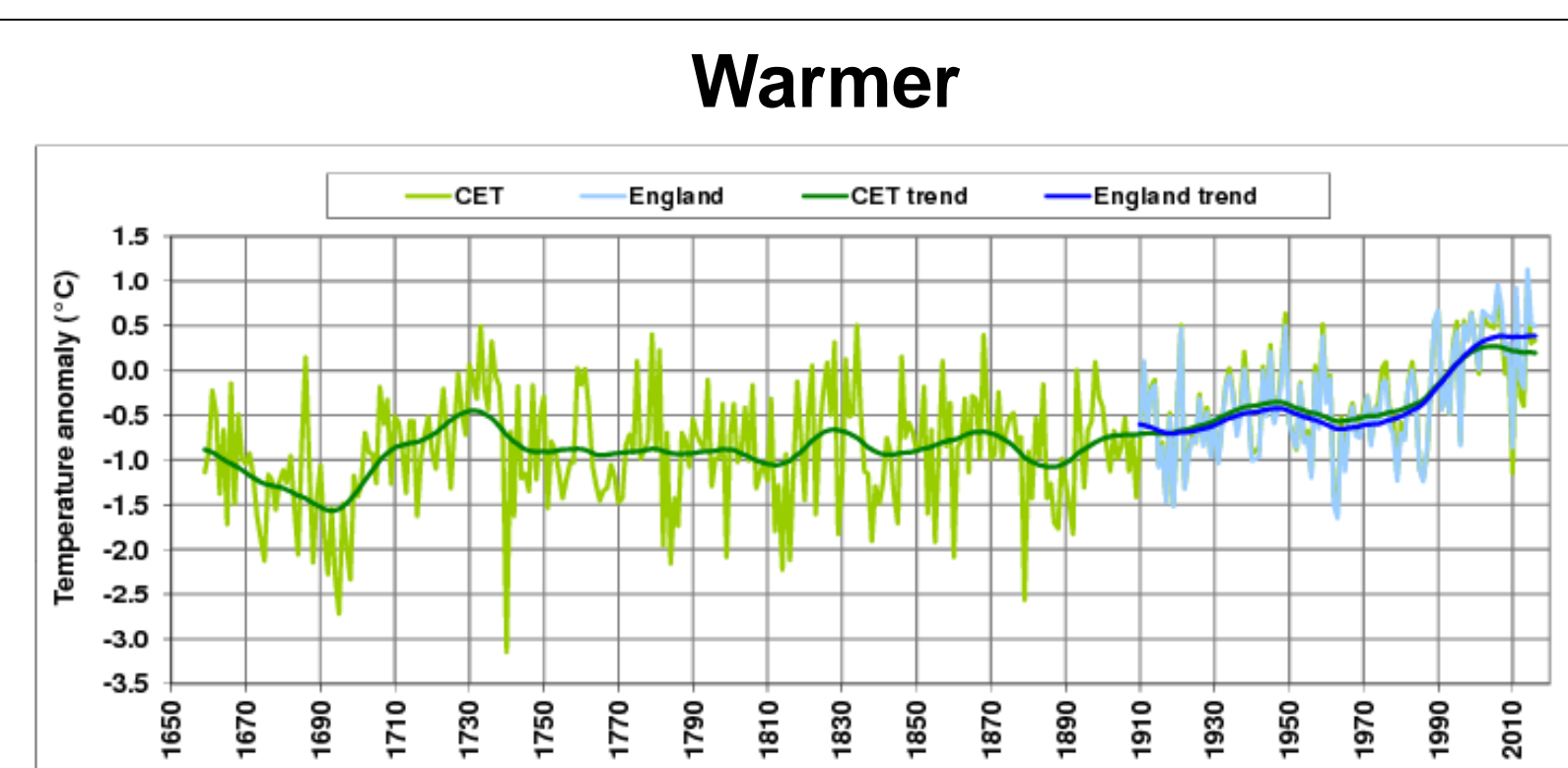
- Release core code through github
- Test portability
- Alternative gridding methods

Climate Series

Long series national and regional climate statistics for monitoring UK climate variability and change from 1910 (National), 1766 (England and Wales Precipitation) and 1659 (Central England Temperature) www.metoffice.gov.uk/climate and www.metoffice.gov.uk/hadobs

What's new:

National monthly series are being extended back from 1910 to 1862 (precipitation) and 1884 (temperature). Revised dataset due in spring 2018.



Annual mean Central England Temperature from 1659, and England series from 1910. The most recent decades are warmer than any in the last 3 centuries.

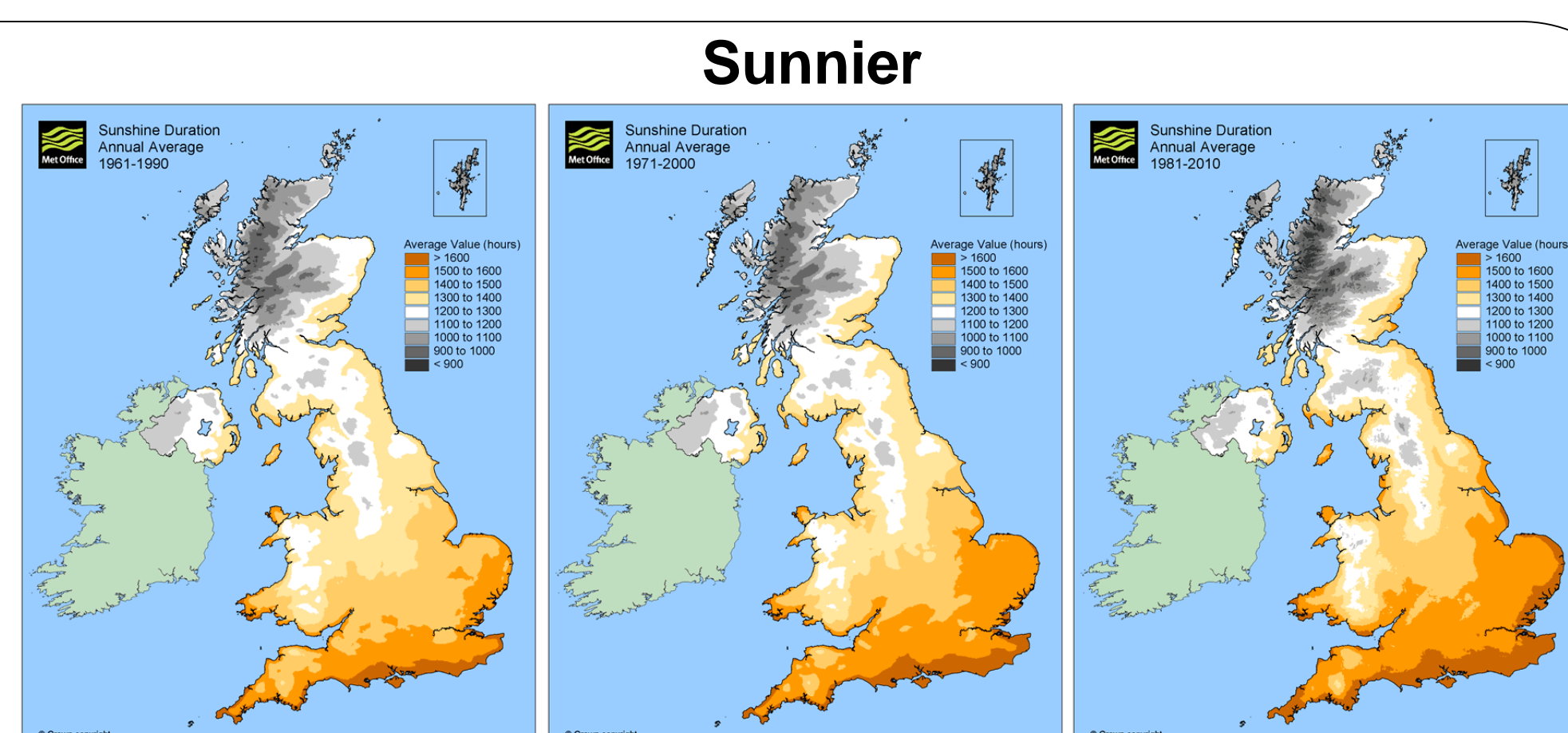
Gridded Climate Data

Users of climate data increasingly require spatially coherent gridded datasets. The NCIC provide 5 km resolution datasets of daily temperature and precipitation, a wider range of variables at monthly resolution and baseline reference climatologies. They form the basis for the national climate series described above.

www.metoffice.gov.uk/climate/uk/data/ukcp09/

What's new:

New Open Access updated and extended (see above) grid data archive at the Centre for Environmental Data Analysis – Spring 2018.



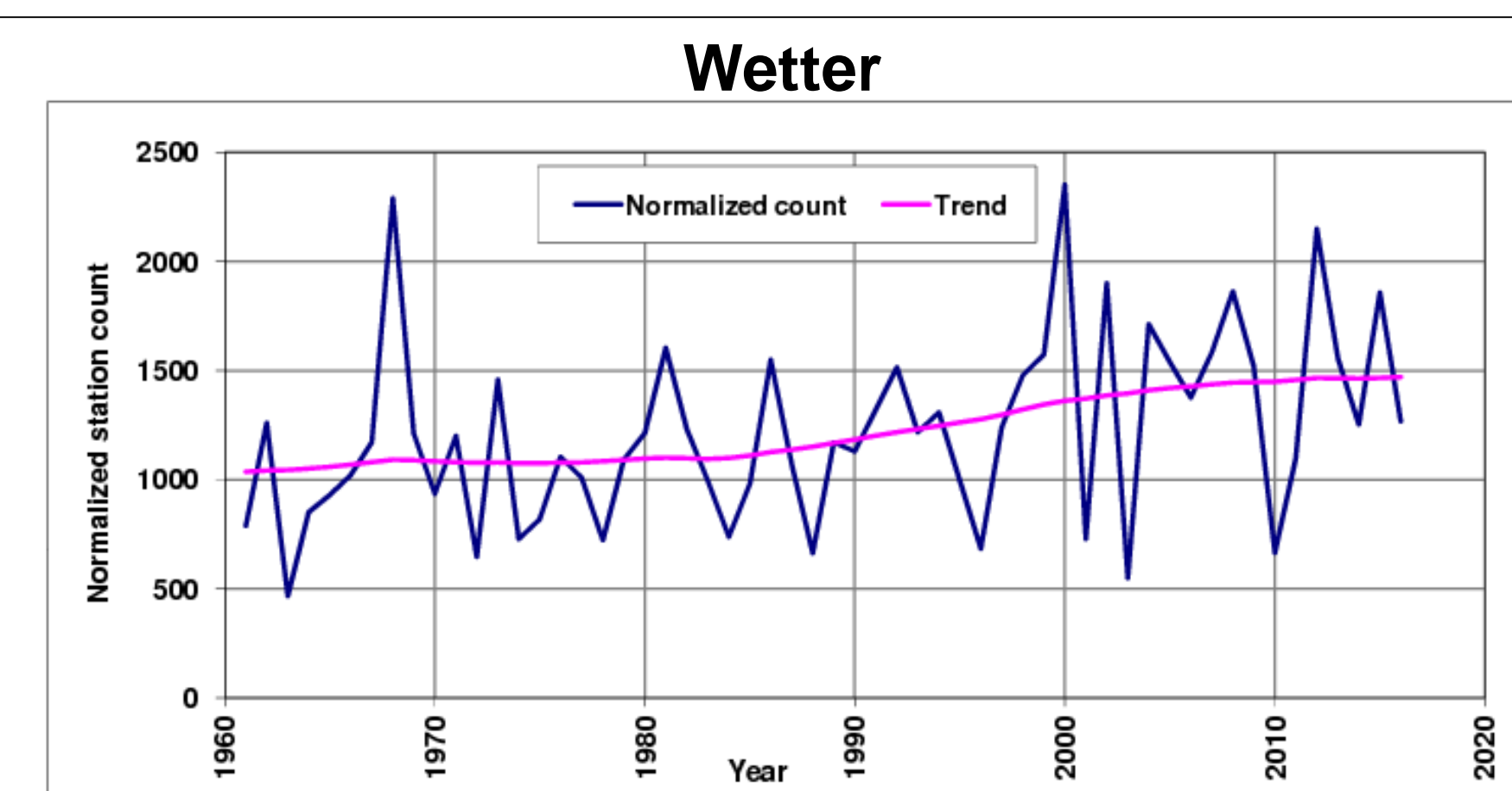
Gridded climatology of annual UK hours of bright sunshine for 1961-90, 1971-2000, and 1981-2010. UK winters and springs in particular have become sunnier.

Station Climate Data

Long term average and monthly climate statistics for a set of UK climate stations are available under open licence through the Met Office www.metoffice.gov.uk/climate. The Met Office Integrated Data Archive System (MIDAS) containing hourly and daily data back to 1853 is held for academic users at the Centre for Environmental Data Analysis www.ceda.ac.uk

What's new:

MIDAS-open a **new open access** archive of historical station observations – coming soon.



Count of number of rain gauges recording at least 50mm rainfall in one day. The series has been normalised to adjust for changes in the size of the station network.

Pull through of underpinning science and data

Highlighting research themes, gaps and future challenges

Methods

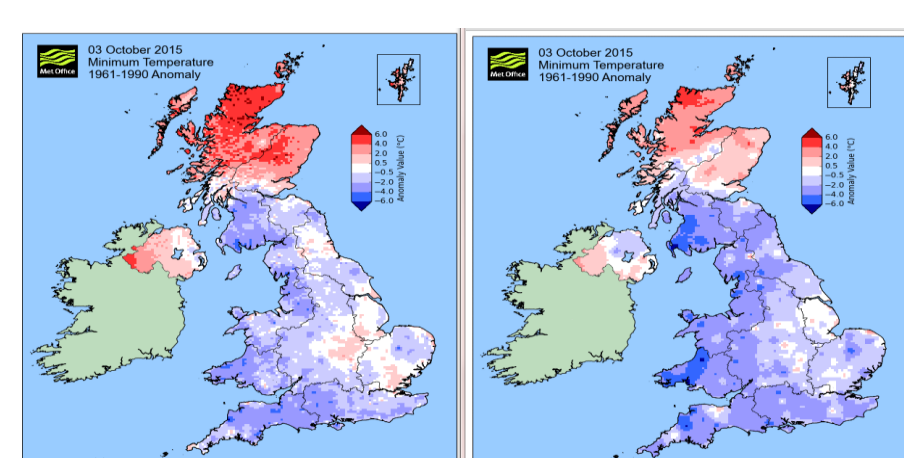
Ongoing research and engagement with the wider research community is required to pull-through the latest developments in science and methodology relating to:

- Geostatistical analysis**
Improving spatial interpolation methods
- Uncertainty modelling**
Quantifying uncertainty (e.g. Legg, 2014a)
- Homogenisation**
Identifying and understanding non-climatic bias in UK climate series using station history archives (e.g. Legg, 2014b)

Observations

Challenges and opportunities from developing observing networks:

- Remote sensing
- Sub-hourly data
- Alternative observations e.g. Weather Observations Website (WOW) <https://wow.metoffice.gov.uk>



A comparison of daily minimum temperature maps estimated from (left) WOW and (right) the official climate network using ClimateGrid.

Historical Archives

Only a fraction of UK meteorological observations are digitally available. A vast wealth of historical data exists in the national meteorological archives at Met Office in Exeter and other archives around the country. Data recovery activities can be used to improve our understanding of historical climate change and extreme events.

What's new:

Recent digitisation activity focussed on:

- Monthly rainfall 1862 to 1909 from approximately 200 sites.
- Monthly temperature 1884 to 1909 from approximately 50 sites.
- ~2.5 million daily observations 1873 to 1958 from approximately 30 sites.

References

- Kendon M, McCarthy, M., Jevrejeva S, and Legg T. 2017. State of the UK Climate 2016, Met Office, Exeter, UK. <http://www.metoffice.gov.uk/climate/uk/about/state-of-climate>
- Legg T P. 2014a. Uncertainties in gridded area-average monthly temperature, precipitation and sunshine for the United Kingdom. *Int. J. Climatol.* doi: 10.1002/joc.4062
- Legg T P. 2014b. Comparison of daily sunshine duration recorded by Campbell-Stokes and Kipp and Zonen sensors. *Weather* 69: 264-267 doi: 10.1002/wea.2288
- Perry, M. and Hollis, D. 2005. The generation of monthly gridded datasets for a range of climatic variables over the UK. *Int. J. Climatol.*, 25: 1041-1054. doi: 10.1002/joc.1161
- Perry, M. and Hollis, D. 2005. The development of a new set of long-term climate averages for the UK. *Int. J. Climatol.*, 25: 1023-1039 doi: 10.1002/joc.1160
- Met Office. Iris. [git@github.com:SciTools/Iris.git](https://github.com:SciTools/Iris.git)
- Open Government Licence: <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>