

# Development of High Resolution Weather Scenarios for the EPSRC/UKCIP Initiative

## Team leader:

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## Project research partners:

- Climatic Research Unit (CRU), University of East Anglia (led by Clare Goodess)
- Water Resource Systems Research Laboratory (WRSRL), University of Newcastle (led by Chris Kilsby)
- Hadley Centre, Met. Office (Richard Betts and Martin Best)



## Project aims and objectives:

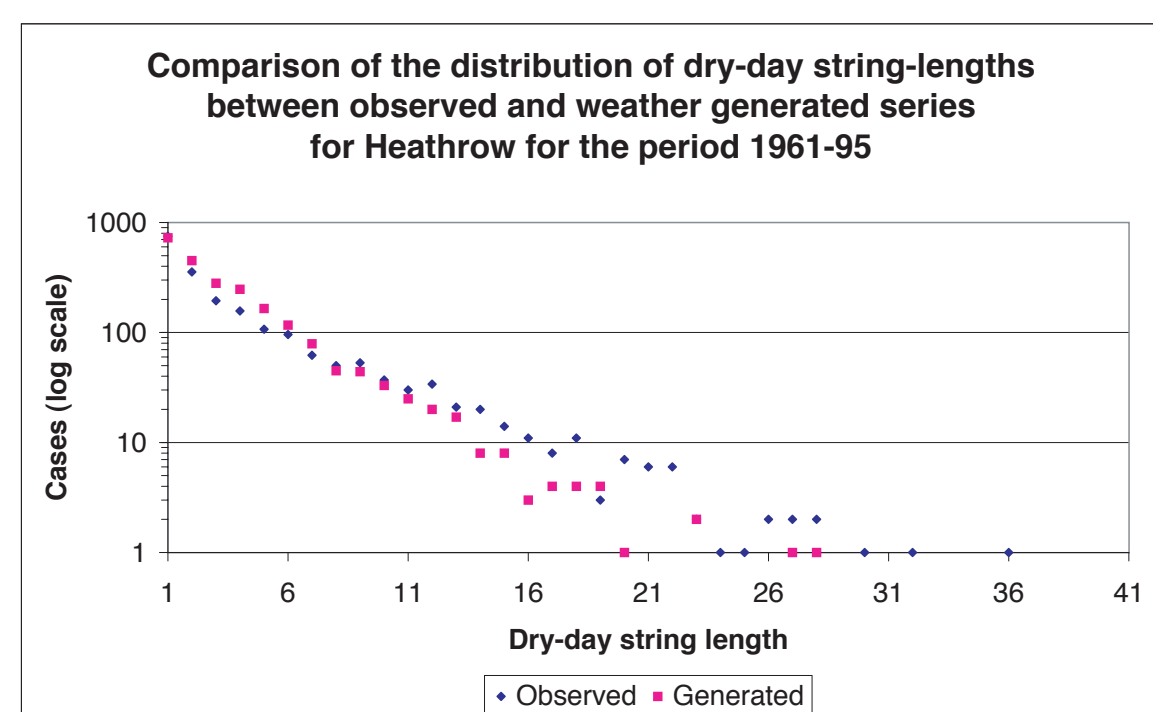
- To provide high spatial/temporal resolution state-of-art climate scenarios for selected case-study locations as a common service to projects funded under the programme
- To provide continuing support and advice to the users of these scenarios

## Project summary

In order to develop high-resolution climate change scenarios for key locations, this project will use computer-based weather generators and statistical models to produce common source datasets for the other projects in the programme. The basis of this additional data will be the UKCIP02 climate change scenarios, which will be developed for shorter time periods (daily and sub-daily) and higher spatial resolution (5 km grid boxes and point locations rather than a 50 x 50 km grid), focusing on climate variables which are of greatest concern to the built environment. The project will also address issues of scenario uncertainty and provide further information on potential changes in the "urban heat island" effect.

This project will act as a service to the other projects in the initiative and develop best practice in the application of climate change scenarios. At the end of the project, the new scenario data that is generated will be made more widely available.

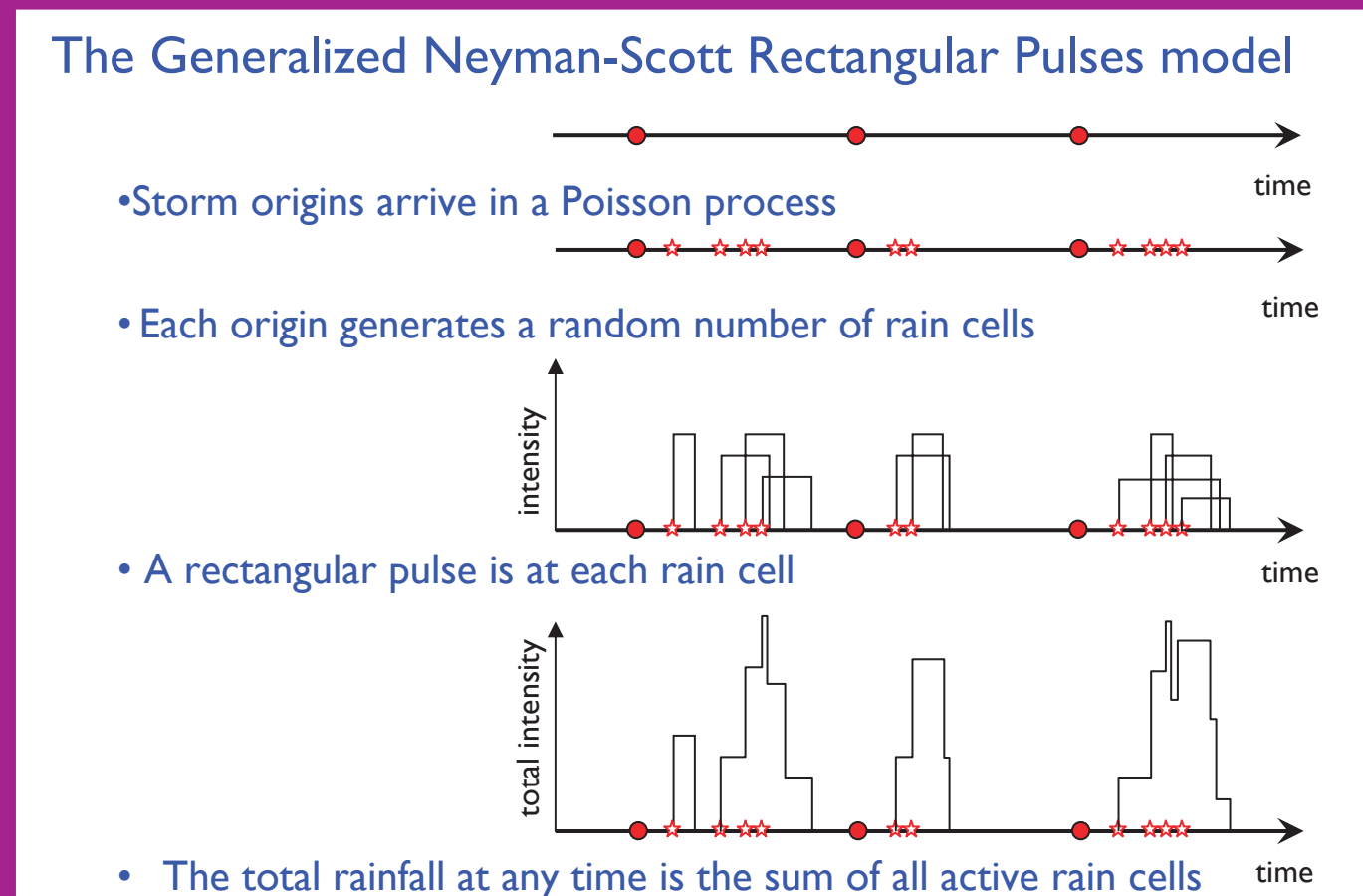
## CRU weather generators



CRU will develop improved weather generators, together with methodologies for perturbing their parameters based on the UKCIP02 scenarios and to quantify some of the uncertainties relating to emissions scenarios and inter-/intra-model variability, in order to construct daily and hourly time series of precipitation, mean temperature, diurnal temperature range, vapour pressure/relative humidity, sunshine duration, wind speed and potential evapotranspiration.

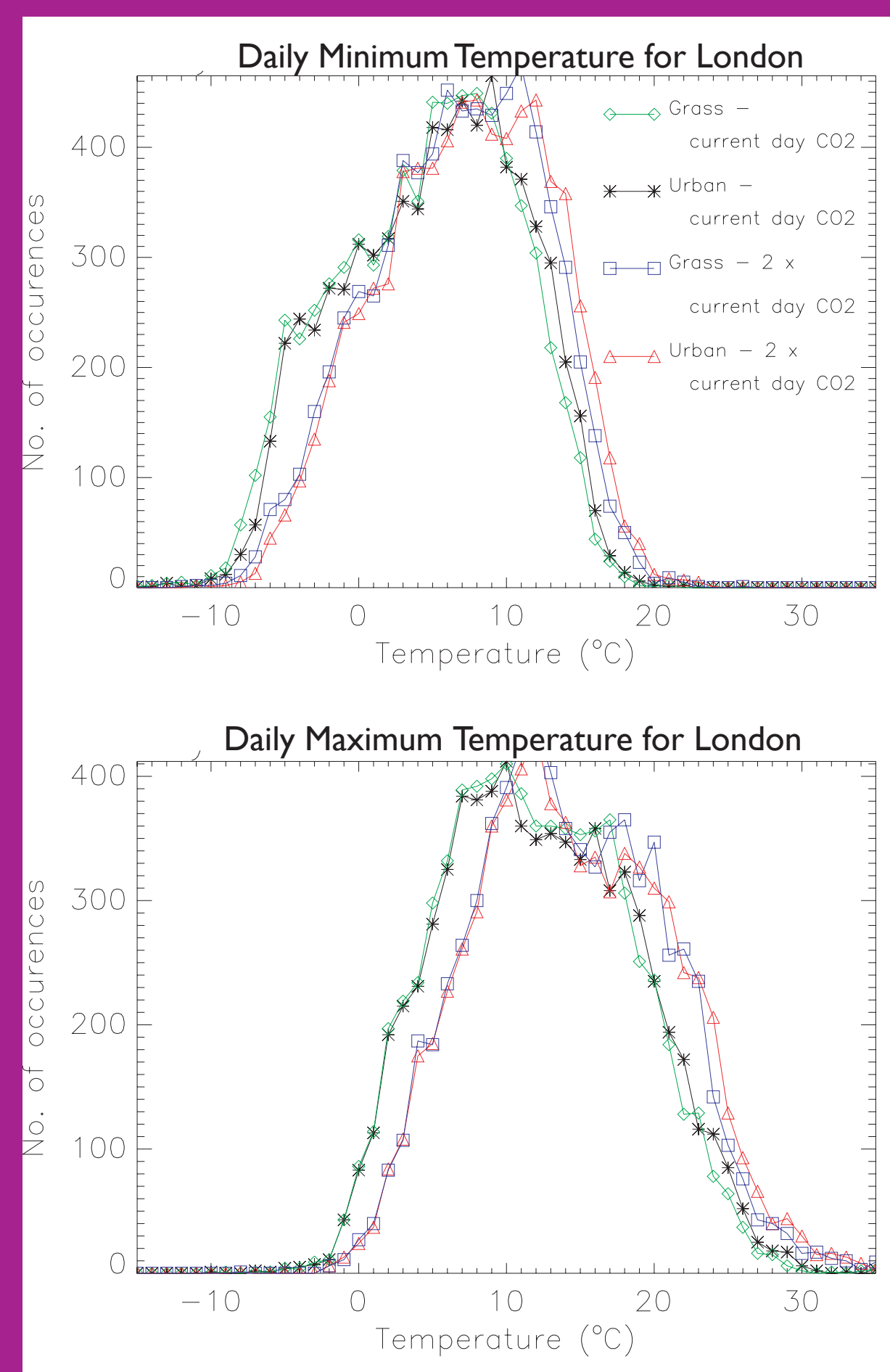


## WRSRL rainfall scenarios



WRSRL will develop a software package to run the GNSRP model for any given UK location (at a 5 km resolution) in order to produce precipitation time series at daily, hourly or 15 minute time resolution and of any length (e.g., 10, 1000, 10,000 years) for the present-day and for the future incorporating changes projected by the UKCIP02 scenarios. The model will also be extended to allow for changing proportions of convective/frontal rainfall in the future.

## Hadley Centre scenarios for urban areas



Using a new land-surface tiling scheme in the HadAM3 general circulation model, the Hadley Centre is, for the first time, in a position to provide global climate predictions which take account of urban effects. Comparison of output for urban and rural locations will allow investigation of changes in the urban heat island and the importance of urban heat sources in the current climate (1xCO<sub>2</sub>) and how this might change in the future (2xCO<sub>2</sub>).



## Uncertainties and reliability

Assessments of scenario reliability will be undertaken, for example, by comparisons with observed weather data for the present day. Where possible, levels of confidence will be assigned using expert judgement and the UKCIP02 terminology (i.e., high/medium/low confidence). If necessary, it will be made clear that not even a low confidence level can be assigned to particular variables/scenarios. The UKCIP02 scenarios report, for example, does not even assign a low confidence level to the wind scenarios. Thus this project will investigate whether more reliable wind scenarios can be developed from information about storm-track changes.

High-resolution scenarios will be provided for the four UKCIP02 emissions scenarios, i.e., low, medium-low, medium-high and high, based on the HadRM3 simulations (for consistency with UKCIP02) and for a limited number of additional scenarios/models (to reflect a wider range of uncertainty). An even wider range of uncertainty, particularly with respect to changes in extreme events, will be addressed as part of the CRANIUM project.

Information about uncertainties and reliability will be disseminated with the scenarios and in a series of information sheets. They will also be discussed at the second project workshop which will provide advice on scenario use and answer user questions/comments. The first project workshop will finalise the requirements of end users from the other projects.