PROJECT PROPOSAL FORM

PROJECT TITLE: Climate change weather generators for built environment design

SUPERVISOR(S) Dr Clare Goodess and Professor Phil Jones, UEA with Dr Jake Hacker, Arup

PROJECT DESCRIPTION (maximum 300 words)

Background

Weather generators (WGs) are a method to produce long-time series weather information to provide a basis for climate and climate change impacts assessments. WGs work by stochastically generating weather information using meteorological rules relating weather variables combined with statistical information regarding local climate. WG models have been produced that provide daily timeseries for sets of correlated variables, for example precipitation and temperature, and have been widely used in hydrology and agriculture impacts studies. For some applications, however, a wider set of correlated weather variables is required and this poses additional methodological challenges. One such area is built environment design, for which correlated data at hourly resolution across the range of weather variables is required, including temperature, humidity, wind speed and direction and direct and diffuse solar radiation. These data are used to assess indoor and outdoor thermal comfort and the energy consumption of the associated heating, cooling and ventilation systems and form an important part of building and urban design codes and standards. The ability to supply accurate and representative weather data sets for such models is therefore crucial to the societal objective of achieving a sustainable and low-carbon built environment.

Proposed work, methodology and outputs

This project aims to develop further, refine and validate stochastic generation approaches to comprehensive weather variables sets with application to built environment design. The work will be carried out at the Climatic Research Unit (CRU), in the School of Environmental Sciences at the University of East Anglia (UEA) in conjunction with the Environmental Physics team at Arup (www.arup.com) as Industrial partner. CRU has developed a weather generator (Kilsby *et al*., 2007) which is currently being further developed to provide daily and hourly time series data as part of the delivery package for the next set of national UK climate change scenarios (UKCIP08). This model will form the basis of the WG to be developed over the project. The work at Arup will involve applying the WG to building and urban design scenarios.

REFERENCES (up to 5)

Goodess, C.M., Hall, J., Best, M., Betts, R., Cabantous, L., Jones, P.D., Kilsby, C.G., Pearman, A. and Wallace, C.J., 2007: Climate scenarios and decision making under uncertainty, *Built Environment*, **33**, 10-30.

Hacker, J.N. and Holmes, M.J., 2007: Thermal comfort: Climate change and the environmental design of buildings in the United Kingdom, *Built Environment*, **33**, 97-114.

Hacker, J.N., Belcher, S.E., Goodess, C.M., Holmes, M.J. and Roaf, S., 2007: Building scale climate scenarios: inclusion of climate change and application to the design of climatically-sensitive buildings, *Planning and Environment B*, in press.

Kilsby, C.G., Jones, P.D., Harpham, C., Burton, A., Ford, A.C., Fowler, H.J., Smith, A. and Wilby, R.L., 2007: A daily weather generator for use in climate change studies, *Environmental Modelling and Software*, **22**, 1705-1719.

CIBSE TM36 *Climate change and the indoor environment. Impacts and Adaptation.* Chartered Institution of Building Services Engineers. London. 2005. See also:
Beating the Heat. UK Climate Impacts Programme Briefing Report. 2005.

Information about BENCH FEES (even a rough estimate is helpful for applicant queries)

Standard bench fees charged by School of Environmental Sciences, currently £1000 per year.

Do you have specific FUNDING for this project?

Yes – it is anticipated that this studentship will be funded by the EPSRC and Arup, although final confirmation is not likely to be available until early Spring 2008.

SOURCE of FUNDING EPSRC Industrial CASE studentship with Arup

CONDITIONS of FUNDING (e.g. Home/EU)

Home

AMOUNT of FUNDING for the student (fees, stipend, bench fees etc)

Standard EPSRC Studentship award (typically £60k over 3.5 years with minimum student stipend of around £12.5k) + CASE top up (see below).

OTHER FUNDING INFORMATION (e.g. CASE partner details)

The CASE funding from Arup is 1/3rd of the EPSRC award. A proportion of this provides a top-up for the student stipend and the remainder to cover bench fees, consumables, etc.

DEADLINE associated with FUNDING

Arup

would require a student to have been found by start August 2008 and the project to have commenced by Jan 2009.

RESEARCH AREA/THEME (please mark all that apply across SCI – double click on relevant boxes and mark checked)

ENV

☒ Atmospheric Sciences

☐ Ecology

☐ Environmental Earth Sciences

☐ Environmental Social Sciences

☐ Marine Sciences

BIO

☐ Cells and Tissues

☐ Molecules and Pathways

☐ Organisms and the Environment

CMP

☐ Computational Biology

☐ Imaging, Graphics and Vision

☐ Mathematical Modelling and Algorithms (KDD, Optimisation, TLM)

☐ Speech, Language and Virtual Humans

CHE

☐ Synthetic Chemistry

☐ Physical and Analytical Chemistry

☐ Biological Chemistry

PHA

☐ Drug Delivery and Materials Characterisation

☐ Cell Biology

☐ Medicinal Chemistry

☐ Pharmacy Practice

MTH

☐ Pure

☐ Applied

ACCEPTABLE FIRST DEGREE (please indicate acceptable first degree subject areas – list all that apply):

Meteorology, Physics, Applied mathematics, Atmospheric physics