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Dr Jonathan Eden PhD

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School of Geography, Earth and Environmental Sciences

About

Jonathan Eden's research primarily focuses on the effect of climate change on regional-scale precipitation. He has a particular expertise in developing statistical downscaling techniques for precipitation simulated in climate models. Jonathan currently works on the international research project PLEIADES, which aims to develop a statistical correction method for simulated precipitation, with a specific focus on extreme events.

Qualifications

- Ph.D Climate Science, University of Birmingham
- MSc Applied Meteorology and Climatology, University of Birmingham
- BSc (Hons) Geography, University of Birmingham

Biography

Jonathan completed his Ph.D here at Birmingham in 2011. His thesis focused on the development of a downscaling correction approach for future precipitation changes simulated by global climate models. Upon finishing his Ph.D, Jonathan accepted a position as a Research Fellow on a NERC-funded project investigating climate reconstruction and predictability in Ethiopia.

In October 2011, Jonathan began work on the PLEIADES project funded by the Volkswagen Foundation. Much of the work undertaken during his Ph.D thesis contributed towards the successful grant application for PLEIADES and Jonathan is currently furthering some of the downscaling methods he has developed over the last few years.

Teaching

Jonathan teaches on the following modules of the **Applied Meteorology and Climatology MSc (http://www.birmingham.ac.uk/postgraduate/courses/taught/gees/applied-met-climatology.aspx)** .

- Weather Forecasting and Climate Modelling (M2)
- Atmospheric Data Processing and Statistics (M3)

Jonathan also co-supervises a number of MSc dissertation students.

Research

Research groups

- **Climate and atmosphere (http://www.birmingham.ac.uk/research/activity/environmental-health/themes/climate/index.aspx)**
- **Geosystems (http://www.birmingham.ac.uk/research/activity/geosystems/index.aspx)**

Research Interests

- Global climate modelling
- Past and future climate change
- Statistical downscaling for precipitation
- Precipitation extremes

Current / Recent Research

PLEIADES: Statistical downscaling for precipitation extremes

Extreme precipitation events constitute major natural hazards. Reliable estimates of precipitation changes are required at local scales where impacts are most keenly felt. However, the limited spatial resolution and the systematic errors of precipitation simulated in General Circulation Models (GCMs) make direct estimates of future daily precipitation from GCMs unrealistic. As part of the international research project PLEIADES (funded by the Volkswagen Foundation) we aim to develop a correction approach based on Model Output Statistics (MOS) to downscale GCM-simulated daily precipitation distributions. Skilful downscaling models will be applied to GCM simulations for the 21st century in order to produce more meaningful projections of local- and regional-scale precipitation, including extreme events.

Collaborators: ***Dr Martin Widmann (http://www.birmingham.ac.uk/schools/gees/people/profile.aspx?ReferenceId=10968&Name=dr-martin-widmann)*** *, Dr Douglas Maraun (GEOMAR, Kiel), Dr Mathieu Vrac (LSCE-IPSL, Gif-sur-Yvette).*

VALUE: Validating and Integrating Downscaling Methods for Climate Change Research (EU COST Action ES1102)

Understanding the skill of methods used to downscale future scenarios is a crucial component of climate change science. However, many aspects of downscaling methods, including the representation of extreme events and spatial coherence, have not been systematically validated. The COST Action **VALUE (http://www.value-cost.eu/)** (2011-2015) provides a research network across Europe and facilitates the interaction of various research communities with stakeholders. Over the course of four years, VALUE will deliver an assessment of end-user needs, a benchmark dataset and a comprehensive validation of a suite of downscaling methods. Jonathan is a member Working Group 4, which specifically aims to review, validate and improve methods to downscale extremes.

Validation of GCM-simulated precipitation

The reliability of General Circulation Model (GCM) projections of future precipitation is usually based simply on the degree of consensus amongst multiple GCMs. More meaningful projections should ideally consider the errors and biases associated with each GCM. We conduct 'nudged' simulations of the ECHAM5 GCM on the University of Birmingham's BlueBEAR Linux cluster in which the circulation and temperature fields are forced towards corresponding quasi-observations. In forcing the large-scale climatic state into temporal phase with the observed record, it is possible to compare the sequence of events in observed and simulated precipitation, and thus identify regions where performance in representing temporal variability is strong.

Collaborators: ***Dr Martin Widmann (http://www.birmingham.ac.uk/schools/gees/people/profile.aspx?ReferenceId=10968&Name=dr-martin-widmann)***, *Dr Sebastian Rast (Max Planck Institute for Meteorology, Hamburg), David Grawe (University of Hamburg).*

Other activities

- Member of Working Group 4 (Extremes) within the European research network **VALUE (http://www.value-cost.eu/)** (EU COST Action ES1102).
- Reviewer for a number of scientific journals, including International Journal of Climatology, Climatic Change and Journal of Geophysical Research - Atmospheres.
- Member of the European Geosciences Union.
- Member of the British Hydrological Society.
- Associate Fellow of the Royal Meteorological Society.

Awards

- Ph.D School Studentship (2007-2010)
- MSc NERC Studentship (half award) (2004-05)

Publications

Peer reviewed journal articles

Eden, J.M., Widmann, M. and Smith, R. MOS correction and downscaling of simulated precipitation during the last millennium (in preparation).

Eden, J.M., Widmann, M., Maraun, D. and Vrac, M. Comparison of GCM- and RCM-simulated precipitation following stochastic postprocessing, Journal of Geophysical Research - Atmospheres (submitted).

Wong, G., Maraun, D., Vrac, M., Widmann, M., **Eden, J.M.** and Kent, T. Stochastic model output statistics for bias correcting and downscaling precipitation including extremes, Journal of Climate (in press).

Eden, J.M. and Widmann, M. 2014. Downscaling of GCM-simulated precipitation using Model Output Statistics, Journal of Climate, 27 (1), 312–324. [**http (http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-13-00063.1)** | **pdf (http://journals.ametsoc.org/doi/pdf/10.1175/JCLI-D-13-00063.1)**]

Eden, J.M., Widmann, M. and Evans, G.R. 2014. Pacific SST influence on spring precipitation in Addis Ababa, Ethiopia, International Journal of Climatology, 34 (4), 1223-1235. [**http (http://onlinelibrary.wiley.com/doi/10.1002/joc.3759/abstract;jsessionid=9A41F710A07D8494E901AA3C504B0A7B.f03t04)** | **pdf (http://onlinelibrary.wiley.com/doi/10.1002/joc.3759/pdf)**]

Eden, J.M., Widmann, M., Grawe, D. and Rast, S. 2012. Skill, correction and downscaling of GCM-simulated precipitation, Journal of Climate, 25 (11), 3970-3984. [**http (http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-11-00254.1)** | **pdf (http://journals.ametsoc.org/doi/pdf/10.1175/JCLI-D-11-00254.1)**]

Jex, C.N., Baker, A., **Eden, J.M.**, Eastwood, W.J., Fairchild, I.J., Leng, M.J., Thomas, L. and Sloane, H.J. 2011. A 500 year speleothem derived reconstruction of late autumn-winter precipitation, North East Turkey, Quaternary Research, 75 (3), 399-405. [**http (http://www.sciencedirect.com/science/article/pii/S0033589411000160)** | **pdf (http://ac.els-cdn.com/S0033589411000160/1-s2.0-S0033589411000160-main.pdf?_tid=331770da-f071-11e3-bbff-00000aab0f6c&acdnat=1402385653_953a99134cf376eb017cb87986ec37eb)**]

Non-peer reviewed publications

Hemida, H. et al. (inc. **Eden, J.M.**) 2014. Birmingham Environment for Academic Research: Case Studies - Volume 2, Project Report, University of Birmingham, UK. [**http (http://epapers.bham.ac.uk/1887/)** | **pdf (http://epapers.bham.ac.uk/1887/5/BEAR-Case-Studies-Vol2.pdf)**]

Selected conference presentations

Eden, J.M., Widmann, M., Maraun, D. and Vrac, M. Downscaling for extreme and non-extreme daily precipitation using GCM model output statistics, EGU General Assembly, Vienna, Austria, 27 April - 2 May 2014.

Eden, J.M., Widmann, M., Maraun, D. and Vrac, M. Event-wise MOS correction of daily precipitation from GCM and RCM simulations, EMS Annual Meeting, Reading, UK, 09-13 September 2013.

Eden, J.M., Widmann, M., Wong, G., Maraun, D., Vrac, M. and Kent, T. MOS downscaling of RCM- and GCM-simulated daily precipitation, EGU General Assembly, Vienna, Austria, 07-12 April 2013.

Eden, J.M., Widmann, M., Wong, G., Maraun, D., Vrac, M. and Kent, T. MOS correction of GCM- and RCM-simulated daily precipitation, International Symposium on Extreme Events: Modelling, Analysis and Prediction, Hanover, Germany, 13-15 February 2013.

Eden, J.M. and Widmann, M. Downscaling precipitation projections using event-wise MOS correction of GCM simulations, International VALUE Conference on "End User

Needs for Regional Climate Change Simulations", Kiel, Germany, 07-09 March 2012.

Eden, J.M. and Widmann, M. Statistical downscaling of future changes in European precipitation using Model Output Statistics, AGU Fall Meeting, San Francisco, USA, 13-17 December 2010.

Eden, J.M. and Widmann, M. Estimating future changes in daily precipitation distribution from GCM simulations, 11th International Meeting on Statistical Climatology, Edinburgh, UK, 12-16 July 2010.

Eden, J.M. and Widmann, M. Statistical downscaling of GCM-simulated precipitation using Model Output Statistics. EGU General Assembly, Vienna, Austria, 02-07 May 2010.

Eden, J.M., Widmann, M., Grawe, D. and Rast, S. Validating simulated precipitation in GCMs. 4th International Verification Methods Workshop, Helsinki, Finland, 4-10 June 2009.

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