

DOUGLAS KELLEY

VEGETATION MODELLER

SUMMARY

Academic qualification

2014 PhD Ecology

Macquarie University, Department of Biological Sciences, Ryde, NSW, Australia
Modelling Australian fire regimes
Benchmarking and developing the LPX Dynamic Global Vegetation Model (DGVM) to improve the simulation of fire and fire-vegetation interacting. Using this new version of LPX to simulate fire, vegetation and carbon dynamics in Australia over the 21st century

2008 MSc Earth System Science

University of Bristol, Department of Earth Sciences, UK
Main dissertation: Statistical modelling of global fire regimes.
Other subjects covered: Climate change science and policy; Earth system modelling; Natural hazards; Remote sensing & GIS; Isotopes and other Earth System tracers

2007 BSc (Hons.) Physics

University of Warwick, Department of Physics, UK
Main dissertation: Modelling atmospheric effects on starlight.

Employment History

Apr 2015-present

Postdoctoral Research Assistant

Department of Geography & Environmental Science, University of Reading, UK.

Jun 2014-Mar 2015

Postdoctoral Research Assistant

Department of Biological Sciences, Macquarie University, Ryde, NSW, Australia.

Sep 2008-Sep 2010

Research Assistant

Department of Geographical Sciences, University of Bristol, UK.

Publications

Total Citations: 190

H index: 6

i10 index: 3

Awards

2010-2014
Macquarie

2013
Post

2011
Biology

University
Research
Excellence
Scholarship

Macquarie
University, Ryde,
NSW, Australia

Graduate
Research
Fund (PGRF)

Macquarie
University, Ryde,
NSW, Australia

postgrad
conference
best
presentation

Biological
Sciences,
Macquarie
University, Ryde,
NSW, Australia

Current Research Interests

Vegetation-climate dynamics and ecosystem modelling, including:

- Fire dynamics and fire—climate—vegetation interactions.
 - Wildfire impacts (on e.g vegetation, carbon-cycle, hydrology)
 - Vegetation disturbance resistance and recovery
 - Vegetation model benchmarking and diagnosis
 - Plant resource allocation strategies.
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FULL CURRICULUM VITAE

Personal Details

Name: Dr Douglas I Kelley Date of Birth: 06/08/1984 Nationality: British

Work Address

Department of
Geography &
Environmental
Science
University of Reading
Whiteknights
Reading
RG6 6AB
UK

Home Address

Flat 40
18 Oxford Road
Reading
Berkshire
RG1 7LB
UK

Email:

douglas.i.kelley@gmail.com

Phone: +44 (0) 7936 726
819

Web:

<http://dougask3.github.io/>

Higher Education

PhD Ecology

Macquarie University, Department of Biological Sciences, Ryde, NSW,
Australia Modelling Australian fire regimes **2010-2014**

Benchmarking and developing the LPX Dynamic Global Vegetation Model (DGVM) to improve the simulation of fire and fire-vegetation interacting. Using this new version of LPX to simulate fire, vegetation and carbon dynamics in Australia over the 21st century. Thesis can be downloaded from goo.gl/9YjwKw

MSc Earth System Science

University of Bristol, Department of Earth Sciences, UK **2007-2008**

Main dissertation: Wildfires as part of the global carbon cycle: Quantitative analysis using data assimilation

Other subjects covered: Earth system modelling; Natural hazards; Remote sensing & GIS; Isotopes and other Earth System tracers; Climate change science and policy

BSc (Hons.) Physics

University of Bristol, Department of Earth Sciences, UK **2002-2007**

Main dissertation: Modelling atmospheric effects on starlight

Employment History

Postdoctoral Research Assistant

Department of Geography & Environmental Science, University of Reading,
UK. **April 2015-present**

Simulating present and future fire regimes using coupled dynamic global vegetation model (DGVM) and process based fire model.

Postdoctoral Research Assistant

Cafe M Research Group, Department of Biological Sciences, Macquarie
University, Ryde, NSW, Australia **Oct 2014-Apr 2015**

Testing conceptual phenology and plant carbon allocation models under changing climate and elevated CO2 fertilization.

Research Assistant

Department of Biological Sciences, Macquarie University, Ryde, NSW,
Australia **Jun 2014-Sep 2014**

Modelling changes on past and future vegetation-fire dynamics and its feedback on terrestrial and atmospheric carbon.

Research Assistant

Department of Geographical Sciences, University of Bristol, UK **Sep 2008-Sep 2010**

DGVM-fire model development. Applying developed model to: test to effectiveness of different fire management techniques in current and future climates; simulate paleo vegetation and carbon stocks.

Department of Earth Sciences, University of Bristol, UK **Apr 2008-Sep 2008**

Publicity; lecture and seminar timetabling; finding and organising guest lectures; general admin.

Widening Participation

Widening Participation Office, University of Bristol **Sep 2007-Sep 2008**

Working with students in primary and secondary education to encourage university attendance from low socio-economic backgrounds: helping organize & run University open days and campus tours; in-school presentations and career evenings.

Current Research Interests

My research focuses on improving our understanding of the interactions between fire, vegetation and climate, and exploring how these interactions feed impact terrestrial ecosystem properties such as carbon and hydrological cycles. I'm also involved in the continued development of a vegetation model benchmarking system; and collaborate on research exploring resource allocation and phenology strategies, and strategies for avoiding drought mortality. Much of this involves utilising experimental and satellite data to drive more observation-driven vegetation model development.

Current Research:

- Development and application of LPX -a coupled Dynamic Vegetation-fire model.
- Vegetation disturbance resistance and recovery
- Statistics and observational data for benchmarking and comparing vegetation models.
- Plant resource allocation strategies.

Publications

Total Citations: 190

H index: 6

i10 index: 3

Reviewed

IC Prentice, DI Kelley, PN Foster, P Friedlingstein, SP Harrison, ...: Modeling fire and the terrestrial carbon balance, Global Biogeochemical Cycles 25 (3) (2011)

. citations:86

P Ciais, A Tagliabue, M Cuntz, L Bopp, M Scholze, G Hoffmann, ...: Large inert carbon pool in the terrestrial biosphere during the Last Glacial Maximum, Nature Geoscience 5 (1), 74-79 (2012)

. citations:42

DI Kelley, IC Prentice, SP Harrison, H Wang, M Simard, JB Fisher, ...: A comprehensive benchmarking system for evaluating global vegetation models, *Biogeosciences* 10, 3313-3340 (2013)

. citations:37

DI Kelley, SP Harrison, IC Prentice: Improved simulation of fire-vegetation interactions in the Land surface Processes and eXchanges dynamic global vegetation model (LPX-Mv1), Copernicus Publications (2014)

. citations:8

T Kaminski, W Knorr, G Schürmann, M Scholze, PJ Rayner, S Zaehle, ...: The BETHY/JSBACH carbon cycle data assimilation system: experiences and challenges, *Journal of Geophysical Research: Biogeosciences* 118 (4), 1414-1426 (2013)

. citations:8

MJB Zeppel, SP Harrison, HD Adams, DI Kelley, G Li, DT Tissue, ...: Drought and resprouting plants, *New Phytologist* 206 (2), 583-589 (2015)

. citations:6

DI Kelley, SP Harrison: Enhanced Australian carbon sink despite increased wildfire during the 21st century, *Environmental Research Letters* 9 (10), 104015 (2014)

. citations:2

D Kelley, SP Harrison, IC Prentice: Implications of introducing realistic fire response traits in a Dynamic Global Vegetation Model, *AGU Fall Meeting Abstracts* 1, 06 (2013)

. citations:0

S Harrison, J Midgley, B Hoffmann, I Radford, C Nano, B Murphy¹⁰, ...: Using plant functional traits to predict ecosystem vulnerability to changing fire regimes, (NA)

. citations:0

Generated using scholar packages:

Keirstead, James (2015), scholar: analyse citation data from Google Scholar, R package version 0.1.4, <http://github.com/jkeirstead/scholar> and

googleScholarGrab version no. 4adb588 extracted from Douglas Kelley's google scholar on Thu 21 Jan 2016 17:32:42

Submitted

Harrison, S. P. and Kelley, D. I.: Projected changes in Australian fire regimes during the 21st century and consequences for ecosystem, *International Journal of Wildland Fire*

Hantson, S., Arneth, A., Harrison, S. P., Kelley, D. I., Prentice, I. C., Rabin, S. S., Archibald, S. ...: Projected changes in Australian fire regimes during the 21st century and consequences for ecosystem, *Biogeosciences*, bg-2016-17

Ukkola, A., Keenan, T., Kelley, D. I., Prentice, I. C., Vegetation buffers the water-resource impacts of environmental change in regions with declining precipitation, *Environmental Research Letters*, ERL-102203

In Prep

Kelley D. I., de Kauwe, M., Medlyn, B. Testing Allocation model assumptions in a simple ecosystem model

Harrison, S. P., Kelley, D. I., Wang, H., Herbert, A., Li, G., Bradstock, R., Fontaine, J., Enright, N., Murphy, B. P., Pekin, B. K., Penman, T., Russell-Smith, J., Wittkuhn, R. S: Patterns in the abundance of post-fire resprouting in Australia based on plot-level measurements.

Whitley, R., Kelley, D. I., de Kauwe, M., Keenan, T. F., Phendulum - A first principles model of describing savanna phenology

International Conference Presentations

Kelley, D. I., Harrison, S. P. and Prentice, I. C.: Implications of introducing realistic fire response traits in a Dynamic Global Vegetation Model, AGU Fall Meeting Abstracts, 1, p.6. Dec 2013.

Visits and Internal Presentations

Kelley, D. I., Harrison, S. P., Prentice, I. C. and Medlyn, B. E.: Modelling Australian Fire Regimes, Thesis completion seminar, Macquarie University, Ryde, Australia. Mar 2015

Kelley, D. I., Harrison, S. P. and Prentice, I. C.: The LPX fire-enabled Vegetation Model, visit to Centre for Environmental Risk Management of Bushfires, University of Wollongong, NSW, Australia. May 2013.

Kelley, D. I., Harrison, S. P., Prentice, I. C. and Medlyn B. : The effects of climate change on Australian fire regimes, Postgraduate supplementary conference, Macquarie University, Ryde, Australia. Nov 2012.

Kelley, D. I.: Development of lightning ignitions scheme in LPX-DGVM, Biosphere and Climate Dynamics brown bag seminars, Macquarie University, Ryde, Australia. Sep 2012.

Kelley, D. I.: Benchmarking vegetation and fire in LPX-DGVM, Biosphere and Climate Dynamics brown bag seminars, Macquarie University, Ryde, Australia. Mar 2012.

Kelley, D. I., Prentice, I. C., Wang, H., Wills, K. and Harrison, S. P.: A comprehensive benchmarking system for evaluating global vegetation models, Postgraduate supplementary conference, Macquarie University, Ryde, Australia. Nov 2011.

Kelley, D. I., Prentice, I. C., Wang, H., Wills, K. and Harrison, S. P.: A comprehensive benchmarking system for evaluating global vegetation models, Climate Futures Postgraduate Forum, Macquarie University, Ryde, Australia. Nov 2011.

Kelley, D. I.: Benchmark data-sets for assessing DGVM performance, Biosphere and Climate Dynamics brown bag seminars, Macquarie University, Ryde, Australia. Sep 2011.

Kelley, D. I., Harrison, S. P. and Prentice, I. C.: The effects of climate change on Australian fire regimes, Postgraduate supplementary conference, Macquarie University, Ryde, Australia. 17th Nov 2010.

Kelley, D. I.: Transient Biomization Scheme, course seminar for Msc Earth Systems Science, Department of Earth Sciences, University of Bristol, UK. 2 July 2008.

Kelley, D. I., Elena Counce: Forest Fire simulator, course seminar for Msc Earth Systems Science, Department of Earth Sciences, University of Bristol, UK. 19 Nov 2007.

Kelley, D. I., Harrison, S. P.: Comparison of simulated fire regimes at the Last Glacial Maximum and for the Mid-Holocene with charcoal data, QUEST: Quantifying and Understanding the Earth System Open Science Conference and Annual Science Meeting, Mar 2008

Workshops and Consultancy Visits

University of Queensland, Brisbane, QL, Australia

Oct 2013

Data Synthesis workshop for fire resilience and response traits} {Australian Centre for Ecological Analysis and Synthesis ACEAS

Fire response traits database
Macquarie University, Ryde, Australia

May 2013

Workshop on construction of database on distribution of different resprouting traits in climate space, as part of the Australian Centre for Ecological Analysis and Synthesis (ACEAS) Working group “.

Technical Assistance for Climate Change
Royal Society for the Conservation of Nature, Jordan

Oct 2009

Report on Impacts of Future Climate Change on Vegetation, Fire, and Runoff in Jordan

Training

Courses

Software Carpentry

Programming philosophy, code structure and version control

Feb 2013

Genses2Geoscience: Writing for journals

Drafting and writing journal articles and research proposals

Aug 2012

Genses2Geoscience: sql

Database Construction using sql

Sep 2011

Genses2Geoscience: Teaching in small groups

Effective questioning, encouraging equal participation, and managing student behaviour.

Aug 2011

Planning and writing journal articles

Planning articles to fit journals

Nov 2009

Awards

International Macquarie University Research Excellence Scholarship (iMQRES)

Macquarie University, Ryde, Australia

2010-2014

Postgraduate award for completion of PhD

Post Graduate Research Fund (PGRF)

Macquarie University, Ryde, Australia

2013

Competitive award to enhance postgraduate research experience. Funded attendance at the 2013 AGU fall conference in order to present DGVM development and future projection of fire regimes and terrestrial carbon stocks under climate change

Postgraduate conference - best presentation

Biological Sciences, Macquarie University, Ryde, Australia

2011

Best presentation out of the departments 78 postgraduate students at the annual post-graduate conference. Awarded for presentation on a vegetation model benchmarking system}

Skills

Modelling

I have been lead developer on LPX - a high-complexity coupled Dynamic Vegetation-Fire Model - since 2009. LPX has both Fortran and C++ components for fast (relative to its complexity) computational times. I have recently also added a shell and R interface to facilitate parallelization and to allow results to be easily plotted and analysed. See douglass3.github.io/LPX.html for more information.

Statistical Programming

Most of my research involves statistical analysis of large datasets and model outputs. Collaboration on many of my projects means I am fluent in most widely used statistical programming languages. Most of my work is in either R, python and matlab, but I have also performed graphical and statistical analysis using Fortran and C amongst others.

See douglass3.github.io/my_best_plots.html for examples of R and matlab plots from my PhD.	See bitbucket.org/douglass3/lpxbenchmarking for an example of statistical benchmarking of extensive model outputs against global raster and site-based datasets.
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Web Design

In my spare time, I have developed dynamic websites using open source content management system. My personal site is on a static host, but is maintained using a python based dynamic-site emulator. Developing and maintaining these sites have allowed me to become familiar with many content management systems (i.e. wordpress, concrete5 etc) and fluent in HTML/CSS, PHP and Markdown. I have linked Markdown with R and python when sharing and presenting results from model development and analysis. * See eppingdac.com.au, an example of a website I have developed using Concrete5 Content Management System * See douglass3.github.io, and example of a website produced using a simple dynamic-site emulator.

Publishing

As well as publishing papers, I have also written manuals, reports and newsletters using a variety of languages and software products, including (aside from standard office/open office): * Latex - this includes my thesis (available <<>>) * Scribus - for example, my running clubs newsletter (eppingdac.com.au/news-and-views/newsletter) * Photoshop/Illustrator and GIMP (the open source equivalent). See flickr.com/doug_from_the_uk for examples of graphical art and photo 'touch ups', manipulation.

Software Tool

Collaborations on various projects has lead me to develop software packages to share across projects teams. Some these perform statistical model-comparisons; others run vegetation models themselves, and some help keep track for workflows and provenance when using a version control system model. Below are some of the most used software packages. More detail can be found at douglass3.github.io/tools, while an exhaustive list can be found on my bitbucket and github repository pages detailed in the contact section.

Software Carpentry

Programming philosophy, code structure and version control

Feb 2013 Other
stuff :
OS X :
Windows
XP/Vista
: Linux
: CVS /
Subversion
: git

Relevant Extra- Circular activity

Committee member responsible for Web-design, Communications, and social runners

Epping and District Athletics Clubs North Epping, Hornsby, NSW Australia 2015

Website development www.eppingdac.com.au; designing, producing and distributing newsletter and e-publicity for local community running and athletics club

Student Union involvement Web-design, Communications, and social runners

University and Warwick and Bristol University

2002-2008

Sabbatical year sitting on board of directors of Warwick Students Union responsible for the Student Advice and Welfare department; 3 years as charity trustee and 6 years on student council responsible for Science Faculty representation; committee posts on various student run sports clubs and societies including People and Planet, Student TV station, Student Support Groups, and running clubs

Digital Photography and Art

Open Univesity, UK

2002-2008

Open University undergrad course in digital photography and image manipulation.
See www.flickr.com/photos/doug_from_the_uk

Referees

**Prof. Sandy
Harrison**

Professor in
Global
Palaeoclimates
and
Biogeochemical
Cycles

Department of
Geography and
Environmental
Science, School of
Archaeology,
Geography and
Environmental
Science, The
University of Reading,
Whiteknights,
Reading RG6 6AB U
Email:
s.p.harrison@reading.ac.uk

**Prof. Colin
Prentice**

Chair of
Biosphere and
Climate Impacts

Grantham Institute
for Climate Change
and Department of
Life Sciences,
Imperial College,
Silwood Park
Campus, Ascot SL5
7PY UK
Email:
c.prentice@imperial.ac.uk

**Prof. Belinda
Medlyn**

Chair of
Biosphere and
Climate Impacts

Hawkesbury Institute
for the Environment,
Western Sydney
University, Locked
Bag 1797, Penrith,
NSW Australia 2751
Email:
b.medlyn@westernsydney.edu.au