Douglas Kelley

Biosphere & Climate Dynamics Modelling

Summary

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Academic qualification

PhD Ecology
2014

Macquarie University, Department of Biological Sciences, Ryde, NSW, Australia
Thesis: Modelling Australian fire regimes

MSc Earth System Science
2008

University of Bristol, Department of Earth Sciences, UK
Dissertation: Statistical modelling of global fire regimes.

BSc (Hons.) Physics
2007

University of Warwick, Department of Physics, UK
Dissertation: Modelling atmospheric effects on starlight

Employment History

Postdoctoral Research Assistant
Apr 2015-present

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

Postdoctoral Research Assistant
Jun 2014-Mar 2015

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

Research Assistant
Sep 2008-Sep 2010

Department of Geographical Sciences, University of Bristol, UK

Publication Statistics

Total Citations: 192 H index: 6 i10 index: 3

Award

Macquarie University Research Excellence Scholarship
2010-2014

Macquarie University, Ryde, NSW, Australia

Post Graduate Research Fund (PGRF)
2013

Macquarie University, Ryde, NSW, Australia

Biology postgrad conference best presentation
2011

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

References

See bottom of extended CV

Douglas Kelley

Biosphere & Climate Dynamics Modelling

Extended CV

Contact Information

- **Name** : 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
- **Web** : douglask3.github.io
- **Phone** : +44 (0) 7936 726 819

Academic qualification

PhD Ecology

Modelling Australian fire regimes

2010-2014

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

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

MSc Earth System Science

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

2007-2008

University of Bristol, Department of Earth Sciences, UK

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

Main dissertation: Modelling atmospheric effects on starlight

2002-2007

University of Warwick, Department of Physics, UK

Employment History

Postdoctoral Research Assistant

Apr 2015-present

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

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

Postdoctoral Research Assistant

Oct 2014-Apr 2015

Cafe M Research Group, Department of Biological Sciences, Macquarie University, Ryde, NSW, Australia

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

Research Assistant

Jun 2014-Sep 2014

Biosphere & Climate Dynamics, Department of Biological Sciences, Macquarie University, Ryde, NSW, Australia

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

Extended CV

Employment History Continued

Research Assistant
Sep 2008-Sep 2010

Department of Geographical Sciences, University of Bristol, UK
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.

Earth System Science Summer School coordinator
Apr 2008-Sep 2008

Department of Earth Sciences, University of Bristol, UK
Publicity; lecture and seminar timetabling; finding and organising guest lectures; general admin.

Widening Participation
Sep 2007-Sep 2008

Widening Participation Office, University of Bristol, UK
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.

Publication

- Total Citations: 192 H index: 6 i10 index: 3

Published Papers

IC Prentice, DI Kelley, PN Foster, P Friedlingstein, SP Harrison, ... (2011) Modeling fire and the terrestrial carbon balance *Global Biogeochemical Cycles* - 25 (3)
Cited by:86

P Ciais, A Tagliabue, M Cuntz, L Bopp, M Scholze, G Hoffmann, ... (2012) Large inert carbon pool in the terrestrial biosphere during the Last Glacial Maximum *Nature Geoscience* - 5 (1), 74-79
Cited by:43

DI Kelley, IC Prentice, SP Harrison, H Wang, M Simard, JB Fisher, ... (2013) A comprehensive benchmarking system for evaluating global vegetation models *Biogeosciences* - 10, 3313-3340
Cited by:37

DI Kelley, SP Harrison, IC Prentice (2014) Improved simulation of fire-vegetation interactions in the Land surface Processes and eXchanges dynamic global vegetation model (LPX-Mv1) *Copernicus Publications* -
Cited by: 8

T Kaminski, W Knorr, G Schürmann, M Scholze, PJ Rayner, S Zaehle, ... (2013) The BETHY/JSBACH carbon cycle data assimilation system: experiences and challenges *Journal of Geophysical Research: Biogeosciences* - 118 (4), 1414-1426
Cited by: 8

MJB Zeppel, SP Harrison, HD Adams, DI Kelley, G Li, DT Tissue, ... (2015) Drought and resprouting plants *New Phytologist* - 206 (2), 583-589
Cited by: 7

DI Kelley, SP Harrison (2014) Enhanced Australian carbon sink despite increased wildfire during the 21st century *Environmental Research Letters* - 9 (10), 104015
Cited by: 3

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

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

- Generated using scholar R package version 0.1.4 by James Keirstead, 2015 (); and googleScholarGrab versionc27d44f (extracted from Douglas Kelley`s google scholar on Sun 31 Jan 2016 22:59:23

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. ...: The status and challenge of global fire modelling *Biogeosciences* - bg-2016-17

Extended CV

Publication Continued

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 assuptions in a simple ecosyste 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 -

Conferences

Conference Presentations & Posters

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

Kelley, D I., Harrison, S. P. (Mar 2008) 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* - Department of Earth Sciences, University of Bristol

Visits and Internal Presentations

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

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

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

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

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

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

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

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

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

Kelley, D. I. (Jul 2008) Transient Biomization Scheme *course seminar for Msc Earth Systems Science* - Department of Earth Sciences, University of Bristol

Kelley, D. I., Elena Counce (Nov 2007) Forest Fire simulator *course seminar for Msc Earth Systems Science* - Department of Earth Sciences, University of Bristol

Extended CV

Award

Macquarie University Research Excellence Scholarship (iMQRES)

2010-2014

Macquarie University, Ryde, NSW, Australia

Postgraduate award for completion of PhD

Postgraduate Graduate Research Fund (PGRF)

2013

Macquarie University, Ryde, NSW, Australia

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

Biology postgraduate conference best presentation

2011

Biological Sciences, Macquarie University, Ryde, NSW, Australia

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

Current Research Interests

My research focuses on improving our understanding of the interactions between vegetation and climate, and exploring how these interactions impact terrestrial ecosystem properties such as carbon and hydrological cycles. Much of this involves utilising experimental and satellite data for more observation-driven vegetation model development and benchmarking. Most of this has been exploring climate and vegetative controls and fire, and the impact fire has on ecosystem, atmposhperic emission and the carbon cycle, and vegetation-controlled hydrology. I am also involved in projects that explore plant resource allocation, phenology and drought recovery stratagies.

My current research projects include:

Development of the LPX coupled Dynamic Vegetetion-fire model

http://douglask3.github.io/lpx-dynamic-global-vegetation-model.html

Much of my thesis focussed on the assessment and development of the LPX-DGVM-fire model to better represent fire and fire-adatped vegetation in tropical savanna ecosystems. Continued development strands include :

- Improving fire-model performace for forest ecoystems
- Paramertization of the carbon cycle and trace gas emissions
- Continued development of disturbance resilance and resistance traits - e.g. resprouting after fire and drought.

Vegetation model benchmarking and inter-comparison

http://douglask3.github.io/vegetation-model-inter-comparison-benchmarking.html

I am the main developer and maintainer of the most widely used vegetation-model benchmarking system, which qualitativly assess model performance for a varity and vegetation and land surface processes. Current work includes:

- Incorporation for fire regime observatations
- Inter-model comparisons for the fireMIP project
- R-package development

Vegetation disturbance resistance and recovery databases

http://douglask3.github.io/traits-for-resistance-and-recovery-to-disturbance.html

I have been involved in the compilation of two databases compliling variations reistance and recovery traits across plant species and geogrpahic locations:

- Bark Thickness as protection against fire.
- Resprouting as a recovery to extreme distrubance from fire and drought.

Plant resource allocation strategies

http://douglask3.github.io/traits-for-resistance-and-recovery-to-disturbance.html

More recently, I have become involved in research projects exploring wider vegetation dynamics and responses to enviromental change including:

- The testing of conceptual carbon allocation stratagies in a vegetation model framework, and the response of the startagies to changing climate and increasing CO2 fertilization.
- Development of a simple dry-season phenology model for tropical grass and woodland ecosystems.

- For more detail on all these projects, see douglask3.github.io/pages/research-interests

Extended CV

Workshops and Consultancy Visits

Using plant functional traits to predict ecosystem vulnerability to changing fire regimes

Australian Centre for Ecological Analysis and Synthesis (ACEAS)

Oct 2013

University of Queensland, Brisbane, QL, Australia

Data Synthesis workshop for fire resilience and response traits

Fire response traits database

May 2013

Macquarie University, Ryde, Australia

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 " Using plant functional traits to predict ecosystem vulnerability to changing fire regimes "

Technical Assistance for Climate Change

Oct 2009

Royal Society for the Conservation of Nature, Jordan

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

Training Courses

Software Carpentry

Feb 2013

Programming philosophy, code structure and version control

Genses2Geoscience: Writing for journals

Aug 2012

Macquarie University, Ryde, Australia

Drafting and writing journal articles and research proposals

Genses2Geoscience: Database Construction using sql

Sep 2011

Macquarie University, Ryde, Australia

Genses2Geoscience: Teaching in small groups

Aug 2011

Macquarie University, Ryde, Australia

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

Planning and writing journal articles

Nov 2009

Macquarie University, Ryde, Australia

Planning articles to fit journals.

Skills

Vegetation modelling

I have been lead developer on LPX - a high-complexity coupled Dynamic Vegetation-Fire Model - since 2009LPX has both Fortran and C++ components for fast (relative to it's complexity) computational times. I have recently also added a shell and R interface to fasilitate parrallization and to allow results to be easily plotted and analysed.

See douglask3.github.io/LPX for more information.

Statistical Programming

Most of my research involves statistical anaylsis 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 statitical analysis using Fotran and C amongst others.

See douglask3.github.io/my_best_plots for examples of R and matlab plots from my PhD.

See douglask3.github.io/lpxbenchmarking for an example of statistical benchmarking of extensive model outputs again global raster and site-based datasets.

Extended CV

Skills Continued

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 contengt managment 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 anlaysis.

See eppingdac.com.au, an example of a website I have developed using Concrete5 Content Managment System

See douglask3.github.io , an example of a website produced using a simple dynamic-site emulator.

Publishing

As well has publishing papers, I have also written manuals, reports and newletters 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/Illistrator and GIMP (the open source equivalent). See flickr.com/doug_from_the_uk for examples of graphical art and photo "touch ups", manipulation.

Software Tools

I have developed and maitained several software packages related to my reasrch projects and shared with collaborators. Some of the most used are:

Extra-Circular

Committee Member responsible for web-design communications, and social runners

Feb 2011-May 2015

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

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

Student Union involvement

2002-2009

University and Warwick and Bristol University

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: creating and sharing better images

2010

Open Univesity, UK

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

References

Prof. Sandy Harrison

Professor in Global Palaeoclimates and Biogeochemical Cycles

Email: s.p.harrison@reading.ac.uk

Department of Geography and Environmental Science School of Archaeology, Geography and Environmental Science The University of Reading Whiteknights Reading RG6 6AB UK

Prof. Colin Prentice

Chair of Biosphere and Climate Impacts

Email: c.prentice@imperial.ac.uk

Grantham Institute for Climate Change and Department of Life Sciences Imperial College Silwood Park Campus Ascot SL5 7PY UK

Prof. Belinda Medlyn

Climate and Forest Ecosystem Modelling

Email: b.medlyn@westernsydney.edu.au

Hawkesbury Institute for the Environment, Western Sydney University, Locked Bag 1797, Penrith, NSW Australia 2751