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douglas.i.kelley@gmail.com
+44 (0) 7936 726 819

DOUGLAS KELLEY

VEGETATION MODELLER

SUMMARY

Academic qualification

2014 PhD Ecology

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

Thesis: Modelling Australian fire regimes

2008 MSc Earth System Science

University of Bristol, Department of Earth Sciences, UK

Dissertation: Statistical modelling of global fire regimes.

2007 BSc (Hons.) Physics

University of Warwick, Department of Physics, UK

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.

Publication Statistics

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

Awards

2010-2014

Macquarie University Research Excellence Scholarship

Macquarie University, Ryde, NSW, Australia

2013

Post Graduate Research Fund (PGRF)

Macquarie University, Ryde, NSW, Australia

2011

Biology 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.

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://douglask3.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 terrestial and atmospheric carbon.

Research Assistant

Department of Geographical Sciences, University of Bristol, UK **Oct 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.

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.

douglask3.github.io/lpx-dynamic-global-vegetation-model

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.

douglask3.github.io/vegetation-model-inter-comparison-benchmarking

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
- R-package development

Vegetation disturbance resistance and recovery databases

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

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.

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

Publications

Total Citations: 192 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

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and
googleScholarGrab version no. 5e36dc5 extracted from Douglas Kelley `s google scholar on Tue 26 Jan 2016 15:28:01

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 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

Conference Papers

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

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Training

Courses

Software Carpentry
Feb 2013

Programming philosophy, code structure and version control

Genses2Geoscience: Writing for journals
Aug 2012

Drafting and writing journal articles and research proposals

Genses2Geoscience: sql
Sep 2011

Database Construction using sql

Genses2Geoscience: Teaching in small groups
Aug 2011

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

Planning and writing journal articles
Nov 2009

Planning articles to fit journals

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-complaexity coupled Dynamic Vegetation-Fire Model - since 2009. LPX has both Fortran and C++ components for fast (relive 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.html 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 douglas.github.io/my_best_plots.html for examples of R and matlab plots from my PhD.

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

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, and 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 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 douglask3.github.io/tools, while an exhustive 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

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Relevant Extra-Circular activity

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

Epping and District Athletics Clubs North Epping, Hornsby, NSW, Australia **Feb 2011-May 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
