



# Douglas Kelley

## Biosphere & Climate Dynamics Modelling

### Summary

e: douglas.i.kelley@gmail.com  
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#### Academic qualifications

##### 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.

#### Recent 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

#### Publication Statistics

Total Citations: 196    H index: 6    i10 index: 4

#### Examples of Awards won

##### Macquarie University Research Excellence Scholarship

2010-2014

Macquarie University, Ryde, NSW, Australia

##### Postgraduate Research Fund (PGRF)

2013

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 i.e. vegetation, carbon-cycle, hydrology)
- Vegetation disturbance resistance/protection and recovery
- Vegetation model benchmarking and diagnosis
- Plant resource allocation strategies

#### Skills

##### Programming

- Fortran
- C++
- C
- R
- Python
- Matlab
- Shell

See examples at [github.com/douglask3](https://github.com/douglask3) and [bitbucket.org/douglask3](https://bitbucket.org/douglask3)

##### Web Design & Publishing

- html
- CSS
- PHP
- Markdown
- Python/R for web-page generation
- Wordpress
- Concrete5
- Latex
- Illustrator
- Photoshop
- GIMP
- Scribus
- ms/open of office

See examples at [douglask3.github.io/pages/websites](https://douglask3.github.io/pages/websites)

# Summary

## *Skills Continued*

### Software Tool development

I have developed several software package tools related to my research, and to help track project work flows

See examples at [douglass3.github.io/pages/tools](https://douglass3.github.io/pages/tools)

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## *References*

### Prof. Sandy Harrison

s.p.harrison@reading.ac.uk

### Prof. Colin Prentice

c.prentice@imperial.ac.uk

### Prof. Belinda Medlyn

b.medlyn@westernsydney.edu.au

Full contact information at end of Extended CV

# Douglas Kelley

## Biosphere & Climate Dynamics Modelling

### Extended CV

#### Contact Information

- **Name :** Douglas I Kelley
- **Work Address :**  
Department of Geography & Environmental Science  
University of Reading  
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- **Home Address :**  
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- **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 interaction. Using this new version of LPX to simulate fire, vegetation and carbon dynamics in Australia over the 21<sup>st</sup> century. Thesis can be downloaded from [www.goo.gl/9YjwKw](http://www.goo.gl/9YjwKw)

##### 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 a 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 fertilization from elevated CO<sub>2</sub>.

# Extended CV

## Employment History Continued

### Research Assistant

Jun 2014-Sep 2014

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

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

### Research Assistant

Sep 2008-Sep 2010

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

Developing a coupled DGVM-fire model and applying the model to: test the effectiveness of different fire management techniques in current and future climates; and 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 organise & run University open days and campus tours; school presentations and career evenings.

## Publications

• Total Citations: 196    H index: 6    i10 index: 4

### Published Papers

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: 9

**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

**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

**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: 34

T Kaminski, W Knorr, G Schürmann, M Scholze, PJ Rayner, S Zaehle, S Blessing, W Dorigo, V Gayler, R Giering, N Gobron, JP Grant, M Heimann, A Hooker-Stroud, S Houweling, T Kato, J Kattge, **DI Kelley**, S Kemp, EN Koffi, C Köstler, P-P Mathieu, B Pinty, C H Reick, C Rödenbeck, R Schnur, K Scipal, C Sebald, T Stacke, A Terwisscha Scheltinga, M Vossbeck, H Widmann, T Ziehn (2013) The BETHY/JSBACH carbon cycle data assimilation system: experiences and challenges *Journal of Geophysical Research: Biogeosciences* - 118 (4), 1414-1426

Cited by: 9

**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

# Extended CV

## Publications Continued

P Ciais, A Tagliabue, M Cuntz, L Bopp, Marko Scholze, G Hoffmann, A Lourdou, Sandy P Harrison, IC Prentice, **DI Kelley**, C Koven, SL Piao (2012) Large inert carbon pool in the terrestrial biosphere during the Last Glacial Maximum *Nature Geoscience* - 5 (1), 74-79

*Cited by:45*

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*

- Generated using R-package scholar R package version 0.1.4 by James Keirstead, 2015 (<http://github.com/jkeirstead/scholar>); and googleScholarGrab version 6be694d (<https://github.com/douglask3/r-cv.git>)  
extracted from Douglas Kelley's google scholar on Sun 14 Feb 2016 17:43:14

## Submitted

**DI Kelley** : Projected changes in Australian fire regimes during the 21<sup>st</sup> century and consequences for ecosystems *International Journal of Wildland Fire*

S Hantson, A Arneth, SP Harrison, **DI Kelley**, IC Prentice, SS Rabin, S Archibald. .... The status and challenge of global fire modelling *Biogeosciences* - bg-2016-17

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

## In Prep

**DI Kelley**, M de Kauwe, B Medlyn: Testing Allocation model assumptions in a simple ecosystem model

SP Harrison, **DI Kelley**, H Wang, A Herbert, G Li, R Bradstock, J Fontaine, N Enright, BP Murphy, BK Pekin, T Penman, J Russell-Smith, RS Wittkuhn: Patterns in the abundance of post-fire resprouting in Australia based on plot-level measurements.

R Whitley, **DI Kelley**, M de Kauwe, TF Keenan: Phendulum - A first principles model of describing savanna phenology

## Conferences

### Conference Presentations & Posters

**DI Kelley**, SP Harrison, IC Prentice (Dec 2013) Implications of introducing realistic fire response traits in a Dynamic Global Vegetation Model *AGU Fall Meeting - Presentation Abstracts* - 1, p.6.

**DI Kelley**, SP Harrison (Mar 2008) Comparison of simulated fire regimes at the Last Glacial Maximum and 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

# Extended CV

## Conferences Continued

### Visits and Internal Presentations

**DI Kelley**, SP Harrison, IC Prentice, BE Medlyn (Mar 2015) Modelling Australian Fire Regimes *Thesis completion seminar* - Macquarie University, Ryde, Australia

**DI Kelley**, SP Harrison, IC Prentice (May 2013) The LPX fire-enabled Vegetation Model *visit to Centre for Environmental Risk Management of Bushfires* - University of Wollongong, NSW, Australia

**DI Kelley**, SP Harrison, IC Prentice, B Medlyn (Nov 2012) The effects of climate change on Australian fire regimes *Postgraduate supplementary conference* - Macquarie University, Ryde, Australia

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

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

**DI Kelley**, IC Prentice, H Wang, K Wills, SP Harrison (Dec 2011) A comprehensive benchmarking system for evaluating global vegetation models *Climate Futures Forum* - Macquarie University, Ryde, Australia

**DI Kelley**, IC Prentice, H Wang, K Wills, SP Harrison (Nov 2011) A comprehensive benchmarking system for evaluating global vegetation models *Postgraduate supplementary conference* - Macquarie University, Ryde, Australia

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

**DI Kelley**, SP Harrison, IC Prentice (Nov 2010) The effects of climate change on Australian fire regimes *Postgraduate supplementary conference* - Macquarie University, Ryde, Australia

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

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

## Awards

### Macquarie University Research Excellence Scholarship (iMQRES)

2010-2014

**Macquarie University, Ryde, NSW, Australia**

Postgraduate award for completion of PhD

### Postgraduate 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 postgraduate conference. Awarded for presentation on a vegetation model benchmarking system

# Extended CV

## 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 composition, disturbance regimes, and 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, atmospheric emission and the carbon cycle, and vegetation-controlled hydrology. I am also involved in projects that explore plant resource allocation, phenology and drought recovery strategies.

My current research projects include:

### Development of the LPX coupled Dynamic Vegetation-fire model

[dougask3.github.io/lpx-dynamic-global-vegetation-model](https://dougask3.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-adapted vegetation in tropical savanna ecosystems. Continued development strands include:

- Improving fire-model performance for forest ecosystems
- Parameterization of the carbon cycle and trace gas emissions
- Continued development of disturbance resilience and resistance traits - e.g. resprouting after fire and drought.

### Vegetation model benchmarking and inter-comparison

[dougask3.github.io/vegetation-model-inter-comparison-benchmarking](https://dougask3.github.io/vegetation-model-inter-comparison-benchmarking)

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

- Incorporation of fire regime observations
- Inter-model comparisons for the fireMIP project
- R software package development

### Vegetation disturbance resistance and recovery databases

[dougask3.github.io/traits-for-resistance-and-recovery-to-disturbance](https://dougask3.github.io/traits-for-resistance-and-recovery-to-disturbance)

I have been one of the lead collaborators on compiling several databases describing site based disturbance resistance and recovery traits across plant species, disturbance regimes and climate gradients. These include:

- Bark Thickness as protection against fire.
- Resprouting as a recovery to extreme fire and drought disturbance.
- Post-fire re-seeding strategies.

### Plant resource allocation strategies

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

- The testing of conceptual carbon allocation strategies in a vegetation model framework, and the response of these strategies to changing climate and increasing CO<sub>2</sub> fertilization.
- Development of a simple dry-season phenology model for tropical grass and woodland ecosystems.

For more detail on all these projects, see [dougask3.github.io/pages/research-interests](https://dougask3.github.io/pages/research-interests)

## 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 analysis

# Extended CV

## Workshops and Consultancy Visits Continued

### Fire response traits database

May 2013

Macquarie University, Ryde, Australia

Workshop on construction of a database describing 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

### An Introduction to Research Impact

Jun 2016

University of Reading, UK

Understanding & identifying potential impact of research including economic, social and policy, and how to write impact summaries and "pathways to impact" for grant applications.

### Software Carpentry

Feb 2013

Programming philosophy, code structure and version control

### Genges2Geoscience: Writing for journals

Aug 2012

Macquarie University, Ryde, NSW, Australia

Drafting and writing journal articles and research proposals

### Genges2Geoscience: Database Construction using sql

Sep 2011

Macquarie University, Ryde, NSW, Australia

Managing data held in a relational database management system

### Genges2Geoscience: Teaching in small groups

Aug 2011

Macquarie University, Ryde, NSW, Australia

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

### Planning and writing journal articles

Nov 2009

University of Bristol, UK

## Skills

### Vegetation 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 it's # complexity) computational times. I have recently also added a shell and R interface to facilitate parallisation and to allow outputs to be easily analysed and plotted.

See [douglass3.github.io/LPX](https://douglass3.github.io/LPX) 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 or Matlab, but I have also performed graphical and statistical analysis using Fortran and C amongst others.

See [douglass3.github.io/my\\_best\\_plots](https://douglass3.github.io/my_best_plots) for examples of R plots from my PhD.

See [douglass3.github.io/lpxbenchmarking](https://douglass3.github.io/lpxbenchmarking) for an example of statistical benchmarking of extensive model outputs against 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 (such as Concrete5 and Wordpress). Also, my personal site is on a static host, but is maintained using a Python based dynamic-site emulator. Developing and maintaining these sites has allowed me to become familiar with many web design software packages and fluent in HTML/CSS, PHP and Markdown. I have also linked Markdown with R and Python when sharing and presenting results from model development and analysis.

*See [eppingdac.com.au](http://eppingdac.com.au), an example of a website I have developed using Concrete5 content management system*

*See [dougask3.github.io](http://dougask3.github.io), an 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 at [www.goo.gl/9YjwKw](http://www.goo.gl/9YjwKw)
- Scribus - my running club newsletter, available at [eppingdac.com.au/news-and-views/newsletter](http://eppingdac.com.au/news-and-views/newsletter)
- Photoshop/Illustrator and GIMP (the open source equivalent). See [flickr.com/doug\\_from\\_the\\_uk](http://flickr.com/doug_from_the_uk) for examples of graphical art and photo "touch ups"/manipulation.

## Software Tools

I have developed and maintained several software packages related to my research projects or to help organise work flow with collaborators. Some of the most used are:

### Vegetation Benchmark Metrics

An R-package containing the metrics and basic statistical models relating to my work on Vegetation model benchmarking.

*See [dougask3.github.io/vegetation-model-benchmarking](http://dougask3.github.io/vegetation-model-benchmarking) for more information.*

### Git-based R project Tracking

Tools for tracking r-projects version controlled by Git.

*See [dougask3.github.io/git-based-r-project-extras](http://dougask3.github.io/git-based-r-project-extras) for more information.*

### LPX

Running, storing, analysing and plotting the LPX-Dynamic Global Vegetation Model.

*See [dougask3.github.io/lpx-dynamic-global-vegetation-model](http://dougask3.github.io/lpx-dynamic-global-vegetation-model) for more information.*

For a more comprehensive list, see [dougask3.github.io/pages/tools](http://dougask3.github.io/pages/tools)

## Extra-Curricular

### 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](http://www.eppingdac.com.au) ); designing, producing and distributing newsletter and e-publicity for local community running and athletics club

### RDA volunteer

*Dec 2012 - Feb 2015*

**RDA - Riding for the Disabled, Ryde, NSW, Australia**

Funding raising & publicity; feeding horses

### Group discussion chair

*2011 - 2013*

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

Organised and chaired group meetings and paper discussions

# Extended CV

## Extra-Curricular Continued

### Outreach volunteer

2010 - 2011

**Genses2Geoscience, Department of Biological Sciences, Macquarie University, Ryde, NSW, Australia**

Demonstrated department research during school tours of the University

### Student Union involvement

2002-2009

**University of Warwick and University of Bristol**

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 University, UK**

Open University undergraduate course in digital photography and image manipulation

See [www.flickr.com/photos/doug\\_from\\_the\\_uk](http://www.flickr.com/photos/doug_from_the_uk)

## References

### Prof. Sandy Harrison

*Professor in Global Paleoclimates and Biogeochemical Cycles*

**Email: [s.p.harrison@reading.ac.uk](mailto: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](mailto: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](mailto:b.medlyn@westernsydney.edu.au)**

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