**NERC Application Form**

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| **Guidance**  Application forms should be completed and uploaded as an attachment directly on to your candidate profile on our recruitment system.  If you experience any issues uploading your application form please contact the UK SBS HR Team by telephone on 01793 867003 or by email: hr@uksbs.co.uk  When uploading your application please ensure that you include the job reference number in the title of the attachment.  CVs are only accepted as part of the application process if requested in the "how to apply" section of the job posting. CVs submitted without request will not be considered. |

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| **IRC Number** | RC221088 |
| **Job Title** | Land Surface Modeller |
| **Organisation (Council)** | NERC |

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| **Family Name** | Kelley |
| **First Name** | Douglas |

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| **Education, Qualification and Employment Details** | | | | |
| **Current /Most Recent Employer** | | | | |
| **Employer Name** | University of Reading | | | |
| **Period of Employment** | *From*  *(MMM-YYYY)* | APR – 2014 | *To*  *(MMM-YYYY)* | APR – 2016 |
| **Job Title** | Postdoctoral Research Assistant | | | |
| **Location** | Department of Geography & Environmental Science, Whiteknights, Reading, RG6 6AB | | | |
| **Description of Duties** | Simulating the impacts of future climate change on vegetation-fire interactions using a coupled dynamic global vegetation model (DGVM). | | | |

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| **Previous Employer** | | | | | | | | | | |
| **Employer Name** | Macquarie University | | | | | | | | | |
| **Period of Employment** | *From*  *(MMM-YYYY)* | | OCT – 2014 | | | | *To*  *(MMM-YYYY)* | | | APR – 2015 |
| **Job Title** | Postdoctoral Research Assistant | | | | | | | | | |
| **Location** | Cafe M Research Group, Department of Biological Sciences, Ryde, NSW, Australia | | | | | | | | | |
| **Description of Duties** | Testing the impacts of climate change and fertilization from elevated CO2 on vegetation dynamics and vegetative carbon uptake in conceptual phenology and plant carbon allocation models. | | | | | | | | | |
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| **Employer Name** | Macquarie University | | | | | | | | | |
| **Period of Employment** | *From*  *(MMM-YYYY)* | JUN – 2014 | | | | *To*  *(MMM-YYYY)* | | OCT – 2014 | | |
| **Job Title** | Research Assistant | | | | | | | | | |
| **Location** | Biosphere & Climate Dynamics, Department of Biological Sciences, Ryde, NSW, Australia | | | | | | | | | |
| **Description of Duties** | Modelling the impacts of past and future climate change on vegetation dynamics, and its feedback on hydrology and terrestrial carbon stocks. | | | | | | | | | |
| **Employer Name** | University of Bristol | | | | | | | | | |
| **Period of Employment** | *From*  *(MMM-YYYY)* | SEP – 2008 | | | | *To*  *(MMM-YYYY)* | | SEP – 2010 | | |
| **Job Title** | Research Assistant | | | | | | | | | |
| **Location** | Department of Geographical Sciences, University Road, Bristol, BS8 1SS | | | | | | | | | |
| **Description of Duties** | 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-climate vegetation and carbon stocks. | | | | | | | | | |
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| **Employer Name** | University of Bristol | | | | | | | | | |
| **Period of Employment** | *From*  *(MMM-YYYY)* | | | APR – 2008 | *To*  *(MMM-YYYY)* | | | | SEP – 2008 | |
| **Job Title** | Earth System Science Summer School Coordinator | | | | | | | | | |
| **Location** | Earth Sciences, Wills Memorial Building, Queens Road, Bristol, BS8 1RJ | | | | | | | | | |
| **Description of Duties** | Publicity; lecture and seminar timetabling; finding and organising guest lectures; general admin. | | | | | | | | | |
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| **Employer Name** | University of Bristol | | | | | | | | | |
| **Period of Employment** | *From*  *(MMM-YYYY)* | | | SEP – 2007 | *To*  *(MMM-YYYY)* | | | | SEP – 2008 | |
| **Job Title** | Widening Participation | | | | | | | | | |
| **Location** | Widening Participation Office, Howard House, Queens Avenue, Bristol, BS8 1SN | | | | | | | | | |
| **Description of Duties** | 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. | | | | | | | | | |

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| **Educational Qualifications (Highest Qualification First, School/College Education and above)** | | |
| **Educational Establishment** | Macquarie University | |
| **Location** | Department of Biological Sciences, Ryde, NSW, Australia | |
| **Qualification** | PhD | |
| **Major Subject** | Climate Change Ecology | |
| **Date Received** | Feb 2016 | |
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| **Educational Establishment** | University of Bristol | |
| **Location** | Earth Sciences, Wills Memorial Building, Queens Road, Bristol, BS8 1RJ | |
| **Qualification** | MSc | |
| **Major Subject** | Earth System Science | |
| **Date Received** | Jan 2009 | |
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| **Educational Establishment** | | University of Warwick |
| **Location** | | Department of Physics, Coventry, CV4 7AL, UK |
| **Qualification** | | BSc |
| **Major Subject** | | Physics |
| **Date Received** | | Jul 2007 |

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| **Experience in using Information Technology**  Please give details of the software packages you have experience in using and any other IT experience. |
| *Modelling* I have been the lead developer on Land Processes and eXchanges (LPX) - a high-complexity coupled Dynamic Vegetation Model - since 2010. LPX combines Fortran and C++ components for fast (relative to its complexity) computational times. I have recently added a shell and R interface to facilitate parallelization, and to allow outputs to be easily analysed and plotted. See [douglask3.github.io/lpx](http://douglask3.github.io/lpx.html) for more information. I have recently been working with the GDAY model, which I helped recode in C, and has a Python interface for output collation and analysis.  I have attended training courses on code structure and parallel processing techniques for solving complex computational problems on an HPC platform. I applied the programming principles these courses introduced to a number of my projects (e.g. see <http://douglask3.github.io/firemip> for my latest project)*Statistical Programming* 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 statistical coding is in either R, Python or Matlab, but I have also performed graphical and statistical analysis using Fortran and C amongst others.*Web Design* In my spare time, I have developed dynamic websites using open source content management systems (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 and HTML with R and Python when sharing and presenting results from model development and analysis.  See [eppingdac.com.au](http://www.eppingdac.com.au/), an example of a website I have developed using Concrete5 content management system and [douglask3.github.io](http://douglask3.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 <http://douglask3.github.io/docs/thesis.pdf> * Scribus - my running club newsletter, available at [eppingdac.com.au/news-and-views/newsletter](http://www.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.  ***Statistical Software Package Development*** I have developed several software package tools related to my research, and to help track project workflows. One of these has since been adopted by a new Model Intercomparison Project: fireMIP. See examples at [douglask3.github.io/tools](http://douglask3.github.io/tools.html). |

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| **Relevant skills, knowledge and experience**  Please indicate why you are applying for this post and outline how your knowledge, skills and experience meet the competencies required for this role (detailed in the job posting). You should draw on your experiences from your current or previous roles or from other activities you have undertaken. |
| *Land Processes Modelling and Data Analysis* For my PhD, I developed an explicit iterative approach to model development in the Land Processes and eXchanges (LPX: Prentice *et al.* 2011; Kelley *et al.* 2014 – see publication list attached for references) Dynamic Global Vegetation Model (DGVM) (Kelley 2014), in which benchmarking against observations was used to identify areas for new data-driven model development, and then subsequently to evaluate whether the implementation of these new developments produces an overall improvement in model performance. This approach contrasts with the general tendency within the vegetation-fire modelling community to focus evaluation on new components, for example, the evaluation of fire treatments within DGVMs using only observations of burnt area and/or fire carbon fluxes. One reason for this partial approach to evaluation was the lack of a comprehensive benchmarking system (Kelley *et al.* 2013b). I therefore developed such a system which allows quantitative evaluation of multiple aspects of simulated land surface processes to identify specific model weaknesses, and differences between model versions, allowing assessment of the overall impact of new developments. I have developed this system into a freely available statistical software package (Kelley 2015). The system is now being adopted by other modelling groups and is being used by a new Model Intercomparison Project to assess the impact of different fire modelling approaches (Hantson *et al.* in prep.), and to help guide the developmental direction of the fire-vegetation modelling community (Hantson *et al.*2016).  Application of this benchmarking system to LPX identified key areas of model weakness and formed the basis of model development throughout the rest of my thesis. Model development focussed on improved simulation of fire and fire-vegetation interactions (Kelley *et al.* 2014) including: a new lightning ignition algorithm; plant functional (PFT) and tissue type (i.e. heartwood, stem, branch, leaf/grass) dependant litter decomposition and drying schemes; parameterization of root profiles; finding and fixing coding "bugs" associated with grassland PFT competition; and incorporation of evolutionary driven adaptive bark thickness (for protection against fire) and post-disturbance resprouting traits (for recovery from fire) (Kelley *et al.* 2014; Harrison *et al.* in prep.).  I concluded my thesis by using the improved version of LPX to perform experiments to explore climate and CO2 fertilization modulated changes in vegetation dynamics by driving the model with multiple historical and reanalysis climate datasets (Prentice *et al.* 2011; Kelley *et al.* 2014), and climate model data for past (Ciais *et al.* 2012) and future climates (Kelley *&* Harrison 2014; Harrison*&* Kelley submitted). Recent work on simulating future land-surface processes provides the best example of managing large and complex datasets. Here, I initially drove LPX with detrended historic climate data, pre-industrial land use and atmospheric CO2 concentrations in order to spin-up the model. I then used historic climate, land use and atmospheric CO2 to drive the model up to the modern day. This then transitioned into 36 different climate realisations, based on outputs from 9 CMIP5 models, two different RCPs, and four atmospheric CO2 pathways. Each step involved processing and organising many different large input files, and historic simulations involved model evaluation against remote sensed and ground-based observations in using the benchmarking system in order to justify model use. This one project, which concluded my thesis, was all initially published in Kelley *&* Harrison (2014), but has since spawned other papers (e.g. Harrison *&* Kelley submitted; Ukkola *et al.* submitted). My thesis was well received by my examiners, who consistently stated that it fell into the “top 10%” they've ever assessed.  I also have experience in using and developing other vegetation, climate and Earth System models. I have recently been working with the GDAY simple vegetation model, developing a way to incorporate and evaluate a number of different conceptual carbon and nitrogen allocation models (Kelley *et al.* in prep.). Recently, I have helped in the development of a new grassland phenology model (Whitley *et al.* in prep.). In the dissertation for my MSc in Earth Systems Science, I incorporated a fire model into CCDAS - a data assimilation system used to constrain physically based parameters for use in an Earth System Model framework - using land-surface satellite observations (Kelley 2008; Kaminski *et al.* 2013). In addition, during my Masters, I gained experience working with MITgcm General Circulation Model and the GENIE Earth System Model.  See my answer to "Experience in using Information Technology" above for information on programming languages and software used during the course of my research. *Communication Skills* I completed my PhD just over one year ago, and I have obtained 7 peer-reviewed publications – 3 of which I first authored - with a further 3 submitted and 3 near submission. One of these papers is in Nature Geoscience, and all the others are in high-impact journals for their field. Please see my attached publication list for more information.  During my PhD, I was given the opportunity to hone my presentation skills at many group and department seminars (see attached publication list). As a result, I was awarded “best presentation” at the department's annual postgraduate conference, out of 78 other presenting students, and was awarded a travel grant to present results of projections of future vegetation composition and carbon stocks at the AGU fall meeting (Kelley *et al.* 2013a). I have also attended several workshops, where I have given oral and poster presentations to audiences from a wide variety of disciplines (e.g. Kelley *&*Harrison 2009; Kelley *et al.* 2011; Kelley *et al.* 2013c).*Collaborations* I have been involved in several inter-university and interdisciplinary collaborations during my PhD. I led the design of a vegetation model benchmarking system (Kelley *et al.* 2013b) which involved liaising with remote sensing experts, statisticians, botanists and other modellers from three different institutions. This system has been widely adopted throughout the vegetation modelling community and is used by several other modelling groups. In addition, I have worked on three vegetation disturbance-trait databases, two of which I was a lead collaborator on (Kelley 2014; Harrison *et al.* 2014; Harrison *et al.* in prep.).  All of these collaborations involved visits to different institutions and workshops, some of which were international. I would be happy to continue this in my new role.***Research group involvement and teamwork*** During my PhD, I acted as chair for my research groups' paper and research discussion meetings. I was also an informal mentor for several students in the group who were new to statistical programming, and volunteered with the department's secondary school outreach programme, performing research demonstrations on school open days.  Whilst working as a research assistant at Bristol, I was involved in the teaching of the MSc Earth Systems Science masters programme, giving seminars and running modelling workshops on programming for beginners.  What these examples show is that I am a team-orientated person, who enjoys using my skills and knowledge for the benefit of the research group as a whole, which would make me a great addition to your team! |

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| **I can confirm that the information I have provided is complete and accurate.** | |
| **Print Name** | **DOUGLAS KELLEY** |
| **Date** | **07/04/2016** |