Ian Ross

Independent software and data analysis contractor

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SKILLS

Languages	C++, Haskell, Fortran (77/90), JavaScript, Perl, Scheme, Java, Emacs Lisp
Data analysis	R, ArcGIS, Ferret, NCL, netCDF tools (NCO, CDO), Mathematica
Other	AngularJS, Trilinos, LAPACK, MPI, Blitz++, POVRAY, OpenGL
Databases	SQLite3, Postgres
Utilities	LaTeX, DocBook, Make, Autoconf, Automake, GDB, CVS, Subversion, Git, Flex, Bison

WORK EXPERIENCE & EDUCATION

Aug 2012 - Present *Independent software contractor based in Igls, Austria*

Ongoing contracts:

University of Bristol Data preparation tools for climate modelling applications:

- Fortran, Tcl/Tk, C++, wxWidgets

OpenBrain Ltd. Bayesian statistics tools (http://www.bayeshive.com):

- Haskell (backend and Yesod web application)
- JavaScript (AngularJS); Radian plotting library (http://openbrainsrc.github.io/Radian/)

Mar 2011 - Jun 2012 *Centre d'Ecologie Fonctionelle et Evolutive, CNRS, Montpellier, France*

Post-doc on the EU FUME project, where I worked, among other things, on regional modelling of vegetation water stress and fire regimes for Mediterranean ecosystems.

Jan 2011 - Mar 2011 *NEPTUNE Canada, University of Victoria*

Short period working as a Scientific Data Specialist with the NEPTUNE Canada project, the world's first regional seafloor cabled observatory, in the north-eastern Pacific off the west coast of Vancouver Island. Worked on data analysis and data product development for a range of different oceanographic instruments. From June 2010 until December 2010, spent one day per week at NEPTUNE, working primarily on data analysis for sonar instruments; moved to full-time status in January 2011.

Jan 2009 - Dec 2010 *Department of Mathematics and Statistics, University of Victoria*

PIMS Postdoctoral Fellow, working on stochastic models of tropical convection. I worked on the development of simplified physically inspired stochastic models of convective processes in the tropics to serve as improved parameterisations in general circulation models of the atmosphere. This work involved a combination of theoretical investigation and practical implementation, including coupling of my models to large climate models. I also had teaching responsibilities in this position, teaching second year Differential Equations and first year Calculus courses in the department.

Oct 2005 - Dec 2008 *School of Geographical Sciences, University of Bristol, UK*

PhD studies: *Nonlinear Dimensionality Reduction Methods in Climate Data Analysis*. Supervised by Prof. Paul Valdes (geography) and Prof. Steve Wiggins (mathematics). PhD awarded December 2008. Work funded by a NERC e-Science studentship, for which I wrote a proposal while working as a research assistant in the department. As well as my PhD work, I was involved in proposal writing, lecturing and research group support activities. I also collaborated with other members of our group on vegetation and palaeoclimate modelling work.

Jun 2004 - Sep 2005 *School of Geographical Sciences, University of Bristol* – Scientific Programmer

Climate modelling position, before starting PhD. Used the FOAM general circulation model coupled

to the LPJ dynamic vegetation model to evaluate vegetation and ocean feedbacks on mid-Holocene climate. Also performed some teaching duties.

Jan 2004 - Mar 2004 *Elixent Ltd., Bristol* – Software Engineer
Contract in semiconductor IP company working on place-and-route tools for a reconfigurable array processor architecture: modelled aspects of architectural timing model to derive simplified empirical timing rules to improve place-and-route performance.

Mar 2003 - Dec 2003 *Ergnosis Ltd., Bristol* – Software Engineer
Permanent position in small software start-up producing next-generation software tools for Java development. Worked on development of low-level infrastructure components such as language parsing infrastructure and a flexible low-level versioning and undo/redo system.

Nov 2002 - Feb 2003 *Coleg Ceredigion, Aberystwyth* – Part-Time Maths Lecturer
Teaching of maths at 'A'-Level and university entrance standard. During this period, also did some freelance web design and CAD work in West Wales, including work for a renewable energy company.

Feb 2002 - Oct 2002 *Systems Engineering & Assessment Ltd., Somerset* – Senior Systems Engineer
Development and contract support work in the marine and aerospace sectors, including: naval sonar system performance analysis as part of support contract to the Ministry of Defence for the Sonar 2076 system for Trafalgar and Astute class submarines; software development for distributed naval simulations; assessment of a large software package for acoustic synthesis for sonar system acceptance testing; software development for CAD geometry translation for use in naval simulation visualisation.

Nov 2001 - Feb 2002 *Every Software Ltd., Oxford* – software developer
Senior software developer, developing image management software for the construction industry.

Oct 1998 - Nov 2001 *Department of Physics, Oxford University, UK*
Three years studying towards a D.Phil. in planetary physics. One year spent on data analysis for the PMIRR-2 instrument on the Mars Climate Orbiter spacecraft, until this mission was lost at Mars in Sep 1999, necessitating a change of D.Phil. project. Spent two years developing optical delay line hardware and associated control software for a proposed space interferometry mission to search for extra-solar planets. Left department before submitting thesis due to lack of financial resources. Received Werrett Prize for first year report. Followed graduate course in atmospheric dynamics. Taught undergraduate physics at Christ Church and St. Anne's College.

Oct 1997 - Jun 1998 *Clare College, Cambridge University, UK*
Certificate of Advanced Study in Mathematics (Part III Maths Tripos) – taught master's in advanced mathematics. Followed courses in a range of subjects in applied mathematics and theoretical physics.

Jan 1997 - May 1997 *Union Bank of Switzerland, New York* – IT consultant
Worked on fixed income analytics library, designing and implementing cross-platform database interface for accessing reference and historical data. Also acted as technical consultant for programming and design questions arising in work of other members of team.

Jul 1995 - Dec 1996 *Credit Suisse Financial Products, Tokyo* – analyst/developer
Support and development work for variety of front office trading systems, including Lotus spreadsheet addins, trade entry systems and deal revaluation servers. As well as project work, also provided general developer support and tools troubleshooting for five other Tokyo developers, and front-line support for dealing room systems.

Aug 1994 - Jun 1995 *Teknekron Software Systems Inc., London* – C++/SQL development
Worked on several projects, with most time spent on a distributed transaction processing infrastructure for financial applications. I was in charge of day-to-day management of the programming team on this project, which involved scheduling work for a 5-6 people and managing deliveries to clients, as well as doing a large proportion of the development work.

Apr 1993 - Jul 1994 *Investment Intelligence Systems Corp., London* – C/C++ development
Work on a market data delivery system, initially in London, then in Paris at Banque Nationale de

Paris, supporting their main Paris dealing room and branch offices world-wide. I worked on both server and client development, writing, among other things, a fault-tolerant feed handler for a French stock market feed. I also worked on other communications projects, including an automated news quality monitoring system for Reuters.

Nov 1992 - Mar 1993 *Compulexis Ltd., Oxford, UK* – C/SQL development
Programming work for dictionary editing systems.

Oct 1989 - Jun 1992 *Christ Church, Oxford University, UK*
BA (Oxon.) First Class Honours degree in Physics. Strong emphasis on theoretical work – final year courses included mathematical physics, advanced quantum mechanics, general relativity and differential geometry. Received college scholarship for performance in first year examinations.

Sep 1987 - Jun 1989 *St. Brendan's Sixth Form College, Bristol, UK*
Five A-levels: Mathematics (A), Further Mathematics (A), Physics (A), Computer Science (A), Chemistry (B); three S-levels: Mathematics (1), Further Mathematics (1), Physics (1).

PEER-REVIEWED PUBLICATIONS

[1] R. Wania, K. J. Meissner, M. Eby, V. K. Arora, **I. Ross**, A. J. Weaver (2012). Carbon-nitrogen feedbacks in the UVic ESCM. *Geosci. Model Dev.* **5**, 1137–1160.

[2] F. Gogé, R. Joffre, C. Jolivet, **I. Ross**, L. Ranjard (2012). Optimization criteria in sample selection step of local regression for quantitative analysis of large soil NIRS database. *Chemometrics and Intelligent Laboratory Systems* **110**, 168–176.

[3] **I. Ross**, L. Misson, S. Rambal, A. Arneth, R. L. Scott, A. Carrara, A. Cescatti, L. Genesio (2011). How do more extreme rainfall regimes affect ecosystem fluxes in seasonally water-limited Northern Hemisphere temperate shrublands and forests? *Biogeosci. Discuss.* **8**, 9813–9845. (In review for *Biogeosciences*.)

[4] R. Wania, **I. Ross**, I. C. Prentice (2010). Implementation and evaluation of a new methane model within a dynamic global vegetation model: LPJ-WHyMe v1.3. *Geosci. Model Dev..* **3**, 565–584.

[5] R. Wania, **I. Ross**, I. C. Prentice (2009). Integrating peatlands and permafrost into a dynamic global vegetation model: I. Evaluation and sensitivity of physical land surface processes. *Global Biogeochem. Cycles* **23**, GB3014.

[6] R. Wania, **I. Ross**, I. C. Prentice (2009). Integrating peatlands and permafrost into a dynamic global vegetation model: II. Evaluation and sensitivity of vegetation and carbon cycle processes. *Global Biogeochem. Cycles* **23**, GB3015.

[7] **I. Ross**, P. J. Valdes, S. Wiggins (2007). ENSO dynamics in current climate models: An investigation using nonlinear dimensionality reduction. *Nonlin. Processes Geophys.* **15**(2), 339–363.

[8] D. J. Lunt, **I. Ross**, P. J. Hopley, P. J. Valdes (2007). Modelling late Oligocene C_4 grasses and climate. *Palaeogeogr. Palaeocl. Palaeoecol.* **251**(2), 239–253.

[9] V. Masson-Delmotte, M. Kageyama, P. Braconnot, S. Charbit, G. Krinner, C. Ritz, E. Guilyardi, J. Jouzel, A. Abe-Ouchi, M. Crucifix, R. Gladstone, C. Hewitt, A. Kitoh, A. LeGrande, O. Marti, U. Merkel, T. Motoi, R. Ohgaito, B. Otto-Bliesner, W. Peltier, **I. Ross**, P. Valdes, G. Vettoretti, S. Weber, F. Wolk, Y. Yu (2006). Past and future polar amplification of climate change: Climate model intercomparisons and ice-core constraints. *Clim. Dyn.* **26**(5), 513–529.

[10] R. M. Gladstone, **I. Ross**, P. J. Valdes, A. Abe-Ouchi, P. Braconnot, S. Brewer, M. Kageyama, A. Kitoh, A. Legrande, O. Marti, R. Ohgaito, B. Otto-Bliesner, W. R. Peltier, G. Vettoretti (2005). Mid-Holocene NAO: A PMIP2 model intercomparison. *Geophys. Res. Lett.* **32**(16), art. no. L16707.

POSTERS

May 2010 **I. Ross**, S. Wiggins, P. J. Valdes
ENSO Through the Lens of Hessian LLE
Data Hierarchies for Climate Modeling, Institute for Pure and Applied Mathematics, UCLA

Jul 2009 **I. Ross**, B. Khouider, A. H. Monahan
Kinetic Monte Carlo modelling of deep convection with stratiform diffusion
ECSA 2009 Junior Faculty Forum, Boulder, Colorado

Aug 2007 R. Wania, **I. Ross**, I. C. Prentice
Towards integration of permafrost & peatlands into a dynamic global vegetation model
Second International Conference on Earth System Modelling, Hamburg, Germany

Sep 2006 **I. Ross**, P. J. Valdes, S. Wiggins
ENSO at the Mid-Holocene and LGM: Results from the Paleoclimate Modelling Intercomparison Project PMIP2
NERC/DAMTP GEFD Summer School, Cambridge

Jun 2006 R. Wania, I. C. Prentice, **I. Ross**, P. J. Valdes
Modelling modern & Holocene land surface processes and methane emissions in high latitudes
HOLIVAR Open Science Meeting, London

Apr 2006 **I. Ross**, P. J. Valdes, S. Wiggins
Towards a framework for stochastic bifurcation analysis of atmospheric models
EGU General Assembly, Vienna

CONFERENCE TALKS

May 2010 Grid-Scale Instabilities in a Popular Cumulus Parametrization Masked by Numerical Dissipation
29th AMS Conference on Hurricanes and Tropical Meteorology
Tucson, Arizona

Aug 2007 Exploratory climate data analysis using nonlinear dimensionality reduction
Second International Conference on Earth System Modelling
Hamburg, Germany

SEMINARS

Apr 2007 ENSO Dynamics in Current Climate Models – Some Nonlinear Dimensionality Reduction Results
Atmospheric and Oceanic Sciences, McGill University, Montreal, Canada

Apr 2007 ENSO Dynamics in Current Climate Models – Some (More) Nonlinear Dimensionality Reduction Results
School of Earth and Ocean Sciences, University of Victoria, Canada

LECTURING & TEACHING

Fall 2010 Calculus II, *University of Victoria*
First year undergraduate lecture course.

Fall 2009 Introduction to Differential Equations, *University of Victoria*
Second year undergraduate lecture course.

Oct 2007 Dynamical systems theory lectures, *University of Bristol*
Four lectures on nonlinear time series methods, dimensionality reduction and synchronisation, delivered to pre-doctoral students on new Complexity Sciences M.Sci. course.

Mar 2007 Land use and climate change lecture, *University of Bristol*
Hydrosphere and Environmental Change, Climate Impacts lecture series.

Sep 2005 NERC Earth System Sciences Summer School, *University of Bristol*
Organised practical elements of summer school, which included the development of a new vegetation modelling practical incorporating future climate change and palaeoclimate applications.

2004/2005 Small group tutorial teaching, *University of Bristol*
General research and study skills teaching for first year undergraduates.

2002/2003 Part-time maths lecturing, *Coleg Ceredigion, Aberystwyth*
Teaching to 'A'-Level and university entrance level.

1998-2001 Tutorial teaching, *University of Oxford*
Small group (2-4 students) teaching of 2nd and 3rd year undergraduate physics and mathematics, including complex analysis, quantum mechanics and applied partial differential equations.

WORKSHOPS, COURSES & MEETINGS

May 2010 Data Hierarchies for Climate Modeling
Institute for Pure and Applied Mathematics, UCLA

May 2010 29th AMS Conference on Hurricanes and Tropical Meteorology
Tucson, Arizona

May 2010 Simulation Hierarchies for Climate Modeling
Institute for Pure and Applied Mathematics, UCLA

Jul 2009 UCAR Junior Faculty Forum
National Center for Atmospheric Research, Boulder, Colorado

Apr 2009 Multiscale Processes in the Tropics
Banff International Research Station, Banff, Canada

Aug 2007 Second International Conference on Earth System Modelling
Hamburg, Germany

Apr 2007 Stochastic Dynamical Systems and Climate Modelling
Banff International Research Station, Banff, Canada

Oct 2006 Geometric and Multiscale Methods for Geophysical Fluid Dynamics
Lorentz Centre, University of Leiden, Netherlands

Sep 2006 NERC/DAMTP GEFD Summer School
University of Cambridge, UK

May 2006 Mathematics of Data Assimilation
Department of Mathematics, University of Warwick, UK

Apr 2006 EGU General Assembly
Vienna, Austria

Mar 2005 Qualitative Numerical Analysis of High-dimensional Nonlinear Systems
Bristol Centre for Applied Nonlinear Mathematics, University of Bristol, UK

PUBLIC TALKS

14 Jun 2007 *Climate change and public health*
Bristol Primary Care Trust Board meeting

23 May 2007 *Climate change Q&A – Sustainable Redland*
Climate change talk for local sustainability group

1 Nov 2006 *Climate change and implications for public health*
Avon Public Health Network Seminar series

19 Oct 2006 *What Do We Know About Climate Change And How Do We Know It?*
Stop Climate Change Campaign

6 Jul 2006 *Aviation and Climate Change*
Stop Bristol Airport Expansion Campaign

PUBLIC OUTREACH ACTIVITIES

Feb 2009 *UVic STEM Outreach Workshops*
This event brought groups of students from local aboriginal schools onto the UVic campus to participate in a range of science and engineering workshops. I helped to run a series of "Math Mania" activities, using simple (and not so simple) games to present mathematical concepts in a more lively manner than is normally done in the classroom.

Mar 2008 *Science Alive*
My second opportunity to help at this biennial event.

Jun 2008 *Bristol Festival of Nature*
The UK's largest public science fair. University of Bristol organised a "Science Now!" tent at which I and colleagues answered questions from the public about climate change.

Mar 2006 *Science Alive*
Biennial public understanding of science event organised by University of Bristol in central Bristol, with stalls from science departments within the university. I produced display materials and helped run the geographical sciences stall, answering questions from the public on climate change and other issues.

INTERESTS

Languages French: fluent; German: intermediate level; Japanese: basic level.

Sports Mountain biking; kayaking, particularly sea kayaking (certified to Paddle Canada Level II).

Volunteer work In 2009 and 2010, I worked with Straitwatch, an organisation that monitors whale-watching activities in the waters around Vancouver Island. This involves spending days out on the water wherever the whales happen to be, collecting data concerning interactions between whales and boaters, and whenever possible, educating recreational boaters about whale ecology and behaviour and about the regulations that govern whale-watching activities. While living in France, I volunteered once a week at the animal shelter of the SPA de l'Agglomération de Montpellier, where I helped to walk the 200 or so dogs that are normally to be found there.

Walking and Camping I am a keen walker and have walked in a number of places in the UK, Iceland, France, Canada and Austria. I particularly enjoy long-distance lightweight backpacking and wild camping.

Travel I have lived in France, Japan, the US, Canada and Austria, and have travelled in Egypt, Tunisia, Indonesia, the Philippines and a number of European countries.