

NAME: Geoff Nicholls

ADDRESS: Mathematics Department,
Auckland University,
Private Bag 92019, Auckland,
New Zealand

EMAIL: nicholls@math.auckland.ac.nz

DATE OF BIRTH: 24/11/1964

NATIONALITY: New Zealander

EDUCATIONAL QUALIFICATIONS:

1986 Canterbury NZ, BSc 1st Hons, Physics
1992 Cambridge UK, PhD, Theoretical Physics

EMPLOYMENT HISTORY:

1990 – 1992 Research Assistant, Electronic and Electrical Engineering, Guildford, Surrey
1992 – 1995 Research Assistant, Statistics, Oxford University
1995 – Lecturer and Senior Lecturer (from 2002), Mathematics, Auckland University

SIGNIFICANT DISTINCTIONS:

Teaching

1997 School of Math. and Info. Sciences, Director's Award for Excellence in teaching

Research Grants (\$NZ)

1996	AUSRC	PI	\$7995	Complex Stochastic Systems
1996	AUSRC	PI	\$4000	Complex Stochastic Systems
1997	AUSRC	PI	\$10000	Complex Stochastic Systems
1999	Marsden	PI	\$195000	Inverse Problems
2001	VC's fund	PI	\$25000	Genetics
2002	Marsden	AI	\$380000	Linguistics
2003	Marsden	AI	\$600000	Spatial-genealogical models of bird song

Visiting grants (valued over NZ\$5000)

1999	FoRST	NZ	\$20000	Radiocarbon Dating
2001	MaPhySto	Denmark	\$6000	Inverse Problems
2003	NSF	USA	\$34000	Inverse Problems
2004	MaPhySto	Denmark	\$22500	Perfect simulation

Invited Lectures (selected)

1997 New Zealand Statistical Association 48th Conference
1998 Department of Mathematical Statistics, Gothenburg, Sweden
1998 Mathematics Department, Aarlborg, Denmark
1998 Statistics Department, Jyvaskyla, Finland
1998 Department of Mathematical Statistics, Lund University. Sweden

2000	Bernoulli/IMS Fifth world congress Guanajuato Mexico
2000	ISBA Sixth world meeting Hersonissos Crete
2001	MaPhySto Workshop on Inverse Problems, Aalborg, Denmark
2001	Stochastic Processes and their Applications, Cambridge, UK
2002	Tools for Constructing Chronologies: crossing disciplinary boundaries, Powys, UK
2002	Statistics Department, Lancaster, UK
2002	Statistics Department, Warwick, UK
2003	“Applied Inverse Problems”, IPAM, UCLA, Lake Arrowhead, California
2003	ICIAM 2003, July, Sydney
2003	“Mathematics and Statistics of Complex Systems”, ARC CoE, Melbourne
2004	Department of Mathematical Sciences, Aalborg University , Denmark
2004	Department of Applied Physics, Kuopio University, Finland
2004	LMS Durham Symposium, Mathematical Genetics, Durham, UK
2004	Institute of Information and Mathematical Sciences, Massey University, Auckland

PROFESSIONAL SOCIETIES / SERVICE / OTHER ACTIVITIES:

Conference/seminar organisation

1999	ANZIAM 2000 Applied Mathematics Conference. Local organizing committee.
2000 – 2002	convened Applied Math seminar
2001	NZMRI Workshop “Probability and Statistics in the Physical Sciences”, Local organizing committee

Refereeing

Journals	Statistics and Computing, Journal of the Royal Statistical Society, series B and C and other probability and statistics journals.
Funding	EPSRC (UK funding agency)
Theses	4 MSc, 1 PhD

Professional societies

Member of NZMS (joined 1995) and ISBA (joined 2000)

TEACHING

1996-2004 Auckland University

MATH 162	1 st Year undergrad	Mathematical modeling
MATH 210	2 nd Year undergrad	Computational geometry
PHYSICS 210	2 nd Year undergrad	Algebra
MATH 252	2 nd Year undergrad	Advanced calculus
MATH 361	3 rd Year undergrad	Partial differential equations
MATH 362	3 rd Year undergrad	Mathematical methods in Physics
MATH 370	3 rd Year undergrad	Advanced Numerical Methods
MATH 388	3 rd Year undergrad	Mathematical biology
BIOSCI 359	3 rd Year undergrad	Bioinformatics (phylogenetics component)
PHYSICS 707	Graduate paper	Inverse problems (classical and Bayesian)
MATH 761	Graduate paper	Nonlinear systems
MATH 763	Graduate paper	Partial differential equations
BIOSCI 743	Graduate paper	Bioinformatics (phylogenetics component)

*Graduate supervision (co-supervisor 2nd column, student 4th column, *=graduated)*

1999*	Colin Fox	Inverse problems	Mathias Palm	MSc
2001*	Colin Fox	Inverse problems	Eddie Rosser	MSc
00-01*	Vivien Kirk	Dynamical Systems	Alona Ben-Tal	PhD
00-	Rodrigo/Smith	Population genetics	Nicoleen Cloete	PhD
01-	Colin Fox	Inverse problems	Debasish Roy	PhD
02-	Allen Rodrigo	Population Genetics	Greg Ewing	PhD
03-	Rodrigo/Solomon	Population Genetics	David Welsh	PhD
04-	Colin Fox	Inverse Problems	Kate Lee	MSc

Course design: substantial parts of the following courses

1996	Physics 707	Inverse problems	Graduate
1997	Maths 361	PDE's	Stage 3
1997	Maths 362	Mathematical Methods	Stage 3
1999	Maths 388	Mathematical Biology	Stage 3
2001	Physics 111	Mathematical Methods	Stage 1
2003	BioSci 359	Bioinformatics	Stage 3
2004	BioSci 743	Bioinformatics	Graduate

PUBLICATIONS

Refereed Journal Articles

Nicholls, G.K., 'Bayesian image analysis with Markov Chain Monte Carlo and colored continuum triangulation models', *Journal of the Royal Statistical Society, series B*, 60(3) 643-659 (1998)

Fox, C., Nicholls, G.K., Palm, M., 'Efficient solution of boundary value problems for image reconstruction via sampling', *J. Elec. Imaging*, 9(3) 251-259 (2000)

Nicholls, G.K., 'Spontaneous magnetisation in the plane', *J. Stat. Phys.*, 102: 1229-1251, (2001)

Jones, M., Nicholls, G.K., 'Reservoir offset models for radiocarbon calibration', *Radiocarbon*, 43(1), 119-124, (2001)

Nicholls, G.K., Jones, M., 'Radiocarbon dating with temporal order constraints', *Journal of the Royal Statistical Society, series C*, 50(4), 503-521 (2001)

Holdaway, S.J., Fanning, P.C., Witter, D.W., Jones, M., Shiner, J. and Nicholls, G.K., 'Late holocene Aboriginal occupation of the Australian arid zone', *Journal of Archaeological Science*, 29:351-363, (2002)

Drummond, A.J., Nicholls, G.K., Rodrigo, A.G., Solomon, W., 'Estimating mutation parameters, population history and genealogy simultaneously from temporally spaced sequence data', *Genetics*, 161:1307-1320, (2002)

Colin Fox and Geoff Nicholls. 'Statistical Estimation of the Parameters of a PDE', *Canadian Applied Mathematics Quarterly*, 10(2), 277-306, (2002)

Jones, M., Nicholls, G.K., 'New Radiocarbon Calibration Software', *Radiocarbon*, 44(3), 663-674, (2003)

Mira, A., Nicholls, G.K., 'Bridge estimation of the probability density at a point', *Statistica Sinica*, 14:603:612, (2004)

Cloete, N., Nicholls, G.K., Scott, D.J., 'Simulation of ancestral selection graphs for Monte Carlo integration', *The ANZIAM Journal*, 45(E), C391-C404, (2004)

Ewing, G., Nicholls, G., and Rodrigo A., 'Using temporally spaced sequences to simultaneously estimate migration rates, mutation rate and population sizes in measurably evolving populations (MEPs)', *Genetics* 168, 2407-2420, (2004)

Welch, D., Solomon, W., Rodrigo, A., Nicholls G., 'Integrating Genealogy and Epidemiology: The Ancestral Infection and Selection Graph as a Model for Reconstructing Host Virus Histories', *Theoretical Population Biology*, (2005) in press.

Atkinson, Q.D., Nicholls, G.K., Welch, D.J. and Gray, R.D., 'From words to dates: water into wine, mathemagic or phylogenetic inference?', *Transactions of the Philological Society*, 103(2), (2005) in press.

McKeague, I.W., Nicholls, G.K., Speer, K., 'Statistical inversion of South Atlantic circulation in an abyssal neutral density layer', *Journal of Marine Research*, 63:4, (2005) in press.

Refereed publications accepted pending revision

Møller, J., Nicholls, G.K., 'Perfect simulated tempering', *Statistics and Computing* (1999)

Refereed publications submitted

Fox, C., Nicholls, G.K. and Roy, D., 'Imaging Convex Quadrilateral Inclusions in Uniform Conductors from Electrical Boundary Measurements', *submitted* (2005)

Refereed and invited papers published in Conference Proceedings

Nicholls, G.K., Petrou, M., 'Generalisation of Renormalisation Group Methods for Multi-resolution Image Analysis', 11'th IAPR International Conference on Pattern Recognition, IEEE Comp. Soc. Press, Los Alamitos, California, Vol 1, p 567-570 (1992)

Nicholls, G.K., 'An Order Preserving Hierarchy of Markov Random Fields', in proceedings, '1st NZ Conference on Image and Vision Computing', Auckland NZ, Eds C Bowman, R Clist, O Olsson and M Rygol (1993)

Petrou, M., Nicholls, G.K., 'On Multiresolution Image Restoration', in proceedings, '12th IAPR International Conference on Pattern Recognition', California, USA: IEEE Computer Society Press p63-67 (1994)

Clifford, P., Nicholls, G.K. 'Bayesian inference for a model of lines, vertices and colored polygons', IMA Proceedings, 'Complex Stochastic Systems and Engineering' Clarendon, Oxford, Ed. D. M. Titterton, p121-139, (1995)

Nicholls, G.K., Fox, C., 'Exact MAP States and Expectations from Perfect Sampling: Grieg, Porteous and Seheult revisited', in Ali Mohammad-Djafari Eds, 'Bayesian Inference and Maximum Entropy Methods in Science and Engineering', American Institute of Physics, v568, p252-263, (2001)

Drummond, A.J., Nicholls, G.K., Rodrigo, A.G., Solomon, W., 'Genealogies from time-stamped sequence data', in *'Tools for Constructing Chronologies'*, Eds. C Buck and A. Millard, Springer, 151-174, (2003)

Nicholls, G.K. and Gray, R.D. 'Quantifying uncertainty in a stochastic Dollo model of vocabulary evolution', The McDonald Institute for Archaeological Research, Cambridge, UK, (2004)

Other Works

Major works published informally

Nicholls, G.K., Petrou, M., 'Multiresolution Representation of Markov Random Fields', Surrey University Elec. Eng. Technical Report VSSP-TR-3/93 (1993)

Clifford, P., Nicholls, G.K., 'Comparison of Birth-and-Death and Metropolis-Hastings Markov chain Monte-Carlo', University Statistics Department Preprint. (1994)

Clifford, P., Nicholls, G.K., 'A Metropolis Sampler for Polyonal Image Reconstruction', Technical report, Statistics department, Oxford University, UK (1994)

Fox, C., Nicholls, G.K., 'Sampling Conductivity Images via MCMC', in Mardia, K.V., Gill, C.A. and Aykroyd, R.G., Eds, "The art and science of Bayesian image analysis", ISBN-0-85316-178-X, Leeds University Press, p91-100, (1997)

Christen, J.A., Nicholls, G.K., 'Random Walk Radiocarbon Calibration', Math. Dept, Auckland, Research Report 457 (2000)

Buck, C., Jones, M., Nicholls, G.K., 'Spatial-temporal models for cultural processes', *in preparation* (2000)

Minor works published informally

Nicholls, G.K., 'Colored continuum triangulation models in the Bayesian analysis of two-dimensional change point problems', in KV Mardia, CA Gill and RG Aykroyd Eds, "The art and science of Bayesian image analysis", ISBN-0-85316-178-X, Leeds University Press, p143-150, (1997)

Fox, C., Nicholls, G.K., 'Physically based likelihood for ultrasound imaging', in proceedings, International Symposium on Optical Science, Engineering, and Instrumentation (SPIE), v3459, p92-99 (1998)

Nicholls, G.K., Fox, C., 'Prior Modelling and Posterior Sampling in Impedance Imaging', in proceedings, International Symposium on Optical Science, Engineering, and Instrumentation (SPIE), v3459, p16-127 (1998)

Fox, C., Nicholls, G.K., Palm, M., 'Efficient exact PDE solutions for MCMC', in proceedings, International Symposium on Optical Science, Engineering, and Instrumentation (SPIE), v3816, p23-30 (1999)

Jones, M.D., Nicholls, G.K., 'Observation models in Radiocarbon Calibration', in *'Australasian Connections and New Directions: Proceedings of the 7th Australasian Archaeometry Conference'*, Eds. Martin Jones and Peter Sheppard, ISBN 0-9583686-4-3 ISSN=1174-5967, 181-186, (2001)