

Andrew Zammit Mangion

National Institute for Applied Statistics Research Australia,
University of Wollongong
39C Northfields Avenue, 2500
Wollongong, Australia
azm@uow.edu.au
+61 2422 15112

Education

- 01.2012 PhD awarded from the University of Sheffield, UK, on **Modelling from spatio-temporal data: A systems perspective** (External examiner: Prof. S. Godsill, Department of Engineering, University of Cambridge, UK).
- 06.2007 B.Eng. (Hons.) awarded from the University of Malta in **Electrical Engineering** (1st class degree, Faculty of Engineering Best Academic Achievement Award, ranking 1st from 76 students).

Professional Appointments

- 09.2014 – present **Senior Research Fellow** at the Centre for Environmental Informatics in the National Institute for Applied Statistics Research, University of Wollongong, Wollongong, Australia. Work focus: Spatial and spatio-temporal statistics research and software implementation.
- 08.2012 – 07.2014 **Postdoctoral Fellow** at the School of Geographical Sciences & Department of Mathematics, University of Bristol, UK. Work focus: Spatio-temporal modelling of Antarctic ice trends and glacio-isostatic adjustment.
- 01.2012 – 07.2012 **Postdoctoral Fellow** at the School of Informatics, University of Edinburgh, UK. Work focus: BOLD MRI cluster analysis of renal oxygenation in response to vasodilators, NO inhibitors and angiotensins.

Relevant Work Experience

- 03.2009 – 07.2009 **Research Assistant** at the Rolls-Royce Technology Centre, Sheffield, UK. Work focus: Simulation speed-up of complex models using FPGAs and multithreading with application to jet engines.
- 01.2008 – 09.2008 **Network Engineer** at Compute Ltd., Malta. Work focus: Corporate networking systems and IT security.
- 09.2007 – 12.2007 **Research Assistant** at the German Aerospace Centre, Braunschweig, Germany. Work focus: Adaptive cruise control for varying traffic densities.
- 06.2007 – 09.2007 **Research Assistant** at CERN, Geneva, Switzerland. Work focus: Feedforward modelling of the main quadrupole magnets.
- 07.2005 – 09.2005 **Research Assistant** at Hochschule Zittau, Germany. Work focus: Custom-built simulation tool for power control applications.

Honours and Awards

- 04.2013 National Academy of Sciences of the USA **Cozzarelli Prize** for PNAS paper of outstanding excellence and originality, Washington DC, USA.

- 11.2012 Institute of Engineering and Technology (IET) Control and Automation **Best Doctoral Dissertation Prize**, London, UK.
- 10.2008 **Best Student Paper** at the UK Automatic Control Council (UKACC) Conference, Manchester, UK.
- 07.2007 **RS Prize for Best Academic Achievement** at the Faculty of Engineering, University of Malta.

Grants

- 11.2015 Global Challenges at the University of Wollongong: **Travel Grant** for maintaining collaboration with the School of Geographical Sciences at the University of Bristol.
- 04.2014 Natural Environment and Research Council (NERC): **Technology Proof of Concept** “Spatio-temporal emulation: A tool for geophysical model calibration and prediction” (conceived and wrote application). *Awarded £120,000 (declined to take up position in Australia).*
- 08.2013 Institute of Mathematics and its Applications at the University of Bristol: **Travel Grant** for attending the Third Workshop on Bayesian Inference for Latent Gaussian Models with Applications (LGM), Reykjavik, Iceland.
- 03.2013 Institute of Advanced Studies (IAS): **Research Workshop Grant** (principle convenor), University of Bristol, UK.
- 11.2010 Pattern Analysis, Statistical Modelling and Computational Learning (PASCAL2): **Travel Grant** for a 5-week visit to the University of Edinburgh, UK.
- 04.2008 University of Sheffield: **Full University Scholarship** for pursuing a PhD at the University of Sheffield, UK, 2008–2012.

Peer-reviewed Publications

J.C. Rougier and **A. Zammit-Mangion** (2016) “Visualisation for large-scale Gaussian updates,” *Scandinavian Journal of Statistics*, in press.

A. Zammit-Mangion, N. Cressie and A.L. Ganesan (2016) “Non-Gaussian bivariate modelling with application to atmospheric trace-gas inversion,” *Spatial Statistics*, in press.

B. Cseke, **A. Zammit-Mangion**, G. Sanguinetti and T. Heskes (2016) “Sparse approximations in spatio-temporal point-process models,” *Journal of the American Statistical Association*, in press.

A. Martín-Español, **A. Zammit-Mangion**, P.J. Clarke, T. Flament, V. Helm, M.A. King, S.B. Luthcke, E. Petrie, F. Remy, N. Schoen, B. Wouters and J.L. Bamber (2016) “Spatial and temporal Antarctic ice sheet mass trends, glacio-isostatic adjustment and surface processes from a joint inversion of satellite altimeter, gravity and GPS data,” *Journal of Geophysical Research*, 121(2), pp. 182–200.

A. Zammit-Mangion, N. Cressie, A.L. Ganesan, S. O’Doherty and A.J. Manning (2015) “Spatio-temporal bivariate statistical models for atmospheric trace-gas inversion,” *Chemometrics and Intelligent Laboratory Systems*, 149(B), pp. 227–241.

A. Zammit-Mangion, J. Bamber, N. Schoen and J.C. Rougier (2015) “A data-driven approach for assessing ice-sheet mass balance in space and time,” *Annals of Glaciology*, 56(70), pp. 175–183.

N. Cressie, S. Burden, W. Davis, P.N. Krivitsky, P. Mokhtarian, T. Suesse and **A. Zammit-Mangion** (2015) “Capturing multivariate spatial dependence: Model, estimate, and then predict,” *Statistical Science*, 30(2), pp. 170–175.

N. Schoen, **A. Zammit-Mangion**, J.C. Rougier, T. Flament, F. Remy, S. Luthcke and J. Bamber (2015) “Simultaneous solution for mass trends on the West Antarctic Ice Sheet,” *The Cryosphere*, 9, pp. 805–819.

A. Zammit-Mangion, J.C. Rougier, N. Schoen, F. Lindgren and J. Bamber (2015) “Multivariate spatio-temporal modelling for assessing Antarctica’s present-day contribution to sea-level rise,” *Environmetrics*, 26(3), pp. 159–177.

A. Zammit-Mangion, J. Rougier, J. Bamber and N. Schoen (2014) “Resolving the Antarctic contribution to sea-level rise: a hierarchical modelling framework,” *Environmetrics*, 25(4), pp. 245–264.

A.L. Ganesan, M. Rigby, **A. Zammit-Mangion**, A.J. Manning, R.G. Prinn, P.J. Fraser, C.M. Harth, K.-R. Kim, P.B. Krummel, S. Li, J. Mühle, S.J. O’Doherty, S. Park, P.K. Salameh, L.P. Steele and R.F. Weiss (2014) “Characterization of uncertainties in trace gas inversions using hierarchical Bayesian methods,” *Atmospheric Chemistry and Physics*, 14, pp. 3855–3864.

R. I. Menzies, **A. Zammit-Mangion**, L. Hollis, R. Lennen, M.A. Jansen, D.J. Webb, J.J. Mullins, J.W. Dear, G. Sanguinetti and M. Bailey (2013) “An anatomically unbiased approach of analysis of renal BOLD magnetic resonance images,” *American Journal of Physiology: Renal Physiology*, 305(6), pp. F845–52.

A. Zammit Mangion, M. Dewar, V. Kadiramanathan and G. Sanguinetti (2012) “Point process modelling of the Afghan War Diary,” *PNAS*, 109(31), pp. 12414–12419. Awarded the Cozzarelli Prize from the National Academy of Sciences.

A. Zammit Mangion, G. Sanguinetti and V. Kadiramanathan (2012) “Variational estimation in spatio-temporal systems from continuous and point process observations,” *IEEE Transactions on Signal Processing*, 60(7), pp. 3449–3459.

A. Zammit Mangion, K. Yuan, V. Kadiramanathan, M. Niranjana and G. Sanguinetti (2011) “Online variational inference of state-space models with point process observations,” *Neural Computation*, 23(8), pp. 1967–1999.

A. Zammit Mangion, G. Sanguinetti and V. Kadiramanathan (2011) “A variational approach for the online dual estimation of spatio-temporal systems governed by the IDE,” *Proceedings of the 18th IFAC World Congress*, 18(1), pp. 3204–3209.

A. Zammit Mangion, S. Anderson and V. Kadiramanathan (2011) “Exploration and control of stochastic spatio-temporal systems with mobile agents,” *Proceedings of the 18th IFAC World Congress*, 18(1), pp. 4489–4494.

A.R. Mills, B. Apopei, **A. Zammit Mangion**, H. Barron-Gonzales, P. Gunetti, H. A. Thompson and P. Garbett (2010) “Heterogeneous hardware technologies for accelerating complex aerospace system simulations,” *Proceedings of the IEEE Aerospace Conference*, doi:10.1109/AERO.2010.5446789.

A. Zammit Mangion and S.G. Fabri (2008) “Experimental Evaluation of Haptic Control for Human Activated Command Devices,” *Proceedings of the UKACC Control Conference*, available online at <http://ukacc.group.shef.ac.uk/proceedings/control2008/Proceedings.html>. Awarded prize for best student paper.

Books

A. Zammit-Mangion, M. Dewar, V. Kadiramanathan, A. Flesken and G. Sanguinetti (2013) *Modeling Conflict Dynamics using Spatio-temporal Data*, London, UK: Springer Briefs.

Manuscripts

C.K. Wikle, **A. Zammit-Mangion** and N. Cressie, *Spatio-temporal Statistics with R*, Wiley, book manuscript in preparation.

A. Martín-Español, M.A. King, **A. Zammit-Mangion**, S.B. Andrews, P. Moore and J.L. Bamber, “An assessment of forward and inverse GIA solutions for Antarctica,” submitted to *Journal of Geophysical Research*, in first review.

N. Cressie and **A. Zammit-Mangion**, “Multivariate spatial covariance models: A conditional approach,” arXiv:1504.01865, submitted to *Biometrika*, in third review.

T. Suesse and **A. Zammit-Mangion**, “Computational aspects of the EM algorithm for spatial econometric models with missing data,” submitted to *Journal of Statistical Computing and Simulation*, in second review.

Reproducibility and Open-source Software Contributions

- *FRK*, an R package for carrying out spatial and spatio-temporal fixed rank kriging on massive datasets. Under development. Available on *github*.
- *MVST*, an R package for modelling and predicting with multivariate spatio-temporal random fields when the covariance parameters are known. Available on *github*.
- 09.2015 *atminv*, an R package for reproducing results in the article “Spatio-temporal bivariate statistical models for atmospheric trace-gas inversion.” Available on *github*.
- 09.2015 *bicon*, an R package for reproducing results in the article “Multivariate Spatial Covariance Models: A Conditional Approach.” Available on *github*.
- 01.2015 *EFDR*, an R package for Enhanced False Discovery Rate for signal detection in noisy images. Available on *CRAN*.
- 05.2012 MATLAB function for Gaussian mixture modelling with background noise. Available on *MATLAB Central* (approx. 30 downloads per month).

Selected Recent Presentations and Posters

- 11.2015 “Atmospheric trace gas inversion with spatial statistical models,” presented at the *Atmospheric Composition & Chemistry Observations & Modelling Conference*, Murrumbidgee, Australia.
- 06.2015 “Bivariate spatio-temporal statistical models for atmospheric trace gas inversions,” presented at *Spatial Statistics: Emerging Patterns*, Avignon, France.
- 03.2014 *Invited talk*. “Multivariate spatio-temporal modelling for resolving the Antarctic’s contribution to sea-level rise,” presented at the University of Bath, Bath, UK.
- 10.2013 *Invited talk*. “Dynamic spatio-temporal point-process modelling with application to violent conflict,” presented as part of the *Bayes Lectures on Spatio-temporal Modelling*, Edinburgh, UK.
- 09.2013 “Resolving the Antarctic contribution to sea-level rise: a hierarchical modelling approach,” presented at the *Workshop on Latent Gaussian Models (LGM2013)*, Reykjavik, Iceland.
- 06.2013 *Invited talk*. “A Markov field approach to quantifying uncertainty on ice mass loss in Antarctica,” presented at the *23rd Annual Meeting of the International Environmetrics Society*, Anchorage, Alaska, USA.

Teaching Experience

Short courses	12.2015	Statistics with spatio-temporal data; joint with Noel Cressie (1-day short course), Sydney Business School, Australia.
Lecturing	10.2015	Module in Generalised Linear Models, STAT332 (12 lectures and examination); joint with Yan-Xia Lin, University of Wollongong, Australia.
Student project supervision	11.2015	Supervision of 8-week winter project on multivariate spatial statistics (A\$3000 awarded to R. McDonald), University of Wollongong, Australia.
	07.2015	Supervision of 3-week summer project on multivariate spatial statistics (A\$900 awarded to J. Laubscher), University of Wollongong, Australia.
	09.2009 – 04.2011	Supervisory assistant for two master students, University of Sheffield, UK.
Tutorial/lab supervision	09.2009 – 04.2011	Tutoring in undergraduate subjects including elementary statistics, instrumentation and control, University of Sheffield, UK.

Professional Service and Activities

Reviewer	<i>Annals of Applied Statistics, Australian and New Zealand Journal of Statistics, Automatica, JABES, JASA, Nature Communications, Scandinavian Journal of Statistics, The Cryosphere</i> and several international conferences.
Associations	IEEE Member (13 years), ASA (1 year), TIES (1 year).
2011	Executive member of the ACSE Research Symposium Organising Committee, University of Sheffield, UK. Official representative of the Department of ACSE on the Post-graduate Research Forum, University of Sheffield, UK.
2010	University of Sheffield, UK.
2009	Finance chair of the IAPR conference in Pattern Recognition in Bioinformatics, Sheffield, UK.
2006	President of IAESTE Malta (one-year term).

Relevant Training

2016	Social Network Analysis with Statnet, 2 days, Wollongong, Australia.
2014	Deep Learning – A tutorial workshop, 1 day, Wollongong, Australia.
2014	Introduction to ARCHER and Cray MPI, 2 days, Bristol, UK.
2013	Introduction to HPC Workshop, 1 day, Bristol, UK.
2013	INLA/SPDE/GMRF Tutorial for the RSS, 1 day, Bath, UK.
2012	Markovian models in spatial statistics, 1 day, Trondheim, Norway (part of LGM2012).

Skills

Language	Maltese, English (mother tongues), Italian (fluent), German (basic understanding).
Computer	Proficient in R, MATLAB and LaTeX. Experience with SIMULINK, C, Python, C#, and PASCAL. Project experience with VBS, Bash and Delphi, NI Labview, dSPACE software, ModelSIM, Xilinx Foundation Series (VHDL with FPGAs), CADENCE and Autodesk Inventor.