DANIEL PETER SIMPSON

PERSONAL DETAILS

Office	Sidney Smith 6026A, University of Toronto, St George Campus	**Email**	simpson@utstat.toronto.edu
		Website	https://dpsimpson.github.io
		Citizenship	Australian

SKILLS AND TOOLS

Statistical modelling; spatial and spatiotemporal modelling; Bayesian modelling; complex multilevel and mixed effects models; modelling non-representative and messy data; MRP; computational statistics; fast approximate Bayesian inference algorithms; R; Github; Markdown; LaTeX; C++ (beginner–intermediate); building new statistical methods and reproducible statistical workflows for complex data; writing, speaking, and teaching for technical and general audiences.

EMPLOYMENT HISTORY

Associate Professor of Statistics (2020–Present
   Associate Chair for Research (2019–2020)
   Assistant Professor (2017–2020)
   Department of Statistical Sciences, University of Toronto   Jul 2017 – Present

- Canadian Research Chair in Bayesian Spatial Modelling (2018-2022)
- Collate and distribute information about grants; mentor junior faculty and assist with their grant writing; contribute to the strategic planning in the Department.
- Chair of four faculty search committees; member of six faculty search committees.
- Supervise four PhD students.
- Co-lead a Demographic Research and Applied Statistics Lab (7 people) with the major project of producing global Cause of Maternal Death estimates for the World Health Organization.
- Develop and teach three new undergraduate units on Machine Learning, Bayesian Statistics, and Spatial Statistics.
- Conduct novel statistical research and publish in world-class statistical journals.

Reader (lower of two UK grades equivalent to a US Full Professor) in Statistics
   (Lecturer (Assistant Professor) in Statistics until May 2016)
   Department of Mathematical Sciences, University of Bath   Aug 2015 – Jun 2017

- Placement Tutor (2016–2017). Responsible for the year long industrial placement students (109 in 2016/17) in our degree programs.
- Equality and Diversity officer(2016–2017)
- Athena SWAN Department Self Assessment Team. This committee put together successful bid for a Bronze Athena SWAN award. (2015–2016)
- Co-supervised two PhD students.
- Developed and taught courses in multivariate data analysis, operations research, and scalable spatial modelling.

CRiSM Fellow   Oct 2014 - Jul 2015
   Department of Statistics, University of Warwick
   Topic: *Spatial and computational statistics with Markovian models*

Research Scientist   Aug 2012 - Sept 2014
   Department of Mathematics, Norwegian University of Science and Technology, Norway

- Researched spatial and computational modelling utilizing the Markov property
- Co-supervised 4 PhD students
- Organized a 15 person weekly lab meeting
- Taught short courses on spatial statistics and the R-INLA package.

Postdoctoral Fellow   Jan 2012 - Jul 2012
   Department of Biological and Environmental Sciences, University of Helsinki, Helsinki
   Topic: *Spatial models in ecology*

Postdoctoral Fellow   Jan 2010 - Dec 2011
  Department of Mathematics, Norwegian University of Science and Technology, Norway
  Topic: *Modelling spatial GMRFs on manifolds*

Postdoctoral Fellow   2009
  Department of Mathematics and Mathematical Statistics, Umeå University, Sweden
  Topic: *Numerical solution of non-local partial differential equations arising in mathematical ecology*

EDUCATION

Doctor of Philosophy   2006–2009
  Queensland University of Technology, Brisbane, Queensland, Australia
  Title: *Krylov subspace methods for approximating functions of symmetric positive definite matrices with applications to applied statistics and models of anomalous diffusion.*
  Supervisors: Ian Turner, Tony Pettitt

Bachelor of Applied Science (Mathematics – Honours 1A (top level))   Graduated 2005
  Queensland University of Technology, Brisbane, Queensland, Australia

Bachelor of Applied Science (Mathematics)   Graduated 2005
  Queensland University of Technology, Brisbane, Queensland, Australia

OTHER INFORMATION

Open source software:

- Developer of the Stan probabilistic programming language (http://mc-stan.org/). Currently focussing on Laplace approximations and sparse matrix support. (2018–Present).

- Stan Governing Board (2018–2019, Founding member). Previously member of Stan's NUMFocus leadership body (2017–2018).

- Developer/Maintainer of the R-INLA software package (http://r-inla.org/, with Håvard Rue, Finn Lindgren, Andrea Riebler, and Elias Krainski) (2010–Present) and contributor to the INLABru R package (2018).

Training and mentorship:

- 29 short courses across 12 countries covering spatial statistics, inverse problems, statistical ecology, Stan, INLA, and data science.

- Four complete and four current PhD students. External examiner for five PhD theses.

Speaking

- 16 invited conference and workshop talks and 24 seminars across the world.

Writing

- Elias T. Krainski, Virgilio Gómez-Rubio, Haakon Bakka, Amanda Lenzi, Daniela Castro-Camilo, Daniel Simpson, Finn Lindgren and Håvard Rue. (2019) *Advanced Spatial Modeling with Stochastic Partial Differential Equations Using R and INLA.* CRC/Tayor and Francis Group. 2019. Online Version: https://becarioprecario.bitbucket.io/spde-gitbook/

- *Advanced Regression and Multilevel Models.* A revision and extension of the second half of Gelman and Hill (2006). With Andrew Gelman, Jennifer Hill, Aki Vehtari, Jonah Gabry, and Ben Goodrich. *Under Contract with Cambridge University Press. Expected Late 2020.*

- *Bayesian Workflow with Stan.* With Andrew Gelman, Bob Carpenter, Jonah Gabry, Mitzi Morris, Advait Rajagopal, Aki Vehtari, Lauren Kennedy, and Rob Trangucci. *Under contract with CRC Press/ Taylor & Francis Group. Expected Early 2021.*

- 33 published articles in statistics, numerical analysis, and mathematical biology journals; 2 articles in proceedings of machine learning conferences (AISTATS and ICML); 2 long published discussions; and 6 submitted papers.

LIST OF PUBLICATIONS, TALKS, AND FUNDING

PUBLICATIONS

Bibliometrics (Google Scholar, July 2020)

h-index:	29
i10-index:	44
Total citations:	3462

Books

- Elias T. Krainski, Virgilio Gómez-Rubio, Haakon Bakka, Amanda Lenzi, Daniela Castro-Camilo, **Daniel Simpson**, Finn Lindgren and Håvard Rue. (2019) *Advanced Spatial Modeling with Stochastic Partial Differential Equations Using R and INLA*. CRC/Tayor and Francis Group. 2019. Online Version: https://becarioprecario.bitbucket.io/spde-gitbook/

- *Advanced Regression and Multilevel Models*. A revision and extension of the second half of Gelman and Hill (2006). With Andrew Gelman, Jennifer Hill, Aki Vehtari, Jonah Gabry, and Ben Goodrich. *Under Contract with Cambridge University Press. Expected Late 2020.*

- *Bayesian Workflow with Stan*. With Andrew Gelman, Bob Carpenter, Jonah Gabry, Mitzi Morris, Advait Rajagopal, Aki Vehtari, Lauren Kennedy, and Rob Trangucci. *Under contract with CRC Press/ Taylor & Francis Group. Expected Early 2021.*

Submitted

- Charles Margossian, Aki Vehtari **Daniel Simpson** and , Raj Agrawal. (2020) *Hamiltonian Monte Carlo using an embedded Laplace Approximation*. arXiv preprint arXiv:2004.12550 (2020). 16 Pages.

- Aki Vehtari, **Daniel Simpson**, Andrew Gelman, Yuling Yao, and Jonah Gabry. (2019) *Pareto smoothed importance sampling*. arXiv preprint arXiv:1507.02646 (2019). 32 Pages (Submitted to Journal of Machine Learning Research)

- Matthew L. Thomas, Gavin Shaddick, **Daniel Simpson**, Kees de Hoogh, and James V. Zidek. (2019) *Data integration for high-resolution, continental-scale estimation of air pollution concentrations.*ăarXiv preprint arXiv:1907.00093ă(2019). 36 Pages. (Submitted to Journal of the Royal Statistical Society, Series C)

- Joaquín Martínez-Minaya, Finn Lindgren, Antonio López-Quílez, **Daniel Simpson**, and David Conesa. (2019) *The Integrated nested Laplace approximation for fitting models with multivariate response.*ăarXiv preprint arXiv:1907.04059(2019). 26 Pages (Submitted to Journal of Computational and Graphical Statistics)

- Sean Talts, Michael Betancourt, **Daniel Simpson**, Aki Vehtari, Andrew Gelman (2018). *Validating Bayesian Inference Algorithms with Simulation- Based Calibration*. arXiv:1804.06788. 26 pages.

Published

- Yuxiang Gao, Lauren Kennedy, **Daniel Simpson**, and Andrew Gelman. (2020) *Improving multilevel regression and poststratification with structured priors*. Bayesian Analysis. Accepted. arXiv preprint arXiv:1908.06716.

- Aki Vehtari, Andrew Gelman, **Daniel Simpson** Bob Carpenter, Paul Bürkner (2020). *Rank-normalization, folding, and localization: An improved $\hat{R}$ for assessing convergence of MCMC*. Bayesian Analysis. Accepted. arXiv:1903.08008. 23 Pages + Long online supplement.

- Alexander Terenin, **Daniel Simpson**, and David Draper. (2020) *Asynchronous Gibbs Sampling*. AISTATS 2020. Accepted January 2020.

- A.C. Farr, K.L. Mengersen, F. Ruggeri, **D.P. Simpson**, P. Wu, P. Yarlagadda. (2019) *Combining opinions for use in Bayesian networks: a measurement error approach*. International Statisistical Review. Accepted July 2019.

- Óli Páll Geirsson, Birgir Hrafnkelsson, **Daniel Simpson**, and Helgi Sigurdarson. (2019) *LGM split sampler: An efficient MCMC sampling scheme for latent Gaussian models*. Statistical Science. Accepted July 2019. .

- Lauren Kennedy, **Daniel Simpson**, Andrew Gelman. (2019) *[hThe Experiment is just as Important as the Likelihood in Understanding the Prior: a Cautionary Note on Robust Cognitive Modeling. Computational Brain & Behaviour. Volume 2(3-4). 210–217.*

- *Mitzi Morris, Katherine Wheeler-Martin,* **Daniel Simpson**, *Stephen J. Mooney, Andrew Gelman, Charles DiMaggio.(2019) Bayesian hierarchical spatial models: Implementing the Besag York Mollié model in Stan. Spatial and Spatio-temporal Epidemiology, Volume 31. 2019.*

- *Haakon Bakka, Jarno Vanhatalo, Janie Illian,* **Daniel Simpson**, *Håvard Rue. (2019)* Non-stationary Gaussian models with physical barriers. *Spatial Statistics, Volume 29, pp 268–288.*

- *Haakon Bakka, Håvard Rue, Geir-Arne Fuglstad, Andrea Riebler, David Bolin, Elias Krainski,* **Daniel Simpson**, *and Finn Lindgren (2018).* Spatial modelling with R-INLA: A review. *WIRE Computational Statistics. Volume 10(6).*

- *Yuling Yao, Aki Vehtari,* **Daniel Simpson**, *Andrew Gelman (2018).* Yes, but did it work?: Evaluating variational inference. *ICML2018. arXiv:1802.02538.*

- *Gavin Shaddick, Matthew Thomas, Heresh Amini, David Broday, Aaron Cohen, Joseph Frostad, Amelia Green, Sophie Gumy, Yang Liu, Randall Martin, Annette Prüss-Üstün,* **Daniel Simpson**, *Aaron van Donkelaar, and Michael Brauer (2018).* Data integration for the assessment of population exposure to ambient air pollution for global burden of disease assessment. *. Environmental Science & Technology. Volume 52(16), pp. 9069–9078.*

- *Sigrunn H. Sørbye, Janine B. Illian,* **Daniel Simpson**, *David Burslem (2018).* Careful prior specification avoids incautious inference for log-Gaussian Cox point processes. *Journal of the Royal Statistical Society, Series C. Volume 68(3), pp. 543–564.*

- *Andrew Gelman, Greggor Mattson, and* **Daniel Simpson** *(2018).* Gaydar and the fallacy of decontextualized measurement. *Sociological Science. 5. 270–280.*

- *Jonah Gabry,* **Daniel Simpson** *(Joint first author), Aki Vehtari, Michael Betancourt, and Andrew Gelman (2018).* Visualization in Bayesian workflow (with Discussion). *Journal of the Royal Statistical Society Series A. Volume 182(2), pp. 389–402.*

- *Yuling Yao, Aki Vehtari,* **Daniel Simpson**, *and Andrew Gelman. (2018).* Using stacking to average Bayesian predictive distributions (with Discussion). *Bayesian Analysis. 13(3). 917–1007.*

- *Geir-Arne Fuglstad,* **Daniel Simpson**, *Finn Lindgren, and Håvard Rue. (2018).* Constructing Priors that Penalize the Complexity of Gaussian Random Fields. *Journal of the American Statistical Association. Volume 114(525), pp. 445–452.*

- *Andrew Gelman,* **Daniel Simpson**, *and Michael Betancourt (2017).* The prior can generally only be understood in the context of the likelihood. *Entropy 19.10 (2017): 555.*

- **Daniel Simpson**, *Håvard Rue, Thiago Martins, Andrea Riebler, and Sigrunn Sørbye.* Penalising model complexity: A principled practical approach to constructing priors (with Discussion). *Statistical Science, Volume 32, Number 1, pp. 1–28, 2017.*

- *Håvard Rue, Andrea Riebler, Sigrunn H Sørbye, Janine B Illian,* **Daniel P Simpson**, *Finn K Lindgren.* Bayesian Computing with INLA: A Review. *Annual Review of Statistics and Its Application. Volume 4, pp. 395–421, 2017.*

- **Daniel Simpson**, *Janine Illian, Finn Lindgren, Sigrunn Sørbye and Håvard Rue.* Going off grid: Computationally efficient inference for log-Gaussian Cox processes. *Biometrika, Volume 103, Number 1, pp. 49–70. 2016.*

- *Andrea Riebler, Sigrunn H Sørbye,* **Daniel Simpson**, *and Håvard Rue.* An intuitive Bayesian spatial model for disease mapping that accounts for scaling. *Statistical Methods in Medical Research, Volume 25, Number 4, pp. 1145–1165. 2016.*

- *Geir-Arne Fuglstad,* **Daniel Simpson**, *Finn Lindgren, and Håvard Rue.* Does non-stationary spatial data always require non-stationary random fields?. *Spatial Statistics, Volume 14, pp. 505–531. 2015.*

- *Óli Páll Geirsson, Birgir Hrafnkelsson, and* **Daniel Simpson**. Computationally efficient spatial modeling of annual maximum 24-h precipitation on a fine grid. *Environmetrics, Volume 26, Issue 5, pp. 339–353. 2015.*

- *Mark Girolami, Anne-Marie Lyne, Yves Atchade, Heiko Strathmann, and* **Daniel Simpson**. On Russian Roulette Estimates for Bayesian inference with Doubly-Intractable Likelihoods. *Statistical Science, Volume 30, Number 4, pp. 443–467, 2015.*

- *Geir-Arne Fuglstad, Finn Lindgren,* **Daniel Simpson**, *Håvard Rue.* Exploring a New Class of Non-stationary Spatial Gaussian Random Fields with Varying Local Anisotropy. *Statistica Sinica, Volume 25, pp. 115–133, 2015.*

- *Yu Ryan Yue,* **Daniel Simpson**, *Finn Lindgren and Håvard Rue.* Bayesian adaptive spline smoothing using stochastic differential equations. *Bayesian Analysis, Volume 09, Number 02, pp. 397 - 424, 2014.*

- *M.R. Nelson, K.J. Sutton, B.S. Brook, D.G. Mallet, **D.P. Simpson** and R.G. Rank.* Simulation of Chlamydia trachomatis infection within the STI-GMaS software environment. *BMC Systems Biology, Volume 8, Number 66, 2014.*

- *Erlend Aune, **Daniel Simpson** and Jo Eidsvik.* Parameter estimation in high dimensional Gaussian distributions. *Statistics and Computing, Volume 24, Issue 2, pp. 247–263, 2014.*

- *Åke Brännström, Linus Carlsson and **Daniel Simpson**.* On the convergence of the escalator-boxcar-train. *SIAM Journal on Numerical Analysis, Volume 51, No. 6, pp. 3213–3231, 2013.*

- *Dann Mallet, Masoumeh Bagher-Oskouei, Anna Charisse Farr, **Daniel Simpson** and Kelly-Jean Heymer.* A mathematical model of chlamydial infection incorporating spatial movement of chlamydial particles. *Bulletin of Mathematical Biology, Volume 75, No. 11, pp. 2257–2270, 2013.*

- *Thiago Martins, **Daniel Simpson**, Finn Lindgren and Håvard Rue.* Bayesian computing with INLA: new features. *Computational Statistics and Data Analysis, Volume 67, pp 68–83, 2013.*

- *Michela Cameletti, Finn Lindgren, **Daniel Simpson** and Håvard Rue.* Spatio-temporal modeling of particulate matter concentration through the SPDE approach. *AStA Advances in Statistical Analysis, Volume 97, Issue 2, pp 109-131, 2013.*

- ***Daniel Simpson**, Finn Lindgren and Håvard Rue.* Think continuous: Markovian Gaussian models in spatial statistics. *Spatial Statistics, Volume 1, pp. 16–29, 2012.*

- ***Daniel Simpson**, Finn Lindgren and Håvard Rue,* In order to make spatial statistics computationally feasible, we need to forget about the covariance function, *Environmetrics, Volume 23, No. 1, p. p65–74, 2012.*

- *C.M. Strickland, **D.P. Simpson**, I.W. Turner, R. Denham, K.L. Mengersen.* Fast Bayesian analysis of spatial dynamic factor models for multi-temporal remotely sensed imagery, *Journal of the Royal Statistical Society Series C, Volume 60, No. 1, pp. 109–124, 2011.*

- *M. Ilić, I.W. Turner and **D.P. Simpson**.* A restarted Lanczos approximation to functions of a symmetric matrix. *IMA Journal on Numerical Analysis, Volume 30, No. 4, pp. 1044–1061, 2010.*

- ***D.P. Simpson**, I.W. Turner, and A.N. Pettitt.* Sampling from a Gaussian Markov random field conditioned on linear constraints. *ANZIAM J., 48 (CTAC2006) pp. C1041–C1053, 2008.*

Published discussions

- Aki Vehtari, **Daniel Simpson**, Yuling Yao, and Andrew Gelman. *Limitations of "Limitations of Bayesian Leave-one-out Cross-Validation for Model Selection".* Computational Brain & Behavior, Volume 2(1), pp. 22–27.

- Juho Piironen, Michael Betancourt, **Daniel Simpson**, and Aki Vehtari. *Comment on "Uncertainty Quantification for the Horseshoe" by van der Pas, Szabo, and van der Vaart.* Bayesian Analysis. Volume 12(4). pp 1264–1266.

- Jon Wakefield, **Daniel Simpson**, and Jessica Godwin. *Comment: Getting into Space with a Weight Problem. Discussion of "Model-based Geostatistics for Prevalence Mapping in Low-Resource Settings" by P.J. Diggle and E. Giorgi.* Journal of the American Statistical Association. Volume 111, pp. 1111–1118, 2016.

- Chris J. Oates, **Daniel Simpson**, and Mark Girolami. *Discussion on "Sequential Quasi-Monte-Carlo Sampling", by Gerber & Chopin,* Journal of the Royal Statistical Society, Series B, Volume 77, Issue 3, pp. 509–726. 2015.

- **Daniel Simpson**, Finn Lindgren, and Håvard Rue. *Beyond the valley of the covariance function (Invited discussion of "Cross-covariance functions for multivariate Gaussian random fields" by Kleiber and Genton).* Statistical Science, Volume 30, Number 2, pp. 164–166. 2015.

- **Daniel Simpson**. *Contribution to the Discussion of the Paper "Geodesic Monte Carlo on Embedded Manifolds" by S. Byrne and M. Girolami.* Scandinavian Journal of Statistics, Volume 41, Issue 1, pp. 16–18. 2014. (Invited)

- Óli Páll Geirsson, Thiago Martins, Håvard Rue, and **Daniel Simpson**. *Discussion of "Beyond Mean Regression" by Thomas Kneib.* Statistical Modelling, Volume 13, Number 4, pp. 355–362. 2013. (Invited)

- Finn Lindgren, Thiago Martins, Håvard Rue and **Daniel Simpson**. *Discussion on "Spatial prediction in the presence of positional error" by T. R. Fanshawe and P. J. Diggle.* Environmetrics, Volume 22, Issue 2, p. 127, 2011. (Invited)

- **Four discussions** on *"An explicit link between Gaussian Fields and Gaussian Markov random fields: the stochastic partial differential equation approach" by Finn Lindgren, Håvard Rue and Johan Lindström.* With Janine Illian; Xiangping Hu; Alessandro Ottavi; and alone. Journal of the Royal Statistical Society, Series B, Volume 74, Part 4, pp. 423–498, 2011.

- Thiago Martins, Håvard Rue and **Daniel Simpson**. *Discussion of "Riemannian manifold Langevin and Hamiltonian Monte Carlo methods" by Mark Girolami and Ben Calderhead.* Journal of the Royal Statistical Society, Series B, Volume 73, Part 2, pp. 123–214, 2011.
- **Daniel Simpson**. *Discussion of "Approximate Bayesian inference for latent Gaussian models by using integrated nested Laplace approximations" by Håvard Rue, Sara Martino, and Nicolas Chopin.* Journal of the Royal Statistical Society, Series B, Volume 71, Part 2, pp. 319–392, 2009.

TALKS

Short Courses   (29 courses from 2011–Present)

With great power comes great responsibility: Stan for modern ecological modelling International Statistical Ecology Conference, June 2020. (1 day with Andrew MacDonald)

Course summary: Contemporary ecological models are growing more complex, capturing not only ecological processes but also other sources of variation, such as sampling noise and measurement error. At the same time, ecological data is growing not only more available, but also more highly detailed. How can we create models that capture all this complexity, while confronting the unavoidable spectre of model misspecification? It is useful to turn to specialized programming languages like Stan, which aims to be a language for specifying probabilistic models.

Stan allows users to specify and infer complex, bespoke, statistical models that are built to appropriately represent the data and process at hand. While this extra power allows scientists to get the most out of their data, we must keep in mind the mantra of Spiderman: "With great power comes great responsibility".

In this course we will cover three main topics: Building bespoke models for ecological data in Stan, including appropriate prior modelling and model checking; Inferring models using the Stan language; and Post-inference model checking, model criticism, and model selection.

Short courses on INLA and stochastic partial differential equations

Course summary: This course covers the basic aspects of building spatial models with the R-INLA software package. Depending on the audience, the course covered the basics of spatial modelling; the basics of Bayesian modelling; the INLA approximation; methods for specifying prior distributions; using the Markov property to speed up computation; random walks and splines; Gaussian models on discrete spaces (lattice and non-lattice data); continuous Gaussian random fields; modelling with stochastic partial differential equations; log-Gaussian Cox processes for point pattern data; joint modelling and spatial error-in-covariates models; and spatiotemporal modelling.

Courses (1 day unless otherwise noted): Oxford University Big Data Institute, Oxford, 2017 (1.5 days); BUC3, University of Bath, 2016 (1/2 day); University of Washington, Seattle, US, 2016; BUC2, UNAM, Mexico City, Mexico, 2016 (2 days); Queensland University of Technology, Brisbane, Australia, 2015 (3 days); Australian Institute of Marine Science, Townsville, Australia (3 days); Imperial College, London, UK, 2015 (2 days); University of St Andrews, UK, 2014 (3 days. Targeted at ecologists. With Janine Illian and Sigrunn Sørbye); University of Bergamo, Italy, 2013 (2 days); University of Santa Cruz, Colorado State University, University of Minnesota, Duke University, USA, 2013 (4 hours, spatial statistics); Medical University of South Carolina, USA, 2013 (2 days); Swiss Tropical and Public Health Institute, Switzerland, 2013 (2 days); University of Girona, Spain, 2013; Queensland University of Technology, Australia, 2012; University of Western Ontario, London, Canada, 2012 ; Dalhousie University, Halifax, Canada, 2012 (2 days); Winter Course in Spatial Statistics, Orsa Grönklitt, Sweden, 2012; Athens University of Economics and Business, 2012; Norwegian Computing Centre, Oslo, 2011; Aalborg University, 2011; 16th Norwegian Statistical Conference, Røros, 2011 (with Håvard Rue); University of Helsinki, 2011 (4 hours).

Short course on statistics and data science National University of Mongolia, Mongolia 2016. (4 days, with Gavin Shaddick)

Course summary: This course covered the basics of using R to model environmental data. The course began with data summaries and hypothesis testing, and concluded with modelling environmental time series.

Short course on finite dimensional models in spatial statistics, Aalborg University, Denmark, 2014. (3 days, with Finn Lindgren)

Course summary: In this course, we covered the details of the stochastic partial differential equation approximation to Matérn Gaussian random fields. The course included an introductions to Gaussian random fields, spectral theory, an the spatial Markov property. It also included more advanced topics dealing with the computational aspects finite element approximation to the random fields, as well as the approximation properties for these finite dimensional random fields.

Short course on Bayesian Inverse Problems 94th European Study Group with Industry, Søderborg, Denmark, 2013. (1 day)

Course Summary: This course covered the basics of the theoretical and computational aspects of Bayesian inverse problems with Gaussian random field priors. The course covered the formulation of these problems, the basics of Gaussian random field priors, and an introduction to MCMC on infinite-dimensional spaces.

Invited conference and workshop talks (16 from 2010–Present)

- The 12th International Conference on Monte Carlo Methods and Applications, Sydney, July 2019. (25 minutes, invited session)
- Royal Statistical Society Meeting, Read Paper session. 2018. (30 minutes, Keynote session)
- StanCon Helsinki. Keynote Speaker, August 2018. (1 hour)
- Workshop on Causal adjustment in the presence of spatial dependence. Centre de Recherches Mathématiques. Montreal. June, 2018. Invited Speaker (1 hour)
- Invited minitutorial, SIAM Conference on Uncertainty Quantification, Anaheim, April 16-19, 2018. The first part of the two hour minitutorial was presented by Finn Lindgren. (My portion: 1 hour)
- Workshop on spatial point processes, UQAM, Montreal, Canada, 2017. (50 minutes).
- Second Autumn meeting on Latent Gaussian models, Trondheim, Norway, 2017. (45 minutes)
- Stan for Pharmacometrics Day. Faculty of Medicine, University of Paris 7 Diderot, 2016. (30 minutes)
- ISBA 2016 World Meeting. Invited talk in the Objective Bayes Session. (30 minutes)
- Bath-RAL Numerical Analysis Day. January 2016. (1 hour)
- Never mind the Big Data, here's the Big Models. 1 Day Meeting, University of Warwick, December 2015. (1 hour)
- Autumn meeting on latent Gaussian models 2015, Trondheim, 2015 (1 hour)
- 11th International Workshop on Objective Bayes Methodology, Valencia, 2015 (Invited Discussant)
- Workshop on Complex Spatio-temporal Data Structures: Methods and applications, Fields Institute, Toronto, 2015 (1 hour).
- Spatial Statistics and Uncertainty Quantification on Supercomputers, University of Bath, May 2014 (45 minutes).
- EQUIP Brainstorm, University of Warwick, May 2014 (45 minutes).
- Advances in Scalable Bayesian Computation, Banff, Canada, March 2014 (1 hour—Withdrew).
- Southern Uncertainty Quantification 2013, Dunedin, NZ, 2013 (1 hour).
- 24th Nordic conference in mathematical statistics, Umeå, 2012 (30 minutes).
- Two-day meeting of the Danish Society for Theoretical Statistics, Aalborg, 2011 (1 hour).
- 58th World Statistics Congress of the International Statistics Institute, Dublin, August 2011 (30 minutes).
- 28th European Meeting of Statisticians, University of Piraeus, 2010 (30 minutes).

Seminars (24 from 2007–Present)

2019:

- MIT Distinguished Seminar Series in Computational Science and Engineering. (With a separate seminar for graduate students)
- Department of Econometrics and Business Statistics, Monash University.
- Department of Computer Science, Monash University.
- School of Physics and Astronomy, Monash University.

- Statistics research group in the Research School of Finance, Actuarial Studies and Statistics (RS-FAS), Australian National University.
- School of Mathematics and Applied Statistics, University of Wollongong.
- School of Mathematics and Statistics, University of Sydney.
- School of Mathematics and Statistics, University of New South Wales.
- School of Mathematical and Physical Sciences, University of Technology, Sydney.
- Department of Statistics, Columbia University.

2017–2018:

- Department of Statistics: Indiana University Bloomington. (2018)
- Department of Statistics, McGill University. (2017)
- School of Mathematics Edinburgh University. (2017)
- Department of Computer Science, Aalto University, Finland. (2017)
- Department of Mathematical Sciences, University of Exeter (2017)

2016 and Before

- School of Mathematics, University of Bristol (2016)
- School of Mathematics, Statistics and Physics, University of Newcastle (2016)
- Department of Mathematics, Brunel University London (2016)
- Department of Statistics, University of Warwick (2015)
- Department of Mathematics, Chalmers University of Technology (2015)
- Department of Statistics, University of Oxford (2015)
- School of Mathematical Sciences, Queensland University of Technology (2009, 2010, 2014)
- Department of Mathematical Sciences, University of Bath (2014)
- Department of Statistics, University of Oxford (2014)
- Department of Mathematics, University of Iceland (2014)
- Biostatistics Department, University of Zurich (2013)
- Department of Statistics, University College London (2013)
- Department of Mathematics and Statistics, University of Jyväskylä (2012)
- Department of Computer Scinece, Aalto University (2012)
- SINTEF (A Norwegian state research company), Trondheim (2011)
- Department of Mathematics, University of St Andrews (2011)
- Department of Mathematics, Norwegian University of Science and Technology (2007, 2010, 2013)
- Department of Mathematics Umeå University (2009)
- International Institute for Applied Systems Analysis (IIASA) (2009)
- Department of Mathematics, University of Lund (2007).

GRANTS AND FUNDING

Received   Approx. \$1,000,000 CAD as PI. ($\sim$\$1,300,000 CAD total)
Monica Alexander (PI), **Daniel Simpson (PI)**, Modelling global cause-specific maternal mortality   2019–2020
An initial contract from the World Health Organization to provide reliable estimates of the distribution of causes of maternal mortality in each country across the world. A second contract is expected in early 2020. \$195,000 (USD).

Daniel Simpson, Canadian Research Chair in Bayesian Spatial Modelling   2018-2022
The Canada Research Chairs Program is a Canadian TriCouncil program designed to attract and retain a diverse cadre of world-class researchers, to reinforce academic research and training excellence in Canadian postsecondary institutions. This grant provides salary and research support for my research program. \$600,000 (CAD)

Daniel Simpson, Towards useable models for complex spatial data   2018-2022
This NSERC Discover program grant focusses on constructing scalable workflows for modelling complex spatial data. \$115,000 (CAD)

Daniel Simpson (CI), Efficiently modelling non-stationarity in ecological spatial models.   2016-2017
This project investigated the use of computationally efficient non-stationary spatial models in species distribution

mapping. This feasibility study, funded through the EPSRC network SECURE, consisted of a workshop and two meetings. £16,532

Daniel Simpson (CI + PI), Network Equilibrium- Advanced Planning Tool.   2016
Two month consultancy contract with Western Power Distribution (working as a subcontractor of TNEI) modelling power demand over the electricity grid and how it is affected by weather. £50,000 (PI: Gavin Shaddick) + £16,532 (PI: Daniel Simpson)

M.R. Nelson, K.J. Heymer, B.S. Brook, J.R. King, D.G. Mallet, **D.P. Simpson (CI)**, R.G. Rank, VPH Exemplar
project EP10   2011–2012
Funding for a one year postdoctoral research position focused on developing an environment for the mathematical and computational modelling of sexually transmitted infections. The funded project is one component of the "Virtual Physiological Human – Network of Excellence". Total budget: €51,087.

SUPERVISION

- Marija Pejcinovska, *Estimating global causes of maternal deaths.* January 2019–Present. University of Toronto. PhD. (With Monica Alexander)

- Yuxiang (Alex) Gao, *Exploiting structured random effects in complex models.* July 2019–Present. University of Toronto. PhD.

- Kamal Rai, *Efficient inference for anisotroptic spatial models*, April 2018–Present. University of Toronto. PhD. (With Patrick Brown)

- Lei Sun. *Fine-scale spatiotempoal modelling of air pollution in India.* October 2017–Present. Universtiy of Toronto. PhD. (With Patrick Brown)

- Elias Krainski. *Statistical Analysis of Space-time Data: New Models and Applications* 2013–2018. NTNU. (With Håvard Rue. Currently a postdoctoral researcher at KAUST and an adjunct professor at the Federal University of Paraná, Brazil.)

- Haakon Bakka. *Modeling Spatial Dependencies using Barriers and Different Terrains.* 2013–2017. NTNU. (With Håvard Rue and Janine Illian. Currently a postdoctoral researcher at KAUST.)

- Geir-Arne Fuglstad. *Modelling spatial non-stationarity.* 2012–2015. NTNU. (With Finn Lindgren and Håvard Rue. Currently an Associate Professor at NTNU.)

- Xiangping Hu. *Multivariate Gaussian random fields: The stochastic partial differential equation approach.* 2010–2013. NTNU. (Joint with Dr Finn Lindgren. Formally supervised by Prof. Håvard Rue. Currently holds a permanent researcher position in industrial ecology at NTNU)

TEACHING

- STA365 Applied Bayesian Statistics. University of Toronto, 2020. Currently 113 students enrolled. (New course 2020)

- STA465 Theory and Methods of Complex Spatial Data. University of Toronto, 2019 (29 students), 2020 (currently 27 students enrolled). 29 Students.(New course 2019)

- STA314 Statistical Methods for Machine Learning I. University of Toronto, 2018. 189 Students. (New course)

- STA4514H Modelling and Analysis of Spatially Correlated Data. University of Toronto, 2018. 6 Students. Half-semester PhD Course. (New Course)

- Lecturer and course coordinator for a level 3 unit in Operations Research at the University of Bath. 141 students. 2016.

- Lecturer and course coordinator for a level 4 unit in Multivariate Data Analysis at the University of Bath. This unit covered dimension reduction, clustering, classification, and support vector machines. For this course I re-wrote all of the resources for the course, including lecture notes. 31 students. 2016.

- PhD course in Probability Theory, NTNU, 2010. Eight Students.

- First year course (accelerated over summer semester) that was equivalent to high school mathematics, QUT, 2008. 28 students.

AWARDS AND PRIZES

Bath Academic Representative Award for Excellence in Teaching   2015/16

An award given by the student body in recognition of an outstanding contribution and dedication to teaching at the University of Bath. Awarded for teaching a Level 4 unit on Multivariate Data Analysis that covered dimension reduction, clustering, classification, and support vector machines.

Australian Postgraduate Award (APA)   2006–2008

A highly competitive three year Australian government PhD scholarship.

REFEREES

References are available upon request.