Richard Wilkinson

Education

2010 – 2013	Postgraduate Certificate in Higher Education (**PGCHE**), University of Nottingham.
2004 – 2008	**PhD**, Department of Applied Mathematics and Theoretical Physics, University of Cambridge. Supervised by Simon Tavaré. *Bayesian inference of primate divergence times.*
2002 – 2003	Part III Mathematics - **Distinction**, University of Cambridge.
1999 – 2002	**BA** Mathematics – **First Class** (Honours), Downing College, University of Cambridge.

Appointments

- Professor, School of Mathematical Sciences, University of Nottingham, Sept 2020–.
- Professor, School of Mathematics and Statistics, University of Sheffield, Jan 2018 - July 2020.
- Senior Lecturer, School of Mathematics and Statistics, University of Sheffield, September 2015 - Dec 2017.
- Assistant Professor, School of Mathematical Sciences, University of Nottingham, September 2009 - August 2015.
- Research Associate, Department of Probability and Statistics, University of Sheffield, October 2007 - September 2009. RCUK funded post-doctoral researcher on the Managing Uncertainty in Complex Models (MUCM) project. I worked on emulation, calibration and data assimilation for complex computer models.

Publications

2023

51. C. Corrado, C. Roney, O. Razeghia, J. A. S. Lemus, S Coveney, I Sim, Steven Williams, M. O'Neill, R. Wilkinson, R. H. Clayton, S. Niederer *Quantifying the impact of shape uncertainty on predicted arrhythmias*, Computers in Biology and Medicine, 153, 2023.

50. M. Strocchi, S. Longobardi, C. M. Augustin, M. A. F. Gsell, A. Petras, C. A. Rinaldi, E. J. Vigmond, G. Plank; C. J. Oates; R. D. Wilkinson; S. A. Niederer *Cell to Whole Organ Global Sensitivity Analysis on a Four-chamber Electromechanics Model Using Gaussian Processes Emulators*, in submission.

49. V.Breaz, R. D. Wilkinson, Randomized Maximum Likelihood via High-Dimensional Bayesian Optimization, in submission.

48. M. T. Smith, M. Ross, J,. Ssematimba, P. Alvarado, M. Alverez, E. Bainomugisha, R. D. Wilkinson *Modelling calibration uncertainty in networks of environmental sensors*, in submission.

47. F. Turner, R. D. Wilkinson, C. Buck, L. Sime, J. Jones *Reconstructing the Antarctic ice sheet shape at the last glacial maximum*, in submission.

2022

46. S. Coveney, C. Corrado, C. Roney, R. D. Wilkinson, J. E. Oakley, S. A. Niederer, R. H. Clayton *Workflow for Probabilistic Calibration of Models of Left Atrial Electrophysiology*, Computing in Cardiology, 2022.

45. S. Coveney, C. Roney, C. Corrado, R. Wilkinson, J. Oakley, S. Niederer, R. Clayton, *Calibrating electrophysiology models on left atrial manifolds using latent Gaussian processes and surrogate models*, to appear, Nature Scientific Reports.

44. P. Gahungu, C. W. Lanyon, M. A. Alvarez, E. Bainomugisha, M. Smith, R. D. Wilkinson, Adjoint-aided inference of Gaussian process driven differential equations, to appear, NeurIPS 2022.

43. M. Strocchi, S. Longobardi, C. Augustin, M. Gsell, E. J. Vigmond, G. Plank, C. J. Oates, R. D. Wilkinson, S. A. Niederer, *Parameter Space Reduction for Four-chamber Electromechanics Simulations Using Gaussian Processes Emulators*, 10th Vienna International Conference on Mathematical Modelling.

2021

42. S. Coveney, C. Corrado, J. Oakley, R.D. Wilkinson, S.A. Niederer, R.H. Clayton. *Bayesian Calibration of Electrophysiology Models using Restitution Curve Emulators*, Frontiers in Physiology.

2020

41. The Royal Society, DELVE Initiative (2020), Balancing the Risks of Pupils Returning to Schools. DELVE Report No. 4. Published 24 July 2020. Available from `http://rs-delve.github.io/reports/2020/07/24/balancing-the-risk-of-pupils-returning-to-school.html`. Lead authors: Simon Burgess, Ines Hassan, Anna Vignoles, Richard Wilkinson.

40. The Royal Society, DELVE Initiative (2020), Face Masks for the General Public. DELVE Report No. 1. Published 04 May 2020. Available from `http://rs-delve.github.io/reports/2020/05/04/face-masks-for-the-general-public.html`.

39. S. Coveney, C. Corrado, C. H. Roney, D. O'Hare, S. E. Williams, M. D. O'Neill, S. A. Niederer, R. H. Clayton, J. E. Oakley, and Wilkinson. *Gaussian Process Manifold Interpolation for Probabilistic Conduction Velocity Maps*, to appear, Philosophical Transactions of the Royal Society A.

38. C. Lok Lei, S. Ghosh, D. G. Whittaker, Y. Aboelkassem, K. A. Beattie, C. D. Cantwell, T. Delhaas, C. Houston, G. Montes Novaes, A. V. Panfilov, P. Pathmanathan, M. Riabiz, R. Weber dos Santos, K. Worden, G. R. Mirams, and Wilkinson. *Consideration of discrepancy when calibrating a mechanistic electrophysiology model*, to appear, Philosophical Transactions of the Royal Society A.

37. C. Corrado, O. Razeghia, C. Roney, S Coveney, S. Williams, I. Sim, M. O'Neill, R. Wilkinson, J. E. Oakley, R. H. Clayton, S. Niederer *Quantifying atrial anatomy uncertainty from clinical data and its impact on electro-physiology simulation predictions*, Medical Image Analysis, 153, 2020.

36. Inglis, G. N., Bragg, F., Burls, N. J., Cramwinckel, M. J., Evans, D., Foster, G. L., Huber, M., Lunt, D. J., Siler, N., Steinig, S., Tierney, J. E., Wilkinson, R., Anagnostou, E., de Boer, A. M., Dunkley Jones, T., Edgar, K. M., Hollis, C. J., Hutchinson, D. K., and Pancost, R. D.: Global mean surface temperature and climate sensitivity of the early Eocene Climatic Optimum (EECO), Paleocene-Eocene Thermal Maximum (PETM), and latest Paleocene, Clim. Past, 16, 1953-1968, https://doi.org/10.5194/cp-16-1953-2020, 2020.

2019

35. P. B. Holden, N. R. Edwards, T. F. Rangel, E. B. Pereira, G. T. Tran, and R. D. Wilkinson, *PALEO-PGEM v1.0: A statistical emulator of Pliocene- Pleistocene climate*, to appear, Geoscientific Model Development.

34. C. Corrado, O. Razeghi, C. Roney, S. Coveney, S. E. Williams, I. Sim, M. D. O'Neill, R. D. Wilkinson, J. E. Oakley, R. H. Clayton, and S. A. Niederer, *Quantifying Atrial Anatomy Uncertainty from Clinical Data and its Impact on Electro-physiology Simulation Predictions*, to appear, Medical Image Analysis.

33. J. Carson, M. Crucifix, S. Preston, Wilkinson, *Quantifying Age and Model Uncertainties in Paleoclimate Data and Dynamical Climate Models with a Joint Inferential Analysis.* Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences.

32. S. Coveney, C. Corrado, R. D. Wilkinson, J. E. Oakley, F. Lindgren, S. E. Williams, M. D. O'Neill, S. A. Niederer, and R. H. Clayton *Probabilistic Interpolation of Uncertain Local Activation Times on Human Atrial Manifolds. IEEE Transactions on Biomedical Engineering (TBME).*

31. F. Turner, Wilkinson, C. Buck, J. Jones, L. Sime *Ice Cores and Emulation: Learning More About Past Ice Sheet Shapes.* In Bayesian Statistics and New Generations, Springer Proceedings in Mathematics & Statistics, pages 175-182.

30. I. Krissaane, Wilkinson, Kingsley Hampton, J. Alshenaifi *Anomaly Detection Semi-supervised Framework for Sepsis Treatment*, 46, 2019 Computing in Cardiology Conference (CinC).

2018

29. E. Uteva, R. Wheatley, R. Graham, and R. Wilkinson, *Active Learning in Gaussian Process Interpolation of Potential Energy Surfaces*, in publication, *Journal of Chemical Physics.*

28. P. B. Holden, N. R. Edwards, A. Ridgwell, R. D. Wilkinson, K. Fraedrich, F. Lunkeit, H. E. Pollitt, J. F. Mercure, P. Salas, A. Lam, F. Knobloch, U. Chewpreecha and J. E. Viñuales, *Climate-carbon cycle uncertainties and the Paris Agreement*, Nature Climate Change.

27. K. Cowtan, P. Jacobs, P. Thorne, R. D. Wilkinson, *What does the 'mean' in 'global mean surface temperature' actually mean?*, accepted, Dynamics and Statistics of the Climate System.

26. J. Sykes, C. Peng, Wilkinson, *An empirical approach to modelling climate change impact on building energy use*, CIBSE (Chartered Institution of Building Services Engineers) Technical Symposium (conference paper), London, April 2018.

25. C. Corrado, S. Williams, I. Sim, S. Coveney, M. O'Neill, R. D. Wilkinson, J. Oakley, R. Clayton, and S. Niederer. *An Algorithm to Sample an Anatomy With Uncertainty*, 45, pages 1-4, Computing in Cardiology (conference paper).

2017

24. J. Carson, M. Crucifix, S. Preston, Wilkinson. *Bayesian model selection for the glacial-interglacial cycle.* To appear, Journal of the Royal Statistical Society, Series C.

23. L. Tian, Wilkinson, Z. Yang, H. Power, F. Fargerlund, A. Niemi. *Gaussian Process Emulators for Quantifying Uncertainty in CO2 Spreading Predictions in Heterogeneous Media.* Computers and Geosciences, 105, 113-119.

22. E. Uteva, R. Graham, Wilkinson, R. Wheatley, *Interpolation of intermolecular potentials using Gaussian processes*. Journal of Chemical Physics, 147(16) 161706 (selected as a **2017 Editors' Choice papers**).

2016

21. Wilkinson, a discussion of *The impact of structural error on parameter constraint in a climate model*, by D McNeall, J. Williams, B. Booth, R. Betts, P. Challenor, A. Wiltshire, and D. Sexton. Earth System Dynamics.

20. D. Crevillén-García, R. D. Wilkinson, A. A. Shah, H. Power, *Gaussian Process Modelling for Uncertainty Quantification in Convectively-Enhanced Dissolution Processes in Porous Media*. Advances in Water Resources, 99, 1-14.

19. Wilkinson, A. Kapranas, I. C. W. Hardy, *Statistical methods for detecting non-binomial sex allocation when developmental mortality operates*. Journal of Theoretical Biology, 408, 167-178.

18. A. J. Cresswell, R. J. Wheatley, Wilkinson, R. S. Graham, *FDCCS16 Molecular simulation of the thermophysical properties and phase behaviour of impure CO2 relevant to CCS*. Faraday Discussions, The Royal Society Of Chemistry, 192, 415-436.

2015

17. P. B. Holden, N. R. Edwards, P. H. Garthwaite, Wilkinson, *Emulation and interpretation of high-dimensional climate model outputs*. Journal of Applied Statistics, 42(9) 2038-2055.

16. N. Bounceur, M. Crucifix, Wilkinson, *Global sensitivity analysis of the climate vegetation system to astronomical forcing: an emulator-based approach*. Earth Syst. Dynam. Discuss, 6, 205-224.

15. P. Holden, N. Edwards, Wilkinson, *ABC for climate: dealing with expensive simulators*. To appear in the *Handbook of ABC*.

2014

14. Wilkinson, *Accelerating ABC methods using Gaussian processes*. JMLR Workshop and Conference Proceedings 33, 1015-1023: Proceedings of the Seventeenth International Conference on Artificial Intelligence and Statistics.

13. Bracken-Grissom, H.D., Ahyong, S. T., Wilkinson, R. D., Feldmann, R., Schweitzer, C., Brienholdt, J., Bendall, M., Palero, F., Chan, T-Y., Felder, D.L., Robles, R., Chu, K.H., Tsang, M., Kim, D., Martin, J., Crandall, K.A. *The Emergence of the Lobsters: Phylogenetic Relationships, Morphological Evolution and Divergence Time Comparisons of an Ancient Group (Decapoda: Achelata, Astacidea, Glypheidea, Polychelida)* Systematic biology, 63(4): 457-479, 2014.

12. Wilkinson, a discussion of *PLASIM-ENTSem: a spatio-temporal emulator of future climate change for impacts assessment*, by P.B. Holden, N. R. Edwards, P. H. Garthwaite, K. Fraedrich, F. Lunkeit, E. Kirk, M. Labriet, A. Kanudia, and F. Babonneau. Geoscientific Model Development, 7, 433-451, 2014.

2013

11. Wilkinson, *Approximate Bayesian computation (ABC) gives exact results under the assumption of model error*, Statistical Applications in Genetics and Molecular Biology, 12(2), 129-142, 2013.

2012

10. Wilkinson, a short contribution to the discussion of *Constructing summary statistics for approximate Bayesian computation: semi-automatic approximate Bayesian computation*, by Fearnhead and Prangle. Journal of the Royal Statistical Society, Series B, 2012.

2011

9. Wilkinson, M. Steiper, C. Soligo, R.D. Martin, Z. Yang, and S. Tavaré, *Dating primate divergences through an integrated analysis of palaeontological and molecular data*, Systematic Biology, 60(1): 16-31, 2011.

8. Wilkinson, M. Vrettas, D. Cornford, J. E. Oakley, *Quantifying simulator discrepancy in discrete-time dynamical simulators*. Journal of Agricultural, Biological, and Environmental Statistics: Special issue on *Computer models and spatial statistics for environmental science*, 16(4), 554-570, 2011.

2010

7. P.B. Holden, N.R. Edwards, K.I.C. Oliver, T.M. Lenton and Wilkinson, *A probabilistic calibration of climate sensitivity and terrestial carbon change in GENIE-1*, Climate Dynamics, 35(5), 785-806, 2010.

6. Wilkinson, a short contribution to the discussion of *Geostatistical inference under preferential sampling*, by Diggle, Menezes and Su. Journal of the Royal Statistical Society, Series C, 59(2), 191-232, 2010.

5. Wilkinson, *Bayesian calibration of expensive multivariate computer experiments*. In 'Large-scale inverse problems and quantification of uncertainty', 2010, John Wiley and Sons. Edited by L. T. Biegler.

4. Bastos, L. and Wilkinson, *Statistical Analysis of Computer Experiments (Análise Estatística de Simuladores)*, Simpaesio Nacional de Probabilidade e Estatistica (SINAPE), pages 1–93, 2010.

2009

3. Wilkinson and S. Tavaré, *Estimating the primate divergence time using conditioned birth-and-death processes*, Theoretical Population Biology 75, pp. 278-285.

2. D.M. Ricciuto, R. Tonkonojenkov, N. Urban, Wilkinson, D. Matthews, K.J. Davis, and K. Keller, *Assimilation of global carbon cycle observations into an Earth system model to estimate uncertain terrestrial carbon cycle parameters*.

2008

1. Wilkinson, *Bayesian inference of primate divergence times*, PhD thesis, Department of Applied Mathematics and Theoretical Physics, University of Cambridge.

Grants Held and Awards

- *Physically-informed probabilistic modelling of air pollution in Kampala using a low cost sensor network*, (£471,037), GCRF/EPSRC, PI, with Co-Is Mauricio Alvarez and Engineer Bainomugisha. 2019–2021.
- *Probabilistic low-cost air pollution monitoring*, (£44,798), GCRF QR Sustainable Partnership Award Notification PI, with Michael Smith. 2019.
- *Plastics: Redefining Single-Use*, (£1,010,896), EPSRC, CI, Tony Ryan is PI. 2019-2020.
- *Enhancing Machine Learning with Physical Constraints for Predicting Microstructure Evolution*, (£250,600) EPSRC, CI, joint with Nigel Clarke (PI), Joao Cabral (CI). 2019-2020.
- *Mechanistic Model Misspecification*, (£92,148) EPSRC Industrial Case award with industrial collaborator Microsoft Research. PI, joint with Ted Meeds (CI). 2019–2023.
- *Improving GP emulation using calibration-aware dimension reduction.* Total fund half the cost of a PhD student to look at UQ methodology for their oil reservoir modelling, PI. 2018–2022.
- *Uncertainty Quantification in Prospective and Predictive Patient Specific Cardiac Models*, (£1,199,421 total), funded by EPSRC, CI, joint with Steven Niederer (PI), Richard Clayton, and Jeremy Oakley.
- *Machine Learning for Aerosol Lifetime Prediction* (£136,479 total), industrial support from SC Johnson, PI, joint with Tony Ryan.
- *A novel statistical approach for palaeoclimate spatial model-data comparison*, Past Earth Network feasibility study, funded by EPSRC, (£24,742 total), PI.
- Exceptional Performance Bonus 2012/13 and 2013/14, University of Nottingham.
- *Tractable equations of state for carbon dioxide mixtures in carbon capture, transport and storage: algorithms for automated generation and optimisation, tailored to end-users* (UKCCSRC-C1-22), funded by *EPSRC* via the *UK Carbon Capture and Storage Research Centre (UKCCSRC)* to fund a PDRA for 12 months (£93,000 total), CI.
- *PANACEA: Predicting and monitoring the long term behaviour of CO_2 injected in deep geological formations*, EU FP7 project (`panacea-co2.org`), €3.6 million (2012-2014), CI.
- *Improving the efficiency of Monte Carlo inference using Gaussian process regression*, EPSRC studentship (£1440 total).
- *Sequential learning of model error in rainfall-runoff models*, Early Career Research and Knowledge Transfer Award from the University of Nottingham (£16,000), July 2010 to funding a PDRA for six months.
- *Royal Society International Travel Grant* for travel to a conference and to meet collaborators in Brazil (£970), July 2010.
- *Visiting Fellowship* at the Isaac Newton Institute (£1260 subsistence costs), August-September 2010.
- *CRiSM Young Academic Awards* , University of Warwick, conference expenses and travel (approximately £300), December 2009.
- Subsistence costs for a six week period as Visiting Fellow at the Institute of Advanced Studies, University of Durham, March-April 2008.
- *Early Career Researcher Award*, International Society for Bayesian Analysis, ($600), January 2008.
- *Rayleigh–Knight and Smith-Knight Essay Prize* (£250), Cambridge, March 2006.

Academic service

- Director of the school funded mini-CDT on Modelling and Prediction (MaP), 2021–.
- From April-September 2020 I served on the DELVE working group (Data Evaluation

and Learning for Viral Epidemics), which is a multi-disciplinary group, convened by the Royal Society, to support a data-driven approach to learning from the different approaches countries are taking to managing the COVID-19 pandemic.

- DELVE Initiative (2020), Face Masks for the General Public. DELVE Report No. 1. Published 04 May 2020. Available here.
- DELVE Initiative (2020), Balancing the Risks of Pupils Returning to Schools. DELVE Report No. 4. Published 24 July 2020. Available from .

I was a lead author on Report 4 with Simon Burgess, Ines Hassan and Anna Vignoles. Both reports were discussed at a SAGE (Scientific advisory Group of Experts) meeting, and received widespread media attention.

- Member of the oversight and working groups of Transmission of COVID-19 in School Children (ToCS), which was set up by the NIHR, the ONS, and PHE to monitor asymptomatic transmission within schools. I was invited onto the group by the National Statistician, Sir Ian Diamond, to help with the methodology for the study, after he read the statistical methodology in the DELVE report we wrote for SAGE.
- I am associate editor of the SIAM Journal of Uncertainty Quantification (2020-2023).
- I serve on the advisory board of the TiPES (Tipping points in the earth system), an EU funded project.
- External Examiner for the MSc in Statistical Science at the University of Oxford, 2017 – 2020.
- REF Impact coordinator for the School of Maths and Statistics in Sheffield 2016-2020. The school came 6th nationally for Impact in REF2021, with 3/4 case studies judged to be 4*.
- External Validator for the BSc (Hons) Data Science, BSc (Hons) Data Science Degree Apprenticeship and BSc (Hons) Mathematics programmes at York St John University 2019.
- External Assessor for the new MSci/BSc programmes in Data Science and Mathematics and Data Science at the University of Exeter, 2019.
- External PhD examinations: Nabila Bonceur (University of Louvain, Belgium, 2015), Ben Timmerman (University of Southampton, 2015), Alex Tunnicliffe (University of Cambridge, 2015), Giang Tran (University of Southampton, 2016), Max Zwiessele (Computer Science, University of Sheffield 2017), Yiolanda Englezou (University of Southampton, 2018), Diana Giurghita (University of Glasgow, 2019), Tom Ryder (University of Newcastle 2021), Wenzhe Xu (University of Exeter, 2021), Jeremias Knoblauch (Warwick University, 2022).
- Area chair (scientific programme committee/associate editor) for the NIPS conference, 2014, 2017.
- Chair of the Environmental Statistics Section of the Royal Statistical Society, 2016.
- Vice-Chair of the Environmental Statistics Section of the Royal Statistical Society, 2017, and Meetings Secretary, 2009-2012.
- Leader of the 'model-data comparison' working group of the Past Earth Network (with Louise Sime and Manfred Mudelsee).

Invited talks since 2010

- *Adjoint-aded inference of Gaussian process driven differential equations.* Departmental seminar, University of Exeter, Sept 2022.
- An Introduction to Gaussian Processes, Gaussian process summer school, Sheffield, September 2022.

- *Adjoint-aded inference of Gaussian process driven differential equations.* Departmental seminar, University of Nottingham, Feb 2022.
- *Adjoint-aded inference of Gaussian process driven differential equations.* Invited talk at the workshop *Lifting Inference with Kernel Embeddings.* Jan 2022.
- *Approximate inference for approximate models.* Key note talk in two parts at the workshop *Accelerated statistical inference for the sciences* held in Bern, Switzerland, Sept 2021.
- An Introduction to Gaussian Processes, Gaussian process summer school, Sheffield, September 2021.
- *Uncertainty Quantification in Prospective and Predictive Patient Specific Cardiac Models*, Royal Statistical Society North East Local Group Christmas Seminar, December 2020.
- *Uncertainty Quantification in Prospective and Predictive Patient Specific Cardiac Models*, North West Mathematical Biology Seminar Series December 2020.
- *Gaussian Processes*, Stanley Black & Decker internal seminar. October 2020.
- An Introduction to Gaussian Processes, Gaussian process summer school, Sheffield, September 2020.
- *Keynote speaker*, SIAM-IMA Student Chapter Conference, Manchester 2020 - cancelled due to COVID-19.
- *Inference for misspecified models*, Workshop on Structural Dynamics, Sheffield, Nov 2019.
- *What drives the glacial-interglacial cycle? A Bayesian approach to a long-standing model selection problem*, departmental seminar, University of Southampton, Oct 2019.
- An Introduction to Gaussian Processes, Gaussian process summer school, Sheffield, September 2019.
- Approximate Bayesian computation: inference for complex stochastic models, The Fickle Heart, Isaac Newton Institute, Cambridge, May 2019.
- *What drives the glacial-interglacial cycle? A Bayesian approach to a long-standing model selection problem*, talk to the Data Science in the Natural Environment project, University of Lancaster, Feb 2019.
- *Uncertainty quantification approaches for patient specific cardiac models*, departmental seminar, School of Mathematics and Computing, Greenwich University, Jan 2019.
- Approximate Bayesian computation: inference for complex stochastic models, ISNET Nuclear Physics at the Extremes meeting, Darmstadt, Germany, Oct 2018.
- Another Introduction to Gaussian Processes, Gaussian process summer school, Sheffield, September 2018.
- Topics in uncertainty quantification, keynote talk, Digitwin launch event, Sheffield, 2018.
- Statistical model data comparison, invited talk, Past Earth Network Conference, Leeds, June 2018.
- Multi-level and multi-fidelity modelling, invited talk, Turing Gateway to Mathematics workshop on *Uncertainty Quantification for Complex Systems - Development in Theory and Methodologies*, Isaac Newton Institute, Cambridge, June 2018.
- Inference under discrepancy, departmental seminar, Maths department, Exeter University, March 2018.
- Alternatives to likelihood based inference, Isaac Newton Institute Workshop on *Surrogate models for UQ in complex systems*, Feb 2018.
- UQ perspectives on Approximate Bayesian computation (ABC), Isaac Newton Institute Workshop on Key UQ methodologies and motivating applications, Jan 2018.
- *Gaussian process accelerated ABC*, departmental seminar, Statistics Department, University of Warwick, December 2017.
- Inference under discrepancy, Subjective Bayes workshop, Open University, September 2017.

- Another Introduction to Gaussian Processes, Gaussian process summer school, Sheffield, September 2017.
- 50 Ways with GPs, Past Earth Network Emulator Workshop, University of Leeds, June 2017, plus 4.5 hours of tutorials on using the Python Gaussian process implementation GPy.
- Approximate Bayesian computation: likelihood-free inference for complex models, Quantifying uncertainty in multiscale models for biomedical applications workshop, University of Sheffield, April 2017.
- Gaussian process accelerated ABC, Medical School, Departmental seminar, Lancaster University, December 2016.
- The ML invasion of ABC, Schloss Dagstuhl seminar, New Directions for Learning with Kernels and Gaussian Processes, Leibniz Center for Informatics, Germany, November 2016.
- Uncertainty quantification for complex simulators using emulation, British Antarctic Survey, Cambridge, October 2016.
- Gaussian process accelerated ABC, Gatsby Computational Neuroscience Unit, UCL, London, September 2016.
- Introduction to ABC, GP and UQ summer school, University of Sheffield, September 2016.
- Surrogate modelling and ABC, invited talk, ABC in Helsinki meeting, middle of the Baltic Sea, May 2016.
- Design for Calibration and History Matching for Complex Simulators, invited talk, minisymposium on Sequential Design of Computer Experiments, SIAM UQ, Lausanne, April 2016.
- Using surrogate models to accelerate parameter estimation for complex simulators, Laboratoire de Recherche en informatique (LRI), Paris, March 2016.
- *Design for ABC and history matching with Gaussian processes*, Biostatistics Unit, MRC, Cambridge, March 2016.
- *Using surrogate models to accelerate parameter estimation for complex simulators*, departmental seminar, Maths Dept, University of Manchester, February 2016.
- *Approximate Bayesian computation: inference for intractable computer models*, invited speaker, Data science @LHC workshop, CERN, Switzerland, November 2015.
- *ABC and history matching with GPs*, invited speaker, Gaussian process summer school, Sheffield, 2015.
- *Modern Computational Statistics*, invited speaker, Statistics for Climate PIs, Royal Statistical Society, London, September 2015.
- *What drives the glacial-interglacial cycle? A Bayesian approach*, invited speaker, Royal Statistical Society conference, Exeter, September 2015.
- *How far can fancy Monte Carlo methods take us?*, contributed talk, Past Earth Network conference, Crewe, September 2015.
- *Efficient history matching and calibration of complex simulators using Bayesian optimization*, invited speaker, International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, August 2015.
- *GP-ABC: accelerating inference for intractable stochastic computer models*, plenary speaker, MascotNum2015, St Etienne, France, April 2015.
- *What drives the glacial-interglacial cycle? A Bayesian approach to a long-standing model selection problem*, University of Glasgow, School of Maths seminar, November 2014.
- *Approximate Bayesian computation (ABC) and the challenge of big simulation*, keynote lecture, NeuroStats2014: Statistical Challenges in Neuroscience. University of Warwick,

September 2014.

- *What drives the glacial-interglacial cycle? A Bayesian approach to a long-standing model selection problem*, Advances in Climate Theory Workshop, Royal Institute of Meteorology, Brussels, Belgium, August 2014.
- *What drives the glacial-interglacial cycle? A Bayesian approach to a long-standing model selection problem*, ISBA, Cancun, July 2014.
- *Statistical challenges and solutions in Equation of State modelling*, Nottingham NEST workshop, Nottingham, May 2014.
- *Emulating computer simulators with high dimensional input and output*, Statoil, Trondheim, Norway, March 2014.
- *Statistical applications of Gaussian processes*, invited seminar, Gaussian process winter school, Sheffield Institute of Translational Neuroscience, January 2014.
- *Approximate Bayesian computation*, 2 hour invited tutorial, NIPS, Lake Tahoe, USA 2014.
- *Probabilistic ABC: accelerating ABC using Gaussian processes*, invited seminar, Robotics Research Group, Department of Engineering Science, University of Oxford, August 2013.
- *Gaussian processes for uncertainty quantification in computer experiments*, invited lecture, Summer School on Gaussian Processes, Sheffield Institute for Translational Neuroscience, June 2013.
- *Accelerating ABC using emulation and history-matching*, invited seminar, Statistical Sciences Research Institute (S3RI), University of Southampton, April 2013.
- *ABC, history matching, and emulation*, invited seminar, School of Mathematics, University of Durham, November 2012.
- *A modelling approach to ABC*, invited seminar, School of Mathematics, University of Leeds, September 2012.
- *Alternative approaches to approximate Bayesian computation (ABC): what and why*, invited seminar, Dept. of Statistics, University of Oxford, January 2012.
- *Calibrating computer simulators using ABC: An example from evolutionary biology*, invited seminar, Maths Department, Exeter University, March 2011.
- *Calibrating the UVic climate model using global carbon cycle observation*, invited seminar, Field Sciences Department, Open University, January 2011.
- *Calibrating and emulating multivariate computer models*, invited seminar, Centre de recherche sur la Terre et le climat, Université catholique de Louvain, January 2011.
- *Exploring the Error in ABC algorithms*, invited seminar, University of Warwick, November 2010.
- *ABC and the challenge of model calibration*, invited seminar, Isaac Newton Institute, September 2010.
- *Análise Estatística de Simuladores*, 18º SINAPE - Simpósio Nacional de Probabilidade e Estatística, Brazilian national statistics conference, Sao Pedro, invited short course on computer experiments, July 2010.
- *Análise Estatística de Simuladores: Learning from computer experiments*, Universidade de Brasília, Brazil, invited seminar, July 2010.
- *Learning model error in dynamical systems*, Royal Meteorological Society Workshop on Model Error, invited talk, Met Office, Exeter April 2010.

PhD Students

- Dr Jake Carson (Department of Statistics, University of Warwick) - Uncertainty Quantification in Palaeoclimate Reconstruction (2010-2014)
- Dr Kamonrat Suphawan (Department of Statistics, Chaing Mai University) - Identifying

model error in dynamical systems (2011 - 2014)

- Dr David Crevillen Garcia (School of Engineering, University of Warwick) - Uncertainty quantification for flow and transport in porous media (2012 - 2015)
- Dr Michael Thomson (School of Mathematical Sciences, University of Nottingham) - Statistical modelling of equations of state for carbon capture, transport, and storage (second supervisor, 2013-2018)
- Dr Elena Uteva - Speeding up molecular simulations using Gaussian processes (second supervisor, 2013 - 2019).
- Dr Fiona Turner - Reconstructing the past and predicting the future: what can ice cores tell us about climate? (Sept 2016–August 20202), funded by the Grantham Centre for Sustainable Futures.
- Jonathan Sykes - Characterising Uncertainty in Complex Environmental Simulations for Public Engagement with Climate Change Conscious Sustainable Planning and Design (second supervisor, start Sept 2016), funded by the Grantham Centre for Sustainable Futures.
- Valentin Breaz - Improving GP emulation using calibration-aware dimension reduction (started July 2018), funded by Total.
- Ines Krissaane - Inference for misspecified mechanistic models (started March 2019), funded from an EPSRC CASE Award from Microsoft Research.

Post-Docs

- Dr Adrian Denz (1/6/2022 - 1/6/2024). Adrian held a postdoc.mobility fellowship from the Swiss National Science Foundation (SNSF) to study mosquito movement. Adrian has chosen to spend that time working with me in Nottingham on statistical methods for fitting models to data.
- Dr Pablo Alvarez Duran (1/1/2020 - 2022), employed by EPSRC grant *Physically-informed probabilistic modelling of air pollution in Kampala using a low cost sensor network*.
- Dr Paterne Gahungu (1/4/2020 - 2022), employed by EPSRC grant *Physically-informed probabilistic modelling of air pollution in Kampala using a low cost sensor network*.
- Dr Sam Coveney (1/5/2017 - 1/5/2021), employed by EPSRC grant *Uncertainty Quantification in Prospective and Predictive Patient Specific Cardiac Models*.
- Dr Philip Paine (25/1/2017 - 25/5/2017), employed by EPSRC grant from the Past Earth Network, working on *Statistical Model-Data Comparison*.
- Dr Alan Saul (1/2/2017 - 1/2/2018), employed by industrial support from SC Johnson looking at *Machine Learning for Aerosol Lifetime Prediction*.
- Dr Ed Knock (1/9/2014 - 1/1/2015), employed by ERC grant *PANACEA* - an investigation of carbon capture and storage technology.
- Dr Jo Dunster, University of Warwick, (20/1/2014 - 30/4/2014), employed by EPSRC grant *Tractable equations of state for carbon dioxide mixtures in carbon capture, transport and storage: algorithms for automated generation and optimisation, tailored to end-users*
- Dr Martin Nelson, Nottingham Trent University, (1/4/2013 - 31/3/2014), employed by EPSRC grant *Tractable equations of state for carbon dioxide mixtures in carbon capture, transport and storage: algorithms for automated generation and optimisation, tailored to end-users*
- Dr Michail Vrettas, U.C. Berkeley, (1/2011 - 6/2011), employed by the grant *Sequential learning of model error in rainfall-runoff models*.

Teaching Experience

Spring 2021 –	**Module convenor** for the level four module Applied Multivariate Statistics. A 20 credit module for MSc students at the University of Nottingham.
Autumn 2020 –	**Second Lecturer** for the level two module Statistical Methods and Models.
Spring 2017– 2020	**Module leader and lecturer** for the level two module Topics in Biomedical Engineering (BIE201). I led a team of 5 staff in designing and creating a 10 lecture block on statistics for second year engineering undergraduates. We delivered the material via flipped learning, whereby traditional lectures are replaced with short videos, and the lecture slots are then used for computer lab sessions.
Spring 2015 – 2020	**Lecturer** for the level four module Computation inference. A 10 credit (20 lecture) module for fourth year mathematics students and Master in Statistics Students at the University of Sheffield.
Spring 2015 – 2020	**Lecturer** for the level four module Extension to linear models. A 10 credit (20 lecture) module for fourth year mathematics students and Master in Statistics Students at the University of Sheffield. I wrote half of the material for this lecture.
Spring 2011 - 2015	**Module Convenor** (Lecturer and Examiner) for the level four module Topics in Biomedical Statistics. A 20 credit (30 lecture) module for fourth year mathematics students and Master in Statistics Students at the University of Nottingham. The module was new and had to be written from scratch
Spring 2011 - 2015	**Module Lecturer** (Lecturer and Examiner) for the level two module Statistical Methods and Models (Linear Models). A 20 credit (20 lecture) module for second year mathematics students at the University of Nottingham.
Autumn 2009	**Module Convenor** (Lecturer and Examiner) for the level four module Computational Statistics. A 20 credit (30 lecture) module for fourth year mathematics students at the University of Nottingham.
Nov - Dec 2008	**Lectured** the course Statistics in Society, giving a block of four lectures on 'Statistics and the Law', a second year undergraduate course, University of Sheffield.
Oct 2007 – May 2009	**Staff tutor** for statistics courses PAS201 and PAS174 at the University of Sheffield.
Oct – Dec 2004 and 2005	Stood in for the **Director of Studies of Mathematics** at Downing College while the permanent Director was on sabbatical leave for two terms. Involved arranging supervisions for the undergraduate students, monitoring their progress and providing support, and interviewing sixth form applicants to the college.
Oct 2003 – Sept 2007	**Small group tutorials** (approximately 280 hours) given at the University of Cambridge in a wide range of statistics and probability courses including
	1st year Probability, Optimization
	2nd year Markov Chains, Statistics
	3rd year Probability and Measure, Applied Probability
Sept 2003 – July 2004	**A-Level Physics and Maths Teacher** Cambridge Centre for Sixth Form Studies, Cambridge, UK.
	Taught three AS Physics classes and one AS Further Maths class to primarily overseas students.

Consultancy

- Scottish Fire and Rescue Service. I did 8 days consultancy advising the SFRS on their Community Risk and Index Model. This involved checking their data processing pipeline, data handling and security, and then critiquing their statistical model. This is ongoing work, and there is hope it will lead to a future REF impact case study.
- I am a Director of DAMSL Consulting Ltd. Work done by DAMSL led to one of the School of Mathematical Sciences Impact Case Studies for REF2021.
- Stanley Black&Decker. Gave a tutorial seminar to staff interested in machine learning/data-science methods.
- Improbable Worlds Ltd. Advised on the mathematical formulation and solution of a complex modelling problem.
- Deb. With Tim Heaton. Delivered a day-long training workshop on introductory statistics to the product development team.
- Network Rail, the UK rail operator. We conducted a major review and development of the uncertainty quantification methods used within Network Rail. We focussed on their Whole Life Costs and Asset Life Cycle profiles, and developed methods to account for uncertainties in the models of various asset disciplines, focusing on track, signalling and earthworks. The project was conducted with John Paul Gosling, via our company UQuant Consulting Limited, and involved 70 days work.
- Sealevel Research, a start-up company in Liverpool. I advised on building and fitting models to predict sea-level in the Port of Liverpool. Funded by a Technology and Strategy Board (TSB) voucher.
- Garrad Hassan and Partners Ltd - engineering (renewable energy) consultants, Bristol, UK. Delivered day-long training workshops on dealing with uncertainty to their engineering consultants in 2010 and 2012.

Meeting organisation

- Co-organiser (with Maurizio Alvarez, Wil Ward, and Michael Smith) of the 2020 Gaussian process summer school, attended by 250 remote delegates.
- Co-organiser (with Maurizio Alvarez, Wil Ward, and Michael Smith) of the 2019 Gaussian process summer school, attended by 80 delegates.
- Co-organiser (with Maurizio Alvarez, Wil Ward, and Michael Smith) of the 2018 Gaussian process summer school, 3-6 Sheffield 2018, attended by 80 delegates.
- Co-organiser (with Dave Woods, Mike Christie, Ralph Smith, and Robert Scheichl) of a week long workshop at the Isaac Newton Institute on *Key UQ methodologies and motivating applications* as part of the programme on *Uncertainty quantification for complex systems: theory and methodologies*, January 2018.
- Organiser (Neil Lawrence, Javier Gonzalez, and Maurizio Alvarez) of the Gaussian Process and Uncertainty Quantification summer school, Sheffield, 12-15 September 2017.
- Co-organiser (with Jochen Voss and John Paul Gosling) of a 3 day workshop on Gaussian process emulators at the University of Leeds, June 2017.
- Organiser of a special session at Bayesian Inference for Stochastic Processes (BISP) conference in Milan, June 2017.
- Co-organiser (with Christian Robert, Luke Bornn, Jukka Corander, Gael Martin and Dennis Prangle) of the Banff International Research Station program on *Validating and Expanding Approximate Bayesian Computation Methods*. This will be a 5 day program to take place between 19-24 February 2017.
- Organiser (with Louise Sime and Manfred Mudelsee) of the Data-model comparison work-

shop, Cambridge, 24-27 August 2016.

- Organiser (with Neil Lawrence and Javier Gonzalez) of the Gaussian Process and Uncertainty Quantification summer school, Sheffield, 12-15 September 2016.
- Organiser (with Caitlin Buck) of the special topic session *Uncertainty quantification for climate simulation*, ISBA 2016, Sardinia, Italy.
- Organiser (with Alex Diaz de la O) of the mini-symposium *Learning Parameters from Data: Calibration, Inverse Problems, and Model Updating* at SIAM UQ2016, Lausanne, Switzerland.
- I am the group leader of the Model-Data Comparison group of the Past Earth Network.
- *Equation of State Modelling* - a workshop for ~ 20 people (mixture of energy company delegates and academics) on fitting equations of state to data. Nottingham University, May 2014. Organised with Richard Graham and Simon Preston
- *Bayes in the environment* - a celebration of the 250th anniversary of the publication of Bayes theorem. Royal Statistical Society, London 2013. Organised with Adam Butler.
- *Subjective inference and uncertainty quantification*, Leeds 2013, and Durham 2014. Organised with JP Gosling and Danny Williamson.
- *ABC in Montreal*, NIPS workshop, Montreal 2014. Organised with Ted Meads, Max Welling, Christian Robert and Neil Lawrence.
- *Uncertainty Quantification for Climate Simulation*, special topic session, ISBA 2016.