



## ABOUT

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 Wessel Bruinsma 

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 Wessel Bruinsma   
 wesselb 

## LANGUAGES

dutch, native  
 english

## INTERESTS

machine learning for environmental science and forecasting, probabilistic modelling with a focus on time series, Bayesian nonparametrics with a focus on Gaussian processes, approximate inference, probabilistic programming, probability theory, and real analysis

## EDUCATION

- Jan '18 – Jul '22 **PhD in Machine Learning** Machine Learning Group, U. of Cambridge  
 • Supervised by Richard E. Turner
- Oct '15 – Sep '16 **MPhil in Machine Learning** Dept. of Engineering, U. of Cambridge  
 • Distinction, class rank 1 / ~20
- Sep '12 – Jul '15 **BSc in Electrical Engineering (Hons)** EEMCS, Delft U. of Technology  
 • Distinction, class rank 1 / ~100  
 • Specialisation in mathematics

## PROFESSIONAL HISTORY

- Oct '22 – now **Senior Researcher** Microsoft Research, Amsterdam  
 • Research into foundation models for atmospheric modelling
- Jul '19 – Sep '19 **Internship (Quantitative Research)** G-Research, London
- Sep '16 – Oct '22 **Machine Learning Researcher** Invenia Labs Limited, Cambridge  
 • Research into modelling multi-output time series, with a focus on electricity markets
- Sep '14 – Jul '15 **Technical Specialist** EEMCS Recruitment Days, Delft  
 • Design and implementation of solutions to scheduling problems
- Sep '13 – Jul '14 **Electrical Engineer** TU Delft Solar Boat Team, Delft  
 • Competed in DONG Solar Energy Challenge 2014 and Solar1 Monte Carlo Cup 2014

## SELECTED PUBLICATIONS

- [link] Bodnar, C., Bruinsma, W. P., Lucic, A., Stanley, M., Brandstetter, J., Garvan, J., Riechert, M., Weyn, J., Dong, H., Vaughan, A., Gupta, J. K., Tambiratnam, K., Archibald, A., Heider, E., Welling, M., Turner, R. E., and Perdikaris, P. (2024). “Aurora: A Foundation Model of the Atmosphere,” in *arXiv preprint: 2405.13063*.
- [link] Bruinsma W. P., Tegnér M., and Turner R. E. (2022). “Modelling Non-Smooth Signals with Complex Spectral Structure,” in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.
- [link] Gordon, J., Bruinsma W. P., Foong, A. Y. K., Requeima, J., Dubois Y., Turner, R. E. (2020). “Convolutional Conditional Neural Processes,” *International Conference on Learning Representations (ICLR), 8th*. (Awarded oral presentation.)

## SELECTED SOFTWARE

- [link] *Stheno*: Probabilistic programming with Gaussian processes in Python
- [link] *Aurora*: Implementation of the Aurora model for atmospheric forecasting in Python
- [link] *Plum*: Implementation of multiple dispatch in Python

## PUBLICATIONS

- [link] Ashman, M., Diaconu, C., Weller, A., Bruinsma, W. P., and Turner, R. E. (2024). “Approximately Equivariant Neural Processes,” in *arXiv preprint: 2406.13488*.
- [link] Räisä, O., Markou, S., Ashman, M., Bruinsma, W. P., Tobaben, M., Honkela, A., and Turner, R. E. (2024). “Noise-Aware Differentially Private Regression via Meta-Learning,” in *arXiv preprint: 2406.08569*.
- [link] Chien, I., Bruinsma, W. P., Gonzalez, J., and Turner, R. E. (2024). “Safe Exploration in Dose Finding Clinical Trials with Heterogeneous Participants,” in *International Conference on Machine Learning (ICML)*, 41th.
- [link] Ashman, M., Diaconu, C., Kim, J., Sivaraya, J., Markou, S., Requeima, J., Bruinsma, W. P., and Turner, R. E. (2024). “Translation-Equivariant Transformer Neural Processes,” in *International Conference on Machine Learning (ICML)*, 41th.
- [link] Bodnar, C., Bruinsma, W. P., Lucic, A., Stanley, M., Brandstetter, J., Garvan, J., Riechert, M., Weyn, J., Dong, H., Vaughan, A., Gupta, J. K., Tambiratnam, K., Archibald, A., Heider, E., Welling, M., Turner, R. E., and Perdikaris, P. (2024). “Aurora: A Foundation Model of the Atmosphere,” in *arXiv preprint: 2405.13063*.
- [link] Vaughan, A., Markou, S., Tebbutt, W., Requeima, J., Bruinsma, W. P., Andersson, T. R., Herzog, M., Lane, N. D., Chantry, M., Hosking, J. S., and Turner, R. E. (2024). “Aardvark Weather: End-to-End Data-Driven Weather Forecasting,” in *arXiv preprint: 2404.00411*.
- [link] Bruinsma, W. P., Markou, S., Requeima, J., Foong, A. Y. K., Andersson, T. R., Vaughan, A., Anthony, B., Hosking, J. S., and Turner, R. E. (2023). “Autoregressive Conditional Neural Processes,” in *International Conference on Representation Learning (ICLR)*, 11th.
- [link] Andersson, T. R., Bruinsma, W. P., Markou, S., Requeima, J., Coca-Castro, A., Vaughan, A., Ellis, A.-L., Lazzara, M., Jones, D. C., Hosking, J. S., and Turner, R. E. (2023). “Environmental Sensor Placement with Convolutional Gaussian Neural Processes” in *Environmental Data Science 2*.
- [link] Lalchand, V., Bruinsma, W. P., Burt, D. R., and Rasmussen, C. E. (2022). “Sparse Gaussian Process Hyperparameters: Optimize or Integrate?” in *Advances in Neural Information Processing Systems (NeurIPS)*, 36th.
- [link] Rawat, A., Requeima, J. R., Bruinsma, W. P., and Turner, R. E. (2022). “Challenges and Pitfalls of Bayesian Unlearning,” in *Updatable Machine Learning (UpML), ICML 2022 Workshop on*.
- [link] Foong, Y. K., Bruinsma, W. P., and Burt, D. (2022). “A Note on the Chernoff Bound for Random Variables in the Unit Interval,” *arXiv:2205.07880*.
- [link] Bruinsma, W. P., Tegnér, M., and Turner, R. E. (2022). “Modelling Non-Smooth Signals with Complex Spectral Structure,” in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.
- [link] Coker, B., Burt, D., Bruinsma, W. P., Pan, W., Doshi-Velez, F. (2022). “Wide Mean-Field Bayesian Neural Networks Ignore the Data,” in *Artificial Intelligence and Statistics (AISTATS), 25th International Conference on*.
- [link] Markou, S., Requeima, J. R., Bruinsma, W. P., and Turner, R. E. (2022). “Practical Conditional Neural Processes Via Tractable Dependent Predictions,” in *International Conference on Learning Representations (ICLR)*, 10th.
- [link] Markou, S., Requeima, J. R., Bruinsma, W. P., and Turner, R. E. (2021). “Efficient Gaussian Neural Processes for Regression,” in *Uncertainty & Robustness in Deep Learning (UDL), ICML 2021 Workshop on*.
- [link] Foong, A. Y. K., Bruinsma, W. P., Burt, D. R., and Turner, R. E. (2021). “How Small can PAC-Bayes be in the Small Data Regime?” in *Advances in Neural Information Processing Systems (NeurIPS)*, 35th.

- [link] Bruinsma, W. P., Requeima, J., Foong, A. Y. K., Gordon, J., and Turner, R. E. (2021). “The Gaussian Neural Process,” in *Advances in Approximate Bayesian Inference (AABI), 3rd Symposium on*. (Awarded contributed talk.)
- [link] Xia, R., Bruinsma W. P., Tebbutt W., and Turner R. E. (2021). “The Gaussian Process Latent Autoregressive Model,” in *Advances in Approximate Bayesian Inference (AABI), 3rd Symposium on*.
- [link] Foong, A. Y. K., Bruinsma W. P., Gordon, J., Dubois, Y., Requeima J., and Turner R. E. (2020). “Meta-Learning Stationary Stochastic Process Prediction with Convolutional Neural Processes,” in *Advances in Neural Information Processing Systems (NeurIPS), 33th*.
- [link] Bruinsma, W. P., Perim E., Tebbutt W., Hosking J. S., Solin A., Turner R. E. (2020). “Scalable Exact Inference in Multi-Output Gaussian Processes,” in *International Conference on Machine Learning (ICML), 37th*.
- [link] Gordon, J., Bruinsma, W. P., Foong, A. Y. K., Requeima, J., Dubois, Y., and Turner, R. E. (2020). “Convolutional Conditional Neural Processes,” in *International Conference on Learning Representations (ICLR), 8th*. (Awarded oral presentation.)
- [link] Berkovich, P., Perim, E., and Bruinsma, W. P. (2019) “GP-ALPS: Automatic Latent Process Selection for Multi-Output Gaussian Process Models,” in *Advanced in Approximate Bayesian Inference (AABI), 2nd Symposium on*.
- [link] Requeima, J. R., Tebbutt, W. C., Bruinsma, W. P., and Turner, R. E. (2019). “The Gaussian Process Autoregressive Regression Model (GPAR),” in *Artificial Intelligence and Statistics (AISTATS), 22nd International Conference on*.
- [link] Bruinsma, W. P. and Turner, R. E. (2018). “Learning Causally-Generated Time Series,” in *arXiv preprint:1802.08167*.
- [link] Bosma, S., Bruinsma, W. P., Hes, R. P., Bentum, M. J., and Lager, I. E. (2017). “Grating Lobe Prediction in 3D Array Antennas,” in *Antennas and Propagation (EuCAP), 11th European Conference on*.
- [link] Bruinsma, W. P., Hes, R. P., Bosma, S., Lager, I. E., and Bentum, M. J. (2016). “Radiation Properties of Moving Constellations of (Nano) Satellites: A Complexity Study,” in *Antennas and Propagation (EuCAP), 10th European Conference on*.
- [link] Bentum, M. J., Lager, I. E., Bosma, S., Bruinsma, W. P., and Hes, R. P. (2015). “Beamforming in Sparse, Random, 3D Array Antennas with Fluctuating Element Locations,” in *Antennas and Propagation (EuCAP), 9th European Conference on*.

## AWARDS AND GRANTS

Jan '22	<b>Christ's College Excellence in Teaching Prize</b>
2018–2021	<b>International Doctoral Scholarship (IDS) Grant Covering PhD Fees and Stipend</b>
Mar '16	<b>UfD – Damen Bachelor Award</b>

## MACHINE LEARNING SOFTWARE

- [link] *Stheno*: Probabilistic programming with Gaussian processes in Python
- [link] *Aurora*: Implementation of the Aurora model for atmospheric forecasting in Python
- [link] *GPAR*: Implementation of GPAR in Python
- [link] *NeuralProcesses.jl*: A framework for composing Neural Processes in Julia
- [link] *NeuralProcesses*: A framework for composing Neural Processes in Python
- [link] *ConvCNP*: Implementation of the ConvCNP in Python
- [link] *GPCM*: Implementation of several variants of the Gaussian Process Convolution Model in Python
- [link] *OILMM*: Implementation of the OILMM in Python

[\[link\]](#) *MLKernels*: Flexible implementation of kernels in Python

## OTHER SOFTWARE

[\[link\]](#) *Plum*: Implementation of multiple dispatch in Python

[\[link\]](#) *LAB*: A generic interface for linear algebra backends in Python

[\[link\]](#) *FDM*: Estimate derivatives with finite differences in Python

[\[link\]](#) *FiniteDifferences.jl*: Estimate derivatives with finite differences in Julia

[\[link\]](#) *Varz*: Painless optimisation of constrained variables in AutoGrad, TensorFlow, PyTorch, and JAX

[\[link\]](#) *Matrix*: Structured matrices in Python

[\[link\]](#) *Algebra*: Algebraic structures in Python

## THESES

[\[link\]](#) Bruinsma, W. P. (2022). “Convolutional Conditional Neural Processes.” Department of Engineering, University of Cambridge. Thesis for the degree Doctor of Philosophy.

[\[link\]](#) Bruinsma, W. P. (2016). “The Generalised Gaussian Process Convolution Model.” Department of Engineering, University of Cambridge. Thesis for the degree Master of Philosophy.

[\[link\]](#) Bruinsma, W. P., Hes, R. P., Kroep, H. J. C., Leliveld, T. C., Melching, W. M., and aan de Wiel, T. A. (2015). “An Extensible Toolkit for Real-Time High-Performance Wideband Spectrum Sensing.” Faculty of Electrical Engineering, Mathematics and Computer Science, Delft University of Technology. Thesis for the degree Bachelor of Science.

## REVIEWING

AABI 2024	<b>Reviewer</b>
NeurIPS 2023	<b>Reviewer</b>
ICML 2023	<b>Reviewer</b>
GPSMDMS 2022	<b>Reviewer</b>
ICML 2022	<b>Reviewer (top 10%)</b>
AISTATS 2022	<b>Reviewer</b>
ICML 2021	<b>Reviewer</b>
NeurIPS 2020	<b>Reviewer</b>

## TEACHING

All teaching was done at the University of Cambridge.

Easter 2022	<b>Cosupervisor for two MPhil Projects</b>	MPhil in Machine Learning and Machine Intelligence
Easter 2021	<b>Cosupervisor for two MPhil Projects</b>	MPhil in Machine Learning and Machine Intelligence
Lent 2021	<b>Supervisor for Inference</b>	Part IIA, Engineering Tripos
Michaelmas '21	<b>Supervisor for Introduction to ML</b>	MPhil in Machine Learning and Machine Intelligence
Easter 2020	<b>Cosupervisor for MPhil Project</b>	MPhil in Machine Learning and Machine Intelligence
Lent 2020	<b>Supervisor for Inference</b>	Part IIA, Engineering Tripos
Michaelmas '20	<b>Demonstrator</b>	AI for the study of Environmental Risks (CDT)
Michaelmas '20	<b>Demonstrator</b>	MPhil in Machine Learning and Machine Intelligence
Lent 2019	<b>Supervisor for Inference</b>	Part IIA, Engineering Tripos

## **FULL PORTFOLIO**

See [wesselb.github.io/publications](https://wesselb.github.io/publications) and [wesselb.github.io/software](https://wesselb.github.io/software) for a full overview of my software, publications, posters, theses, talks, and write-ups.