

Victor BOUSSANGE

Engineer in Energy & Environmental Systems
Ph.D candidate in Environmental Sciences

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Zürich, Switzerland i Born 1995 (age 27) | France Citizen

EDUCATION

October 2022 (expected)	Ph.D in Environmental Sciences, SWISS FEDERAL INSTITUTE FOR FOREST, SNOW AND LANDSCAPE (WSL SWISS FEDERAL INSTITUTE OF TECHNOLOGY ZÜRICH, ETH), Switzerland
September 2018	<i>"Forward and inverse modelling of eco-evolutionary processes"</i> . Under the guidance of Prof. Dr. Loïc Pellissier. computational biology mathematical modeling scientific machine learning complex systems complexity economics
June 2017 September 2016	Full year academic exchange, UNIVERSITY OF NEW SOUTH WALES (UNSW SYDNEY), Australia computational methods for finance electrical energy chemical reaction engineering
June 2017 February 2017	Master thesis in theoretical geomechanics, UNSW SYDNEY CSIRO, Australia <i>"Numerical continuation and bifurcation analysis for unconventional geomechanics"</i> . Under the guidance of Dr. Thomas Poulet. theoretical geomechanics numerical continuation bifurcation analysis
August 2018 September 2013	B.S./ M.S. in Energy and Environmental Engineering, INSTITUT NATIONAL DES SCIENCES APPLIQUÉES DE LYON (INSA LYON), France Two-year undergraduate intensive course in mathematics and physics. Ranking : 21/650 students. Three-year undergraduate engineering course in Energy and Environmental Systems, focused on Advanced Energy Systems and Efficiency. fluid mechanics thermodynamics electrical networks and optimisation energy markets

PROFESSIONAL APPOINTMENTS

August 2018 March 2018	R&D intern, COMPAGNIE NATIONAL DU RHÔNE (CNR), France Development of an Energy Management System based on various optimisation techniques for optimal production of renewable resources. Applications to EU sponsored projects : Jupiter1000 (power-to-gas) Move in pure (vehicle-to-grid) Marie-Galante island (micro-grid) software development mathematical optimisation energy trading
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PUBLICATIONS

Peer-reviewed

- **Boussange, V.** & Pellissier, L., *Eco-evolutionary model on spatial graphs reveals how habitat structure affects phenotypic differentiation*. Commun Biol 5, 668 (2022). [bioRxiv]

Preprints

- **Boussange, V.**, Vilimelis-Aceituno, P., Pellissier, L., *Mini-batching ecological data to improve ecosystem models with machine learning* [bioRxiv] (2022), 46 pages. In review.
- **Boussange, V.**, Becker, S., Jentzen, A., Kuckuck, B., Pellissier, L., *Deep learning approximations for non-local nonlinear PDEs with Neumann boundary conditions*. [arXiv] (2022), 59 pages. Revision requested from Partial Differential Equations and Applications.

Proceedings

- Poulet, T., Alevizos, S., Veveakis, M., **Boussange, V.**, Regenauer-Lieb, K., *Episodic mineralising fluid injection through chemical shear zones*, ASEG Extended Abstracts (2018), 5 pages.

In preparation

- **Boussange, V.**, Sornette, D., Lischke, H., Pellissier, L., *Quantifying eco-evolutionary dynamics in economic system*.

TALKS

July 2022	Speaker, HighDimPDE.jl : A Julia package for solving high-dimensional PDEs, JuliaCon2022, online. [video]
June 2022	Speaker, <i>Interpretable machine learning for forecasting dynamical processes in ecosystems</i> , World Biodiversity Forum, Davos, Switzerland.
June 2022	Invited speaker, <i>Investigating empirical patterns of biodiversity with mechanistic eco-evolutionary models</i> , Seminar at the Theoretical Ecology and Evolution group, Universität Bern.
November 2021	Invited speaker, <i>Numerical approximations of solutions of highly dimensional, non-local nonlinear PDEs</i> , StAMBio seminar, St Andrews, UK.
October 2021	Speaker, <i>Graph topology and habitat assortativity drive phenotypic differentiation in an eco-evolutionary model</i> , Conference on Complex Systems, Lyon, France.
October 2021	Speaker, <i>Using graph-based metrics to assess the effect of landscape topography on diversification</i> , ECBC, Amsterdam, Netherlands.
September 2021	Speaker, <i>Solving non-local nonlinear Partial Differential Equations in high dimensions with HighDimPDE.jl</i> , International Conference on Computational Methods in Systems Biology, Bordeaux, France.
April 2021	Speaker, <i>Responses of neutral and adaptive diversity to complex geographic population structure</i> , Mathematical Population Dynamics, Ecology and Evolution, CIRM Marseille, France.

SOFTWARES

MINIBATCHINFERENCE.JL

2022

 github.com/vboussange/MiniBatchInference.jl  [documentation](#)

A Julia package for maximum likelihood estimation and model selection of strongly nonlinear dynamical models.

Julia

HIGHDIMPDE.JL

2021

 github.com/vboussange/HighDimPDE.jl  [documentation](#)

A Julia package that breaks down the curse of dimensionality in solving non local, non linear PDEs.

Julia

EVOLD.JL

2019 - 2021

 github.com/vboussange/Evold.jl  [documentation](#)

Evolutionary individual based modelling, mathematically grounded.

Julia

OPTIVPP

2018

 [confidential](#)

Energy Management System for Virtual Power Plants.

Python

GAMS

Open Source contributions

SciML, DiffEqFlux.jl, CUDA.jl, Flux.jl, LightGraphs.jl.

</> PROGRAMMING

Programming languages Julia, Python, C++, Java, Matlab, R, Bash, VBA
Libraries Flux.jl, DifferentialEquations.jl, DiffEqFlux.jl, CUDA.jl, LightGraphs.jl, TensorFlow, ArchGDAL, matplotlib

TEACHING AND SUPERVISION

December 2020 September 2020	701-3001-00L Environmental Systems Data Science, ETH ZÜRICH, D-USYS, Switzerland Undergraduate course. In charge of the unit <i>Supervised Deep Learning - Application</i> .
June 2020 April 2020	262-0100-00L Lab rotation, ETH ZÜRICH, D-BSSE, Switzerland Supervision of Cecilia Valenzuela Agui in the frame of her MS in <i>Computational Biology and Bioinformatics : How Climatic Conditions shape Biodiversity Patterns?</i>
December 2020 September 2020	Taste of research internship, POLYTECH NICE-SOPHIA, France Supervision of Nicolas Demolin for his research internship in the frame of his MS in <i>Applied Mathematics and Modeling : Dynamical modelling of the Product Space</i> .

REVIEWS

Journal of Open Source Software, Journal of Theoretical Biology

LANGUAGES

French ● ● ● ● ●
English ● ● ● ● ●

Spanish ● ● ● ○ ○
German ● ● ○ ○ ○

HOBBIES

- > Ski touring, ski mountaineering. **Major achievements** : Graubünden Haute Route, 6 days, group leader, 2021 | Hausstock 3158m, S ridge, 38° / D, 2021 | Stucklistock 3313m, S ridge, 40° / D, 2021.
- > Alpinism. **Major achievements** : Spaghetti tour, 6 days, group leader, AD, 2021 | Mönch 4017m, Normal route, AD, 2020 | Piz Palü 3882m, traverse W-E from Rifugi dals Chamuotschs-Fortezza, PD 2c, 2020.
- > Rock climbing, alpine climbing. **Major achievements** : Sewenstock 2820m, "Amarone", 10 pitches, 7 pitches in 6a+, 2021 | Hannibalturm 2920m, "Conquest of Paradise", 6 pitches, 6b, 2020 | Brüggler, "Sonntagweg", 7 pitches, 6a+, 2020.
- > Enduro mountainbiking, bikepacking. **Major achievements** : "From the first to the last droplet of the Rhone river", Furkapass to Marseille, 11 days, group leader, 2018-2020 | Tour du Mont Blanc, 5 days, group leader, 2019.
- > Surfing.

REFERENCES

Prof. Dr. Loïc Pellissier
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Prof. Dr. Arnulf Jentzen
, UNIVERSITY OF MÜNSTER
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Dr. Thomas Poulet
Deep Earth Imaging, CSIRO
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