

Victor BOUSSANGE


Engineer in Energy & Environmental Systems

Ph.D candidate in Environmental Sciences

 github.com/vboussange













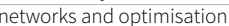

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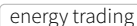
 Zürich, Switzerland  Born 1995 (age 26) | France Citizen

I am a researcher with interest in complex systems, mathematical modeling and scientific machine learning. My Ph.D aims at better understanding the drivers behind diversification processes in biological and economic systems. I conduct my investigations with mathematical models capturing eco-evolutionary dynamics. In parallel, I develop machine learning methods to empower these models and obtain an agreement with empirical data. I believe that the combination of mechanistic models and machine learning provides a powerful approach to better understand and forecast the dynamics of real ecosystems and economies. This is crucial for policy-makers to take the right decisions, in the face of potentially important ecosystem changes and accelerating threats.

EDUCATION

September 2022 (expected)	Ph.D in Environmental Sciences, SWISS FEDERAL INSTITUTE FOR FOREST, SNOW AND LANDSCAPE (WSL), Switzerland
September 2018	<p>Title : <i>"Diversification in Complex Adaptive Systems : from biological populations to economic sectors"</i></p> <ul style="list-style-type: none">➢ Part I : <i>"Neutral and adaptive diversification in spatial graphs"</i>➢ Part II : <i>"Scientific Machine Learning with applications to eco-evolutionary modeling"</i>➢ Part III : <i>"Econobiology : understanding economic dynamics with biological models"</i> <p>    </p>
June 2017 September 2016	Full year academic exchange, UNIVERSITY OF NEW SOUTH WALES (UNSW SYDNEY), Australia <p>  </p>
June 2017 February 2017	Master thesis in theoretical geomechanics, UNSW SYDNEY CSIRO, Australia <ul style="list-style-type: none">➢ Title : <i>"Numerical continuation and bifurcation analysis for unconventional geomechanics"</i>➢ Supervisor : Thomas Poulet (CSIRO Australia) <p> </p>
August 2018 September 2013	B.S./ M.S. in Energy and Environmental Engineering, INSTITUT NATIONAL DES SCIENCES APPLIQUÉES DE LYON (INSA LYON), France <ul style="list-style-type: none">➢ 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. <p>   </p>

PROFESSIONAL APPOINTMENTS

August 2018 March 2018	R&D intern, COMPAGNIE NATIONAL DU RHÔNE (CNR), France <p>Development of an Energy Management System based on various optimisation techniques for optimal production of renewable resources. Applications to EU sponsored projects :</p> <ul style="list-style-type: none">➢ Jupiter1000 (power-to-gas)➢ Move in pure (vehicle-to-grid)➢ Marie-Galante island (micro-grid) <p>  </p>
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PUBLICATIONS

Preprints

- Boussange, V. & Pellissier, L., *Topology and habitat assortativity drive neutral and adaptive diversification in spatial graphs*, [bioRxiv] (2021), 25 pages. Revision requested from Communications Biology.

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.

Works in progress

- Boussange, V., Becker, S., Jentzen, A., Pellissier, L., *Deep learning approximations for non-local non-linear PDEs with Neumann boundary conditions*.
- Boussange, V., Sornette, D., Pellissier, L., *Eco-evolutionary dynamics in economic systems*.
- Boussange, V., Vilimelis-Aceituno, P., Pellissier, L., *Interpretable Machine Learning for forecasting dynamical processes in ecosystems*.
- Boussange, V., Becker, S., Rackauckas, C., Pellissier, L., **HighDimPDE.jl** : A Julia package for solving high dimensional, non-local, nonlinear PDEs.

TALKS

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|----------------|---|
| November 2021 | StAMBio seminar, St Andrews, UK. <i>Numerical approximations of solutions of highly dimensional, non-local nonlinear PDEs</i> . |
| October 2021 | Conference on Complex Systems, Lyon, France. <i>Graph topology and habitat assortativity drive phenotypic differentiation in an eco-evolutionary model</i> . |
| October 2021 | ECBC, Amsterdam, Netherlands. <i>Using graph-based metrics to assess the effect of landscape topography on diversification</i> . |
| September 2021 | International Conference on Computational Methods in Systems Biology, Bordeaux, France. <i>Solving non-local nonlinear Partial Differential Equations in high dimensions with HighDimPDE.jl</i> . |
| April 2021 | Mathematical Population Dynamics, Ecology and Evolution, CIRM Marseille, France. <i>Responses of neutral and adaptive diversity to complex geographic population structure</i> . |

SOFTWARES

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

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 MENTORING

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

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 | Brügler, "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

Landscape Ecology, ETH ZÜRICH

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Prof. Dr. Arnulf Jentzen

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Dr. Thomas Poulet

Deep Earth Imaging, CSIRO

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