Victor **Boussange** Engineer in Energy & Environmental Systems Ph.D in Environmental Sciences

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Zürich, Switzerland i Born 1995 (age 29) | France Citizen
Updated as of May 16, 2025.



EDUCATION

October 2022	Ph.D in Environmental Sciences, Swiss Federal Institute for Forest, Snow and Landscape (WSL
	Swiss Federal Institute of Technology Zurich, ETH), Switzerland
September 2018	"Forward and inverse modelling of eco-evolutionary dynamics in ecological and economic systems". Under
	the guidance of Prof. Dr. Loïc Pellissier.
	mathematical modeling applied mathematics scientific machine learning complex systems
June 2017	M.S., UNIVERSITY OF NEW SOUTH WALES (UNSW SYDNEY), Australia
September 2016	Full year academic exchange
	computational methods for finance electrical energy chemical reaction engineering
lune 2017	Master thesis LINSW SYDNEY CSIRO Australia
Eebruary 2017	"Numerical continuation and bifurcation analysis for unconventional asomechanics" Under the guidance of
rebruary 2017	Dr. Thomas Doulot
	scientific computing applied mathematics dynamical systems
August 2018	B.S./ M.S. in Energy and Environmental Engineering, INSTITUT NATIONAL DES SCIENCES APPLIQUÉES DE
	LYON (INSA LYON), France
September 2013	> 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 Ad-
	vanced Energy Systems and Efficiency.
	optimisation energy markets fluid mechanics thermodynamics

PROFESSIONAL APPOINTMENTS

May 2025	Postdoctoral researcher, Swiss Federal Institute of Technology Zurich (ETHZ) Swiss Federal Institute for Forest Snow and Landscape (WSL), Switzerland
March 2024	Dynamic Macroecology group, in charge of biodiversity modelling within the Speed2Zero initiative.
	scientific machine learning for spatial planning ecological connectivity assessment teaching and supervision
February 2024	Postdoctoral researcher, Swiss Federal Institute For Forest, Snow and Landscape (WSL), Switzerland
October 2023	Dynamic Macroecology group, under the supervision of Dirk Karger.
	deep learning for biodiversity conservation global change biodiversity teaching and supervision
April 2023	Postdoctoral researcher, Swiss Federal Institute of Technology Zurich (ETHZ) Swiss Federal
	INSTITUTE FOR FOREST, SNOW AND LANDSCAPE (WSL), Switzerland
November 2022	Ecosystems and landscape evolution group, under the supervision of Loic Pellissier.
	inverse modelling cological modelling teaching and supervision
August 2018	R&D intern, Compagnie National du Rhône (CNR), France
March 2018	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 of mathematical optimisation of energy trading

PUBLICATIONS

Peer-reviewed	> Alsos, I.G., Boussange, V., Rijal, D.P., Beaulieu, M., Brown, A.G., Herzschuh, U., Svenning, J.C., Pellissier,
	L., Using ancient sedimentary DNA to forecast ecosystem trajectories under climate change. Phil. Trans. R. Soc. B (2024).
	 Boussange, V., Becker, S., Jentzen, A., Kuckuck, B., Pellissier, L., <i>Deep learning approximations for non-local nonlinear PDEs with Neumann boundary conditions</i>. Partial Differ. Equ. Appl., Paper no. 51, 59 pages (2023). [arXiv]
	 Skeels, A., Boschman, L. M., McFadden, I. R., Joyce, E.M., Hagen, O., Jiménez Robles, O., Bach, W., Boussange, V., Keggin, T., Jetz, W., Pellissier, L., <i>Paleoenvironments shaped the exchange of terrestrial verte-brates across Wallace's Line</i>. Science 381, 86-92 (2023).
	> Boussange, V., Forward and inverse modelling of eco-evolutionary dynamics in ecological and econo- mic systems, PhD thesis. ETH Zurich (2022).
Duranista	> Boussange, V. & Pellissier, L., Eco-evolutionary model on spatial graphs reveals how habitat structure affects phenotypic differentiation. Commun Biol 5, 668 (2022). [bioRxiv]
Preprints	> Poulet, T., Truttmann, S., Boussange, V., Veveakis, M., Chaotic Slow Slip Events in New Zealand from two coupled slip patches : a proof of concept. [arXiv] (2024). In review.
	Sapienza, F., Bolibar, J., Schäfer, F., Groenke, B., Pal, A., Boussange, V., Heimbach, P., Hooker, G., Pérez, F, Persson, P.O., Rackauckas, C., <i>Differentiable Programming for Differential Equations : A Review</i> . [arXiv] (2024), 72 pages. In review at SIAM Review.
	Reji Chacko, M., Albouy, C., Altermatt, F., Casanelles Abella, J., Brändle, M., Boussange, V., Campell, F., Ellis, W. N., Fopp, F., Gossner, M., Ho, H. C., Joss, A., Kipf, P., Neff, F., Petrović, A., Prié, V., Tomanović, Ž., Zimmerli, N., Pellissier, L., trophiCH - a national species-level trophic metaweb of 23k species for Switzerland. [EcoEvoRxiv] (2024). In review.
	> Boussange, V., Vilimelis-Aceituno, P., Pellissier, L., Partitioning ecological time series to improve process-based models with machine learning [bioRxiv] (2024), 46 pages. In review at Methods in Eco- logy and Evolution.
	 Boussange, V., Lischke, H., Sornette, D., Pellissier, L., Processes analogous to ecological interactions and dispersal shape the dynamics of economic activities. [arXiv] (2023), 23 pages.
Reports	Martin, C., Guisan, A., Boussange, V., Morán-Ordóñez, A., Pierre, E., Pellissier, L., D'Acremont, V., The Context of the Joint Climate and Biodiversity Crises, and Implications for Energy Development. In Nick, S., Guisan, A., Morán-Ordóñez, A., Ballif, C. (Eds.), RE-BD AR2024. Accelerating renewable energy develop- ment while enhancing biodiversity protection in Switzerland, CLIMACT. Lausanne : EPFL; UNIL. 21-27. doi:10.5075/epfl.20.500.14299/241642 (2024).
	Morán-Ordóñez, A., Guisan, A., Altermatt, F., Arlettaz, R., Boussange, V., Krug, C., Martin, C., Nick, S., Losapio, G., Urbach, D., Pellissier, Pierre, E., Developing Renewable Energy while Preserving Biodiversity: Impacts, Trade-Offs, and Synergies. In Nick, S., Guisan, A., Morán-Ordóñez, A., Ballif, C. (Eds.), RE-BD AR2024. Accelerating renewable energy development while enhancing biodiversity protection in Switzerland, CLIMACT. Lausanne: EPFL; UNIL. 21-27. doi:10.5075/epfl.20.500.14299/241642 (2024).
Proceedings	> Poulet, T., Alevizos, S., Veveakis, M., Boussange, V., Regenauer-Lieb, K., <i>Episodic mineralising fluid injection through chemical shear zones</i> , ASEG Extended Abstracts (2018), 5 pages.
Work in progress	> Boussange, V., Dahito, M.A., Chauvier, Y., Adde, A., Graham, C., Pellissier, L., Altermatt, F., Zimmermann, N., <i>A unified ecological importance index for large-scale biodiversity priorization in Switzerland</i> . In pre-
	 Van Moorter, B., Kivimäki, I., Panzacchi, M., Niebuhr, B., Boussange, V., Saerens, M., Network-based sensitivity analysis for prioritizing conservation areas in fragmented landscapes. In preparation.
	 Aceituno, P., Miller, J., Marti, N., Farag, N., Boussange, V., Temporal horizons in forecasting : a performance-learnability trade-off. In preparation.
	 > Bach, W., Skeels, A., Boussange, V., Pellissier, L., The multidimensional absence of a signature of competition in tetrapods. In review at American Naturalist. > Daulet T. Boussange, V. Fruttman, S. Navashia, M., Chaotia Slaw Slip Events in Naw Zagland from two
	 Poulet, I., Boussange, v., Inutinan, S., Veveakis, M., Chaotic Slow Slip Events in New Zealand from two coupled slip patches : a proof of concept. In review at Communications Earth & Environment. Boussange, V., Malle, J. T., Midolo, G., Brun, P., Zimmermann, N. E., Sanchez, T., Karger, D. N., Multiple
	<i>instance learning to predict species richness and turnover across spatial scales</i> ". In review at Nature Communications.

A TALKS

August 2024	3-day workshop organizer and speaker, Practical introduction to Julia for biodiversity research, German
	Centre for Integrative Biodiversity Research (iDiv), Leipzig, Germany
July 2024	Speaker, PiecewiseInference.jl : <i>inverse modelling for complex dynamics</i> , JuliaCon2024, Eindhoven, Netherlands
June 2024	2-day workshop co-organizer and speaker, <i>Reproducible research and geodata processing</i> , Swiss Federal Institute for Forest Snow and Landscape Research WSL, Birmensdorf, Switzerland
January 2024	Speaker, A scalable machine learning approach to assess the combined effect of habitat loss and climate change on biodiversity, IBS 2024, Prague, Czech Republic
April 2023	Speaker, PiecewiseInference.jl : <i>a machine learning framework for inverse ecosystem modelling</i> , EGU 2023, Vienna, Austria
March 2023	2-day workshop organizer and speaker, <i>Practical introduction to Julia for modelling and data analysis in biodiversity and earth sciences</i> , WSL biodiversity center, Birmensdorf, Switzerland
February 2023	Invited speaker, <i>Combining eco-evolutionary theory and machine learning to advance our understanding of living systems</i> , Seminar at the Laboratoire interdisciplinaire de physique (LiPhy), Grenoble, France
July 2022	Speaker, HighDimPDE.jl: A Julia package for solving high-dimensional PDEs, JuliaCon2022, online
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, Switzerland
November 2021	Invited speaker, Numerical approximations of solutions of highly dimensional, non-local nonlinear PDEs, 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, Using graph-based metrics to assess the effect of landscape topography on diversification, ECBC, Amsterdam, Netherlands
September 2021	Speaker, Solving non-local nonlinear Partial Differential Equations in high dimensions with HighDimPDE.jl, International Conference on Computational Methods in Systems Biology, Bordeaux, France
April 2021	Responses of neutral and adaptive diversity to complex geographic population structure, Mathematical Po- pulation Dynamics, Ecology and Evolution, CIRM Marseille, France

\$ Fundings

August 2024yDiv Graduate School & Postdoc Program funding for a 3-day workshop, 2,000EUR.March 2023WSL Biodiversity Center Innovative Workshop grant, 10,000CHF.

PROGRAMMING AND OPEN SOURCE CONTRIBUTIONS

Programming languages	Julia , Python , C++, Java, Matlab, R, Bash, Mathematica, VBA, ध्रा _E X
Technologies	JAX, PyTorch, Equinox, Xarray, scikit-learn, Lux.jl, DifferentialEquations.jl, CUDA.jl, Graphs.jl,
	TensorFlow, ArchGDAL, matplotlib
Open source contributions	Member of the SciML organisation (open source software for scientific machine learning) with
	contributions to core packages, lineax, ConScape.jl, CUDA.jl, Flux.jl, Graphs.jl.



JAXSCAPE github.com/vboussange/jaxscape A minimal JAX library for connectivity analysis at scales. JAX	2024
EcoEvoModeLZoo.JL © github.com/vboussange/EcoEvoModelZoo.jl C documentation A zoo of eco-evolutionary models with high fitness. Julia	2023
 PIECEWISEINFERENCE.JL github.com/vboussange/PiecewiseInference.jl documentation Suite for parameter inference and model selection with dynamical models characterised by complex dynamics. Julia 	2022
HIGHDIMPDE.JL O github.com/SciML/HighDimPDE.jl C documentation A Julia package that breaks down the curse of dimensionality in solving non local, non linear PDEs. Julia	2021
Evold.JL O github.com/vboussange/Evold.jl C documentation Evolutionary individual based modelling, mathematically grounded. Julia	2019 - 2021
OPTIVPP C confidential Energy Management System for Virtual Power Plants. Python GAMS	2018

✤ Teaching and Supervision

July 2024	701-1679-00L Landscape Modelling of Biodiversity : From Global Changes to Conservation, ETH ZÜRICH, D-USYS, Switzerland
February 2023	Environmental Sciences Master course. Supervising a student group on the proposed project <i>Modelling the spread dynamics of invasive alien species</i> .
December 2023 September 2023	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</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</i> <i>and Modeling</i> .

🔯 Languages





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- > Ski mountaineering, alpinism, rock climbing. Major achievements : Swiss Alpine Club tour leader | 28/48 Swiss 4000m peaks climbed | From Tromsø to Nordkapp with skis and bicycle, Norway, March 2024 | North-South traverse of the Alps from Innsbruck to Venice with skis and bicycle, March 2023 | Haute Route Chamonix Zermatt, February 2022 | Crossing of the Grisons massif with skis, February 2021.
- > Enduro mountainbiking, bikepacking. Major achievements : "From the first to the last droplet of the Rhone river", Furkapass to Marseille, 2018-2020 | Tour du Mont Blanc, 2019.
- > Sailing. Major achievements : Refit of a 36-feet, 40 year-old sailing boat, sailed it from Germany to Norway, May-September 2023.
- > Surfing.

Full adventure CV available at https://vboussange.github.io/pages/alpine_cv/.

SS References

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