Sebastián RIFFO

Applied mathematician with a strong interest in data analytics, visualization, algorithm design, modeling, and numerical analysis. Concise, rigorous, and independent, I'm eager to contribute to interdisciplinary teams and collaborative research. At ease navigating diverse cultural contexts, I'm also fluent in English, French, and Spanish.

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EXPERIENCE

03.2024 - 08.2025 **Postdoctoral researcher.** IPSL Climate Modeling Center.
Engaged in projects involving the terrestrial module of the IPSL Earth System Model, ORCHIDEE, focusing on evaluation workflows and their conceptual basis.
- Structured and integrated distinct processes into a cohesive framework, bridging analysis with design to support future developments.
- Prototyped a D3.js/Flask data visualization interface as the sole front-end lead.
- Contributed as co-developer to *C-ESM-EP*, one of IPSL's platforms for model assessment, enhancing functionality with new features.

09.2022 - 05.2023 **Independent developer.** Parliamentary election maps.
Created an interactive chart visualization of the last 20 Chilean legislative elections, accessible at *sebastianriffo.github.io/congreso-chile*.
- Scraped information from government sources using Beautiful Soup.
- Used Pandas to clean, merge, and standardize electoral data.
- Automated geospatial data extraction from maps in QGIS.
- Built a spatial visualization with Folium and Highcharts.

10.2020 - 09.2021 **Postdoctoral researcher.** Géoazur.
Partnered with geophysicists and mathematicians on seismic imaging to develop a binding layer that incorporated new algorithms into the existing data-fitting workflow.
- Designed and implemented a divide-and-conquer parallelization strategy for an existing wave propagation solver, using Fortran and MPI.
- Initiated integration of these codes with the scalable library PETSc.

02.2016 - 11.2019 **Graduate student.** CEREMADE, Université Paris Dauphine-PSL.
Conducted in-depth research on marine energy extraction, emphasizing practical problem-solving through modeling, numerical methods, and theoretical analysis.
- Developed and validated an inverse model for seafloor reconstruction.
- Explored essential aspects for a better understanding of a blade design procedure.
- Proposed a time-parallel algorithm for unbounded in time data assimilation.
- Conceived a theoretical framework for the topics mentioned above.

06.2011 - 08.2014 **Research assistant.** CEAMOS and ISCI, Universidad de Chile.
- Performed a study of agent-based models for social behavior.
- Theoretical analysis and numerical simulation of bifurcation branches.
- Led a 15-person team to coordinate programs for 400 pre-college students.

EDUCATION

2019 **PhD in Applied Mathematics.** Université Paris Dauphine-PSL.
Mathematical methods for marine energy extraction.
Thesis directed by Julien Salomon.

2015 **Master 2 in Applied Mathematics.** Université Paris Dauphine-PSL.

2013 **Mathematical Engineering.** Universidad de Chile.

Languages English (fluent), French (fluent), Spanish (native).

COMPUTER SKILLS

Currently using	Argparse, Matplotlib, Xarray, Flask •Git •shell scripting •D3.js, JavaScript •markdown, HTML, CSS •LaTeX
Worked with	Pandas, Numpy •Fortran •MPI •Bash •MATLAB •QGIS
Notions of	Scikit-learn, Scipy •SQL •C++

TEACHING EXPERIENCE

2017 - 2019 **Assistant teacher** (∼60h). MIDO, Université Paris Dauphine-PSL.
- Linear algebra 3.
- Complex analysis.

01.2018 **Lecturer** (∼22.5h). EdV, Universidad de Chile.
- An introduction to abstract algebra.

2011 - 2013 **Coordinator.** EdV, Universidad de Chile.
- Summer mathematics program for pre-college students.

2008 - 2013 **Assistant teacher** (∼160h). DIM, Universidad de Chile.
- Probability and statistics.
- Introduction to partial differential equations.
- Ordinary differential equations.
- Algebra 1.
- Linear algebra.
- Single variable calculus.

CONFERENCES

07-12.12.2020 *Time-parallelization of sequential data assimilation problems.*
26th International Conference on Domain Decomposition Methods (DD26).
Chinese University of Hong Kong, Hong Kong, China.

10-11.12.2020 12th Conference FreeFEM Days.
Laboratoire Jacques-Louis Lions (LJLL), Paris, France.

02-04.07.2019 2nd Conference on Simulation and Optimization for Renewable Marine Energies (EMRSIM19).
Roscoff marine station, Roscoff, France.

02-05.09.2018 7th Workshop on Parallel-in-Time Methods (PinT18).
Roscoff marine station, Roscoff, France.

06-10.02.2017 24th International Conference on Domain Decomposition Methods (DD24).
University of Bergen, Longyearbyen, Norway.

AWARDS

2015 Doctoral contract granted by École Doctorale de Dauphine.

2014 Master scholarship granted by Fondation Sciences Mathématiques de Paris.

2006 Excellence scholarship granted by Universidad de Chile.

PUBLICATIONS

(1) P.-H. Tournier, P. Jolivet, V. Dolean, H. Aghamiry, S. Operto and S. Riffo. *3D finite-difference and finite-element frequency-domain wave simulation with multilevel optimized additive Schwarz domain-decomposition preconditioner: A tool for full-waveform inversion of sparse node datasets*. Geophysics, 87(5), pp. T381-T402, 2022.

(2) P.-H. Cocquet, S. Riffo, J. Salomon. *Optimization of bathymetry for long waves with small amplitude*. SIAM J. Control Optim., 59(6), pp. 4429–4456, 2021.

(3) J. Ledoux, S. Riffo, J. Salomon. *Analysis of the Blade Element Momentum Theory*. SIAM J. Appl. Math., 81(6), pp. 2596–2621, 2021.