Luiz Max Carvalho

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*Assistant Professor at the School of Applied Mathematics (EMAp), Getulio Vargas Foundation, Brazil.**

Last update: December 2025

Summary

Natural biological processes emit signals, which are often too "high" or too "low" for us to "hear". My goal as a scientist is to develop and apply statistical and mathematical tools to decode and quantify these biological signals. I hope a better understanding of these entities can lead to a progressive reduction of the world's disease burden. Bringing state-of-the-art statistical practice to the Life Sciences has been a major focus of my career in recent years. My interests lie in **Biostatistics**, ranging from complex networks to spatial analysis to statistical phylogenetics.

As you will notice if you continue reading, I am a big fan of collaboration, interacting with colleagues around Brazil and abroad. My current interests are:

- Bayesian inference of deterministic models;
- Combining (pooling) probability distributions;
- Learning from historical data under model misspecification;
- Phylogeny estimation: MCMC exploration of time-tree space – characterising time-tree space, new transition kernels;
- Coupling mathematical models to coalescent-based population reconstructions;

Please feel free to contact me if your interests lie anywhere near these topics.

Google Scholar: `https://scholar.google.com/citations?user=y2mxpbcAAAAJ&hl=en`

Currículo Lattes : `http://lattes.cnpq.br/7282202947621572`

*I also hold a an Adjunct Assistant Professor at the Biostatistics Department at the University of North Carolina, Chapel Hill `https://sph.unc.edu/adv_profile/luiz-carvalho/`

PDFs of my publications can be found at `https://github.com/maxbiostat/papers/tree/master/PAPERS`

Publications

Published/Accepted – peer reviewed

[1] F. P. Camara, A. L. Gomes, Carvalho, L. M., and L. G. Castello, "Dynamic behavior of sylvatic yellow fever in Brazil (1954-2008)," *Rev. Soc. Bras. Med. Trop.*, vol. 44, no. 3, pp. 297–299, 2011.

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[12] F. C. Coelho, B. Durovni, V. Saraceni, C. Lemos, C. T. Codeco, S. Camargo, Carvalho, L. M., L. Bastos, D. Arduini, D. A. Villela, *et al.*, "Higher incidence of Zika in adult women than adult men in Rio de Janeiro suggests a significant contribution of sexual transmission from men to women," *International Journal of Infectious Diseases*, vol. 51, pp. 128–132, 2016.

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Under review

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Conference papers

[47] Carvalho, L.M., L. Santos, P. Pereira, and W. Silveira, "Phylodynamics of foot-and-mouth disease virus: a complex network approach," in *Proceedings of the 10th Brazilian Conference on Dynamics, Control and Their Applications*, Brazilian Society for Applied and Computational Mathematics, 2011.

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Book chapters

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[51] Carvalho, L. M., "Métodos Bayesianos para inferir o padrão de dispersão de agentes patogénicos : filogeografia do vírus da febre aftosa na América do Sul como um caso de estudo [Bayesian methods to infer spread patterns for pathogens: the phylogeography of Foot-and-Mouth Disease virus in South America as a case study]," in *Abordagens Moleculares em Veterinária* (M. V. Cunha and J. Inácio, eds.), Lisbon: Lidel Editora, 1st ed., 2014.

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Tech reports

[54] C. Codeço, D. Villela, F. Coelho, L. Bastos, Carvalho, LM, M. Gomes, O. Cruz, and R. Lana, "Risco de espalhamento da COVID-19 em populações indígenas: considerações preliminares sobre vulnerabilidade geográfica e socioeconômica [Risk of spread of COVID-19 in indigenous populations: preliminary considerations on geographic and socioeconomic vulnerability]," *Rio de Janeiro: Fiocruz: FGV*, vol. 18, 2020.

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Work in progress[1]

Carvalho, L.M., G. Baele, M.A. Suchard, A. Rambaut, "An efficient, tunable time-tree transition kernel for Bayesian phylogenetics", In preparation.

Carvalho, L.M., Dudas, G., Rambaut, A.. "Bayesian estimation of R_0 from sub-critical chains of transmission under observation error", In preparation.

Education

2009–2012	BSc (hons.) Microbiology and Immunology, Federal University of Rio de Janeiro, Brazil.
2014–2018	PhD Evolutionary Biology, University of Edinburgh, UK. Thesis committee: Richard Everitt (Reading) and Jarrod Hadfield (Edinburgh).

Professional Experience

2010–2013	Pan American Health Organization (PAHO) Position: Statistical Assistant Role: Developed and analysed quality control experiments for veterinary diagnostic tests; Research on Foot-and-Mouth Disease virus (FMDV) phylodynamics

[1] Drafts in final phase of preparation

Academic Experience

2009–2011	Infectious Diseases Epidemiology Division (SEDI), Institute of Microbiology, Federal University of Rio de Janeiro Position: Scientific initiation student Supervisor: Prof. Dr. Fernando Portela Câmara Role: research on the epidemiology of AIDS, sylvatic yellow fever and dengue.
2012–2013	Programme for Scientific Computing (PROCC), Oswaldo Cruz Foundation (Fiocruz) Position: Scientific initiation student Supervisor: Prof. Dr. Oswaldo Gonçalves Cruz Role: research on spatial partition methods for health areal data.
2013–2014	Programme for Scientific Computing (PROCC), Oswaldo Cruz Foundation (Fiocruz) Position: Scientific initiation student Supervisors: Prof. Dr. Claudio Struchiner and Dr. Leonardo Bastos Role: research on Bayesian inference of deterministic population growth models, multilevel binary regression and opinion pooling.
2014–2018	Institute of Evolutionary Biology (SBS), University of Edinburgh Position: PhD student Supervisors: Andrew Rambaut and Darren Obbard Role: research on statistical phylogenetics methods for RNA virus phylodynamics.
2018–2019	Programme for Scientific Computing (PROCC) and National School of Public Health (ENSP), Oswaldo Cruz Foundation Position: Postdoctoral Researcher Supervisor: Claudio Struchiner Role: research on statistical methods applied to Public Health.
2020–	School of Applied Mathematics (EMAp), Getúlio Vargas Foundation (FGV) Position: Lecturer (Assistant Professor) Role: research on Biostatistics and teaching Statistics at the graduate and undergraduate levels.

Memberships

Brazilian Statistical Association (ABE), Analytical Methods in Epidemiological Surveillance Group (MAVE).

Teaching Experience

2007–2011	**High School Chemistry and Biology for underpriviledged students** I was a voluntary teacher of whole-year high school courses on organic chemistry, general chemistry and biology.
2010–2013	**Basics of Mathematics and Statistics for Microbiology** Federal University of Rio de Janeiro Supervisor: Prof. Dr. Fernando Portela Câmara Basic calculus; descriptive statistics, Gaussian distribution and hypothesis testing.
2010	**Topics in Human Physiology** Federal University of Rio de Janeiro Supervisor: Prof. Dr. Pedro Paulo Elsas By means of seminars and group discussions, we approach particular aspects of human physiology and stimulate the students to draw general conclusions about the subjacent biological processes.
2012	**Bioinformatics** Federal University of Rio de Janeiro Supervisor: Prof. Andrew Macrae, PhD Basics on Bioinformatics: basic genome annotation, databases, alignment, phylogenetics.
2014-2017	**Molecular Evolution** University of Edinburgh Supervisor: Prof. Andrew Rambaut, PhD Molecular phylogenetics.
2017	**Statistics for Genetics** University of Edinburgh Supervisor: Ian White TA in the Bayesian module
2020–	**Statistical inference** School of Applied Mathematics (EMAp) Undegraduate and graduate (PhD) courses (60 hours).
2023–	**Statistical modelling** School of Applied Mathematics (EMAp) Undegraduate (PhD) course (60 hours).
2020–	**Computational Statistics** School of Applied Mathematics (EMAp) PhD course (60 hours).
2021–	**Bayesian Statistics** School of Applied Mathematics (EMAp) PhD course (60 hours).

Awards

2010	Honourable Mention - XVI Week of Microbiology and Immunology, Federal University of Rio de Janeiro.
2011	Honourable Mention - XVII Week of Microbiology and Immunology, Federal University of Rio de Janeiro.
2011	Selected for Oral presentation – XXII National Meeting of the Brazilian Society for Virology.
2012	Honourable Mention - XVIII Week of Microbiology and Immunology.
2014	Selected for Oral presentation – XII Brazilian Meeting on Bayesian Statistics.
2014	Principal's Career Development Scholarship, University of Edinburgh.

Languages

Portuguese	Native
English	Fluent (CAE – Grade A)
Spanish	Advanced

References

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