

LUIS ALBERTO BARBOZA CHINCHILLA

Escuela de Matemática
Centro de Investigación en Matemática Pura y Aplicada
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RESEARCH

- Bayesian estimation of spatio-temporal models.
- Space-State models and applications to Paleoclimate Reconstructions.
- Bayesian estimation of Dynamical Systems. Applications to epidemiological models.
- Applications of Statistical Learning techniques to epidemiological and climate modeling.
- Parameter Estimation of Long-Memory Processes.
- Functional data analysis.

EDUCATION

- **Purdue University** (West Lafayette, Indiana, USA)
PhD Statistics, December 2012.
Dissertation: New Methods of Estimation of Long-Memory Models with an Application in Climatology.
Advisors: Frederi G. Viens, Bo Li.
- **Purdue University** (West Lafayette, Indiana, USA)
MS Statistics with Specialization in Computational Finance, August 2011.
- **Universidad de Costa Rica** (San José, Costa Rica)
MSc Applied Mathematics, July 2007.
Dissertation: Interest Rate Swaps. Losses Estimation Model.
Advisor: Jose A. Ramírez.
- **Universidad de Costa Rica** (San José, Costa Rica)
Bachelor degree, Actuarial Science, December 2003.

ACADEMIC HONORS

- **UCREA Grant** for the research project: “Potencial aumento del riesgo en Costa Rica y Nicaragua por causa de ciclones tropicales en el Caribe”, Collaborator. 2023-2025.

- **UCREA Grant** for the research project: “LaBsiq: Medidas de educación comunitarias para la prevención de arbovirosis en un cantón modelo (Siquirres)”, Collaborator. 2022-2024.
- University of California at Davis - **Seed Grant Biostatistics, Public Health Sciences**. For the research project: Mathematical Models for Dengue Surveillance: Challenges and Opportunities. 2022.
- **UCREA Grant** for the research project: “Mathematical Models for the Development of Prevention/Control Strategies of *Aedes aegypti* in Costa Rica”, Collaborator. 2018-2020.
- **Bilsland Dissertation Fellowship**
Graduate School. Purdue University. May-December 2012.
- **Summer Research Grant**
Graduate School. Purdue University. June-August 2009.
- **PhD Scholarship**
Oficina de Asuntos Internacionales. Universidad de Costa Rica. August 2007-May 2012.
- **Academic Excellence Diploma**
Universidad de Costa Rica. “Highest GPA: Actuarial Science Major”. 2003.
- **Academic Excellence Diploma**
Universidad de Costa Rica. “Highest GPA: Sciences Area”. 1999.

RESEARCH PAPERS

1. Barboza, L. A., Chen, S. W. C., Córdoba, M. A., Alfaro, E. J., and Hidalgo, H. G. (2023). Spatio-temporal downscaling emulator for regional climate models. *Environmetrics*. <https://onlinelibrary.wiley.com/doi/10.1002/env.2815>.
2. Gómez, M. J., Barboza, L. A., Vásquez, P., and Moraga, P. (2023). Bayesian spatial modeling of childhood overweight and obesity prevalence in Costa Rica. *BMC Public Health*, 23(1), 651. <https://doi.org/10.1186/s12889-023-15486-1>.
3. Barboza, L. A., Chou-Chen, S.-W., Vásquez, P., García, Y. E., Calvo, J. G., Hidalgo, H. G., and Sanchez, F. (2023). Assessing dengue fever risk in Costa Rica by using climate variables and machine learning techniques. *PLoS Neglected Tropical Diseases*, 17(1), e0011047. <https://doi.org/10.1371/journal.pntd.0011047>.
4. Calvo, J. G., Sanchez, F., Barboza, L. A., García, Y. E., and Vásquez, P. (2022). An implementation of a multilayer network model for the Covid-19 pandemic: A Costa Rica study. *Mathematical Biosciences and Engineering: MBE*, 20(1), 534–551. <https://doi.org/10.3934/mbe.2023024>.

5. Vásquez, P., Sanchez, F., Barboza, L., García, Y. E., Calvo, J. G., Chou-Chen, S.-W., and Mery, G. (2022). Mathematical and statistical models for the control of mosquito-borne diseases: the experience of Costa Rica. *Revista Panamericana de Salud Publica [Pan American Journal of Public Health]*, 46, 1. <https://doi.org/10.26633/rpsp.2022.113>
6. Sanchez, F., Calvo, J. G., Mery, G., García, Y. E., Vásquez, P., Barboza, L., Pérez, M. D., and Rivas, T. (2022). A multilayer network model of Covid-19: Implications in public health policy in Costa Rica. *Epidemics*, 39(100577), 100577. <https://doi.org/10.1016/j.epidem.2022.100577>
7. García, Y., Mery, G., Vásquez, P., Calvo, J.G., Barboza. L., Rivas, T., Sanchez, F. Projecting the Impact of Covid-19 Variants and Vaccination Strategies in Disease Transmission using a Multilayer Network Model in Costa Rica. (2022). *Scientific Reports* 12:2279.
8. Montesinos-López JC, Daza-Torres ML, García YE, Barboza.L., Sanchez F, Schmidt AJ, Pollock BH, Nuño M. The Role of SARS-CoV-2 Testing on Hospitalizations in California. *Life*. 2021; 11(12):1336. <https://doi.org/10.3390/life11121336>
9. Barboza, L., Vásquez, P., Mery, G., Sánchez, F., García, Y., Calvo, J.G., Rivas, T., Salas, D. The Role of Mobility and Sanitary Measures on the Delay of Community Transmission of COVID-19 in Costa Rica (2021). *Epidemiologia* 2021, 2(3), 294-304; <https://doi.org/10.3390/epidemiologia2030022>.
10. Lucke, O., Vega, A., Varela, M. Barboza, L., Garbanzo, J. The improvements of the Costa Rican ground-based gravity dataset as a result of a comprehensive attribute and spatial assessment of the historical databases (2021). *Applied Geomatics* 12(4). <https://doi.org/10.1007/s12518-021-00356-5>
11. Vazquez, P., Loría, A., Sánchez, F., Barboza. L. Climate-driven statistical models as effective predictors of local dengue incidence in Costa Rica: A Generalized Additive Model and Random Forest approach (2020). *Revista de Matemática: Teoría y Aplicaciones*, 27(1): 1-21.
12. Barboza, L., Emile-Geay, J., Li, B. and He, W. Efficient Reconstructions of Common Era Climate via Integrated Nested Laplace Approximations (2019). *Journal of Agricultural, Biological and Environmental Statistics (JABES)*, 24(3) 535-554.
13. Neukom, R., Barboza, L., Erb, M., Shi, F., Emile-Geay, J., Evans, M., Franke, J., Kaufman, D., Lücke, L., Rehfeld, K., Schurer, A., Zhu, F., Brönnimann, S., Hakim, G., Henley, B., Charpentier, F., McKay, N., Valler, V., von Gunten, L. Consistent multi-decadal variability in global temperature reconstructions and simulations over the Common Era (2019). *Nature Geoscience* 12, 643-649.
14. Sánchez, F., Barboza, L., Vázquez, P. Parameter estimates of the 2016-2017 Zika outbreak in Costa Rica: An Approximate Bayesian Computation (ABC) Approach (2019). *Mathematical Biosciences and Engineering* 16(4): 2738-2755.
15. Arroyo, J., Sánchez, F. and Barboza, L. Infection model for analyzing biological control of coffee rust using bacterial anti-fungal compounds. (2019) *Mathematical Biosciences*. 307, 13-24.

16. Sanchez, F., Barboza, L., Burton, D., Cintrón-Arias, A. Comparative Analysis of Dengue versus Chikungunya Outbreaks in Costa Rica. (2018) *Ricerche di Matematica*. Springer. 67: 163. <https://doi.org/10.1007/s11587-018-0362-3>.
17. Sibaja, R., Barboza, L., Rojas, C. Can mycetozoans be used as health indicators of soil in the agricultural context of Costa Rica? (2018) *Revista de Ciencias Ambientales (Tropical Journal of Environmental Sciences)* 52(1): 161-174.
18. Barboza, L. and Viens, F. Parameter Estimation of Gaussian Stationary Processes using the Generalized Method of Moments. Volume 11, Number 1, 401-439. *Electronic Journal of Statistics*. (2017).
19. Li, B., Barboza, L., Tingley, M. and Viens, F., Discussion on Temperature Reconstruction with Sediment Core Data in Ilvonen et al. (2016), *Environmetrics*. 27, 428-430.
20. Barboza, L., Li, B., Tingley, M. and Viens, F. Reconstructing Past Climate from Natural Proxies and Estimated Climate Forcings using Long Memory Models. *Annals of Applied Statistics*. Volume 8, Number 4, 1966-2001. (2014).

TECHNICAL REPORTS

1. Arias, R. Barboza, L. Ramírez, José A. Estudio Actuarial del Seguro de Invalidez, Vejez y Muerte administrado por la Caja Costarricense de Seguro Social. 2016.
2. Barboza, L. Solís, M. Víquez, Juan J. Informe Técnico. Convenio CCSS-SUPEN-UCR. 2015.
3. Barboza, L., Hernández, G. Evaluación Actuarial del Fondo de Socorro Mutuo de COOPEJUDICIAL R.L. 2014.

TEACHING EXPERIENCE

- *Mathematics Department, Universidad de Costa Rica*
Profesor Asociado (January 2013-)
 - Actuarial Science courses. Level: third and fourth year, bachelor degree.
 - Calculus and linear algebra courses for Engineering and Economics.
 - Creation of optative course in Time Series and Space-State processes.
 - Courses of the Master's program in Applied Mathematics.
- *Statistics Department, Universidad de Costa Rica*
Professor of graduate-level courses: Master's academic program in Statistics (January 2014-December 2015).
- *Statistics Department, Purdue University*
Teaching Assistant (TA) (August 2007-May 2012)

- Undergraduate courses (recitations and lectures) of Probability and Statistics: STAT 113, STAT 225, STAT 301.
 - Graduate course (lectures) of Financial Algorithms and Applications: STAT 598W.
 - Help Sessions related to statistical software (SAS, SPSS)
 - Grader in different courses for the Master and PhD programs in Statistics (Statistical Methods, Statistical Theory and Probability, Financial Mathematics)
- *Mathematics Department, Universidad de Costa Rica*
Profesor Instructor (August 2003-June 2007)
 - Actuarial Science Courses and Calculus courses for students in Engineering and Economics majors.
 - MATLAB and VBA Labs with Actuarial Applications.
 - Teaching Assistant in Probability, Stochastic Processes and Real Analysis courses.

ADMINISTRATIVE EXPERIENCE

- *Centro de Investigación en Matemática Pura y Aplicada, UCR*
Director (2021-2025).

CONFERENCES

- International Conference on Malliavin Calculus and Stochastic Analysis. University of Kansas (March 2011) **Poster Session.**
- Coloquios de Matemática. Escuela de Matemática. Universidad de Costa Rica (June 2011) **Invited Talk.**
- TIES Third North American Regional Meeting. La Crosse, Wisconsin, USA. (July 2011) **Invited Talk.**
- XII Latin American Congress of Probability and Mathematical Statistics. Viña del Mar, Chile. (March 2012) **Contributed Talk.**
- AMS 2012 Spring Central Section Meeting. University of Kansas. Lawrence, KS, USA. (April 2012) **Invited Talk.**
- 8th International Purdue Symposium on Statistics. Purdue University. West Lafayette, IN, USA. (June 2012) **Invited Talk.**
- Probability Seminar. Purdue University. West Lafayette, IN, USA. (October 2012) **Contributed talk.**
- Graduate Student Organization (GSO-Statistics). Purdue University. West Lafayette, IN, USA. (November 2012) **Contributed talk.**

- XXXVIII Mini-Congreso. Centro de Investigaciones Geofísicas (CIGEFI). Universidad de Costa Rica. San José, Costa Rica. (April 2013) **Contributed talk.**
- Primer Simposio Centroamericano de Estadística Bayesiana. Escuela de Estadística, Universidad de Costa Rica. San José, Costa Rica (July 2013) **Contributed talk.**
- I Congreso Regional de Estadística y Matemática. Universidad de El Salvador. San Salvador, El Salvador. (July 2014) **Invited talk.**
- XIII Latin American Congress of Probability and Mathematical Statistics. Cartagena de Indias, Colombia. (September 2014) **Contributed Talk.**
- Pre-World Congress Meeting of New Researchers in Statistics and Probability. Fields Institute. Toronto, Ontario, Canada. (July 2016) **Poster Session.**
- World Congress in Probability and Statistics. Fields Institute. Toronto, Ontario, Canada. (July 2016) **Contributed Talk.**
- XIV Latin American Congress of Probability and Mathematical Statistics. San José, Costa Rica. (December 2016) **Contributed Talk.**
- 28th Annual Conference of the International Environmetrics Society (TIES 2018). CIMAT. Guanajuato, México. (July 2018). **Invited Talk.**
- Mini-Congreso. Centro de Investigaciones Geofísicas (CIGEFI). Universidad de Costa Rica. San José, Costa Rica. (April 2019) **Contributed Talk.**
- Division of Applied Mathematics. Brown University, Providence, RI, USA. (October 2019) **Invited Talk.**
- II Semana de Riesgos. Instituto Nacional de Seguros. San José, Costa Rica (October 2020) **Invited Talk.**
- Workshop: Climate Change, Human Behavior, and Vector-Borne Diseases. University of California, Davis (UCDavis). (May 2022). **Invited Talk.**
- Mini-Congreso. Centro de Investigaciones Geofísicas (CIGEFI). Universidad de Costa Rica. San José, Costa Rica. (May 2022) **Contributed Talk.**
- Seminario Divisional de Ciencia de Datos. Universidad Autónoma Metropolitana, Iztapalapa, Ciudad de México, México. (July 2022) **Invited talk** (on-line)

MAJOR ADVISOR OF:

-
- Fabio Santamaría. Tesis: Aplicación de Series de Tiempo en la Evaluación de Regímenes de Pensiones. *Licenciatura en Ciencias Actuariales*. 2016.
 - Greivin Hernández González. Tesis: Modelo Espacial Bayesiano para la Incidencia de Dengue en la Isla Principal de Puerto Rico para el Año 2014. *Maestría Académica en Matemática Aplicada*. 2017.

- Andrés Quirós Granados. Tesis: Estimación de Parámetros en un Modelo de Volatilidad Estocástica con Memoria Larga usando Filtro de Partículas. *Maestría Académica en Matemática Aplicada*. 2021.
- Siviany Araya Vargas. Tesis: Aplicación de la Teoría Bayesiana en la Tarifación de un Seguro de Aviación. *Licenciatura en Ciencias Actuariales*. 2021.
- Luis Diego Fernández. Tesis: Efecto de la Dependencia entre Retornos Financieros en la Optimización de Portafolios de Inversión: un Abordaje mediante el Uso de Cópulas. *Maestría Académica en Estadística*. 2021.
- Yenny Rodriguez Campos and Ricardo Venegas Oses. Tesis: Tabla de Mortalidad para Riesgos de Trabajo aplicando Modelos de Supervivencia. *Licenciatura en Ciencias Actuariales*. 2022.
- José Ignacio Suárez Abarca. Tabla de Invalidez para la Línea Colectivo de Vida del Instituto Nacional de Seguros. *Licenciatura en Ciencias Actuariales*. 2023.
- Mario J. Gómez Camacho. Comparación de Métodos de Evaluación de Modelos Climáticos Globales para América Central. *Maestría Académica en Estadística*. 2023.

REVIEWER OF:

- **Academic Journals:** Journal of the Royal Statistical Society, Journal of Time Series Analysis, Environmetrics, Plos One, SIAM Journal of Control and Optimization, Stochastics and Dynamics, Electronic Journal of Statistics, Revista de Matemática: Teoría y Aplicaciones.
- **Risk Models and coding:** Banco Nacional de Costa Rica.

INDUSTRIAL EXPERIENCE

- *Dirección Corporativa de Riesgo, Banco Nacional de Costa Rica*
Quantitative Analyst and Actuary (2005-2007)
 - Quantitative modeling (Finance) and implementation.
 - Actuarial studies.
- *Dirección Actuarial, Caja Costarricense de Seguro Social*
Actuary (2002-2005)
 - Actuarial studies of retirement and healthcare funds.

TECHNICAL SKILLS

- Mathematical and statistical software: R, MATLAB, Python.
- General Programming languages: C++, Visual Basic.

PROFESSIONAL AND ACADEMIC MEMBERSHIP

- The International Environmetrics Society (TIES)
- Institute of Mathematical Statistics (IMS)
- International Statistical Institute (ISI)
- Colegio de Profesionales en Ciencias Económicas de Costa Rica.