

Israel Martínez Hernández

Lecturer/Assistant Professor | Lancaster University

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Curriculum Vitae

Research Interest

My primary research interests lie in developing novel statistical methodologies for analyzing (1) large-scale and complex time series and (2) spatio-temporal data. I am highly motivated by real world problems such as data from Environment, Energy, Health, and Engineering. I am excited about functional data analysis (FDA) approach, which I find very promising and flexible in modeling this type of data. FDA assumes that data are in the form of continuous functions and can overcome several challenges faced in real applications. Some topics I am interested in include modeling, exploratory data analysis, hypothesis testing, forecasting, classification, and efficient estimation.

Employment

2023-Present.	Lecturer/Assistant Professor , Lancaster University, School of Mathematical Sciences.
2021-2022.	Senior Research Associate , Lancaster University, School of Mathematical Sciences. EPSRC funded “Quantum Imaging for Monitoring of Wellbeing & Disease in Communities.” PI - Professor Rebecca Killick
2018-2020.	Post-Doctoral fellow , King Abdullah University of Science and Technology (KAUST). PI - Distinguished Professor Marc G. Genton

Education

2014 - 2017	Ph.D. in Probability and Statistics , Center for Research in Mathematics, CIMAT, Mexico. Supervisor: Dr. Graciela González-Farías. Thesis: <i>Time series methods: Long memory detection and robust model for functional data.</i>
2011 - 2013	M.S. in Probability and Statistics , Center for Research in Mathematics, CIMAT, Mexico. Thesis: <i>Risk measure for some spectrally negative Levy processes.</i>
2006 - 2011	B.S. in Mathematics , University of Benito Juárez, UABJO, Oaxaca, Mexico. Thesis: <i>A study of supersystem and subsystem of Pfaff as a generalization of the Frobenius Theorem.</i>

Grants

- STORi: Evolution of statistical earthquake models to account for measurement errors and dependence (Wanchen Yue). Founding: Shell Research, Ltd. £34,999.99.
- Granted project (100,000 MXN): PADaJ Consulting (Performing Analysis for Decision-Making Judgment Consulting). Call for Entrepreneurship CIMAT-2015.

Publications

Published

- **Martínez-Hernández, I.**, Euán, C., Meis, M., Pirani, M., S. Burr, W., and Blangiardo, M. (2024c) Modelling particle number size distribution: A continuous approach. *Royal Statistical Society, C*.
- **Martínez-Hernández, I.** and Killick, R. (2024b). Changepoint Detection on Daily Home Activity Pattern: A Sliced Poisson Process Method. *Biometrics*.
- **Martínez-Hernández, I.**, and Genton, M. G. (2024a). Functional Time Series Analysis Based on Records. *Journal of Computational and Graphical Statistics*. <https://doi.org/10.1080/10618600.2024.2374578>. Link to Rcode.
- **Martínez-Hernández, I.** and Genton, M. G. (2023b). Surface Time Series Models for Large Nonstationary Spatio-Temporal Datasets. *Spatial Statistics*.

- Baerenbold, O., Meis, M., **Martínez-Hernández, I.**, Euán, C., S. Burr, W., Tremper, A., Fuller, G., Pirani, M., and Blangiardo, M. (2023a). A dependent Bayesian Dirichlet Process model for source apportionment of particle number size distribution. *Environmetrics*.
- **Martínez-Hernández, I.**, Gonzalo, J., and González-Farías, G. (2022). Nonparametric Estimation of Functional Dynamic Factor Model. *Journal of Nonparametric Statistics*. <https://doi.org/10.1080/10485252.2022.2080825>. Link to Rcode.
- **Martínez-Hernández, I.**, and Genton, M. G. (2021). Nonparametric Trend Estimation in Functional Time Series with Application to Annual Mortality Rates. *Biometrics*. <https://doi.org/10.1111/biom.13353>. Link to Rcode.
- **Martínez-Hernández, I.**, and Genton, M. G. (2020). Recent Developments in Complex and Spatially Correlated Functional Data. *Brazilian Journal of Probability and Statistics*. <http://dx.doi.org/10.1214/20-BJPS466>
- **Martínez-Hernández, I.**, Genton, M. G., and González-Farías, G. (2019). Robust depth-based estimation of the functional autoregressive model. *Computational Statistics & Data Analysis*. <https://doi.org/10.1016/j.csda.2018.06.003>

Presentations

Selected invited talks:

- Modelling Large Spatio-Temporal Datasets: 15th International Meeting on Statistical Climatology (IMSC 2024), 2024, Toulouse, France.
- *Surface Time Series Models for Large Spatio-Temporal Datasets*, Spatial Statistics Conference, 2023, Boulder, USA.
- *Methodologies of Functional Time Series with Possible Applications to Neuroscience*. CMO BIRS, 2023, Mexico.
- *Functional Factor Model for Particle Number Size Distribution*, 2023, Computational and Methodological Statistics (CMStatistics), December 2022, London.
- *Changepoint detection for home activity count data: a functional approach*. Computational and Methodological Statistics (CMStatistics), December 2021, King's College London.
- *Nonparametric Trend Estimation in Functional Time Series*. XV Latin American Congress of Probability and Mathematical Statistics (CLAPEM) 2019, Mérida-Yucatán, Mexico.
- *A Unit-Root Test For Functional Data Based On Records*. Computational and Methodological Statistics (CMStatistics) 2018, University of Pisa, Italy.
- *Modelo Factorial para Datos funcionales*. Workshop on Econometrics and Data Science 2018, Monterrey, Mexico.
- *Robust depth-based estimation of the functional autoregressive model*. JSM 2018, Vancouver, Canada.
- *Depth-based Robust Estimation of the Functional Autoregressive Model*. BIRSS 2017, Oaxaca, Mexico.
- *Dynamic Factor Model for Functional Data*. International Workshop on Perspectives on High-dimensional Data Analysis 2017, Guanajuato, Mexico.

Supervisory Experience

August 2024 - present	Supervising a PhD student. Spatio-Temporal Functional Data Analysis On Manifold Domains (Tom Keany)
June 2023-present	Supervising a PhD student. Evolution of statistical earthquake models to account for measurement errors and dependence (Wanchen Yue)
June - September, 2021.	Supervisor of MSc Dissertations, Lancaster University. Matthew Carter. <i>Analysing daily activity curves using functional data analysis and functional clustering</i> .
June - September, 2021.	Supervisor of MSc Dissertations, Lancaster University. Ben Long. <i>Comparison of Univariate Time Series Analysis with Functional Time Series Analysis for Modeling Particulate Matter Concentrations (PM10)</i> .
Summer 2019.	Summer research of a PhD student, KAUST. Soumya Das. <i>Cyclostationary Processes for Time Series</i> .

Teaching Experience

2022-Present	Lecturer of Modelling Multilevel and Longitudinal Data (Math453), Probability and Stochastic Process (STOR602).
2021	Lecturer of Time Series (Part II: Functional Time Series), Master in Computational Statistics, CIMAT, Mexico. No student feedback collected. For this module, I prepared lecture notes and workshop notes.
2013-2015	Teaching assistant, CIMAT, Mexico. MSc modules: Regression Models, Time series, Stochastic Models I, Stochastic Models II. My experience ranges through: Marking assignments and projects, Preparing weekly revision sessions, Explaining the solution of selected problems, Delivering R training courses.

Impact Mechanisms

- FUNts package (in development), R package for functional time series methods: nonparametric estimations, robust coefficient operator estimation, and functionalfactor models.
- R code of the methods developed in my papers at <https://github.com/Martinez-Hernandez>

Other Relevant Experience

- 2023 Committee organiser. Workshop on Ecological and Environmental Statistics. Lancaster University.
- 2022 Participation on CEEDS Ideas Generating Workshop. Lancaster University. I participated in a team preparing a potential project pipeline for funding. Real-Time Water Quality Twin.
- 2021 Session organiser at 14th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics).
- 2019 Session organiser at XV Latin American Congress of Probability and Mathematical Statistics (CLAPEM).

Service to the Profession

- 2023 - Present. Committee member of Liaison and Outreach of the International Enviorometrics Society.
- Peer reviewer for international journals, such as International Statistical Review, Journal of Nonparametric Statistics, Journal of the Royal Statistical Society, Computational Statistics & Data Analysis, Data Science in Science, Statistics and Computing, and WIREs.
<https://publons.com/researcher/3962433/israel-martinez-hernandez/>

Personal and Professional Development

At Lancaster University:

- 2024: Designing a Good Moodle Course
- 2023: Grant Writing Retreat.
- 2023: Research Software Writing Retreat, Sharing and collaborating with GitHub, Grant Writing Retreat.
- 2022: Project Management for Research, Making the Most of Your LinkedIn Profile.