

Gonzalo G. Peraza Mues

Urban Scientist · Research Professor

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EXPERIENCE

- 2023–present **Research Professor** *Monterrey, Mexico*
School of Government and Public Transformation, and Fellow of the Center for the Future of Cities, Tecnológico de Monterrey
- 2023 **Coordinator of Network Modeling and Spatial Data** *Monterrey, Mexico*
Tecnológico de Monterrey
– Implementation of an agent-based transport simulator for the Monterrey Metropolitan Area.
- 2022 **Postdoctoral Researcher** *Monterrey, Mexico*
Institute for the Future of Education, with the Center for the Future of Cities, Tecnológico de Monterrey
- 2021–2022 **Coordinator of Network Modeling and Spatial Data** *Monterrey, Mexico*
School of Government and Public Transformation, Tecnológico de Monterrey
- 2018–2021 **Director, Data Engineering Program** *Yucatán, Mexico*
Universidad Politécnica de Yucatán
– Taught data science courses and led the design and updates of the program's curriculum.

EDUCATION

- 2018 **PhD in Theoretical Physics**
Centro de Investigación y de Estudios Avanzados del IPN (Cinvestav)
– Thesis: *Spontaneous rotation in vibrated disk packings*
- 2012 **MSc in Applied Physics**
Centro de Investigación y de Estudios Avanzados del IPN (Cinvestav)
- 2010 **Physics Engineering (BSc)**
Universidad Autónoma de Yucatán, graduated with honors

PUBLICATIONS

- Journal articles*
- 2026 **G. G. Peraza-Mues**, E. Resendiz, R. Figueroa-Soriano, R. Prieto-Curiel, and R. Ponce-Lopez. Scaling and population loss in Mexican urban centres. *Nature Communications* 17, 9039. doi:10.1038/s41467-026-75780-5
- 2025 M. Cruz-Sandoval, F. Gómez-Zaldívar, **G. Peraza-Mues**, and R. Ponce-López. The interplay of economic complexity and urban sprawl in shaping socio-spatial segregation in Mexico. *Applied Geography* 181, 103690. doi:10.1016/j.apgeog.2025.103690
- 2025 R. Turner, C. Higgs, C. Sun, ..., **G. Peraza-Mues**, et al. Development and validation of the Global Urban Heat Vulnerability Index (GUHVI). *Urban Climate* 64, 102716. doi:10.1016/j.uclim.2025.102716
- 2025 C. Maia de Souza, R. Ponce-Lopez, **G. G. Peraza-Mues**, A. A. Dominguez-Cristerna, and E. J. Miller. Imputing informal workers for transportation modeling in Latin America by the use of machine learning techniques. *Latin American Transport Studies* 3, 100032. doi:10.1016/j.latran.2025.100032
- 2024 **G. Peraza-Mues**, R. Ponce-Lopez, J. A. Muñoz Sanchez, F. Cavazos Alanis, G. Olivera Martínez, and C. Brambila Paz. Income segregation analysis in limited-data contexts: A methodology based on iterative proportional fitting. *Geographical Analysis* 56(1), 79-96. doi:10.1111/gean.12367
- 2023 R. Ponce-Lopez, **G. Peraza-Mues**, F. Gómez-Zaldívar, J. Membrillo-Hernández, A. Acuña-López, and P. Caratozzolo. Knowledge based urban development: An approach to innovation districts based on education. *Frontiers in Education* 8, 1029234. doi:10.3389/feduc.2023.1029234

- 2022 H. A. Pacheco-Martinez, **G. Peraza-Mues**, F. Peñuñuri, and O. Carvente. Precursor nuclei on the bottom of a vibrating container: The onset of granular self-assembly crystallization. *Physica A: Statistical Mechanics and its Applications* 588, 126577. doi:10.1016/j.physa.2021.126577
- 2020 C. F. Moukarzel, **G. Peraza-Mues**, and O. Carvente. Rotational transport via spontaneous symmetry breaking in vibrated disk packings. *Physical Review Letters* 125(2), 028001. doi:10.1103/PhysRevLett.125.028001
- 2019 **G. G. Peraza-Mues** and C. F. Moukarzel. Sustained rotation in a vibrated disk with asymmetric supports. *Journal of Statistical Mechanics: Theory and Experiment* 2019(10), 103201. doi:10.1088/1742-5468/ab417e
- 2017 **G. G. Peraza-Mues**, O. Carvente, and C. F. Moukarzel. Rotation in a gravitational billiard. *International Journal of Modern Physics C* 28(2), 1750021. doi:10.1142/S0129183117500218
- 2012 O. Carvente, **G. G. Peraza-Mues**, J. M. Salazar, and J. C. Ruiz-Suárez. Self-assembling of non-Brownian magnetized spheres. *Granular Matter* 14(3), 303-308. doi:10.1007/s10035-012-0333-4
Reports
- 2024 R. Madera Arends, A. Vazquez Brust, C. Piedrafita, **G. G. Peraza-Mues**, M. A. Scetta, and R. Ponce-Lopez. URSA: A tool to guide urban planning using satellite data. Inter-American Development Bank. doi:10.18235/0013065

RESEARCH PROJECTS

- 2026–present **SOFIAA Guadalajara: agent-based transportation model for the Guadalajara Metropolitan Area**
Center for the Future of Cities, Tecnológico de Monterrey, with IMEPLAN (GTAModel)
– Synthetic population and processing of the 2023 origin–destination survey.
- 2026–present **Instrumentos y herramientas para la revitalización de un polígono en la zona central de Saltillo, Coahuila**
Center for the Future of Cities, Tecnológico de Monterrey, for the Municipality of Saltillo (IMPLAN Saltillo)
– Quantitative analysis; geostatistical and econometric analysis at the census-tract (AGEB) level.
- 2026–present **Urban revitalization in the Monterrey Metropolitan Area**
Center for the Future of Cities, Tecnológico de Monterrey; municipalities of Monterrey, Apodaca, and San Nicolás de los Garza
– Analysis of the likelihood of successful revitalization, particularly in areas with access to mass transit.
- 2025–present **Resilient Coasts: A multi-disciplinary framework for assessing and mitigating coastal vulnerability in Mexico**
Challenge-Based Research program, Tecnológico de Monterrey (PI H. Barrios)
– Population exposure analysis (Guaymas case study).
- 2024–present **MexPop: multi-temporal population grids for Mexico (1990–2020)**
Center for the Future of Cities, Tecnológico de Monterrey, with R. Figueroa-Soriano; in collaboration with R. Prieto-Curiel (Complexity Science Hub, Vienna)
– Population grids for 69 metropolitan areas, the basis of the *Nature Communications* study on population loss in urban centres.
- 2025–present **Metropolitan scenario planning for Monterrey**
Center for the Future of Cities, Tecnológico de Monterrey, and Consejo Nuevo León, with City Explained (CommunityViz)
– Technical team; evaluated scenario-planning tools (CommunityViz, SILO) and prepared data for land-suitability and development scenarios.
– Participatory workshops with state and municipal officials, business chambers, and experts.
- 2022–present **Agent-based transportation microsimulation for the Monterrey Metropolitan Area (TASHA/GTAModel, SOFIAA)**
Tec Challenge-Based Research grant (2022, PI R. Ponce-Lopez) with the University of Toronto Transportation Research Institute and Consejo Nuevo León; continued with RTI International (USAID Net Zero Cities)
– Synthetic population and origin–destination tables for travel-demand modeling.

2025	Publication on Amazonian cities (accessibility and remoteness) Inter-American Development Bank, Housing and Urban Development Division (technical consultant)
2024–2025	Identification and characterization of urban settlements in the Amazon region Inter-American Development Bank, Housing and Urban Development Division (consultant) – GIS analysis to map human settlements in the Amazon region. – Network metrics and accessibility analysis.
2024	Sistema de apoyo a la evaluación de proyectos de construcción residencial urbana Consultancy for the Municipality of San Pedro Garza García (Secretaría de Desarrollo Urbano); project lead
2021–2024	Sistema de Información Urbano Metropolitano (SIUM) de Monterrey School of Government and Public Transformation and Center for the Future of Cities, Tecnológico de Monterrey; funded by Fundación FEMSA – Open web platform on three decades of urban expansion in Monterrey, launched in April 2024.
2022–2023	Urban heat island assessment for resilient and sustainable planning Inter-American Development Bank, Housing and Urban Development Division (algorithm developer) – Interactive dashboard for urban heat island assessment in Latin America. – Evaluation of mitigation strategies for urban heat islands.
2021–2022	Urban modeling algorithms for resilient and sustainable planning Inter-American Development Bank, Housing and Urban Development Division (algorithm developer) – Interactive dashboard of urban growth in Latin America. – Urban growth simulator for scenario planning to 2050.

TEACHING

2026	Probabilidad y estadística (AP6001) Doctorado en Política Pública, School of Government and Public Transformation, Tecnológico de Monterrey
2025–2026	Ciencia de datos para políticas públicas (TC4036) Master in Public Policy, School of Government and Public Transformation, Tecnológico de Monterrey
2023–2025	Ciencia de datos (TC4025) Graduate course (including the Maestría en Economía Aplicada), School of Government and Public Transformation, Tecnológico de Monterrey
2026	Course design: Maestría en Planeación Urbana School of Government and Public Transformation, Tecnológico de Monterrey – Course plans for Ciencia de datos urbanos y geográficos, Ciencia geoespacial para ciudades, Análisis espacial avanzado, and Simulación y modelado de ciudades.
2025	Course design: Futuros urbanos: datos, diseño y política pública General education course, Tecnológico de Monterrey – With R. Ponce-Lopez and E. Resendiz.
2021–2022	Professional training for public agencies (remote), Tecnológico de Monterrey – <i>Diseño de soluciones colaborativas a problemáticas territoriales</i>, Instituto Nacional Electoral, 2022: blocks on territorial projects and urban land classification with Google Earth Engine. – Diplomado modules on big data and on storing and querying structured and unstructured data, 2021. – Courses for the state financial intelligence units of Chiapas and Baja California Sur (UIPE).
2021	Instructor, Master in Data Science & AI Dev.F (online bootcamp) – Contributed to the design of the program's curriculum.
2017–2021	Undergraduate courses, taught in English Universidad Politécnica de Yucatán – Programming; probability and statistics; differential, integral, and multivariate calculus; statistical models; unsupervised learning; machine learning.

2016 **Física e introducción a la fisicoquímica; Temas de matemáticas (undergraduate)**
Facultad de Química, Universidad Autónoma de Yucatán

STUDENT SUPERVISION

- 2026 **Thesis advisor: Andrea Salinas Blancas**
Maestría en Ciencia de Datos y Políticas Públicas, Tecnológico de Monterrey
– *Identificación de zonas para la instalación de sistemas de captación de agua de lluvia en el estado de Oaxaca mediante técnicas de aprendizaje no supervisado y análisis geoespacial*
- 2026 **Thesis advisor: Christian Amado Láscarez Salas**
Tecnológico de Monterrey
– *Industrialización y salud mental: evidencia causal del impacto de nuevas plantas manufactureras en la tasa de suicidios municipal en México*
- 2026 **Applied policy report advisor: Andrea Victoria Vásquez Cantero**
Master in Public Policy, Tecnológico de Monterrey
– *Hacia un modelo de vivienda asequible en la Ciudad de México*
- 2025–present **Doctoral committee member: Mónica Belén Hernández-Bennettz**
Doctorado en Política Pública, Tecnológico de Monterrey
- 2024–2026 **Thesis examiner**
– Antonio Sebastián Villarreal, Doctorado en Política Pública, Tecnológico de Monterrey (defense scheduled for November 2026).
– Cristian Peña Cárdenas, predoctoral exam, Doctorado Interinstitucional en Ciencias del Hábitat (UADY–UASLP), 2026.
– Ricardo Soriano Garibay, Maestría en Ciencia de Datos y Políticas Públicas, Tecnológico de Monterrey, 2026.
– Alberto Heredia, Maestría en Economía Aplicada, Tecnológico de Monterrey, 2025.
– Guillermo Pérez Vallet, Maestría en Prospectiva Estratégica, Tecnológico de Monterrey, 2024.
– Luis Enrique Cano Palafox, Maestría en Prospectiva Estratégica, Tecnológico de Monterrey, 2024.
- 2025–2026 **Faculty mentor, thesis bootcamp (Bootcamp de Titulación)**
Maestría en Ciencia de Datos y Políticas Públicas, Tecnológico de Monterrey
- 2024 **Capstone project advisor (Proyecto Integrador), master’s students**
Center for the Future of Cities, Tecnológico de Monterrey
- 2022–2024 **Internship supervisor, Data Engineering students**
Universidad Politécnica de Yucatán
– Alexa Canché and Guillermo Montes de Oca (2022); Hugo Demian Zúñiga Medina (2024).

CONFERENCE PRESENTATIONS

- 2026 **Keynote: Reescalamiento y pérdida de población en centros urbanos de México** *Mérida, Mexico*
6.º Congreso Internacional de Estudios sobre la Ciudad (PUEC, UNAM)
- 2026 **[Talk title]** *Mexico City, Mexico*
22nd International Conference on Urban Health (ICUH), International Society for Urban Health
- 2026 **Developing and validating spatial indicators of cycling access and connectivity across diverse urban contexts globally** *Mérida, Mexico*
International Society for Physical Activity and Health (ISPAH) Congress 2026
– Co-author; with M. Abdollahyar, C. Higgs, A. Jafari, and the GOHSC cycling working group.
- 2026 **Urban scaling and population drift: The case of Mexico** *Turin, Italy*
CS2Italy: Italian Conference on Computational Social Science
- 2026 **Poster: A preference-based urban expansion simulator for housing and employment growth: Methods and case study in the Monterrey Metropolitan Area, Mexico** *Turin, Italy*
CS2Italy: Italian Conference on Computational Social Science
– With N. Cadavid-Aguilar, S. Gutiérrez-Bernal, and U. Salazar De Urquidi.

- 2025 **Assessing cell phone data for home–work mobility analysis: Evidence from the Mexico City Metropolitan Area** *London, UK*
International Conference on Computational Urban Planning and Urban Management (CUPUM)
– With N. Cadavid-Aguilar and R. Ponce-Lopez; presented by R. Figueroa-Soriano.
- 2025 **Building a multi-temporal urban population grid for Mexico: The why and the how** *London, UK*
International Conference on Computational Urban Planning and Urban Management (CUPUM)
– With R. Figueroa-Soriano, who presented.
- 2024 **Imputing informal workers for transportation modelling in Latin America by the use of machine learning techniques** *Bogotá, Colombia*
World Symposium on Transport and Land Use Research (WSTLUR)
– With C. Maia de Souza, A. A. Domínguez-Cristerna, R. Ponce-Lopez, and E. J. Miller.
- 2023 **Interactive dashboard to characterize urban sprawl in Latin America based on SLEUTH** *Montréal, Canada*
International Conference on Computational Urban Planning and Urban Management (CUPUM)
– With R. Ponce-Lopez, J. A. Torre, A. Vazquez Brust, M. A. Scetta, and C. Piedrafitra.
- 2022 **An implementation of SLEUTH as an open platform for doing scenario planning to predict urban growth** *Mexico City, Mexico*
Annual Meeting of the Society for Decision Making Under Deep Uncertainty (DMDU)
– With R. Ponce-Lopez.

INVITED TALKS AND OUTREACH

- 2026 **Scaling and population loss in Mexican urban centres** *Mexico City, Mexico*
Presentation of the study to researchers from El Colegio de México and UNAM, with commentary by Diane Davis (Harvard GSD); Tecnológico de Monterrey
– With R. Ponce-Lopez.
- 2026 **Scaling and population loss in Mexican urban centers** *Mexico City, Mexico*
Research Seminar, School of Government and Public Transformation, Tecnológico de Monterrey
- 2025 **Dinámicas de población al interior de 69 zonas metropolitanas de México con relación al modelo urbano vigente** *Mexico City, Mexico*
Invited speaker, Academic Advisory Council (Consejo Consultivo Académico) of INEGI, second session of 2025
- 2025 **Cuando el desarrollo separa: complejidad económica y segregación urbana en México** *San Pedro Garza García, Mexico*
Data Day Monterrey 2025, Software Guru
– With F. Gómez Zaldívar.
- 2025 **Cuando el desarrollo separa: complejidad económica y segregación urbana en México** *Mérida, Mexico*
MeriData meetup
- 2025 **Cuando el desarrollo separa: complejidad económica y segregación urbana en México** *Yucatán, Mexico*
Engineering Week (Semana de Ingeniería), Universidad Politécnica de Yucatán
- 2024 **Despoblación de los centros urbanos en México**
Research Seminar, School of Government and Public Transformation, Tecnológico de Monterrey
- 2024 **Sistema de Información Urbano Metropolitano: la expansión urbana de Monterrey en datos, hacia una discusión informada** *San Pedro Garza García, Mexico*
Data Day Monterrey 2024, Software Guru
- 2024 **URSA, herramienta open source para la planificación urbana** *Mérida, Mexico*
ConCiencia Social Mérida (Data-Pop Alliance), CEPHCIS-UNAM
- 2023 **URSA: sistema de apoyo para la planificación urbana** *Puebla, Mexico*
Urban Open Day, Tecnológico de Monterrey
- 2023 **Aprenda a implementar la herramienta de código abierto Predicción de Crecimiento Urbano**
Code for Development workshop, Inter-American Development Bank (online)
– Co-presenter.

2023	Presentation of the URSA interactive dashboard Tec Science Summit, cities track, Tecnológico de Monterrey – With R. Ponce-Lopez.	
2022	pySleuth Workshop of Tecnológico de Monterrey and the University of Toronto Transportation Research Institute (online)	
2021	Calificación automática con Jupyter, Nbgrader y GitHub Classroom 1.er Congreso de Innovación en la Práctica y Enseñanza de las Disciplinas Científicas, Sociales y Humanas, Colegio de Bachilleres del Estado de Yucatán – With D. Gamboa Angulo.	
2019	Forest fire prediction in Yucatán National Meeting of the Intel Innovation Labs Network (Red de Laboratorios de Innovación Intel)	Mérida, Mexico

SERVICE

2026	Proposal evaluator, Strategic Research Projects 2026–2028 University of California Alianza MX	
2026	Admissions committee, Maestría en Ciencia de Datos y Políticas Públicas Tecnológico de Monterrey	
2022–2026	Hiring and interview panels (fellows, postdoctoral researchers, staff) Institute for the Future of Education and Center for the Future of Cities, Tecnológico de Monterrey	
2025	Reviewer: <i>Environment and Planning B: Urban Analytics and City Science</i>	
2025	Program committee and reviewer, DISE track Symposium on Information Management and Big Data (SIMBig 2025)	
2025	Peer evaluator, Comités de Pares Académicos SECIHTI, Estancias Posdoctorales por México 2025	
2025–present	Member, Global Observatory of Healthy and Sustainable Cities (GOHSC) Software working group (1000 Cities Challenge); Global Cycling Indicators project	

HONORS AND AWARDS

2023–present	National Researcher, Level I National System of Researchers (SNII), Secihti, Mexico	
2015	Doctoral Fellowship National Council of Science and Technology (CONACyT), Mexico	
2010	Cum Laude Distinction Universidad Autónoma de Yucatán	
2010	International Mobility Scholarship Universidad Autónoma de Yucatán and Universidad Autónoma de Madrid	Madrid, Spain

TRAINING AND CERTIFICATIONS

2023	Summer University on Effective High-Performance Computing and Data Analytics Swiss National Supercomputing Centre (CSCS) and Università della Svizzera italiana (USI)	Lugano, Switzerland
2019	Project Management Certification, IPMA Level D International Project Management Association	
2018	Teaching by professional competencies and competency assessment (workshop) Universidad Politécnica de Yucatán	Yucatán, Mexico
2014	IV Summer School on Statistical Physics of Complex and Small Systems Instituto de Física Interdisciplinar y Sistemas Complejos (IFISC)	Palma de Mallorca, Spain

SOFTWARE AND DATA

- 2026 **Code and data for *Scaling and population loss in Mexican urban centres***
Multi-temporal population grid for Mexico and radial density functions. doi:10.5281/zenodo.20630381 · GitHub
- 2026 **mxccensus**
Mirror of Mexican census files with optional preprocessing and harmonization (Python).
- 2022–2024 **URSA**
Open-source tool to guide urban planning with satellite data, Inter-American Development Bank (co-developer).
- 2024 **ghsldownloader**
Python package with algorithms to delineate cities from Global Human Settlement Layer data.
- 2023 **population-synthesis**
Open-source tool to generate synthetic populations of households and persons from aggregate census data.
- 2022 **income-segregation**
Code and data for estimating income segregation from census and survey data with iterative proportional fitting.
- 2022 **sleuth_python**
Python implementation of the SLEUTH urban growth model.

MEDIA

- 2026 **Press coverage of *Scaling and population loss in Mexican urban centres***
 - Interviewed in “Mexican cities are expanding towards the periphery, but its centers are increasingly empty,” *TecScience*, August 2026 (Spanish).
 - Reported by UDG TV, NTR Guadalajara, and Libera Radio, August 2026.
- 2026 **Gonzalo Peraza – Centro para el Futuro de las Ciudades**
Video profile, School of Government and Public Transformation, Tecnológico de Monterrey
- 2026 **Extreme heat doesn’t impact every city equally. This index shows where it is most dangerous**
TecScience, April 2026; interviewed on the Global Urban Heat Vulnerability Index
- 2024 **Una herramienta que transforma la movilidad**
TecScience, Tecnológico de Monterrey
 - Feature on a mobility simulation tool for Monterrey; credited, with A. Romero, for key implementation work.
- 2024 **Hacia el modelo de ciudad que queremos: Sistema de Información Urbano Metropolitano de Monterrey**
Blog post with R. Ponce-Lopez, School of Government and Public Transformation, Tecnológico de Monterrey