F. ANTONIO MEDRANO

Curriculum Vitae

Texas A&M University–Corpus Christi (TAMUCC)
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Corpus Christi, TX 78412

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EDUCATION

Ph.D.	University of California, Santa Barbara, 2014 Department of Geography Emphasis on Modeling, Measurement, and Computation
M.S.	University of California, Santa Barbara, 2009 Media Arts and Technology Program Emphasis on Multimedia Engineering
B.S.	Harvey Mudd College, 2002 Engineering, *with honors* Emphasis on Systems Engineering

ACADEMIC AND RESEARCH POSITIONS

Assistant Professor	Texas A&M University–Corpus Christi (January 2019–present) Department of Computer Science, Geospatial Computer Science Program Conrad Blucher Institute for Surveying and Science
Postdoctoral Researcher	University of California, Santa Barbara (August 2017–December 2018) Bren School of Environmental Science & Management
Co-Founder	Arogi, Inc., Santa Barbara, CA (February 2016–February 2017)
Postdoctoral Researcher	University of California, Santa Barbara (April 2015–January 2016) Center for Spatial Studies, Department of Geography
Visiting Professor	Universitat Jaume I, Castellón de la Plana, Spain (September–October 2015) *Geographic Information Systems I (SIW009)*
Instructor	University of California, Santa Barbara (Winter 2011, Spring 2013, Winter 2018) *Introduction to Optimization for Geographic Problems (GEOG 191)*
Instructor	University of California, Santa Barbara (Summer 2013) *Maps and Spatial Reasoning (GEOG W12, online course)*
Instructor	University of California, Santa Barbara (Winter 2006, 2007, 2008) *Mathematics for Digital Signal Processing (MAT 202)*
Teaching Assistant	University of California, Santa Barbara (various quarters) *Intro to Geographic Information Systems, Intro to Optimization for Geographic Problems, Geography of Europe, Mathematics of Engineering, Media Digital Signal Processing, Intro to C Programming and MATLAB, Statics, Intro to Mechanical Engineering Design, Advanced Mechanical Engineering Lab, Intro to Machine Shop*

GRANTS AND FELLOWSHIPS

2020–2025 NSF Grant – AI Institute: Artificial Intelligence for Environmental Sciences, #2019758, TAMUCC sub-award Co-PI, $2,579,256 ($20M total award)

2022–2023 NSF Grant International Supplement – AI Institute: Artificial Intelligence for Environmental Sciences, #2019758, TAMUCC sub-award Co-PI, $80,290

2016 NSF SBIR Phase I: Advanced Data Analytics for Public Safety, #1549445, $149,905

2010–2014 Graduate Research Assistantship, funding from Argonne National Laboratories, (Summer–Fall 2010, Fall 2011–Winter 2013, Summer–Winter 2014)

2010 University of California Transportation Center Graduate Fellowship, $30,000

REFEREED JOURNAL ARTICLES AND BOOK CHAPTERS

2024 Phadke, A., F.A. Medrano, T. Chu, C.N. Sekharan, M.J. Starek. Modeling Wind and Obstacle Disturbances for Effective Performance Observations and Analysis of Resilience in UAV Swarms. *Aerospace*. **24**(11), 237. DOI: 10.3390/aerospace11030237

2024 Phadke, A., F.A. Medrano. Increasing Operational Resiliency of UAV Swarms: An Agent-Focused Search and Rescue Framework. *Aerospace Research Communications*. **1**:12420. DOI: 10.3389/arc.2023.12420

2023 Phadke, A., F.A. Medrano. Examining application-specific resiliency implementations in UAV swarm scenarios. *Intelligence & Robotics*. **3**(3):436-61. DOI: 10.20517/ir.2023.27

2023 Phadke, A., F.A. Medrano, C.N. Sekharan, T. Chu. Designing UAV Swarm Experiments: A Simulator Selection and Experiment Design Process. *Sensors*. **23**(17), 7359. DOI: 10.3390/s23177359

2022 Vicens-Miquel, M., F.A. Medrano, P.E. Tissot, H. Kamangir, M.J. Starek, K. Colburn. A Deep Learning Based Method to Delineate the Wet/Dry Shoreline and Compute its Elevation Using High-Resolution UAS Imagery. *Remote Sensing*. **14**(23), 5990. DOI: 10.3390/rs14235990

2022 Phadke, A., F.A. Medrano. Towards Resilient UAV Swarms—A Breakdown of Resiliency Requirements in UAV Swarms. *Drones*. **6**(11), 340. DOI: 10.3390/drones6110340

2021 Medrano, F.A. Effects of Raster Terrain Representation on GIS Shortest Path Analysis. *PLOS ONE*. **16**(4). DOI: 10.1371/journal.pone.0250106

2020 Medrano, F.A. The Complete Vertex *p*-Center Problem. *EURO Journal on Computational Optimization* **8**, 327–343. DOI: 10.1007/s13675-020-00131-y.

2018 Church, R. & F.A. Medrano. Location-Allocation Modeling and GIS. *The Geographic Information Science & Technology Body of Knowledge (3rd Quarter 2018 Edition)*, John P. Wilson (ed). DOI: 10.22224/gistbok/2018.3.4.

2016 Lafia, S., J. Jablonski, W. Kuhn, S. Cooley & F.A. Medrano. Spatial Discovery and the Research Library. *Transactions in GIS*. **20**, 399–412. DOI: 10.1111/tgis.12235.

2015 Medrano, F.A. & R.L. Church. A Parallel Computing Framework for Finding the Supported Solutions to a Biobjective Network Optimization Problem. *Journal of Multi-Criteria Decision Analysis*. **22**, 244-259. DOI: 10.1002/mcda.1541.

2014 Scaparra, M.P., R.L. Church & F.A. Medrano. Corridor Location: The Multi-Gateway Shortest Path Model. *Journal of Geographical Systems*. **16**, 287–309. DOI: 10.1007/s10109-014-0197-8.

2014 Medrano, F.A. & R.L. Church. Corridor Location for Infrastructure Development: A Fast Bi-Objective Shortest Path Method for Approximating the Pareto Frontier. *International Regional Science Review*. **37**, 129–148. DOI: 10.1177/0160017613507772.

2013 Medrano, F.A. & R.L. Church. "A Parallel Algorithm to Solve Near-Shortest Path Problems on Raster Graphs." *In* Shi, X., Kindratenko, V. & Yang, C. eds. *Modern accelerator technologies for geographic information science.* Springer, 83–94. DOI: 10.1007/978-1-4614-8745-6_7.

CONFERENCE PROCEEDINGS

2023 Phadke A., F.A. Medrano, T. Chu, C. Sekharan, M. Starek. D2D (Drone2Drone): a search and rescue framework module for finding lost UAV swarm agents, *The 21st International Conference on Embedded Systems (ESCS23)*, Las Vegas, Nevada, July 24-27, 2023. DOI: 10.1109/CSCE60160.2023.00153.

2022 Phadke A., F.A. Medrano, S. Ustymenko, T. Chu. A Study on the Inclusion of Heterogeneous Agents in Unmanned Vehicle Swarms, *The 20th International Conference on Embedded Systems (ESCS22)*, Las Vegas, Nevada, July 25-28, 2022. *(Accepted, in press)*

2022 Vicens Miquel M., F.A. Medrano, P. Tissot, H. Kamangir, M. Starek. Deep Learning Automatic Detection of The Wet/Dry Shoreline at Fish Pass, Texas, *2022 International Geoscience and Remote Sensing Symposium (IGARSS 2022)*, Kuala Lumpur, Malaysia, July 17-22, 2022. DOI: 10.1007/s10109-014-0197-8

2022 Phadke A., F.A. Medrano, T. Chu. Engineering resiliency in UAV Swarms–A bibliographic analysis, *2022 International Symposium on Intelligent Unmanned Systems and artificial Intelligence (SIUSAI 2022)*, Macao, China, April 22-24, 2022. DOI: 10.1088/1742-6596/2330/1/012007

2022 Phadke A., F.A. Medrano, J. Brahmbhatt, S. Ustymenko. A Framework for an Optimized Smart Energy System, *2022 International Symposium on Electrical, Electronics and Information Engineering (ISEEIE 2022)*, Chiang Mai, Thailand, February 25-27, 2022. DOI: 10.1109/ISEEIE55684.2022.00049

2022 Phadke, A., F.A. Medrano, S. Ustymenko. Applications of Blockchain in E-government. *2022 International Symposium on Electrical, Electronics and Information Engineering (ISEEIE 2022)*, Chiang Mai, Thailand, February 25-27, 2022. DOI: 10.1109/ISEEIE55684.2022.00035

2021 Phadke A., F.A. Medrano, J. Brahmbhatt. A Conceptual Framework for a Blockchain-based Tax payment Financial Service, *2021 International Conference on Computational Science and Computational Intelligence (CSCI 2021)*, December 15-17, 2021, Las Vegas, Nevada. DOI: 10.1109/CSCI54926.2021.00296

2021 Phadke A., F.A. Medrano, S. Ustymenko. A Review of Vehicular Micro Clouds. *2021 International Conference on Computational Science and Computational Intelligence (CSCI 2021)*, December 15-17, 2021, Las Vegas, Nevada. DOI: 10.1109/CSCI54926.2021.00139

RESEARCH REPORTS, THESES, AND OTHER PUBLICATIONS

2024 Phadke, A., F.A. Medrano, C.N. Sekharan, T. Chu. An Analysis of Trends in UAV Swarm Implementations in Current Research: Simulation Versus Hardware. *Drone Systems and Applications*. **12**: 1-10. DOI: 10.1139/dsa-2023-0099

2023 Phadke, A., J. Boyd, F.A. Medrano, M. Starek. Navigating the skies: examining the FAA's remote identification rule for unmanned aircraft systems. *Drone Systems and Applications*. **11**: 1-4. DOI: 10.1139/dsa-2023-0029

2022 Phadke, A., F.A. Medrano. A conceptual Blockchain backed framework for Healthcare Data access – Extended abstract series. *Academia Letters*, Article 4944. DOI: 10.20935/AL4944

2021 Phadke, A., A. Medrano. A Resilient Multi-UAV System of Systems (SoS). *Academia Letters*, Article 1659. DOI: 10.20935/AL1659

2016 Kuhn, W., M. Hegarty, A. Ballatore, K. Doehner, A. Medrano & D. Janelle. Report on the Center for Spatial Studies. *Center for Spatial Studies*, University of California at Santa Barbara. Retrieved from https://escholarship.org/uc/item/02s8z0vv

2015 Cooley, S., S. Lafia, A. Medrano, D. Stephens & W. Kuhn. Spatial Discovery Expert Meeting—Final Report. *Center for Spatial Studies and UCSB Library*, University of California, Santa Barbara. Retrieved from https://escholarship.org/uc/item/64p820kg

2014 Medrano, F.A. Corridor Location: Generating Competitive and Efficient Route Alternatives. *Ph.D. Dissertation*, Geography, University of California, Santa Barbara. Retrieved from https://escholarship.org/uc/item/4g92536t

2014 Medrano, F.A. & R.L. Church. A Parallel Biobjective Shortest Path Algorithm. *Geotrans Report 2014-12-01*, University of California, Santa Barbara.

2013 Medrano, F.A. & R.L. Church. Strahler Stream Order Inspired Gateway Shortest Path Subsets. *Geotrans Report 2013-12-01*, University of California, Santa Barbara.

2013 Medrano, F.A. & R.L. Church. An Exact Biobjective Shortest Path Method with Gateway Heuristic and Supported Point Upper-Bounds. *Geotrans Report 2013-06-01*, University of California, Santa Barbara.

2012 Medrano, F.A. & R.L. Church. A new parallel algorithm to solve the near- shortest-path problem on raster graphs. *Geotrans Report RP-01-12-01*, University of California, Santa Barbara.

2011 Medrano, F.A. & R.L. Church. Transmission corridor location: Multi-path alternative generation using the k-shortest path method. *Geotrans Report RP-01-11-01*, University of California, Santa Barbara.

2009 Medrano, F.A. Optical position sensors with applications in servo feedback subwoofer control. *M.S. Thesis*, Media Arts and Technology Program, University of California, Santa Barbara.

TEACHING HISTORY

Texas A&M University–Corpus Christi (TAMUCC)

- PhD level: GSCS-6331 Advanced Geospatial Computing
- MS level: GSEN-6390 Introduction to Optimization for Geographic Problems
  GSEN-6395 Geospatial Engineering Research
- BS level: GISC-2438 Geospatial Software Systems I
  GISC-3421 Visualization for GIS
  COSC-3351 Internet Programming

University of California Santa Barbara (UCSB)

- MS level: MAT-202 Mathematics for Digital Signal Processing
- BS level: GEOG-W12 Maps and Spatial Reasoning
  GEOG-191 Introduction to Optimization for Geographic Problems

Universitat Jaume I (UJI)

- MS level: GIS-1 Geographic Information Systems I

STUDENT MENTORSHIP

PhD Chair

- Marina Vicens-Miquel (advanced to candidacy 12/2022, expected graduation 5/2024)
- Abhishek Phadke (advanced to candidacy 4/2023, expected graduation 5/2024)
- Adarsh Kesireddy (expected proposal defense Spring 2024)

PhD Committee

- Mahmoud Eldefrawy (expected proposal defense Spring 2024)
- Evan Krell (expected proposal defense Spring 2024)

MS Chair

- Mona Hajiesmaeeli (started 1/2023)
- Gabriel Ibiassi Nambila (graduated Summer 2023)

MS Committee

- Regmi Pratikshya (graduated Summer 2023)
- Rafael Gabriel-Jose (graduated Spring 2022)

MERITORIOUS STUDENT ACCOMPLISHMENTS

- 2024 Spring TAMUCC Three Minute Thesis (3MT) Competition, Third Place and People's Choice Award, Abhishek Phadke, $500
- 2023-2024 TAMUCC Division of Research and Innovation Student Research Competition, Abhishek Phadke, $800
- 2023 Spring TAMUCC Three Minute Thesis (3MT) Competition, Third Place and People's Choice Award, Abhishek Phadke, $500
- 2022 AGU Fall Meeting Outstanding Student Presentation Award, Marina Vicens-Miquel, for:

    - Vicens-Miquel, M., F.A. Medrano, P.E. Tissot, H. Kamangir, M. Starek. Generalized Model for Wet/Dry Shoreline Detection and Total Water Level Elevation Using Deep Learning. *Poster presentation at the AGU Fall Meeting 2022*, Chicago, IL, USA, December 12-16.

- 2022 Drones MDPI fully funded Abhishek Phadke's open access publication fees for:
    - Phadke, A. & F.A. Medrano. Towards Resilient UAV Swarms—A Breakdown of Resiliency Requirements in UAV Swarms. *Drones*. **6**(11), 340. DOI: 10.3390/drones6110340

- 2021-2022 TAMUCC Division of Research and Innovation Student Research Competition, Abhishek Phadke, $775

- 2021 Spring TAMUCC Three Minute Thesis (3MT) Competition, Third Place and People's Choice Award, Abhishek Phadke, $500

- 2020-2021 TAMUCC Division of Research and Innovation Student Research Competition, Marina Vicens Miquel, $800

CONFERENCE PRESENTATIONS AND INVITED TALKS

2022 F.A. Medrano. "The Complete Vertex *p*-Center Problem." *University of Oklahoma Industrial and Systems Engineering Graduate Seminar*, Norman, OK. February 4, 2022.

2019 F.A. Medrano. "The Complete Vertex p-Center Problem: An Exact Set Covering Method with Brute Force Combinatorics." *INFORMS Annual Meeting*, Seattle, WA. October 20–23, 2019.

2019 F.A. Medrano. "The Complete p-Center Problem: A Planning Tool for Urban Location Coverage Optimization." *International Workshop on Urban Operations Research (IWUOR 2019)*, Nagoya, Japan, July 19–21, 2019.

2019 F.A. Medrano. "The Complete Vertex p-Center Problem: An Exact Set Covering Method." *30th European Conference on Operational Research (EURO)*, Dublin, Ireland, June 23–26, 2019.

2019 F.A. Medrano. "A Set Covering Trade-Off to Solve the Complete Vertex p-Center Problem." *25th International Conference on Multi-Criteria Decision Making (MCDM)*, Istanbul, Turkey. June 16–21, 2019.

2019 F.A. Medrano. "Effects of Raster Terrain Representation on GIS Spatial Network Analysis." *International Network Optimization Conference (INOC)*, Avignon, France, June 12–14, 2019.

2019 F.A. Medrano. "Brute Force Spatial Optimization: When It's Okay." *American Association of Geographers (AAG) Annual Meeting*, Washington DC. April 3–7, 2019.

2018 F.A. Medrano. "The Complete Vertex p-Center Problem: A Fast Set Covering Method." *American Association of Geographers (AAG) Annual Meeting*, New Orleans, LA. April 10–14, 2018.

2018 F.A. Medrano "GIS Data For Spatial Analysis: What To Avoid At All Costs!", *Bren School of Environmental Science & Management Seminar*, University of California, Santa Barbara. March 5, 2018.

2018 F.A. Medrano. "Understanding the Effects of Attribute Scale and Connectivity on GIS Raster Network Analysis." *Western Regional Science Association Annual Meeting (WRSA)*, Pasadena, CA. February 11–14, 2018.

2017 F.A. Medrano. "The Complete p-Center Problem: A Fast Set Covering Method." *64th Annual North American Meetings of the RSAI (NARSC)*, Vancouver, BC. November 8–11, 2017.

2017 F.A. Medrano. "GIS Data for Spatial Analysis: What to Avoid at All Costs!" *Environmental Studies Department seminar*, Zamorano University, Honduras. March 24, 2017

2017 F.A. Medrano. "Spatial Analysis." *GIS course guest lecture*, Zamorano University, Honduras. March 24, 2017

2016 F.A. Medrano. "The Clarity of Disruption." *TEDx Santa Barbara*, Santa Barbara, CA. August 20, 2016. (https://tedxsantabarbara.com/2016/antonio-medrano/)

2016 F.A. Medrano. "Attribute Scale on GIS Raster Data: What to Avoid at All Costs!" *ThinkSpatial brownbag seminar at the Center for Spatial Studies*, University of California, Santa Barbara. January 26, 2016.

2015 F.A. Medrano and R.L. Church. "GIS Raster Data for Multi-Objective Shortest Path Analysis: The Elephant in the Room." *62nd Annual North American Meetings of the RSAI (NARSC)*, Portland, OR. November 11–14, 2015.

2015 F.A. Medrano and R.L. Church. "Spatial Data for Multiobjective Shortest Path Analyses: Small Decisions with Large Consequences." *INFORMS Annual Meeting*, Philadelphia, PA. November 1–4, 2015.

2015 F.A. Medrano. "Modeling Wicked Spatial Problems: Lessons Learned from my Ph.D. Dissertation." *Invited talk at the Center for Spatial Studies*, University of California, Santa Barbara, February 18, 2015.

2014 F.A. Medrano. "Corridor Location: Generating Competitive and Efficient Route Alternatives." *Ph.D. Defense Presentation*, University of California, Santa Barbara, December 5, 2014.

2014 F.A. Medrano and R.L. Church. "A Simple Framework for Parallel Multi-Objective Optimization using Java." *61st Annual North American Meetings of the RSAI (NARSC)*, Bethesda, MD. November 12–15, 2014.

2014 F.A. Medrano and R.L. Church. "A Simple Framework for Parallel Multi-Objective Optimization using Java" *INFORMS Annual Meeting*, San Francisco, CA. November 9–12, 2014.

2014 F.A. Medrano and R.L. Church. "A Simple Framework for Parallel Multi-Objective Optimization using JAVA." *20th Conference of the International Federation of Operational Research Societies (IFORS)*, Barcelona, Spain. July 13–18, 2014.

2013 F.A. Medrano and R.L. Church. "Fast Generation of Spatially Diverse One-To-One Shortest Path Options." *60th Annual North American Meetings of the RSAI (NARSC)*, Atlanta, GA. November 13–16, 2013.

2013 F.A. Medrano and R.L. Church. “Between Terrain and an NP-hard Place: Challenges of Solving Multiobjective Shortest Paths on GIS Networks.” *INFORMS Annual Meeting*, Minneapolis, MN. October 6–9, 2013.

2013 F.A. Medrano and R.L. Church. “Improved Upper Bounds for a Two-Phase Biobjective Shortest Path Algorithm.” *International Conference on Multi-Criteria Decision Making (MCDM)*, Málaga, Spain. June 16–21, 2013.

2013 F.A. Medrano and R.L. Church. “Corridor Location for Infrastructure Development: Solving For The Pareto-Frontier Of Solutions.” *Western Regional Science Association Annual Meeting (WRSA)*, Santa Barbara, CA. February 24–27, 2013.

2013 F.A. Medrano and R.L. Church. “New Methods for Solving the Bi-Objective Shortest Path Problem.” *13th INFORMS Computing Society Conference (ICS)*, Santa Fe, NM. January 6–8, 2013.

2012 F.A. Medrano. “Gateway to Computationally Efficient Corridor Location.” *Invited Talk at Argonne National Laboratory*, Lemont, IL. November 28, 2013.

2012 F.A. Medrano and R.L. Church. “A Parallel Algorithm to Solve Near-Shortest Path Problems on Raster Graphs.” *MAT4GIScience 2012 (workshop associated with GIScience 2012)*, Columbus, OH. September 18, 2012.

2012 F.A. Medrano and R.L. Church. “An Efficient Heuristic for Generating Unsupported Non-Dominated Solutions in a Bi-Objective Shortest Path Problem.” *International Symposium on Location Decisions (ISOLDE XII)*, Nagoya & Kyoto, Japan. July 19–24, 2012.

2011 F.A. Medrano and R.L. Church. “Modeling Corridor Location Alternatives: New Methods and Future R&D Needs.” *Invited talk at the Department of Energy Headquarters*, Washington DC. November 1, 2011.

2010 F.A. Medrano and R.L. Church. “Transmission Corridor Location: A Wicked Public Problem.” *Invited talk at Argonne National Laboratory*, Lemont, IL. November 18, 2010.

2009 F.A. Medrano and R.L. Church. “Differentiated Least Cost Path Selection on Raster Networks.” *Colloquium for the Department of Geography*, University of California, Santa Barbara. October 30, 2009.

2009 F.A. Medrano. “Optical Position Sensors with Applications in Servo Feedback Subwoofer Control.” *Masters Defense Presentation*, University of California, Santa Barbara. February 13, 2009.

CONFERENCE ORGANIZATION

2019 Program committee, The 2nd AAG Symposium on GeoAI and Deep Learning for Geospatial Research, AAG Annual Meeting, Washington DC, April 2019

2015 Spatial Information for Human Health (with M. Castro, M. Duckham and W. Kuhn) Santa Barbara, CA. December 9–11, 2015.

2015 Expert Meeting on Spatial Discovery (with D. Stephens and W. Kuhn) Santa Barbara, CA. June 17–18, 2015.

CERTIFICATIONS, AWARDS, AND HONORS

Tau Beta Pi engineering honor society, Omega chapter, member
State of California, Engineer in Training, #EIT115948
California Non-Residential Title 24-2001 Certified Energy Plans Examiner

PROFESSIONAL SOCIETY MEMBERSHIPS

Association of American Geographers (AAG) – *lifetime member*

- Spatial Analysis and Modeling (SAM)

University Consortium for Geographic Information Science (UCGIS) – *TAMUCC delegate*

Institute for Operations Research and the Management Sciences (INFORMS)

- Section on Location Analysis (SOLA)
- Multiple Criteria Decision Making (MCDM) Section
- Computing Society

Regional Science Association International (RSAI)

Western Regional Science Association (WRSA)

UNIVERSITY SERVICE & COMMITTEES

TAMUCC Faculty Senate, Representative (Fall 2021 – Spring 2024)

COE Steering Committee, Member (Fall 2022 – present)

Ad-Hoc Course Evaluation Committee, Member (Fall 2021 – Spring 2022)

S&E Research Enhancement Committee, Member (Fall 2020 – Spring 2022)

Wes Tunnel Distinguished Lecturers Selection Committee (Fall 2019 – Spring 2021)

Hiring Committee, Department of Computing Sciences, TAMUCC (2019–2021, various positions)

Hiring Committee, Conrad Blucher Institute, TAMUCC (2019)

JOURNAL REVIEWER

ACM Transactions on Spatial Algorithms and Systems
Computers, Environment and Urban Systems
Computers & Operations Research
Geographic Information Science & Technology Body of Knowledge
Geographical Analysis
International Journal of Geographic Information Science
Journal of Geographical Systems
MDPI Aerospace
MDPI Drones
MDPI Electronics
MDPI Journal of Marine Science and Engineering
MDPI Remote Sensing
Networks and Spatial Economics
Operations Research for Healthcare
PLOS ONE
Socio-Economic Planning Sciences
The Professional Geographer
Transactions in GIS