Ran Tao, Ph.D.

School of Geosciences,
University of South Florida
4202 E. Fowler Ave. Tampa, FL 33620
E-mail: rtao@usf.edu; Webpage: https://gis-flow.com

CONCENTRATION

Geographic Information Science | spatial interactions | spatial statistics | data mining | geovisualization | geocomputation | movement analysis | shrinking cities | migration

PROFESSIONAL APPOINTMENT

Aug 2018–   Assistant Professor. School of Geosciences, University of South Florida

2017–2018   Lecturer. Spatial Sciences Institute, University of Southern California

EDUCATION

Ph.D. 2017   Geography and Urban Regional Analysis
University of North Carolina at Charlotte, USA
Dissertation: No Boundary for Spatial Interactions
— Exploratory Spatial Flow Data Analysis.

B.E.   2012   Remote Sensing Science and Technology
Wuhan University, China
Thesis: Impacts of High-Speed Rail on Railroad Network Accessibility in China.

PUBLICATIONS (student advisee)

22. Lauren Carter and **Ran Tao**[*] (2023). Evaluating COVID-19's Impacts on Puerto Rican's Travel Behaviors. *Geo-Spatial Information Science.*

21. Yuzhou Chen and **Ran Tao**[*] (2022). A New Urban Detection Method based on the Local G and Local Spatial Heteroscedasticity Statistics. *Transactions in GIS.*

20. Yuzhou Chen, **Ran Tao**[*], and Joni Downs. (2022). Location Optimization of COVID-19 Vaccination Sites: Case in Hillsborough County, Florida. *International Journal of Environmental Research and Public Health.*

19. Aynaz Lotfata, **Ran Tao**, and Yanfang Su. (2022). Evaluating the Walking Accessibility of Cook County's Public School to Use as Open Space. *International Journal of Urban Sciences*.

18. **Ran Tao** and Yuzhou Chen. (2022). Applying Local Indicators of Spatial Association (LISA) to Analyze Longitudinal Data: The Absolute Perspective. *Geographical Analysis*.

17. Danhuai Guo, Shiyin Ge, Shu Zhang, Song Gao, **Ran Tao**, Yangang Wang. (2022). DeepSSN: A Deep Convolutional Neural Network to Assess Spatial Scene Similarity. *Transactions in GIS*.

16. **Ran Tao**. (2021). Big Spatial Flow Data Analytics. In *Handbook of Big Geospatial Data*. (pp. 163-183). Springer, Cham.

15. **Ran Tao**, Joni Downs, Theresa M. Beckie, <u>Yuzhou Chen</u>, <u>Warren McNelley</u>. (2020). Examining Spatial Accessibility to COVID-19 Testing Sites in Florida. *Annals of GIS*: 1–9.

14. Qiwei Ma, Jing Kang, Zhaoya Gong, **Ran Tao**, Anrong Dang. (2020). Measuring Functional Urban Shrinkage with Multi-Source Geospatial Big Data: A Case Study of The Beijing-Tianjin-Hebei Megaregion. *Remote Sensing* 12(16): 2513.

13. **Ran Tao**, Jean-Claude Thill. (2020). BiFlowLISA: Measuring Spatial Association for Bivariate Flow Data. *Computer, Environment and Urban Systems* 83: 101519.

12. **Ran Tao**, Zhaoya Gong, Qiwei Ma, Jean-Claude Thill. (2020). Boosting Computational Performance in Spatial Flow and Network Data Analysis with Head/Tail Breaks. *ISPRS International Journal of Geo-Information* 9(5): 299.

11. **Ran Tao**, Jean-Claude Thill. (2019). Flow Cross K-function: A Bivariate Flow Analytical Method. *International Journal of Geographical Information Science*: 1–17.

10. **Ran Tao**, Jean-Claude Thill. (2019). flowAMOEBA: Identifying Regions of Anomalous Spatial Interactions. *Geographical Analysis* 51(1): 111–130.

9. Zhaoya Gong, **Ran Tao,** Qiwei Ma, Changcheng Kan. (2018). Exploratory Analysis of Inter-City Human Activity Interactions for Shrinking Cities in Northeast China with flowAMOEBA. In *Proceedings of the 26th GIScience Research UK Conference*. Leicester, UK.

8. Gang Chen, Jean-Claude Thill, Sutee Anantsuksomsri, Nij Tontisirin, **Ran Tao**. (2018). Stand Age Estimation of Rubber (Hevea brasiliensis) Plantations Using an Integrated Pixel- and Object-Based Tree Growth Model and Annual Landsat Time Series. *ISPRS Journal of Photogrammetry and Remote Sensing* 144: 94–104.

7. **Ran Tao**, Jean-Claude Thill, Craig Depken, II, Mona Kashiha. (2017). Flow HDBSCAN: A Hierarchical and Density-Based Spatial Flow Cluster Analysis Method. In *Proceedings of UrbanGIS'17:3rd ACM SIGSPATIAL Workshop on Smart Cities and Urban Analytics*. Redondo Beach, CA, USA.

6. **Ran Tao**, Jean-Claude Thill. (2016). A Density-Based Spatial Flow Cluster Detection Method. In *the Ninth International Conference on Geographic Information Science (GIScience2016) Short Paper Proceedings*. Montreal, Canada: 288–291.

5. **Ran Tao**, Daniel Strandow, Michael Findley, Jean-Claude Thill, James Walsh. (2016). A Hybrid Approach to Modeling Territorial Control in Violent Armed Conflicts. *Transactions in GIS* 20(3): 413–425.

4. **Ran Tao**, Jean-Claude Thill. (2016). Spatial Cluster Detection in Spatial Flow Data. *Geographical Analysis* 48(4): 355–372.

3. **Ran Tao**, Jean-Claude Thill, Ikuho Yamada. (2015). Detecting Clustering Scales with the Incremental K-Function: Comparison Tests on Actual and Simulated Geospatial Datasets. In V. Popovich, M. Schrenk, K. Korolenko, and C. Claramunt (editors), *Information Fusion and Geographic Information Systems (IF&GIS'2015)*. Springer, Heidelberg, Germany: 93–107.

2. Shih-Lung Shaw, Zhixiang Fang, Shiwei Lu, **Ran Tao**. (2014). Impacts of High Speed Rail on Railroad Network Accessibility in China. *Journal of Transport Geography* 40: 112–122.

1. **Ran Tao**, Manzhu Yu. (2011). Comparative Study on Methods of Quantitative Identification of Sand and Dust Storm Based on MODIS Data, *Geomatics World* 09: 51–54.

Software

Ran Tao, James Walsh, Jean-Claude Thill. (2018). *TerritorialControl*. A QGIS Plugin to the Location and Extent of Territory Controlled by Warring Parties During Civil Wars.
Updated to QGIS 3 in 2020: https://plugins.qgis.org/plugins/territorial_control/

RESEARCH PROJECTS

2023–2024	PI. *Are Public Charging Stations the Bottleneck of Electric Vehicle Adoption? A Case Study in Florida.* The USF Interdisciplinary Research Grant Program. ($20,000)
2023–2024	PI. *SCC-CIVIC-FA Track A: A GIS-Based Digital Platform for Promoting Sustainable, Equitable, and Resilient Access to Healthy Foods in Response to Natural Disasters*. NSF. ($1 million. Pending)
2022–2023	PI. *SCC-CIVIC-PG Track A: A GIS-Based Digital Platform for Promoting Sustainable, Equitable, and Resilient Access to Healthy Foods in Response to Natural Disasters.* NSF. ($50,000)
2022–2023	Co-PI. *Carpool-Based Parking Assignment Policy.* National Institute for Congestion Reduction, the US Department of Transportation. (Total: $138,659. USF's share: $55,500. PI: Daniel Rodríguez)
2020–2022	PI. *Optimizing the Allocation of COVID-19 Testing and Vaccine Resources in Florida.* USF COVID-19 Rapid Response Research Grants. ($47,320)

2020–2021	Co-PI. *Restaurant Resiliency Through Digital Communication and Ordering Channels During COVID-19*. USF COVID-19 Rapid Response Research Grants. ($21,223. PI: Mark Bender)
2020–2021	Co-PI. *Spatial-Temporal Prediction Models for COVID-19*. USF COVID-19 Rapid Response Research Grants. ($25,000. PI: Ming Ji)
2019–	Research Lead. *Study of Puerto Rican Migration Induced by Hurricane Maria with Fusion of Multi-source Heterogeneous Data*.
2018–	Research Lead. *Shrinking City Study* Develop methods to detect shrinking city phenomena in various countries and investigate the factors of each unique case.
2015–2018	Research Associate. *Resources and Conflict Research Project* Developed GIS approach to model territorial control in violent armed conflicts in Sub-Saharan Africa on a hybrid transportation network. Implemented the approach both as an ArcGIS toolkit and an open-source QGIS plugin to share with the broader community of scholars.
2013–2014	Research Assistant. *Mecklenburg County Air Quality Project* Applied GIS spatial analysis techniques to investigate environmental justice aspects of air quality in Mecklenburg County.
2013	Research Assistant. *North Carolina Forest Service Project* Applied cloud computing and parallel computing to enhancing the process of watershed delineation and land cover change modeling in North Carolina
2011–2012	Research Associate. *China's High-Speed Rail Research Project* Quantitatively assess the influence of high-speed rails on the traditional railroad system in China.
2010–2011	PI and Team Leader. *National Undergraduate Key Research Project* Analyzed the relationships between sandstorms and vegetation, temperature, sand soil moisture using MODIS satellite imagery.

CONFERENCE PRESENTATIONS

23. **Ran Tao**, Jean-Claude Thill. Bivariate Local Geary's C: Mind the "Forgotten Middle". 2022 Annual North American Meetings of the Regional Science Association International. Montreal. November 2022

22. **Ran Tao**, Yuzhou Chen. A Close Examination of Online Search Flows and Human Travel Flows. American Association of Geographers 2022 Annual Meeting. New York City, NY. Feb 2022.

21. **Ran Tao**, Yuzhou Chen. Modifying Local Indicators of Spatial Association (LISA) to Analyze Longitudinal Data. 2021 Annual North American Meetings of the Regional Science Association International. Denver. November 2021

20. **Ran Tao**, Yuzhou Chen. A New Urban Change Detection Method based on the Local G and LOSH Statistics. The 17th China Geoinformation Science Theory and Method Academic Annual Conference. Hangzhou, China. Oct 2021

19. **Ran Tao**, Theresa Beckie, Joni Downs, He Zhang, Elizabeth Dunn, Yuzhou Chen. Optimizing the Allocation of COVID-19 Testing and Vaccine Resources in Florida. American Association of Geographers 2021 Annual Meeting. Seattle, WA. April 2021.

18. **Ran Tao**, Jean-Claude Thill. Measuring Spatial Association for Bivariate Flow Data. 2019 Annual North American Meetings of the Regional Science Association International. Pittsburgh. November 2019

17. **Ran Tao**, Jean-Claude Thill. Detecting Intra-city Travel Patterns with Flow Cross K-function. American Association of Geographers 2019 Annual Meeting. Washington DC. April 2019.

16. **Ran Tao**, Jean-Claude Thill, Zhaoya Gong. The Fundamentals of Computing Big Spatial Flow Data. 2018 Annual North American Meetings of the Regional Science Association International. San Antonio, TX. November 2018.

15. **Ran Tao**, Jean-Claude Thill, Zhaoya Gong. GeoComputing of Big Spatial Flow Data. The 58th European Regional Science Association Congress. Cork, Ireland. August 2018.

14. Jacob Aronson, Kyosuke Kikuta, Michael Findley, **Ran Tao**, Jean-Claude Thill, James Igoe Walsh. Conceptualizing and Measuring Territorial Control. The Annual Meeting of the American Political Science Association. Boston, MA. August 2018.

13. Zhaoya Gong, **Ran Tao**, Qiwei Ma, Changcheng Kan. Exploratory Analysis of Inter-City Human Activity Interactions for Shrinking Cities in Northeast China with flowAMOEBA. The 26th Annual GIScience Research UK Conference. University of Leicester, UK. April 2018.

12. **Ran Tao**, Jean-Claude Thill. flowAMOEBA: Identifying Regions of Anomalous Spatial Interactions. American Association of Geographers 2018 Annual Meeting. New Orleans, LA. April 2018.

11. **Ran Tao**, James Igo Walsh, Jean-Claude Thill, Jacob Aronson. An Open-Source GIS Solution to Modeling Territorial Control. American Association of Geographers 2018 Annual Meeting. New Orleans, LA. April 2018.

10. **Ran Tao**, Jean-Claude Thill, Craig Depken, II, Mona Kashiha. flowHDBSCAN: A Hierarchical and Density-Based Spatial Flow Clustering Method. UrbanGIS'17:3rd ACM SIGSPATIAL Workshop on Smart Cities and Urban Analytic. Redondo Beach, CA. November 2017.

9. Jacob Aronson, **Ran Tao**, Jean-Claude Thill, James Igoe Walsh. Territorial Control and Violence Against Civilians: Boko Haram in Nigeria. The Annual Meeting

of the American Political Science Association. San Francisco, CA. September 2017.

8. **Ran Tao**, Jean-Claude Thill. A Density-Based Spatial Flow Cluster Detection Method. GIScience 2016. Montreal, Canada. September 2016.

7. **Ran Tao**, Daniel Strandow, Michael Findley, Jean-Claude Thill, James Walsh. Calculating Drive-time Buffers and Territories with Sparse Road Network. Esri User Conference. San Diego, CA. June 2016.

6. **Ran Tao**, Daniel Strandow, Michael Findley, Jean-Claude Thill, James Walsh. A Hybrid Model of Territorial Control in Violent Armed Conflicts. American Association of Geographers 2016 Annual Meeting. San Francisco, CA. April 2016.

5. Jean-Claude Thill, **Ran Tao**, Ikuho Yamada. Detecting Clustering Scales with the Incremental K-function: Comparison Tests on Actual and Simulated Geospatial Datasets. 7th International Workshop on Information Fusion and Geographic Information Systems: Deep Virtualization for Mobile GIS, Grenoble, France. May 2015.

4. **Ran Tao**, Jean-Claude Thill. Explore Vehicle Theft & Recovery Data in City of Charlotte. American Association of Geographers 2015 Annual Meeting. Chicago, IL. April 2015.

3. **Ran Tao**, Anjun Hu, Jean-Claude Thill. The Spatial Pattern of Economic Impact by High-Speed Rail in China. American Association of Geographers 2014 Annual Meeting. Tampa, FL. April 2014.

2. **Ran Tao**, Jean-Claude Thill. Detecting Spatial Clustering Pattern of Flow Data. 2013 Annual North American Meetings of the Regional Science Association International. Atlanta, GA. November 2013.

1. **Ran Tao**, Jean-Claude Thill. A New Method to Detect Spatial Clustering of Flow Data. American Association of Geographers 2013 Annual Meeting. Los Angeles, CA. April 2013.

TEACHING and STUDENT ADVISING

Teaching Experience

At University of South Florida (USF)

2018– Every semester	*GIS 3006 Mapping and Geovisualization* A general education course that introduces digital map design and geovisualization techniques with the assist of geographic information system (GIS)
2020– Every	*GEO 4930 Web Mapping / GIS 6307 Web GIS*

Spring	An introduction & practice on the cutting-edge web mapping & web GIS technology, facing both undergraduate and graduate students with basic GIS knowledge

2020– Summer	*GLY 4930 GIS Field Camp* An online learning & practicing experience of the latest and most popular techniques in mapping and geovisualizaiton.

2020– Every year	Advise senior undergraduate students in research projects for the capstone internship course *EVR 4940*

At University of Southern California (USC)

2017–2018	*SSCI 582 Spatial Databases* A graduate-level course that introduces the design, implementation, and interrogation of relational, object-oriented and other types of geospatial databases
	SSCI 583 Spatial Analysis A graduate-level course that provides the knowledge and skills necessary to investigate the spatial patterns which result from social and physical processes operating at or near the Earth's surface.
	SSCI 592 Mobile GIS A graduate-level course designed to immerse students in the fundamental programming concepts and cutting-edge technologies that support mobile GIS development (Android).
	SSCI 165 Sustainability Science in the City A general education course that introduces the influence of sustainability science on public policy and vice versa in the context of social/ethical theories, analytical methods and solutions.
	SSCI 265 The Water Planet A general education course that explores earth's water, ranging from water properties, chemistry, and pollution to groundwater dynamics, watershed processes, and oceanic-atmospheric circulation.
	SSCI 401 Geospatial Intelligence Introduction to basic geospatial intelligence knowledge and related practical applications that assist in informing decision-making in a variety of human security settings.

At University of North Carolina at Charlotte (UNCC)

2015 Summer	*GEOG 1103 Spatial Thinking* Provided students with an overview of spatial thinking fundamentals and introduced the latest geospatial technologies including online mapping, GIS, GPS, and remote sensing.

2013–2015	*Workshop series of Project Mosaic*

Designed and instructed 10+ workshops for both faculties and graduate students in social sciences at UNCC. Covering topics of ArcGIS, cartography, spatial regression, spatial statistics, R, GeoDa, and high-performance computing

GEOG 4105 Spatial Database (Teaching Assistant)
GEOG 6131 Research Design Fundamentals (Teaching Assistant)

Student Advising

Ongoing

Advisor	Ph.D. student Yuzhou Chen at USF
	Ph.D. student Lauren Carter at USF
	M.A. student Chuang Yin at USF
Committee	Ph.D. student Jinwen Xu at USF

Graduated

Advisor	M.A. student Robin Rives at USF (2022)
	M.A. student Simon Kyutae Ahn at USF (2020)
	Undergraduate student Warren McNelley at USF (2020)
Committee	Ph.D. student Yijie Zhu at USF (2022)
	M.A. student Bestami Cevher at USF (2020)
	M.S. GIST students at USC: Alexander Fox; Devlin Howieson; Allen Branch; Ray Danser; William Taff (2018)

PROFESSIONAL SERVICES and AFFILIATIONS

2020– **Grant Panelist/Reviewer**
NSF Human Networks and Data Science (HNDS)
NSF Information and Intelligent Systems (IIS)

2022– **Guest Editor**
Special issue of *Applied Sciences* on "Decision Making with Geospatial Information"

2019–2022 **Co-Guest Editor**
Special issue of *ISPRS International Journal of Geo-Information (IJGI)* on Crowdsourced Geographic Information in Citizen Science

2021–22 **Chair**. Cyberinfrastructure Specialty Group (CISG) of AAG

2020–21 **Vice Chair**. Cyberinfrastructure Specialty Group (CISG) of AAG

2018–20	**Treasurer and Board Member**. Cyberinfrastructure Specialty Group (CISG) of AAG
2018–20	**Board Member**. Urban Geography Specialty Group (UGSG) of AAG
2020	**Coordinator** USF Pandemic Response Research Network – Environmental Health and Resiliency Hub (EHRH)
2019–20	**Program Committee Member** *SpatialDI 2020: The First International Conference on Spatial Data Intelligence*
2018–	**Conference Session Organizer** NARSC 2019 *GeoComputation* AAG 2019 *Symposium on Human Dynamics Research in the Age of Smart/Intelligent Systems: Sensing Human Dynamics for Smart Urban Functions* AAG 2018 *Spatiotemporal Symposium: Advances in Spatial Interaction Models and Methods in the Big Data Era I & II* NARSC 2018 *GeoComputation I: Spatial Flow and Network Analysis* NARSC 2018 *GeoComputation II: Spatial Data Analysis and Statistics*

Search Committee Member

2020	Tenure-Track Faculty in GIS; GIS instructor; GIS Visiting Instructor. School of Geosciences, USF
2019	GIS Visiting Instructor. School of Geosciences, USF
2016	Tenure-Track Faculty in Economic Geography. Dept. of Geography and Earth Sciences, UNCC

2013–	**Manuscript Reviewer** *Journal Name (# of completed reviews)* *Computers, Environment and Urban Systems* (8) *International Journal of Geographical Information Science* (7) *Annals of the American Association of Geographers* (5) *Transactions in GIS* (8) *Geographical Analysis* (3) *Cartography and Geographic Information Science* (5) *The Professional Geographer* (2) *Journal of Royal Statistical Society* (1) *Journal of Spatial Science* (1) *GIS&T Body of Knowledge* (3) *Geo-spatial Information Science* (2) *Annals of GIS* (1) *The Professional Geographer* (1) *Asian Geographers* (1) *ISPRS International Journal of Geo-Information Sustainability (1)* *Remote Sensing* (7)

Urban Science (1)
Applied Sciences (2)
Land (1)
Asia-Pacific Journal of Regional Science (1)
Journal of Asian and African Studies (1)
Science and Public Policy (1)
Scientia Iranica (1)
SpatialDI 2020 (2)
ACM SIGSPATIAL EM-GIS (1)

2013– **Professional Affiliations**
Association of American Geographers (AAG)
Association for Computing Machinery, SIGSPATIAL
Regional Science Association International (RSAI)

2013–14 **Student Senator**. GESGO (Geography and Earth Science Graduate Organization), UNCC