

Ran Tao, Ph.D.

Spatial Sciences Institute
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CONCENTRATION

Geographic Information Science, spatial interactions, spatial statistics, data mining, geovisualization, GIS in transportation, migration, crime, and civic conflicts

CURRENT APPOINTMENT

Aug 2017– **Lecturer.** Spatial Sciences Institute, Dornsife College of Letters, Arts and Sciences, University of Southern California, USA

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. Advisor: Prof. Jean-Claude Thill
- B.S. 2012 Remote Sensing Science and Technology
Wuhan University, China
Thesis: Impacts of High Speed Rail on Railroad Network Accessibility in China. Advisor: Prof. Zhixiang Fang

PUBLICATIONS

Peer-reviewed

10. **Ran Tao**, Jean-Claude Thill. (In Press). flowAMOEBa: Identifying Regions of Anomalous Spatial Interactions. *Geographical Analysis*.
9. Zhaoya Gong, **Ran Tao**. (Under Review). Exploratory Analysis of Inter-City Human Activity Interactions for Shrinking Cities in Northeast China with flowAMOEBa. *The 26th GIScience Research UK Conference*.
8. Gang Chen, Jean-Claude Thill, Sutee Anantsuksomsri, Nij Tontisirin, **Ran Tao**. (Major Revision). 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*.

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 (in Chinese).

Manuscripts in preparation

6. **Ran Tao**, Zhaoya Gong. A Thorough Investigation of Shrinking Cities in Northeast China. Plan to submit to *Annals of the AAG*.
5. **Ran Tao**, Weixin Zhai, Ying Long. Explore Travel Behavior During China's Chunyun with Mobile Phone Location Data. Plan to submit to *Computers, Environment and Urban Systems*.
4. **Ran Tao**. Local Indicators of Spatial Association on Flow Data. Plan to submit to *Geographical Analysis*.
3. **Ran Tao**, Yao-Yi Chiang, Jean-Claude Thill. Where to Search for the Stolen Cars? A Spatial Data Mining Solution. Plan to submit to *The Professional Geographer*.
2. Aronson, Jacob, **Ran Tao**, Jean-Claude Thill, James Igoe Walsh. Territorial Control and Violence Against Civilians: Boko Haram in Nigeria. Plan to submit to *The ANNALS of the American Academy of Political and Social Science*.

1. Daniel Yonto, **Ran Tao**, Jean-Claude Thill. Where Does Gentrification Happen? Examine Distribution of Gentrification with Local Spatial Heteroscedasticity (LOSH). Plan to submit to *Environment and Planning A*.

Software

Ran Tao, James Walsh, Jean-Claude Thill. *TerritorialControl*. A QGIS Plugin to the Location and Extent of Territory Controlled by Warring Parties During Civil Wars.

RESEARCH EXPERIENCE

- 2017– Present **Research Associate. *China Migration Study***
Investigate the reason behind the massive labor migration from Northeast China, using the big geospatial data sponsored by Baidu Inc.
- 2017– Present **Research Lead. *Trade Flow Study***
Measure bi-variate network autocorrelation of trade flows between Latin America and the U.S. to improve modeling the Trade Impedance Quotient (TIQ), using containerized shipment flow data.
- 2017– Present **Research Lead. *Motor Vehicle Crime Study***
Use deep-learning technique to recommend where to search for the stolen motor vehicles, using the ten-year crime data sponsored by Charlotte-Mecklenburg Police Department.
- 2017– Present **Research Lead. *Traveler's Behavior Study***
Develop an analytical framework to classify travelers based on transport mode, travel purpose, and travel direction, using mobile phone location data in Chengdu, China.
- 2015– Present **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.
- 2012– 2017 **Research Assistant. *Geography Department at UNC-Charlotte***
Dissertation research is focused on developing three exploratory spatial data analysis methods for massive spatial flow data in migration, online shopping behavior, and crime events.
- 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.
- Summer 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– **Research Associate. *China's High-Speed Rail Research Project***
 2012 Quantitatively assess the influence of high-speed rails on the traditional railroad system in China.
- 2010– **Principal Investigator and Team Leader. *Nationally Funded Undergraduate Key Research Project***
 2011 Analyzed the relationships between sand storms and vegetation, temperature, sand soil moisture using MODIS satellite imagery.

CONFERENCE PRESENTATIONS

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. Aronson, Jacob, **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 ADVISING

Teaching Experience (number of students) (student evaluation out of 5)

At USC

- Spring 2018 **Instructor. *SSCI 592 Mobile GIS (Online)* (7)**
 A graduate-level course designed to immerse students in the fundamental programming concepts and cutting-edge technologies that support mobile GIS development (Android).
- Lab Instructor. *SSCI 165 Sustainability Science in the City (120)***
 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.
- Lab Instructor. *SSCI 265 The Water Planet (72)***
 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.
- Fall 2017 **Lab Instructor. *SSCI 401 Geospatial Intelligence (11)* (4/5)**
 Introduction to basic geospatial intelligence knowledge and related practical applications that assist in informing decision-making in a variety of human security settings.
- Lab Instructor. *SSCI 165 Sustainability Science in the City (120)* (5/5)**
 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.
- Lab Instructor. *SSCI 265 The Water Planet (107)* (4.3/5)**
 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.

At UNC Charlotte

- Summer 2015 **Instructor. *GEOG 1103 Spatial Thinking (8)* (4.7/5)**
 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 **Instructor. *Workshop series of Project Mosaic***
Designed and instructed **10+ workshops** for both faculties and graduate students in social sciences at UNC Charlotte. Covering topics of ArcGIS, cartography, spatial regression, spatial statistics, R, GeoDa, and high-performance computing
- 2013–
2014 **Teaching Assistant. *GEOG 4105 Spatial Database***
Teaching Assistant. *GEOG 6131 Research Design Fundamentals*

Student Advising

- 2017– **Committee Member.** Devlin Howieson (M.S. GIST in progress)
Committee Member. Alexander Fox (M.S. GIST in progress)
Committee Member. Allen Branch (M.S. GIST in progress)
Committee Member. James Graves (M.S. GIST in progress)
Committee Member. William Taff (M.S. GIST in progress)

HONORS and AWARDS

- 2015 AWS in Education Grant award (\$1,000 in AWS credit)
2015 UNC Charlotte TPDS teaching award (\$4,500)
2012–2017 Tuition Award, Graduate Assistant Support Plan (GASP), UNC Charlotte
Sept 2013 Championship of North Carolina World Geography Bowl
June 2013 Travel Award of Open Science Grid (OSG) 2013 Summer School
July 2013 Travel Award of XSEDE (Extreme Science and Engineering Discovery Environment)

PROFESSIONAL SERVICES and AFFILIATIONS

- Organizer *AAG 2018 Spatiotemporal Symposium: Advances in Spatial Interaction Models and Methods in the Big Data Era I & II*
- Reviewer Computers, Environment and Urban Systems (5)
Cartography and Geographic Information Science (1)
Scientia Iranica (1)
Transactions in GIS (1)
Science and Public Policy (1)
3rd ACM SIGSPATIAL Workshop on Emergency Management using GIS (EM-GIS 2017) (1)
- Committee Economic Geographer Faculty search committee, Dept. of Geography and Earth Sciences, UNC Charlotte. (2015–2016)

Research Fellow Center for Applied Geographic Information Science (CAGIS), UNC Charlotte. (2013–2017)

Member Association of American Geographers (AAG)
Association for Computing Machinery, SIGSPATIAL
Regional Science Association International (RSAI)

Student Senator GESGO (Geography and Earth Science Graduate Organization), UNC Charlotte. (2013–2014)

TECHNICAL SKILLS

C/C++, Python, R, ArcGIS, QGIS, GrassGIS, GeoDa, HTML, Java, JavaScript, SQL, D3.js, OpenMP, MPI, MySQL, ENVI, ERDAS, AWS, OpenStack, GeoServer