

## Tao Hu

Assistant Professor

Department of Geography  
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### PROFESSIONAL APPOINTMENT

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Aug 2021 – present	Assistant Professor Department of Geography, Oklahoma State University, OK 74078
Jul 2019 – Jun 2021	Postdoctoral Fellow Center for Geographic Analysis, Harvard University, Cambridge, MA 02138
Jun 2018 – Jun 2019	Postdoctoral Fellow Department of Geography, Kent State University, Kent, OH 44242
Sep 2016 – May 2018	Postdoctoral Fellow School of Information, Kent State University, Kent, OH 44242
Sep 2015 – Aug 2016	Research Associate Collaborative Innovation Center of Geospatial Technology, Wuhan University, Wuhan, China

### EDUCATION

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June 2015	Ph.D. in Cartography and Geographic Information System Wuhan University, Wuhan, China
June 2009	B.S. in Software Engineering Wuhan University, Wuhan, China

### RESEARCH INTERESTS

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- Geospatial Big Data
- Health Disparity
- Environmental Health
- Location-based Social Media Analytics
- Spatiotemporal Theories and Applications
- Crime Geography
- Human Mobility

## GRANTS

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- 2020-2021 RAPID: Building a Spatiotemporal Platform for Rapid Response to COVID-19, NSF, (Co-I), PI: Wendy Guan, Funding: \$100k
- 2019-2021 Developing an online spatial data sharing and management platform, NSF, (Co-I), PI: Jason Ur, Funding: \$100k
- 2015-2016 Urban crime risk estimation and impact factors analysis, Central University Foundation (China), PI: Tao Hu, Funding: ¥100k

## PUBLICATIONS

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### **Peer-reviewed Journal Articles**

- Hu, T.**, Wang, S., ..., and Li, Z. (2021) Human Mobility Data in the COVID-19 Pandemic: Characteristics, Applications, and Challenges. *International Journal of Digital Earth*, 14:9, 1126-1147, DOI: 10.1080/17538947.2021.1952324
- Hu, T.**, Wang, S., ... & Li, Z. (2021). Revealing public opinion towards COVID-19 vaccines using Twitter data in the United States: a spatiotemporal perspective. *Journal of Medical Internet Research*.
- Yue, H., & **Hu, T.\*** (2021). Geographical detector-based spatial modeling of the COVID-19 mortality rate in the continental United States. *International Journal of Environmental Research and Public Health*, 18(13), 6832.
- Liu, L., **Hu, T.**, Bao, S., Wu, H., Peng, Z., & Wang, R. (2021). The Spatiotemporal Interaction Effect of COVID-19 Transmission in the United States. *ISPRS International Journal of Geo-Information*, 10(6), 387.
- Wang, S., Zhang, M., **Hu, T.**, Fu, X., Gao, Z., Halloran, B., & Liu, Y. (2021). A Bibliometric Analysis and Network Visualisation of Human Mobility Studies from 1990 to 2020: Emerging Trends and Future Research Directions. *Sustainability*, 13(10), 5372.
- Peng, Z., Ao, S., Liu, L., Bao, S., **Hu, T.**, Wu, H., & Wang, R. (2021). Estimating Unreported COVID-19 Cases with a Time-Varying SIR Regression Model. *International Journal of Environmental Research and Public Health*, 18(3), 1090.
- Hu, T.**, Yue, H., ..., Zhu, X., & Bao, S. (2020) Racial segregation, testing sites access, and COVID-19 incidence rate in Massachusetts, USA. *International Journal of Environmental Health and Public Health*, 17(24), 9528.
- Hu, T.**, Guan, W. W., Zhu, X., Shao, Y., ... & Bao, S. (2020). Building an Open Resources Repository for COVID-19 Research. *Data and Information Management*, 4(3), 130-147.
- Hu, T.**, & Zhang, Y. (2020). A spatial-temporal network analysis of patent transfers from US universities to firms. *Scientometrics*, 1-28.
- Wang, S., Liu, Y., & **Hu, T.** (2020). Examining the Change of Human Mobility Adherent to Social Restriction Policies and Its Effect on COVID-19 Cases in Australia. *International journal of environmental research and public health*, 17(21), 7930.

- Yan, W., Zhang, Y., **Hu, T.**, & Kudva, S. (2020). How does scholarly use of academic social networking sites differ by academic discipline? A case study using ResearchGate. *Information Processing & Management*, 58(1), 102430.
- Yang, C., Sha, D., Liu, Q., Li, Y., Lan, H., Guan, W. W., **Hu, T.**, ... & Wang, Z. (2020). Taking the pulse of COVID-19: A spatiotemporal perspective. *International Journal of Digital Earth*, 13:10, 1186-1211.
- Liu, Q., Sha, D., Liu, W., Houser, P., Zhang, L., Hou, R., ... **Hu, T.**, & Yang, C. (2020). Spatiotemporal Patterns of COVID-19 Impact on Human Activities and Environment in Mainland China Using Nighttime Light and Air Quality Data. *Remote Sensing*, 12(10), 1576.
- Hu, T.**, She, B., Duan, L., Yue, H., & Clunis, J. (2019). A Systematic Spatial and Temporal Sentiment Analysis on Geo-Tweets. *IEEE Access*, 8, 8658-8667.
- Hu, T.**, Zhu, X., Wang, S., & Duan, L. (2019). Human interaction recognition using spatial-temporal salient feature. *Multimedia Tools and Applications*, 78(20), 28715-28735.
- Hu, T.**, Zhu, X., Guo, W., Wang, S., & Zhu, J. (2019). Human action recognition based on scene semantics. *Multimedia Tools and Applications*, 78(20), 28515-28536.
- Zhu, X., **Hu, T.\***, Ye, X., Guo, W., Huang, L., Xiong, H., ... & Duan, L. (2019). Development and implementation of a dynamic and 4D GIS based on semantic location model. *Geo-Spatial Information Science*, 22(3), 193-213.
- She, B., **Hu, T.**, Zhu, X., & Bao, S. (2019). Bridging open source tools and Geoportals for interactive spatial data analytics. *Geo-spatial Information Science*, 22(3), 185-192.
- Hu, T.**, Zhu, X., Duan, L., & Guo, W. (2018). Urban crime prediction based on spatio-temporal Bayesian model. *PloS one*, 13(10), e0206215.
- Hu, T.**, Zhang, H., Zhu, X., Clunis, J., & Yang, G. (2018). Depth sensor based human detection for indoor surveillance. *Future Generation Computer Systems*, 88, 540-551.
- Yue, H., Zhu, X., Ye, X., **Hu, T.**, & Kudva, S. (2018). Modelling the effects of street permeability on burglary in Wuhan, China. *Applied geography*, 98, 177-183.
- Duan, L., Ye, X., **Hu, T.\***, & Zhu, X. (2017). Prediction of suspect location based on spatiotemporal semantics. *ISPRS International Journal of Geo-Information*, 6(7), 185.
- Zhang, F., Zhu, X., **Hu, T.\***, Guo, W., Chen, C., & Liu, L. (2016). Urban link travel time prediction based on a gradient boosting method considering spatiotemporal correlations. *ISPRS International Journal of Geo-Information*, 5(11), 201.
- Zhang, F., Zhu, X., Guo, W., Ye, X., **Hu, T.**, & Huang, L. (2016). Analyzing urban human mobility patterns through a thematic model at a finer scale. *ISPRS International Journal of Geo-Information*, 5(6), 78.
- Hu, T.**, Zhu, X., Guo, W., & Su, K. (2013). Efficient interaction recognition through positive action representation. *Mathematical Problems in Engineering*, 2013.
- Guo, W., Zhu, X., **Hu, T.**, & Fan, L. (2012). A Multi-granularity Parallel Model for Unified Remote Sensing Image Processing Web Services. *Transactions in GIS*, 16(6), 845-866.

**Articles Under Review or In Preparation**

- Zhang, M., Wang, S., **Hu, T.\***, Fu, X., Wang, X., Hu, Y., ... & Bao, S. (2021). Human mobility and COVID-19 transmission: a systematic review and future directions. *Annals of GIS*. Under review.
- Yue, H., **Hu, T.\***, & Duan, L. (2020) Examining the effect of housing density and typology on residential burglary. *Journal of Urban Planning and Development*. Under review
- Hu, T.**, She, B., & Liu, R. Exploring Human Mobility Patterns during COVID-19 using Social Media and Land Use Data. In preparation

**Conference Presentations:**

- Hu, T.**, Wang, S., She, B., Zhang M., et al. Mobility Data Applications and Challenges in the COVID-19 Pandemic. Oral presentation at the 2021 American Association of Geographers (AAG) Annual Meeting. United States, April 07 – 11, 2021.
- She, B., **Hu, T.**, et al. Exploring Human Mobility Patterns during COVID-19 using Social Media and Land Use Data. Oral presentation at the 2021 American Association of Geographers (AAG) Annual Meeting. United States, April 07 – 11, 2021.
- Hu, T.**, & Zhang, Y. Patent transfers between universities and firms: a network and spatial-Temporal Analysis. Poster presentation at the 6th International Conference on Innovation and Entrepreneurship 2018. Washington DC, United States, March 05 – 06, 2018.
- Hu, T.**, Zeng, M., & Zhang, Y. Spatial-temporal variation-based innovation history visualization. Poster presentation at Digital Humanities 2017. Montreal, Canada, August 8-11, 2017.
- Hu, T.**, Ye, X., & Duan, L. Integrating near repeat and social network approaches to analyze crime patterns. Oral presentation at the 25th IEEE International Conference on Geoinformatics. Buffalo, NY, USA, August 2-4, 2017.
- Lian D., & **Hu, T.** Deep convolutional neural networks for spatiotemporal crime prediction. Oral presentation at the 16th Int'l Conf. on Information and Knowledge Engineering. Las Vegas, Nevada, USA, July 17-20, 2017.
- Hu, T.** A vehicle tracing approach based on video and road network. Oral presentation at the Computational Intelligence and Design (ISCID), 2012 Fifth International Symposium on. Hangzhou, China, 2:376-380, 2012.
- Du, T., Guo, W., & **Hu, T.** Kinect-based real-time RGB-D image fusion method. Oral presentation at the International archives of the photogrammetry, remote sensing and spatial information sciences. Melbourne, Australia. 25 Aug - 1 Sep, 2012.
- Hu, T.**, & Zhu, X. Collection and remote management of disaster information with mobile positioning terminals. Oral presentation at the Geoinformatics, 2011 19th International Conference on, pp. 1-5. IEEE, 2011.

**Invited Talks & Presentations:**

- 2020 Workflow-based Intelligent Analysis on Spatiotemporal Data. 67th Annual North American Meetings of the Regional Science Association International. November 9-13, 2020.

- 2020 GIS: from Data to Knowledge for Economic Research and Business Applications. Invited by the Chinese Economic Society. August 13, 2020
- 2020 The Data Review for COVID-19 Modeling. Invited by China Data Institute, and China Health Policy and Management Policy. July 30, 2020
- 2019 Introduction to Spatial Data Lab (SDL). Invited by Harvard-Yenching Library, Cambridge, MA. Apr 20, 2019.

## TEACHING & MENTORING EXPERIENCE

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### Guest Lecturer

- Space-time Visualization. Harvard GIS Institute. Spring, 2021.
- Introduction to Public Health. Peking University, China. Spring, 2020
- Introduction to Spatial Statistics and Applications. Wuhan University, China. Spring, 2020.

### Mentoring

- Harvard Coronavirus Visualization Team, 2020.

## SERVICES

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### Guest Editor

- 2021 "Spatial Analytics for COVID-19 Studies", *International Journal of Environmental Research and Public Health*
- 2020 "Recent Distributed Analytics and Deep Learning algorithm for Big Health Care data", *Health Informatics Journal*
- 2019 "Research on methods of multimodal information fusion in emotion recognition", *Personal and Ubiquitous Computing*

### Reviewer for peer-reviewed Journal

- 2021- PLOS One
- 2021- Scientific Reports
- 2020- Cities
- 2020- Transactions in GIS
- 2020- International Journal of Digital Earth
- 2020- IEEE Transactions on Intelligent Transportation
- 2020- American Journal of Public Health
- 2020- International Journal of Intelligent Systems
- 2020- China Economic Review
- 2020- International Journal of Environmental Research and Public Health
- 2019-2020 Geo-spatial Information Science
- 2019-2020 Complexity
- 2019-2020 Applied Sciences

2018-2020 ISPRS International Journal of Geo-Information  
2017-2020 Cluster Computing

### **Conference Sessions Chaired**

2021, Session Chair, Mobility Data: Applications and Challenges, 2021 American Association of Geographers (AAG) Annual Meeting

### **Professional Associations**

2020- Member, University Consortium for Geographic Information Science (UCGIS)  
2019-2020 Member, American Association of Geographers (AAG)  
2017-2020 Member, Chinese Professional in Geographic Information Systems (CPGIS)

## **RESEARCH EXPERIENCE**

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- June 2020 – May 2021      **RAPID: Building a Spatiotemporal Platform for Rapid Response to COVID-19**
- *Co-I*, Harvard University
  - Sponsor: NSF
  - Responsibilities: building a comprehensive data repository of virus cases and associated social and natural information from different resources; understanding the spread and outbreak of COVID-19 in the spatiotemporal context using spatiotemporal statistics, advanced ML and data mining techniques; developing workflows to reproduce, replicate, and expand COVID-19 studies for educating and training.
- July 2019 – June 2021      **Spatial Data Lab: An Online Resource Sharing and Management Platform**
- *Co-I*, Harvard University
  - Sponsor: NSF
  - Responsibilities: developing large-scale spatial and non-spatial data management platform; compiling spatiotemporal data processing, analysis and visualization workflows as case studies; co-hosting training webinars for students, researchers and educators.
- June 2018 – June 2019      **China Geo-Explorer — A Spatial Data Management and Intelligent Analysis Platform**
- *Co-I*, University of Michigan
  - Sponsor: China Data Center
  - Responsibilities: census and social-economic data management and visualization and developing an online data analysis platform.
- Sep 2016 – May 2018      **Digital Humanities Research with Smart Big Data — A Network Framework of Innovation History**

- *Co-I*, Kent State University
- Sponsor: Kent State University
- Responsibilities: design a conceptual architecture for innovation studies to facilitate the knowledge management; various types of data collection, cleaning and analysis; building a data visualization software including charts, maps, timeline, network, and others.

July 2015 – Aug 2016                      **Developing Spatiotemporal Cloud Platform**

- *Co-I*, Wuhan University
- Sponsor: Wuhan Public Security Bureau
- Responsibilities: building high-performance map services, developing online real-time mapping tools, and establishing real-time cloud platform monitoring tools.

Jun 2011 – June 2015                      **The Key Technology and Application for Location-based Sensor Network and Place-based Pan-information System**

- *Student Co-I*, Wuhan University
- Sponsor: China NSF
- Responsibilities: building an indoor panorama system, integrating indoor 3D model and outdoor street views; developing real-time web data crawler, real-time information publishing, and visualization platform.