Guofeng Cao

201A Guggenheim
Department of Geography
University of Colorado Boulder

Tel: (303) 735-0659
E-mail: guofeng.cao@colorado.edu
Web: https://www.spatstat.com/guofeng

Curriculum Vitae

Last update: September 2024

I. GENERAL INFORMATION

Research and Teaching Interests

- GeoAI and Big Data
- GIScience and Remote Sensing
- Geostatistics and Spatiotemporal Statistics
- Uncertainty-Aware Spatiotemporal Modeling
- Geospatial Cyberinfrastructure

Education

2011 Ph.D.: Department of Geography, University of California, Santa Barbara

- Specialization: GIScience and Environmental Statistics
- Dissertation Co-Advisors: Phaedon C. Kyriakidis and Michael F. Goodchild

2009 M.A.: Department of Statistics, University of California, Santa Barbara

- Specialization: Applied Statistics

2004 M.S.: Institute of Geographic Science and Natural Resources Research, Chinese Academy of Sciences, Beijing, China

- Specialization: Cartography and GIS

2001 B.S.: Department of Earth Sciences, Zhejiang University, Hangzhou, China

- Specialization: Remote sensing
- Minor in Computer Science

Current Academic Position(s)

09/2025- Associate Professor (with tenure), Dept. of Geography, University of Colorado Boulder

09/2020-08/2025 Assistant Professor, Dept. of Geography, University of Colorado Boulder

03/2021- Faculty Affiliate, Natural Hazard Center, University of Colorado Boulder

09/2021- Faculty Affiliate, CU Population Center, University of Colorado Boulder

09/2020- Faculty Affiliate, Dept. of Geosciences, Texas Tech

Prior Academic Position(s)

09/2019-09/2020 Associate Professor (with tenure), Dept. of Geosciences, Texas Tech

10/2015-09/2020 Co-Director, Center for Geospatial Technology, Texas Tech

09/2013-09/2020 Faculty Affiliate, National Wind Institute, Texas Tech

09/2013-09/2020 Faculty Affiliate, Climate Science Center, Texas Tech

09/2013-09/2019 Assistant Professor, Dept. of Geosciences, Texas Tech

08/2011-08/2013 Postdoctoral Research Associate, University of Illinois Urbana-Champaign

09/2006-08/2011 Graduate Assistant, Department of Geography and Center for Spatial Studies, University of California, Santa Barbara

06/2008-09/2008 Graduate Assistant, High Energy Physics (T-8) Group, Los Alamos National Laboratory

Prior Industrial Position(s)

06/2010-09/2010 Graduate Research Assistant, TeleNav Inc., Sunnyvale, CA

- Map matching/conflation and traffic modeling

06/2007-09/2007 Graduate Research Assistant, ESRI Inc., Redlands, CA

- Geostatistics group of ESRI

06/2001-09/2006 Development lead, SuperMap Software Co., Ltd, Beijing, China

- Led the research and development of a national award winning (of China) 3D GIS and spatial analysis software at SuperMap (a leading GIS platform in China)

Honors, Distinctions & Awards

2005	National Scientific Technology Progress Award of China (second-class) as a member of SuperMap
1998-2000	Scholarship for excellent students, Zhejiang University, Hangzhou, China

II. RESEARCH

II.A Grants & Contracts *(Total funded amount my portion since at CU: ∼ $1.6 million)*

(indicates the leading principal investigator of the proposal)*

External Applications Pending:

4. National Science Foundation (NSF): Collaborative Research: FIRE-MODEL: PISNO-WRF-Fire: Modeling Wildfire-Atmosphere Coupling with Numerical Models, Physics-Informed Machine Learning, and Earth Observations. Amount: ∼**$1.3M**. Role: **PI**.

3. National Science Foundation (NSF): Collaborative Research: Frameworks: Harnessing Geospatial Artificial Intelligence for Accelerating Scientific Innovation. Amount: ∼**$2M**. Role: **PI**.

2. Climate Change AI Innovation Grant: Early Warning of Agricultural Pest Outbreaks with Geospatial Artificial Intelligence (GeoAI). Amount: ∼**$150K**. Role: **PI**

1. National Institute of Health (NIH): SBIR Phase I: GeoAI Software for Enhanced Spatial Analysis and Decision-Making. Role: **Consultant**

External Applications Funded:

8. National Aeronautics and Space Administration (NASA): Understanding the Effects of Agricultural Land Use Transformations on Weather Dynamics in Southern High Plains (2025-2028; *in awarding process*). Amount: ∼**$740k** (∼**$410k** to Cao, G.). Role: **PI** (with X. Song, U of Maryland College Park and R. Abolafia-Rosenzweig, NSF NCAR)

7. US Dept. of Agriculture (USDA): Modeling Spatiotemporal Distribution of Mormon Crickets with Geospatial Artificial Intelligence (2024-2025). Amount: **$134k** + 50k supplemental fund. Role: **PI**

6. National Science Foundation (NSF, DMS-2220529): Collaborative Research: A Geostatistical Framework for Spatiotemporal Extremes (2023-2026). Amount **$150*k***. Role: **PI**

5. US Dept. of Agriculture (USDA): Geospatial Artificial Intelligence (GeoAI) for Spatiotemporal Modeling of Pest Insects (2022-2023, NCE till 2025). Amount: **$100*k*** with $20k cost share. Role: **Sole PI**

4. National Science Foundation (NSF, BCS-2026331): Deep Learning in Geospatial Uncertainty Modeling (2021-2024). Amount: **$265,058**. Role: **Sole PI**

3. US Dept. of Commerce National Institute of Standard and Technology (DOC NIST): Innovative Measurement and Modeling of Dynamical Social and Health Effects of Windstorms (2020-2023, NCE till 2024). Amount: **$667,024** (**$234,140** to Cao, G.). Role: **Co-PI** (with D. Liang* and Z. Cong)

2. US Geological Survey (USGS): Toward Near Real-time Monitoring and Characterization of Land Surface Change for the Conterminous US (2017-2022, NCE till 2023). Amount: **$1,062,069** (∼**$200k** to Cao, G). Role: **Co-PI** [1] (with Z. Zhu* at UConn and Z. Yang from Oregon State)

1. US Environmental Protection Agency (EPA): Texas Indoor Radon Map 2020 (2020-2021). Amount: **$77,182** (**$20k** to Cao, G). Role: **Co-PI**. [1] (with K. Millerick*, W. Lawson, C. Hetherington, J. Surles, and G. Herrmann from Texas Tech)

Prior to CU:

6. CH Foundation: Mapping Local Community Preparedness to Tornado Hazards in Lubbock, Texas (2018-2019). Amount: **$29,500**. Role: **PI** (with D. Liang)

5. CH Foundation: Immersive VR Experience for Teaching, Learning, and Researching (2018-2019). Amount: **$17,989**. Role: **Co-PI** (with Litsey R.*, TTU)

4. US Agency for International Development (USAID): Mappers Without Borders (2015-2019). Amount: **$999,000**. Role: **Co-PI** (with P. Solis*, K. Mulligan and C. Portillo-Quintero)

3. US Dept. of Agriculture (USDA): Development of Current Hydrologic Data and Analysis of Water Availability in the Ogallala Aquifer over the Next 50 Years (2014-2016). Amount: **$119,895**. Role: **Co-PI** (with K. Mulligan* and L. Barbato)

2. US Dept. of Agriculture (USDA): Development of a GIS Model to Project and Map Future Water Availability (2015-2016). Amount: **$40,679**. Role: **Co-PI** (with K. Mulligan* and L. Barbato)

1. National Institute on Minority Health and Health Disparities Pilot Research Core: Center of Excellence at Meharry (NIMHD HDRCOE): The role of climate and air pollution for racial disparities in infant mortality (2014-2015). Amount: **$12,729**. Role: **Co-PI** (with L. Gittner* and J. Vanos)

Internal Applications Funded:

2. CU Population Center (CUPC): Understanding Community Disaster Resilience with GeoAI and Big Geospatial Data (2023-2024). Amount: **$25k**. Role: **Sole PI**

1. CU Population Center (CUPC): Understanding Social Dynamics with Location-Based Social Media (2022-2023). Amount: **$15k**. Role: **Sole PI**

[1] This project was awarded to and conducted at Texas Tech

Prior to CU:

3. Texas Tech: Story Maps of Humanitarian Projects around the World (2017-2018). Amount: **$90,000**. Role: **Co-PI**

2. Texas Tech National Wind Institute: Toward a Geospatial Cyberinfrastructure for Enhancement of Community Resilience to Tornado Hazards (2014-2015). Amount: **$30,500**. Role: **Sole PI**

1. Texas Tech Transdisciplinary Research Academy: A Big Data Approach for Spatial Environmental Epidemiology (2014-2015). Amount: **$4,000**. Role: **PI**

Travel and Other Grants:

3. Texas Tech Open Access Publication Initiative: 2018

2. National Science Foundation (NSF) Travel Grants: Geocomputation 2015, CyberGIS 2012 and 2015, ACM GIS 2011

1. Jack Dangermond Travel Grants, UCSB 2007, 2010, 2011

II.B Publications *(Google Scholar: 3131, h-index:30)*

(∗ indicates corresponding author, † advisee or mentee author(s) for whom I served as the principal supervisor)

Peer-Reviewed Book Chapters

7. Zhu, D.*, **Cao, G.** (2023): Intelligent spatial prediction and interpolation methods. In Gao, S., Hu, Y. and Li, W. (eds) *Handbook of Geospatial Artificial Intelligence*. CRC Press. https://doi.org/10.1201/9781003308423-7

6. **Cao, G.*** and Buttenfield, B. P. (2022). Pattern recognition and matching. In John P. Wilson (ed.) *The Geographic Information Science & Technology Body of Knowledge* (2nd Quarter 2022 Edition). https://doi.org/10.22224/gistbok/2022.2.10

5. **Cao, G.*** (2022): Deep Learning of Big Spatiotemporal Data: Challenges and Opportunities. In: Li, B., Shi, X., Zhu, AX., Wang, C., Lin, H. (eds) *New Thinking in GIScience*. Springer, Singapore. https://doi.org/10.1007/978-981-19-3816-0_18

4. **Cao, G.*** and Zhao, N. (2021): Integrating remote sensing and social sensing to examine socioeconomic dynamics. In Yang, X. (ed.)*Urban Remote Sensing: Monitoring, Synthesis and Modelling in the Urban Environment 2e*. Wiley Blackwell. https://doi.org/10.1002/9781119625865.ch7

3. Liu, Y.†, **Cao, G.*** and Zhao, N.† (2020): Spatiotemporal mapping of ground-level $PM_{2.5}$ concentrations using a machine learning based-geostatistical approach. In Li, L., Zhou, X. and Tong, W. (eds) *Spatiotemporal Analysis of Air Pollution and Its Application in Public Health*. Elsevier. https://doi.org/10.1016/B978-0-12-815822-7.00006-6

2. **Cao, G.*** (2016): Modeling uncertainty in categorical fields, *International Encyclopedia of Geography: People, the Earth, Environment and Technology*, 1-11. https://doi.org/10.1002/9781118786352.wbieg0604

1. Wang, S.* and **Cao, G.**, Zhang, Z., Zhao, Y., Padmanabhan, A. and Wu, K. (2013): A CyberGIS environment for analysis of location-based social media data. In Hassan, A.K. and Amin, H. (eds) *Advanced Location-Based Computing and Services,2nd Edition*. CRC Press. https://doi.org/10.1201/b14940

Peer-Reviewed Journals Articles

49. Li, G.† and **Cao, G.***: Generative adversarial models for extreme super-resolution of climate datasets. *International Journal of Applied Earth Observation and Geoinformation 139(2025): 104541*. https://doi.org/10.1016/j.jag.2025.104541

48. Huang, L.*, Willis, M.J., Li, G.†, Lantz, T.C., Schaefer, K., Wig, E., **Cao, G.** and Tiampo, K. (2023): Identifying active retrogressive thaw slumps in the pan-Arctic

from ArcticDEM. *ISPRS Journal of Photogrammetry and Remote Sensing*, 205, 301-316. https://doi.org/10.1016/j.isprsjprs.2023.10.008

47. Xiao, W., Su, J.* and **Cao, G*** (2023): Cross-scale guided fusion transformer for disaster assessment using satellite imagery. *IEEE Transaction on Geosciences and Remote Sensing*, 61, 1-12. https://doi.org/10.1109/TGRS.2023.3298037.

46. Ye, S.*, Zhu, Z., and **Cao, G.** (2023). Object-based continuous monitoring of land disturbances from dense Landsat time series. *Remote Sensing of Environment*, 287, 113462. https://doi.org/10.1016/j.rse.2023.113462

45. Neupane, J., Guo, W.*, **Cao, G.**, Zhang, F., Slaughter, L., and Deb, S. (2022). Spatial patterns of soil microbial communities and implications for precision soil management at the field scale. *Precision Agriculture*, 23(3), 1008-1026. https://doi.org/10.1007/s11119-021-09872-1

44. Liang, D.*, Cong, Z., and **Cao, G.** (2022). Examination of diffusion patterns of tornado warning using an agent-based model and simulation. *Weather, Climate, and Society*, 14(2), 521-533. https://doi.org/10.1175/WCAS-D-21-0089.1

43. Coman, E. N.*, Steinbach, S., and **Cao, G.** (2022). Spatial perspectives in family health research. Family Practice, 39(3), 556-562. https://doi.org/10.1093/fampra/cmab165

42. Rabia, A. H., Neupane, J., Lin, Z., Lewis, K., **Cao, G.**, and Guo, W.* (2022). Principles and applications of topography in precision agriculture. *Advances in Agronomy*, 171, 143-189. https://doi.org/10.1016/bs.agron.2021.08.005

41. Sun, Y., Guo, W.*, Weindorf, D., Sun, F., Deb, S., **Cao, G.**, Neupane, J., Lin, Z., and Raihan, A. (2021). Field-scale spatial variability of soil calcium in a semi-arid region: Implications for soil erosion and site-specific management, *Pedosphere*, 31 (5), 2021. https://doi.org/10.1016/S1002-0160(21)60019-X

40. Jamali, M., Nejat, A.*, Moradi, S., Ghosh, S., **Cao, G.**, Jin, F. (2020). Social media data and housing recovery following extreme natural hazards. *International Journal of Disaster Risk Reduction*, 51, 101788. https://doi.org/10.1016/j.ijdrr.2020.101788

39. Zhao, N.†, Liu, Y.†, Hsu, F., Samson, E.L., Husi, L., Liang,D, **Cao, G.*** (2020). Time series analysis of VIIRS-DNB nighttime lights imagery for change detection in urban areas: A case study of devastation in Puerto Rico from hurricanes Irma and Maria. *Applied Geography*, 120, 102222. https://doi.org/10.1016/j.apgeog.2020.102222

38. Zhao, N.†, **Cao, G.***, Zhang, W., Samson, E. L., and Chen, Y. (2020). Remote sensing and social sensing for socioeconomic systems: A comparison study between nighttime lights and location-based social media at the 500 m spatial resolution. *International Journal of Applied Earth Observation and Geoinformation*, 87, 102058. https://doi.org/10.1016/j.jag.2020.102058

37. Tiffin, H. S., Peper, S. T., Wilson-Fallon, A. N., Haydett, K. M., **Cao, G.**, and Presley, S. M.* (2019). The influence of new surveillance data on predictive species distribution modeling of *Aedes aegypti* and *Aedes albopictus* in the United States. *Insects*, 10(11), 400. https://doi.org/10.3390/insects10110400

36. Nguyen, L., Yang, Z., Li, J., **Cao, G.** and Jin, F.* (2019): Forecasting people's needs in hurricane events from social network. *IEEE Transactions on Big Data*, 8(1): 229-240. https://doi.org/10.1109/TBDATA.2019.2941887

35. Guo, M.*, Su, J. and **Cao, G.** (2019): Statistical regression analysis of functional and shape data. *Journal of Applied Statistics*. 47(1): 28-44. https://doi.org/10.1080/02664763.2019.1669541.

34. Liu, S., Su, H., **Cao, G.**, Wang, S. and Guan, Q.* (2019): An iterative spatio-temporal consistency modification method for urban land cover trajectory analysis. *ISPRS Journal of Photogrammetry and Remote Sensing*, 154, 202-215. https://doi.org/10.1016/j.isprsjprs.2019.06.006

33. Han, S. Y.*, Tsou, M. H., Knaap, E., Rey, S., and **Cao, G.** (2019). How do cities flow in an emergency? Tracing human mobility patterns during a natural disaster with big data and geospatial data science. *Urban Science*, 3(2), 51. https://doi.org/10.3390/urbansci3020051

32. Liu, Y.†, Zhao, N.†, J. Vanos and **Cao, G.*** (2019): Revisiting estimations of $PM_{2.5}$-attributable mortality with advancements in $PM_{2.5}$ mapping and statistical mortality rates: A case study on ischemic heart diseases. *Science of the Total Environment*, 66, 499-507. https://doi.org/10.1016/j.scitotenv.2019.02.269

31. Zhao, N.†, Zhang, W., Liu, Y.†, Samson, E., Chen, Y. and **Cao, G.*** (2019): Improving nighttime lights imagery with location-based social media data. IEEE Transactions on Geosciences and Remote Sensing, 57(4): 2161-2172. https://doi.org/doi:10.1109/TGRS.2018.2871788

30. Jamali, M.*, Nejat, A., Ghosh, S., Jin, F. and **Cao, G.** (2019): Social media data and post-disaster recovery of giant natural disasters. *International Journal of Information Management*, 44, 25-37. https://doi.org/10.1016/j.ijinfomgt.2018.09.005

29. Zhao, N.†,*, Liu, Y.†, J. Vanos, and **Cao, G.** (2018): Day-of-week and seasonal patterns of $PM_{2.5}$ concentrations over the United States: Time-series analyses using the Prophet procedure. *Atmospheric Environment*, 192, 116-127. https://doi.org/10.1016/j.atmosenv.2018.08.050

28. Herdt, A., Brown, R., Scott-Fleming, S., **Cao, G.**, MacDonald, M., Henderson, D. and Vanos, J.* (2018): Outdoor thermal comfort during anomalous heat at the 2015 Pan American soccer games in Toronto, Canada. Atmosphere, 9(8), 321. https://doi.org/10.3390/atmos9080321

27. Zhao, N.[†,*], **Cao, G.**, W. Zhang and E. L. Samson (2018): Tweets or nighttime lights: comparison for preeminence in estimating socioeconomic factors. *ISPRS Journal of Photogrammetry and Remote Sensing*, 146, 1-10. https://doi.org/10.1016/j.isprsjprs.2018.08.018

26. Liu, Y.[†], **Cao, G.***, Zhao, N.[†], Mulligan, K., Ye, X. (2018): Improve ground-level $PM_{2.5}$ concentration mapping using a random forests-based geostatistical approach. *Environmental Pollution*, 235, 272-282. https://doi.org/10.1016/j.envpol.2017.12.070

    Note: A $PM_{2.5}$ concentration dataset derived in this paper (1km resolution for the United States 2000-2015) is available.

25. Gao, Y., Wang, S.*, Padmanabhan, A., Yin, J. and **Cao, G.** (2018): Mapping spatiotemporal patterns of events using social media: A case study of influenza trends. *International Journal of Geographic Information Science*, 32 (3), 425-449. https://doi.org/10.1080/13658816.2017.1406943

24. Liu, Y.[†,*], Zhao, N.[†], Vanos, J. and **Cao, G.** (2017): Visualizing changes in nationally averaged $PM_{2.5}$ concentrations by an alluvial diagram. *Environment and Planning A: Economy and Space* (*Featured graphics*), 50 (2), 259-261. https://doi.org/10.1177/0308518X17745067

23. Hardin, A., Liu, Y.[†], **Cao, G.** and Vanos, J.* (2017): Urban heat island intensity and spatial variability by synoptic weather type in the northeast US. *Urban Climate*, 24, 747-762. https://doi.org/10.1016/j.uclim.2017.09.001

22. Zhao, N.[†] and **Cao, G.*** (2017): Quantifying and visualizing language diversity of Hong Kong using Twitter. *Environment and Planning A: Economy and Space* (*Featured graphics*), 49 (12), 2698-2701. https://doi.org/10.1177/0308518X17722369

21. Mehdipoor, H., Vanos, J.*, Zurita-Milla, R. and **Cao, G.** (2017): Short communication: Emerging technologies for biometeorology. *International Journal of Biometeorology*, 61 (1), 81-88. https://doi.org/10.1007/s00484-017-1399-9

20. Fisher-Phelps, M.*, **Cao, G.**, Wilson, R. and Kingston, T. (2017): Protecting bias: Across time and ecology, open-source bat locality data are heavily biased by distance to protected area. *Ecological Informatics*, 40, 22-34. https://doi.org/10.1016/j.ecoinf.2017.05.003

19. Zhao, N.[†,*], Hsu, F., **Cao, G** and Samson, E. (2017): Improving accuracy of economic estimations with VIIRS DNB image products. *International Journal of Remote Sensing*, 38 (21), 5899-5918. https://doi.org/10.1080/01431161.2017.1331060

18. Zhao, N.[†,*], Liu, Y.[†], **Cao, G.**, Samson, E., Zhang, J. (2017): Forecasting China's GDP at the pixel level using nighttime light time series images. *GIScience & Remote Sensing*, 54(3), 407-425. https://doi.org/10.1080/15481603.2016.1276705

17. Zhao, N.†, **Cao, G.***, Vanos, J., Vecellio, D. (2017): Effects of synoptic weather on influenza infection incidence: A retrospective study using influenza surveillance data and spatial synoptic classification. *International Journal of Biometeorology*, 62 (1), 69-84. https://doi.org/10.1007/s00484-017-1306-4

    Note: An influenza dataset for major cities of the United States derived in this paper (a combination of Google Flu Trends and CDC reports) is available.

16. Liu, Y.†,*, Zhao, N.†, Vanos, J., and **Cao, G** (2017): Effects of synoptic weather on ground-level PM2.5 concentrations in the United States. *Atmospheric Environment* (148) 297-305. https://doi.org/10.1016/j.atmosenv.2016.10.052

15. Liu, Y.†,*, Delahunty, T., Zhao, N †. and **Cao, G.** (2016): These lit areas are undeveloped: China's urban extents and urban development patterns from thresholded nighttime light imagery. *International Journal of Applied Earth Observation and Geoinformation*, 50(8), 39-50. https://doi.org/10.1016/j.jag.2016.02.011

14. Luo, F.†, **Cao, G.***, Mulligan, K. and Li, X. (2016): Explore spatiotemporal and demographic characteristics of human mobility via Twitter: A case study of Chicago. *Applied Geography*, 70 (5), 11-25. https://doi.org/10.1016/j.apgeog.2016.03.001

    Note: This article is the most cited article in *Applied Geography* since 2016. Accessed: 06/31/2019

13. **Cao, G.***, Wang, S., Hwang, M., Padmanabhan, A., Zhang, Z. and Soltani, K. (2015): A general framework for scalable spatio-temporal analysis of location-based social media data, *Computers, Environment and Urban System*, 51(5), 70-82. https://doi.org/10.1016/j.compenvurbsys.2015.01.002

    Note: This article is one of the top 25 most cited articles in *Computers, Environment and Urban System* since 2015. Accessed: 08/31/2018

12. Padmanabhan, A.*, Wang, S., **Cao, G.**, Hwang, H., Zhao, Y., Zhang Z. and Gao Y. (2014): FluMapper: an interactive CyberGIS environment for massive location-based social media data analysis, *Concurrency and Computation: Practice and Experience*, 26(13) 2253-2265. https://doi.org/10.1145/2484762.2484821

11. **Cao, G.***, Yoo, E.H., Wang, S. (2014): A statistical framework of data fusion for spatial prediction of categorical variables. *Stochastic Environmental Research and Risk Assessment*, 28 1785-1799. https://doi.org/10.1007/s00477-013-0842-7

    Note: A Matlab toolbox associated with this paper is available.

10. Leetaru, K.*, Wang, S., **Cao, G.**, Padmananabhan, A., Shook, E. (2013): Mapping the global Twitter heartbeat: the geography of Twitter. *First Monday*. https://doi.org/10.5210/fm.v18i5.4366

9. Yoo, E.H.*, Hoagland, B.W., **Cao, G.** and Fagin, T.D. (2013): Spatial distribution of trees and landscapes of the past: a mixed spatially correlated multinomial logit model approach for the analysis of the Public Land Survey data. *Geographical Analysis*, 45(4), pp.419-440. https://doi.org/10.1111/gean.12018

8. Luo, F.*, Zhong, E., **Cao, G.**, Tellez, R.D. and Gao, P. (2013): VGIS-AntiJitter: an effective framework of solving jitter problems in virtual geographic information systems. *International Journal of Digital Earth*, 6(1), pp.28-50. https://doi.org/10.1080/17538947.2011.601766

7. **Cao, G.***, Kyriakidis, P.C., and Goodchild, M.F. (2012): Response to 'Comments on 'Combining spatial transition probabilities for stochastic simulation of categorical fields' with communications on some issues related to Markov chain geostatistics'. *International Journal of Geographical Information Science*, 26(10), pp.1741-1750. https://doi.org/10.1080/13658816.2012.717630

   Note: A Matlab toolbox associated with this paper is available.

6. **Cao, G.***, Kyriakidis, P.C. and Goodchild, M.F. (2011): A multinomial logistic mixed model for prediction of categorical spatial data. *International Journal of Geographical Information Science*, 25(12), pp.2071-2086. https://doi.org/10.1080/13658816.2011.600253

   Note: A Matlab toolbox associated with this paper is available.

5. **Cao, G.***, Kyriakidis, P.C. and Goodchild, M.F. (2011): Combining spatial transition probabilities for stochastic simulation of categorical fields. *International Journal of Geographical Information Science*, 25(11), pp.1773-1791. https://doi.org/10.1080/13658816.2010.528421

   Note: A Matlab toolbox associated with this paper is available.

4. Li, K.*, Zhong, E., Zeng, Z. and **Cao, G.**(2006): An optimal path algorithm based on hierarchically structured topographical network. *Journal of Images and Graphics (In Chinese)*, 11(07): 1004-1009. http://dx.doi.org/10.11834/jig.200607172

3. Zhang, X.*, Zhang, L., **Cao, G.** and Zhong, E.(2006): A study on expressing techniques of battlefield situation evolution and variation based on GIS and its application. *Geo-Information Science (In Chinese)*, 8(4). http://www.dqxxkx.cn/EN/Y2006/V8/I4/80

2. Zhang, L.*, Zhu, J., Zeng, Z., and **Cao, G.**(2006): GRID services for large scale elevation derivatives computation. *Geo-Information Science (In Chinese)*, 8(2), pp.14-29. http://www.dqxxkx.cn/CN/Y2006/V8/I2/14

1. **Cao, G.***, Zhang, L. and Zhong, E. (2005): A discussion on key techniques in 3D GIS rendering engine. *Geo-Information Science (In Chinese)*, 7(1), pp.87-91. http://www.dqxxkx.cn/EN/Y2005/V7/I1/87

Conference Proceedings with Full Paper Review

20. Li, G.† and **Cao, G.***: Neural process for uncertainty-aware geospatial modeling. *Proceedings of the 7th ACM SIGSPATIAL International Workshop on AI for Geographic Knowledge Discovery* (accepted).

19. Li, G.† and **Cao, G.***: Statistical downscaling of climate datasets with deep generative model and Bayesian inference. *Proceedings of I-GUIDE Forum 2024: Convergence Science and Geospatial AI for Environmental Sustainability* (accepted).

18. Li, G.†,* and **Cao, G.**: Bayesian super-resolution using deep generative models. *GeoKG& GeoAI 2023*. https://doi.org/10.17605/OSF.IO/H2AWQ

17. Zhu, D.*, Gao, S., and **Cao, G.** (2022). Towards the intelligent era of spatial analysis and modeling. In *Proceedings of the 5th ACM SIGSPATIAL International Workshop on AI for Geographic Knowledge Discovery*, pp. 10-13. https://doi.org/10.1145/3557918.3565863

16. Du, H., Long, N., Yang, Z., Abu-Gellban, H., Zhou, X., Xing, W., **Cao, G.** and Jin, F.* (2019): Twitter vs News: Concern analysis of the 2018 California wildfire event. In *2019 IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC)*, pp. 207-212. https://doi.org/10.1109/COMPSAC.2019.10208

15. Yang, Z., Nguyen, L. H., Stuve, J., **Cao, G.**, and Jin, F.* (2017): Harvey flooding rescue in social media. In *2017 IEEE International Conference on Big Data (Big Data)*, pp. 2177-2185. https://doi.org/10.1109/BigData.2017.8258166

14. Liu, Y.†,*, Luo, F.† and **Cao, G.** (2015): Track spatiotemporal spread of public concerns on Ebloa in the US via Twitter. In *Proceedings of Geocomputation 2015 Conference*. http://www.geocomputation.org/2015/papers/GC15_67.pdf

13. Luo, F.†,*, **Cao, G.**, and Li, X. (2014): An interactive approach for deriving geometric network models in 3D indoor environments. In *Proceedings of the Sixth ACM SIGSPATIAL International Workshop on Indoor Spatial Awareness*, pp. 9-16. https://doi.org/10.1145/2676528.2676531

12. Huang, Q.*, **Cao, G.**, and Wang, C. (2014): From where do Tweets originate?-A GIS approach for user location inference. In *Proceedings of the Seventh ACM SIGSPATIAL International Workshop on Location-based Social Media*, pp. 1-8. https://doi.org/10.1145/2755492.2755494

11. **Cao, G.*** (2014): A geostatistical framework for heterogeneous spatatial data fusion. In *Proceedings of the 11th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*. http://spatialaccuracy.org/wp-content/uploads/2021/07/Paper_50_Cao.pdf

10. Hwang, M.*, Wang, S., **Cao, G.**, Padmanabhan, A. and Zhang, Z.(2013): Spatiotemporal transformation of social media: A case study of Twitter for exploration of flu risk indicators. In *Proceedings of the 4th ACM SIGSPATIAL International Workshop on GeoStreaming*, pp. 12-21. https://doi.org/10.1145/2534303.2534310

9. Padmanabhan, A.*, Wang, S., **Cao, G.**, Hwang, H., Zhao, Y., Zhang Z. and Gao Y. (2013): FluMapper: an interactive CyberGIS environment for massive location-based

social media data analysis. IN *Proceedings of the Conference on Extreme Science and Engineering Discovery Environment: Gateway to Discovery*. https://doi.org/10.1145/2484762.2484821

8. Shook, E.*, Leetaru, K, **Cao, G.**, Padmanabhan, A and Wang, S. (2012): Happy or not: Generating topic-based geospatial emotional heatmaps for Culturomics using CyberGIS. *IEEE 8th International Conference on E-Science*, pp. 1-6. https://doi.org/10.1109/eScience.2012.6404440

7. **Cao, G.*** , Wang, S., and Guan, Q. (2012): A state-space model for understanding spatial dynamics represented by areal data. In *Proceedings of the Seventh International Conference, GIScience 2012*.

6. **Cao, G.*** , Kyriakidis, P.C., and Goodchild, M.F. (2011): A geostatistical framework for categorical spatial data modeling, in *Proceedings of the 19th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, pp. 4-9. https://doi.org/10.1145/2078296.2078298

5. Kyriakidis, P.C.* and **Cao, G** (2010): Generating fine resolution area class maps subject to coarser resolution data constraints. In *Proceedings of the Sixth International Conference, GIScience 2010*. https://giscience2010.org/pdfs/paper_221.pdf

4. **Cao, G.***, Kyriakidis, P.C., and Goodchild, M.F. (2009): Prediction and simulation in categorical fields: a transition probability combination approach, in *Proceedings of the 17th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, pp.496-499. https://doi.org/10.1145/1653771.1653853

3. **Cao, G.***, and Kyriakidis, P.C. (2008): Combining transition probabilities in the prediction and simulation of categorical fields, in: J. Zhang, and M.F. Goodchild (Eds.), *Proceedings of the 8th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, Shanghai, China, June 2008, pp.25-32.

2. Li, K.*, Zhong, E., Song, G., **Cao, G.**, Zhang, L. and Wu, Q. (2007): NDF: An effective mobile GIS physical storage model. In *Proceedings of the Geoinformatics 2007: Geospatial Information Technology and Applications*. https://doi.org/10.1117/12.764932

1. Zhang, X.*, **Cao, G.** and Zhang, L. (2006): Research and improvement on optimal path analysis algorithm based on cost-distance grid. In *Proceedings of the IEEE International Conference on Geoscience and Remote Sensing Symposium*, pp.869-871. https://doi.org/10.1109/IGARSS.2006.223

Technical Report

1. **Cao, G.***, Kyriakidis, P.C., and Goodchild, M.F. (2013): On spatial transition probabilities as continuity measures in categorical fields. (Available at: http://arxiv.org/abs/1312.5391)

In Conference Proceedings (not peer-reviewed)

1. **Cao**, G.*, Yu, Z., Yang, Z. (2002): Spatially visualized Internet management system based on GIS technologies. *Proceedings of International Conference on Computer Graphics & Spatial Information System*, Beijing, China, August 2002

II.C Professional Presentations

(† indicates advisee author(s), presenter is underlined)

In Conferences and Symposia

55. Song, W., Cong, Z. and **Cao**, G.: Innovative measurement and modeling of dynamical social and health effects of windstorms. *NIST-NSF Disaster Resilience Research Symposium*. Virtual event. August 20-21, 2024

54. **Cao, G.**: Uncertainty Modeling in GeoAI. The International Symposium of Spatiotemporal Data Science. Virginia Tech Research Center. July 22-24, 2024

53. **Cao, G.** and Li, G.†: Generative adversarial models for extreme downscaling of geospatial datasets. The 7th International Conference on Econometrics and Statistics (EcoSta 2024). Beijing Normal University, Beijing, China. July 2024

52. **Cao, G.** and Li, G.†: Generative adversarial models for extreme super-resolution of climate datasets. Evaluating the Science of Geospatial AI. Harvard University, Cambridge, MA. May 2024

51. J. Zhou † and **Cao**, G.: Understanding the relative risk of morbidity and its disparities attributable to air pollution exposure. AAG 2024. Honolulu, HI. Apr. 2024

50. G. Li † and **Cao**, G.: Bayesian Super-Resolution of Climate Datasets with Deep Generative Models. AAG 2024. Honolulu, HI. Apr. 2024

49. **Cao**, G. and G. Li †: Uncertainty Modeling in GeoAI. AAG 2024. Honolulu, HI. Apr. 2024

48. A. Ma†, A. Filippi, I. Guneralp, X. Chen and **Cao**, G.: A LSTM-based classification framework for floodplain land-cover mapping using single-image-based sequential feature extraction. AGU 2023. San Francisco, CA. Dec. 2023

47. Z. Cong, D. Liang, W. Song and **Cao**, G.: Multidimensional tornado exposure and climate change risk perceptions. *APHA 2023 Annual Meeting and Expo*. Atlanta, GA. November 2023

46. Li, G.† and **Cao**, G.: Bayesian Super-Resolution of Geospatial Datasets with Deep Generative Models. *Geospatial Knowledge Graphs and GeoAI Workshop, GIScience 2023*. Leeds, UK. September 2023

45. Song, W., Cong, Z. and **Cao**, G.: Innovative measurement and modeling of dynamical social and health effects of windstorms. *NIST-NSF Disaster Resilience Research Symposium*. Virtual event. August 23-24, 2023

44. Li, G.† and **Cao**, G.: Generative adversarial models for extreme super-resolution of climate datasets. *AAG 2023*. Denver, CO. March 2023

43. **Cao**, G. and Li, G.†: A deep learning-based geostatistical framework for geospatial uncertainty modeling. *AAG 2023*. Denver, CO. March 2023

42. **Cao**, G.: Geospatial Uncertainty Modeling in GeoAI. *Specialist Meeting on Digital Twins*. ASU, Tempe, AZ. February 2023

41. **Cao,** G.: Exploring the health disparity of long-term PM2.5 exposure with advanced PM2.5 mapping and hospital admission records. *AutoCarto 2022*. Redland, CA. November 2022

40. **Cao,** G.: Revisiting the estimations of PM2.5-attributable mortality with advancements in PM2.5 mapping and mortality statistics. *GEOMED 2022*. Irvine, CA. October 2022

39. Song, W., Cong, Z. and **Cao**, G.: Innovative measurement and modeling of dynamical social and health effects of windstorms. *NIST-NSF Disaster Resilience Research Symposium*. Virtual event. September 14-15, 2022

38. Song, W., Cong, Z. and **Cao**, G.: Innovative measurement and modeling of dynamical social and health effects of windstorms. *NIST Disaster Resilience Research Symposium*. Virtual event. July 20-21, 2021

37. **Cao**, G. and Y. Liu†: Integrated use of machine learning and geostatistics for high resolution mapping of ground-level PM2.5 concentrations. *22nd Conference on Geo-information Science*, Limassol, Cyprus. June 2019

36. **Cao**, G.: A deep learning-based geostatistical framework for geospatial data analysis and modeling *Annual Meeting of American Association Geographers*, Washington DC. April 2019

35. **Cao**, G.: A statistical framework of functional data analysis for modeling positional uncertainty of geographic information. *Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, Beijing, China. May 2018

34. **Cao**, G.: High resolution mapping of ground-level $PM_{2.5}$ concentrations. *Annual Meeting of American Association Geographers*, New Orleans, LA. April 2018

33. **Cao**, G.: Uncertainty modeling in geospatial data science. *NSF SI2-S2I2 Conceptualization: Geospatial Software Institute*, Los Angeles, CA. January 2018

32. **Cao**, G.: High resolution mapping of ground-level $PM_{2.5}$ concentrations. *The Third International Conference on CyberGIS and Geospatial Data Science*, Boston, MA. April 2017

31. **Cao**, G.: Explore spatiotemporal and demographic characteristics of human mobility via location-based social media. *NSF Workshop on Advancing Movement and Mobility Science by Bridging Research on Human Mobility and Animal Movement Ecology*, Columbus, Ohio. May 2017

30. **Cao**, G.: Learning deep of remote sensing imagery for high-resolution mapping of ground-level $PM_{2.5}$ concentrations. *Annual Meeting of American Association of Geographers*, Boston, MA. April 2017

29. **Cao**, G.: Statistical modeling of animal movement trajectory: A functional data analysis approach. *NSF Workshop on Advancing Movement and Mobility Science by Bridging Research on Human Mobility and Animal Movement Ecology*, Austin, TX. November 2016

28. **Cao**, G.: High resolution mapping of ground-level $PM_{2.5}$ concentrations. *The Third International Conference on CyberGIS and Geospatial Data Science*, Urbana, IL. July 2016

27. **Cao**, G.: Exploring biases in location-based social media. *International Workshop of Cloud Computing and Big Data*, Fairfax, VA. July 2016

26. **Cao**, G.: Integrating CyberGIS for spatiotemporal uncertainty modeling. *CyberGIS All Hands Meeting*, Reston, VA. September 2015

25. **Cao**, G.: Representing spatiotemporal uncertainty in function spaces. *110th Annual Meeting of the Association of American Geographers*, Chicago, IL. April 2015

24. Y. Liu† and **Cao**, G.: Geostatistical downscaling of gridded PM2.5 concentration datasets using nighttime light imagery. *110th Annual Meeting of the Association of American Geographers*, Chicago, IL. April 2015

23. Liu, Y.†, Luo, F.† and **Cao**, G.: Track spatiotemporal spread of public concerns on Ebloa in the US via Twitter. *The 13th International Conference of Geocomputation*, Dallas, TX. May 2015

22. Luo, F.†, **Cao**, G., and Li, X.: An interactive approach for deriving geometric network models in 3D indoor environments. *ACM GIS 2014*, Dallas, Texas. November 2014

21. Huang, Q., **Cao,**, G., and Wang, C.: From where do Tweets originate?-A GIS approach for user location inference. *ACM GIS 2014*, Dallas, Texas. November 2014

20. **Cao**, G., Wang, S.: A scalable framework for spatiotemporal analysis of location-based social media data *109th Annual Meeting of the Association of American Geographers*, Tampa, FL. April 2014

19. **Cao**, G.: A geostatistical framework for heterogeneous spatatial data fusion, *11th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, Lansing, Michigan. July 2014

18. Hwang, M., Wang, S., **Cao**, G., Padmanabhan, A. and Zhang, Z.: spatiotemporal transformation of social media: A case study of Twitter for exploration of flu risk indicators. *ACM GIS 2013*, Orlando, Florida. November 2013

17. **Cao**, G.and Wang, S.: A statistical framework for spatiotemporal dynamics modeling. *AAG 2013*, Los Angels, CA. April 2013

16. **Cao**, G., Wang, S., and Guan, Q.: A state-space model for understanding spatial dynamics represented by areal data. *GIScience 2012*, Columbus, Ohio. September 2012

15. **Cao**, G., Wang, S.: A CyberGIS-enabled statistical framework for spatiotemporal data fusion *The First International Conference on Space, Time and CyberGIS*, Champaign, Illinois. August 2012

14. **Cao**, G., Goodchild, M.F., Wang, S., Kyriakidis,P.C.,: A spatial multinomial logistic mixed model for mapping thematic classification uncertainty. *107th Annual Meeting of the Association of American Geographers*, New York City, New York. February 2012

13. **Cao**, G., Kyriakidis,P.C., Goodchild, M.F.: A geostatistical framework for categorical spatial data modeling. *The 19th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, Chicago, Illinois. November 2011

12. **Cao**, G., Goodchild, M.F., Kyriakidis,P.C.: A multinomoial mixed model for prediction of categorical saptial data. *National Geospatial-Intelligence Agency Academic Research Program Symposium (NARP)*, National Academy of Sciences, Washington, D.C., September 2011

11. **Cao**, G., Goodchild, M.F., Kyriakidis,P.C.: A computer package for modeling, prediction and simulation of categorical spatial data. *107th Annual Meeting of the Association of American Geographers*, Seattle, WA. April 2011

10. Marston, J. R., **Cao**, G., Brabyn, J. A. Evaluation of an online mapping program with user-defined map features for persons with low vision. *First European Congress On Visual Impairment*, Valladolid, Spain. October 2010

9. **Cao**, G., Goodchild, M.F., Kyriakidis,P.C.: A geostatistical framework for geospatial data analysis and modeling across multiple spatial and temporal scales. *National Geospatial-Intelligence Agency Academic Research Program Symposium (NARP)*, National Academy of Sciences, Washington, D.C., September 2010

8. Kyriakidis, P.C. and **Cao**, G: Generating fine resolution area class maps subject to coarser resolution data constraints, in *Proceedings of the Sixth International Conference, GIScience 2010*, Zurich, Switzerland. Sep.14-17,2010

7. **Cao**, G., Kyriakidis,P.C., Goodchild, M.F..: Transition probability-based geostatistical methods for modeling categorical spatial data. *106th Annual Meeting of the Association of American Geographers*, Washinton, D.C., March 2010

6. Marston, J.R. and **Cao**, G.: Making geographical information accessible for people with low vision. *106th Annual Meeting of the Association of American Geographers*, Washinton, D.C., March 2010

5. **Cao**, G., Kyriakidis,P.C., Goodchild, M.F.: Prediction and simulation in categorical fields: A transition probability combination approach. *The 17th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, Seattle, Washington. November 2009

4. **Cao**, G., Kyriakidis,P.C., Goodchild, M.F.: Prediction and simulation in categorical fields: A transition probability combination approach. *2009 Annual Conference of the International Association for Mathematical Geosciences*, Stanford, CA. August 2009

3. **Cao**, G., and Kyriakidis, P.C.: Combining transition probabilities in the prediction and simulation of categorical fields. *105th Annual Meeting of the Association of American Geographers*, Las Vegas, NV. March 2009

2. **Cao**, G., and Kyriakidis, P.C.: Combining transition probabilities in the prediction and simulation of categorical fields, *The 8th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, Shanghai, China. June 2008

1. **Cao**, G.: Distributed GIS based on Google's MapReduce. *104th Annual Meeting of the Association of American Geographers*, Boston, MA. April 2008

Invited Talks and Colloquia Presentations

10. **Cao**, G.: Integrating social sensing and remote sensing for understanding socioeconomic dynamics. *CU Info Seminar Series*. Boulder, CO. April 2022

9. **Cao**, G.: Integrating social sensing and remote sensing for understanding socioeconomic dynamics. *Rutgers University*. New Brunswick, NJ. January 2020

8. **Cao**, G.: Integrating social sensing and remote sensing for understanding socioeconomic dynamics. *Florida State University*. Tallahassee, FL. December 2019

7. **Cao**, G.: Spatiotemporal analysis of location-based social media data. *Zhejiang University*. Hangzhou, Zhejiang, China. June 2018

6. **Cao**, G.: A scalable framework for scalable spatiotemporal analysis of location-based social media data. *Texas Tech University 2015 Symposium on Big Data*. Lubbock, Texas. April 2015

5. **Cao**, G.: A scalable framework for spatiotemporal analysis of location-based social media data. *Chinese University of Geosciences*, Wuhan, Hubei, China. June 2014

4. **Cao**, G.: A scalable framework for spatiotemporal analysis of location-based social media data. *Institute of Geographic Research and Natural Resource Research, Chinese Academy of Sciences*, Beijing, China. June 2014

3. **Cao**, G.: A geostatistical framework for categorical spatial data modeling. *Department of Geography, University of Illinois at Urbana-Champaign*, Urbana, IL. October 2011

2. Marston, J. R., **Cao**, G., Brabyn, J. A.: Accessible maps customized for visually impaired persons. *Atlanta Vision Seminar*, Atlanta, GA. October 2010

1. **Cao**, G.: Markov chain-based geostatistical methods for modeling categorical spatial data. *Geography Department Colloquium*, UC Santa Barbara. Santa Barbara, CA. October 2007

II.D Software & Data Products

(† indicates advisee or mentee author(s))

Software Products

2. **Cao,** G.: SMC: A Matlab/Octave toolbox for statistical modeling of spatial categorical data. (Available at GitHub)

1. Li, G.† and **Cao,** G. : STAR: A Python toolbox for deep learning-based geostatistical modeling of spatiotemporal data. (Available at GitHub)

Data Products

4. Zhao, N.† and **Cao**, G. : A times series of datasets of Chinese urban boundaries derived from nighttime remote sensing imagery (for the years of 2004, 2006, 2008 and 2010, available at GitHub)

3. Liu, Y.†, Zhao, N.† and **Cao**, G.: A time series of high-resolution (1km) gridded datasets of $PM_{2.5}$ concentration of the United States 2000-2015. (Available at GitHub)

2. Zhao, N.†, Liu, Y.† and **Cao**, G.: A times series of high-resolution (1km) gridded datasets of the projected GDP of China between 2014-2020. (Available at GitHub)

1. Zhao, N.†, **Cao**, G., and J. Vanos: Estimated weekly influenza incidences (ILI+) across 79 major cities of the United States by combining Google Flu Trends and CDC's virologic surveillance reports. (January 2005 to December of 2014, Available at GitHub)

II.E Selected Media Mentions

4. "40 maps that explain the world" by Washington Post: the 25th map in https://www.washingtonpost.com/news/worldviews/wp/2013/08/12/40-maps-that-explain-the-world/

3. http://www.poynter.org/news/mediawire/213847/
study-twitter-has-a-distinct-geographic-profile-from-mainstream-media/

2. http://globalnews.ca/news/613788/
researchers-map-the-geography-of-twitter-with-geo-referencing/

1. http://news.abs-cbn.com/lifestyle/06/17/13/
manila-among-top-20-most-tweeting-cities

III. TEACHING

III.A Course offerings

University of Colorado Boulder

4. Geog 4403/5403: Space-Time Analytics (new development)
   - Spring 2022, Spring 2023, Spring 2024, Spring 2025
3. Geog 3023: Statistics for Geography (major re-development)
   - Fall 2020, Fall 2021, Fall 2022, Fall 2023, Fall 2024
2. Geog 4023/5023: Advanced Quantitative Methods in Geography (major re-development)
   - Spring 2021, Spring 2023, Spring 2024, Spring 2025
1. Geog 4103/5103 Spatial Analytics
   - Spring 2021, Spring 2023, Fall 2025

Texas Tech

3. GEOG 5330: Applied Spatial and Spatiotemporal Analysis (new development)
   - Fall 2016, Fall 2017, Fall 2018
2. GEOG 3340: Introduction to Human Geography Research
   - Fall 2015
1. GIST 4302/5302: Spatial Analysis and Modeling:
   - Fall 2013, Spring 2014, Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2017, Spring 2018, Fall 2018

University of Illinois at Urbana-Champaign

2. Geog 480: Principles of GIS
   - Spring 2013
1. Course Development of Geog 379: Introduction to GIS (**online course**)
   - Summer 2012

III.B Advising and Mentoring

($*$ indicates serving as the co-Chair of the Committee)

Postdoctoral Scholar

3. Dr. Di Wu: Dept. of Geography, CU Boulder (07/2024 -)
2. Dr. Andong Ma: Dept. of Geography, CU Boulder (2021-2023).
   Current employment: Visiting Assistant Professor at Texas A&M University
1. Dr. Naizhuo Zhao: Center for Geospatial Technology and Department of Geosciences, Texas Tech (2016-2018). Current employment: Full Professor at Northeastern University (of China)

Chair of Doctoral Dissertation Committees

University of Colorado Boulder

4. Yangchengsi Zhang Dept. of Geography, CU Boulder (Fall 2024-). Dissertation topic: *Geospatial Foundation Models for Uncertainty-Aware Geospatial Knowledge Discovery (tentative)*
3. Zhou Yu: Dept. of Geography, CU Boulder (Fall 2023-). Dissertation topic: *Geostatistical Modeling of Spatiotemporal Extremes*
2. Jiacheng Zhou: Dept. of Geography, CU Boulder (Fall 2022-). Dissertation topic: *Health Effects of Combined Exposure to Air Pollution, Extreme Heat and Natural Hazards on Aging Populations*
1. Guiye Li: Dept. of Geography, CU Boulder (Fall 2021-). Dissertation topic: *Deep Learning-Based Geostatistics for Geospatial Uncertainty Modeling*

Texas Tech

4. Ying Liu: Dept. of Geosciences, Texas Tech (Completed in Summer 2018). Dissertation: *High-resolution Mapping of Ground-Level Fine Particulate Matter and the Associated Human Health Risks* (**Doctoral Dissertation Completion Fellowship Awardee**)

   Current employment: Postdoc Fellow at the University of Montreal
3. Hasan Almekdash* (co-chair with Dr. Valerie Paton): Higher Education, Texas Tech (Completed in Summer 2018). Dissertation: *Visualizing, Analyzing, and Modeling Data in Quantitative Higher Educational Research Using Geospatial Technologies: A Spatial Analysis of Texas Public School District Factors and Four-Year College Degree Completion*

   Current employment: Assistant Professor, Baylor College of Medicine
2. Feixiong Luo: Dept. of Geosciences, Texas Tech. Entered the program in Fall 2014; did not complete the degree

   Current employment: ByteDance
1. Jimin Chun* (co-chair with Dr. Jeff Lee): Dept. of Geosciences, Texas Tech. Stepped off as co-chair in Fall 2020

Member of Doctoral Dissertation Committees

University of Colorado Boulder

8. Lauren Herwehe (supervisor: John O'Loughlin): Department of Geography, CU Boulder (Spring 2024-)
7. Naia Ormaza Zulueta (supervisor: Zia Mehrabi): Department of Environmental Studies, CU Boulder (Spring 2024-)
6. John Dzwonczyk(supervisor: John O'Loughlin): Department of Geography, CU Boulder (Spring 2024-)
5. Taylor Johaneman (supervisor: Katherine Lininger): Department of Geography, CU Boulder (Fall 2023-)
4. Emma Rieves (supervisor: Colleen Reid): Department of Geography, CU Boulder (Fall 2022-)
3. Sarah Posner (supervisor: John O'Loughlin): Department of Geography, CU Boulder (Fall 2021-Spring 2024; step off after comprehensive exam)
2. Zhongying Wang (supervisor: Morteza Karimzadeh): Department of Geography, CU Boulder (Fall 2021-)
1. Behzad Vahedi (supervisor: Morteza Karimzadeh): Department of Geography, CU Boulder (Fall 2020-)

Texas Tech

8. Saeed Moradi (supervisor: Ali Nejat): Civil Engineering, Texas Tech (Completed in Fall 2019)
7. Lucy Lim (supervisor: David Klein): Environmental Toxicology, Texas Tech (Completed in Spring 2019)
6. Mehdi Jamali (supervisor: Ali Nejat): Civil and Environmental Engineering, Texas Tech (Completed in Spring 2019)
5. Jason Post (supervisor: Perry Carter): Geosciences, Texas Tech (Completed in Fall 2017). Dissertation: *Human Interactions with the Aquatic Ecosystems of The Los Angeles River: The Creation of the LA River as a Human Landscape and the Effect of Exotic Fish on Human Activity*
4. Thu Nguyen (supervisor: Jeff Lee): Geosciences, Texas Tech (Completed in Fall 2017). Dissertation: *An Evaluation of Coastal Flooding Risk due to Storm Surge in Sea Level Rise Condition in Thua Thien Hue Province, Vietnam*

3. Fahad Abdulaziz F Almutlaq (supervisor: Kevin Mulligan): Geosciences, Texas Tech (Completed in Fall 2017). Dissertation: *Analysis of Dune Morphology within the Rub'al Khali Using Geospatial Technology*

2. Marina Fisher-Phelps (supervisor: Tigga Kingston): Biological Sciences, Texas Tech (Completed in Fall 2017). Dissertation: *Historical Records in Species Distribution Models: Impacts on Spatial Bias and Uncertainty*

1. Lionel Plummer (supervisor: Robert Cox): Natural Resource Management, Texas Tech (Completed in Fall 2014). Dissertation: *An Examination of Hydrologic Restoration Efforts for Wetland Mitigation Banks*

Ph.D. Dissertation External Examiner

1. Azadeh Mousavi (supervisor: Matt Duckham): Dept. of Infrastructure Engineering, University of Melbourne. Dissertation: *Decentralized Data Mining for Event Detection in Spatiotemporal Fields*. (June, 2015)

Chair of Master Thesis Committees

University of Colorado Boulder

2. Ryan Theurer: Dept. of Geography, CU Boulder (Fall 2025-Fall 2025). Thesis topic: *TBD*

1. Ryan Erickson: Dept. of Geography, CU Boulder (Fall 2021-Fall 2025). Thesis topic: *Integrating Machine Learning and Geostatistics for High Resolution Mapping of Ozone Concentrations*

Texas Tech

5. Chan-mi Lee* (co-chair with Dr. Jeff Lee): Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2020). Thesis: *Spatiotemporal association between Valley Fever and PM_{10}: A Case Study of Arizona*.
Current Employment: PhD at Temple University

4. Congliang Zhou: Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2019). Thesis: *Deep Learning of Geospatial Patterns for Remote Sensing Image Downscaling*.
Current Employment: Assistant Professor at Louisiana State University

3. Alexandria Herdt* (co-chair with Dr. Jennifer Vanos): Atmospheric Science, Dept. of Geosciences, Texas Tech (Completed in Summer 2017). Thesis: *A Multi-Index Investigation of the Spatiotemporal Relationships Between Heat and EMS Calls During the 2015 Pan American Games in Toronto, Canada*

2. Ashley Morris: Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2017). Thesis: *Mapping Local Community Preparedness to Tornado Hazards in Lubbock, Texas*

1. Morgan Kraft: Geography, Dept. of Geosciences, Texas Tech (Completed in Summer 2016).Thesis: *Exploring Biases in Location-Based Social Media A Case Study of Twitter in the 2012 U.S. Presidential Election*

Member of Master Thesis Committees

University of Colorado Boulder

5. Kate Little (supervisor: Colleen Reid): Department of Geography, CU Boulder (Spring 2024-)

4. Buddy Collins (supervisor: Stefan Leyk): Dept. of Geography, CU Boulder (in progress)

3. Andrew Eiswerth (supervisor: John O'Loughlin): Dept. of Geography, CU Boulder (Completed in Spring 2022)

2. Margaret Digiorno (supervisor: Michael Gooseff): Dept. of Civil, Environmental and Architectural Engineering, CU Boulder (Completed in Spring 2022)

1. Emma Rieves (supervisor: Colleen Reid): Dept. of Geography, CU Boulder (Completed in Spring 2022)

Texas Tech

7. Cole Edwards (supervisor: Kevin Mulligan): Geography, Texas Tech (Completed Summer 2019)

6. Hannah Greenberg (supervisor: Steven Presley): Environmental Toxicology, Texas Tech (Completed in Spring 2018). Thesis:*Geospatial Assessment and Species Distribution Modelling of Aedes aegypti and Aedes albopictus, Potential Zika Virus Vectors, in the United States with an Emphasis on Current and Predicted Distribution in Texas*

5. Vaughn Smith (supervisor: Carlos Portillo-Quintero): Natural Resource Management, Texas Tech (Completed in Fall 2017). Thesis: *Near real-time monitoring of tropical dry forests in Latin and Central America*

4. Evan Levine (supervisor: Gary Elbow): Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2016). Thesis: *A Geospatial Contextualization of Archaic Greek Epigram on Thasos*

3. Aaron Hardin (supervisor: Jennifer Vanos): Atmospheric Science, Dept. of Geosciences, Texas Tech (Completed in Summer 2015). Thesis: *Assessment of Urban Heat Islands During Hot Weather in the U.S. Northeast and Linkages to Microscale Thermal and Radiational Properties*.

2. Jason Post (supervisor: Perry Carter): Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2014). Thesis: *Environmental Inequality in Lubbock Texas*

1. Tiffany Lambert (supervisor: Jeff Lee): Geography, Dept. of Geosciences, Texas Tech (Completed in Spring 2014). Thesis: *Analysis of Marine Stratus Surges in the Pacific Northwest*

Undergraduate Student Mentorship

University of Colorado Boulder

5. Bryan Gager: Dept. of Ecology and Evolutionary Biology, CU Boulder (Member of honor thesis committee, Fall 2024-)

4. Matthew Woodland: Dept. of Geography, CU Boulder (Research assistant, Spring 2022-Fall 2023)

    - **UROP project** (Summer 2023): *Characterizing Spatiotemporal Changes of Wildland Urban Interfaces in the United States*

3. Maile Rhea: Dept. of Anthropology, CU Boulder (Member of honor thesis committee, defended in Spring 2024)

2. Keely Lawrence: Dept. of Geosciences, CU Boulder (Member of honor thesis committee, defended in Fall 2021)

1. Trevor Bloom: Dept. of Geography, CU Boulder (Independent study, Summer 2021)

Texas Tech

1. John Wells: Geography, Dept. of Geosciences, Texas Tech (Independent study, Spring 2016)

IV. SERVICE

IV.A Department, College and University

University of Colorado Boulder:

7. ASFS Senate Representative, Dept. of Geography, Fall 2024-
6. Search Committee of Environmental Data Science position, Dept. of Geography and CIRES, Fall 2023
5. Member of Personnel Committee, Dept. of Geography, 2021-2024
4. Member of Computing Committee, Dept. of Geography, 2020-2021
3. Class Evaluation (Dr. Rachel Isaacs), Dept. of Geography, Fall 2022
2. Class Evaluation (Dr. Jessica Finlay), Dept. of Geography, Fall 2023
1. Class Evaluation (Sarah Scholsser), Dept. of Geography, Spring 2024

Texas Tech:

10. Textbook Committee in the Department of Geosciences, Fall 2019
9. Third Year Review Committee of Dr. Branimir Segvic in the Department of Geosciences, Fall 2019
8. Search Committee of Remote Sensing position in the Department of Geosciences, Spring 2018
7. Search Committee of Atmospheric Science position in the Department of Geosciences, Spring 2017
6. Search Committee of Climate Science position in the Department of Geosciences, Spring 2015
5. Organizer of Geography Seminar in the Department of Geosciences
4. Dean's Representative of Dissertation Defense: Yuepeng Cui (Civil Engineering)
3. Dean's Representative of Dissertation Defense: Hoonill Won (Wind Science and Engineering)
2. Dean's Representative of Dissertation Defense: Liann Gallagher (Political Science)
1. Dean's Representative of Dissertation Defense: Ali Jamali (Petroleum Engineering)

IV.B Professional Communities

Editorial

Editorial Board:

1. Scientific Reports

Special Issue Editor:

1. N. Zhao, G., Cao, T. Ghosh and Q. Zhang, Remote Sensing for Mapping Economic Activities (2021 - 2023). *Remote Sensing*.

Service as Referee and Panelist

Panelist for Funding Agencies

3. National Science Foundation (NSF) CSSI, 2022
2. Department of Homeland Security, 2022
1. NSF SSI, 2016

Referee for Research Proposals

10. National Research Foundation of Singapore
9. Israeli Science Foundation
8. NSF Geoinformatics Program
7. NSF MMS Program
6. NSF GSS Program
5. NSF HEGS Program
4. NSF DIBBs Program
3. NSF Science of Sciences
2. National Center for Atmospheric Research (NCAR) Innovator Program
1. Louisiana Board of Regents Support Fund

Referee for Book Proposals, Scientific Journals and Professional Conferences (selected)

26. Cambridge Press (book proposal)
25. Nature Sustainability
24. Remote Sensing of Environment

23. Environmental Science & Technology
22. IEEE Transactions on Geosciences and Remote Sensing
21. International Journal of Geographical Information Science
20. International Journal of Applied Earth Observation and Geoinformation
19. Cartography and Geographic Information Science
18. GIScience & Remote Sensing
17. PLOS ONE
16. Atmospheric Environment
15. ISPRS Journal of Photogrammetry and Remote Sensing
14. International Journal of Disaster Risk Reduction
13. IEEE Transactions on Parallel and Distributed Systems
12. Applied Geography
11. Environmetrics
10. The Annals of the American Association of Geographers
9. Transactions in GIS
8. Geoinformatica
7. Journal of Geographical Systems
6. Computers, Environment and Urban Systems
5. Science of Total Environment
4. Mathematical Geosciences
3. International Journal of Digital Earth
2. International Journal of Remote Sensing
1. Stochastic Environmental Research and Risk Assessment

Conference Program Committee Member and Session Organizer

Program Committee

8. CAGIS+UCGIS Symposium 2024
7. GeoAI and Deep Learning Symposium, Annual Meeting of AAG 2023, 2024
6. The 1st workshop on Bridge-AI: From Climate Change to Health Equity (BridgeAICCHE) 2023
5. The 14th International Conference on Geostatistics for Environmental Applications (geoENV) 2020-
4. The Association of Geographic Information Laboratories in Europe (AGILE) 2019 -
3. ACM GIS International Workshop on Location-based Social Networks 2014, 2015, 2016
2. CyberGIS Symposium, Annual Meeting of American Association of Geographers (AAG) 2015
1. The Third International Conference on CyberGIS and Geospatial Data Science, 2016

Session Organizer

6. GeoAI for Spatial Analytics and Modeling, Annual Meeting of AAG 2023, 2024
5. Deep Learning for Geospatial Patterns & Applications, Annual Meeting of AAG 2018, 2019, 2022
4. Classification Methods and Accuracy Assessment in Land Cover Mapping, Annual Meeting of AAG, 2016
3. CyberGIS and Spatiotemporal Uncertainty, Annual Meeting of AAG 2015, 2016
2. CyberGIS and Digital Epidemiology, Annual Meeting of AAG 2014
1. Computational and Statistical Methods for Spatiotemporal Data Analytics, Annual Meeting of AAG 2012, 2013

Membership and Services in Professional Organizations

2024-	Board of Directors, University Consortium for Geographic Information Science (UCGIS)
2020-	CU Delegate, UCGIS
2007-	Association of American Geographers
2017-	Chinese Professionals in Geographic Information Systems (CPGIS)

2018-2020	Board of Directors, Chinese Professionals in Geographic Information Systems (CPGIS)
2008-2010	International Spatial Accuracy Research Association
2009-2011	ACM SIGSPATIAL
2015-2016	International Society of Biometeorology
2015-2016	Americal Geophysical Union
2009-2010	International Association for Mathematical Geosciences