

# Shengjie Kris Liu

University of Southern California  
3616 Trousdale Pkwy, AHF B55  
Los Angeles, CA 90089, USA

Email 1: [liusheng@usc.edu](mailto:liusheng@usc.edu)  
Email 2: [skrisliu@gmail.com](mailto:skrisliu@gmail.com)  
URL: <https://skrisliu.com>

## Current position

*Doctoral Student*, University of Southern California

## Research interests

Remote Sensing, Machine Learning, Spatial Statistics, Nighttime Lights

## Education and academic training

2021-	PhD in <i>Population, Health and Place</i> , University of Southern California
2019-2021	RA of <i>Artificial Light at Night</i> , Department of Physics, The University of Hong Kong
2015-2019	BSc in <i>Geographical Information Science</i> , Sun Yat-Sen University

## Publications

### WORKING PAPER(S)

2023	<b>Liu, Shengjie</b> , and Lu Zhang (2023). Combining Gaussian process and deep learning for aerosol optical depth estimation. Target: <i>IEEE Transactions on Geoscience and Remote Sensing</i>
------	--

### MANUSCRIPT(S) UNDER REVIEW

2023	<b>Liu, Shengjie</b> , and Emily Smith-Greenaway (2023). Ethnic Minorities and Low-Income Populations Disproportionately Exposed to Extreme Daily Temperature Variation in the United States. Submitted to <i>PNAS Nexus</i> , under review
2023	<b>Liu, Shengjie</b> , and Hung Chak Ho (2023). Effects of socioeconomic status and greenspace on respiratory emergency department visits under short-term temperature variations: An age-stratified case-crossover study. Submitted to <i>Social Science &amp; Medicine</i> , under review

## JOURNAL ARTICLES

- 2023 **Liu, Shengjie**, An-Min Wu, and Hung Chak Ho (2023). [Spatial variability of diurnal temperature range and its associations with local climate zone, neighborhood environment and mortality in Los Angeles](#). *Urban Climate* 49, 101526
- 2022 Kyba, Christopher CM, Martin Aubé, Salvador Bará, Andrea Bertolo, Constantinos A Bourousis, Stefano Cavazzani, Brian R Espey, Fabio Falchi, Geza Gyuk, Andreas Jechow, Miroslav Kocifaj, Zoltán Kolláth, Héctor Lamphar, Noam Levin, **Shengjie Liu**, Steven D Miller, Sergio Ortolani, Chun Shing Jason Pun, Salvador José Ribas, Thomas Ruhtz, Alejandro Sánchez de Miguel, Matthias Schneider, Ranjay Man Shrestha, Alexandre Simoneau, Chu Wing So, Tobias Storch, Kai Pong Tong, Diane Turnshek, Ken Walczak, Jun Wang, Zhuosen Wang, and Jianglong Zhang (2022). [Multiple Angle Observations Would Benefit Visible Band Remote Sensing Using Night Lights](#). *Journal of Geophysical Research: Atmospheres* 127(12), e2021JD036382
- 2021 **Liu, Shengjie**, Zhize Zhou, Huaxiang Ding, Yuanjun Zhong, and Qian Shi (2021). [Crop Mapping Using Sentinel Full-Year Dual-Polarized SAR Data and a CPU-Optimized Convolutional Neural Network With Two Sampling Strategies](#). *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 14, 7017-7031
- 2021 **Liu, Shengjie**, Qian Shi, and Liangpei Zhang (2021). [Few-shot Hyperspectral Image Classification with Unknown Classes Using Multitask Deep Learning](#). *IEEE Transactions on Geoscience and Remote Sensing* 59(6), 5085-5102
- 2021 **Liu, Shengjie**, Haowen Luo, and Qian Shi (2021). [Active Ensemble Deep Learning for Polarimetric Synthetic Aperture Radar Image Classification](#). *IEEE Geoscience and Remote Sensing Letters* 18(9), 1580-1584
- 2020 **Liu, Shengjie**, and Qian Shi (2020). [Local Climate Zone Mapping as Remote Sensing Scene Classification Using Deep Learning: A Case Study of Metropolitan China](#). *ISPRS Journal of Photogrammetry and Remote Sensing* 164, 229-242
- 2020 **Liu, Shengjie**, and Qian Shi (2020). [Multitask Deep Learning With Spectral Knowledge for Hyperspectral Image Classification](#). *IEEE Geoscience and Remote Sensing Letters* 17(12), 2110-2114
- 2019 **Liu, Shengjie**, Zhixin Qi, Xia Li, and Anthony Gar-On Yeh (2019). [Integration of Convolutional Neural Networks and Object Based Post-Classification Refinement for Land Use and Land Cover Mapping with Optical and SAR Data](#). *Remote Sensing* 11(6), 690

## CONFERENCE PROCEEDINGS

- 2023 **Liu, Shengjie**, Chu Wing So, Hung Chak Ho, Qian Shi, and Chun Shing Jason Pun (2023). Using high-resolution nighttime remote sensing data to identify light sources in Hong Kong. *IGARSS 2023*, in press
- 2023 **Liu, Shengjie**, Chu Wing So, Xiang Feng Foo, and Chun Shing Jason Pun (2023). Using multisource data to capture the impacts of Earth Hour 2021: A case study of Hong Kong. *IGARSS 2023*, in press
- 2022 **Liu, Shengjie**, and Qian Shi (2022). [Estimating PM<sub>2.5</sub> and PM<sub>10</sub> on Zhuhai-1 hyperspectral imagery](#). *IGARSS 2022*, 5933-5936
- 2021 **Liu, Shengjie**, Chu Wing So, and Chun Shing Jason Pun (2021). [Analyzing long-term artificial light at night using VIIRS monthly product with land use data: Preliminary result of Hong Kong](#). *IGARSS 2021*, 6821-6824
- 2021 **Liu, Shengjie**, and Qian Shi (2021). [Multi-label local climate zone mapping as scene classification using very high resolution imagery: Preliminary result of Hong Kong](#). *IGARSS 2021*, 6809-6812
- 2018 **Liu, Shengjie**, Haowen Luo, Ying Tu, Zhi He, and Jun Li (2018). [Wide contextual residual net-](#)

work with active learning for remote sensing image classification. *IGARSS 2018*, 7145-7148

#### CONFERENCE ABSTRACTS

presenter marked with \*

- 2023 **Liu, Shengjie\***, Chu Wing So, Hung Chak Ho, Qian Shi, and Jason Chun Shing Pun (2023). [High inequality of artificial light due to commercial and sports lighting in Hong Kong](#). *ALAN 2023*, Calgary, Alberta, Canada, August 2023
- 2023 So, Chu Wing\*, **Shengjie Liu**, and Jason Chun Shing Pun (2023). [Association between indoor lux measurements and outdoor wall brightness in the high-rise urban environment of Hong Kong](#). *ALAN 2023*, Calgary, Alberta, Canada, August 2023
- 2023 Pun, Jason Chun Shing\*, Chu Wing So, Xiang Feng Foo, and **Shengjie Liu** (2023). [Using multi-source data to capture the impacts of Earth Hour 2021 in Hong Kong](#). *ALAN 2023*, Calgary, Alberta, Canada, August 2023
- 2022 Pun, Jason C.S., Chu Wing So\*, **Shengjie Liu**, Lina Canas, Constance E. Walker, and Sze Leung Cheung (2022). [Measurement of cloud amplification effect over a wide range of night sky brightness observations with the GaN-MN](#). *LPTMM 2022*, Santiago de Compostela, Galicia, Spain, June 2022
- 2022 Pun, Jason Chun Shing, Chu Wing So, and **Shengjie Liu\*** (2022). [Analyzing the sources and variations of night lights between 2012 and 2019 in Hong Kong from VIIRS monthly products](#). *LPTMM 2022*, Santiago de Compostela, Galicia, Spain, June 2022
- 2021 **Liu, Shengjie\***, Chu Wing So, and Chun Shing Jason Pun (2021). [The relationship between night sky brightness and remote sensing data: Preliminary result from LuoJia-1 and the International Space Station](#). *ALAN 2021*, Lleida, Catalonia, Spain, June 2021
- 2021 Chu Wing So\*, Nok Yan Janet Chang, **Shengjie Liu**, Lina Canas, Constance E. Walker, Sze Leung Cheung, and Jason Chun Shing Pun (2021). [A multinational study of night sky brightness \(NSB\) patterns: Preliminary results from the Globe at Night – Sky Brightness Monitoring Network \(GaN-MN\) – Study of cloud amplification on NSB](#). *ALAN 2021*, Lleida, Catalonia, Spain, June 2021
- 2020 Pun, Jason Chun Shing\*, Chu Wing So, Nok Yan Janet Chang, **Shengjie Liu**, Lina Canas, Constance E. Walker, and Sze Leung Cheung (2020). [A multinational study of night sky brightness patterns: Preliminary results from the Globe at Night – Sky Brightness Monitoring Network \(GaN-MN\)](#). *ALAN 2020*, Lleida, Catalonia, Spain, June 2020

#### Talks

- 2022 **Liu, Shengjie\***, Chu Wing So, Hung Chak Ho, Qian Shi, and Chun Shing Jason Pun (2022). [Disproportionate distribution of artificial light at night in Hong Kong: evidence from space with high-resolution nighttime remote sensing](#). *Advanced Urban Remote Sensing Workshop 2022*, The University of Hong Kong, HKSAR, China, December 2022
- 2020 **Liu, Shengjie\*** (2020). [Two cases of deep learning remote sensing image classification: local climate zone mapping and fine-grained classification considering unknown classes](#). *The 3rd Urban Remote Sensing Workshop*, East China Normal University, Shanghai, China, October 2020

#### Grants, honours & awards


2023	USC Dornsife PhD Academy Scholarship, US\$500
2022	USC Dornsife PhD Academy Scholarship, US\$485
2021	USC Spatial Sciences Institute Fellowship for Incoming Students (2 Summers, US\$21,500)
2021	USC Dana and David Dornsife College of Letters, Arts and Sciences/Graduate School Fellowship for Incoming Students (2 Academic Years, US\$64,500)
2020	Arctic Code Vault Contributor, GitHub
2019	<a href="#">Zhuhai Orbita Hyperspectral Data Processing Paper Contest</a> , CN¥5,000 (US\$714)
2018	IEEE IGARSS 2018 Student Travel Grant, US\$1,650
2018	Scholarship of SYSU EMBA Alumni Association, CN¥3,000 (US\$428)
2018	<a href="#">National Undergraduate Innovative Project</a> , CN¥10,000 (US\$1,428)

## Research

### PARTICIPATED FUNDED PROJECTS (PAID MY SALARY/STIPEND)

2023	Southern California Environmental Health Sciences Center Pilot Project. PI: Dr Lu Zhang
2019-2021	Environment and Conservation Fund of the Government of the Hong Kong Special Administrative Region (2018-125), PI: Dr Jason C.S. Pun. <i>Effects of external lighting on the environment</i>
2019-2021	HKU Knowledge Exchange Fund, University Grants Committee of Hong Kong (KE-IP-2019/20-54, KE-IP-2020/21-78), PI: Dr Jason C.S. Pun
2019	Guangdong Basic and Applied Basic Research Foundation (2019A1515011057), PI: Dr Qian Shi
2019	National Natural Science Foundation of China (61976234), PI: Dr Qian Shi
2018	National Natural Science Foundation of China (61601522), PI: Dr Qian Shi

### RESEARCH EXPERIENCE

May 2023 - Present	<b>Graduate research assistant</b> <b><a href="#">Division of Biostatistics</a>, <a href="#">Keck School of Medicine</a>, USC</b>  Advisor: <a href="#">Lu Zhang</a> <ul style="list-style-type: none"> <li>Developing advanced Gaussian Process methods for spatial data interpolation</li> </ul>
Oct 2019 - Aug 2021	<b>Research assistant (full-time, <a href="#">holding working visa</a>)</b> <b><a href="#">HKU Light Pollution Research</a>, Department of Physics, The University of Hong Kong</b>  Advisor: <a href="#">Jason Chun Shing Pun</a> <ul style="list-style-type: none"> <li>Analyzed light pollution in Hong Kong since 2000s from multi-resolution spaceborne imagery, including VIIRS DNB monthly composites, VIIRS Black Marble daily products, LuoJia-1, Jilin-1, and the international space station (ISS)</li> <li>Analyzed the relationship between remotely sensed nighttime lights and night sky brightness data measured from sky quality meter</li> <li>Collected and analyzed panoramic 360 imagery for analyzing light pollution (<a href="#">demo</a>)</li> <li>Analyzed multi-source open data (traffic camera, weather camera, all-sky camera, panoramic camera, and video recordings) to see the impacts of Earth Hour on external lighting</li> <li>Made a <a href="#">video</a> showing the lights-out phenomenon from HK's unique double-deck tramway</li> <li>Collected and examined the association between indoor lux measurements and outdoor wall brightness in the high-rise urban environment of Hong Kong</li> <li>Helped set up and maintain sky quality meter stations in the <a href="#">Globe at Night - Sky Brightness Monitoring Network</a></li> </ul>

- Feb 2018 - Jun 2019 **Research assistant (undergraduate)**  
**Guangdong Key Laboratory for Urbanization and Geo-simulation**, SYSU  
 🏠 Advisor: [Qian Shi](#)
- Developed a [multitask deep learning](#) method with spectral knowledge for hyperspectral image classification with limited training samples
  - Developed [Active Ensemble Deep Learning](#) for radar remote sensing image classification with limited training samples
  - Developed [LCZNet](#) for high-accuracy local climate zone mapping in metropolitan China
- Aug 2018 - Dec 2018 **Research assistant (undergraduate)**  
**Guangdong Key Laboratory for Urbanization and Geo-simulation**, SYSU  
 🏠 Advisor: [Zhixin Qi](#)
- Developed an [object-based deep learning classification method](#) for land cover mapping
  - [Integrated Sentinel-1 Optical & Sentinel-2 PolSAR data](#) for land cover mapping
  - Analyzed [urban expansion of Zhuhai 1980-2015 using spatial analysis](#) (Local Moran's I)
- Feb 2018 - May 2018 **Research assistant (undergraduate)**  
**Urbanization Institute**, Sun Yat-Sen University  
 🏠 Advisor: [Xun Li](#)
- Discovered urban structure in the Pearl River Delta using mobile GPS data with complex network analysis and community detection (Gephi, NetworkX, Fast-unfolding algorithm)
  - Explored the distribution of diseases with online medical records using complex network analysis and clustering analysis
- ## Work experience
- Oct 2019 - Aug 2021 **Research assistant (full-time, holding working visa)**  
**HKU Light Pollution Research**, Department of Physics, The University of Hong Kong  
 🏠 Advisor: [Jason Chun Shing Pun](#)
- See research experience for details
- Jul 2019 - Aug 2019 **Remote sensing engineer (full-time)**  
**Department of Spatial Information, OneSpace Technology Co Ltd** (spinoff as **SenSpace China**)  
 🏠 CTO & Vice President: [Zhize Zhou](#)
- Developed deep learning methods for crop mapping with Sentinel and Gaofen satellite data
  - Awarded a project by the Chongqing Agriculture and Rural Committee: "[Digital Map of Agricultural Industry in Yubei District, Chongqing](#)" (CNY¥3,000,000 = US\$428,000)
- Jun 2017 - Nov 2019 **Assistant lab manager (part-time)**  
**Department of Remote Sensing & GIS**, Sun Yat-Sen University
- Maintained 82 PC desktops and 2 multimedia systems for GIS Lab
  - Provided tech support for ArcGIS, ENVI, & eCognition
- Jul 2017 **Assistant (part-time)**  
**ENVI/IDL Remote Sensing Summer School**, Guangzhou
- Supported ENVI/IDL software training with ESRI ENVI/IDL senior engineer
  - Participants including professors & postdocs from major Chinese universities
- Jun 2016 - Aug 2016 **Interviewer (internship)**  
**China Labor-force Dynamics Survey (CLDS)**, Center of Social Survey, SYSU  
 🏠 Project PI: [Yucheng Liang](#), 🏠 Team Leader: [Haiwei Guo](#)

- Conducted computer-assisted personal interview for China Labor-force Dynamics Survey
- Covered 140 families in 4 communities

## Teaching

### UNIVERSITY OF SOUTHERN CALIFORNIA

- 2023 [SSCI-382 Geographic Information Science: Spatial Analytics](#) (Lab instructor; rating: 4.0/4.0)
- 2023 [SSCI-220 Spatial Data Collection Using Drones](#) (Lab instructor; rating: 4.0/4.0)
- 2022 [SSCI-165 Sustainability Science in the City](#) (Lab instructor; rating: 3.59/4.0)

### GUEST LECTURE

- 2022 Urban Heat Islands with Nighttime and Daytime Landsat Imagery. *SSCI-382 Geographic Information Science: Spatial Analytics*, University of Southern California, October 2022

## Service & membership

### CONFERENCE

- 2023 Session Chair, [Hyperspectral Imaging Classification, IGARSS 2023](#)

### JOURNAL REVIEWER

IEEE Geoscience and Remote Sensing Letters (2)  
 IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (14)  
 IEEE Transactions on Geoscience and Remote Sensing (3)  
 Knowledge-Based Systems (4)  
 Pattern Recognition Letters (2)  
 Remote Sensing Letters (3)  
 Scientific Reports (2)  
 Urban Climate (13)

### MEMBERSHIP

American Geophysical Union  
 American Society for Photogrammetry and Remote Sensing  
 Atmospheric Environmental Remote Sensing Society  
 IEEE Geoscience and Remote Sensing Society (GRSS)  
 IEEE GRSS Image Analysis and Data Fusion (IADF) Technical Committee

## Skills & software

Deep learning: Pytorch, TensorFlow, Keras  
 Coding: Python, MATLAB, Julia, R, ENVI-IDL, HTML5, L<sup>A</sup>T<sub>E</sub>X  
 Software: QGIS, ArcGIS, GeoDa, OriginLab, Gephi, ENVI, eCognition, ESA-SNAP

Last updated: September 26, 2023