Insang Song

issong.net | sigmafelix | ORCiD | LinkedIn | {I} at {D}
I = geoissong
D = snu.ac.kr

Research Interests

- Environmental Health
- Geocomputation
- Health Geography / Spatial Epidemiology
- Spatial Disparity
- Causal Inference
- Mental Health

Professional Employment

Sep. 2024 - Current	**Assistant Professor (Tenure track)**, Seoul National University, Seoul, Republic of Korea (South)
Jan. 2024 - Aug. 2024	**Visiting Fellow**, National Institute of Environmental Health Sciences (NIEHS), Durham, NC, United States Mentor: Dr. Kyle P. Messier
Sep. 2023 - Jan. 2024	**Data Analyst**, NIEHS

Education

2019 – 2023 Ph.D. (Geography)
University of Oregon, Eugene, United States
Dissertation: *Multiscale and Spatiotemporal Dynamics of Socioeconomic and Environmental Effects on Mental Illness Mortality*
Advisor: Dr. Hui Luan

2015 – 2017 M.A. (Geography)
Seoul National University, Seoul, Republic of Korea
Thesis: *Construction of a Resampling-based Imputation Model based on Spatio-temporal Kriging and Its Implication*
Advisor: Dr. Key-Ho Park

2009 – 2015 B.A. (Geography, European Regional Studies minor, *summa cum laude*)
Seoul National University

Projects

- Reproducible high-resolution spatiotemporal $PM_{2.5}$ and PM_{10} modeling in Republic of Korea
- Scalable computation for geospatial exposure assessment
- Spatiotemporal analysis of antidepressant prescription and social pressure
- Impact of incorrect address in the estimation of area representative air quality values and spatiotemporal air pollution models

Publications

Peer-reviewed or Refereed Journal Articles

- For details, please refer to my Google Scholar page

Song, I., & Messier, K. P. (2025). Chopin: An open source r-language tool to support spatial analysis on parallelizable infrastructure. *SoftwareX*, *30*, 102167. https://doi.org/10.1016/j.softx.2025.102167

Manware, M., Song, I., Marques, E. S., Kassien, M. A., Clark, L. P., & Messier, K. P. (2025). Amadeus: Accessing and analyzing large scale environmental data in R. *Environmental Modelling & Software*, *186*, 106352. https://doi.org/10.1016/j.envsoft.2025.106352

Song, I., & Luan, H. (2024). Localized effects of neighborhood park exposure on mental illness mortality in the Pacific Northwest United States. *Applied Geography*, *162*, 103127. https://doi.org/10.1016/j.apgeog.2023.103127

Ransome, Y., Luan, H., Song, I., & Duncan, D. T. (2023). Church closings were associated with higher COVID-19 infection rates: Implications for community health equity. *Journal of Urban Health*, *100*, 1258–1263. https://doi.org/10.1007/s11524-023-00791-2

Song, I., & Kim, D. (2023). Three Common Machine Learning Algorithms Neither Enhance Prediction Accuracy Nor Reduce Spatial Autocorrelation in Residuals: An Analysis of Twenty-five Socioeconomic Data Sets. *Geographical Analysis*, *55*(4), 585–620. https://doi.org/10.1111/gean.12351

Song, I., Yoo, E.-H., Jung, I., Oh, J.-K., & Kim, S.-Y. (2023). Role of geographic characteristics in the spatial cluster detection of cancer: Evidence in South Korea, 1999–2013. *Environmental Research*, *236*, 116841. https://doi.org/10.1016/j.envres.2023.116841

Kim, D., Song, I., Miralha, L., Hirmas, D. R., McEwan, R. W., Mueller, T. G., & Šamonil, P. (2023). Consequences of spatial structure in soil–geomorphic data on the results

of machine learning models. *Geocarto International*, *38*(1), 2245381. https://doi.org/10.1080/10106049.2023.2245381

Nguyen, C. T., Song, I., Jung, I., Choi, Y.-J., & Kim, S.-Y. (2023). Changes in spatial clusters of cancer incidence and mortality over 15 years in South Korea: Implication to cancer control. *Cancer Medicine*, *12*(16), 17418–17427. https://doi.org/10.1002/cam4.6365

Taggart, T., Ransome, Y., Andreou, A., Song, I., Kershaw, T., & Milburn, N. (2023). Activity Space Assessments to Investigate Neighborhood Exposure to Racism-Related Stress and Related Substance Use Among Young Black Men: Connecticut, 2019. *American Journal of Public Health*, *113*(S2), S136–S139. https://doi.org/10.2105/AJPH.2023.307254

Song, I., & Luan, H. (2022). The spatially and temporally varying association between mental illness and substance use mortality and unemployment: A Bayesian analysis in the contiguous United States, 2001–2014. *Applied Geography*, *140*, 102664. https://doi.org/10.1016/j.apgeog.2022.102664

Luan, H., Song, I., Fiellin, D. A., & Ransome, Y. (2021). HIV Infection Prevalence Significantly Intersects With COVID-19 Infection At the Area Level: A US County-Level Analysis. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *88*(2), 125–131. https://doi.org/10.1097/QAI.0000000000002758

Ransome, Y., Luan, H., Song, I., Fiellin, D. A., & Galea, S. (2021). Association of Poor Mental-Health Days With COVID-19 Infection Rates in the U.S. *American Journal of Preventive Medicine*, *62*(3), 326–332. https://doi.org/10.1016/j.amepre.2021.08.032

Kim, D., & Song, I. (2021). Predicting Model Improvement by Accounting for Spatial Autocorrelation: A Socioeconomic Perspective. *The Professional Geographer*, *73*(1), 131–149. https://doi.org/10.1080/00330124.2020.1812408

Song, I., Kim, O.-J., Choe, S.-A., & Kim, S.-Y. (2020). Spatial heterogeneity in the association between particulate matter air pollution and low birth weight in South Korea. *Environmental Research*, *191*, 110096. https://doi.org/10.1016/j.envres.2020.110096

Park, Y., Song, I., Yi, J., Yi, S.-J., & Kim, S.-Y. (2020). Web-Based Visualization of Scientific Research Findings: National-Scale Distribution of Air Pollution in South Korea. *Int. J. Environ. Res. Public Health*, 14. https://doi.org/10.3390/ijerph17072230

Kim, D., Lee, J.-Y., Seo, J., & Song, I. (2019). Recolonization of native and invasive plants after large-scale clearance of a temperate coastal dunefield. *Applied Geography*, *109*, 102030. https://doi.org/10.1016/j.apgeog.2019.05.007

Song, I., Lee, C., & Park, K.-H. (2018). An Ensemble Machine Learning from Spatio-temporal Kriging for Imputation of PM10 in Seoul, Korea. *Journal of the Korean Geographical Society*, *53*(3), 427–444. https://journal.kgeography.or.kr/articles/article/vMLR/

Kim, S.-Y., & Song, I. (2017). National-scale exposure prediction for long-term concentrations of particulate matter and nitrogen dioxide in South Korea. *Environmental Pollution*, *226*, 21–29. https://doi.org/10.1016/j.envpol.2017.03.056

Song, I., & Kim, S.-Y. (2016). Estimation of Representative Area-Level Concentrations of Particulate Matter (PM_{10}) in Seoul, Korea. *Journal of the Korean Association of Geographic Information Studies*, *19*(4), 118–129. https://doi.org/10.11108/KAGIS.2016.19.4.118

Eum, Y., Song, I., Kim, H.-C., Leem, J.-H., & Kim, S.-Y. (2015). Computation of geographic variables for air pollution prediction models in South Korea. *Environmental Health and Toxicology*, *30*, e2015010. https://doi.org/10.5620/eht.e2015010

Under review / In preparation

Song, I., & Luan, H. In preparation. Spatial heterogeneity in causal effect estimation by contextual subregional partitioning.

Song, I., & Luan, H. In preparation. Does missing mechanism matter to the imputation accuracy? - an evaluation of imputation algorithms for missing mechanisms in simulated and real spatiotemporal data.

Policy Report

Ransome, Y., Song, I., Pham, L., & Busette, C. (2022, May 3). Churches are closing in predominantly Black communities why public health officials should be concerned. Retrieved April 2, 2024, from https://www.brookings.edu/articles/churches-are-closing-in-predominantly-black-communities-why-public-health-officials-should-be-concerned

Conference Presentations

Song, I. (2022). Spatial difference in the impact of greenspace exposure on mental illness mortality in the Pacific Northwest United States. *Association of Pacific Coast Geographers 2022 84th Annual Meeting*. Bellingham, WA. Oct. 4 – 6, 2022.

Song, I. (2021). Does missing mechanism matter?—an evaluation of imputation algorithms for missing mechanisms. *2021 American Association of Geographers Annual Meeting*. Virtual. Apr. 7 – 11, 2021.

Song, I. (2020). Getting time from space: interactive visualization of temporal information from spatial data. *2020 Portland Cartography Symposium*. Portland, OR. Mar. 6, 2020.

Song, I., & Luan, H. (2020). Local explanations of individual characteristics and district-level air pollution on low birth weight in South Korea: a Bayesian network approach. *2020 American Association of Geographers Annual Meeting*. (Cancelled due to the COVID-19)

Song, I., & Kim S.-Y. (2016). Estimation of representative areal concentrations of particulate air pollution in Seoul, Korea. *2016 American Association of Geographers Annual Meeting*. San Francisco, CA. Mar. 29 – Apr. 4, 2016.

Poster Presentations

Song, I., & Messier, K.P. (2024). R-based geospatial parallel processing tool for environmental health research by data partitioning. *American Geophysical Union 2024 Annual Meeting*. Washington, D.C., Dec. 9–13, 2024.

Messier, K.P., Manware, M., Marques, E., Alifa Kassien, M., Clark, L., Singh, A., Ward-Caviness, C., & Song, I. (2024). Reproducible Pipelines for Updateable and FAIR Geostatistical Air Pollution Exposure Models. *American Geophysical Union 2024 Annual Meeting*, Washington, D.C., Dec. 9–13, 2024.

Song, I., & Messier, K.P. (2024). Development of geospatial parallel processing software tool for large-scale geospatial exposure assessment. *ISEE Conference Abstracts* 2024(1). Santiago, Chile, Aug. 25–28, 2024. (Virtual Presentation)

Song, I., Marques, E., Manware, M., Alifa Kassien, M., Daw, R., Zilber, D., Singh, A., Clark, L., Ward-Caviness, C., & Messier, K.P. (2024). Air Pollution Data for the Masses: An Open-Access, Test-Driven, and Reproducible Pipeline $PM_{2.5}$ Hybrid Model for Epidemiology Applications . *ISEE Conference Abstracts* 2024(1). Santiago, Chile, Aug. 25–28, 2024. (Virtual Presentation)

Song, I., & Luan, H. (2022). Matching by multivariate similarity matrix with geographic coordinates: Causal inference of the relationship between residential greenspace and deaths by mental illness. *GEOMED 2022*. Irvine, CA. Oct. 12 – 14, 2022.

Song, I., & Kim, S.-Y. (2018). A study on the association between two air pollutants (PM_{10}, NO_2) and traffic-related variables in 2010. *Proceedings of the Korean Society of Atmospheric Environment* 2018: 210.

Song, I., & Kim S.-Y. (2016). Local difference of association between PM_{10} and low birth weight. *Proceedings of the Korean Society of Environmental Health and Toxicology* 2016(10):297. (Awarded by the Korean Society of Environmental Health and Toxicology)

Trainees

Daehoon Yu, Master's (2025–)

Research Experience

Affiliated Researcher Aug. 2021 – Aug. 2023
National Cancer Center of Korea, Republic of Korea

Research Assistant Jun. 2020 – Jun. 2023
Department of Geography, University of Oregon

Researcher Oct. 2017 – Aug. 2019
The Institute for Korean Regional Studies, Seoul National University, Republic of Korea

Research Assistant Sep. 2017 – Aug. 2019
National Research Foundation of Korea, Republic of Korea
Dynamics of coastal environment by climate change (PI: Dr. Daehyun Kim, Seoul National University)

Research Assistant Aug. 2015 – Aug. 2019
National Research Foundation of Korea, Republic of Korea
Simulation and epidemiological studies on spatial exposure prediction modeling approaches (PI: Dr. Sun-Young Kim, National Cancer Center of Korea)

Researcher Jan. – Dec. 2018
National Cancer Center of Korea, Republic of Korea

Research Assistant Jun. – Oct. 2017
The Asia Center, Seoul National University, Republic of Korea

Research Assistant Mar. 2015 – Feb. 2017
Brain Korea 21 Plus, Seoul National University, Republic of Korea

Research Assistant Jan. – Mar. 2016
The Seoul Institute, Republic of Korea

Student Researcher Nov. 2014 – Feb. 2015
University for Creative Korea Initiative, Seoul National University, Republic of Korea

Student Researcher Jun. 2013 – Dec. 2014
Seoul National University, Republic of Korea

Research Assistant Oct. 2014 – Nov. 2014
The Korea Research Institute for Human Settlements, Republic of Korea

Work Experience

Instructor May and Aug. 2017
Partnerships in Environmental Management for the Seas of East Asia

Field Geographic Data Collection Coordinator Jul. 2015 – Oct. 2015
Seoul National University

Secretary Mar. 2014 – Dec. 2014
The Association of Korean Cultural and Historical Geographers, Seoul, Republic of Korea

Field Geographic Data Collector Jul. 2014
Seoul National University

Sergeant (GIS Specialist) Feb. 2011 – Nov. 2012
The 3rd Republic of Korea Army Headquarters, Republic of Korea Army, Republic of Korea

Teaching Experience

Seoul National University

Seminars in Health & Medical Geography	Spring 2025
Analytical Methods in Geography 1: Statistical Modeling	Spring 2025
Analytical Methods in Geography 2: Machine Learning	Fall 2024

Instructor, University of Oregon Jan. – Apr. 2023
Geographic Information Science (GIScience) I

Teaching Assistant, University of Oregon Sep. 2020 – Jun. 2022

Public Health and GIS	Apr. – Jun. 2022
Topic Geospatial Data Science Applications (Python)	Jan. – Mar. 2022
Spatial Analysis	Sep. – Dec. 2021
GIScience I	Jan. – Mar. 2021
Spatial Analysis	Sep. – Dec. 2020

Session Organizer and Tutor
Geographers' Cooperative Network for Data Analysis (GeoCONDA) Bootcamp
Jun. 2018 – Aug. 2018

Teaching Assistant, Seoul National University

Analytical Methods in Geography	Spring 2017
Geographic Information Systems	Fall 2015

Guest Lecture

Regional health effect analysis with spatiotemporal analytical methods, Program in National and Urban Policy, Korea University, May 1, 2025 (Korean).

Potentials and challenges in the triad of GIS, geographic knowledge, and large language models, Introduction to GIS for Planners, Department of City and Regional Planning, Cornell University, May 7, 2024, Virtual.

Invited Talks

After relocation: sensitivity in health effect analysis by changes in particulate matter concentration by the relocation of governmental monitoring sites. Institute of Social Sciences, Seoul National University. Apr. 2025.

Spatial clustering analysis with covariates: a case of stomach and lung cancer at district level in South Korea. National Cancer Center of Korea. Dec. 2021, Virtual.

Vessel trajectory analysis: a case study in Yellow Sea. The Korea Maritime Institute. Sep. 2021, Virtual.

Professional Development

Office of Intramural Training & Education, National Institutes of Health, *Responsible Conduct of Research Training*, Mar. 6, 2024, Virtual.

American Association of Geographers 2022 Summer Series: Advanced-level Workshop, *Developing Open Source SpatiaLite Databases in QGIS*, Jul. 11 – Sep. 8, 2022, Virtual.

The Big Data Institute, Seoul National University, *The 5^{th} Big Data Camp: Introductory Engineering for Big Data Scientists*, Feb. 6 – 8, 2017, Seoul, Republic of Korea.

Awards and Honors

Sandra Pritchard Mather Graduate Student Award, University of Oregon, Jun. 2022.

Lokey Graduate Science Award, University of Oregon, Oct. 2019.

Excellent Poster Award, The Korean Society of Environmental Health and Toxicology, Oct. 2016.

Grants and Scholarships

Funded / Granted

New Faculty Startup Fund, Seoul National University. Oct. 2024 – Sep. 2026.

The Association of Pacific Coast Geographers, Travel Grant, Oct. 2022.

University of Oregon, Department of Geography Sandra Pritchard Mather Graduate Award, Jun. 2022.

University of Oregon, Department of Geography Rippey Dissertation Grant, Apr. 2022.

University of Oregon, Department of Geography Rippey Graduate Grant, Dec. 2021.

University of Oregon, Raymund First-Year Ph.D. Fellowship, Fall 2019 – Spring 2020.

University of Oregon, Lokey Graduate Science Award, Fall 2019.

Seoul National University, Lecture and Research Scholarship, Spring 2017.

Seoul National University, International Conference Grant, Mar. – Apr. 2016.

Seoul National University, Merit-based Scholarship, Spring – Fall 2015 and Fall 2016.

The Sung Ryun Scholarship Foundation, Academic Performance, Spring 2014.

Seoul National University, Undergraduate Research Grant, Fall 2013 and Fall 2014.

Seoul National University, Academic Performance, Fall 2009 – Spring 2011.

The Priming Water Scholarship Foundation, Academic Performance, Mar. 2009.

Not funded

National Science Foundation, Doctoral Dissertation Research Improvement Grant, USD 17,760.

Membership

American Geophysical Union

American Association of Geographers

The Korean Geographical Society

Service

Manuscript review

BMC Public Health (5), *JAMA Network Open* (1), *npj Urban Sustainability* (1), *Scientific Reports* (2), *International Journal for Equity in Health* (1), *International Journal of Health Geographics* (1)

Intramural service

Graduate Admission Committee, Department of Geography, Seoul National University (2024 – 2025)

Department Steward, Graduate Teaching Fellow Federation, University of Oregon (2020 – 2022)

Treasurer, Geography Graduate Student Association, Seoul National University (SNU) (2015)

Chair and Member, Geography Club GET, Department of Geography, SNU (2013 – 2014)

Organizer, Classics in Social Sciences Reading Group, Department of Geography, SNU (2013 – 2014)

Co-organizer, Geographers' Night, Department of Geography, SNU (2014)

Outreach service

Braille Book Production Volunteer, Siloam Welfare Center for the Blind (Seoul, Republic of Korea) (2013)

Mentor, Seoul National University & Korea Scholarship Foundation (Seoul, Republic of Korea) (2013)

Skills

Computer language	R, Python, Julia, SQL (SpatiaLite, PostGIS), JavaScript, C++, LaTeX, Shell
Software	QGIS, ArcGIS Suite, Microsoft Office Suite, Microsoft Azure, Git, Docker, Apptainer (Singularity), Quarto, Shiny, GIMP, Inkscape, Blender
Language	Korean (Native), English (Professional Proficiency), Standard Chinese, Japanese, German (Reading)

Software

autoSTK: Automatic Spatiotemporal Kriging in R

chopin: Computation of Spatial Data by Hierarchical and Objective Partitioning of Inputs for Parallel Processing (the software is peer-reviewed through rOpenSci)

Patents

Korea Patent Registration No. 1024661190000, Apparatus and Method for Extracting Main Vessel Lane Network Based on AIS Information (with Jongseo Yim, Jae-Young Park, Sungjin Cho, and Chan-Woong Kim)

Korea Patent Registration No. 1019917960000, Method of Automatically Generating Input File of Marxan with Zones from Shapefile (with Jung-Ho Nam and Jongseo Yim).

Other Information

Nationality Republic of Korea