

Jiangong Liu

Assistant Professor

Carbon Neutrality and Climate Change Thrust

Earth, Ocean and Atmospheric Sciences Thrust

The Hong Kong University of Science and Technology (Guangzhou)

Address: Room 532, W4 Building, 1 Duxue Road, Nansha, Guangzhou 511453, China

Email: jiangongliu@hkust-gz.edu.hk

Areas of Expertise

Ecosystem Ecology

Global Change Ecology

Land-Atmosphere Interaction

Nature-based Climate Solutions

Research Experience

Postdoctoral Research Scientist, Columbia University

2022/05-2025/05

Department of Earth & Environmental Engineering

Advisor: Dr. Pierre Gentine

Topic: *Causality-guided Explainable AI of Ecophysiology*

Postdoctoral Researcher, Seoul National University

2020/06-2022/04

Institute of Agriculture and Life Sciences

Advisor: Dr. Youngryel Ryu

Topic: *Eco-evolutionary Optimality of Plant Acclimation*

Visiting Scholar, University of California, Berkeley

2019/01-2019/07

Department of Environmental Science, Policy & Management

Advisor: Dr. Dennis Baldocchi

Topic: *Wetland Methane Fluxes:*

Multiscale, Nonlinearity, Asynchrony and Causality

Research Assistant

The Chinese University of Hong Kong

2016/01-2017/01

Department of Geography & Resource Management

Advisor: Dr. Derrick Y.F. Lai

Education

Ph.D. in Physical Geography

The Chinese University of Hong Kong

2016/01-2020/12

Department of Geography & Resource Management,

Advisor: Dr. Derrick Y.F. Lai

Thesis: *Biosphere-atmosphere Carbon Exchange in a Subtropical Mangrove Wetland in Hong Kong*

M.S. in Global Change Ecology

2013/09-2015/07

Northwest A&F University, China

College of Forestry

Advisor: Dr. Changhui Peng

Thesis: *Spatiotemporal Variations of Natural Wetland Methane Emissions over China under Climate Change*

B.S. in Forestry

2009/09-2013/07

Northwest A&F University, China
College of Forestry

<i>Awards & Honors</i>	FLUXNET Secondment Award	2024
	IOP Trusted Reviewer	2023
	Best Oral Presentation, Annual Eastern Regional Dynamic Global Vegetation Modeling Conference	2023
	First Class Award, ChinaFlux Outstanding Papers	2020
	Best Oral Presentation, AsiaFlux Workshop	2019
	Global Scholarship for Research Excellence	2018
<i>Grants</i>	PI, CUHK Seed Funding Support for Thesis Research	2019
	PI, CUHK Interdisciplinary Research Seed Funding	2017

Publications
(*corresponding author)

Preprint & *in press*

1. Tian, Y., **Liu, J.**, Huang, Y., Gentine, P., & Kai, K. Three-way circulation–soil moisture–temperature feedbacks amplify the most extreme mid-latitudinal heatwaves. Accepted by *Science Advances*. (preprint) doi: **10.21203/rs.3.rs-6585759/v1**.
2. Fan, P., **Liu, J.**, Xu, Y., Huang, B., Webster, C., & Zhou, Y. A global dataset of high-resolution CO₂ enhancements derived from OCO-3 measurements. Accepted by *Communications Earth & Environment*. (preprint) doi: **10.5194/essd-2025-234**.
3. Jeong, S., Ryu, J., Gentine, P., Lian, X., Fang, J., Li, X., Dechant, B., **Liu, J.**, Kong, J., Wang, L., Choi, C., Zhang, H., Wu, J., Prentice, C., & Harrison, S. Sustained global greening driven by continuous CO₂ fertilization. 1st-round revision by *Nature Communications*. (preprint) doi: **https://doi.org/10.21203/rs.3.rs-8621169/v1**.
4. Huang, Y., Lian, X., Skulovich, O., **Liu, J.**, Shamekh, S., & Gentine, P. Large and increasing soil moisture impact on Western European heatwaves. (preprint) doi: **10.22541/au.173161581.17902240/v1**.

Book Chapter

1. **Liu, J.**, Schäfer, K.V.R., & Lai, D. Y. F. (2022). Biosphere-Atmosphere Exchange of CO₂ and CH₄ in Mangrove Forests and Salt Marshes. Book chapter for “*Carbon Mineralization in Coastal Wetlands*” edited by Lee, J., Marchand, C., Ouyang X., & Lai, D. Y. F. *Elsevier*. doi: **10.1016/B978-0-12-819220-7.00009-1**.

Journal

1. Giardina, F.*, **Liu, J.***, Seneviratne, S., Stocker, B., & Gentine, P. Groundwater regulates the spatial pattern of photosynthesis in the contiguous United States. (2026). *Communications Earth Environment*. doi: **10.1038/s43247-026-04067-w**.
2. Lian, X., Jiji, J., Fang, J., Han, J., Ryu, Y., Harrison, S., Jeong, S., Zhang, H., Novick, K., Benson, M., Dong, N., Green, J., Sandoval, D., **Liu, J.**, Keenan, T.,

- & Gentine, P. Leaf temperature and its departure from ambient air temperature. *Nature Plants*. (2026). 12, 1189–1202. doi: **10.1038/s41477-026-02304-w**.
3. **Liu, J.***, Wang, Q., Zhan, W., Lian, X., & Gentine, P. When and where soil dryness matters to ecosystem photosynthesis. (2025). *Nature Plants*. 11, 1390–1400. doi: **10.1038/s41477-025-02024-7**.
 4. **Liu, J.**, Neogi, S., & Lai, D. Y. F. Ecosystem-scale carbon dioxide, methane and water fluxes from a freshwater fishpond: temporal variability, drivers, and implications for nature-based climate solutions. (2025). *Earth's Future*. 13, 5. doi: **10.1029/2024EF005277**.
 5. Zhan, W., Lian, X., **Liu, J.**, Han, J., Huang, Y., Yang, H., Zhan, C., Winkler, A., & Gentine, P. Reduced water loss rather than increased photosynthesis controls CO₂-enhanced water-use efficiency. (2025). *Nature Ecology and Evolution*, 9, 1571-1584. doi: **10.1038/s41477-025-02024-7**.
 6. Lian, X., Li, Y., **Liu, J.**, Kornhuber, K., & Gentine, P. Northern ecosystem productivity reduced by Rossby-wave-driven hot–dry conditions. *Nature Geoscience*. (2025). 18, 615–623. doi: **10.1038/s41561-025-01722-3**.
 7. Hao, Y., Mao, J., Bachmann, C., Hoffman, F., Koren, G., Chen, H., Tian, H., **Liu, J.**, *et al.* Soil moisture controls over carbon sequestration and greenhouse gas emissions: a review. (2025). *npj Climate and Atmospheric Science*, 8, 16. doi: **10.1038/s41612-024-00888-8**.
 8. **Liu, J.***, Ryu, Y., Luo, X., Dechant, B., Keenan, T., Gentine, P., Li, B., Li, X., Prentice, C. I., Stocker, B., & Harrison, S. Evidence for widespread thermal acclimation of canopy photosynthesis. (2024). *Nature Plants*. doi: **10.1038/s41477-024-01846-1**.
 9. Jeong, S., Ryu, Y., Li, X., Dechant, B., **Liu, J.**, Kong, J., Choi, W., Fang, J., Lian, X., & Gentine, P. GEOSIF: A continental-scale sub-daily reconstructed solar-induced fluorescence derived from OCO-3 and GK-2A over Eastern Asia and Oceania. (2024). *Remote Sensing of Environment*, 311, 114284. doi: **10.1016/j.rse.2024.114284**.
 10. Guo, R., Chi, J., **Liu, J.**, Luo, Y., Shekhar, A., Mo, L., & Liu, G. Atmospheric water demand constrains net ecosystem production in subtropical mangrove forests. (2024). *Journal of Hydrology*, 630, 130651. doi: **10.1016/j.jhydrol.2024.130651**.
 11. Qiu, R., Han, G., Li, X., Xiao, J., **Liu, J.**, Wang, S., Li, S., & Gong, W. Contrasting responses of relationship between solar-induced fluorescence and gross primary production to drought across aridity gradients. (2024). *Remote Sensing of Environment*, 302, 113984. doi: **10.1016/j.rse.2023.113984**.
 12. Tang, Y., Li, T., Yang, X., Chao, Q., Wang, C., Lai, D. Y. F., **Liu, J.**, Zhu, X., Zhao, X., Fan, X., Zhang, Y., Hu, Q., & Qin, Z. (2023). Mango-GPP: A process-based model for simulating gross primary productivity of mangrove ecosystems. *Journal of Advances in Modeling Earth Systems*, 15, e2023MS003714. doi: **10.1029/2023MS003714**.
 13. Li, X., Ryu, Y., Xiao, J., Dechant, B., **Liu, J.**, Li, B., Jeong, S., & Gentine,

- P. (2023). New-generation geostationary satellite reveals widespread midday depression in dryland photosynthesis during the 2020 western U.S. heatwave. *Science Advances*, 9(31), eadi0775. doi: **10.1126/sciadv.adi0775**.
14. Nathaniel, J., **Liu, J.**, & Gentine, P. (2023). MetaFlux: Meta-learning global carbon fluxes from sparse spatiotemporal observations. *Scientific Data*, 10(1), 440. doi: **10.1038/s41597-023-02349-y**.
 15. Li, B., Ryu, Y., Jiang, C., Dechant, B., **Liu, J.**, Yan, Y., & Li, X. BESSv2.0: A satellite-based and coupled-process model for quantifying long-term global land-atmosphere fluxes. (2023). *Remote Sensing of Environment*, 295, 113696. doi: **10.1016/j.rse.2023.113696**.
 16. Qu, S., **Liu, J.**, Li, B., Zhao, L., Li, X., Zhang, Z., Yuan, M., & Lin, A. Unveiling the driver behind China's greening trend: urban vs. rural areas. (2023). *Environmental Research Letters*, 18, 084027. doi: **10.1088/1748-9326/ace83d**.
 17. Qu, S., Ryu, Y., **Liu, J.**, & Wang, J. (2023). Greening rate in North Korea doubles South Korea. *Environmental Research Letters*, 18, 084020. doi: **10.1088/1748-9326/acdaad**.
 18. **Liu, J.**, Valach, A., Baldocchi, D., & Lai, D. Y. F. (2022). Biophysical controls of ecosystem-Scale methane fluxes from a subtropical estuarine mangrove: multiscale, nonlinearity, asynchrony and causality. *Global Biogeochemical Cycles*, 36, e2021GB007179. doi: **10.1029/2021GB007179**.
 19. Kong, J., Ryu, Y., **Liu, J.**, Dechant, B., Shortt, R., Rey-Sanchez, C., Szutu, D., Verfaillie, J., Houborg, R., & Baldocchi, D. (2022). Matching high resolution satellite data and flux tower footprints improves their agreement in photosynthesis estimates. *Agricultural and Forest Meteorology*, 316, 108878. doi: **10.1016/j.agrformet.2022.108878**.
 20. Zhan, W., Lian, X., **Liu, J.**, & Gentine, P. (2022). Inappropriateness of space-for-time and variability-for-time approaches to infer future dryland productivity changes. *Frontiers in Environmental Science*, 10, 1010269. doi: **10.3389/fenvs.2022.1010269**.
 21. Zhou, T., **Liu, J.**, Lie, Z., & Lai, D. Y. F. (2022). Effects of applying different carbon substrates on nutrient removal and greenhouse gas emissions by constructed wetlands treating carbon-depleted hydroponic wastewater. *Biore-source Technology*, 357, 127312. doi: **10.1016/j.biortech.2022.127312**.
 22. **Liu, J.**, Zhou, Y., Valach, A., Shortt, R., Kasak, K., Rey-Sanchez, C., Hemes, K. S., Baldocchi, D., & Lai, D. Y. F. (2020). Methane emissions reduce the radiative cooling effect of a subtropical estuarine mangrove wetland by half. *Global Change Biology*, 26(9), 4998–5016. doi: **10.1111/gcb.15247**.
 23. Kasak, K., Valach, A. C., Rey-Sanchez, C., Kill, K., Shortt, R., **Liu, J.**, Dronova, I., Mander, Szutu, D., Verfaillie, J., & Baldocchi, D. D. (2020). Experimental harvesting of wetland plants to evaluate trade-offs between reducing methane emissions and removing nutrients accumulated to the biomass in constructed wetlands. *Science of the Total Environment*, 715, 136960. doi: **10.1016/j.scitotenv.2020.136960**.

24. **Liu, J.**, & Lai, D. Y. F. (2019). Subtropical mangrove wetland is a stronger carbon dioxide sink in the dry than wet seasons. *Agricultural and Forest Meteorology*, 278, 107644. doi: **10.1016/j.agrformet.2019.107644**.
25. **Liu, J.**, Hartmann, S. C., Keppler, F., & Lai, D. Y. F. (2019). Simultaneous abiotic production of greenhouse gases (CO₂, CH₄, and N₂O) in subtropical soils. *Journal of Geophysical Research: Biogeosciences*, 124(7), 1977–1987. doi: **10.1029/2019JG005154**.
26. **Liu, J.**, Chen, H., Zhu, Q., Shen, Y., Wang, X., Wang, M., & Peng, C. (2015). A novel pathway of direct methane production and emission by eukaryotes including plants, animals and fungi: An overview. *Atmospheric Environment*, 115, 26-35. doi: **10.1016/j.atmosenv.2015.05.019**.
27. **Liu, J.**, Zhu, Q., Yang, Y., Luo, Y., & Peng, C. (2015). Spatiotemporal patterns of natural wetland methane emissions over China under climate change. (in Chinese). *Chinese Journal of Applied Ecology*, 26(11), 3467-3474. pmid: **26915204**.

Tools

1. Irvin, J., Zhou, Y., Lu, F., Liu, V., Zhou, S., McNicol, G., & **Liu, J.** (2021). FluxGapfill: A Python Interface for Machine-learning Driven Methane Gap-filling. Version 0.2.0. Zenodo. doi: **10.5281/zenodo.5515761**.

Teaching

Instructor

The Hong Kong University of Science and Technology (Guangzhou)

CNCC5100 Carbon Neutrality and Climate Change

(required course for RPG students)

2025 Fall, 2026 Spring & Fall

Teaching assistant

The Chinese University of Hong Kong

GRMD2001 Non-local Field Trip (Tai Wan)

2016 Summer

GRMD4203 Ecosystem Restoration and Management

2017,2018 Spring

UGEB2240 Natural Wonders of the World

2017,2019 Fall

GRMD3205 Geomorphology

2018 Fall

UGEB2222 Natural Hazards

2018 Fall

Services

Leader, FLUXNET-Early Career Scientist Network

Member, FLUXNET CH₄ and N₂O processing committee

Member, AmeriFlux-Diversity, Equity and Inclusion Committee

Guest editor, Frontiers in Forests and Global Change

Journal Reviewer: Nature Geoscience, Nature Communications, Science Advances, National Science Review, Global Change Biology, Remote Sensing of Environment, Ecology Letters, Agricultural and Forest Meteorology, Environmental Research Letters, Geophysical Research Letters, Journal of Geophysical Research: Biogeosciences, Earth's Future, Biogeosciences, Limnology and Oceanography Letters, Frontiers in Forests and Global Change, Environmental Research Communications