

Junjie Liu

Professional experience

- Science Team Lead for Orbiting Carbon Observatory-2/3, Jan 2024-
- Senior Research Scientist, May 2023-
- Principle Scientist, Oct 2022-
- Acting Science Team Lead for Orbiting Carbon Observatory -2/3, Jan 2022-Dec 2023
- Visiting Associate, Aug 2018-, Caltech
- Research Scientist, Feb 2011-: Jet Propulsion Laboratory, Caltech
- Assistant Researcher, Feb 2010-Feb2011: University of California, Berkeley
- Research associate, Feb 2008-Feb 2010: University of California, Berkeley
- Research associate, Dec 2007-Feb 2008: University of Maryland-College Park

Education

- Ph. D, December 2007: University of Maryland-College Park.
- M. S., Spring 2003: Nanjing Institute of Meteorology, China
- B. S., 2000: Nanjing Institute of Meteorology, China.

Honors and Awards

- JPL Voyager Award (2022)
- JPL Team Award (2022)
- NASA Exceptional Achievement medal (2018)
- JPL Ed Stone Award (2018)
- JPL Voyager Award (2017)
- NASA early career achievement award (2015)
- NASA Group Achievement Award, Carbon Monitoring System Flux Pilot Project Team (2013)
- Best Ph. D thesis award in Atmospheric and Oceanic Science department, University of Maryland, 2007
- Second place student paper award for “Application of Local Ensemble Transform Kalman Filter: Perfect model experiments with NASA fvGCM” in AMS 86th annual meeting held in Atlanta, GA, Jan. 28-Feb. 3, 2006

Selected Publications

2024

Liu, J, et al., The reduced net carbon uptake over northern hemisphere land causes the close-to-normal CO₂ growth rate in 2021 La Niña, *Science Advances*, Accepted

Stanley, M., Kuusela, M., Byrne, B., and Liu, J.: Technical note: Posterior Uncertainty Estimation via a Monte Carlo Procedure Specialized for Data Assimilation, *EGUsphere* [preprint], <https://doi.org/10.5194/egusphere-2023-2675>, 2024.

Liu, J., et al., Nonlinear carbon flux response to aridity and water storage deficit during 2015-2016 El Niño compromised recovery of the tropical South America carbon balance, *AGU-Advances*, *minor revision*.

Byrne, B., Liu, J., Bowman, K. W., Yin, Y., Yun, J., Ferreira, G. D., et al.

(2024). Regional inversion shows promise in capturing extreme-event-driven CO₂ flux anomalies but is limited by atmospheric CO₂ observational coverage. *Journal of Geophysical Research: Atmospheres*, 129, e2023JD040006. <https://doi.org/10.1029/2023JD040006>

Hobbs, J., Katzfuss, M., Nguyen, H., Yadav, V., and Liu, J.: Functional analysis of variance (ANOVA) for carbon flux estimates from remote sensing data, *Geosci. Model Dev.*, 17, 1133–1151, <https://doi.org/10.5194/gmd-17-1133-2024>, 2024.

Liu, J., Wennberg, P.O. An emergent constraint on the thermal sensitivity of photosynthesis and greenness in the high latitude northern forests. *Sci Rep* **14**, 6189 (2024). <https://doi.org/10.1038/s41598-024-56362-1>

Chen, et al, (including J. Liu) 2024 *Environ. Res. Lett.* in press, DOI 10.1088/1748-9326/ad3cf7, <https://doi.org/10.1088/1748-9326/ad3cf7>

Yun, J., Liu, J., Byrne, B., Weir, B., Ott, L. E., McKain, K., Baier, B., and Gatti, L. V.: Quantification of regional terrestrial biosphere CO₂ flux errors in v10 OCO-2 MIP models using airborne measurements, *EGUsphere* [preprint], <https://doi.org/10.5194/egusphere-2023-2258>, 2023.

2023

Wang, Y., Liu, J., Wennberg, P. O., He, L., Bonal, D., Köhler, P., Frankenberg, C., Sitch, S., & Friedlingstein, P.(2023). Elucidating climatic drivers of photosynthesis by tropical forests. *Global Change Biology*, 29, 4811–4825. <https://doi.org/10.1111/gcb.16837>

Friedlingstein, P., (including J. Liu): Global Carbon Budget 2023, *Earth Syst. Sci. Data*, 15, 5301–5369, <https://doi.org/10.5194/essd-15-5301-2023>, 2023.

Levine, P. A., Bloom, A. A., Bowman, K. W., Reager, J. T., Worden, J. R., Liu, J., et al. (2023). Water stress dominates 21st-century tropical land carbon uptake. *Global Biogeochemical Cycles*, 37, e2023GB007702. <https://doi.org/10.1029/2023GB007702>

Gaubert, B., Stephens, B. B., Baker, D. F., Basu, S., Bertolacci, M., Bowman, K. W., et al. (2023). Neutral tropical African CO₂ exchange estimated from aircraft and satellite observations. *Global Biogeochemical Cycles*, 37, e2023GB007804. <https://doi.org/10.1029/2023GB007804>

Wu, D., et al.: A simplified non-linear chemistry transport model for analyzing NO₂ column observations: STILT–NO_x, *Geosci. Model Dev.*, 16, 6161–6185,

<https://doi.org/10.5194/gmd-16-6161-2023>, 2023.

Wang, J., Zeng, N., Wang, M., Jiang, F., Chevallier, F., Crowell, S., et al. (2023). Anomalous net biome exchange over Amazonian rainforests induced by the 2015/16 El Niño: Soil dryness-shaped spatial pattern but temperature-dominated total flux. *Geophysical Research Letters*, 50, e2023GL103379. <https://doi.org/10.1029/2023GL103379>

Taylor, T. E., O'Dell, C. W., (including **Liu, J.**) et al., Evaluating the consistency between OCO-2 and OCO-3 XCO₂ estimates derived from the NASA ACOS version 10 retrieval algorithm, *Atmos. Meas. Tech. Discuss.* [preprint], <https://doi.org/10.5194/amt-2022-329>, in review, 2023.

Quetin, G. R., Famiglietti, C. A., Dadap, N. C., Bloom, A. A., Bowman, K. W., Diffenbaugh, N. S., **Liu, J.**, et al. (2023). Attributing past carbon fluxes to CO₂ and climate change: Respiration response to CO₂ fertilization shifts regional distribution of the carbon sink. *Global Biogeochemical Cycles*, 37, e2022GB007478. <https://doi.org/10.1029/2022GB007478>

Byrne, B., Baker, D. F., Basu, S., Bertolacci, M., Bowman, K. W., Carroll, D., Chatterjee, A., Chevallier, F., Ciais, P., Cressie, N., Crisp, D., Crowell, S., Deng, F., Deng, Z., Deutscher, N. M., Dubey, M. K., Feng, S., García, O. E., Griffith, D. W. T., Herkommer, B., Hu, L., Jacobson, A. R., Janardanan, R., Jeong, S., Johnson, M. S., Jones, D. B. A., Kivi, R., **Liu, J.**, Liu, Z., Maksyutov, S., Miller, J. B., Miller, S. M., Morino, I., Notholt, J., Oda, T., O'Dell, C. W., Oh, Y.-S., Ohyama, H., Patra, P. K., Peiro, H., Petri, C., Philip, S., Pollard, D. F., Poulter, B., Remaud, M., Schuh, A., Sha, M. K., Shiomi, K., Strong, K., Sweeney, C., Té, Y., Tian, H., Velasco, V. A., Vrekoussis, M., Warneke, T., Worden, J. R., Wunch, D., Yao, Y., Yun, J., Zammit-Mangion, A., and Zeng, N.: National CO₂ budgets (2015–2020) inferred from atmospheric CO₂ observations in support of the global stocktake, *Earth Syst. Sci. Data*, 15, 963–1004, <https://doi.org/10.5194/essd-15-963-2023>, 2023.

2022

He, Wei, Fei Jiang, Mousong Wu, Weimin Ju, Marko Scholze, Zhi Chen, Brendan Byrne, **Liu, J.**, et al. n.d. “China’s Terrestrial Carbon Sink over 2010–2015 Constrained by Satellite Observations of Atmospheric CO₂ and Land Surface Variables.” *Journal of Geophysical Research: Biogeosciences* n/a (n/a): e2021JG006644. <https://doi.org/https://doi.org/10.1029/2021JG006644>.

Wu, D., **Liu, J.**, Wennberg, P. O., Palmer, P. I., Nelson, R. R., Kiel, M., and Eldering, A.: Towards sector-based attribution using intra-city variations in satellite-based emission ratios between CO₂ and CO, *Atmos. Chem. Phys.*, 22, 14547–14570,

<https://doi.org/10.5194/acp-22-14547-2022>, 2022.

He, L., Wei, J., Wang, Y., Shang, Q., **Liu, J.**, Yin, Y., et al. (2022). Marked impacts of pollution mitigation on crop yields in China. *Earth's Future*, 10, e2022EF002936. <https://doi.org/10.1029/2022EF002936>

Friedlingstein, P., et al. (including **J. Liu**) Global Carbon Budget 2022, *Earth Syst. Sci. Data*, 14, 4811–4900, <https://doi.org/10.5194/essd-14-4811-2022>, 2022.

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Zhang, Li, Kenneth J Davis, Andrew E Schuh, Andrew R Jacobson, Sandip Pal, Yu Yan Cui, David Baker, (including **Liu, J.**) et al. 2022. “Multi-Season Evaluation of CO₂ Weather in OCO-2 MIP Models.” *Journal of Geophysical Research: Atmospheres* 127 (2): e2021JD035457. <https://doi.org/https://doi.org/10.1029/2021JD035457>.

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Laughner, Joshua L, Jessica L Neu, David Schimel, Paul O Wennberg, Kelley Barsanti, Kevin W Bowman, Abhishek Chatterjee, et al. 2021. “Societal Shifts Due to COVID-19 Reveal Large-Scale Complexities and Feedbacks between Atmospheric Chemistry and Climate Change.” *Proceedings of the National Academy of Sciences* 118 (46). <https://doi.org/10.1073/pnas.2109481118>.

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Aridity {textendash} carbon Feedbacks and the Future of Carbon Sequestration,” October. <https://doi.org/10.1088/1748-9326/ac2ce8>.

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- Parazoo, Nicholas C, Kevin W Bowman, Bianca C Baier, Junjie Liu, Meemong Lee, Le Kuai, Yoichi Shiga, et al. 2021. “Covariation of Airborne Biogenic Tracers (CO₂, COS, and CO) Supports Stronger Than Expected Growing Season Photosynthetic Uptake in the Southeastern US.” *Global Biogeochemical Cycles* 35 (10): e2021GB006956. <https://doi.org/https://doi.org/10.1029/2021GB006956>.
- Park, Chaerin, Sujong Jeong, Hoonyoung Park, Jeongmin Yun, and **Junjie Liu**. 2021. “Evaluation of the Potential Use of Satellite-Derived XCO₂ in Detecting CO₂ Enhancement in Megacities with Limited Ground Observations: A Case Study in Seoul Using Orbiting Carbon Observatory-2.” *Asia-Pacific Journal of Atmospheric Sciences* 57 (2): 289–99. <https://doi.org/10.1007/s13143-020-00202-5>.
- Peiro, H, S Crowell, A Schuh, D F Baker, C O’Dell, A R Jacobson, F Chevallier, et al. 2021. “Four Years of Global Carbon Cycle Observed from OCO-2 Version 9 and *in Situ* Data, and Comparison to OCO-2 V7.” *Atmospheric Chemistry and Physics Discussions* 2021: 1–50. <https://doi.org/10.5194/acp-2021-373>.
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- Chen, Z., Huntzinger, D. N., **Liu, J.**,, and Miller, S. M.: Five years of variability in the global carbon cycle: comparing an estimate from the Orbiting Carbon Observatory-2 and process-based models, *Environ. Res. Lett.* **16** 054041
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- Chen, Z., **Liu, J.**, Henze, D. K., Huntzinger, D. N., Wells, K. C., and Miller, S. M.: Linking global terrestrial CO₂ fluxes and environmental drivers using OCO-2 and a geostatistical inverse model, *Atmos. Chem. Phys.*, 21, 6663–6680, <https://doi.org/10.5194/acp-21-6663-2021>, 2021.

Worden, S., Fu, R., Chakraborty, S., **Liu, J.**, & Worden, J. (2021). Where does moisture come from over the Congo Basin? *Journal of Geophysical Research: Biogeosciences*, 126, e2020JG006024. <https://doi.org/10.1029/2020JG006024>

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Liu, J., Baskaran, L., Bowman, K., Schimel, D., Bloom, A. A., Parazoo, N. C., Oda, T., Carroll, D., Menemenlis, D., Joiner, J., Commane, R., Daube, B., Gatti, L. V., McKain, K., Miller, J., Stephens, B. B., Sweeney, C., and Wofsy, S.: Carbon Monitoring System Flux Net Biosphere Exchange 2020 (CMS-Flux NBE 2020), *Earth Syst. Sci. Data*, 13, 299–330, <https://doi.org/10.5194/essd-13-299-2021>, 2021.

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Carroll, D., Menemenlis, D., et al. (including **J. Liu**), (2020). The ECCO-Darwin data-assimilative global ocean biogeochemistry model: Estimates of seasonal to multidecadal surface ocean $p\text{CO}_2$ and air-sea CO_2 flux. *Journal of Advances in Modeling Earth Systems*, 12, e2019MS001888. <https://doi.org/10.1029/2019MS001888>

Liao, E., Resplandy, L., Liu, J., & Bowman, K. W. (2020). Amplification of the ocean carbon sink during El Niños: Role of poleward Ekman transport and influence on atmospheric CO_2 . *Global Biogeochemical Cycles*, 34, e2020GB006574. <https://doi.org/10.1029/2020GB006574>

Yin, Y. et al. (including **J. Liu**), 2020, Fire decline in dry tropical ecosystems enhances decadal land carbon sink. *Nat Commun* **11**, 1900 (2020). <https://doi.org/10.1038/s41467-020-15852-2>

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Byrne, B. *, **Liu, J.**, Bloom, A. A., Bowman, K. W., Butterfield, Z., Joiner, J., et al. (2020). Contrasting regional carbon cycle responses to seasonal climate anomalies across the east-west divide of temperate North America. *Global Biogeochemical Cycles*, 34, e2020GB006598. <https://doi.org/10.1029/2020GB006598>

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Shi, M., **Liu, J.**, Worden, J. R., Bloom, A. A., Wong, S., & Fu, R. (2019). The 2005 Amazon drought legacy effect delayed the 2006 wet season onset. *Geophysical Research Letters*, 46, 9082–9090. <https://doi.org/10.1029/2019GL083776>

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CO₂ fluxes estimated from OCO-2 retrievals, *Atmos. Chem. Phys.*, 19, 13267–13287, <https://doi.org/10.5194/acp-19-13267-2019>, 2019.

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Prior 2019

Basu, S., Baker, D. F., Chevallier, F., Patra, P. K., **Liu, J.**, and Miller, J. B.: The impact of transport model differences on CO₂ surface flux estimates from OCO-2 retrievals of column average CO₂, *Atmos. Chem. Phys.*, 18, 7189–7215, <https://doi.org/10.5194/acp-18-7189-2018>, 2018.

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- NASA OCO Science team, title: Revealing the mystery of African Carbon cycle. PI, 2021-2024
- NASA Carbon Cycle science program, title: Contrasting carbon-climate interactions from interannual to long-term carbon-climate feedbacks across tropical continents. PI, 2021-2024
- NASA CMS program, title: High-Resolution Carbon Monitoring System in East Africa: Unifying Top-Down Atmospheric Inversion and Bottom-Up Next-Generation Vegetation-Soil Models and Observations, **co-I, institutional PI, 2021-2024.**
- NASA CMS program, title: Preparing CMS flux for inventory applications, **co-I, institutional PI, 2021-2024.**
- NASA OCO Science Team, title: Revealing the mystery of African carbon cycle, **PI: 2021-2024.**
- NASA OCO Science Team, **PI, 2024-207**

- NASA OCO Science Team, title: Diagnosing and attributing Arctic-Boreal carbon fluxes using in situ and satellite CO₂ monitoring network. **co-I, institutional PI, 2021-2024.**
- NASA CMS program, title: Decadal CMS-Flux, co-I, **2023-2026**

Community Service

- Reviewer for Nature, Nature communications, Science Advance, Nature Plants, Scientific Report, Monthly Weather Review, Quarterly Journal of, Tellus, Climate Dynamics, Journal of Climate, Atmospheric Chemistry and Physics, and Geophysical Model Development
- Reviewer for NASA, NOAA and NSF proposals

Mentoring Experience

Current students and postdocs

Postdoc: Shuang Ma (JPL, co-advise with Anthony Bloom), Jeongmin Yun (JPL), Eren Bilir (JPL, co-advise with Anthony Bloom), Dien Wu (Caltech, co-advise with Paul Wennberg)

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