

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 North Star Award for innovation (2025)
- 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

Selected Publications

2026

Liu, K., **Liu, J.**, et al., Heterogeneous Responses of High-Latitude Forest Productivity to Interannual Climate Variability, *Geophysical Research Letters*, 2026, 10.1029/2025GL121078

Byrne, B., **Liu, J.**, Domke, G. M., Ogle, S. M., Ferreira, G. D., Bar-On, Y. M., et al. (2026). Significant influence of lateral Carbon fluxes on regional U.S. Carbon budgets. *Global Biogeochemical Cycles*, 40, e2025GB009020. <https://doi.org/10.1029/2025GB009020>

- Liu, J.** (2026). The growing threat of extreme drought-heat to the Amazon carbon sink. *AGU Advances*, 7, e2026AV002309. <https://doi.org/10.1029/2026AV002309>
- Liu, J., Basu, S., Byrne, B., Yun, J., & O'Dell, C.** (2026). The impact of OCO-2 seasonally dependent sampling on carbon flux estimation in the northern tropical Africa. *Geophysical Research Letters*, 53, e2025GL119838. <https://doi.org/10.1029/2025GL119838>
- Shi, M., Fang, Y., McDowell, N., Koven, C., Liu, J., Kuai, L., et al.** (2026). Accelerated carbon and water cycles in the Amazon and Congo basins revealed from TRENDY models and remote sensing products. *Global Biogeochemical Cycles*, 40, e2025GB008747. <https://doi.org/10.1029/2025GB008747>
- Dong, Guanyu, Fei Jiang, Yongguang Zhang, et al.** 2026. “Canadian Net Forest CO₂ Uptake Enhanced by Heat Drought via Reduced Respiration.” *Nature Geoscience*, ahead of print, January 5. <https://doi.org/10.1038/s41561-025-01875-1>.
- Ciais, Philippe, Piyu Ke, Yitong Yao, et al.** n.d. *Low Latency Global Carbon Budget Indicates Reduced Land Carbon Sink in the Year 2024*.
- 2025**
- Das, Chiranjit, Abhishek Chatterjee, Ravi Kumar Kunchala, and Junjie Liu.** 2025. “Regional Fire Dynamics and Its Contributions to Carbon Flux Variability in South Asia.” *Environmental Research Letters* 20 (12): 124004. <https://doi.org/10.1088/1748-9326/ae18e6>.
- Parazoo, N., D. Carroll, J. B. Abshire, et al.** 2025. “A U.S. Scientific Community Vision for Sustained Earth Observations of Greenhouse Gases to Support Local to Global Action.” *AGU Advances* 6 (6): e2025AV001914. <https://doi.org/10.1029/2025AV001914>.
- Singha Roy, Emili, Sajeev Philip, Matthew S. Johnson, et al.** 2025. “Gross Primary Production Variations Dominate the Response of Indian Terrestrial Carbon Fluxes to Global Climatic Phenomena.” *Communications Earth & Environment* 6 (1): 1054. <https://doi.org/10.1038/s43247-025-03013-6>.
- Whelan, Mary, Nick Parazoo, and Paul O. Wennberg, et al. (including J. Liu),** 2025. “A Blueprint for a Joint Meteorology and Atmospheric Composition Program”. W. M. Keck Institute of Space Studies (KISS), California Institute of Technology. <https://doi.org/10.26206/sk7nw-4ej15>.

- Worden, M. A., T. E. Bilir, A. A. Bloom, et al. 2025. “Combining Observations and Models: A Review of the CARDAMOM Framework for Data-Constrained Terrestrial Ecosystem Modeling.” *Global Change Biology* 31, no. 8: e70462. <https://doi.org/10.1111/gcb.70462>.
- Bilir, T. E., Bloom, A. A., Konings, A. G., Liu, J., Parazoo, N. C., Quetin, G. R., et al. (2025). Satellite-constrained reanalysis reveals CO₂ versus climate process compensation across the global land carbon sink. *AGU Advances*, 6, e2025AV001689. <https://doi.org/10.1029/2025AV001689>
- Pandey, S., Chevallier, F., Rödenbeck, C. *et al.* Reduction in Earth’s carbon budget imbalance. *Nat Commun* 16, 6818 (2025). <https://doi.org/10.1038/s41467-025-61588-2>
- Virkkala, AM., Rogers, B.M., Watts, J.D. *et al.* Wildfires offset the increasing but spatially heterogeneous Arctic–boreal CO₂ uptake. *Nat. Clim. Chang.* (2025). <https://doi.org/10.1038/s41558-024-02234-5>
- Deng, Z., Ciais, P., Hu, L., Martinez, A., Saunio, M., Thompson, R. L., Tibrewal, K., Peters, W., Byrne, B., Grassi, G., Palmer, P. I., Lujikx, I. T., Liu, Z., Liu, J., Fang, X., Wang, T., Tian, H., Tanaka, K., Bastos, A., Sitch, S., Poulter, B., Albergel, C., Tsuruta, A., Maksyutov, S., Janardan, R., Niwa, Y., Zheng, B., Thanwerdas, J., Belikov, D., Segers, A., and Chevallier, F.: Global greenhouse gas reconciliation 2022, *Earth Syst. Sci. Data*, 17, 1121–1152, <https://doi.org/10.5194/essd-17-1121-2025>, 2025.
- Friedlingstein, P. et al (including J. Liu). Global Carbon Budget 2024, *Earth Syst. Sci. Data*, 17, 965–1039, <https://doi.org/10.5194/essd-17-965-2025>, 2025.

2024

- Kennedy, R. E., Serbin, S., Dietze, M., Andersen, H., Babcock, C., Baker, D. F., Brown, M. E., Davis, K. J., Duncanson, L., Feng, S., Hudak, A. T., Liu, J., Patterson, P. L., Raczka, B., Cochrane, M. A., Sepulveda Carlo, E., Vargas, R. **2024. Characterizing and communicating uncertainty: lessons from NASA’s Carbon Monitoring System.** *Environmental Research Letters*. DOI: [10.1088/1748-9326/ad8be0](https://doi.org/10.1088/1748-9326/ad8be0)
- Hugelius, G., Ramage, J., Burke, E., Chatterjee, A., Smallman, T. L., Aalto, T., et al. (2024). Permafrost region greenhouse gas budgets suggest a weak CO₂ sink and CH₄ and N₂O sources, but magnitudes differ between top-down and bottom-up methods. *Global Biogeochemical Cycles*, 38, e2023GB007969. <https://doi.org/10.1029/2023GB007969>
- Byrne, B., Liu, J., Bowman, K.W. *et al.* Carbon emissions from the 2023 Canadian

wildfires. *Nature* (2024). <https://doi.org/10.1038/s41586-024-07878-z>

Ruixue Lei, Jeralyn Poe, Deborah Huntzinger, Junjie Liu, Stephen Stich, David F. Baker, Leyang Feng, Dylan C. Gaeta, Ziting Huang, Scot M. Miller, The Orbiting Carbon Observatory-2 (OCO-2) and in situ CO₂ data suggest a larger seasonal amplitude of the terrestrial carbon cycle compared to many dynamic global vegetation models, *Remote Sensing of Environment*, Volume 312, 2024, 114326, ISSN 0034-4257, <https://doi.org/10.1016/j.rse.2024.114326>.

Liu, J., Bowman, K., Palmer, P. I., Joiner, J., Levine, P., Bloom, A. A., et al. (2024). Enhanced carbon flux response to atmospheric aridity and water storage deficit during the 2015–2016 El Niño compromised carbon balance recovery in tropical South America. *AGU Advances*, 5, e2024AV001187. <https://doi.org/10.1029/2024AV001187>

Stanley, M., Kuusela, M., Byrne, B., and Liu, J.: Technical note: Posterior uncertainty estimation via a Monte Carlo procedure specialized for 4D-Var data assimilation, *Atmos. Chem. Phys.*, 24, 9419–9433, <https://doi.org/10.5194/acp-24-9419-2024>, 2024.

Pandey, S., Miller, J. B., Basu, S., Liu, J., Weir, B., Byrne, B., et al. (2024). Toward low-latency estimation of atmospheric CO₂ growth rates using satellite observations: Evaluating sampling errors of satellite and in situ observing approaches. *AGU Advances*, 5, e2023AV001145. <https://doi.org/10.1029/2023AV001145>

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. *Sci. Adv.* **10**,eadl2201(2024).DOI:10.1126/sciadv.ad

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>

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., Velazco, 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.

Byrne, B., **Liu, J.**, Yi, Y., Chatterjee, A., Basu, S., Cheng, R., Doughty, R., Chevallier, F., Bowman, K. W., Parazoo, N. C., Crisp, D., Li, X., Xiao, J., Sitch, S., Guenet, B., Deng, F., Johnson, M. S., Philip, S., McGuire, P. C., and Miller, C. E.: Multi-year observations reveal a larger than expected autumn respiration signal across northeast Eurasia, *Biogeosciences*, 19, 4779–4799, <https://doi.org/10.5194/bg-19-4779-2022>, 2022.

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>.

He, Liyin, Brendan Byrne, Yi Yin, **Junjie Liu**, and Christian Frankenberg. 2022.

“Remote-Sensing Derived Trends in Gross Primary Production Explain Increases in the CO₂ Seasonal Cycle Amplitude.” *Global Biogeochemical Cycles* 36 (9): e2021GB007220. <https://doi.org/https://doi.org/10.1029/2021GB007220>.

Friedlingstein, P., et al. (including **J. Liu**): Global Carbon Budget 2021, Earth Syst. Sci. Data, 14, 1917–2005, <https://doi.org/10.5194/essd-14-1917-2022>, 2022.

Cui, Yu Yan, Li Zhang, Andrew R Jacobson, Matthew S Johnson, Sajeev Philip, David Baker, Frederic Chevallier, et al. 2022. “Evaluating Global Atmospheric Inversions of Terrestrial Net Ecosystem Exchange CO₂ over North America on Seasonal and Sub-Continental Scales.” *Geophysical Research Letters* n/a (n/a): e2022GL100147. <https://doi.org/https://doi.org/10.1029/2022GL100147>.

2021

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>.

Barkhordarian, Armineh, Kevin W Bowman, Noel Cressie, Jeffrey Jewell, and **Junjie Liu**. 2021. “Emergent Constraints on Tropical Atmospheric Aridity{textendash}carbon Feedbacks and the Future of Carbon Sequestration,” October. <https://doi.org/10.1088/1748-9326/ac2ce8>.

Byrne, B, **J Liu**, M Lee, Y Yin, K W Bowman, K Miyazaki, A J Norton, et al. 2021. “The Carbon Cycle of Southeast Australia During 2019–2020: Drought, Fires, and Subsequent Recovery.” *AGU Advances* 2 (4): e2021AV000469. <https://doi.org/https://doi.org/10.1029/2021AV000469>.

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>.

Liao, E., Resplandy, L., **Liu, J.**, & Bowman, K. W. (2021). Future weakening of the ENSO ocean carbon buffer under anthropogenic forcing. *Geophysical Research Letters*, 48, e2021GL094021. <https://doi.org/10.1029/2021GL094021>

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

Worden, J., Saatchi, S., Keller, M., Bloom, A., **Liu, J.**, Parazoo, N., et al. (2021). Satellite observations of the tropical terrestrial carbon balance and interactions with the water cycle during the 21st century. *Reviews of Geophysics*, 59, e2020RG000711. <https://doi.org/10.1029/2020RG000711>

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>

2020

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.

Liu, J., Wennberg, P. O., Parazoo, N. C., Yin, Y., & Frankenberg, C. (2020). Observational constraints on the response of high-latitude northern forests to warming. *AGU Advances*, 1, e2020AV000228. <https://doi.org/10.1029/2020AV000228>

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*CO₂ and air-sea CO₂ 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 CO₂. *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>

Yi, Y., Kimball, J. S., Watts, J. D., Natali, S. M., Zona, D., **Liu, J.**, Ueyama, M., Kobayashi, H., Oechel, W., and Miller, C. E.: Investigating the sensitivity of soil heterotrophic respiration to recent snow cover changes in Alaska using a satellite-based permafrost carbon model, *Biogeosciences*, **17**, 5861–5882, <https://doi.org/10.5194/bg-17-5861-2020>, 2020.

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>

Byrne, B. *, Liu, J., Lee, M., Baker, I., Bowman, K. W., Deutscher, N. M., et al. (2020). Improved constraints on northern extratropical CO₂ fluxes obtained by combining surface-based and space-based atmospheric CO₂ measurements. *Journal of Geophysical Research: Atmospheres*, **125**, e2019JD032029. <https://doi.org/10.1029/2019JD032029>

Butler, M. P., Lauvaux, T., Feng, S., **Liu, J.**, Bowman, K. W., & Davis, K. J. (2020). Atmospheric simulations of total column CO₂ mole fractions from global to mesoscale within the carbon monitoring system flux inversion framework. *Atmosphere*, **11**(8), 787.

Bloom, A. A., Bowman, K. W., **Liu, J.**, Konings, A. G., Worden, J. R., Parazoo, N. C., Meyer, V., Reager, J. T., Worden, H. M., Jiang, Z., Quetin, G. R., Smallman, T. L., Exbrayat, J.-F., Yin, Y., Saatchi, S. S., Williams, M., and Schimel, D. S.: Lagged effects regulate the inter-annual variability of the tropical carbon balance, *Biogeosciences*, **17**, 6393–6422, <https://doi.org/10.5194/bg-17-6393-2020>, 2020.

Jones, S., Rowland, L., Cox, P., Hemming, D., Wiltshire, A., Williams, K., Parazoo, N. C., **Liu, J.**, da Costa, A. C. L., Meir, P., Mencuccini, M., and Harper, A. B.: The impact of a simple representation of non-structural carbohydrates on the simulated response of tropical forests to drought, *Biogeosciences*, **17**, 3589–3612, <https://doi.org/10.5194/bg-17-3589-2020>, 2020.

Yun et al., (including **Liu, J.**), Enhanced regional terrestrial carbon uptake over Korea revealed by atmospheric CO₂ measurements from 1999 to 2017, *Global Change Biology*, 2020, DOI: 10.1111/gcb.15.061

Yin, Y., Byrne, B., **Liu, J.**, Wennberg, P., Davis, K. J., Magney, T., et al. (2020). Cropland carbon uptake delayed and reduced by 2019 Midwest floods. *AGU Advances*, 1, e2019AV000140. <https://doi.org/10.1029/2019AV000140>

Year 2019

Feng, S., T. Lauvaux, K. Davis, K. Keller, Y. Zhou, C. Williams, A. Schuh, **J. Liu**, I. Baker, 2019: Seasonal characteristics of model uncertainties from biogenic fluxes, transport, and large-scale boundary inflow in atmospheric CO₂ simulations over North America. *J. Geophys. Res.-Atmos.*, <https://doi.org/10.1029/2019JD031165>

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>

Crowell, S., Baker, D., Schuh, A., Basu, S., Jacobson, A. R., Chevallier, F., **Liu, J.**, Deng, F., Feng, L., McKain, K., Chatterjee, A., Miller, J. B., Stephens, B. B., Eldering, A., Crisp, D., Schimel, D., Nassar, R., O'Dell, C. W., Oda, T., Sweeney, C., Palmer, P. I., and Jones, D. B. A.: The 2015–2016 carbon cycle as seen from OCO-2 and the global in situ network, *Atmos. Chem. Phys.*, 19, 9797–9831, <https://doi.org/10.5194/acp-19-9797-2019>, 2019.

Philip, S., Johnson, M. S., Potter, C., Genovesse, V., Baker, D. F., Haynes, K. D., Henze, D. K., **Liu, J.**, and Poulter, B.: Prior biosphere model impact on global terrestrial CO₂ fluxes estimated from OCO-2 retrievals, *Atmos. Chem. Phys.*, 19, 13267–13287, <https://doi.org/10.5194/acp-19-13267-2019>, 2019.

Konings, A. G., Bloom, A. A., **Liu, J.**, Parazoo, N. C., Schimel, D. S., and Bowman, K. W.: Global satellite-driven estimates of heterotrophic respiration, *Biogeosciences*, 16, 2269–2284, <https://doi.org/10.5194/bg-16-2269-2019>, 2019.

Schuh, A., A. R. Jacobson, S. Basu, B. Weir, D. Baker, K. Bowman, F. Chevallier, S. Crowell, K. Davis, F. Deng, S. Denning, L. Feng, D. Jones, **J. Liu**, and P. Palmer, 2019, Quantifying the impact of atmospheric transport uncertainty on CO₂ surface flux estimates. *Global Biogeochemical Cycles*, 33, 484–500.

.....

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.

Hedelius, J. K., **Liu, J.**, Oda, T., Maksyutov, S., Roehl, C. M., Iraci, L. T., Podolske, J. R., Hillyard, P. W., Liang, J., Gurney, K. R., Wunch, D., and Wennberg, P. O.: Southern California megacity CO₂, CH₄, and CO flux estimates using ground- and

- space-based remote sensing and a Lagrangian model, *Atmos. Chem. Phys.*, 18, 16271-16291, <https://doi.org/10.5194/acp-18-16271-2018>, 2018.
- Liu, J.**, et al., 2018, Detecting drought impact on terrestrial biosphere carbon fluxes over contiguous US with satellite observations, *Environmental Research Letters*, vol 13, 095003.
- Liu J.**, et al., 2018, Response to Comment on “Contrasting carbon cycle responses of tropical continents to 2015-2016 El Nino”, Vol. 362, Issue 6418, eaat1211. DOI: 10.1126/science.aat1211
- Souri, A. H., Choi, Y., Pan, S., Curci, G., Nowlan, C. R., Janz, S. J., M. K. Kowalewski, **J. Liu** et al.(2018). First Top-Down Estimates of Anthropogenic NO_x Emissions Using High-Resolution Airborne Remote Sensing Observations. *Journal of Geophysical Research: Atmospheres*, 123. <https://doi.org/10.1002/2017JD028009>
- Sellers, P. J., D. S. Schimel, B. Moore, **J. Liu**, and A. Eldering, Observing Carbon Cycle-climate feedbacks from space, Proceedings of the National Academy of Sciences Jul 2018, 115 (31) 7860-7868; DOI: 10.1073/pnas.1716613115
- Parazoo NC, Arneeth A, Pugh TAM, et al (including **Liu, J.**). 2018, Spring photosynthetic onset and net CO₂ uptake in Alaska triggered by landscape thawing. *Glob Change Biol.* 2018;24:3416–3435. <https://doi.org/10.1111/gcb.14283>
- *****
- Liu, J.** et al 2017 Contrasting carbon cycle responses of the tropical continents to the 2015–2016 El Nino Science **358** eaam5690
- Eldering, A., Wennberg, P. O., Crisp, D., Schimel, D. S., Gunson, M. R., Chatterjee, A.,**J. Liu**, et al.(2017). The Orbiting Carbon Observatory-2 early science investigations of regional carbon dioxide fluxes. Science, 358, eaam5745.
- Shi, M., **Liu, J.**, Zhao, M., Yu, Y., & Saatchi, S. (2017). Mechanistic processes controlling persistent changes of forest canopy structure after 2005 Amazon drought. *Journal of Geophysical Research: Biogeosciences*, 122, 3378–3390. <https://doi.org/10.1002/2017JG003966>
- Mueller, K.J., **J. Liu**, W. McCarty, and R. Gelaro, 2017: An Adjoint-Based Forecast Impact from Assimilating MISR Winds into the GEOS-5 Data Assimilation and Forecasting System. *Mon. Wea. Rev.*, **145**, 4937–4947, <https://doi.org/10.1175/MWR-D-17-0047.1>
- Bowman, K. W., **Liu, J.**, Bloom, A. A., Parazoo, N. C., Lee, M., Jiang, Z., ... Wunch, D. (2017). Global and Brazilian carbon response to El Niño Modoki 2011–2010. *Earth and Space Science*, 4, 637–660. <https://doi.org/10.1002/2016EA000204>
- Byrne, B., D. B. A. Jones, K. Strong, Z.-C. Zeng, F. Deng, and J. Liu,(2017), Sensitivity of CO₂ surface flux constraints to observational coverage, *J. Geophys. Res. Atmos.*, 122, 6672–6694, doi:[10.1002/2016JD026164](https://doi.org/10.1002/2016JD026164).
- Fischer, M. L., N. Parazoo, K. Brophy, X Cui, S. Jeong, **J. Liu** et al. (2017), Simulating estimation of California fossil fuel and biosphere carbon dioxide exchanges combining in situ tower and satellite column observations, *J. Geophys. Res. Atmos.*, 122, doi:10.1002/2016JD025617.

Fisher, J.B., Sikka, M., Huntzinger, D.N., Schwalm, C., **Liu, J.**, 2016. 3-hourly temporal downscaling of monthly global terrestrial biosphere model net ecosystem exchange. *Biogeosciences* 13(14): 4271-4277.

Liu, J., K. W. Bowman, and M. Lee (2016), Comparison between the Local Ensemble Transform Kalman Filter (LETKF) and 4D-Var in atmospheric CO₂ flux inversion with the Goddard Earth Observing System-Chem model and the observation impact diagnostics from the LETKF, *J. Geophys. Res. Atmos.*, 121, 13,066–13,087, doi:[10.1002/2016JD025100](https://doi.org/10.1002/2016JD025100).

Liu, J., and K. Bowman (2016), A method for independent validation of surface fluxes from atmospheric inversion: Application to CO₂, *Geophys. Res. Lett.*, 43, doi:[10.1002/2016GL067828](https://doi.org/10.1002/2016GL067828).

Kuai, L., et al. (including **Liu, J.**) (2015), Estimate of carbonyl sulfide tropical oceanic surface fluxes using Aura Tropospheric Emission Spectrometer observations, *J. Geophys. Res. Atmos.*, 120, 11,012–11,023, doi:[10.1002/2015JD023493](https://doi.org/10.1002/2015JD023493).

Liu, J., K. W. Bowman, and D. K. Henze (2015), Source-receptor relationships of column-average CO₂ and implications for the impact of observations on flux inversions. *J. Geophys. Res. Atmos.*, 120, 5214–5236. doi: 10.1002/2014JD022914.

Worden, J. R., Turner, A. J., Bloom, A., Kulawik, S. S., **Liu, J.**, Lee, M., Weidner, R., Bowman, K., Frankenberg, C., Parker, R., and Payne, V. H.: Quantifying lower tropospheric methane concentrations using GOSAT near-IR and TES thermal IR measurements, *Atmos. Meas. Tech.*, 8, 3433-3445, doi:10.5194/amt-8-3433-2015, 2015.

Bousserez, N., D. K. Henze, A. Perkins, K. W. Bowman, M. Lee, **J. Liu**, D.B.A. Jones, F. Deng (2015), Improved analysis error covariance matrix estimates for variational inverse problems, *Q. J. R. Meteorol. Soc.*, 141: 1906--1921, do:10.1002/qj.2495,

Miller, S. M., Hayek, M. N., Andrews, A. E., Fung, I., **and Liu, J.**: Biases in atmospheric CO₂ estimates from correlated meteorology modeling errors, *Atmos. Chem. Phys.*, 15, 2903-2914, doi:10.5194/acp-15-2903-2015, 2015.

Ott, L. E., Steven Pawson, George J. Collatz, Watson W. Gregg, Dimitris Menemenlis, Holger Brix, Cecile S. Rousseaux, Kevin W. Bowman, **Junjie Liu**, Annmarie Eldering, Michael R. Gunson, and Stephan R. Kawa, 2015, Assessing the magnitude of CO₂ flux uncertainty in atmospheric CO₂ records using products from NASA's Carbon Monitoring Flux Pilot Project, *J. Geophys. Res. Atmos.*, 120, doi:10.1002/2014JD022411.

Kuai, L., J. Worden, S. S. Kulawik, S. A. Montzka, and **J. Liu** (2014): Characterization of aura tropospheric emissions spectrometer carbonyl sulfide retrievals over ocean, *Atmos. Meas. Tech.*, 7, 163-172, doi:10.5194/amt-7-163-2014.

Liu, J., Bowman, K., Lee, M., Henze, D., Bousserez, N., Brix, H., Collatz, G., Menemenlis, D., Ott, L., Pawson, S., Jones, D., Nassar, R.. Carbon monitoring system

- flux estimation and attribution: impact of ACOS-GOSAT XCO₂ sampling on the inference of terrestrial biospheric sources and sinks. *Tellus B*, North America, 66, may. 2014. Available at: <http://www.tellusb.net/index.php/tellusb/article/view/22486>
- Parazoo, N. C., et al. (including **Liu, J.**) (2013), Interpreting seasonal changes in the carbon balance of southern Amazonia using measurements of XCO₂ and chlorophyll fluorescence from GOSAT, *Geophys. Res. Lett.*, 40, 2829–2833, doi:10.1002/grl.50452.
- Worden, J., et al. (including **Liu, J.**) (2013), El Niño, the 2006 Indonesian peat fires, and the distribution of atmospheric methane, *Geophys. Res. Lett.*, 40, 4938–4943, doi:10.1002/grl.50937
- Liu, J.**, I. Fung, E. Kalnay, J.-S. Kang, E. T. Olsen, and L. Chen (2012), Simultaneous assimilation of AIRS Xco₂ and meteorological observations in a carbon climate model with an ensemble Kalman filter, *J. Geophys. Res.*, 117, D05309, doi:10.1029/2011JD016642.
- Kalnay, E., Y. Ota, T. Miyoshi, **J. Liu** (2012), A simpler formulation of forecast sensitivity to observations: application to ensemble Kalman filters. *Tellus A*.
- Kang, J.-S., E. Kalnay, T. Miyoshi, **J. Liu**, and I. Fung (2012), Estimation of surface carbon fluxes with an advanced data assimilation methodology, *J. Geophys. Res.*, 117, D24101, doi:10.1029/2012JD018259.
- Liu, J.**, I. Fung, E. Kalnay, and J.-S. Kang (2011), CO₂ transport uncertainties from the uncertainties in meteorological fields, *Geophys. Res. Lett.*, 38, L12808, doi:10.1029/2011GL047213.
- Kang, J.-S., E. Kalnay, **J. Liu**, I. Fung, T. Miyoshi, and K. Ide (2011), “Variable localization” in an ensemble Kalman filter: Application to the carbon cycle data assimilation, *J. Geophys. Res.*, 116, D09110, doi:10.1029/2010JD014673.
- Li, H., **J. Liu**, E. J. Fertig, E. Kalnay, E. Kostelich, and I. Szunyogh (2011), Improved analyses and forecasts with AIRS temperature retrievals using the Local Ensemble Transform Kalman Filter. *J. of Tropical Meteorology*. 17, 43-49.
- Li, H., **J. Liu**, and E. Kalnay, 2010: Correction of ‘Estimating observation impact without adjoint model in an ensemble Kalman filter’. *Quart. J. Roy. Meteor. Soc.* 136, 1652-1654
- Liu, J.**, E. Kalnay, T. Miyoshi, and C. Cardinali, 2009: Analysis sensitivity calculation within an ensemble Kalman filter. *Quart. J. Roy. Meteor. Soc.* **135**, 1842-1851
- Liu, J.**, H. Li, E. Kalnay, E.J. Kostelich, and I. Szunyogh, 2009: Univariate and Multivariate Assimilation of AIRS Humidity Retrievals with the Local Ensemble Transform Kalman Filter. *Mon. Wea. Rev.*, **137**, 3918–3932.
- Fertig, E. J., S.-J. Baek, B. R. Hunt, E. Ott, I. Szunyogh, J. A. Aravequia, E. Kalnay, H. Li, and **J. Liu**, 2009: Observation bias correction with an ensemble Kalman filter. *Tellus A*, **61**, 210-226.
- Liu, J.** and E. Kalnay, 2008: Estimating observation impact study without adjoint model in an ensemble Kalman filter. *Quart. J. Roy. Meteor. Soc.* **134**, 1327-1335.
- Liu, J.**, E. J. Fertig, H. Li, I. Szunyogh, B. Hunt, E. Kalnay, E. J. Kostelich, and R. Todling, 2008: Comparison between Local Ensemble Transform Kalman Filter and PSAS in the NASA finite volume GCM: perfect model experiments. *Nonlin. Processes in Geophys.*, 15, 645-659.

Liu, J. and E. Kalnay, 2007: Simple Doppler Wind Lidar (DWL) adaptive observation experiments with 3D-Var and an ensemble Kalman filter in a global primitive equations model. *Geophys. Res. Lett.*, **34**, L19808, doi: 10.1029/2007GL030707.

Liu, J., Y-H. Ding, and J-H. He, 2003: Analysis of typical Meiyu front structure in 1999. *Acta Meteorological Sinica*. **61**, 291-301.

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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
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