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Curriculum Vitae

EDUCATION

2011 **PhD, California Institute of Technology**,
Division of Geological and Planetary Sciences.
- Thesis: "*I: Retrieval of atmospheric carbon dioxide from high-resolution spectra. II: Interannual variability of the stratospheric quasi-biennial oscillation.*"
  Advisor: Prof. Yuk L. Yung.

2008 **Master of Science, California Institute of Technology**,
Division of Geological and Planetary Sciences.

2006 **Master of Science, Iowa State University**, Atmospheric Sciences.
- Thesis: "*CFD simulation study of the flow field in a tornado-like vortex.*"
  Advisor: Prof. William Gallus.

2003 **Bachelor of Science, Nanjing University, China**, Atmospheric Sciences.

APPOINTMENTS

2018-present Scientific Applications Software Engineer, **Jet Propulsion Laboratory, California Institute of Technology**
- Retrieval algorithm development for multi-satellites, e.g. OCO-2, TES, AIRS, OMI, CrIS, IASI, HyTES (aircraft).
- Satellite products validation e.g. OCO-2, TES
- Understand the relation between variation of the atmospheric carbonyl sulfide (OCS) and photosynthesis.

2015–2018 Assistant Researcher, Joint Institute for Regional Earth System Science & Engineering, **University of California, Los Angeles**, and **the Jet Propulsion Laboratory**, **California Institute of Technology**
- **Constrained the gross primary productivity** in global ecosystem models using observations of OCS.
- Detected and **quantified point sources of methane/ammonia** in Southern California
- Benchmarked ozone radiative forcing in climate models and quantified the impacts of hydrological variables on ozone radiative forcing

2013–2015 Assistant Scientist, **California Institute of Technology** and **the Jet Propulsion Laboratory**, **California Institute of Technology**
- **Quantified missing tropical OCS ocean flux** using Harvard's GEOS-Chem model and optimal estimation methods.
- Applied the WRF-STILT model to Japan's GOSAT satellite CO_2 measurements to **identify the footprint of carbon flux** over the Amazon basin.

2011–2013 Postdoctoral Scholar, **the Jet Propulsion Laboratory**, **California Institute of Technology**
- **Developed a retrieval algorithm** and retrieved the atmospheric OCS abundance using NASA's Tropospheric Emission Spectrometer (TES) satellite measurements
- Validated total column CO_2 from ground-based Total Carbon Column Observing Network (TCCON) near-infrared (NIR) observations with aircraft data
- Retrieved the lower tropospheric CO_2 abundance using combined TCCON and TES measurements

PEER-REVIEWED PUBLICATIONS

2025

34. Hasheminassab, S., Tratt, D. M., Kalashnikova, O. V., Chang, C. S., Alvarez, M., Buckland, K. N., Garay, M. J., Hopkins, F. M., Keim, E. R., **Kuai, L.**, Miao, Y., Pakbin, P., Porter, W. C., and Sowlat, M. H.: Tracing Ammonia Emission Sources in California's Salton Sea Region: Insights from Airborne Longwave-Infrared Hyperspectral Imaging and Ground Monitoring, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2025-1378, 2025.
33. **Le Kuai**, Olga Kalashnikova, Glynn Hulley, Karen Cady-Pereira, Kevin Bowman, Vivienne Payne, Francesca Hopkins, 2024, Application of HyTES observations from the high-altitude ER-2 aircraft for quantification of medium-scale ammonia sources including fires, finalizing for submission.

2024

32. Jiameng Lai, Linda M.J. Kooijmans, Wu Sun, Danica Lombardozzi, J. Elliott Campbell, Lianhong Gu, Yiqi Luo, **Le Kuai,** Ying Sun, Terrestrial Photosynthesis Inferred from Plant Carbonyl Sulfide Uptake, Nature, 10.1038/s41586-

024-08050-3, 2024.

2023

31. Thomas E. Taylor, et al., Evaluating the consistency between OCO-2 and OCO-3 XCO2 estimates derived from the NASA ACOS version 10 retrieval algorithm, AMTD, accepted, 1-61.
30. Wang, X., Jiang, X., Li, K. F., Liang, M. C., **Kuai, L**., Tan, L., & Yung, Y. L., Variations of Carbonyl Sulfide During the Dry/Wet Seasons Over the Amazon, GRL, *50*(5), e2022GL101717. https://doi.org/10.1029/2022GL101717, 2023
29. Malina, E., Bowman, K.W., Kantchev, V., **Kuai, L.,** Kurosu, T.P., Miyazaki, K., Natraj, V., Osterman, G.B. and Thill, M.D., Joint spectral retrievals of ozone with Suomi NPP CrIS augmented by S5P/TROPOMI. *EGUsphere*, pp.1-59, 2023

2022

28. **Kuai, L.,** C. Miller, N. Parazoo, I. Baker, M. Shi, A. Bloom, K. Bowman, M. Lee, Z. Zeng, J. Berry, R. Commane, Y. Yung: A New Method to benchmark the Alaskan Arctic Gross Primary Productivity (GPP), *Global Biogeochemical Cycles, 36, e2021GB007216. https://doi.org/10.1029/2021GB007216*, 2022
27 Stinecipher, J.R., Cameron‐Smith, P., **Kuai, L.,** Glatthor, N., Höpfner, M., Baker, I., Beer, C., Bowman, K., Lee, M., Miller, S.M. and Parazoo, N., 2022. Remotely Sensed Carbonyl Sulfide Constrains Model Estimates of Amazon Primary Productivity. Geophysical Research Letters, 49(9), p.e2021GL096802, 2022

2021

26. N. Parazoo, K. Bowman,B Baier, J. Liu1, M. Lee, **L Kuai**, Y. Shiga, I. Baker, M. Whelan, S. Feng, M. Krol, C. Sweeney, K. J.Davis, Covariation of airborne biogenic tracers (CO2, COS, and CO) supports stronger than 1expected growing season photosynthetic uptake in the southeastern US, ESSOAr | https://doi.org/10.1002/essoar.10505574.1
25. Jin Ma, Linda M. J. Kooijmans, Ara Cho, Stephen A. Montzka, Norbert Glatthor, John R. Worden, **Le Kuai**, Elliot L. Atlas, and Maarten C. Krol, Inverse modelling of carbonyl sulfide: implementation, evaluation and implications for the global budget, Atmos. Chem. Phys., 21, 3507–3529, https://doi.org/10.5194/acp-21-3507-2021, 2021.

2020

24. M. E. Whelan, L. D. L. Anderegg, G. Badgley, J. E. Campbell, R. Commane, C. Frankenberg, T. W. Hilton, L. Kuai, N. Parazoo, Y. Shiga, Y. Wang, and J. Worden, Scientific Communities Striving for a Common Cause: Innovations in Carbon Cycle Science, v101, issue 9, page E1537-E1543, DOI: https://doi.org/10.1175/BAMS-D-19-0306.1, 2020.
23. V. Payne, Brian Drouin, Fabiano Oyafuso, **Le Kuai**, Brendan Fisher, Keeyoon Sung, Deacon Nemchick, Timothy crawford, Mike Smyth, David Crisp, Erin Adkins, Joseph Hodges, David Long, Eli Mlawer, Aronne Merrelli, Elizabeth Lunny, Christopher O'Dell: Absorption Coefficient (ABSCO) Tables for the Orbiting Carbon Observatories: Version 5.1, Journal of Quantitative Spectroscopy and Radiative Transfer, v255, https://doi.org/10.1016/j.jqsrt.2020.107217, 2020
22. **Kuai, L.,** Bowman, K. W., Worden, H., Miyazaki, K., Kulawik, S., Conley, A., Lamarque, J.-F., Paulot, F., Paynter, D., Oman, L. D., Strode, S., Rozanov, E., Stenke, A., Revell, L., Plummer, D. A., Deushi, M., Jöckel, P., and Kunze, M.: Attribution of Chemistry-Climate Model Initiative (CCMI) ozone radiative flux bias from satellites, Atmos. Chem. Phy., 20, 281–301, https://doi.org/10.5194/acp-20-281-2020, 2020.

2019

21. **Kuai, L**., et al., "Quantification of Ammonia Emissions With High Spatial Resolution Thermal Infrared Observations From the Hyperspectral Thermal Emission Spectrometer (HyTES) Airborne Instrument," in IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. doi: 10.1109/JSTARS.2019.2918093. URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8745674&isnumber=4609444
20. J. R. Stinecipher, P. Cameron-Smith, N. Blake, **L. Kuai,** B. Lejeune, E. Mahieu, I. Simpson, R. Yokelson, J. E. Campbell: Biomass burning unlikely to account for missing source of carbonyl sulfide, GRL, 2019, doi: 10.1029/2019GL085567
19. Jongaramrungruang, S., Frankenberg, C., Matheou, G., Thorpe, A., Thompson, D. R., **Kuai, L**., and Duren, R.: Towards accurate methane point-source quantification from high-resolution 2D plume imagery, Atmos. Meas. Tech., 12, 6667–6681, https://doi.org/10.5194/amt-12-6667-2019, 2019

2018

18. Zumkehr, A., T. W. Hilton, M. E. Whelan, S. Smith, **L. Kuai**, J. R. Worden, J. E. Campbell (2018): Global gridded anthropogenic emissions inventory of carbonyl sulfide, Atmospheric Environment, 183, 11–19, doi:10.1016/j.atmosenv.2018.03.063.
17. Whelan, M. E., S. T. Lennartz, T. E. Gimeno, R. Wehr, G. Wohlfahrt, Y. Wang, L. M. J. Kooijmans, T. W. Hilton, S. Belviso, P. Peylin, R. Commane, W. Sun, H. Chen, **L. Kuai**, I. Mammarella, K. Maseyk, M. Berkelhammer, K.-F. Li, D. Yakir, A. Zumkehr, Y. Katayama, J. Ogée, F. M. Spielmann, F. Kitz, B. Rastogi, J. Kesselmeier, J. Marshall, K.-M. Erkkilä, L. Wingate, L. K. Meredith, W. He, R. Bunk, T. Launois, T. Vesala, J. A. Schmidt, C. G. Fichot, U. Seibt, S. Saleska, E. S. Saltzman, S. A. Montzka, J. A. Berry, and J. E. Campbell (2018), Reviews and Syntheses: Carbonyl Sulfide as a Multi-scale Tracer for Carbon and Water Cycles, Biogeosci., 15, 3625–3657, doi:10.5194/bg-15-3625-2018.
16. Veraverbeke, S., P. Dennison, I. Gitas, G. Hulley, O. Kalashnikova, T. Katagis, **L. Kuai**, R. Meng, D. Roberts, N. Stavros

(2018), Hyperspectral remote sensing of fire: a review, Remote Sensing of Environment, 216, 105–121, doi:10.1016/j.rse.2018.06.020.

2017

15. **Kuai, L.**, K. W. Bowman, H. M. Worden, R. L. Herman, S. S. Kulawik (2017): Hydrological controls on the tropospheric ozone greenhouse gas effect, *Elem. Sci. Anth.*, 5, 10, doi:10.1525/elementa.208.
14. S. S. Kulawik, C. O'Dell, V. H. Payne, **L. Kuai**, H. M. Worden, C. Sweeney, S. C. Biraud, E. Dlugokencky, L. Iraci, E. Yates, T. Tanaka (2017): Lower-tropospheric CO_2 from near infrared ACOS-GOSAT observations, *Atmos. Chem. Phys.* 17, 5407–5438, doi:10.5194/acp-17-5407-2017.
13. J. E. Campbell, J. Kesselmeier, D. Yakir, J. A. Berry, P. Peylin, S. Belviso, T. Vesala, K. Maseyk, U. Seibt, H. Chen, M. E. Whelan, T. W. Hilton, S. A. Montzka, M. B. Berkelhammer, S. T. Lennartz, **L. Kuai**, G. Wohlfahrt, Y. Wang, N. J. Blake, D. R. Blake, J. Stinecipher, I. Baker, and S. Sitch, (2017): Assessing a New Clue to How Much Carbon Plants Take Up, *Eos*, 98, 10, Oct.

2016

12. **Kuai, L.**, J. R. Worden, K.-F. Li, G. C. Hulley, F. M. Hopkins, C. E. Miller, S. J. Hook, R. M. Duren, and A. D. Aubrey (2016): Characterization of anthropogenic methane plumes with the Hyperspectral Thermal Emission Spectrometer (HyTES): a retrieval method and error analysis, *Atmos. Meas. Tech.*, 9, 3165–3173, doi:10.5194/amt-9-3165-2016.
11. Hulley, G. C., R. M. Duren, F. M. Hopkins, S. J. Hook, N. Vance, P. Guillevic, W. R. Johnson, B. T. Eng, J. M. Mihaly, V. M. Jovanovic, S. L. Chazanoff, Z. K. Staniszewski, **L. Kuai**, J. R. Worden, C. Frankenberg, G. Rivera, A. D. Aubrey, C. E. Miller, N. K. Malakar, J. M. Sánchez Tomás, and K. T. Holmes (2016): High spatial resolution imaging of methane and other trace gases with the airborne Hyperspectral Thermal Emission Spectrometer (HyTES), *Atmos. Meas. Tech.*, 9, 2393–2408, doi:10.5194/amt-9-2393-2016.

2007–2015

10. **Kuai, L.**, J. R. Worden, J. E. Campbell, S. S. Kulawik, K.-F. Li, M. Lee, R. J. Weidner, S. A. Montzka, F. Moore, J. A. Berry, I. Baker, A. S. Denning, H. Bian, K. W. Bowman, J. Liu, Y. L. Yung (2015): Estimate of Carbonyl Sulfide Tropical Oceanic Surface Fluxes Using Aura Tropospheric Emission Spectrometer Observations, *J. Geophys. Res. Atmos.*, 120, 11012–11023, doi:10.1002/2015JD023493.
9. **Kuai, L.,** J. Worden, S. S. Kulawik, S. A. Montzka, and J. Liu (2014): Characterization of Aura TES carbonyl sulfide retrievals over ocean, *Atmos. Meas. Tech.*, 7, 163–172, doi:10.5194/amt-7-163-2014.
8. **Kuai, L.,** J. Worden, S. Kulawik, K. Bowman, S. Biraud, V. Natraj, C. Frankenberg, D. Wunch, B. Connor, R. Shia, C. E. Miller, and Y. L. Yung (2013): Profiling Tropospheric CO_2 using the Aura TES and TCCON instruments, *Atmos. Meas. Tech*., 6, 63–79, doi:10.5194/amt-6-63-2013.
7. Li, K.-F., B. Tian, K.-K. Tung, **L. Kuai**, J. R. Worden, and Y. L. Yung (2013), A link between tropical intraseasonal variability and polar stratospheric ozone, *Geophys. Res. Lett.*, 118, 4280–4289, doi:10.1002/jgrd.50391.
6. **Kuai, L.,** B. Connor, D. Wunch, R. Shia, C. E. Miller, and Y. L. Yung (2012): Vertically constrained CO_2 retrievals from TCCON measurements, *J. Quant. Spectro. Rad. Trans.*, 113, 1753–1761, doi:10.1016/j.jqsrt.2012.04.024
5. **Kuai, L.**, V. Natraj, R. Shia, C. Miller, and Y. L. Yung, 2010: Channel Selection Using Information Content Analysis: A Case Study of CO_2 Retrieval From Near Infrared Measurements, *J. Quant. Spectro. Rad. Trans.*, 111, 1296–1304, doi: 10.1016/j.jqsrt.2010.02.011.
4. **Kuai, L.,** R. L. Shia, X. Jiang, K. K. Tung, and Y. L. Yung, 2009: The Modulation of the Period of the Quasi-Biennial Oscillation by the Solar Cycle, *J. Atmos. Sci.*, 66, 2418–2428, doi:10.1175/2009JAS2958.1.
3. **Kuai, L.,** R. L. Shia, X. Jiang, K. K. Tung, and Y. L. Yung, 2008: Non-stationary Synchronization of Equatorial QBO with SAO in Observation and Model, *J. Atmos. Sci.*, 66, 1654–1664, doi:10.1175/2008JAS2857.1.
2. **Kuai, L.,** F. L. Haan, W. A. Gallus, and P. P. Sarkar, 2008: CFD simulations of the flow field of a laboratory-simulated tornado for parameter sensitivity studies and comparison with field measurements, *Wind and Structures,* 11, 75–96.
1. Tian, B., Y. L. Yung, D. E. Waliser**,** T. Tyranowski, **L. Kuai**, E. J. Fetzer, and F. W. Irion, 2007: Intraseasonal variations of the tropical total ozone and their connection to the MJO, *Geophys. Res. Lett.* 34, L08704, 10.1029/2007GL029471.