

Jared F. Brewer, Ph.D.

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RESEARCH & TEACHING INTERESTS

I am an atmospheric chemist with expertise in remote sensing, atmospheric modeling, large dataset analysis, tropospheric photooxidation of trace gases, and aerosol formation. I have experience in laboratory research, marine biochemical modeling, and environmental policy analysis. My technical skills include computer programming in multiple languages including fortran, R, and python, as well as objective analysis techniques and machine learning. I am the first author of five published publications.

RESEARCH EXPERIENCE

2025- Postdoctoral Research Fellow, Department of Bioproducts and Biosystems Engineering, University of Minnesota, Saint Paul, MN
Faculty Advisor: Professor Jason Hill
Project: developing novel emissions inventories of agricultural emissions of ammonia, nitrogen oxides, particulate matter, and volatile organic compounds associated with animal husbandry worldwide, and simulating the air quality impacts of these emissions on human health.

2022-25 Postdoctoral Research Fellow, Department of Soil, Water, and Climate, University of Minnesota, Saint Paul, MN
Faculty Advisor: Professor Dylan Millet
Project: developing satellite-based measurements of multiple VOCs, including ethane, ethene, ethyne, HCN, and methanol in the thermal infrared with sensitivity to the lower troposphere using machine learning.

2020 - 22 Postdoctoral Fellow in Atmospheric Chemistry, School of Engineering and Applied Sciences, Harvard University, Cambridge, MA
Faculty Advisor: Professor Daniel Jacob
Project: Studied the sources and chemistry of particulate air pollution over South Korea during the KORUS-AQ field campaign in Spring 2016. Designed modeling tools to integrate process-based chemistry and microphysical models into global chemical transport model frameworks to better simulate aerosol formation.

EDUCATION

2020 - Ph.D. in Atmospheric Chemistry, Colorado State University.
Thesis: Ketones in the Troposphere: Studies of Loss Processes, Emissions, and Production
Faculty Advisors: Dr. Emily Fischer, Dr. A.R. Ravishankara

2012 - M.S. in Marine Biogeochemistry and Marine Policy, Earth Systems, Stanford University.

Thesis: Modeling the Effects of Ocean Acidification on Aragonite and Calcite Saturation Levels in the Ross Sea

Faculty Advisors: Dr. Kevin Arrigo, Dr. Robert Dunbar

2011 - **B.S. in Marine Biogeochemistry and Marine Policy**, Earth Systems, Stanford University.

TEACHING & ADVISING EXPERIENCE

Head Teaching Assistant

Responsibilities included hiring the TA team, deciding upon the content of the course and the subjects of the lectures and sections, developing new class materials, leading class discussions, supervising labs, grading all assignments, meeting with students individually.

- Earth Systems 10: Introduction to Earth Systems, Fall 2011, Stanford University. 180 undergraduate students.

Teaching Assistant

Responsibilities included developing new class materials, leading class discussions, supervising labs, grading all assignments, and meeting with students individually.

- Atmospheric Science 150: The Science of Global Climate Change, Spring 2019, Colorado State University. 14 undergraduate students.
- Earth Systems 151: The Fundamentals of Negotiation, Spring 2012, Stanford University. 60 Students from the graduate, undergraduate, and business schools.
- Earth Systems 210: Senior Seminar, Winter 2012, Stanford University. 12 undergraduate students.

Course Creator

Stanford allows students to design new Stanford classes not previously offered at the institution through the *Student-Initiated Courses* program. This is a competitive application program. Responsibilities included grant proposal writing, course design, developing new class materials, leading class discussions, and grading all assignments.

- Genetics 25SI: The Art, Science, and Business of Brewing, Spring 2011-2012, Stanford University. 20 enrolled graduate and undergraduate students, with 40 additional auditing students.

Pedagogical Training

Attended weekly training sessions on pedagogical techniques, teaching, communication, leadership, and organizations skills.

- **Graduate Teaching Fellow**, The Institute for Learning and Teaching, Colorado State University, 2018-2019.
- **Earth Systems Fellow**, The Center for Teach and Learning, Stanford University, 2011-2012.

Advising Experience

- **ESME REU (CSU)**: Mentored one undergraduate REU student through the ESME program at CSU, Summer 2015. In collaboration with my advisor, I set up the REU project for the summer, set goals for the student, taught the basics of atmospheric modeling, and held weekly meetings to monitor the student's progress and answer questions.
- **Harvard Atmospheric Chemistry Modeling Group**: Mentored two junior graduate students on their research and graduate school progress. I held monthly meetings with these students to hear

their concerns and answer their questions. I was also especially available to them for advice on their research, which was focused on chemical transport modeling.

WORK EXPERIENCE

Colorado Science and Engineering Policy Fellow, Colorado State Legislature, Summer 2019

- Designed policy proposals to reduce the impacts of ammonia pollution from cattle feedlots in the Colorado Front Range.
- Collaborated with a state representative and a state senator to turn this policy proposal into a bill to be debated in the 2020 session.

Program Analyst, Office of Oceanic & Atmospheric Research, Division of International Activities, National Oceanic & Atmospheric Administration (NOAA), Silver Spring, MD, 2012-2014

- Managed programmatic responsibilities for multiple portfolios on Bilateral NOAA research cooperation with the EU countries and Russia.
- Spearheaded extensions of legal agreements between NOAA and the Russian Academy of Sciences, as well as the French Institute for the Exploitation of the Ocean (Ifremer)
- Advanced US science policy priorities at the Intergovernmental Oceanographic Commission (IOC) as an Advisor to the IOC and a staffer to the US Permanent Representative on the IOC.
- Organized US participation in the Climate Science Subgroup (CSS) of the US-Russia Bilateral Presidential Commission as Subgroup Executive Secretary and International Activities Staffer to NOAA Assistant Administrator for Research Dr. Robert Detrick.

FELLOWSHIPS & AWARDS

Fellowships

Colorado Science and Engineering Policy Fellowship, Colorado State Legislature – 2019

Chateaubriand Fellowship, Embassy of France in the United States – 2017

ASCENT Research Fellowship, Colorado State University Dept. of Atmospheric Science – 2017

Knauss Fellowship, California Seagrant, National Oceanic and Atmospheric Administration - 2012

Academic Recognition

Dean's Award for Academic Excellence, Stanford School of Earth Sciences – 2012

Research Grants

EUROCHAMP TNA Research Grant, The European Distributed Infrastructure for Experimental Atmospheric Simulation – 2017

PROFESSIONAL ACTIVITIES AND SERVICE

Society Memberships

American Geophysical Union (since 2015) - member

American Meteorological Society (since 2017) - member

American Association for Aerosol Research (2015-2018) – member
Treasurer of CSU student AAAR chapter (2016-2018)

Peer Reviewer

Nature Communications (1)
American Chemical Society Earth and Space Chemistry Journal (1)
Atmospheric Chemistry and Physics (1)
Journal of Geophysical Research (Atmospheres) (2)

PUBLICATION LIST

Selected

Brewer, J.F., D.B. Millet, K.C. Welles, V.H. Payne, S.S. Kulawik, C. Vigouroux, K.E. Cady-Pereira, R. Pernak, M. Zhou (2024). Space-based observations of tropospheric ethane map emissions from fossil fuel extraction. *Nat. Commun.*, 15, 7829

Brewer, J.F., D.J. Jacob, A. Akherati, S. Zhai, K. Bilsback, D.S. Jo, A. Hodzic., B.A. Nault, P. Campuzano-Jost, J.L. Jimenez, S.H. Jathar (2022). A Scheme for Representing Aromatic Secondary Organic Aerosols in Chemical Transport Models: Application to Source Attribution of Organic Aerosols Over South Korea During the KORUS-AQ Campaign. *J. Geophys. Res. Atmos.*, 128, 8, <https://doi.org/10.1029/2022JD037257>.

Brewer, J.F., E.V. Fischer, R. Commane, S.C. Wofsy, E. Apel, R.S. Hornbrook, B. Barletta, S. Meinard, D.R. Blake, A.R. Ravishankara (2020). An Oceanic Source of Methyl Ethyl Ketone to the Atmosphere. *Geophys. Res. Lett.*, 47, e2019GL086045. <https://doi.org/10.1029/2019GL086045>

Brewer, J.F., D. K. Papanastasiou, J. B. Burkholder, E. V. Fischer, Y. Ren, A. Mellouki, A. R. Ravishankara (2019). Atmospheric Photolysis of Methyl Ethyl, Diethyl, and Propyl Ethyl Ketones: Temperature Dependent UV Absorption Cross Sections, *J. Geophys. Res. Atmos.*, 124, 5906-5918, [doi:10.1029/2019JD030391](https://doi.org/10.1029/2019JD030391).

Brewer, J. F., M. Bishop, M. Kelp, C. Keller, A. R. Ravishankara, and E. V. Fischer (2017). A sensitivity analysis of key factors in the modeled global acetone budget, *J. Geophys. Res. Atmos.*, 122, 2043–2058, [doi:10.1002/2016JD025935](https://doi.org/10.1002/2016JD025935).

Additional Published Research

C. Hu, D.B. Millet, K.C. Wells, **J.F. Brewer**, J.F. Juncosa Calahorrano, V.H. Payne, J. Taylor, D.C. Tobin (2025). First airborne VOC measurements using thermal infrared remote sensing: Mapping fire plumes with the Scanning High-resolution Infrared Sounder (S-HIS). *Accepted*, *J. Geophys. Res. Atmos.*

D.B. Millet, J.F. Brewer, K.C. Wells, V.H. Payne, C. Vigouroux, M. Zhou (2025). Comment on “Tracking Ethane from Space Over a Large US Oil and Gas Region” by Franceour et al. *In review* with *Geophys. Res. Lett.*

Yang L.H., Jacob D.J., Bates K.H., Lin H., Allen H.M., Müller J.-F., Brown S.S., Dang R., Colombi N.K., Zhai S., Yantosca R.M., **Brewer J.F.**, Ng N.L., Crounse J.D., Wennberg P.O., Li K., Liao H. (2025). Modeling of Methyl Hydroperoxide Observations in Urban and Remote Air over South Korea:

Methylperoxy Radical Chemistry and Inference of Atmospheric Methanediol, *accepted Geophys. Res. Let.*

Wells, K.C., D.B. Millet, **J.F. Brewer**, V.H. Payne, S.S. Kulawik, K.E. Cady-Pereira, R. Pernak (2025). Long-term global measurements of methanol, ethene, ethyne, and HCN from the Cross-track Infrared Sounder, *Atmos. Meas. Tech.*, 18, 695-716, <https://doi.org/10.5194/amt-18-695-2025>.

Link, M. F., **Brewer, J.**, Farmer, D. K., & Ravishankara, A. R. (2025). Constraining the acetone photolysis quantum yield: Current insights and atmospheric chemistry implications. *Journal of Geophysical Research: Atmospheres*, 130, e2024JD042216. <https://doi.org/10.1029/2024JD042216>.

Yang, L.H., D.J. Jacob, N.K. Colombi, S. Zhai, K.H. Bates, V. Shah, E. Beaudry, R.M. Yantosca, H. Lin, **J.F. Brewer**, H. Chong, K.R. Travis, J.H. Crawford, L.N. Lamsal, J. Koo, and J. Kim (2023). Tropospheric NO₂ vertical profiles over South Korea and their relation to oxidant chemistry: implications for geostationary satellite retrievals and the observation of NO₂ diurnal variation from space. *Atmos. Chem. And Phys.*, 23, 2465-2481, doi: 10.5194/acp-23-2465-2023.

Bourgeois, I., J. Peischl, J.A. Neuman, S.S. Brown, C.R. Thompson, K.C. Aikin, H.M. Allen, H. Angot, E.C. Apel, C.B. Baublitz, **J.F. Brewer**, P. Campuzano-Jost, R. Commane, J.D. Crouse, B.C. Daube, J.P. DiGangi, G. Diskin, L. Emmons, A.M. Fiore, G.I. Gkatzelis, A. Hills, R.S. Hornbrook, L.G. Huey, J.L. Jimenez, M. Kim, F. Lacey, K. McKain, L.T. Murray, B.A. Nault, D.D. Parrish, E.A. Ray, C. Sweeney, D. Tanner, S.C. Wofsy, T.B. Ryerson (2021). Large contribution of biomass burning emissions to ozone throughout the global remote troposphere. *PNAS*, doi: 1073/pnas.2109628118.

Zhai, S., D.J. Jacob, **J.F. Brewer**, K. Li, J.M. Moch, J. Kim, S. Lee, H. Lim, H.C. Lee, S.K. Kuk, R.J. Park, J.I. Jeong, X. Wang, P. Liu, G. Luo, F. Yu, J. Meng, R.V. Martin, K.R. Travis, J.W. Hair, B.E. Anderson, J.E. Dibb, J.L. Jimenez, P. Campuzano-Jost, B.A. Nault, J-H. Woo, Y. Kim, Q. Zhang, H. Liao (2021). Interpretation of geostationary satellite aerosol optical depth (AOD) over East Asia in relation to fine particulate matter (PM_{2.5}): insights from the KORUS-AQ aircraft campaign and seasonality. *Atmos. Chem. and Phys.*, doi:10.5194/acp-2021-413.

Bates, K. H., D. J. Jacob, S. Wang, R. S. Hornbrook, E. C. Apel, M. J. Kim, D.B. Millet, K.C. Wells, X. Chen, **J.F. Brewer**, E.A. Ray, G.S. Diskin, B.C. Daube, and S.C. Wofsey (2021). The global budget of atmospheric methanol: new constraints on secondary, oceanic, and terrestrial sources. *J. Geophys. Res. Atmos.*, 126, e2020JD03349. doi:10.1029/2020JD033439 .

V. H. Payne, S. S. Kulawik, E.V. Fischer, **J.F. Brewer**, L.G. Huey, K. Miyazaki, J.R. Worden, K.W. Bowman, E.J. Hints, F. Moore, J.W. Elkins, and J. Juncosa Calahorrano (2022). Satellite measurements of peroxyacetyl nitrate from the Cross-Track Infrared Sounder: comparison with ATom aircraft measurements. *Atmos. Meas. Techniques*, 15, 3497–3511, doi: 10.5194/amt-15-3497-2022.

David, L. M., A. R. Ravishankara, **J. F. Brewer**, V. Sinha, S. Venkataramani, T. K. Mandal, P. Cristofanelli, W. Lin, and X. Xu (2019). Tropospheric ozone over the Indian subcontinent during 2000 to 2014: Data set and simulation using GEOS-Chem chemical transport model, *Atmos. Env.* 219, 117039, doi:10.1016/j.atmosenv.2019.117039.

Hodshire, A. L., M. J. Lawler, J. Zhao, J. Ortega, C. Jen, T. Yli-Juuti, **J.F. Brewer**, J. K. Kodros, K. C. Barsanti, D. R. Hanson, P. H. McMurry, J. N. Smith, and J. R. Pierce (2016). Multiple new-particle

growth pathways observed at the US DOE Southern Great Plains field site, *Atmos. Chem. and Phys.*, 16(41) 9321-9348, doi: 10.5194/acp-16-9321-2016.

Invited Talks And Featured Presentations

1. **Brewer, J.F.**, D.B. Millet, K.C. Welles, V.H. Payne, S.S. Kulawik, C. Vigouroux, K.E. Cady-Pereira, R. Pernak, M. Zhou, Using ML-based measurements of tropospheric ethane from the Cross-track Infrared Sounder to estimate ethane emission fluxes in fossil fuel production basins, American Geophysical Union Fall Meeting, Washington, DC, 2024 (*Presentation*)

First Author Presentations

1. **Brewer, J.F.**, D.B. Millet, K.C. Welles, V.H. Payne, S.S. Kulawik, C. Vigouroux, K.E. Cady-Pereira, R. Pernak, M. Zhou, Space-based observations of tropospheric ethane map emissions from fossil fuel extraction, International GEOS-Chem Meeting, St. Louis, MO, 2024 (*Poster*)
2. **Brewer, J.F.**, D.B. Millet, K.C. Welles, V.H. Payne, S.S. Kulawik, C. Vigouroux, K.E. Cady-Pereira, R. Pernak, M. Zhou, Space-based observations of tropospheric ethane map emissions from fossil fuel extraction, American Meteorological Society Annual Meeting, Baltimore, MD, 2024 (*Presentation*)
3. **Brewer, J.F.**, D.B. Millet, K.C. Welles, V.H. Payne, S.S. Kulawik, C. Vigouroux, K.E. Cady-Pereira, R. Pernak, M. Zhou, Novel Measurements of Tropospheric Ethane from the Cross-Track Infrared Sounder (CrIS), NASA JPL Science Visitor Earth Science Seminar, Pasadena, CA, 2023 (*Talk*)
4. **Brewer, J.F.**, D.B. Millet, K.C. Wells, V.H. Payne, K.E., Cady-Pereira, R. Pernak, First Space-Based Measurements of Tropospheric Ethane from the Cross-Track Infrared Sounder (CrIS), Gordon Research Conference on Atmospheric Chemistry, Sunday River, ME, 2023 (*Poster*)
5. **Brewer, J.F.**, D.B. Millet, K.C. Wells, V.H. Payne, K.E., Cady-Pereira, R. Pernak, Next-Generation Trace Gas Measurements from the Cross-track Infrared Sounder (CrIS), American Meteorological Society Annual Meeting 2023, Denver, CO, 2023 (*Presentation*)
6. **Brewer, J.F.**, D.J. Jacob, S.H. Jathar, Y. He, A. Akherati, S. Zhai, K. Bilsback, D.S. Jo, A. Hodzic, B.A. Nault, P. Campuzano-Jost, J.L. Jimenez, R.J. Park, Y.J. Oak, H. Liao, Updating Organic Aerosols in GEOS-Chem with SOM-VBS: A KORUS-AQ Case Study, American Geophysical Union Fall Meeting, Chicago, IL, 2022 (*Poster*)
7. **Brewer, J.F.**, D.J. Jacob, S.H. Jathar, Y. He, A. Akherati, S. Zhai, K. Bilsback, D.S. Jo, A. Hodzic, B.A. Nault, P. Campuzano-Jost, J.L. Jimenez, R.J. Park, Y.J. Oak, H. Liao, Updating Organic Aerosols in GEOS-Chem with SOM-VBS: A KORUS-AQ Case Study, American Geophysical Union Fall Meeting, Chicago, IL, 2022 (*Poster*)
8. **Brewer, J.F.**, D.J. Jacob, S.H. Jathar, Y. He, A. Akherati, S. Zhai, K. Bilsback, D.S. Jo, A. Hodzic, B.A. Nault, P. Campuzano-Jost, J.L. Jimenez, R.J. Park, Y.J. Oak, H. Liao, Updating Organic Aerosols in GEOS-Chem with SOM-VBS, International GEOS-Chem Meeting, St. Louis, MO, 2022 (*Poster*)
9. **Brewer, J.F.**, E.V. Fischer, A.R. Ravishankara, E. Apel, R. Hornbrook, A. Hills, Global Atmospheric Budget and Importance of Methyl Ethyl Ketone (MEK): Chemical Transport Analysis and Constraints from In-Situ Aircraft Observations, American Meteorological Society Annual Meeting 2021, Remote, (*Presentation*)
10. **Brewer, J.F.**, E.V. Fischer, E.C. Apel, R.S. Hornbrook, A.R. Ravishankara, The global budget of Methyl Ethyl Ketone (MEK), American Geophysical Union Fall Meeting, San Francisco, CA, 2019 (*Presentation*)
11. **Brewer, J.F.**, E.V. Fischer, A.R. Ravishankara, J.B. Burkholder, D.K. Papanastasiou, A. Mellouki, Y. Ren, E.C. Apel, R.S. Hornbrook, Modeling the Global Budget of Methyl Ethyl Ketone, American Meteorological Society Annual Meeting, Phoenix, AZ, 2019 (*Presentation*)
12. **Brewer, J.F.**, E.V. Fischer, A.R. Ravishankara, J.B. Burkholder, D.K. Papanastasiou, A. Mellouki, Y. Ren, E.C. Apel, R.S. Hornbrook, Modeling the Global MEK Budget in GEOS-Chem, American Geophysical Union Fall Meeting, Washington, DC, 2018 (*Presentation*)
13. **Brewer, J.F.**, E.V. Fischer, A.R. Ravishankara, A. Kukui, D. Veronique, W. Ait-Helal, J. Leglise, A. Mellouki, Y. Ren, New Measurements of Methyl Ethyl Ketone Photolysis Rates and Their Relevance to Global Oxidative Capacity, American Geophysical Union Fall Meeting, New Orleans, LA, 2017 (*Poster*)
14. **Brewer, J.F.**, A.R. Ravishankara, E.V. Fischer, Atmospheric Methyl Ethyl Ketone (MEK): Global Budget and Source Attribution, American Meteorological Society Annual Meeting, Seattle, WA, 2017 (*Poster*)
15. **Brewer, J.F.**, M. Bishop, M. Kelp, C. Keller, A. R. Ravishankara, E. V. Fischer, Utilizing model sensitivity analysis to set research priorities and constrain the global acetone budget, International Global Atmospheric Chemistry Conference, Breckenridge, CO, 2016 (*Poster*)

16. **Brewer, J.F.**, E.V. Fischer, A.R. Ravishankara, M. Bishop, Uncertainties in Biogenic Sources and Sinks and Their Relevance for the Global Acetone Budget, American Geophysical Union Fall Meeting 2015, San Francisco, CA, 2015
(Presentation)