

Wenfu Tang

Project Scientist I
Atmospheric Chemistry Observations & Modeling (ACOM)
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EDUCATION

Ph.D., 2019, Atmospheric Sciences – Department of Hydrology and Atmospheric Sciences, University of Arizona
Ph.D. Minor, 2019, Statistics – Graduate Interdisciplinary Program, University of Arizona
M.S., 2016, Atmospheric Sciences – Department of Atmospheric Sciences, University of Arizona
B.S., 2014, Atmospheric Sciences – Department of Atmospheric Sciences, Nanjing University

RESEARCH INTEREST

- Fires, fire emissions, and fire impacts
- Air quality
- Atmospheric chemistry modeling and model development (e.g., MUSICA, CESM/CAM-chem)
- Satellite data analysis (e.g., MOPITT, TROPOMI, OMI, MODIS, IASI, OCO-2, GOSAT)
- Field campaign modeling support and measurements analysis (e.g., KORUS-AQ, FIREX-AQ, ASIA-AQ)
- Air quality and chemical data assimilation
- Environmental issues in Africa

PROFESSIONAL EXPERIENCES

Jan. 2022 – present	Project Scientist I, NCAR, USA
Jun. 2019 – Jan. 2022	Advanced Study Program (ASP) Postdoctoral Fellow, NCAR, USA
Aug. 2014 – May. 2019	Graduate Student Researcher, University of Arizona, USA

PUBLICATIONS

1. **Tang, W.**, Gaubert, B., Emmons, L., Ziskin, D., Mao, D., Edwards, D., Arellano, A., Raeder, K., Anderson, J., and Worden, H.: Advantages of assimilating multi-spectral satellite retrievals of atmospheric composition: A demonstration using MOPITT CO products, *Atmos. Meas. Tech. Discuss.* [preprint], <https://doi.org/10.5194/amt-2023-238>, in review, 2023.
2. **Tang, W.**, He, C., Emmons, L. K., Zhang, J., Global Expansion of Wildland-Urban Interface (WUI) and WUI fires, *Environmental Research Letters*, in review, 2024.
3. Gaubert, B., Anderson, J., Trudeau, M., Smith, N., Emmons, L. K., **Tang, W.**, Worden, H., Ziskin, D., McKain, K., Petron, G., Raeder, K., Arellano, A., Edwards D. P., Assimilating CrIS and MOPITT CO Using Ensemble Filters, *Journal of Geophysical Research: Atmospheres*, in review, 2024.
4. United Nations Environment Programme (2023). Integrated Assessment of Air Pollution and Climate Change for Sustainable Development in Africa. Nairobi, <https://www.ccacoalition.org/resources/full-report-integrated-assessment-air-pollution-and-climate-change-sustainable-development-africa> (co-author of Section 2).
5. **Tang, W.**, Emmons, L. K., Worden, H. M., Kumar, R., He, C., Gaubert, B., Zheng, Z., Tilmes, S., Buchholz, R. R., Martinez-Alonso, S.-E., Granier, C., Soulie, A., McKain, K., Daube, B. C., Peischl, J., Thompson, C., and Levelt, P.: Application of the Multi-Scale Infrastructure for Chemistry and Aerosols version 0 (MUSICAv0) for air quality research in Africa, *Geosci. Model Dev.*, 16, 6001–6028, <https://doi.org/10.5194/gmd-16-6001-2023>, 2023.
6. Martinez-Alonso, S., Veeffkind, J. P., Dix, B., Gaubert, B., Theys, N., Granier, C., Soulie, A., Darras, S., Eskes, H., **Tang, W.**, Worden, H., de Gouw, J., and Levelt, P.: TROPOMI-derived NO₂ emissions from copper/cobalt mining and other industrial activities in the Copperbelt (DRC and Zambia), *Geophysical Research Letters*, <https://doi.org/10.1029/2023GL104109>, 2023.
7. Gaubert, B., Edwards, D.P., Anderson, J.L., Arellano, A.F., Barré, J., Buchholz, R.R., Darras, S., Emmons, L.K., Fillmore, D., Granier, C., Hannigan, J.W., Ortega, I., Raeder, K., Soulié A., **Tang, W.**, Worden, H., Ziskin, D., Global

- Scale Inversions from MOPITT CO and MODIS AOD. *Remote Sens.* 2023, 15, 4813. <https://doi.org/10.3390/rs15194813>.
8. Wiedinmyer, C., Kimura, Y., McDonald-Buller, E. C., Emmons, L. K., Buchholz, R. R., **Tang, W.**, Seto, K., Joseph, M. B., Barsanti, K. C., Carlton, A. G., and Yokelson, R.: The Fire Inventory from NCAR version 2.5: an updated global fire emissions model for climate and chemistry applications, *Geosci. Model Dev.*, 16, 3873–3891, <https://doi.org/10.5194/gmd-16-3873-2023>, 2023.
 9. He, C., Kumar, R., **Tang, W.**, Pfister, G.G., Xu, Y., Qian, Y., Brasseur, G.: Air pollution interactions with weather and climate extremes: current knowledge, gaps, and future directions, *Current Pollution Reports*, in review, 2023.
 10. **Tang, W.**, Tilmes, S., Lawrence, D. M., Li, F., He, C., Emmons, L. K., Buchholz, R. R., and Xia, L.: Impact of solar geoengineering on wildfires in the 21st century in CESM2/WACCM6, *Atmos. Chem. Phys.*, 23, 5467–5486, <https://doi.org/10.5194/acp-23-5467-2023>, 2023.
 11. **Tang, W.**, Pfister, G.G., Kumar, R., Barth, M., Edwards, D.P., Emmons, L.K. and Tilmes, S., 2023. Capturing high-resolution air pollution features using the Multi-Scale Infrastructure for Chemistry and Aerosols version 0 (MUSICAv0) global modeling system. *Journal of Geophysical Research: Atmospheres*, p.e2022JD038345.
 12. Albores, I.S., Buchholz, R.R., Ortega, I., Emmons, L., Hannigan, J.W., Lacey, F., Pfister, G., **Tang, W.**, Worden H.M. Continental-scale Atmospheric Impacts of the 2020 Western US Wildfires. *Atmospheric Environment*. 2022 Nov 5:119436.
 13. **Tang, W.**, Emmons, L.K., Buchholz, R.R., Wiedinmyer, C., Schwantes, R.H., He, C., Kumar, R., Pfister, G.G., Worden, H.M., Hornbrook, R.S., Apel, E.C., et al., Effects of fire diurnal variation and plume rise on US air quality during FIREX-AQ and WE-CAN based on the Multi-Scale Infrastructure for Chemistry and Aerosols (MUSICAv0). *Journal of Geophysical Research: Atmospheres*, p.e2022JD036650.
 14. Buchholz, R.R., Park, M., Worden, H.M., **Tang, W.**, Edwards, D.P., Gaubert, B., Deeter, M.N., Sullivan, T., Ru, M., Chin, M., Levy, R.C.. New seasonal pattern of pollution emerges from changing North American wildfires. *Nature communications*. 2022 Apr 19;13(1):1-9.
 15. **Tang, W.**, Edwards, D. P., Emmons, L. K., Worden, H. M., Judd, L. M., Lamsal, L. N., Al-Saadi, J. A., Janz, S. J., Crawford, J. H., Deeter, M. N., Pfister, G., Buchholz, R. R., Gaubert, B., and Nowlan, C. R.: Assessing sub-grid variability within satellite pixels over urban regions using airborne mapping spectrometer measurements, *Atmos. Meas. Tech.*, 14, 4639–4655, <https://doi.org/10.5194/amt-14-4639-2021>, 2021.
 16. Buchholz, R. R., Worden, H. M., Park, M., Francis, G., Deeter, M. N., Edwards, D. P., Emmons, L. K., Gaubert, B., Gille, J., Martinez-Alonso, S., **Tang, W.**, Kumar, R., Drummond, J. R., Clerbaux, C., George, M., Coheur, P., Hurtmans, D., Bowman, K. W., Luo, M., Payne, V. H., Worden, J. R., Chin, M., Levy, R. C., Warner, J., Wei, Z., and Kulawik, S. S.: Air pollution trends measured from Terra: CO and AOD over industrial, fire-prone, and background regions, *Remote Sensing of Environment*, 256, 112275, 2021.
 17. Gaubert, B., Emmons, L. K., Raeder, K., Tilmes, S., Miyazaki, K., Arellano Jr., A. F., Elguindi, N., Granier, C., **Tang, W.**, Barré, J., Worden, H. M., Buchholz, R. R., Edwards, D. P., Franke, P., Anderson, J. L., Saunio, M., Schroeder, J., Woo, J.-H., Simpson, I. J., Blake, D. R., Meinardi, S., Wennberg, P. O., Crounse, J., Teng, A., Kim, M., Dickerson, R. R., He, H., Ren, X., Pusede, S. E., and Diskin, G. S.: Correcting model biases of CO in East Asia: impact on oxidant distributions during KORUS-AQ, *Atmos. Chem. Phys.*, 20, 14617–14647, <https://doi.org/10.5194/acp-20-14617-2020>, 2020.
 18. He, C., O. Clifton, E. Felker-Quinn, S. R. Fulgham, J. J. Calahorrano, D. Lombardozzi, G. Purser, M. Riches, R. Schwantes, **Tang, W.**, B. Poulter, and A. L. Steiner (2020). Air Pollution-Ecosystem Interactions: Perspectives on Challenges and Future Directions, *Bulletin of the American Meteorological Society*, 1-32.
 19. **Tang, W.**, Worden, H. M., Deeter, M. N., Edwards, D. P., Emmons, L. K., Martínez-Alonso, S., Gaubert, B., Buchholz, R. R., Diskin, G. S., Dickerson, R. R., Ren, X., He, H., and Kondo, Y.: Assessing Measurements of Pollution in the Troposphere (MOPITT) carbon monoxide retrievals over urban versus non-urban regions, *Atmos. Meas. Tech.*, 13, 1337–1356, <https://doi.org/10.5194/amt-13-1337-2020>, 2020.
 20. He, C., Chen, F., Barlage, M., Liu, C., Newman, A., **Tang, W.**, Ikeda, K., Rasmussen, R., Can convection-permitting modeling provide decent precipitation for high-resolution snowpack simulations over mountains? *J. Geophys. Res. Atmos.*, <https://doi.org/10.1029/2019JD030823>, 2019.
 21. **Tang, W.**, Global Modeling and Analysis of Anthropogenic Combustion and Associated Emissions, *Doctoral dissertation, The University of Arizona*, 2019.

22. **Tang, W.**, Arellano, A. F., Gaubert, B., Miyazaki, K., and Worden, H. M, Satellite data reveal a common combustion emission pathway for major cities in China, *Atmos. Chem. Phys.*, 19, 4269-4288, <https://doi.org/10.5194/acp-19-4269-2019>, 2019.
23. **Tang, W.**, Emmons, L. K., Arellano, A. F., Gaubert, B., Knote, C., Tilmes, S., Buchholz, R. R., Pfister, G. G., Diskin, G. S., Blake, D. R., Blake, N. J., Meinardi, S., DiGangi, J P., Choi, Y., Woo, J., He, C., Schroeder, J. R., Suh, I., Lee, H., Jo, H., Kanaya, Y., Jung, J., Lee, Y., and Kim, D.: Source contributions to carbon monoxide concentrations during KORUS-AQ based on CAM-chem model applications, *J. Geophys. Res. Atmos.*, 10.1029/2018JD029151, 2019.
24. **Tang, W.**, Arellano, A. F., DiGangi, J. P., Choi, Y., Diskin, G. S., Agustí-Panareda, A., Parrington, M., Massart, S., Gaubert, B., Lee, Y., Kim, D., Jung, J., Hong, J., Hong, J.-W., Kanaya, Y., Lee, M., Stauffer, R. M., Thompson, A. M., Flynn, J. H., and Woo, J.-H.: Evaluating high-resolution forecasts of atmospheric CO and CO₂ from a global prediction system during KORUS-AQ field campaign, *Atmos. Chem. Phys.*, 18, 11007-11030, <https://doi.org/10.5194/acp-18-11007-2018>, 2018.
25. **Tang, W.**, and Arellano, A. F.: Investigating dominant characteristics of fires across the Amazon during 2005–2014 through satellite data synthesis of combustion signatures, *J. Geophys. Res. Atmos.*, 121, doi:10.1002/2016JD025216, 2017.

SERVICES AND OUTREACH

- Served on NOAA ERB, AC4, CVP Review Panel
- Served on Panel Review for NASA ROSES A.33 The Science of Terra, Aqua, and Suomi NPP (TASNPP)
- Reviewed papers from ACP, JGR, AMT, Nature Communications, AE, BG, Earth's Future, EST, GMD, RSE, JAMES, etc.
- Served as co-convenor and co-chair of EGU 2022, Session AS3.19: Satellite observations of tropospheric composition and pollution, analyses with models and applications
- Steering committee of NRG@SC23 workshop in 2023
- Leader of the UCAR Africa Initiative (<https://www2.acom.ucar.edu/ucar-africa-initiative>)

PROFESSIONAL TRAINING

- NCAR ASP Summer Colloquium 2016 — Jul - Aug, 2016
- NCAR ACOM Analysis of existing biomass burning datasets (ACCORD) Workshop — July, 2017
- Joint Center for Satellite Data Assimilation (JCSDA) 2018 Colloquium — Jul - Aug, 2018
- Fundamentals of Atmospheric Chemistry and Aerosol Modeling 2018 workshop — Aug, 2018
- Frontiers of Atmospheric Science and Chemistry: Integration of Novel Applications and Technological Endeavors (FASCINATE) 2019 workshop — Sep, 2019
- 16th Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS XVI) — Dec, 2021
- NCAR Early Career Leadership Program Certificate — Jan - Aug 2022
- UCAR Leadership Academy— Mar - Sep 2023

FUNDED RESEARCH GRANT

Period	Agency	My Role	Project	Funding
2024-2027	CARB	Co-I	Using Integrated Observations and Modeling to Better Understand Current and Future Air Quality Impacts of Wildfires and Prescribed Burns	\$600,000
2023-2026	NASA ASIA-AQ	Co-I	MUSICA for ASIA-AQ: Urban to Global Modeling to Understand Air Quality in Asia	\$695,407
2023-2024	UCAR PSIF	PI	Accelerating environmental sustainability solutions in Africa: a UCAR initiative	\$65,668
2023-2026	NASA ACMAP	Co-I	Atmospheric impacts of the extreme Australian 2019/2020 wildfire season	\$779,876
2023-2026	NASA SERVIR	Co-I	Enhancing air quality decision-making activity in eastern and southern Africa	\$659,936

2022-2025	NOAA AC4	PI	Global multi-scale modeling and satellite data assimilation to quantify fire emissions at the wildland-urban interface and their impacts	\$739,229
2022-2025	NOAA WPO	Co-I	A novel dynamical ensemble design for probabilistic air quality predictions during wildfires based on RRFs-CMAQ	\$747,722
2019-2021	NCAR/ASP Fellowship	PI	Quantification and prediction of atmospheric chemical impacts of fires by integrating models, satellite observations and field measurements	\$135,000
2020-2023	NOAA MAPP	Collaborator	Disentangling complex interactions and feedbacks among droughts, fires, and snowpack in the western U.S. by integrating observations and models	\$506,815

TEACHING EXPERIENCES

June – Aug. 2023	Mentor	Ralph Cicerone Fellowship Program
June – Aug. 2022	Mentor	Ralph Cicerone Fellowship Program
May – Jun. 2021	Mentor	Internship for Credit Program at NCAR through CU Boulder
Jan – Feb. 2021	Mentor	Internship for Credit Program at NCAR through CU Boulder
Feb – May. 2020	Mentor	Research Experience for Undergrads (REU) Program at CU Boulder

SELECTED AWARDS

2023	UCAR President's Strategic Initiative Fund
2022	NASA Group Achievement Award to FIREX-AQ
2021	Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS XVI) selected participants
2019	Terra Mission's 2019 Pecora Team Award
2019	NCAR Advanced Study Program (ASP) fellowship

PRESENTATIONS AND CONFERENCES

- Global Expansion of Wildland-Urban Interface (WUI) and WUI fires, Oral, AGU 2023, San Francisco, USA, Dec, 2023.
- Global Expansion of Wildland-Urban Interface (WUI) and WUI fires, Oral, Urban Climate Solutions Workshop, College Station, TX, Oct, 2023.
- (Invited Keynote speaker)** MUSICA_{v0}: Multi-Scale Infrastructure for Chemistry and Aerosols, Oral, Digital Twins Webinar Series, Virtual, Sep, 2023.
- Global Expansion of Wildland-Urban Interface (WUI) and WUI fires, Oral, Energy, Fire, and Changing Landscapes – Satellite Applications Workshop, Boulder, CO, Sep, 2023.
Accelerating environmental sustainability solutions in Africa: a UCAR initiative, Poster, AGU Chapman Conference on Climate and Health for Africa, Washington, D.C., June, 2023.
- Forecast: Multi-scale modeling, Oral, workshop on “The use of geostationary satellites to improve air quality characterization and forecasts”, March 2023, hosted by the International Space Science Institute (ISSI), Bern, Switzerland.
- Evaluation and Application of the Multi-Scale Infrastructure for Chemistry and Aerosols version 0 (MUSCIA_{v0}) in Africa, Oral, Follow up Workshop on a Pilot Design for Air Quality in Africa, Kigali, Rwanda and online, Jan, 2023.
- Evaluation and Application of the Multi-Scale Infrastructure for Chemistry and Aerosols version 0 (MUSCIA_{v0}) in Africa, Oral, 2023 AMS Annual Meeting, Denver, USA, Jan, 2023.
- Evaluation and Application of the Multi-Scale Infrastructure for Chemistry and Aerosols version 0 (MUSCIA_{v0}) in Africa, Poster, 2022 AGU Fall Meeting, Chicago, USA, Dec, 2022.
- Evaluation and Application of the Multi-Scale Infrastructure for Chemistry and Aerosols version 0 (MUSCIA_{v0}) in Africa, 2022 IGAC Conference, Manchester, UK, Virtual, Sep, 2022.
- Comparing the regional-scale model variability of MUSICA with a regional model (WRF-Chem) over CONUS, 2022 CESM Workshop, Virtual, Jun, 2022.
- What is MUSICA? How does MUSICA compare to WRF-Chem? And going to higher resolution, Oral, the Joint WRF/MPAS Users' Workshop 2022, Virtual, June 2022.

12. Detecting Cobalt-Mining Activities in Africa with TROPOMI, Poster, Lorentz workshop – the Power of TROPOMI to Bridge African Science and Policy, Virtual, Apr, 2022.
13. **(Invited)** Fires, fire emissions, and impacts on air quality, Oral, the Department of Atmospheric Science Seminar, University of Wyoming, Virtual, Feb 22, 2022.
14. MUSICA-V0 simulation over Africa, Oral, 2022 Atmosphere Model, Whole Atmosphere, and Chemistry Climate Working Group meeting, Virtual, Feb, 2022.
15. Effects of fire diurnal variation and plume rise on U.S. air quality during FIREX-AQ based on the Multi-Scale Infrastructure for Chemistry and Aerosols (MUSICA-V0), Oral, Abstract A42D-04, 2021 AGU Fall Meeting, Virtual, Dec, 2021.
16. Effects of fire diurnal variation and plume rise on U.S. air quality during FIREX-AQ based on the Multi-Scale Infrastructure for Chemistry and Aerosols (MUSICA-V0), Oral, 16th Atmospheric Chemistry Colloquium for Emerging Senior Scientists, Virtual, Dec, 2021.
17. Effects of fire diurnal variation and plume rise on U.S. air quality during FIREX-AQ based on the Multi-Scale Infrastructure for Chemistry and Aerosols (MUSICA-V0), Invited, Oral, International Workshop on Fires in South Asia, Dec, 2021.
18. Effects of fire diurnal variation on U.S. air quality during FIREX-AQ based on the Multi-Scale Infrastructure for Chemistry and Aerosols (MUSICA-V0), 2021 IGAC Conference, Virtual, Sep, 2021.
19. Wildfires in the 21st Century under Different Scenarios in CESM2/WACCM6, Oral, 2021 CESM Workshop, Virtual, Jun, 2021.
20. Improving fire representation in MUSICA-V0, Oral, 2021 CESM Workshop, Virtual, Jun, 2021.
21. MUSICA simulations of fire impacts on air quality during the 2019 FIREX-AQ field campaign, Oral, Joint WACCM & Chemistry-Climate Working Groups meeting, Virtual, Mar, 2021.
22. Fires in the 21st Century under Different Shared Socioeconomic Pathways (SSPs) using CESM/WACCM ensemble projections, Oral, Abstract NH011-03, 2020 AGU Fall Meeting, Virtual, Dec, 2020.
23. Investigating global fire behavior, variability, trends, and driving factors using an interactive fire module coupled with CESM2, Oral, 2020 Atmosphere Model, Whole Atmosphere, and Chemistry Climate Working Group meeting, Boulder, CO, Mar, 2020.
24. Investigating global fire behavior, variability, trends, and driving factors using an interactive fire module coupled with CESM2, Oral, 2020 Atmosphere Model, Land Model & Biogeochemistry Working Group meeting, Boulder, CO, Mar, 2020.
25. Investigating air quality and climate impacts of fires using an interactive fire module in CESM2, Abstract A23L-2963, 2019 AGU Fall Meeting, San Francisco, USA, Dec, 2019.
26. Modeling and tagging CO and CO₂ in CAM-chem: A case study during the KORUS-AQ campaign, Oral, 2019 Joint WACCM & Chemistry-Climate Working Groups meeting, Boulder, CO, Feb, 2019.
27. Tracking Fossil Fuel Emissions in East Asia by Combining Model Simulations, Satellite Observations, and Field Measurements of the CO-to-CO₂ Ratio, Oral, Abstract A52A-06, 2018 AGU Fall Meeting, Washington D.C., USA, Dec, 2018.
28. CO₂ tracking in CAM-chem/CESM, Abstract CCWG-1 presented at 2018 CESM Workshop, Boulder, CO, Jun, 2018.
29. CO Source Contributions and Combustion Characteristics during KORUS-AQ, Oral, AOGS Annual Meeting, Honolulu, HI, USA, Jun, 2018.
30. Ensemble Simulation of Anthropogenic and Biomass Burning CO₂ and CO in CAM-chem, Abstract 1102, 2018 AMS Annual Meeting, Austin, TX, USA, Jan, 2018.
31. Joint Evaluation of Copernicus Atmosphere Monitoring Service (CAMS) High-resolution Global Near-Real Time CO and CO₂ Forecasts during KORUS-AQ Field Campaign, Abstract A53A-2210, 2017 AGU Fall Meeting, New Orleans, LA, USA, Dec, 2017.
32. Investigating Combustion and Emission Trends in Megacities through Synthesis of Combustion Signatures Using Multiple Datasets, Abstract 1.040, 2017 AMS Annual Meeting, Seattle, WA, USA, Jan, 2017.
33. Investigating Combustion and Emission Trends in Megacities through Synthesis of Combustion Signatures Using Multiple Datasets, Abstract 1.040, 2016 IGAC Conference, Breckenridge, CO, USA, Sep, 2016.
34. Joint Analysis of Bulk Wildfire Characteristics from Multiple Satellite Retrievals, Abstract A23A-0275, 2015 AGU Fall Meeting, San Francisco, USA, Dec, 2015.

35. A Comparative Analysis on the Temporal and Spatial Distribution of Fire Characteristics in the Amazon and Equatorial Southern Africa Using Observations from Space, Oral, Abstract EGU2015-637, 2015 EGU Meeting, Vienna, Austria, Apr, 2015.