

Rebecca Schwantes

Email: rebecca.schwantes@noaa.gov

EDUCATION

- California Institute of Technology** Pasadena, CA
PhD Environmental Science and Engineering June 2017
Thesis: Identifying Isoprene and Toluene Gas-Phase Oxidation Products to Better Constrain Ozone and Secondary Organic Aerosol Formation in the Atmosphere
- University of Virginia** Charlottesville, VA May 2009
B.S. in Chemistry with a specialization in Biochemistry
Distinguished Majors Program – Highest Distinction
B.A. in Mathematics

WORK HISTORY

- National Oceanic and Atmospheric Administration (NOAA), Chemical Sciences Laboratory**
Boulder, CO
Research Chemist June 2022 to present
Developing MELODIES-MONET, which is a model evaluation tool that easily and efficiently compares simulations from a variety of research and operational models against observations. Updating the RACM_ESRL chemical mechanism to improve the representation of volatile organic compounds in order to reduce biases in simulated ozone and secondary organic aerosol. Evaluating NOAA's operational or soon to be operational air quality forecasts and adding enhanced research capabilities for atmospheric chemistry within NOAA's Unified Forecasting System. Leading and providing forecasting support for aircraft campaigns (e.g., co-PI of AEROMMA).
- Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder & NOAA Chemical Sciences Laboratory** Boulder, CO
Research Scientist 2 April 2020 to June 2022
Evaluating and improving chemistry in NOAA research and operational models with an ultimate goal of improving simulated air pollutants including ozone and secondary organic aerosol.
- National Center for Atmospheric Research (NCAR), Atmospheric Chemistry Observations and Modeling Laboratory** Boulder, CO
Project Scientist 1 Sept 2019 to March 2020
Updating chemistry in CESM/CAM-Chem and assisting in the development of a new version of CESM called CAM-chem-SE with the capability of regional refinement, which includes model development, emissions regriding, and evaluation against field campaign observations.
- Postdoctoral Fellow* Nov 2016 to Sept 2019
Updating, optimizing, and evaluating biogenic volatile organic compound oxidation chemistry in CESM/CAM-Chem, a community earth system model, in order to improve simulated ozone.
- California Institute of Technology** Pasadena, CA Sept 2011 to Oct 2016
PhD Candidate
Conducted atmospheric chamber experiments under the supervision of Dr. John Seinfeld (primary advisor) and Dr. Paul Wennberg (secondary advisor) with a focus on identifying gas-phase oxidation products and secondary organic aerosol precursors using a CF₃O[•] chemical ionization mass spectrometer.

Eastern Research Group, Inc. Chantilly, VA
Chemist

Aug 2009 – March 2011

Worked as a technical contractor to the US Environmental Protection Agency.

HONORS and AWARDS

NCAR Advanced Study Program (ASP) Postdoctoral Fellowship

Nov 2016 – Nov 2018

COMMUNITY CODE DEVELOPMENT

MELODIES-MONET Development - Currently, co-leading effort to develop a community diagnostic tool called MELODIES-MONET that will evaluate research & operational models against surface, aircraft, & satellite observations.

Community Model Development:

- Developed MOZART-TS2.1 chemical mechanism, which improved biogenic volatile organic compound oxidation chemistry (released in CESM2.2)
- Helped develop new component set of CESM called CAM-chem-SE or MUSICA_{v0} with the capability of horizontal regional refinement over the continental US (released in CESM2.2)

FIELD CAMPAIGN SUPPORT

Chemical Forecasting for Field Campaigns - Helped with chemical forecasting efforts for FIREX-AQ (2019) & RECAP-CA (2021).

Co-PI of AEROMMA 2023 aircraft campaign

MENTORING AND SUPERVISING

NCAR Significant Opportunities in Atmospheric Research and Science - Writing Mentor for undergraduate student to enhance writing/presentation skills (Summer 2017 & 2018)

Supervisor for Qindan Zhu, CIRES temporary researcher, Jan 2022 – June 2022.

SELECTED PUBLICATIONS

Refer to ResearcherID for full list: <https://publons.com/researcher/4117022/rebecca-schwantes>

Peer-Reviewed Journal Articles

Schwantes, R. H., Lacey, F. G., Tilmes, S. Emmons, L. K., Lauritzen, P. H., Walters, S. et al.: Evaluating the Impact of Chemical Complexity and Horizontal Resolution on Tropospheric Ozone Over the Conterminous US With a Global Variable Resolution Chemistry Model, *J. Advances in Modeling Earth Systems*, 14, <https://doi.org/10.1029/2021MS002889>, 2022.

Coggon M. M., Gkatzelis, G. I., McDonald, B. C., Gilman, J. B., **Schwantes, R. H.**, et al.: Volatile chemical product emissions enhance ozone and modulate urban chemistry. *Proc. Natl. Acad. Sci. U.S.A.*, 118, <https://doi.org/10.1073/pnas.2026653118>, 2021.

Jo, D. S., Hodzic, A., Emmons, L. K., Tilmes, S., **Schwantes, R. H.**, Mills, M. J., et al.: Future changes in isoprene-epoxydiol-derived secondary organic aerosol (IEPOX SOA) under the Shared Socioeconomic Pathways: the importance of physicochemical dependency, *Atmos. Chem. Phys.*, 21, 3395–3425, <https://doi.org/10.5194/acp-21-3395-2021>, 2021.

Wang, S., Apel, E. C., **Schwantes, R. H.**, Bates, K., Jacob, D. J., Fisher, E. V., et al.: Global Atmospheric Budget of Acetone: Air-Sea Exchange and the Contribution to Hydroxyl Radicals. *J. Geophys. Res. Atmos.*, 125, <https://doi.org/10.1029/2020JD032553>, 2020.

He, C., Clifton, O., Felker-Quinn, E., Fulgham, S. R., Calahorrano, J. J., Lombardozzi, D., Purser, G., Riches, M., **Schwantes, R. H.**, Tang, W., Poulter, B., Steiner, A. L.: Interactions between Air Pollution and Terrestrial Ecosystems: Perspectives on Challenges and Future Directions, *Bull. Am. Meteorol. Soc.*, 102, E525-E538, <https://doi.org/10.1175/BAMS-D-20-0066.1>, 2020.

Schwantes, R. H., Emmons, L. K., Orlando, J. J., Barth, M. C., Tyndall, G. S., et al.: Comprehensive Isoprene and Terpene Gas-Phase Chemistry Improves Simulated Surface Ozone in the Southeastern U.S., *Atmos. Chem. Phys.*, 20, 3739-3776, <https://doi.org/10.5194/acp-20-3739-2020>, 2020.

Emmons, L. K., **Schwantes, R. H.**, Orlando, J. J., Tyndall, G. S., Kinnison, D., et al.: The Chemistry Mechanism in the Community Earth System Model version 2 (CESM2). *J. Advances in Modeling Earth Systems*, 12, e2019MS001882, <https://doi.org/10.1029/2019MS001882>, 2020.

Schwantes, R. H., Charan, S. M., Bates, K. H., Huang, Y., Nguyen, T. B., Mai, H., Kong, W., Flagan, R. C., Seinfeld, J. H.: Low-volatility Compounds Contribute Significantly to Isoprene SOA Under High-NO_x Conditions. *Atmos. Chem. Phys.*, 19, 7255-7278, <https://doi.org/10.5194/acp-2018-1358>, 2019.

Wennberg, P. O., Bates, K. H., Crouse, J. D., Dodson, L. G., McVay, R. C., Mertens, L. A., Nguyen, T. B., Praske, E., **Schwantes, R. H.**, Smarte, M. D., St Clair, J. M., Teng, A. P., Zhang, X., Seinfeld, J. H.: Gas-Phase Reactions of Isoprene and Its Major Oxidation Products. *Chem. Rev.*, 118, 3337-3390, <https://doi.org/10.1021/acs.chemrev.7b00439>, 2018.

Schwantes, R. H., Schilling, K. A., McVay, R. C., Lignell, H., Coggon, M. M., Zhang, X., Wennberg, P. O., Seinfeld, J. H.: Formation of Highly Oxygenated Low-Volatility Products from Cresol Oxidation. *Atmos. Chem. Phys.*, 17, 3453-3474, <https://doi.org/10.5194/acp-17-3453-2017>, 2017.

Schwantes, R. H., Teng, A. P., Nguyen, T. B., Coggon, M. M., Crouse, J. D., St. Clair, J. M., Zhang, X., Schilling, K. A., Seinfeld, J. H., Wennberg, P. O.: Isoprene NO₃ Oxidation Products from the RO₂ + HO₂ Pathway. *J. Phys. Chem. A.*, 119, 10158-10171, <https://doi.org/10.1021/acs.jpca.5b06355>, 2015.

Nguyen, T. B., Crouse, J. D., **Schwantes, R. H.**, Teng, A. P., Bates, K. H., Zhang, X., St. Clair, J. M., Brune, W. H., Tyndall, G. S., Keutsch, F. N., Seinfeld, J. H., Wennberg, P. O.: Overview of the Focused Isoprene eXperiment at the California Institute of Technology (FIXCIT): Mechanistic Chamber Studies on the Oxidation of Biogenic Compounds. *Atmos. Chem. Phys.*, 14, 13531-13549, <https://doi.org/10.5194/acp-14-13531-2014>, 2014.

Book Chapters

Schwantes, R. H., McVay, R. C., Zhang, X., Coggon, M. M., Lignell, H., Flagan, R. C., Wennberg, P. O., Seinfeld, J. H.: Chapter 1: Science of the Environmental Chamber. *Advances in Atmospheric Chemistry: Vol 1* In J. R. Barker, A. L. Steiner, & T. J. Wallington Eds., Singapore: World Scientific Publishing Co. Pte. Ltd., 1-93, https://doi.org/10.1142/9789813147355_0001, 2017.