KARL M. SELTZER

Curriculum Vitae

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EDUCATION

Duke University *December 2019*
Ph.D. in Earth & Ocean Sciences

University of Florida *December 2011*
M.E. in Environmental Engineering & Sciences

University of Florida *December 2009*
B.S. in Environmental Engineering & Sciences

PROFESSIONAL POSITIONS

Physical Scientist - Office of Air and Radiation 2021 - Present
U.S. Environmental Protection Agency *Durham, NC*

ORISE Post-Doctoral Fellow 2020 - 2021
U.S. Environmental Protection Agency *Durham, NC*

Graduate Research Assistant 2015 - 2019
Duke University - Dr. Drew Shindell *Durham, NC*

Research Fellow 2017
International Institute of Applied Systems Analysis *Vienna, Austria*

Koogler and Associates, Inc. 2011 - 2015
Engineer III *Gainesville, FL*

Research Assistant 2013 - 2015
University of Florida - Dr. Barron Henderson *Gainesville, FL*

ORISE Fellow 2014
U.S. Environmental Protection Agency *Durham, NC*

Graduate Research Assistant 2010 - 2011
University of Florida - Dr. John Sansalone *Gainesville, FL*

Student Research Assistant 2008 - 2009
University of Florida - Dr. John Sansalone *Gainesville, FL*

PUBLICATIONS

Seltzer KM, Rao V, Pye HOT, Murphy BN, Place BK, Khare P, Gentner DR, Allen C, Cooler D, Mason R, Houyoux M, Anthropogenic Secondary Organic Aerosol and Ozone from Asphalt-Related Emissions. in preparation.

Pye HOT, Place BK, Murphy BN, **Seltzer KM**, D'Ambro EL, Allen C, Piletic I, Farrell S, Schwantes RH, Coggon MM, Saunders E, Xu L, Sarwar G, Hutzell B, Foley KM, Pouliot G, Bash J, Stockwell WR, Linking gas, particulate, and toxic endpoints to air emissions in the Community Regional Atmospheric Chemistry Multiphase Mechanism (CRACMM) version 1.0. in preparation.

Khare P, Krechmer JE, Machesky J, Hass-Mitchell T, Cao C, Wang J, Majluf F, Lopez-Hilfiker, **Seltzer KM**, Pye HOT, Commane R, McDonald B, Toledo-Crow R, Mak JE, Gentner DR, Leveraging ammonium-adduct chemical ionization to investigate anthropogenic oxygenated gas-phase organic compounds in urban air. in preparation.

Murphy BN, Sonntag D, **Seltzer KM**, Pye HOT, Allen C, Murray E, Toro C, Reactive Organic Carbon Air Emissions from Mobile Sources in the United States. in preparation.

Sonntag D, Base J, Toro C, Burke G, Murphy BN, **Seltzer KM**, Simon H, Shephard M, Cady-Periera KE, Sensitivity of Air Quality to Vehicle Ammonia Emissions in the United States. in preparation.

Pye HOT, Appel KW, **Seltzer KM**, Ward-Caviness CK, Murphy BN, The relationship between controls on secondary air pollution precursors and human-health impacts. Environmental Science and Technology Letters, 9, 2, 96101, 2022; doi:10.1021/acs.estlett.1c00798.

Pennington E, **Seltzer KM**, Murphy BN, Qin M, Seinfeld JH, Pye HOT. Modeling secondary organic aerosol formation from volatile chemical products. Atmospheric Chemistry and Physics, 21, 1824718261, 2021; doi: 10.5194/acp-21-18247-2021.

Pye HOT, Ward-Caviness CK, Murphy BN, Appel KW, **Seltzer KM**, Secondary organic aerosol and cardiorespiratory disease mortality in the United States. Nature Communications, 12, 7215, 2021; doi: 10.1038/s41467-021-27484-1.

Seltzer KM, Murphy BN, Pennington EA, Allen C, Talgo, K, Pye HOT. Volatile Chemical Product Enhancements to Criteria Pollutants in the United States. Environmental Science and Technology, 56, 11, 69056913, 2021; doi: 10.1021/ace.est.1C04298.

Shindell D, Ru M, Zhang Y, **Seltzer KM**, Faluvegi G, Nazarenko L, Schmidt GA, Parsons L, Challapalli A, Yang L, Glick A. Temporal and Spatial Distribution of Health, Labor and Crop Benefits of Climate Change Mitigation in the US. Proceedings of the National Academy of Sciences, 2021, 118:46; doi: 10.1073/pnas.2104061118.

Zhang Y, Shindell D, **Seltzer KM**, Shen L, Lamarque J-F, Zhang Q, Zheng B, Xing J, Jiang Z, Zhang L. Impacts of emission changes in China from 2010 to 2017 on domestic and intercontinental air quality and health effect. Atmospheric Chemistry and Physics, 21:16051-16065, 2021; doi: 10.5194/acp-21-16051-2021.

Seltzer KM, Pennington E, Rao V, Murphy BN, Strum M, Isaacs KK, Pye HOT. Reactive Organic Carbon Emissions from Volatile Chemical Products. Atmospheric Chemistry and Physics, 2021, 21:50795100; doi: 10.5194/acp-21-5079-2021.

Contributing Author: United Nations Environment Programme and Climate and Clean Air Coalition, Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions, Nairobi: United Nations Environment Programme, 2021.

Seltzer KM, Shindell DT, Kasibhatla P, Malley CS. Magnitude, Trends, and Impacts of Ambient

Long-Term Ozone Exposure in the United States from 2000-2015. Atmospheric Chemistry and Physics, 2020, 20:1757-1775; doi: 10.5194/acp-20-1757-2020.

Ru M, Shindell D, **Seltzer KM**, Tao S, Zhong Q. The long-term relationship between emissions and economic growth for CO2, SO2, and BC. Environmental Research Letters, 2018; doi: 10.1088/1748-9326/aaece2.

Seltzer KM, Shindell DT, Malley CS. Measurement-Based Assessment of Health Burdens from Long-Term Ozone Exposure in the United States, Europe, and China. Environmental Research Letters, 2018, 13; doi:10.1088/1748-9326/aae29d.

Contributing Author: United Nations Environment Programme and Climate and Clean Air Coalition, Air Pollution in Asia and the Pacific: Science-Based Solutions, NNairobi: United Nations Environment Programme, 2018.

Shindell DT, Faluvegi G, **Seltzer KM**, Shindell C. Quantified, Localized Health Benefits of Accelerated Carbon Dioxide Emissions Reductions. Nature Climate Change, 2018, 8:291295; doi: 10.1038/s41558-018-0108-y

Seltzer KM, Shindell DT, Faluvegi G, Murray LT. Evaluating modeled impact metrics for human health, agriculture growth, and near-term climate. Journal of Geophysical Research: Atmospheres, 2017, 122; doi: 10.1002/2017JD026780.

Seltzer KM, Nolte CG, Spero TL, Appel KW, Xing J. Evaluation of near surface ozone and particulate matter in air quality simulations driven by dynamically downscaled historical meteorological fields. Atmospheric Environment, 2016, 138:42-54; doi: 10.1016/j.atmosenv.2016.05.010

Seltzer KM, Vizuete W, Henderson BH. Evaluation of updated nitric acid chemistry on ozone precursors and radiative effects. Atmospheric Chemistry and Physics, 2015, 15:1-14; doi: 10.5194/acp-15-1-2015.

Sansalone J, Raje S, Kertesz R, Maccarone K, **Seltzer K**, Siminari M, Simms P, Wood B. Retrofitting impervious urban infrastructure with green technology for rainfall-runoff restoration, indirect reuse and pollution load reduction. Environmental Pollution, 2013, 183:204-212.

PRESENTATIONS/POSTERS

Murphy B, **Seltzer KM**, Pye H, D'Ambro E, Heald C, Kroll J. Application of Reactive Organic Carbon Framework to Modeling VOC and PM Emissions. Presentation at the AGU Conference, December 14, 2021.

Foley K, Pouliot G, Eyth A, Possiel N, Gilliam R, Appel W, Bash J, Eder B, Misenis C, Reynolds L, Aldridge M, Allen C, Beardsley M, Beidler J, Choi D, Farkas C, Godfrey J, Henderson B, Koplitz S, Mason R, Mathur R, Pye H, Roark M, Roberts S, **Seltzer KM**, Sonntag D, Talgo K, Toro C, Vukovich J, Hogrefe C, Adams L, Arunachalam S, Benish S, Schwede D, Simon H. EPA's Air QUAlity TimE Series Project (EQUATES). Presentation at the AGU Conference, December 13, 2021.

Pye H, **Seltzer KM**, Murphy BN, Allen C, Piletic I, D'Ambro E, Schwantes R, Coggon M, Saunders E, Farrell S, Foley K, Pouliot G, Stockwell WR. Integrating reactive organic carbon emissions into the Community Regional Atmospheric Chemistry Multiphase Mechanism (CRACMM). Presentation at the IAMA Conference, December 8, 2021.

Seltzer KM, Murphy BN, Pennington E, Allen C, Talgo K, Pye HOT. Volatile Chemical Product Enhancements to Criteria Pollutants in the United States. Presentation at the CMAS Conference, November 3, 2021.

Pye H, **Seltzer KM**, Murphy BN, Allen C, Piletic I, D'Ambro E, Schwantes R, Coggon M, Saunders E, Farrell S, Foley K, Pouliot G, Stockwell WR. Integrating reactive organic carbon emissions into the Community Regional Atmospheric Chemistry Multiphase Mechanism (CRACMM). Presentation at the CMAS Conference, November 3, 2021.

Sonntag D, Bash J, Toto C, Burke G, Murphy B, **Seltzer KM**, Simon H, Benish S, Foley K, Eyth A, Allen C, Godfrey J, Shephard M, Cady-Periera KE. Sensitivity of Particulate Matter Concentrations to Revised Estimates of Onroad Ammonia Emissions. Presentation at the CMAS Conference, November 3, 2021.

Murphy B, **Seltzer KM**, Pye H, D'Ambro E, Heald C, Kroll J. Application of Reactive Organic Carbon Framework to Modeling VOC and PM Emissions. Presentation at the CMAS Conference, November 3, 2021.

Pouliot G, Pye H, Murphy B, Menetrez M, Diem A, Rao T, **Seltzer KM**, Myers C, Hsu Y, Divita F. What's New in SPECIATE 5.2? Presentation at the CMAS Conference, November 3, 2021.

Pennington EA, **Seltzer KM**, Murphy BN, Qin M, Want Y, Yang J, Schulze B, Lee M, Kenseth CM, Parker H, Moul B, Hawkins L, Pye HOT, Seinfeld J. Modeling the Formation of SOA from Volatile Chemical Products in Los Angeles. Presentation at the CMAS Conference, November 3, 2021.

Foley K, Pouliot G, Eyth A, Possiel N, Gilliam R, Appel W, Bash J, Eder B, Misenis C, Reynolds L, Aldridge M, Allen C, Beardsley M, Beidler J, Choi D, Farkas C, Godfrey J, Henderson B, Koplitz S, Mason R, Mathur R, Pye H, Roark M, Roberts S, **Seltzer KM**, Sonntag D, Talgo K, Toro C, Vukovich J, Hogrefe C, Adams L, Arunachalam S, Benish S, Schwede D, Simon H. EPA's Air QUAlity TimE Series Project (EQUATES). Presentation at the CMAS Conference, November 2, 2021.

Pennington EA, **Seltzer KM**, Murphy BN, Qin M, Want Y, Yang J, Schulze B, Lee M, Kenseth CM, Parker H, Moul B, Hawkins L, Pye HOT, Seinfeld J. Modeling the Formation of SOA from Volatile Chemical Products in Los Angeles. Presentation at the AAAR Conference, October 20, 2021.

Schulze B, Kenseth C, Pennington E, Ward R, Van Rooy P, **Seltzer KM**, Barletta B, Meinardi S, Parker H, Buenconsejo R, Murphy S, Crounse J, Pye H, Blake DR, Barsanti KC, Wennberg PO, Seinfeld JH. On-road vehicle emissions account for a minor fraction of organic aerosol in Los Angeles. Presentation at the AAAR Conference, October 20, 2021.

Seltzer KM, Murphy BN, Pennington E, Rao V, Isaacs KK, Allen C, Talgo K, Pye HOT. Volatile Chemical Product Emissions and Criteria Pollutant Enhancements in the United States. Poster at the

IGAC Conference, September 14, 2021.

Pennington E, **Seltzer KM**, Murphy BN, Qin M, Seinfeld JH, Pye HOT. Modeling Secondary Organic Aerosol Formation from Volatile Chemical Products. Poster at the IGAC Conference, September 15, 2021.

Khare P, Krechmer JE, Hass-Mitchell T, Machesky J, Wang J, Stark H, Lopez-Hilfiker, **Seltzer KM**, Pye HOT, Cao C, Commane R, Toledo-Crow R, Mak JE, Gentner DR. Expanded observations of oxygenated organic compounds in urban emissions via ammonoim-adduct chemical ionization mass spectrometry. Poster at the IGAC Conference, September 15, 2021.

Seltzer KM, Murphy BN, Rao V, Pennington E, Foley K, Pye HOT. Nationwide Trends of Reactive Organic Carbon Emissions from Volatile Chemical Products. Poster at the AGU Conference, December 15, 2020.

Pye HOT, **Seltzer KM**, Qin M, Murphy BN, Pennington E, Rao V, Isaacs KK. Improving tools and methods to understand the implications of volatile chemical product usage on public health. Presentation at the AGU Conference, December 15, 2020.

Seltzer KM, Pennington E, Rao V, Murphy BN, Strum M, Isaacs KK, Pye HOT. Reactive Organic Carbon Emissions from Volatile Chemical Products. Presentation at the CMAS Conference, October 28, 2020.

Pye HOT, Ward-Caviness C, Murphy BN, Apell KW, **Seltzer KM**. Role of secondary organic aerosol in cardiovascular and respiratory disease mortality in the United States. Presentation at the CMAS Conference, October 28, 2020.

Pennington EA, **Seltzer KM**, Murphy BN, Seinfeld JH, Pye HOT. A Model to Represent SOA Formation from Volatile Chemical Products. Presentation at the CMAS Conference, October 28, 2020.

Foley K, Pouliot G, Eyth A, Posseil N, Aldridge M, Allen C, Appel W, Bash J, Beardsley M, Beidler J, Choi D, Eder B, Farkas C, Gilliam R, Godfrey J, Henderson B, Hogrefe C, Koplitz S, Mason R, Mathur R, Misenis C, Pye H, Reynolds L, Roark M, Roberts S, **Seltzer KM**, Sonntag D, Talgo K, Toro C, Vukovich J. EQUATES: EPA's Air QUAlity TimE Series Project. Presentation at the CMAS Conference, October 28, 2020.

Seltzer KM, Pennington E, Rao V, Murphy BN, Strum M, Isaacs KK, Pye HOT. A New Framework for Modeling Emissions from Volatile Chemical Products. Poster at the AAAR Conference, October 5, 2020.

Pennington EA, **Seltzer KM**, Murphy BN, Seinfeld JH, Pye HOT. A Model to Represent SOA Formation from Volatile Chemical Products. Presentation at the AAAR Conference, October 5, 2020.

Jaoui M, Lewandowski M, Pye H, Docherty K, Cocker III DR, Charan S, Buenconsejo R, Seinfeld J, **Seltzer KM**, Hleindienst TE. Formation of highly oxygenated molecules and nitro aromatic compounds from the oxidation of benzyl alcohol. Presentation at the AAAR Conference, October 5, 2020.

Pye HOT, Ward-Caviness C, Murphy BN, Apell KW, **Seltzer KM**. Role of organic aerosol in cardiovascular and respiratory disease deaths. Presentation at the AAAR Conference, October 5, 2020.

Zhang, Y., Shindell, D., **Seltzer KM**, Shen, L., Zhang, Q., Zheng, B., Xing, J., Jiang, Z., Zhang, L. Recent China Clean Air Actions on Global Air Quality and Climate Change. Poster at the FASCINATE Conference, NCAR/ACOM, September 9, 2019.

Seltzer KM. Long-Term Ambient Ozone Exposure: Magnitude, Trends, and Impacts on Human-Health and Agriculture. Presentation for the National Center for Environmenal Assessment at the U.S. Environmental Protection Agency, August 26, 2019.

Seltzer KM, Shindell, DT, Kasibhatla, P, Malley, CM. Trends, drivers, and impacts of ozone exposure in the United States from 2000-2015. Poster at the 9th International GEOS-Chem Meeting (IGC9), Harvard University, May 7, 2019.

Seltzer KM, Shindell, DT, Kasibhatla, P, Malley, CM. Application of Machine Learning to Estimate Ozone Metrics Relevant for Human-Health and Agriculture Impact Assessments. Poster at the 2019 Duke Research Computing Symposium. Durham, NC. January 16, 2019.

Seltzer KM, Shindell, DT, Malley, CM. Measurement-Based Assessment of Health Burdens from Long-Term Ozone Exposure in the United States, Europe, and China. Poster at the AGU Fall Meeting in Washington DC. December 10, 2018.

Seltzer KM, Shindell, DT, Kasibhatla, P, Malley, CM. Trends and Dynamics of Ozone Exposure Metrics in the USA and Europe. Poster at the AGU Fall Meeting in Washington DC. December 10, 2018.

Seltzer KM. Air quality and health impacts in China: Ozones emergence in the present and future. Presentation at the Chinese Environmental Scholars Forum at Duke University. May 18, 2018.

Seltzer KM. Future Trends of Air Quality and Health Impacts in the USA and China: Ozone's Emerging Contributions. Presentation at the Nicholas School PhD Symposium at Duke University. February 9, 2018.

Seltzer KM, Heyes C, Borken-Kleefeld J. Sectoral Strategies for Reducing Ozone in China. Presentation at the Young Scientists Summer Program Final Symposium at the International Institute of Applied Systems Analysis in Vienna, Austria. August 21, 2017.

Seltzer KM, Nolte CG, Spero TL, Appel KW, Xing J. Evaluation of CMAQ Driven by Downscaled Historical Meteorological Fields. Presentation at the Community Modeling and Analysis System (CMAS) Conference in Chapel Hill, NC. October 7, 2015.

Henderson BH, **Seltzer KM**. Sensitivity of Radiative Effect to Chemistry. Presentation at the 7th International GEOS-Chem Meeting at Harvard University. May 4, 2015.

Seltzer KM. Historical Evaluation of CMAQ Using Downscaled Meteorology for Future Air Quality Purposes. Presentation at the UF Air Resources Seminar at the University of Florida in Gainesville, FL. January 22, 2015.

Seltzer KM, Henderson BH. Nitric Acid Formation Rates Impact on Climate Forcing. Presentation at the Spring 2014 Air Quality Workshop at the University of Florida in Gainesville, FL. March 26, 2014.

TEACHING

Guest Lecturer and/or Teaching Assistant — Spring 2016/17/18/19
EOS355 Global Warming — *Duke University*

Guest Lecturer and/or Teaching Assistant — Fall 2016/17/18/19
EOS550 Climate and Society — *Duke University*

Teaching Assistant — Fall 2015
ENV330 Energy and Environment — *Duke University*

MODEL, TOOL, AND MODELING PLATFORM CONTRIBUTIONS

SPECIATE: U.S. EPA's Speciation Database	v5.2: summer 2022, v5.3: in development
Spectiation Tool	v5.1: spring 2022, v5.2: summer 2022 v5.3: in development
2016v2 Modeling Platform	winter 2021
2017 Modeling Platform	fall 2021
2018 Modeling Platform	spring 2022
2019 Modeling Platform	spring 2022

TECHNICAL SKILLS

Air Quality Modeling	GEOS-Chem (global), GISS modelE2 (global), CMAQ (regional/local)
Visualization & Analysis	matplotlib, NumPy, Panopoly
Programming Languages	Python, TensorFlow, git, HTML/CSS, LaTeX, FORTRAN 90
Miscellaneous	Proficient in Linux, OS X, Windows, bash/c-shell scripting, NetCDF/CDO Operators, 7+ years of laboratory experience

AWARDS

U.S. Environmental Protection Agency ORISE Post-Doctoral Fellowship (2020-2021)
NASA NESSF Fellowship Re-newal (2018)
NASA NESSF Fellowship (2017)
IIASA Young Scientists Summer Program Fellowship (2017)
U.S. Environmental Protection Agency ORISE Fellowship (2014)
WEFTEC national student design competition winner and team leader (2010)
FWRC statewide student design competition winner and team leader (2009)
University Scholars Recipient (2009)
University of Florida Undergraduate Outstanding Scholar Award (2009)
Passed Fundamentals of Engineering Exam (2009)
Florida Bright Futures Scholarship Recipient (2005-2009)