Nicholas Clements, PhD

Email: nicholas.clements@colorado.edu, nsclements@gmail.com, Phone: (303)532-6546

Professional Career

Manager, Larson Laboratory and the BEST Center (NSF IUCRC), Architectural Engineering
University of Colorado Boulder 2023-Present
Adjunct Instructor, Architectural Engineering
University of Colorado Boulder 2023-Present
Adjunct Instructor, Mechanical Engineering
University of Colorado Boulder 2023
Senior Research Associate, Mechanical Engineering
University of Colorado Boulder 2022-2023
Postdoctoral Research Associate, Mechanical Engineering
University of Colorado Boulder 2021-2022
Research Consultant, SafeTraces Inc. 2021-2022
Lead Consultant, WSP USA 2020
Senior Director, Building Sciences, Well Living Lab 2019-2020
Research Affiliate, Mayo Clinic 2016-2020
Research Consultant, Well Living Lab 2017-2019
Director, Delos Labs, Well Living Lab 2016-2017
Postdoctoral Research Assistant, Mechanical Engineering
University of Colorado Boulder 2014-2015
Graduate Research Assistant, Mechanical Engineering
University of Colorado Boulder 2008-2013

Education

Ph.D. Mechanical Engineering, University of Colorado Boulder 2010-2013
M.S. Mechanical Engineering, University of Colorado Boulder 2009-2010
B.S. Mechanical Engineering, University of Colorado Boulder 2005-2009

Peer-Reviewed Research and Book Chapters

1. Fowler, A, Miklaszewski, J, Simone, D, Heredia, N, Fry, A, Gutierrez, K, Borja, C, Miller, S, Hamlington, P, **Clements, N** (2024). Measurement and modeling of dental aerosol proxies using synthetic DNA aerosol tracers in lab and clinical settings. *In prep.*
2. Khalili Hollo, A, Gonzalez-Beltran, D, Heckman, A, Castillo, S, Herwig, T, Aumann, J, Morency, C, Leiden, L, Wang, L, Stockman, T, Sankhyan, S, **Clements, N**, Miller, SL (2024). Validation and Correction of Consumer-Grade Personal Exposure Monitors for Particulate Matter Air Pollution in Denver, Colorado. *In prep.*
3. Sankhyan, S, Khalili Hollo, M, Gonzalez-Beltran, D, **Clements, N**, Miller, S (2024). Long-term monitoring of indoor CO levels in disproportionately impacted communities in the North Denver metropolitan area. *Environmental Science and Technology Letters*, *submitted.*

4. Sankhyan, S, **Clements, N**, Heckman, A, Sankhyan, S, Aumann, J, Morency, C, Leiden, L, Miller, S (2023). Optimization of a Do-It-Yourself Air Cleaner Design to Reduce Residential Air Pollution Exposure for a Community Experiencing Environmental Injustices. *Atmosphere* 14: 1734. https://doi.org/10.3390/atmos14121734.
5. **Clements, N**, Arvelo, I, Arnold, P, Heredia, NJ, Hodges, UW, Deresinski, S, Cook, PW, Hamilton, KA (2023). Informing Building Strategies to Reduce Infectious Aerosol Transmission Risk by Integrating DNA Aerosol Tracers with Quantitative Microbial Risk Assessment. *Environmental Science & Technology*, 57(14): 5771-5781. https://doi.org/10.1021/acs.est.2c08131.
6. Pantelic, J, Aristizabal, S, Liu, Q, Senerat, A, Son, YJ, Byun, K, Li, L, Mullan, A, Zhang, R, Johnson, B, **Clements, N** (2022). The Impact of Automated Control of Indoor Air Pollutants on Cardiopulmonary Health, Environmental Comfort, Sleep Quality in a Simulated Apartment: A Crossover Experiment Protocol. *Frontiers in Built Environment, Sec. Indoor Environment*, 9(14). https://doi.org/10.3389/fbuil.2023.1117992.
7. Arvelo, I, Pagone, F, Persky, J, Carpio, C, Arnold, P, **Clements, N** (2022). Decay Rates of Two Tracer Gases Compared to DNA-Tagged Liquid Aerosol Tracer Particles: Impact of Varying Dilution Rate and Filtration. *Building and Environment*, 212: 108819. https://doi.org/10.1016/j.buildenv.2022.108819.
8. Aristizabal, S, Byun, K, Porter, P, **Clements, N**, Campanella, C, Li, L, Mullan, A, Ly, S, Senerat, A, Nenadic, IZ, Bauer, B (2021). Biophilic Office Design: Exploring the Impact of a Multisensory Approach on Human Well-Being. *Journal of Environmental Psychology*,77: 101682. https://doi.org/10.1016/j.jenvp.2021.101682.
9. Miller, S, Mukherjee, D, Wilson, J, **Clements, N**, Steiner, C (2020). Implementing a Negative Pressure Isolation Space within a Skilled Nursing Facility to Control SARS-CoV-2 Transmission. *American Journal of Infection Control*, 49(4): 438-446. https://doi.org/10.1016/j.ajic.2020.09.014.
    a. Preprint: https://www.medrxiv.org/content/10.1101/2020.07.04.20143123v1.
10. Senerat, A, Manemann, SM, **Clements, NS**, Brook, RD, Hassett, LC, Roger, VL (2020). Biomarkers and Indoor Air Quality: A Translational Research Review. *Journal of Clinical and Translational Science*, 5(1): e39. https://doi.org/10.1017/cts.2020.532.
11. Li, L, Mullan, AF, **Clements, N** (2020). Exposure to Air Pollution in Indoor Walkways of a Suburban City. *Building and Environment*, 183: 107171. https://doi.org/10.1016/j.buildenv.2020.107171.
12. **Clements, N**, Binnicker, MJ, Roger, VL (2020). Indoor Environment and Viral Infections. *Mayo Clinic Proceedings*, 95(8): 1581-1583. https://doi.org/10.1016/j.mayocp.2020.05.028.
13. Dujardin, CE, Mars, RAT, Manemann, SM, Kashyap, PC, **Clements, NS**, Hassett, LC, Roger, VL (2020). Impact of air quality on the gastrointestinal microbiome: A review. *Environmental Research*, 186: 109485. https://doi.org/10.1016/j.envres.2020.109485.
14. Aristizabal, S, Porter, P, **Clements, N**, Campanella, C, Zhang, R, Hovde, K, Lam, C (2019). Conducting Human-Centered Building Science at the Well Living Lab. *Technology | Architecture + Design*, 3, 161-173. https://doi.org/10.1080/24751448.2019.1640535.
15. Jamrozik, A, **Clements, N**, Hasan, SS, Zhao, J, Zhang, R, Campanella, C, Loftness V, Porter P, Ly, S, Wang, S, Bauer, B (2019). Access to daylight and view in an office improves cognitive

performance and satisfaction and reduces eyestrain: A controlled crossover study. *Building and Environment*, 165, 106379. https://doi.org/10.1016/j.buildenv.2019.106379.

16. **Clements, N**, Zhang, R, Jamrozik, A, Campanella, C, Bauer, B (2019). The Spatial and Temporal Variability of the Indoor Environmental Quality during Three Simulated Office Studies at a Living Lab. *Buildings*, 9(3), 62. https://doi.org/10.3390/buildings9030062.
17. **Clements, N**, Keady, P, Emerson, JB, Fierer, N, Miller, SL. Seasonal Variability of Airborne Particles and Bacterial Concentrations in Colorado Homes (2018). *Atmosphere*, 9(4), 130. https://doi.org/10.3390/atmos9040133.
18. Jamrozik, A, Ramos C, Zhao J, Bernau J, **Clements N**, Vetting-Wolf, T, Bauer B (2018). A novel methodology to realistically monitor office occupant reactions and environmental conditions using a living lab. *Building and Environment*, 130, 190-199. https://doi.org/10.1016/j.buildenv.2017.12.024.
19. Torpy, F, **Clements, N**, Pollinger M, Dengel A, Mulvihill I, He C, Irga P (2017). Testing the single-pass VOC removal efficiency of an active green wall using methyl ethyl ketone (MEK). *Air Quality, Atmosphere & Health*, 1-8. https://doi.org/10.1007/s11869-017-0518-4.
20. Miller, SL, **Clements, N**, Elliott, SA, Subhash, SS, Eagan, AE, Radonovich R (2017). Implementing a Negative-Pressure Isolation Ward for a Surge in Airborne-Infectious Patients. *American Journal of Infection Control* 45(6), 652-659. https://doi.org/10.1016/j.ajic.2017.01.029.
21. Emerson, JB, Keady, PB, **Clements, N**, Morgan, EE, Awerbuch, J, Miller, SL, Fierer, N (2016). High temporal variability in airborne bacterial diversity and abundance inside single-family residences. *Indoor Air* 27(3), 576-586. https://doi.org/10.1111/ina.12347.
22. **Clements, N**, Milford, JB, Miller, SL, Peel, JL, Hannigan, MP (2016). Comparisons of Urban and Rural $PM_{10-2.5}$ and $PM_{2.5}$ Mass Concentrations and Semi-Volatile Fractions in Northeastern Colorado. *Atmospheric Chemistry and Physics,* 16(11), 7469-7484*.* https://doi.org/10.5194/acp-16-7469-2016.
23. Emerson, JB, Keady, P, Brewer, T, **Clements, N**, Morgan, E, Awerbuch, J, Miller, SL, Fierer, N (2015). Impacts of flood damage on airborne bacteria and fungi in homes after the 2013 Colorado Front Range Flood. *Environmental Science and Technology* 49(5), 2675-2684. https://pubs.acs.org/doi/abs/10.1021/es503845j.
24. **Clements, N**, Eav, J, Xie, M, Hannigan, MP, Miller, SL, Navidi, W, Peel, JL, Schauer, JJ, Shafer, MM, Milford, JB (2014). Concentrations and source insights for trace elements in fine and coarse particulate matter. Atmospheric Environment 89, 373-381. https://doi.org/10.1016/j.atmosenv.2014.01.011.
25. Adar, SD, Filigrana, PA, **Clements, N**, Peel, JL (2014). Ambient Coarse Particulate Matter and Human Health: A Systematic Review and Meta-Analysis. *Current Environmental Health Reports* 1(3), 258-274. https://doi.org/10.1007/s40572-014-0022-z.
26. Duhl, TR, **Clements, N**, Mladenov, N, Cawley, K, Rosario-Ortiz, FL, Hannigan, MP (2014). Natural and Unnatural Organic Matter in the Atmosphere: Recent Perspectives on the High Molecular Weight Fraction of Organic Aerosol. *Advances in the Physicochemical Characterization of Dissolved Organic Matter: Impact on Natural and Engineered Systems,* Volume 1160, American Chemical Society, pp. 87-111. https://pubs.acs.org/doi/abs/10.1021/bk-2014-1160.ch005.
27. **Clements, N**, Milford, JB, Miller, SL, Navidi, W, Peel, JL, Hannigan, MP (2013). Errors in coarse particulate matter ($PM_{10-2.5}$) mass concentrations and spatiotemporal characteristics when using subtraction estimation methods. *Journal of the Air & Waste Management Association* 63, 1386-1398. https://doi.org/10.1080/10962247.2013.816643.

28. Bowers, R, **Clements, N**, Emerson, J, Wiedinmyer, C, Hannigan, M, Fierer, N (2013). Seasonal variability in the bacterial and fungal diversity of the near-surface atmosphere. *Environmental Science and Technology* 47(21), 12097-12106. https://pubs.acs.org/doi/abs/10.1021/es402970s.
29. **Clements, N**, Piedrahita, R, Ortega, J, Peel, JL, Hannigan, M, Miller, SL, Milford, JB (2012). Characterization and Nonparametric Regression of Rural and Urban Coarse Particulate Matter Mass Concentrations in Northeastern Colorado. *Aerosol Science and Technology* 46(1), 108-123. https://doi.org/10.1080/02786826.2011.607478.
30. Ryan, K, McCabe, K, **Clements, N**, Hernandez, M, Miller, SL (2010). Inactivation of Airborne Microorganisms Using Novel Ultraviolet Radiation Sources in Reflective Flow-Through Control Devices. *Aerosol Science and Technology* 44(7), 541-550. https://doi.org/10.1080/02786821003762411.

Conference Papers and Other Publications

1. Hammad, O, Rahman, Md R, **Clements, N**, Mishra, S, Miller, S, Sullivan, E (2023). PureNav: A Personalized Navigation Service for Environmental Justice Communities Impacted by Planned Disruptions. CRV-ACM/IEEE Advances in Social Network Analysis and Mining (ASONAM) 2023, Kusadasi, Turkey.
2. Wilson, J, Miller, S, **Clements, N**, Steiner, C, Mukherjee, D (2020). A Coupled Lagrangian Model for Flow-mediated Transmission of SARS-CoV-2 through Respiratory Ejecta in a Skilled Nursing Facility. Bulletin of the American Physical Society, 73rd Annual Meeting of the APS Division of Fluid Dynamics.
3. Clevenger, C, Abdallah, M, **Clements, N**, Byun, K, Aristizabal, S, Russell, M, Beauregard, M, Raman, J (2019). Studying Physical and Cognitive Characteristics of Construction Workers. ASCE Construction Research Conference 2020, March 2020. https://ascelibrary.org/doi/abs/10.1061/9780784482889.068.
4. Jamrozik, A, **Clements, N** (2019). Human Performance and Productivity in Buildings. ASHRAE Journal, June 2019.
5. Nguyen, J, Huynh, S, Jamrozik, A, **Clements, N**, Ramos, C, Bauer, B, Zhao, J (2018). Environmental Conditions and Occupant Satisfaction in the Workplace: A Controlled Study in a Living Lab. IBPC 2018.
6. Hasan, SS, Aristizabal, S, Jamrozik, A, Zhang, R, Campanella, C, **Clements, N** (2018). Living Labs: Measuring Human Experience in the Built Environment. CHI'18 Extended Abstracts, Montreal, QC, Canada. https://doi.org/10.1145/3170427.3170627.
7. **Clements, N**, Marks, F, Weekes, L-C (2018). Potential Microbial Contaminants in Biowall Water and Soil Systems. ASHRAE Environmental Health Committee Emerging Issue Brief.
8. **Clements, N**, Miller, SL, Subhash, SS, Eagan, AE (2015). Hospital Surge Capacity: Practical Aspects of Temporary Isolation Ward Design. Proceedings: Healthy Buildings 2015 America.
9. **Clements, N** (2014). Temporary Isolation Rooms and their Application to Hospital Surge Capacity for Infection Control. microBEnet: The microbiology of the Built Environment Network.
10. Miller, S, **Clements, N** (2014). Flooding and Indoor Air Quality. microBEnet: The microbiology of the Built Environment Network.
11. **Clements, N** (2013). The CCRUSH Study: Characterization of Coarse and Fine Particulate Matter in Northeastern Colorado (Doctoral dissertation). University of Colorado at Boulder, 319 pages. AAT 3607289.

Conference and Invited Speaker Presentations

1. **Clements, N**, Likins-White, M (2023). Leveraging University-Industry Collaborations to Drive Progress in Building Sustainability and Window Systems. National Fenestration Research Council (NFRC) Webinar, November 2023.
2. Sankhyan, S, **Clements, N**, Heckman, A, Hollo, AK, Gonzalez-Beltran, D, Aumann, J, Morency, C, Leiden, L, Miller, S (2023). Social Justice and Environmental Quality in Denver (SJEQ-D): Optimization of a Do-It-Yourself Air Cleaner Design to Reduce Residential Air Pollution Exposure for a Community Experiencing Environmental Injustices. AAAR 2023.
3. **Clements, N** (2023). The Role Indoor Air Quality Plays in Environmental Justice Communities Impacted by Construction. FGIA 2023 Conference, invited speaker.
4. Hammad, O, Kanugo, GKV, **Clements, N**, Miller, S, Sullivan, E, Mishra, S (2023). PUREmotion: Understanding the Impacts of Highway Construction on People's Wellbeing via a Smartphone App. IMWUT 2023.
5. **Clements, N** (2023). Social Justice and Environmental Quality in Denver (SJEQ-D): Well-being and Air Pollution Exposure During Major Construction in an Environmental Justice Community. CDC Built Environment Working Group, invited speaker.
6. **Clements, N** (2023). Community-Centered Research and DNA-Based Aerosol Tracers as Approaches to Reducing Airborne Particulate Matter and Pathogen Exposure. 3M Tech Forum, invited speaker.
7. Hammad, O, Westbrook, M, **Clements, N**, Miller, S, Mishra, S, Sullivan, E (2022). Usability study of a self tracking smartphone app for an environmental justice community. CSCW 2023, virtual conference.
8. Khalili, MA, **Clements, N**, Dolores-Castillo, S, Gonzalez-Beltran, D, Heckman, A, Herwig, T, Westbrook, M, Serrano-Salomon, V, Hammad, O, Sullivan, E, Mishra, S, Miller, SL (2022). Personal Exposure using Low-Cost PM Sensors in Low Income Denver Communities. AAAR 2022, Raleigh, NC.
9. **Clements, N** (2022). Aerosol Tracer with Quantitative Microbial Risk Assessment Modeling. AIHA-RMS 2022, Denver, CO, invited speaker.
10. **Clements, N**, Khalili, A, Wang, L, Castillo, S, Westbrook, M, Serrano-Salomon, V, Hammad, O, Sullivan, E, Mishra, S, Miller, SL (2022). Measuring personal air pollution exposure in highly polluted North Denver neighborhoods. Indoor Air 2022, Kuopio, Finland.
11. Pantelic, J, Senerat, A, Aristizabal, S, Liu, Q, Son, Y, Byun, K, Li, L, Wood, N, Wibben, C, Mullan, A, Zhang, R, **Clements, N** (2022). The impact of automated control of indoor air pollutants on cardiopulmonary health, environmental comfort, sleep quality in a simulated apartment. Indoor Air 2022, Kuopio, Finland.
12. **Clements, N**, Arvelo, I, Pagone, F, Persky, J, Carpio, C, Arnold P (2022). Use of DNA-tagged liquid tracer aerosols to simulate the emission, transport, and management of respiratory aerosols in buildings. AIHceEXP2022, Nashville, TN.
13. Arvelo, I, Malmstrom, E, Arnold, P, Hodges, U, Persky, J, Pagone, F, Heckman, B, Carpio, C, **Clements, N** (2022). Use of liquid aerosols as a measurement of dilution ventilation and filtration efficacy for indoor spaces and its comparison with conventional tracer gas method for assessing air changes. Healthy Buildings America 2021, Honolulu, Hawaii.
14. Arvelo, I, Arnold, A, Malmstrom, E, **Clements, N** (2022). Estimation of SARS-CoV-2 transmission risk in heterogeneous spaces with an emission and measurement system

using DNA-tagged liquid tracer aerosols to simulate the transport of human respiratory emission. Healthy Buildings America 2021, Honolulu, Hawaii.

15. Pagone, F, Persky, J, Heckman, B, Arvelo, I, Malmstrom, E, Arnold, P, Hodges, U, Carpio, C, **Clements, N** (2021). Use of liquid aerosols as a measurement of dilution ventilation and filtration efficacy for indoor spaces and its comparison with conventional tracer gas method for assessing air changes. Symposium: Conventional vs. New Technologies for Evaluating and Validating Engineering Controls through the SARS-CoV-2 Pandemic and Beyond. SRA 2021. Virtual Conference.
16. **Clements, N**, Arvelo, I (2021). Use of DNA-tagged bioaerosol tracers for estimating the risk of infection of airborne disease. Symposium: Conventional vs. New Technologies for Evaluating and Validating Engineering Controls through the SARS-CoV-2 Pandemic and Beyond. SRA 2021. Virtual Conference.
17. Westbrook, M, **Clements, N**, Sullivan, E (2021). Engaging Residents in Community Science to Address Air and Noise Pollution Exposure. AAAR 2021 Annual Conference. Virtual Conference.
18. Byun, K, Aristizabal, S, Porter P, Campanella C, **Clements N**, Li, L (2020). The effect of visual and auditory biophilic design interventions on cognitive performance in office workers. ISEE2020. Virtual Conference.
19. **Clements, N**, Jamrozik, A, Hasan, SS, Zhao, J, Zhang, R, Campanella, C, Loftness, V, Porter, P, Ly, S, Wang, S, Bauer, B (2020). Access to Daylight and View Improves Cognitive Performance, Satisfaction with the Environment, and Eyestrain: A Crossover Study in a Simulated Office at a Living Lab. ISES2020. Virtual Conference.
20. **Clements, N**, Zhang, R, Jamrozik, A, Campanella, C, Bauer, B (2020). Spatial and Temporal Variability in Indoor Environmental Quality Conditions during Three Simulated Office Studies at a Living Lab. ISES2020. Virtual Conference.
21. Li, L, Mullan, AF, **Clements, N** (2020). Exposure to Air Pollutants in Urban Indoor Walkways. Extended Abstract. ISES2020. Virtual Conference.
22. **Clements, N**, Jamrozik, A, Hasan, SS, Zhao, J, Zhang, R, Campanella, C, Loftness, V, Porter, P, Ly, S, Wang, S, Bauer, B (2020). Access to Daylight and View Improves Cognitive Performance, Satisfaction with the Environment, and Eyestrain: A Crossover Study in a Simulated Office at a Living Lab. IAQ2020, Athens, Greece.
23. **Clements, N**, Zhang, R, Jamrozik, A, Campanella, C, Bauer, B (2020). Spatial and Temporal Variability in Indoor Environmental Quality Conditions during Three Simulated Office Studies at a Living Lab. IAQ2020, Athens, Greece.
24. Senerat, AM, Manemann, SM, **Clements, NS**, Hassett, LC, Roger, VL (2020). Biomarkers Affected by Indoor Air Quality Exposures: A Review. Extended Abstract, International Conference on Environmental Research and Public Health – Addressing Environmental Threats to Human Health from Pregnancy to Senility. Virtual Conference.
25. Li, L, Mullan, AF, **Clements, N** (2020). Exposure to Air Pollutants in Urban Indoor Walkways. Extended Abstract. Indoor Air 2020. Virtual Conference.
26. **Clements, N** (2019). Human-Centered Building Standards: Overview and Research Needs. ASHRAE 2019 Winter Conference, Seminar 50: Energy Efficiency and the Impact on Human Health. Atlanta, GA.
27. **Clements, N** (2018). Optimizing Building-Human Interactions in the Office Environment. Healthcare Symposium 2018, Harvard Medical School, Boston, MA, invited speaker.

28. **Clements, N**, Aristizabal, S, Ly, SM (2018). Characterization of Three Scent Diffusers using d-Limonene. Extended Abstract. Indoor Air 2018, Philadelphia, PA.
29. **Clements, N** (2018). Technology for Fostering Resilience: An Unconference. Austin, TX.
30. **Clements, N**, Bauer, B, MD, Zhao, J, Ramos, C, Anderson, A, Bernau, J (2017). The Well Living Laboratory: A Facility for Investigating the Impact of the Indoor Environment on Human Comfort, Health, and Productivity. ASHRAE 2017 Annual Conference, Seminar 10: Research Methods to Achieve Superior Comfort, Health, and Well-Being in Buildings.
31. Zhao, J, Bauer, Brent, Pillai, Dana, Ramos, C, **Clements, N**, Vetting Wolf, T, Anderson, A, Bernau, J (2017). Occupant Preferences on Indoor Environmental Conditions in an Open Office. ASHRAE 2017 Winter Conference, Las Vegas, NV.
32. **Clements, N** (2016). Indoor Environmental Quality Research at the Well Living Lab. Federal Interagency Committee on Indoor Air Quality (CIAQ), invited speaker.
33. **Clements, N** (2016). WELL Symposium, Pittsburgh, PA, invited speaker.
34. **Clements, N**, Miller, SL, Subhash, SS, Eagan, AE (2015). Hospital Surge Capacity: Practical Aspects of Temporary Isolation Ward Design. Healthy Buildings 2015. Boulder, CO.
35. **Clements, N**, Miller, S, Peel, J, Milford, J, Hannigan, M (2014). The Colorado Coarse Rural-Urban Sources and Health Study: Spatiotemporal Variability of Coarse and Fine Particulate Matter Mass Concentrations and Composition. DUST2014 Conference, Castellaneta Marina, Italy.
36. **Clements, N**, Duhl, T, Lee, E, Chhun, B, Rosario-Ortiz, F, Milford, JB, Miller, SL, Hannigan, MP (2013). Exploring the Composition of Urban and Rural Organic Matter Found in Coarse Particles ($PM_{10-2.5}$) in Northeastern Colorado. AAAR Annual Conference, Portland, OR.
37. **Clements, N**, Eav, J, Moore, A, Albano, K, Milford, JB, Miller, SL, Hannigan, MP (2012). Characterization of Metal and Ion Concentrations in Rural and Urban $PM_{2.5}$ and $PM_{10-2.5}$ in Colorado. AAAR Annual Conference, Minneapolis, MN.
38. Bowers, R, **Clements, N**, Moore, A, Hannigan, M, Wiedinmyer, C, Fierer, N (2012). The Spatial and Temporal Variability in Bioaerosol Community Structure in Urban and Rural Colorado. AAAR Annual Conference, Minneapolis, MN.
39. **Clements, N**, Milford, J, Miller, SL, Hannigan, M, Peel, JL (2012). Characterization of Rural and Urban $PM_{2.5}$ and $PM_{10-2.5}$ Mass Concentrations in Colorado from 3 Years of Continuous Monitoring. AAAR Annual Conference, Minneapolis, MN, 2012.
40. **Clements, N**, Milford, J, Hannigan, M, Solheim, F (2012). Using Boundary Layer Dynamics for Air Pollution Concentration Prediction. EPA National Air Quality Conference, Denver, CO.
41. **Clements, N**, Albano, K, Moore, A, Hannigan, M, Miller, S, Milford, J, Schauer, J, Sioutas, C (2011). The Spatial and Temporal Variability of the Composition of Fine and Coarse Particulate Matter in Colorado. AAAR Annual Conference, Orlando, FL.
42. **Clements, N**, Coons, T, Hannigan, M, Miller, S, Milford, J (2010). Spatiotemporal Analysis of Particulate Matter Volatility using Filter Dynamic Measurement System - Equipped TEOMs. AAAR Annual Conference, Portland, OR.
43. **Clements, N**, Piedrahita, R, Hannigan, M, Milford, J, Miller, S, Peel, J (2010). Continuous Coarse Particulate Matter Concentration Measurement and Source Identification Using Non-Parametric Regression. AAAR Speciality Conference: Air Pollution and Health: Bridging the Gap from Sources to Health Outcomes, San Diego, CA.
44. **Clements, N**, Hannigan, M, Milford, J, Miller, S, Ortega, J, Peel, J (2009). Measuring Mass Concentrations of Urban and Rural Coarse Particulate Matter in Northeastern Colorado. AAAR Annual Conference, Minneapolis, MN, 2009.

Patents

1. Campanella, C, **Clements, N**, Hasan, SS, Jamrozik, A, Porter, P, Zhang, R, Zhao, J. Method and apparatus for lighting in an office environment (2022). US20020159811A1, Status: Pending.

Press

1. Colorado Experience (2023). The Most Polluted Zip Code Part 2. Acted as an advisor on SJEQ-D study and neighborhood contacts. https://youtu.be/ZlexYGT2ABM?si=3JMfv3qNQZoGvVf .
2. Colorado Experience (2023). The Most Polluted Zip Code, Part 1. Acted as an advisor on region and neighborhood contacts. https://youtu.be/Pcx3mi4nDA8?si=lYvhBuhiGkevAQDZ.
3. Brasch, S (2023). Colorado built a park over I-70 to contain pollution. Is the air safe to breath? Colorado Public Radio (CPR) News. Acted as an advisor on air quality measurements. https://www.cpr.org/2023/10/30/colorado-built-a-park-over-i-70-to-contain-pollution-is-the-air-safe-to-breathe/.
4. Healthy Air Podcast (SafeTraces), A More Prepared Future: Dr. Nick Clements (2020). https://healthyair.libsyn.com/website/a-more-prepared-future-dr-nick-clements.
5. Steiner, C (2020). COVID Proved the Importance of Airflow in Buildings. Infection Control Today. Link.
6. The Edifice Complex Podcast #002 – Dr. Nicholas Clements: Behavioral Building Science (2017).
7. Anthes, E (2016). The Office Experiment: Can Science Build the Perfect Workspace? *Nature*, 537, 294-296. DOI:10.1038/537294a. Link.

Funding

1. John Wesley Powell Center for Earth System Science Analysis and Synthesis Working Group 2023. Improving Airborne Disaster Response Coordination and Communication with Real-Time Open Environmental Data (PIs: Damby, D, **Clements, N**, Crawford, B), 2023-2024.
2. Healthway Air Cleaner Testing, CU Foundation Donation (PI: Krarti, M, **Clements, N**, $50,000), 2023.
3. Department of the Air Force (AF) Small Business Technology Transfer (STTR) Program, X21.B Commercial Solutions Opening (CSO), Phase II. *Superior Air Quality and Supply Chain Resilience for the Air Force*. Awardee: SafeTraces (Prime Award #: FA864922P1155, $750,000 total), University of Colorado Boulder (Award #: AWD-21-06-0149, PI: Miller, S, **Clements, N, $250,000**), 2022-2023.
4. Department of the Air Force (AF) Small Business Technology Transfer (STTR) Program, X21.B Commercial Solutions Opening (CSO), Phase I. *Superior Air Quality and Supply Chain Resilience for the Air Force*. Awardee: SafeTraces (Prime Award #: FA864922P0106, $49,297 total), University of Colorado Boulder (Award #: AWD-21-06-0149, PI: **Clements, N, $15,000**), 2021-2022.

Professional Organizations

ASHRAE Member	2016-Present
Environmental Health Committee (Voting Member)	2018-2023
Chair	2022-2023
Vice Chair	2021-2022
Coordination/Outreach Subcommittee Chair	2020-2021

Technology Council	2021-2023
Operations Subcommittee	2022-2023
Special Projects Subcommittee	2021-2022
SGPC10 (Voting Member)	2019-Present
IEQ2025 Steering Committee	2023-Present
Position Document Committee, Health and Wellness in the Built Env.	2023-Present
TRG.IAQP (Corresponding Member)	2019-Present
TC2.3: Gas-phase Filtration (Corresponding Member)	2017-Present
TC2.4: Particle Filtration (Corresponding Member)	2017-Present
MTG.HWBE (Secretary)	2019
ISIAQ Member	2016-2023

Journal/Proposal Reviewer

Atmospheric Environment, Journal of Environmental Sciences, PLoS ONE, Indoor and Built Environment, Environmental Pollution, Science of the Total Environment, NSF, Environmental Science & Technology, US EPA, German DFG

Awards

Well Living Lab, Edison Award for Collective Disruption (Silver)	2018
CU Mech. Engineering Department Graduate Teaching Fellowship	2013

Conference Organization

IEQ2025 (Steering Committee)	2025
Intelligent Building Operations Workshop	2023
CHI2018 Conference Session: Living Labs: Measuring Human Experience in the Built Environment	2018
DUST2014 Conference Session: Dust Near Population Centers – Sources, Composition, Epidemiology, and Toxicity	2014

Mentoring and Advising Activities:

CU DLA Mentor	2023-2024
NSF REU Mentor	2023
Larson Lab Research Assistantship (2) Manager	2023
CU SPUR Mentor	2023
CU DLA Mentor	2022-2023
CU SPUR Mentor	2022
CU SPUR Mentor	2021
CU LISA Mentor	2021
Well Living Lab Research Associate Manager	2017-2020
YOU'RE@CU Mentor	2014, 2012
UROP Mentor	2012-2014
NCAR SOARS Mentor/Advisor	2012

Teaching Experience

University of Colorado Boulder

Instructor, AREN 2120 Fluid Dynamics and Heat Transfer	2024
Instructor, EVEN-CVEN 4434-5434 Environmental Engineering Design	2023
Instructor, MCEN4037 Measurements Lab 1 (Fall Semester)	2013
Instructor, MCEN4047 Measurements Lab 2 (Spring/Fall Semesters)	2013
Teaching Assistant (Measurements Labs, Engineering Statistics)	2009-2010

References

Prof. Shelly Miller
Paul M. Rady Department of Mechanical Engineering, University of Colorado Boulder
shelly.miller@colorado.edu
(303)641-9626

Dr. Brent Bauer
Director of Mayo Clinic Complementary and Integrative Medicine Program
Department of Internal Medicine, Mayo Clinic
Former Medical Director, Well Living Lab
bauer.brent@mayo.edu
(507)266-6256

Phil Arnold
Vice President of Engineering and Manufacturing, SafeTraces, Inc.
phil@safetraces.com
(670)307-3362

Prof. Moncef Krarti
Civil, Environmental, and Architectural Engineering, University of Colorado Boulder
moncef.krarti@colorado.edu
(303)492-3389