Michael P. Hannigan

Mechanical Engineering Leadership Chair

Professor and Department Chair
Mechanical Engineering Department (303) 735-5045
University of Colorado – Boulder hannigan@colorado.edu
Boulder, CO 80309-0427 http://tinyurl.com/hanniganlab

Education

Ph.D., Environmental Engineering Science 1997
California Institute of Technology, Pasadena, CA

M.S., Environmental Engineering Science 1991
California Institute of Technology, Pasadena, CA

B.S., Civil Engineering 1990
Southern Methodist University, Dallas, TX

Professional Research Experience

Professor 2018 – present
Mechanical Engineering, University of Colorado, Boulder, CO

Associate Professor 2013 – 2018
Mechanical Engineering, University of Colorado, Boulder, CO

Assistant Professor 2007 – 2013
Mechanical Engineering, University of Colorado, Boulder, CO

Assistant Professor (secondary appointment) 2010 – present
Colorado School of Public Health, University of Colorado, Denver, CO

Research Assistant Professor 2005-2007
Mechanical Engineering, University of Colorado, Boulder, CO

Research Associate 2001-2005
Mechanical Engineering, University of Colorado, Boulder, CO

Assistant Research Professor 1999-2001
Chemistry, University of Denver, Denver, CO

Postdoctoral Research Associate 1998
Atmospheric Science, Colorado State University, Fort Collins, CO

Postdoctoral Research Associate 1997
Environmental Health Sciences, Massachusetts Institute of Technology, Cambridge, MA

Awards and Honors

Mechanical Engineering Department, Outstanding Research Award 2009-2010
Mechanical Engineering Department, Outstanding Service Award 2008-2009
State of Colorado, Health and Environmental Stewardship Award 2008
Mechanical Engineering Department, Outstanding Undergraduate Educator Award 2006-2007, 2011-2012
University of Colorado, Green Faculty Award 2007
University of Colorado, President's Teaching and Learning Collaborative 2006-2007

Peer Reviewed Publications (names in bold are Hannigan Group members)

1. Salazar, JR, **Pfotenhauer, DJ**, Leresche, F, Rosario-Ortiz, FL, Hannigan, MP, Fakra, SC, Majestic, BJ. Iron speciation in PM2.5 from urban, agriculture, and mixed environments in Colorado, USA. *Earth and Space Science,* 7:ARTN e2020EA001262.
2. **Toth, S**, Hannigan, M, Vance, M, Deceglie, M. Predicting photovoltaic soiling from air quality measurements. *IEEE Journal of Photovoltaics*, 2020, 10:1142-1147.
3. **Collier-Oxandale, A**, Wong, N, Navarro, S, Johnston, J, Hannigan, MP. Using gas-phase air quality sensors to disentangle potential sources in a Los Angeles neighborhood. *Atmospheric Environment*, 2020, 233:ARTN 117519.
4. **Thorson, J, Collier-Oxandale, A,** Hannigan, M. Using a low-cost sensor array and machine learning techniques to detect complex pollutant mixtures and identify sources. *Sensors*, 2019, 19:3723.
5. Vikram, S, **Collier-Oxandale, A**, Ostertag, MH, Menarini, M, Chermak, C, Dasgupta, S, Rosing, T, Hannigan, MP, Griswold, WG. Evaluating and improving the reliability of gas-phase sensor system calibrations across new locations for ambient measurements and personal exposure monitoring. *Atmospheric Measurement Techniques*, 2019, 12: 4211–4239.
6. **Piedrahita, R**, **Coffey, ER**, Hagar, Y, Kanyomse, E, Wiedinmyer, C, Dickinson, KL, Oduro, A, Hannigan, MP. Exposures to carbon monoxide in a cookstove intervention in northern Ghana. *Atmosphere,* 2019, 10:402.
7. **Piedrahita, R**, **Coffey, ER**, Hagar, Y, Kanyomse, E, Verploeg, K, Wiedinmyer, C, Dickinson, KL, Oduro, A, Hannigan, MP. Attributing air pollutant exposure to emission sources with proximity sensing. *Atmosphere,* 2019, 10:395.
8. **Coffey, ER**, **Pfotenhauer, D**, **Mukherjee, A**, Agao, D, Moro, A, Dalaba, M, **Begay, T,** Banacos, N, Oduro, A, Dickinson, KL, Hannigan, MP. Kitchen area air quality measurements in northern Ghana: evaluating the performance of a low-cost particulate sensor within a household energy study. *Atmosphere*, 2019, 10:400.
9. **Collier-Oxandale, A, Thorson**, J, Halliday, H, Milford, J, Hannigan, MP. Understanding the ability of low-cost MOx sensors to quantify ambient VOCs. *Atmospheric Measurement Techniques*, 2019, 12:1441-1460.
10. Dickinson, KL, **Piedrahita, R, Coffey, E**, Kanyomse, E, Alirigia, R, Molnar, T, Hagar, Y, Hannigan, MP, Oduro, A, Wiedinmyer, C. Adoption of improved biomass stoves and stove/fuel stacking in the REACCTING intervention study in Northern Ghana. *Energy Policy*, 2019, 130:361-374.
11. Williams, R, Duvall, R, Kilaru, V, Hagler, G, Hassinger, L, Benedict, K, Rice, J, Kaufman, A, Judge, R, Pierce, G, Allen, G, Bergin, M, Cohen, RC, Fransioli, P, Gerboles, M, Habre, R Hannigan, M, Jack, D, Louie, P, Martin, NA, Penza, M, Polidori, A, Subramanian, R, Ray, K, Schauer, J, Seto, E, Thurston, G, Turner, J, Wexler, AS, Ning, Z. Deliberating performance targets workshop: Potential paths for emerging PM2. 5 and O3 air sensor progress. *Atmospheric Environment X,* 2019, 2:ARTN 100031.
12. **Pfotenhauer, D, Coffey, E, Piedrahita, R,** Agao, D, Alirigia, R, **Muvandimwe, D, Lacey, F,** Wiedinmyer, C, Dickinson, KL, Dalaba, M, Kanyomse, E, Oduro, A, Hannigan, MP. Updated emission factors from diffuse combustion sources in sub-Saharan Africa and their effect on regional emission estimates. *Environmental Science & Technology*, 2019, 53: 6392-6401.
13. **Casey, JG, Collier-Oxandale, A**, Hannigan, MP. Performance of artificial neural networks and linear models to quantify four trace gas species in an oil and gas production region with low-cost sensors. *Sensors and Actuators: B. Chemical*, 2019, 283:504-514.
14. **Casey, JG,** Hannigan, MP. Testing the performance of field calibration techniques for low-cost gas sensors in new deployment locations: across a county line and across Colorado. *Atmospheric Measurement Techniques,* 2018: 11:6351-6378.
15. Dickinson, KL, Dalaba, M, Brown, Z, Alirigia, R, **Coffey, E**, **Mesenbring, E,** Achazanaga, M, Agao, D, Kanyomse, E, Awaregya, J, Adagenera, A, Aburiya, JB, Gubilla, B, Oduro, A, Hannigan, M. Prices, Peers, and Perceptions (P3): Study protocol for improved biomass cookstove project in northern Ghana. *BMC Public Health*, 2018, 18:1209.

16. Xie, M, Chen, X, Holder, A, Hays, MD, Lewandowski, M, Offenberg, JH, Kleindienst, TE, Jaoui, M, Hannigan, MP. Light absorption of organic carbon and its sources at a southeastern US location in summer. *Environmental Pollution*, 2019, 244:38-46.

17. Dalaba, M, Alirigia, R, **Mesenbring, E, Coffey, E**, Brown, Z, Hannigan, M, Wiedinmyer, C, Oduro, A, Dickinson, KL. Liquified petroleum gas supply and demand for cooking in northern Ghana. *EcoHealth*, 2018, 15:716-728.

18. **Collier-Oxandale, A**, **Casey, JG, Piedrahita, R, Ortega**, J, Halliday, H, Johnston, J, Hannigan, MP. Assessing a low-cost methane sensor quantification system for use in complex rural and urban environments. *Atmospheric Measurement Techniques*, 2018, 11:3569-3594.

19. **Collier-Oxandale, A**, **Coffey, E**, **Thorson, J**, Johnston, J, Hannigan, MP. Comparing building and neighborhood-scale variability of CO2 and O3 to inform deployment considerations for low-cost sensor system. *Sensors*, 2018:1349.

20. **Sadighi, K, Coffey, E,** Polidori, A, Feenstra, B, Lv, Q, Henze, D, Hannigan, MP. Intra- urban spatial variability of surface ozone and carbon dioxide in Riverside, CA: viability and validation of low-cost sensors. *Atmospheric Measurement Techniques (AMT)*, 2018: 1777-1792.

21. **Casey, JG, Ortega, J, Coffey, E,** Hannigan, MP. Low-cost measurement techniques to characterize the influence of home heating fuel on carbon monoxide in Navajo homes. *Science of the Total Environment*, 2018, 625:608-618.

22. Shamasunder, B, **Collier-Oxandale, A**, Blickley, J, Sadd, J, Chan, M, Navarro, S, Hannigan, MP, Wong, NJ. The South Los Angeles neighborhood oil drilling health and exposure study: community-based research amid urban oil development. *International Journal of Environmental Research and Public Health*. 2018, 15:138.

23. Clements, AL, Griswold, WG, Johnson, JE, Herting, MM, **Thorson, J, Collier-Oxandale,** A, Hannigan, MP. Low-cost air quality monitoring tools: from research to practice (a workshop summary). *Sensors*, 2017, 17:2478.

24. **Coffey, E, Muvandimwe, D,** Hagar, Y, Wiedinmyer, C, Kanyomse, E, **Piedrahita, R,** Dickinson, K, Oduro, A, Hannigan, MP. New emission factors and efficiencies from in-field measurements of traditional and improved cookstoves and their potential implications. *Environmental Science & Technology*, 2017, 12508-12517.

25. **Cheadle, L, Deanes, L, Sadighi, K, Casey, J, Collier-Oxandale,** A, Hannigan, MP, Quantifying neighborhood-scale spatial variations of ozone at open space and urban sites in Boulder, Colorado using low-cost sensor technology. *Sensors*, 2017, 17:2072.

26. **Boyle, L,** Burton, P, **Danner, V,** Hannigan, MP, King, B. Regional and national scale spatial variability of photovoltaic cover plate and subsequent solar transmission losses. *IEEE Journal of Photovoltaics*. 2017, 7, 1354-1361.

27. **Lacey, FG**, Marais, EA, Henze, DK, Lee, CJ, van Donkelaar, A, Martin, RV, Hannigan, MP, Wiedinmyer, C. Improving estimates of anthropogenic emissions and the resulting air quality impacts in Africa. *Faraday Discussions*, 2017, 200:397-412.

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29. **Piedrahita, R**, Kanyomse, E, **Coffey, E, Xie, M**, Hagar, Y, **Alirigia, R**, Agyei, F, Wiedinmyer, C, Dickinson, KL, Oduro, A, Hannigan, MP. Exposures to and the origins of carbonaceous PM2.5 in a cookstove intervention in Northern Ghana. *Science of the Total Environment*, 2017, 576:178-192.

30. **Xie, M**, Mladenov, N, Williams, MW, Neff, JC, Wasswa, J, Hannigan, MP. Water soluble organic aerosols in the Colorado Rocky Mountains, USA: composition, sources and optical properties. *Scientific Reports*, 2016, 6:39339. doi:10.1038/srep39339.

31. **Piedrahita, R**, Dickinson, KL, Kanyomse, E, **Coffey, E,** Alirigia,R, Hagar, Y, Rivera, I, Oduro, A, Dukic, V, Wiedinmyer, C, Hannigan, M. Assessment of cookstove stacking in Northern Ghana using surveys and stove use monitors. *Energy for Sustainable Development*, 2016, 34:67-76. doi:10.1016/j.esd.2016.07.007

32. Knight, D, Hannigan, MP, **Collier, A, Hafich, K**. Broadening and Sustaining an Air Quality K-12 Curriculum through a Digital Library and Undergraduate Service Learning Course. *Frontiers in Education Conference*, 2016, Vol. 2016. doi:10.1109/FIE.2016.7757362.

33. **Boyle L, Flinchpaugh, H,** Hannigan, M. Assessment of PM dry deposition on solar energy harvesting systems: Measurements-model comparison. *Aerosol Science and Technology*, 2016, 380-391. doi:10.1080/02786826.2016.1153797.

34. **Clements, N,** Hannigan, MP, Miller, SL, Peel, JL, Milford, JB. Comparisons of urban and rural PM10-2.5 and PM2.5 mass concentrations and semivolatile fractions in northeastern Colorado. *Atmospheric Chemistry and Physics*, 16:7469-7484. doi:10.5194/acp-16-7469-2016.

35. **Boyle, L, Flinchpaugh, H, Danner, V,** Robinson, C, Blackwell, K, King, B, Hannigan, MP. Initial results of a five site study comparing spatial variability of soiling and ambient particulate concentrations. Paper presented in IEEE Photovoltaic Specialist Conference (PVSC), 2015, 42:1-4.

36. **Collier, A,** Knight, D, **Hafich, K**, Hannigan, MP, Graves, B, Polmear, M. On the development and implementation of a project-based learning curriculum for air quality in K-12 schools. *Frontiers in Education Conference*, 2015, 1-7.

37. **Masson, N, Piedrahita, R,** Hannigan, MP. Quantification method for electrolytic sensors in long-term monitoring of ambient air quality. *Sensors,* 2015, 15: 27283-27302.

38. Kim, SY, **Dutton, SJ**, Sheppard, L, Hannigan, MP, Miller, SL, Milford, JB, Peel, JL, Vedal, S. The short-term association of selected components of fine particulate matter and mortality in the Denver Aerosol Sources and Health (DASH) study. *Environmental Health*. 2015, 14: 49.

39. Dickinson, KL, Kanyomse, E, **Piedrahita R, Coffey, E,** Rivera, I, Adoctor, J, Aligiria, R, **Muvandimwe, D,** Dove, M, Dukic, V, Hayden, M, Diaz-Sanchez, D, Adoctor, V, Anaseba, D, Slichter, Y, **Masson, N** Monaghan, A, Titati, A, Steinhoff, D, Hsu, Y-Y, Kaspar, R, Brooks, B, Hodgson, A, Hannigan, MP, Oduro, AR, and Wiedinmyer,C. Research on Emissions, Air quality, Climate, and Cooking Technologies in Northern Ghana (REACCTING): Study Rationale and Protocol. *BMC Public Health*, 2015, 15:126.

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41. **Boyle, L, Flinchpaugh, H,** Hannigan, MP. Natural soiling of photovoltaic cover plates and the impact on transmission. *Solar Energy*, 2015, 77: 166-173.

42. **Almand-Hunter, B,** Walker, JT, **Masson, N, Hafford, L,** Hannigan, MP. Development and validation of inexpensive, automated, dynamic, flux chambers. *Atmospheric Measurement Techniques,* 2015, 8: 267-280.

43. **Duhl, TR, Clements, N,** Mladenov, N, Cawley, KM, Rosario-Ortiz, FL, Hannigan, MP. Natural and unnatural organic matter in the atmosphere: recent perspectives on the high molecular weight fraction of organic aerosol. *Advances in the Physiochemical Characterization of Dissolved Organic Matter: Impact on Natural and Engineered Systems, ACS Symposium Series*. 2014, 1160: 87-111.

44. Oakes, M, Baxter, L, Duvall, R, Madden, M, **Xie, M**, Hannigan, MP, Peel, J, Pachon, J, Balachandran, S, Russell, L, Long, T. Comparing multipollutant emissions-based mobile source indicators to other single pollutant and multipollutant indicators in different urban areas. *International Journal of Environmental Research and Public Health*, 2014, 11:11727-11752.

45. **Xie, M,** Hannigan, MP, **Barsanti, KC**. Impact of Gas/Particle Partitioning of semi-volatile organic compounds on source apportionment with positive matrix factorization. *Environmental Science & Technology*, 2014, 48:9053-9060.

46. **Xie, M**, Hannigan, MP, **Barsanti, KC**. Gas/particle partitioning of n-alkanes, PAHs and oxygenated PAHs in urban Denver. *Atmospheric Environment*, 2014, 95:355-362.

47. **Piedrahita, R**, Xiang, Y, **Masson, N, Ortega, J, Collier, A,** Jiang, Y, Li, K, Dick, R, Lv, Q, Hannigan, M, Shang, L. The next generation of low-cost personal air quality sensors for quantitative exposure monitoring. *Atmospheric Measurement Techniques*, 2014, 7:3325-3336.

48. **Xie, M**, Hannigan, MP, **Barsanti, KC**. Gas/particle partitioning of 2-methyltetrols and levoglucosan at an urban site in Denver. *Environmental Science & Technology*, 2014, 48:2835-2842.

49. **Clements, N, Eav, J, Xie, M**, Hannigan, MP, Miller, SL, Navidi, W, Peel, JL, Schauer, JJ, Shafer, M, Milford, JB. Concentrations and source insights for trace elements in fine and coarse particulate matter in northeastern Colorado. *Atmospheric Environment*, 2014, 89:373-381.

50. Bowers, R, **Clements, N**, Emerson, J, Wiedinmyer, C, Hannigan, MP, F. Seasonal variability in the bacterial and fungal diversity of the near-surface atmosphere. *Environmental Science and Technology*, 2013, 47:12097-12106.

51. **Clements, N**, Milford, JB, Miller, SL, Navidi, W, Peel, JL, Hannigan, MP. Errors in coarse particulate matter (PM10-2.5) mass concentrations and spatiotemporal characteristics when using subtraction estimation methods. *Journal of Air and Waste Management Association*, 2013, 63:1386-1398.

52. Kim, SY, Sheppard, L, Hannigan, MP, **Dutton, SJ**, Peel, JL, Clark, M, Vedal, S. The sensitivity of time series health effect estimates to fine particulate matter (PM2.5) component sampling schedule. *Journal of Exposure Science and Environmental Epidemiology*, 2013, 23:481-486.

53. **Xie, M, Barsanti, KP**, Hannigan, MP. Positive matrix factorization of PM2.5 - eliminating the effects of gas/particle partitioning of semivolatile organic compounds. *Atmospheric Chemistry and Physics*, 2013, 13:7381-7393.

54. **Li, R,** Wiedinmyer, C, Hannigan, MP. Contrast and correlations between coarse and fine particulate matter in the United States. *Science of the Total Environment*, 2013, 456:346-358.

55. Jiang, Y, Xiang, Y, Pan, X, Li, K, Lv, Q, Dick, RP, Shang, L, Hannigan, MP. "Hallway based Automatic IndoorFloorplan Construction using Room Fingerprints." *UbiComp 2013: in Proc. the 2013 ACM International Joint Conference on Pervasive and Ubiquitous Computing*. Zurich, Switzerland.

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57. Jiang, Y, Li, K, **Piedrahita, R**, Yun, X, Tian, L, Mansata, OM, Lv, Q, Dick, RP, Hannigan, MP, Shang, L. User-CentricIndoor Air Quality Monitoring on Mobile Devices. AI Magazine. 2013. 34 (2), 11.

58. **Xie, M, Piedrahita, R, Dutton, SJ,** Milford, JB, Hemann, JG, Miller, SL, Peel, JL, Kim, SY, Vedal, S, Sheppard, L, Hannigan, MP. Positive matrix factorization of a 32-month series of daily PM2.5 speciation data with incorporation of temperature stratification. *Atmospheric Environment*, 2013, 65:11-20.

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60. **Xie, M**, Hannigan, MP, **Dutton, SJ**, Milford, JB, Hemann, JG, Miller, SL, Schauer, JJ, Peel, JL, Vedal, S. Positive matrix factorization of PM2.5 – comparison and implications of using different speciation data sets. *Environmental Science& Technology*, 2012, 46:11962-11970.

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97. Hannigan, MP, Cass, GR, Penman, BW, Crespi, CL, Busby, Jr, WF, Lafleur, AL, Thilly, WG. Human cell mutagens in Los Angeles air, *Environmental Science & Technology* , 1997, 31: 438-447.

98. Hannigan, MP, Cass, GR, Busby, Jr, WF, Lafleur, AL, Thilly, WG. Seasonal and spatial variation of the bacterial mutagenicity of fine organic aerosol in Southern California, *Environmental Health Perspectives*, 1996, 104: 428-436.

99. Hannigan, MP, Cass, GR, Lafleur, AL, Longwell, J, Thilly, WG. Bacterial mutagenicity of urban organic aerosol sources in comparison to atmospheric samples, *Environmental Science & Technology*, 1994, 28: 2014-2024.

100. Harley, RA, Hannigan, MP, Cass, GR. Respeciation of organic gas emissions and the detection of excess unburned gasoline in the atmosphere, *Environmental Science & Technology*, 1992, 26: 2395-2408.

Teaching (since 2007)

MCEN 1000, Introduction to Mechanical Engineering (1x)
Fall 2011
135 students

MCEN 2023, Statics and Structures (7x)
Fall 2012, Fall 2013, Fall 2014, Fall 2017, Fall 2018, Fall 2019, Fall 2020
830 students

MCEN 3037, Experimental Design and Data Analysis (4x)
Spring 2008, Spring 2009, Spring 2010, Spring 2011
448 students

MCEN 4047, Measurements Lab 2 (2x)
Fall 2014, Fall 2015
103 students

MCEN 4131/5131, Air Pollution Control (2x)
Spring 2011, Spring 2012
128 students

MCEN 6228, Aerosols (1x)
Fall 2009
8 students

MCEN 4228/5228 Cookstove Assessment (4x)
Spring 2014, Spring 2015, Spring 2017, Spring 2018
79 students

MCEN 4228/5228 Household Energy Systems in the Global South (2x)
Spring 2020, Spring 2021
38 students

MCEN 4228/5228 Project Based Learning in Rural High Schools (7x)
Fall 15 & Spring 16, Fall 16 & Spring 17, Fall 17 & Spring 18, Fall 18 & Spring 19, Fall 19 & Spring 20, Fall 19 & Spring 20, Fall 20 & Spring 21
80 students

MCEN 4228/5228, Sustainable Energy (5x)

Fall 2007, Fall 2009, Fall 2010, Fall 2011, Fall 2012
326 students

Advising (since 2007)

Ph.D. Current

1. Eric Kolb, PhD Candidate in Mechanical Engineering Summer 2020 – Present
   "Assessing emissions and associated impacts of particulate matter from wildland fires"
2. Sarah Toth, PhD Candidate in Environmental Engineering Fall 2017 – Present
   "Understanding PV panel soiling variability in large scale arrays"
3. Kristen Okorn, PhD Candidate in Mechanical Engineering Fall 2018 – Present
   "Improving the utility of gas sensors to understand community scale VOC and methane"

Ph.D. Complete

1. Steve Dutton, PhD in Civil, Environmental and Architectural Engineering July, 2008
   Thesis: Measurement, time series analysis, and source apportionment of inorganic and organic speciated PM2.5 air pollution in Denver.
   Steve is currently employed by the National Center for Environmental Assessment at the US EPA as a physical scientist. He is one of team that is tasked with developing the Integrated Scientific Assessments for the Criteria Air Pollutants.
2. Gregory Brinkman, PhD in Mechanical Engineering July, 2009
   Thesis: Air pollutant sources and exposure: organic tracers for source identification of exposure to fine particle and effects of plug-in hybrid electric vehicles on ozone concentrations in Colorado.
   Greg is currently employed by the Strategic Energy Analysis Center at NREL as an energy analysis engineer. He is working on a team that focuses on electric power dispatch forecasting and the resultant impacts on emissions and subsequently air quality.
3. Nicholas Clements, PhD in Mechanical Engineering December, 2013
   Thesis: Detailed characterization of coarse particulate matter in the Front Range and its implications to human health.
   Nick did a postdoc at CU and then moved onto the Well Living Lab where he leads their efforts at air quality and building sensing for improvements in occupant health.
4. Mingjie Xie, PhD in Mechanical Engineering December, 2013
   Thesis: Source apportionment of PM2.5 for use in epidemiological studies: limitations and results
   Mingjie did a postdoc at Virginia Tech and at the US EPA National Risk Management Research Lab before landing a faculty job at Nanjing University of Science and Technology.
5. Liza Boyle, PhD in Mechanical Engineering December, 2015
   Thesis: Developing a process level understanding of the impact of airborne particle deposition on solar energy harvesting.
   Liza did a postdoc at CU and is now faculty at Humboldt State University.
6. Berkeley Almand-Hunter, PhD in Mechanical Engineering December, 2015
   Thesis: Development of low-cost sensing technologies for measuring air quality.
   Berkeley is a data scientist at Square in the Bay Area.
7. Ricardo Piedrahita, Ph.D. in Mechanical Engineering May, 2017
   Thesis: On the assessment of air pollution and behavior within a cookstove intervention study in Northern Ghana and development of improved measurement techniques.

Ricardo is a research scientist at Berkeley Air where is leading the efforts at improving exposure assessment for a several cookstove intervention projects.

8. Joanna Casey, PhD in Mechanical Engineering December, 2017
   Thesis: Understanding the impacts of natural gas extraction on air quality in the Rocky Mountains
   GK-12 NSF Fellow 2012 – 2013

   Joanna completed a year as an Air Quality Specialist for the Southern Ute Tribe before starting a faculty position at Fort Lewis College in Durango, CO

9. Kyle Karber, PhD in Mechanical Engineering May, 2018
   Thesis: Enabling and implementing wind energy harvesting in the developing world
   NSF Graduate Fellow 2012 – 2015

   Kyle is working with Winrock International as a development engineering focusing on sustainable energy systems.

10. Ashley Collier-Oxandale, PhD in Environmental Engineering August, 2018
    Thesis: Enabling the broad use of the next generation air monitoring technologies

    Ashley is working as a research scientist at the South Coast Air Quality Management District (SCAQMD) in their Air Quality Sensor Performance Evaluation Center (AQ-SPEC), which the world's leading facility for air sensors evaluation.

11. David Pfotenhauer, PhD Candidate in Mechanical Engineering December 2020
    Thesis: Assessing emissions of air pollutants in northern Ghana

    David is working as an air quality specialist at the Wisconsin Department of Natural Resources.

MS Current

1. Helena Pliszka, MS Candidate in Environmental Engineering Fall 2020 – Present

MS Complete

1. Bryn Grunwald, MS in Mechanical Engineering August, 2020
   Thesis:
2. Jake Thorson, MS in Environmental Engineering December, 2018
   Thesis: Understanding our local environment: Developing novel approaches to quantify and apportion ambient VOCs with low cost sensors

   Jake is working as a research engineer at the National Renewable Energy Lab

3. Lucy Cheadle, MS in Environmental Engineering May, 2017
   Thesis: Improving quantification of low cost sensors for use to evaluate ambient air quality in regions of energy development.

   Lucy is working as a research scientist at the California Air Resources Board.

4. Nicholas Masson, MS in Mechanical Engineering December, 2013
   Thesis: Assessment of emissions reductions by switching from kerosene to solar lighting in rural Uganda
   Nick is the CEO of QSense, which is a start-up devoted to data analytics and services linked to air quality sensing.

5. Teresa Coons, MS in Civil, Environmental and Architectural Engineering December, 2009
   Thesis: Urban air pollution: personal exposure and spatial variability of fine particulate matter in Denver, Colorado and Xi'an, China.
   NSF EAPSI Fellow
   Teresa is currently employed by the Yakima Regional Clean Air Agency as an Air Quality Engineer/Planner. She is using her training to help guide the regulatory air quality decision in Eastern Washington.

6. Adam Eisele, M.S. in Mechanical Engineering July, 2009
   Thesis: Understanding air toxics and carbonyl pollutant sources in Boulder County, Colorado.

   Adam is currently employed with the US EPA Region 8 office in Denver, CO. Adam is using his training to oversee the regulatory air quality measurements ongoing in his region. In addition, Adam has also helped to lead novel EPA research into the measurement of emissions from oil and gas exploration.

7. Joel Bettner, M.S. in Mechanical Engineering July, 2007
   Thesis: Development of concept inventory and assessment of instruction methods for sustainable energy.
   Joel was employed with Abengoa Solar, but has recently shifted his interest back to further education, applying for PhD programs and is running a private tutoring business.

Postdoctoral Research Associates

1. Forrest Lacey, PhD in Mechanical Engineering from University of Colorado 2016 – 2018
   Forrest is working in collaboration with Christine Wiedinmyer at NCAR on exploring the impacts of technology adoption on health and climate in Africa.
2. John Ortega, PhD in Atmospheric Science from University of Colorado 2008, 2012 - 2016
   John is currently employed 5% at CU and 95% in the Atmospheric Chemistry Division at the National Center for Atmospheric Research (NCAR) in Boulder, CO. John serves as laboratory support staff where he trouble shoots instrumentation, organizes field campaigns, and is a collaborator on the particle group research efforts.
3. Rong Li, PhD in Atmospheric Science from the University of Waterloo 2010 – 2012
   Rong worked on a collaboration with Christine Wiedinmyer at NCAR that was sponsored by the EPA. He has since moved on to a position with CU INSTAAR.
4. Kelley Barsanti, PhD in Environmental Science from the Oregon Graduate Institute 2009
   Kelley is currently an Assistant Professor in the Chemical Engineering Department at the University of California, Riverside.

Research Associates

1. Evan Coffey, received BS in Environmental Engineering, CU 2013 – Present
2. Anna Iisa, received MS in Environmental Engineering, CU 2017 – 2018
3. Katya Hafich, received BS in Geology, CU 2014 – 2018
4. Ricardo Piedrahita, received M.S. in Mechanical Engineering, CU 2010 – 2013
5. Tiffany Duhl, received MS in Environmental Studies, CU 2012 – 2014
6. Josh Hemann, received MS in Applied Math, CU 2009 – 2010

Non-Thesis Research Students

1. Annamarie Guth, BS student in Environmental Engineering present
2. Jenna Engelken, BS student in Environmental Engineering 2019
3. Taylor Begay, BS student in Mechanical Engineering (NSF REU) 2018 – 2019
4. Rachel Moore, BS student in Applied Math, SPUR student 2017 – 2019
5. Keani Willebrand, BS student in Environmental Engineering (NSF REU) Summer 2018
6. Amanda Worthy, BS student in Environmental Engineering 2018
7. Claire Meyers, BS student in Mechanical Engineering, SPUR student Summer 2018
8. Rebecca Bullard, BS student in Mechanical Engineering 2016 – 2018
9. Kira Sadighi, BS/MS student in Mechanical Engineering 2015 – 2017
10. Drew Meyers, BS student in Electrical Engineering 2015 – 2017
11. Bryan Melonis, BS student in Chemical Engineering, Discovery Learning Apprentice 2015 – 2016
12. Holly Flinchpaugh, BS student in Mechanical Engineering 2012 – 2016

13. Victoria Danner, BS student in Mechanical Engineering 2014 – 2016
14. Bryce Goldstein, NSF Research Experience for Undergraduates Summer 2015
15. Lauren Deanes, NCAR SOARS Summer 2015
16. Alec Motazedi, BS student in Electrical Engineering 2014 – 2015
17. Conner Jacobsen, BS student in Mechanical Engineering 2013 – 2015
18. Mike Russel, BS student in Electrical Engineering 2013 – 2014
19. Madeline Polmear, BS student in Mechanical Engineering 2014-2015
20. Tasha Nez, NSF Research Experience for Undergraduate Summer 2014
21. Brandon Robinson, NSF Research Experience for Undergraduate Summer 2014
22. Jenine McKoy, NCAR SOARS Summer 2014 & 2015
23. Nick Merten, BS student in Mechanical Engineering, Discovery Learning Apprentice 2013 – 2014
24. Lamar Blackwell, BS student in Mechanical Engineering, Ball Summer Fellow 2012 – 2013
25. Josh Bowen, BS student in Electrical Engineering 2013
26. Ashley Collier, BS student in Environmental Engineering, Discovery Learning Apprentice 2011 – 2013
27. Aaron Sheppard, BS student in Mechanical Engineering 2012 – 2013
28. Steven Hendricks, MS student in Mechanical Engineering 2012 – 2013
29. Angela Molli, BS student in Environmental Engineering 2012 – 2013
30. Raisha Santos, BS student in Energy Engineering from Brazil 2012
31. Kelsi Middleton, NSF Research Experience for Undergraduate Summer 2012
32. Jenny Eav, NCAR Significant Opportunities for Atmospheric Research and Science Summer 2012
33. Allison Moore, BS student in Mechanical Engineering 2009 – 2012
34. Brian Hancz, MS student in Mechanical Engineering 2010 – 2012
35. Kelli Fischer, BS student in Mechanical Engineering 2011 – 2012
36. Sharome Goode, NCAR Significant Opportunities for Atmospheric Research and Science Summer 2011
37. Kelly Albano, B. student in Environmental Engineering 2009 – 2011
38. Brent Timberlake, MS student in Mechanical Engineering 2009 – 2010
39. Lauren Gardenswartz, NSF Research Experience for Undergraduate Summer 2010
40. Rebecca Lyman, NSF Research Experience for Undergraduate Summer 2010
41. Alex Yersak, Mechanical Engineering student from NJIT 2010 – 2011
42. Brett Casso, BS student in Environmental Engineering 2008-2010
43. Paul Mountford, BS student in Mechanical Engineering 2009-2010
44. Leanne Miller, BS student in Environmental Engineering 2009
45. James Schroeder, BS student in Mechanical Engineering 2008-2009
46. Robert Irmiger, BS student in Mechanical Engineering 2007-2009
47. Dan Williams, BS student in Environmental Engineering 2005-2008
48. Shoshanna Blank, NSF Research Experience for Undergraduate Summer 2008
49. Jessica Garcia, NSF Research Experience for Undergraduate Summer 2007
50. Stacie Louie, NSF Research Experience for Undergraduate Summer 2007