



# Matthew David Wallenstein, PhD

## EDUCATION

- 2004 Ph.D., Ecology. Duke University, William Schlesinger, advisor.  
1996 B.A., Geosciences. Franklin & Marshall College, Lancaster, Pennsylvania; Honors in Biology. Andrew Barton, thesis advisor.

## APPOINTMENTS & POSITIONS

- 2015- Co-Founder and Chairman, Growcentia Inc.  
2015- Joint Associate Professor, Department of Soil and Crop Sciences, Colorado State University  
2014- Associate Professor, Department of Ecosystem Science, Colorado State University  
2010-2014 Assistant Professor, Department of Ecosystem Science, Colorado State University  
2007- Research Scientist, Natural Resource Ecology Laboratory, Colorado State University  
2004-2007 National Science Foundation Postdoctoral Fellow

## AWARDS

- 2017 CSU Ventures Award for Innovative Excellence  
2014 John S. Waid Award for best review paper in Soil Biology & Biochemistry  
2013 National Science Foundation BREAD Ideas Challenge winner  
2013 National Science Foundation CAREER award  
2013 Jack Cermak Advising Award (CSU award for outstanding graduate advising)  
2007, 2011 "Outstanding Graduate Advisor", Natural Resource Ecology Laboratory.  
2007, 2010, 2014 "Most Proposals Submitted", Natural Resource Ecology Laboratory.

## LEADERSHIP ACTIVITIES

- Director, Innovation Center for Sustainable Agriculture. 2015-  
President. Soil Ecology Society. 2015-2017.  
Co-Chair. USGS Powell Center Working Group: Identifying the Next Generation of Ecological Indicators. 2012-2016.  
Director. Enzymes in the Environment Research Coordination Network. 2009-2015.  
Faculty Director. EcoCore Analytical Facility at the Natural Resource Ecology Laboratory. 2009-2015.  
Chair. International Workshop on Environmental Proteomics. Keystone, Colorado. January 2010.  
Secretary. ESA Biogeosciences Section. 2008-2010.  
Guidance Committee Member. American Geophysical Union Biogeosciences Section. 2009-present.  
Committee Member. Technical Committee on Soils and Critical Zone Processes. American Geophysical Union. 2011-2015.  
Program Committee Member/Organizer: AGU Chapman conference: "Soil-mediated drivers of coupled biogeochemical and hydrological processes across scales", October 2013.  
Workshop Organizer. 2nd International Enzymes in the Environment RCN Workshop: Incorporating Enzymes and Microbial Physiology into Biogeochemical Models. Colorado State University, 2012.  
Symposium Organizer. Assessing the relative contributions of fungi and bacteria to terrestrial biogeochemical processes: state of the art. Ecological Society of America Annual Meeting, 2011.  
Symposium Organizer. Enzymes in the Environment: New insights into controls on enzyme production, in situ activity, and turnover. Ecological Society of America Annual Meeting, 2013.

## EDITORSHIPS AND REVIEWS

Associate Editor: Biogeochemistry. 2009-2014; Founding Chief Editor for special section "Biogeochemistry Letters".

Subject Editor: Soil Biology & Biochemistry. 2009-present.

Editorial Advisory Board: Global Change Biology. 2008-present.

Review Editor: Frontiers in Terrestrial Microbiology. 2010-present.

Panelist. NSF Ecosystems (5x), NSF Polar Programs, NSF NRI, USDA NRI, DOE National Institute for Climate Change Research (NICCR), DOE Next Generation Ecosystem Experiment, DOE ENIGMA

Ad-Hoc proposal reviewer for NSF; DOE National Institute for Climate Change Research; Energy Biosciences Institute; National Academy of Sciences

Reader Advisory Panel: NATURE. 2008-2010.

## TEACHING EXPERIENCE

- Ecosystem Ecology (ESS 311): 2017
- General Ecology (LIFE 320): 2008, 2010, 2011, 2012
- Biogeochemistry (NR/ESS 660): 2010, 2012, 2014, 2016
- Ecosystem Ecology (ESS 440): 2015
- Skills for Undergraduate Participation in Research (ESS 220/221): 2015, 2016
- Summer Soil Institute: 2010, 2011, 2012, 2013
- Biogeography and Biogeochemistry of Arctic and Alpine Ecosystems (EY 592): 2008
- Advanced Topics in Soil Ecology (EY 592); 2007
- Earned 'Certificate in Teaching Biology' through completion of a formal training program at Duke University. 2004.

## GRANTS (LAST 10 YEARS; OF 31 TOTAL)

1. 2013-2018: PI. CAREER: Microbial Allocation of Assimilated Carbon: Interactions between Temperature, Substrate Quality, and Microbial Physiology Determine the Efficiency of Arctic Soil Carbon Cycling. NSF \$916,609
2. 2013-2016. PI. Understanding litter input controls on soil organic matter turnover and formation are essential for improving carbon-climate feedback predictions for Arctic, tundra ecosystems. DOE, \$1,045,99
3. 2017-2020. PI. Effects of a dairy production derivative as a soil amendment. Leprino, Inc. \$375,000
4. 2015-2017. PI. Innovation Center for Sustainable Agriculture. CSU Catalyzing Interdisciplinary Partnerships program. \$200,000.
5. 2015. PI. Development of a directed artificial selection approach to optimize microbial consortia for soil phosphorus solubilization. USDA \$100,000
6. 2015. PI. Colorado Bioscience Discovery Evaluation Grant. Prototype formulation and field testing of microbial biostimulants for greener lawns. \$65,627
7. 2014. PI. Colorado Bioscience Discovery Evaluation Grant. Commercialization of advanced soil-based microbial solutions for agricultural management. \$50,000.
8. 2014: PI. I-Corps: Commercialization of Optimized Microbial Solutions. NSF. \$50,000
9. 2012-2014. PI. Dissertation Research: Is organic matter chemistry or temperature a stronger driver of microbial community structure in permafrost soil? (NSF-DDIG award to Jessica Ernakovich). \$15,000
10. 2010-2014. PI. Plant-microbe feedback mechanisms affecting decomposition and nutrient availability and interactions with climate change. NSF Ecosystems. \$666,209

11. 2009-2014. PI, Mary Stromberger and Richard Dick Co-PI's. RCN: Enzymes in the Environment. NSF Research Coordination Networks. \$499,833
12. 2009-2013. Co-PI. Laura Gough, PI; John Moore Co-PI. A biotic awakening: How do invertebrates, microbes, and plants determine soil organic matter responses to release from nutrient limitation in arctic tundra? NSF Office of Polar Programs. \$771,369
13. 2010-2013. Co-PI. John Moore, PI. Global climate change education (GCCE): Research experiences, modeling and data. NASA. \$399,365
14. 2009-2013. Co-PI. Mike Weintraub, PI; Heidi Steltzer, Co-PI. The Changing Seasonality of Tundra Nutrient Cycling: Implications for Ecosystem and Arctic System Functioning. NSF Office of Polar Programs. \$409,117 (CSU portion).
15. 2011-2012. PI. Dissertation research: Does long-term drought alter the response of microbial communities to moisture? (NSF-DDIG award to Sarah Evans). \$15,000
16. 2009-2012. Co-PI. Richard Conant, PI. Reconciling predictions of kinetic theory with observations of decomposition responses to temperature: Biochemical, biological, and edaphic constraints. NSF Ecosystems. \$698,980.
17. 2009-2011. Co-PI. John Moore, PI. Summer Soil Institute: Addressing environmental challenges with current and emerging techniques. USDA NRI. \$149,950.
18. 2008-2011. Co-PI with John Moore (PI). USDA-National Needs Fellowship. Research opportunities in ecosystem science and environmental sustainability. \$234,000.
19. 2008-2011. PI with Ed Ayres (PI) and Heidi Steltzer. NSF Ecological Biology. Does home-field advantage cause faster decomposition rates in temperate forest ecosystems? \$135,000
20. 2007-2011. Co-PI with Josh Schimel (PI), Ken Reardon, and Michael Weintraub. NSF Office of Polar Programs. IPY: Microbial winter survival physiology: a driver on microbial community composition and carbon cycling \$908,000; \$358,718 subcontract to Wallenstein.
21. 2007-2010. Co-PI with Elise Pendall (PI) and Feike Dijkstra. USDA-NRI-Soil Processes Microbial and biogeochemical mechanisms of altered decomposition and N mineralization in a rangeland ecosystem exposed to global change. \$360,000; \$180,000 subcontract to Wallenstein.
22. 2007-2010. PI, Co-PI's Richard Conant, Eldor Paul. DOE-NICCR. Responses of soil decomposition processes and decomposer communities to climate warming and altered precipitation: a test of the microbial acclimation hypothesis. \$375,000.
23. 2008-2010. PI. USGS contract to examine recovery of microbial community structure and function in soils degraded by Coal Bed Methane extraction in Wyoming. \$35,000.
24. 2007-2010. Co-PI with Alan Knapp, PI: John Blair. DOE-NICCR. Collaborative Research: Interactive effects of altered rainfall timing and elevated temperature on soil communities and ecosystem processes. \$480,000; \$25,000 subcontract to Wallenstein.
25. 2009. PI, Shawna McMahon Co-PI. Microbes at the Cold Margin of Life: Can They Grow in Permanently Frozen Environments? Colorado State Space Grant. \$8486
26. 2008. PI. Warner College of Natural Resources, Mini-Grant Program. An evaluation of soil warming effects on soil C quality using microbial indicator species. \$10,000

## UNIVERSITY SERVICE

- Advisory Board, Next-Generation Sequencing Facility. 2016-
- Advisory Board, Central Instrument Facility. 2014-
- Vice President for Research Advisory Committee, 2014-
- Horizontally Accelerated Research Program (HARP) Committee, VPR. 2014-
- WCNR Curriculum committee, WCNR. (2013-)
- Proteomics and Metabolomics Facility, User Committee (2012-)
- Executive committee, NREL. (2011-)
- Executive committee, CSU Graduate Degree Program in Ecology (2008-2010)
- Director of Graduate Studies, NREL (2009-2011)
- Search Chair (4x); Search Committee member for faculty search 2012-2013; Chair for faculty search 2016.
- Organized and developed new 'Area of Emphasis' in Microbial Ecology for Graduate Degree Program in Ecology (2008)
- NREL Web committee (2008-)
- NREL Curriculum committee (2007-present)
- Affiliate Faculty, School of Global Environmental Sustainability at CSU (2008-present).

## PROFESSIONAL MEMBERSHIPS

Ecological Society of America, Soil Science Society of America, American Geophysical Union, Soil Ecology Society, International Society of Microbial Ecology

## PEER-REVIEWED PUBLICATIONS (LAST 10 YEARS; OF 85 TOTAL)

1. Pankaj Trivedi, Peer M Schenks, Matthew D Wallenstein, Brajesh K Singh. Tiny Microbes, Big Yields: Enhancing food crops production with biological solutions. *Microbial Biotechnology*, In Press.
2. Ernakovich, J., L. Lynch, P. Brewer, F. Calderon, M. Wallenstein. Redox and temperature-sensitive changes in microbial communities and soil chemistry dictate greenhouse gas loss from thawed permafrost. In Press, *Biogeochemistry*
3. Wallenstein, Matthew D. 2017. Managing and manipulating the rhizosphere microbiome for plant health: A systems approach. *Rhizosphere* 3: 230-232.
4. DeVries, F., M.D. Wallenstein. Belowground connections underlying aboveground food production: a framework for optimising ecological connections in the rhizosphere. *J. Ecology*. In press.
5. Carrillo, Yolima; Bell, Colin; Koyama, Akihiro; Canarini, Alberto; Boot, Claudia; Wallenstein, Matthew; Pendall, Elise. Plant traits, stoichiometry and microbes as drivers of decomposition in the rhizosphere in a temperate grassland. In press, *J. Ecology*.
6. Conant, R. T., R. P. Walsh, M. Walsh, C. Bell, W., and M. D. Wallenstein. Effects of a microbial biostimulant, Mammoth PTM, on *Cannabis sativa* bud yield. *Journal of Horticulture*. In press.
7. Alster, C. J., Baas, P., Wallenstein, M. D., Johnson, N. G., & von Fischer, J. C. (2016). Temperature Sensitivity as a Microbial Trait Using Parameters from Macromolecular Rate Theory. *Frontiers in Microbiology*, 7, 1821.
8. Foster, E. J., N. Hansen, M. Wallenstein, and M. F. Cotrufo. 2016. Biochar and manure amendments impact soil nutrients and microbial enzymatic activities in a semi-arid irrigated maize cropping system. *Agriculture, Ecosystems & Environment* 233:404–414.
9. Haddix, M. L., K. Magrini-Bair, R. J. Evans, R. T. Conant, M. D. Wallenstein, S. J. Morris, F. Calderón,

- and E. A. Paul. 2016. Progressing towards more quantitative analytical pyrolysis of soil organic matter using molecular beam mass spectroscopy of whole soils and added standards. *Geoderma* 283:88–100.
10. Baas, P., C. Bell, L. M. Mancini, M. N. Lee, R. T. Conant, and M. D. Wallenstein. 2016. Phosphorus mobilizing consortium Mammoth P™ enhances plant growth. *PeerJ* 4:e2121.
  11. Alster, C. J., A. Koyama, N. G. Johnson, M. D. Wallenstein, and J. C. von Fischer (2016), Temperature sensitivity of soil microbial communities: An application of macromolecular rate theory to microbial respiration, *J. Geophys. Res. Biogeosci.*, 121, 1420–1433, doi:[10.1002/2016JG003343](https://doi.org/10.1002/2016JG003343).
  12. Wallenstein, M.D. 2016. Lessons from the Startup World. *Science Careers*. DOI: 10.1126/science.caredit.a1600052
  13. Carolyn Livensperger, Heidi Steltzer, Anthony Darrouzet-Nardi, Patrick Sullivan, Matthew Wallenstein, Michael Weintraub. 2016. Altered seasonality due to experimental climate change leads to earlier growth but not more growth. *AOB Plants*, plw 021.
  14. Wood, S. A., Sokol, N., Bell, C. W., Bradford, M. A., Naeem, S., Wallenstein, M. D. and Palm, C. A. (2016), Opposing effects of different soil organic matter fractions on crop yields. *Ecol Appl*, 26: 2072–2085. doi:10.1890/16-0024.1
  15. Deng, Y., Z. He, J. Xiong, H. Yu, M. Xu, S. E. Hobbie, P. B. Reich, C. W. Schadt, A. Kent, E. Pendall, M. Wallenstein, and J. Zhou. 2016. Elevated carbon dioxide accelerates the spatial turnover of soil microbial communities. *Global Change Biology* 22:957–964.
  16. Bier, R.L., Bernhardt, E.S., Boot, C.M., Graham, E.B., Hall, E.K., Lennon, J.T., Nemergut, D.R., Osborne, B.B., Ruiz-González, C., Schimel, J.P., Waldrop, M.P., M.D. Wallenstein. 2015. Linking microbial community structure and microbial processes: an empirical and conceptual overview. *FEMS microbiology ecology*, 91(10), p.fiv113.
  17. Helen Rowe, Paul J. A. Withers, Peter Baas, Neng long Chan, Donnacha Doody, Jeff Holiman, Brent Jacobs, Haigang Li, Graham K. MacDonald, Richard McDowell, Andrew N. Sharpley, Jianbo Shen, Wendy Taheri, Matthew Wallenstein, Michael N. Weintraub. 2016. Integrating legacy soil phosphorus into sustainable nutrient management strategies for future food, bioenergy and water security. *Nutrient Cycling in Agroecosystems*, pp.1-20.
  18. Osborne, B. B., Baron, J. S., & Wallenstein, M. D. (2016). Moisture and temperature controls on nitrification differ among ammonia oxidizer communities from three alpine soil habitats. *Frontiers of Earth Science*, 10(1), 1-12.
  19. Melle, C., M. Wallenstein, A. Darrouzet-Nardi, and M. N. Weintraub. 2015. Microbial activity is not always limited by nitrogen in Arctic tundra soils. *Soil Biology and Biochemistry* 90:52-61.
  20. Ernakovich, J. G. and M. D. Wallenstein. 2015. Permafrost microbial community traits and functional diversity indicate low activity at in situ thaw temperatures. *Soil Biology and Biochemistry* 87:78-89.
  21. Bell, C. W., Asao, S., Calderon, F., Wolk, B., & Wallenstein, M. D. (2015). Plant nitrogen uptake drives rhizosphere bacterial community assembly during plant growth. *Soil Biology and Biochemistry*, 85, 170-182.
  22. Wullschleger, S. D., A. L. Breen, C. M. Iversen, M. S. Olson, T. Näsholm, U. Ganeteg, M. D. Wallenstein, and D. J. Weston. 2015. Genomics in a changing Arctic: Critical questions await the molecular ecologist. *Molecular Ecology* 24:2301-2309.
  23. Ernakovich, J., M. Wallenstein, F. Calderon. 2015. Chemical Indicators of Cryoturbation and

Microbial Processing Throughout an Alaskan Permafrost Soil Depth Profile. In press, Soil Science Society of America Journal. doi:10.2136/sssaj2014.10.0420

24. Nie, M., C. Bell, M. Wallenstein, E. Pendall. Increased plant productivity and decreased microbial respiratory C loss by 2 plant growth-promoting rhizobacteria under elevated CO<sub>2</sub>. *Scientific Reports* 5:9212 | DOI: 10.1038/srep09212.
25. Rocca, Jennifer D., Edward K. Hall, Jay T. Lennon, Sarah E. Evans, Mark P. Waldrop, James B. Cotner, Diana R. Nemergut, Emily B. Graham, and Matthew D. Wallenstein. 2015. Relationships between protein-encoding gene abundance and corresponding process are commonly assumed yet rarely observed. *The ISME Journal*. 9:1693-1699.
26. Birge, Hannah E., Richard T. Conant, Ronald F. Follett, Michelle L. Haddix, Sherri J. Morris, Sieglinde S. Snapp, Matthew D. Wallenstein, and Eldor A. Paul. 2014. Soil respiration is not limited by reductions in microbial biomass during long-term soil incubations. *Soil Biology and Biochemistry*. 81:304-310.
27. Koyama, A., M. D. Wallenstein, R. Simpson, J.C. Moore. 2014. Soil bacterial community composition altered by increased nutrient availability in Arctic tundra soils. *Frontiers in Terrestrial Microbiology*. doi: 10.3389/fmicb.2014.00516.
28. Ernakovich, J. G., K. A. Hopping, A. B. Berdanier, R. T. Simpson, E. J. Kachergis, H. Steltzer, and M. D. Wallenstein. 2014. Predicted responses of arctic and alpine ecosystems to altered seasonality under climate change. *Global Change Biology*. 20: 3256–3269.
29. Wallenstein, M. 2014. Microbial Community-Level Responses to Warming and Altered Precipitation Patterns Determine Terrestrial Carbon-Climate Feedbacks. Pages 349-354 in B. Freedman, editor. *Global Environmental Change*. Springer Netherlands.
30. Nie, M., E. Pendall, C. Bell, and M. D. Wallenstein. 2014. Soil aggregate size distribution mediates microbial climate change feedbacks. *Soil Biology and Biochemistry* 68:357-365.
31. Evans, S. E., M. D. Wallenstein, and I. C. Burke. 2014. Is bacterial moisture niche a good predictor of shifts in community composition under long-term drought? *Ecology* 95:110-122.
32. Evans, S. E. and M. D. Wallenstein. 2014. Climate change alters ecological strategies of soil bacteria. *Ecology Letters* 17:155-164.
33. Bell, C., M. Stromberger, and M. Wallenstein. 2014. New insights into enzymes in the environment. *Biogeochemistry* 117:1-4.
34. Bell, C., Y. Carrillo, C. M. Boot, J. D. Rocca, E. Pendall, and M. D. Wallenstein. 2014. Rhizosphere stoichiometry: are C: N: P ratios of plants, soils, and enzymes conserved at the plant species-level? *New Phytologist* 201:505-517.
35. Arnosti, C., C. Bell, D. Moorhead, R. Sinsabaugh, A. Steen, M. Stromberger, M. Wallenstein, and M. Weintraub. 2014. Extracellular enzymes in terrestrial, freshwater, and marine environments: perspectives on system variability and common research needs. *Biogeochemistry* 117:5-21.
36. Steinweg, J. M., J. S. Dukes, E. A. Paul, and M. D. Wallenstein. 2013. Microbial responses to multi-factor climate change: effects on soil enzymes. *Frontiers in Microbiology* 4.
37. Koyama, A., M. D. Wallenstein, R. T. Simpson, and J. C. Moore. 2013. Carbon-Degrading Enzyme Activities Stimulated by Increased Nutrient Availability in Arctic Tundra Soils. *PLoS ONE* 8:e77212.
38. Delgado-Baquerizo, M., A. Gallardo, M. D. Wallenstein, and F. T. Maestre. 2013. Vascular plants

mediate the effects of aridity and soil properties on ammonia-oxidizing bacteria and archaea. *FEMS Microbiology Ecology* 85:273-282.

39. Delgado-Baquerizo, M., F. T. Maestre, A. Gallardo, J. L. Quero, V. Ochoa, M. García-Gómez, C. Escolar, P. García-Palacios, M. Berdugo, and E. Valencia. 2013. Aridity modulates N availability in arid and semiarid Mediterranean grasslands. *PLoS ONE* 8:e59807.
40. Delgado-Baquerizo, M., F. T. Maestre, A. Gallardo, M. A. Bowker, M. D. Wallenstein, J. L. Quero, V. Ochoa, B. Gozalo, M. García-Gómez, and S. Soliveres. 2013. Decoupling of soil nutrient cycles as a function of aridity in global drylands. *Nature* 502:672-676.
41. Cotrufo, M. F., M. D. Wallenstein, C. M. Boot, K. Denef, and E. Paul. 2013. The Microbial Efficiency-Matrix Stabilization (MEMS) framework integrates plant litter decomposition with soil organic matter stabilization: do labile plant inputs form stable soil organic matter? *Global Change Biology* 19:988-995.
42. Burns, R. G., J. L. DeForest, J. Marxsen, R. L. Sinsabaugh, M. E. Stromberger, M. D. Wallenstein, M. N. Weintraub, and A. Zoppini. 2013. Soil enzymes in a changing environment: current knowledge and future directions. *Soil Biology and Biochemistry* 58:216-234.
43. Bell, C. W., D. T. Tissue, M. E. Loik, M. D. Wallenstein, V. Acosta-Martinez, R. A. Erickson, and J. C. Zak. 2013. Soil microbial and nutrient responses to seven years of seasonally altered precipitation in a Chihuahuan Desert grassland. *Global Change Biology*.
44. Bell, C. W., B. E. Fricks, J. D. Rocca, J. M. Steinweg, S. K. McMahon, and M. D. Wallenstein. 2013. High-throughput fluorometric measurement of potential soil extracellular enzyme activities. *Journal of Visualized Experiments*. doi 10:50961.
45. Wallenstein, M. D. and E. K. Hall. 2012. A trait-based framework for predicting when and where microbial adaptation to climate change will affect ecosystem functioning. *Biogeochemistry* 109:35-47.
46. Wallenstein, M. D., M. L. Haddix, E. Ayres, H. Steltzer, K. A. Magrini-Bair, and E. A. Paul. 2012. Litter chemistry changes more rapidly when decomposed at home but converges during decomposition-transformation. *Soil Biology and Biochemistry*.
47. Wallenstein, M., M. Stromberger, and C. Bell. 2012. Bridging the gap between modelers and experimentalists. *Eos, Transactions American Geophysical Union* 93:312.
48. Steinweg, J. M., J. S. Dukes, and M. D. Wallenstein. 2012. Modeling the effects of temperature and moisture on soil enzyme activity: Linking laboratory assays to continuous field data. *Soil Biology and Biochemistry*.
49. Evans, S., M.D. Wallenstein. 2012. Soil microbial community response to drying and rewetting stress: does historical precipitation regime matter? *Biogeochemistry* 109:101-116.
50. Nie, M., E. Pendall, C. Bell, C. K. Gasch, S. Raut, S. Tamang, and M. D. Wallenstein. 2012. Positive climate feedbacks of soil microbial communities in a semi-arid grassland. *Ecology Letters*.
51. Graham, D. E., M. D. Wallenstein, T. A. Vishnivetskaya, M. P. Waldrop, T. J. Phelps, S. M. Pfiffner, T. C. Onstott, L. G. Whyte, E. M. Rivkina, and D. A. Gilichinsky. 2012. Microbes in thawing permafrost: the unknown variable in the climate change equation. *The ISME Journal* 6:709-712.
52. Wang, S.-Y., E. B. Sudduth, M. D. Wallenstein, J. P. Wright, and E. S. Bernhardt. 2011. Watershed urbanization alters the composition and function of stream bacterial communities. *PLoS ONE* 6:e22972.
53. Wallenstein, M. D., M. L. Haddix, D. D. Lee, R. T. Conant, and E. A. Paul. 2011. A litter-slurry

technique elucidates the key role of enzyme production and microbial dynamics in temperature sensitivity of organic matter decomposition. *Soil Biology and Biochemistry*.

54. Wallenstein, M. D. and R. G. Burns. 2011. Ecology of extracellular enzyme activities and organic matter degradation in soil: A complex community-driven process. *Methods of soil enzymology*. SSSA Book Ser 9:35-56.
55. Wallenstein, M., S. D. Allison, J. Ernakovich, J. M. Steinweg, and R. Sinsabaugh. 2011. Controls on the temperature sensitivity of soil enzymes: a key driver of in situ enzyme activity rates. *Soil Enzymology*:245-258.
56. McMahon, S. K., M. D. Wallenstein, and J. P. Schimel. 2011. A cross-seasonal comparison of active and total bacterial community composition in Arctic tundra soil using bromodeoxyuridine labeling. *Soil Biology and Biochemistry* 43:287-295.
57. Hoyt, C. M. and M. D. Wallenstein. 2011. Soil Respiration and Student Inquiry: A Perfect Match. *Science Activities: Classroom Projects and Curriculum Ideas* 48:119-128.
58. Goldfarb, K. C., U. Karaoz, C. A. Hanson, C. A. Santee, M. A. Bradford, K. K. Treseder, M. D. Wallenstein, and E. L. Brodie. 2011. Differential growth responses of soil bacterial taxa to carbon substrates of varying chemical recalcitrance. *Frontiers in Microbiology* 2.
59. Finzi, A. C., A. T. Austin, E. E. Cleland, S. D. Frey, B. Z. Houlton, and M. D. Wallenstein. 2011. Responses and feedbacks of coupled biogeochemical cycles to climate change: examples from terrestrial ecosystems. *Frontiers in Ecology and the Environment* 9:61-67.
60. Evans, S. E. and M. D. Wallenstein. 2011. Soil microbial community response to drying and rewetting stress: does historical precipitation regime matter? *Biogeochemistry*:1-16.
61. Conant, R. T., M. G. Ryan, G. I. Ågren, H. E. Birge, E. A. Davidson, P. E. Eliasson, S. E. Evans, S. D. Frey, C. P. Giardina, and F. M. Hopkins. 2011. Temperature and soil organic matter decomposition rates—synthesis of current knowledge and a way forward. *Global Change Biology*.
62. Wallenstein, M. D., A. M. Hess, M. R. Lewis, H. Steltzer, and E. Ayres. 2010. Decomposition of aspen leaf litter results in unique metabolomes when decomposed under different tree species. *Soil Biology and Biochemistry* 42:484-490.
63. Smith, W. K., W. Gao, H. Steltzer, M. D. Wallenstein, and R. Tree. 2010. Moisture availability influences the effect of ultraviolet-B radiation on leaf litter decomposition. *Global Change Biology* 16:484-495.
64. Allison, S. D., M. D. Wallenstein, and M. A. Bradford. 2010. Soil-carbon response to warming dependent on microbial physiology. *Nature Geoscience* 3:336-340.
65. Wallenstein, M. D., S. K. McMahon, and J. P. Schimel. 2009. Seasonal variation in enzyme activities and temperature sensitivities in Arctic tundra soils. *Global Change Biology* 15:1631-1639.
66. McMahon, S. K., M. D. Wallenstein, and J. P. Schimel. 2009. Microbial growth in Arctic tundra soil at -2° C. *Environmental Microbiology Reports* 1:162-166.
67. Bradford, M. A., M. D. Wallenstein, S. D. Allison, K. K. Treseder, S. D. Frey, B. W. Watts, C. A. Davies, T. R. Maddox, J. M. Melillo, and J. E. Mohan. 2009. Decreased mass specific respiration under experimental warming is robust to the microbial biomass method employed. *Ecology Letters* 12:E15-E18.
68. Ayres, E., H. Steltzer, B. L. Simmons, R. T. Simpson, J. M. Steinweg, M. D. Wallenstein, N. Mellor, W.



- J. Parton, J. C. Moore, and D. H. Wall. 2009. Home-field advantage accelerates leaf litter decomposition in forests. *Soil Biology and Biochemistry* 41:606-610.
69. Ayres, E., H. Steltzer, S. Berg, M. D. Wallenstein, B. L. Simmons, and D. H. Wall. 2009. Tree species traits influence soil physical, chemical, and biological properties in high elevation forests. *PLoS ONE* 4:e5964.
70. Wallenstein, M. D. and M. N. Weintraub. 2008. Emerging tools for measuring and modeling the in situ activity of soil extracellular enzymes. *Soil Biology and Biochemistry* 40:2098-2106.
71. Sinsabaugh, R. L., C. L. Lauber, M. N. Weintraub, B. Ahmed, S. D. Allison, C. Crenshaw, A. R. Contosta, D. Cusack, S. Frey, and M. E. Gallo. 2008. Stoichiometry of soil enzyme activity at global scale. *Ecology Letters* 11:1252-1264.
72. Hanson, C. A., S. D. Allison, M. A. Bradford, M. D. Wallenstein, and K. K. Treseder. 2008. Fungal taxa target different carbon sources in forest soil. *Ecosystems* 11:1157-1167.
73. Bradford, M. A., C. A. Davies, S. D. Frey, T. R. Maddox, J. M. Melillo, J. E. Mohan, J. F. Reynolds, K. K. Treseder, and M. D. Wallenstein. 2008. Thermal adaptation of soil microbial respiration to elevated temperature. *Ecology Letters* 11:1316-1327.
74. Wallenstein, M. D., S. McMahon, and J. Schimel. 2007. Bacterial and fungal community structure in Arctic tundra tussock and shrub soils. *FEMS Microbiology Ecology* 59:428-435.
75. Schimel, J., T. C. Balser, and M. Wallenstein. 2007. Microbial stress-response physiology and its implications for ecosystem function. *Ecology* 88:1386-1394.
76. Wallenstein, M. D., W. T. Peterjohn, and W. H. Schlesinger. 2006. N fertilization effects on denitrification and N cycling in an aggrading forest. *Ecological Applications* 16:2168-2176.
77. Wallenstein, M. D., D. D. Myrold, M. Firestone, and M. Voytek. 2006. Environmental controls on denitrifying communities and denitrification rates: insights from molecular methods. *Ecological Applications* 16:2143-2152.
78. Wallenstein, M. D., S. McNulty, I. J. Fernandez, J. Boggs, and W. H. Schlesinger. 2006. Nitrogen fertilization decreases forest soil fungal and bacterial biomass in three long-term experiments. *Forest Ecology and Management* 222:459-468.
79. Barrett, J., R. Virginia, D. Hopkins, J. Aislabie, R. Bargagli, J. Bockheim, I. Campbell, W. Lyons, D. Moorhead, and J. Nkem. 2006. Terrestrial ecosystem processes of Victoria Land, Antarctica. *Soil Biology and Biochemistry* 38:3019-3034.
80. Wallenstein, M. D. and R. J. Vilgalys. 2005. Quantitative analyses of nitrogen cycling genes in soils. *Pedobiologia* 49:665-672.
81. Wallenstein, M. D. 2004. Effects of increased nitrogen deposition on forest soil nitrogen cycling and microbial community structure. Duke University.
82. Schlesinger, W. H., J. S. Phippen, M. D. Wallenstein, D. M. Klepeis, and B. E. Mahall. 2003. Photosynthetic rate of algae under quartz pebbles in the Southern Mojave Desert, California. *Ecology* 84:3222-3231.
83. Schlesinger, W. H., J. S. Phippen, M. D. Wallenstein, K. S. Hofmockel, D. M. Klepeis, and B. E. Mahall. 2003. Community composition and photosynthesis by photoautotrophs under quartz pebbles, southern Mojave Desert. *Ecology* 84:3222-3231.

84. Barton, A. M. and M. D. Wallenstein. 1997. Effects of invasion of *Pinus virginiana* on soil properties in serpentine barrens in southeastern Pennsylvania. *Journal of the Torrey Botanical Society*:297-305.
85. Suseela, V., R. T. Conant, M. D. Wallenstein, and J. S. Dukes. 2011, Effects of soil moisture on the temperature sensitivity of heterotrophic respiration vary seasonally in an old-field climate change experiment. *Global Change Biology* 55:336-348.

#### OTHER PUBLICATIONS, BLOGS, ARTICLES

1. [To restore our soils, feed the microbes](#). The Conversation. July 27, 2017.
2. ["From flask to field: How tiny microbes are revolutionizing big agriculture"](#). The Conversation. Jan 25, 2017.
3. [The irony of ecological eating](#). Medium. November 14, 2016
4. [Live from the thawing arctic tundra: the challenge of communicating complex science to the public](#). NREL EcoPress. June 6, 2014.
5. Wallenstein, M. D., 2007. *Modern Soil Microbiology* (second Edition): Edited by Jan Dirk van Elsas, Janet K. Jansson, and Jack T. Trevors. *Soil Sci Soc Am J* 71, 1947.

#### PATENTS

Wallenstein, M. D., & Bell, C. W. (2016). U.S. Patent No. 20,160,145,163. Washington, DC: U.S. Patent and Trademark Office.

#### SELECTED MEDIA COVERAGE

- ["Tiny organisms, Giant Impact"](#). AgWeb. March 2017.
- Television interview. RFD-TV. February 7, 2017.
- ["Are microbes the next revolution coming to Big Ag?"](#). Marketwatch. Jan 29, 2017.
- Interview on SiriusXM "Entrepreneurs are Everywhere". Dec 10, 2015.
- <https://soundcloud.com/sgblank/how-talking-to-customers-changed-everything?in=sgblank/sets/matthew-wallenstein-on>
- "Deep influence of soil microbes". Karl Gruber, *Nature plants*. Nov 23, 2015.
- "The littlest farmhands". Jop de Vries, *Science*. Aug 14, 2015.
- Interview on Harvest Radio USA KSIR 1010: <http://audio.necolorado.com/ksir/morning/2015/10-02-15>  
[Matt Wallenstein.mp3](#)
- "In the Alaskan tundra, scientists dig up dirt on future climate change " *PBS NewsHour*. Dec 2014.
- "Microbes unleash buried carbon". *Live Science*. January 13, 2015.
- "Soil Microbes Produce Less Atmospheric CO<sub>2</sub> Than Expected With Climate Warming". *Science Daily*. April 27, 2010.
- "CSU Scientists Find Bacteria and Fungi Actively Grow in Frozen Arctic Tundra". *Colorado Higher Ed News*. 2009.
- "Home field advantage for leaf decay". *Today@Colorado State*. Feb 6, 2009.
- "A sensitive reaction. Global warming could speed up decomposition, but how much might decomposition speed up global warming?" *The Scientist*. 2008. Vol 22, p.38.
- Research featured on Colorado Public Radio news. October 2007.
- "CSU scientists to study Arctic microorganisms". *The Greeley Tribune*. October 8, 2007.