

Zoe G. Card (author) and Edward (editor)

- Invited Plenary speaker, EMSL Integration Meeting, Pacific Northwest National Lab (2021)
- Invited speaker, American Geophysical Union symposium “Plants-microbes-minerals: interactions that drive soil organic matter cycling”, AGU fall annual meeting, San Francisco, CA (2019)
- Invited speaker, American Society of Agronomy symposium “Water movement in soil and plants”, ASA-CSA-SSA annual meeting, San Antonio, TX (2019)
- Invited Keynote speaker, Goldschmidt Conference, session 12d “Interactions between Soil and Biota as Controls on Ecosystem Function from Canopy to Rhizosphere”, Geochemical Society and the European Association of Geochemistry, Boston, MA (2018)
- Invited speaker, Goldschmidt Conference, session 12f “Identifying and Modeling Mechanistic Drivers of Elemental Cycles Across the Critical Zone”, Geochemical Society and the European Association of Geochemistry, Boston, MA (2018)
- Invited speaker, Hydrology Section and Biogeosciences Section session “Hydrobiogeochemical interactions among plants, soil and microorganisms at molecular to single plant scales.” American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, (2016)
- Invited speaker, Ignite Session organized by the Ecological Society of America’s overall Science Committee: “Advances, Frontiers, Applications, and Challenges within and across Ecological Disciplines: a Celebration of ESA’s Centennial, and a Roadmap for the Next 100 Years”, 100th annual Ecological Society of America meeting, Baltimore, MD, (2015)
- Invited speaker, Harvard University Plant Biology Initiative Symposium, “Plants and Climate Change: From Leaves to Ecosystems” (2015)
- Invited speaker, MBL Celebration of Discovery (2015)
- Invited speaker, AGU session “B32D: Ideas in Terrestrial Biogeochemistry: Tell the Story”, San Francisco, CA, December (2014)
- Invited speaker, 5th ASM Conference on Beneficial Microbes, invited main talk for “Ecology of Host-Microbial Interactions” session. Washington DC, September 2014
- Invited Plenary speaker, DOE TES/SBR Joint Investigators Meeting, Plenary Session III “Plant Genomics to Ecosystem Function”, Washington DC May (2014)
- Invited Plenary speaker, DOE Environmental Molecular Sciences Laboratory meeting “Plants, Microbes, and their Interactions” (2013)
- Invited speaker, Keystone Symposium on Microbial Communities as Drivers of Ecosystem Complexity, Breckenridge, Colorado (2011)
- Invited speaker, Ecological Society of America meetings, organized oral session “Missing Links in the Root-Soil Organic Matter Continuum” (2009)
- Invited speaker, Soil Science Society of America meetings, symposium “Towards a Predictive Understanding of Belowground Ecosystem Responses to Global Change” (2006)
- Invited speaker, Ecological Society of America meetings, organized oral session “Rhizosphere Functioning in Carbon and Nitrogen Cycles” (2006)
- Invited speaker, Ecological Society of America meetings, organized oral session “Sensors and Sensor Networks” (2005)
- Invited Keynote speaker, Soil Ecology Society Meeting, keynote "Resource Exchange in the Rhizosphere" (2005)
- Invited speaker, Global Change in Terrestrial Ecosystems workshop, Oxford, UK “Carbon Below Ground” (1995).

Departmental or Series Seminars:

General Public Seminars, Webinars & Radio Interviews

Plant Roots as Underground Allies on our Changing Planet. MBL Friday Evening Lecture (2022) <https://www.mbl.edu/events/friday-evening-lectures/2022-friday-evening-lectures>

Surprising Things Plant Roots Do. Thursday evening talk for The 300 Committee Land Trust (2022). <https://www.youtube.com/watch?v=Cn0APoU3iwg>

Wildlands and Woodlands: A Vision for Sustaining Forested and Natural Landscapes.

Sponsored by the MBL's Falmouth Forum and by The 300 Committee. Co-interviewee with David Foster, interviewer Mindy Todd, *The Point*, WCAI. (2021)

Death Defying Down-regulation Among Algae Living High and Dry in Desert Ecosystems.

Ecosystems Center and Semester in Environmental Science Webinars, MBL (2020). Co-presenter with Elena Lopez Peredo.

<https://mbl.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=0b75e805-de0b-4cdf-933a-ac77010853ae>

Picture a Scientist. One hour live panel discussion focusing on women in science after movie screening, sponsored by the MBL. Co-panelist with K. Gribble, S. Nemes, J. Gitlin. (2020).

Shades of Green Energy. Austin, TX. Discussion about sustainability and ecology, associated with the "Austin Night for Nature" event, Ecological Society of America meeting (2011).

<https://archive.org/details/ShadesOfGreenEnergyAugust42011EcologicalSocietyOfAmerica>

TRAINING WORKSHOPS

Invited senior mentor, "Theory of Microbial Symbiosis" workshop 2024

(<https://manoa.hawaii.edu/holobiont/>), a three week workshop for early career scientists at the Hawaii Institute for Marine Biology. "The purpose of the workshop is to introduce young theoretical investigators to biological issues pertaining to microbial symbiosis, including holobionts, that need new conceptualization and/or mathematical formulation."

Invited senior mentor, "Woodstoich" 2019, a project-focused week for early career scientists studying ecological stoichiometry. Special suite of papers introduced by Evans-White et al. 2019 in *Frontiers in Ecology and Evolution* resulted. (doi: 10.3389/fevo.2019.00463)

SERVICE ON NATIONAL COMMITTEES AND INSTITUTIONAL BODIES (2011-2024)

OSTP forum “Microbiome Innovation: Roadmap to the Future”, (2015), OSTP workshop “The Microbiome: Developing a Roadmap for Discovery” (2015), and OSTP launch of the “National Microbiome Initiative” (2016).

U.S. Department of Energy, triennial reviewer, Oak Ridge National Laboratory (2015)

U.S. Department of Energy, triennial reviewer, Joint Genome Institute (2014)

Organizer, Ecological Society of America Annual Meeting, fund-raising concert at the Moody Theatre, Austin, TX, to showcase local environmental groups. 20 groups participated (2011)

President (elected), Physiological Ecology Section, Ecological Society of America (2009-2011)

Invited member of nominating committee to establish the Board of Directors for the National iPlant Collaborative (<http://www.iplantcollaborative.org/>) (2008)

Invited member of the Program Leaders Committee, NSF-funded Statistical and Applied Mathematical Sciences Institute (SAMSI) program on statistics for control of wireless sensing networks and analysis of data streams (2007-2008)

Secretary (elected), Physiological Ecology Section, Ecological Society of America (2002-2004)

Invited member, international panel to review the National Phytotron at Duke (2001)

SERVICE – GRANT AND JOURNAL REVIEW

Invited DOE-funded workshop, *Opportunities in Biological and Environmental Research Uniquely Enabled by the APS Upgrade (APS-U)*, Argonne National Laboratory (2018).

Report: [aps.anl.gov/sites/www.aps.anl.gov/files/APS-Uploads/PUBLICATION-](https://aps.anl.gov/sites/www.aps.anl.gov/files/APS-Uploads/PUBLICATION-FILES/Workshop%20to%20Identify%20Opportunities%20in%20Biological%20and%20Environmental%20Research.pdf)

[FILES/Workshop%20to%20Identify%20Opportunities%20in%20Biological%20and%20Environmental%20Research.pdf](https://aps.anl.gov/sites/www.aps.anl.gov/files/APS-Uploads/PUBLICATION-FILES/Workshop%20to%20Identify%20Opportunities%20in%20Biological%20and%20Environmental%20Research.pdf)

Invited NSF-funded workshop, University of Chicago, “*The Subterranean Macroscopic: Sensor Networks for Understanding, Modeling, and Managing Soil Processes*” (2017)

Invited workshop, Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, “*Breakthrough Science & Technologies (BS&T) Workshop*” (2017)

Invited workshop, White House Office of Science and Technology Policy, “*The Microbiome: Developing a Roadmap for Discovery*”, Washington, DC., (2015)

Invited workshop, “*Belowground Carbon Cycling Processes at the Molecular Scale: New Tools for User Research*”, Environmental Molecular Sciences Laboratory at Pacific Northwest National Lab, Richland, WA (2013)

Invited workshop, American Academy of Microbiology colloquium “*Incorporating microbes into climate models*”, Dallas, TX (2011) Report:

https://www.ncbi.nlm.nih.gov/books/NBK561255/pdf/Bookshelf_NBK561255.pdf

Invited workshop, NSF “*Frontiers in Belowground Carbon Cycling Research*” (2003). Report: [https://doi-org.library.proxy.mbl.edu/10.1890/1540-9295\(2004\)002\[0522:CCIS\]2.0.CO;2](https://doi-org.library.proxy.mbl.edu/10.1890/1540-9295(2004)002[0522:CCIS]2.0.CO;2)

PATENT

2021. Scalable, large-area optical sensing platform with compact light delivery and imaging system. Patent number: 11035794 Date of Patent: June 15, 2021.

Inventors: Xufeng Zhang, Supratik Guha, Zoe G. Cardon

PUBLICATIONS

Submitted:

Zhou Y, O’Meara T, **Cardon ZG**, Wang J, Sulman BN, Giblin A, Forbrich I. Simulated plant-mediated oxygen input has strong impacts on fine-scale porewater biogeochemistry and weak impacts on integrated methane fluxes in coastal wetlands. *Biogeoche*

- amphipod system. *Molecular Ecology*. DOI: 10.1111/mec.17093
- Arredondo M, Fang Y, Jones M, Yabusaki SB, **Cardon ZG**, Keiluweit, M. (2023) Resolving dynamic mineral-organic interactions in the rhizosphere by combining *in-situ* microsensors with plant-soil reactive transport modeling. *Soil Biology and Biochemistry*. 184:109097. <https://doi.org/10.1016/j.soilbio.2023.109097>
- Li H, Bölscher T, Winnick M, Tfaily MM, **Cardon ZG**, and Keiluweit M. (2021) Simple plant and microbial metabolites destabilize mineral-associated organic matter via multiple pathways. *Environmental Science and Technology* 55(5): 3389–3398 doi: 10.1021/acs.est.0c04592
- Fu C, Wang G, Bible K, Goulden ML, Saleska SR, Scott RL, **Cardon ZG**. (2018) Hydraulic redistribution affects modeled carbon cycling via soil microbial activity and suppressed fire. *Global Change Biology*.24(8):3472-3485. doi: 10.1111/gcb.14164
- Biteen JS, Blainey PC, **Cardon ZG**, Chun M, Church G, Dorrestein PC, Fraser SE, Gilbert J, Janss

- Neumann, R.B. and **Z.G. Cardon** (2012). Tansley Review: The magnitude of hydraulic redistribution by plant roots: a review and synthesis of empirical and modeling studies. *New Phytologist* 194:337-352. doi: 10.1111/j.1469-8137.2012.04088.x
- Skogen, K.A., Holsinger, K.E., and **Cardon, Z.G.** (2011) Nitrogen deposition and the decline of a regionally threatened legume, *Desmodium cuspidatum*. *Oecologia* 165:261–269.
- Xia, LC, Steele, JA, Cram, JA, **Cardon, ZG**, Simmons, SL, Vallino, JJ, Fuhrman, JA, Sun, F (2011) Extended local similarity analysis (eLSA) of microbial communities. microbia4iloc8.nal

Cardon, Z.G. (1995) Influence of rhizodeposition under elevated CO₂ on plant nutrition and soil organic matter. *Plant and Soil* 187(2):277-288.

Publications focused on photosynthesis, transpiration, and desiccation tolerance:

Massoud EC, Hoffman F, Shi Z, Tang J, Alhajar E, Barnes M, Braghieri RK, **Cardon ZG**, Collier N, Crompton O, Denedy-Frank JK, Gautam S, Gonzalez-Meler MA, Green JK, Levine P, MacBean N, Mao J, Tran Mills R, Mishra U, Mudunuru M, Renchon AA, Scott S, Siirila-Woodburn ER, Sprenger M, Tague C, Wang Y, Xu C, Zarakasz C. Perspectives on Artificial Intelligence for Predictions in Ecohydrology. *Artificial Intelligence for the Earth Systems*. DOI: 10.1175/AIES-D-23-0005.1 e230005

Cardon ZG, Peredo EL, Enloe CM, Oakey JS, Wu S-Z, and Bezanilla M. (2022). Slip slidin' away: bristle-driven gliding by *Tetrademus deserticola* (Chlorophyta) in microfluidic chambers. *PLoS ONE* 17(12): e0247800

- Hooper, D. U., **Cardon, Z. G.**, Chapin III, F. S., and Durant, M. (2002) Corrected calculations for whole ecosystem measurements of CO₂ flux using the LI-COR 6200 portable photosynthesis system. *Oecologia* 132: 1-11. doi: 10.1007/s00442-002-0870-3
- Lodding, C. C., Behling, J., and **Cardon, Z. G.** (2000) Water relations of *Betula cordifolia* and *Betula allegheniensis* rooted together on landslides in Franconia Notch, NH. *American Midland Naturalist* 143:321-329.
- Tsionsky, M., **Cardon, Z.G.**, Bard, A.J., and Jackson, R.B. (1997) Photosynthetic electron transport in single guard cells as measured by scanning electrochemical microscopy. *Plant Physiology* 113(3):895-901. doi: 10.1104/pp.113.3.895
- Cardon, Z.G.**, Berry, J.A., and Woodrow, I.E. (1995). Fluctuating [CO₂] drives species-specific changes in water use efficiency. *Journal of Biogeography* 22:203-208.
- Jackson, R.B., Luo, Y., **Cardon, Z.G.**, Chiariello, N.R., Sala, O.E., Field, C.B., and Mooney, H. A. (1995). Photosynthesis, growth, and density for the dominant species in a CO₂-enriched grassland. *Journal of Biogeography* 22:221-225.
- Cardon, Z.G.**, Berry, J.A., and Woodrow, I.E. (1994). Dependence of the extent and direction of average stomatal response in *Zea mays* and *Phaseolus vulgaris* on the frequency of fluctuations in environmental stimuli. *Plant Physiology* 105:1007-1013. doi: 10.1104/pp.105.3.1007
- Cardon, Z.G.**, Mott, K.A., and Berry, J.A. (1994) Dynamics of patchy stomatal movements, and their contribution to steady-state and oscillating stomatal conductance calculated with gas-exchange techniques. *Plant, Cell, and Environment* 17:995-1007. doi: 10.1111/j.1365-3040.1994.tb02033.x
- Mott, K.A., **Cardon, Z.G.**, and Berry, J.A. (1993). Asymmetric patchy stomatal closure for the two surfaces of *Xanthium strumarium* L. leaves at low humidity. *Plant, Cell, and Environment* 16:25-34. doi: 10.1111/j.1365-3040.1993.tb00841.x
- Cardon, Z.G.**, and Berry, J.A. (1992). Effects of O₂ and CO₂ concentration on the steady-state fluorescence yield of single guard cell pairs in intact leaf discs of *Tradescantia albiflora*. Evidence for Rubisco-mediated CO₂ fixation and photorespiration in guard cells. *Plant Physiology* 99:1238-1244. doi: 10.1104/pp.99.3.1238
- Cardon, Z.G.**, and Mott, K.A. (1989). Evidence that ribulose 1,5-bisphosphate (RuBP) binds to inactive sites of RuBP carboxylase *in vivo* and an estimate of the rate constant for dissociation. *Plant Physiology* 89:1253-1257. doi: 10.1104/pp.89.4.1253
- Special Journal Issues, Volumes Edited, and Peer-Reviewed Contributions to Edited Volumes:
 Evans-White MA, **Cardon ZG**, Schweitzer JA, Urabe J, Elser JJ. (2019) Editorial: Emerging Frontiers in Ecological Stoichiometry. *Frontiers in Ecology and Evolution*. 7:463. doi: 10.3389/fevo.2019.00463
- Cardon, Z.G.**ited 2[0.001 Tw [(Fr)-2 (fi a)4 (ndw -Ed)Tj0.002 Tc -0.002 Tw-3J0.0oo Tc -0.002 Tw (G6 0 f (:

ecology. In: *Models in Ecosystem Science*. 9th Cary Conference volume, Canham, C., Cole, J. and Lauenroth, W., eds. pp. 428-436.

FUNDING

Research grants:

- Simons Foundation, “Ecosystem on the Edge: How Coastal Marsh Plants and Microbes Thrive in an Oscillating Environment”. **Cardon** (PI). 2024-2028. (\$1,433,030)
- DOE Environmental System Science (ESS) Program. “Tidal Triggers and Hot-Spot Switches in Coastal Marshes” **Cardon** (PI), co-Is Bowen J, Giblin A, Forbrich I, Sulman B, and O’Meara T. 2023-2026. (\$999,724, \$878314 to MBL)
- DOE Environmental System Science (ESS) Program. “Hydraulic redistribution in forests: Spatial and temporal drivers of variation, and consequences for climate feedbacks” Jacobs E. (PI at Purdue), co-Is **Cardon**, Dukes J, Welp L, and Fang Y. 2022-2025. (\$840,000, \$60,000 to MBL)
- DOE Environmental System Science (ESS) Program. “From tides to seasons: How cyclic tidal drivers and plant physiology interact to affect carbon cycling at the terrestrial-estuarine boundary” Forbrich I (PI at MBL), co-Is **Cardon**

Search committees, Bell Center faculty searches, 2011, 2018

Co-Leader (appointed), “PRO-Microbes” vision meeting (23 invited attendees, 9 from MBL).

New research and education linking dynamic microbial response with shifting ecosystem function over ecological and evolutionary time scales. (2015)

Co-Leader (appointed), MBL “Vision Team IV: Microbial diversity, ecology, evolution and microbiomes” (12 invited attendees, 5 from MBL, 5 from University of Chicago).

Development of new strategic MBL theme in research and education focused on microbiomes. (2015)

Institutional Committee (appointed 2009 – 2010) (Advisory committee to the MBL Director on resident research at the MBL)

Implementation -University of Chicago affiliation:

MBL Affiliation Committee (appointed 2014) (guidance for new MBL-UChicago affiliation)

Head (appointed), Organizing Committee, first UChicago-MBL faculty retreat (2014)

Day-to-day operations: MBL Research Services (2013 -2019); MBL Biosafety (2009 - ongoing); Head, Ecosystems Center Facilities (2009 - 2019); Head, MBL Research Greenhouse (2009 - ongoing); Stabl

Participant in graduate Phenology seminar, EEB Department, Brown Univ., fall 2009.

University of Connecticut, regularly taught (1996-2007):

Introductory Biology (~300 first year students);

General Ecology "W" (~70-100 sophomores/juniors, writing intensive);

Organisms and Ecosystems (~10-20 seniors and graduate students);

Soil Degradation and Conservation (~10-15 seniors and graduate students)

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Graduate Major Advisor, Department of Ecology and Evolutionary Biology, UConn:

Patrick Herron, PhD 2007. NSF DDIG recipient and EPA STAR Fellow. Now Executive Director, Mystic River Watershed Association. Arlington, MA.

Bethanie Hooker, PhD 2006. EPA STAR Fellow and PEO Scholar. Now Senior Manager, Water and Agriculture Resilience at Ceres, Inc. Cambridge, MA.

Tracy Gartner, PhD 2004. NSF Graduate Research Fellow. Now Director, Environmental Science Program; Professor of Environmental Science and Biology. Carthage College, Kenosha, WI.

Graduate Major Co-Advisor, Center for Integrative Geosciences,

Matthew Dunn, honors thesis
Laura Pustell
Kristen Riley

Bowdoin:

Cynthia Lodding, honors thesis published in *American Midland Naturalist*. Now physician.
Erika Kiers, now University Research Chair and Professor at Vrije Universiteit, Amsterdam

Multiple other undergraduates for shorter-term projects, at Bowdoin, UConn, and MBL.