

RICHARD J. NORBY

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Education

Ph.D., University of Wisconsin-Madison, Forestry and Botany, 1981
B.A., Carleton College, Chemistry, 1972

Positions

University of Tennessee-Knoxville
Joint Professor, Center for Interdisciplinary Research and Graduate Education, 2011-present
Adjunct Professor, Department of Ecology & Evolutionary Biology, 1986-present
Research Associate, Graduate Program in Ecology, 1983-1985

Environmental Sciences Division, Oak Ridge National Laboratory

ORNL Corporate Fellow, 2007 - 2020
Distinguished R&D Staff Member, 2001 - 2007
Senior Research Staff Member, 1996 - 2001
Research Staff Member, 1987-1996
Research Associate, 1985 -1987
University of Tennessee Research Associate, 1983-1985
U.S. DOE Postdoctoral Research Training Program, 1981-1983

University of Birmingham (UK), Institute for Advanced Studies

Distinguished Visiting Fellow, 2019 -2020

University of Wisconsin-Madison

Research Assistant, Department of Forestry, 1978-1981
Research Assistant, Department of Botany, 1977-1978

Professional Activities

Editor and Trustee, *New Phytologist*, 1997-
Associate Editor, *Journal of Plant Ecology*, 2008 - 2016
Editorial Board, *Ecological Applications*, 1998 – 2002
Member, Advisory Group, Birmingham Institute of Forest Research, University of Birmingham (UK), 2020 -
Member, AGU Fellows Selection Committee, 2018 –
Co-chair, Research Priorities for Tropical Ecosystems Under Climate Change Workshop, U.S.

Department of Energy, Office of Science, Office of Biological and Environmental Research, June, 2012.

Member, Science Steering Group for the North American Carbon Program, 2005 - 2008

Secretary, National Technical Advisory Committee, National Institute for Global Environmental Change, 2002

Task Leader, Global Change and Terrestrial Ecosystems, Focus 1, 1997- 2003

Member, Scientific Steering Committee, Terrestrial Ecosystem Responses to Atmospheric and Climatic Change (NSF network activity), 2001- 2007

Member, Planning Committee and Science and Facility Writing Team, Terrestrial Ecosystem Research Facility (DOE), 2001

Panel member, NASA Carbon Cycle Science peer review panel, 2004

Panel member, National Institute for Global Environmental Change, southeastern region, 1997-1998

Organizer of NSF/DOE Workshop, "Phosphorus Cycling in Terrestrial Ecosystems: Advancing our fundamental understanding through a model-data connection", Townsend, Tennessee, May, 2016; New Phytologist Symposium, "Stoichiometric Flexibility in Terrestrial Ecosystems Under Global Change", Oracle, Arizona, September, 2011; New Phytologist Symposium, "Carbon Cycling in Tropical Ecosystems", Guangzhou, China, November, 2009; New Phytologist Symposium "Functional Genomics of Environmental Adaptation in *Populus*", Gatlinburg, Tennessee, October, 2004; TERACC workshop, "Interactions Between Increasing CO₂ and Temperature in Terrestrial Ecosystems", Lake Tahoe, California, April, 2003; GCTE/New Phytologist Symposium, "Fine Root Dynamics and Global Change: An Ecosystem Perspective", Townsend, Tennessee, October, 1999.

Contributing author, "Climate Change Impacts on Forests", In: Climate Change 1995. Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, 1996.

External Reviewer, EPRI/DOE Forest Response to CO₂ Research Program

External Reviewer, U.S. EPA Global Change Research Program

Consultant to the DOE/NSF/USDA Collaborative Research in Plant Biology Program Advisory Committee, 1992

Visiting Scientist, Estonian Academy of Sciences, Tartu, Estonia, U.S.S.R., 1989.

Rapporteur, SCOPE workshop, CO₂ and Climate Change, Washington, D.C., 1993.

Rapporteur, Interagency Workshop: Biological Response to Environmental Change, Woods Hole, Massachusetts, 1987

Rapporteur, CO₂ Research Conference: Carbon Dioxide, Science, and Consensus, Institute for Energy Analysis, Berkeley Springs, West Virginia, 1982.

Participant in environmental impact study of Columbia Generating Station, Portage, Wisconsin, 1979-1981.

Reviewer for *Acta Oecologica*, *American Journal of Botany*, *Annales des Sciences Forestières*, *Annals of Botany*; *Atmospheric Environment*; *Biogeochemistry*; *Canadian Journal of Forest Research*; *Ecological Applications*; *Ecology*; *Ecology Letters*; *Ecosystems*; *Environmental and Experimental Botany*; *Environmental Pollution*, *Forest Science*; *Functional Ecology*; *Functional Plant Biology*; *Global Biogeochemical Cycles*; *Global Change Biology*; *Global and Planetary Change*; *International Journal of Plant Science*; *Journal of Ecology*; *Journal of Environmental Quality*; *Nature*; *Nature Climate Change*; *New Phytologist*; *Oecologia*; *Oikos*; *Plant and Soil*; *Plant, Cell and*

Environment; Plant Physiology; Proceedings of the National Academy of Sciences; Science; Soil Science Society of America Journal; Tree Physiology; Trees; Trends in Ecology and Evolution; Urban Atmosphere; Water, Air and Soil Pollution; Academic Press; Oxford University Press; Springer-Verlag; International Geosphere-Biosphere Programme; National Science Foundation; U.S. Environmental Protection Agency; U.S. Forest Service; U.S. Department of Energy; U.S. Department of Agriculture; U.S. Agency for International Development; U.S.-Israel Binational Science Foundation; National Acid Deposition Assessment Program; National Institute for Global Environmental Change; U.K. National Environmental Research Council, Dutch National Research Council, Swiss National Science Foundation, Israel Science Foundation

Outreach Activities

Organizer of class on global change, Oak Ridge Institute for Continued Learning, 2000
Treasurer, University of Tennessee Arboretum Society, 1996 – 1999
Lecturer, Traveling Lecture Program, Oak Ridge Institute for Science and Education, U.S. Department of Energy, 1987- 1993

Research Activities

Ecosystem responses to atmospheric and climatic change
Effects of atmospheric CO₂ enrichment on tree growth and forest metabolism
Carbon and nitrogen cycling in forest ecosystems
Forest tree physiology and plant physiological ecology
Synthesis of experimental results for use in models

Membership in Professional Societies

American Association for the Advancement of Science
American Geophysical Union
Association of Tropical Biology and Conservation
Ecological Society of America

Awards and Honors

Highly Cited Researcher, 2018, 2019, 2020, Clarivate Analytics
Fellow, American Geophysical Union, 2017
Fellow, Ecological Society of America, 2016
Significant Event Award, Oak Ridge National Laboratory, 2015
Outstanding Mentor Award, U. S. Department of Energy Office of Science, 2007
UT-Battelle Award for Outstanding Accomplishment in Science and Technology, 2004
Fellow, American Association for the Advancement of Science, 1995
Scientific Achievement Award, Environmental Sciences Division, Oak Ridge National Laboratory, 1992
Society of Technical Communications, Award of Merit for Technical Publication, 1989 and 1998; Award of Distinguished Technical Communication and Best of Show – Print, 2014
E. B. Fred Fellow, University of Wisconsin-Madison, 1977
Westinghouse Science Talent Search semi-finalist, 1968
Sigma Xi
Xi Sigma Pi

Teaching Experience

Lectures as part of core curriculum in Ecology & Evolutionary Biology, University of Tennessee-Knoxville, 2009
Organizer of class on global change, Oak Ridge Institute for Continued Learning, 2000
Lecturer, Traveling Lecture Program, Oak Ridge Institute for Science and Education, U.S. Department of Energy, 1987- 1993

Student supervision

Postdoctoral advisees (current affiliation): Anthony Walker (ORNL), Victoria Sloan (ORNL), Colleen M Iversen (ORNL), Jeffery M. Warren (ORNL), Aimee T. Classen (University of Tennessee), Shiqiang Wan (Chinese Academy of Sciences), Tim J. Tschaplinski (ORNL),
PhD. Dissertation advisee: Colleen M. Iversen, University of Tennessee; Kristine Cabugao, University of Tennessee; Daniela Yaffar (University of Tennessee)
PhD Committees: Jessica Bryant Moore (UTK), Emmi Felker-Quinn (UTK), Milena Holmgren (UTK), Sue Natali (SUNY-StonyBrook), Elizabeth O'Neill (UTK), Johnna Sholtis (Texas Tech Univ.), Katie Stuble (UTK), Lina Taneva (Univ. Illinois-Chicago), Rebecca Trueman (Univ. Illinois-Chicago)
MS committees: Cayenne Engle (UTK), Travis Belote (UTK)
Numerous summer undergraduate participants and post-B.S. interns at ORNL

Publications

2021

Cabugao KG, Yaffar D, Stenson N, Childs J, Phillips J, Mayes MA, Yang X, Weston DJ, Norby RJ. 2021. Bringing function to structure: Root-soil interactions shaping phosphatase activity throughout a soil profile in Puerto Rico. *Ecology and Evolution* 11:1150-1164, DOI: 10.1002/ece3.7036

Norby RJ. 2021. Comment on “Increased growing-season productivity drives earlier autumn leaf senescence in temperate trees”. *Science* 10.1126/science.abg1438

Shi X, Ricciuto DM, Thornton PE, Xu X, Yuan F, Norby RJ, Walker AP, Warren J, Mao J, Hanson PJ, Meng L, Weston D, Griffiths NA. 2021. Extending a land-surface model with Sphagnum moss to simulate responses of a northern temperate bog to whole ecosystem warming and elevated CO₂. *Biogeosciences*, DOI: 10.5194/bg-18-1-2021.

Walker AP, De Kauwe MG, Bastos A, Belmecheri S, Georgiou K, Keeling RF, McMahon SM, Medlyn BE, Moore DJP, Norby RJ, Zaehle S, Anderson-Teixeira KJ, Battipaglia G, Brienen RJW, Cabugao KG, Cailleret M, Campbell E, Canadell JG, Ciais P, Craig ME, Ellsworth DS, Farquhar GD, Fatichi S, Fisher JB, Frank DC, Graven H, Gu L, Haverd V, Heilman K, Heimann M, Hungate BA, Iversen CM, Joos F, Jiang M, Keenan TF, Knauer J, Körner C, Leshyk VO, Leuzinger S, Liu Y, MacBean N, Malhi Y, McVicar TR, Penuelas J, Pongratz J, Powell AS, Riutta T, Sabot MEB, Schleucher J, Sitch S, Smith WK, Sulman B, Taylor B, Terrer C, Torn MS, Treseder KK, Trugman AT, Trumbore SE, van Mantgem PJ, Voelker SL, Whelan ME, Zuidema PA. 2020. Integrating the evidence for a terrestrial carbon sink caused by increasing atmospheric CO₂. *New Phytologist* 229: 2413-2445, DOI: 10.1111/nph.16866.

2020

Cordeiro AL, Norby RJ, Andersen KM, Valverde-Barrantes O, Fuchslueger L, Oblitas E, Hartley IP, Iversen CM, Gonçalves NB, Takeshi B, Lapola DM, Quesada CA. 2020. Fine-root dynamics vary with soil depth and precipitation in a low nutrient tropical forest in the Central Amazonia. *Plant-Environment Interactions* 1:3-16, DOI:10.1002/pei3.10010.

Hanson PJ, Griffiths NA, Iversen CM, Norby RJ, Sebestyén SD, Phillips JR, Chanton JP, Kolka RK, Malhotra A, Oleheiser KC, Warren JM, Shi X, Yang X, Mao J, Ricciuto DM. 2020. Rapid net carbon loss from a whole-ecosystem warmed peatland. *AGU Advances* AGA220032, DOI: 10.1029/2020AV000163.

Koven CD, Knox RG, Fisher RA, Chambers JQ, Christoffersen BO, Davies SJ, Detto M, Dietze MC, Faybishenko B, Holm J, Huang MY, Kovenock M, Kueppers LM, Lemieux G, Massoud E, McDowel NG, Muller-Landau HC, Needham JF, Norby RJ, Powell T, Rogers A, Serbin SP, Shuman JK, Swann ALS, Varadharajan C, Walker AP, Wright SJ, Xu CG. 2020. Benchmarking and parameter sensitivity of physiological and vegetation dynamics using the Functionally Assembled Terrestrial Ecosystem Simulator (FATES) at Barro Colorado Island, Panama *Biogeosciences*, **17**, 3017-3044.

Yaffar D, Norby RJ. 2020. A historical and comparative review of 50 years of root data collection in Puerto Rico. *Biotropica* 52: 563-576, DOI:10.1111/btp.1277

2019

Fleischer K, Rammig A, De Kauwe MG, Walker AP, Domingues TF, Fuchslueger L, Garcia S, Goll DS, Grandis A, Jiang MK, Haverd V, Hofhansl F, Holm JA, Kruijt B, Leung F, Medlyn BE, Mercado LM, Norby RJ, Pak B, von Randow C, Quesada CA, Schaap KJ, Valverde-Barrantes OJ, Wang YP, Yang XJ, Zaehle S, Zhu Q, Lapola DM. 2019. Amazon forest response to CO₂ fertilization dependent on plant phosphorus acquisition. *Nature Geoscience* 12: 736-+. DOI:10.1038/s41561-019-0404-9

Norby RJ, Childs J, Hanson PJ, Warren JM. 2019. Rapid loss of an ecosystem engineer: *Sphagnum* decline in an experimentally warmed bog. *Ecology and Evolution* 9:12571-12585. DOI: 10.1002/ece3.5722.

Norby RJ, Sloan VL, Iversen CM, Childs J. 2019. Controls on fine-scale spatial and temporal variability of plant-available inorganic nitrogen in a polygonal tundra landscape. *Ecosystems* 22: 528-543. DOI: 10.1007/s10021-018-0285-6.

Pereira IS, Nascimento HEM, Vicari MB, Disney M, DeLucia EH, Domingues T, Kruijt B, Lapola D, Meir P, Norby RJ, Ometto JPHB, Quesada CA, Rammig A, Hofhansl F. 2019. Performance of laser-based electronic devices for structural analysis of Amazonian terra-firme forests. *Remote Sensing* 11: 510. DOI:10.3390/rs11050510

Song J, Wan S, and 57 co-authors including Norby RJ. 2019. A meta-analysis of 1119

manipulative experiments on terrestrial carbon cycling responses to global change. *Nature Ecology and Evolution* 3: 1309-1320. <https://doi.org/10.1038/s41559-019-0958-3>.

Walker AP, De Kauwe MG, Medlyn BE, Zaehle S, Iversen CM, Asao S, Guenet B, Harper A, Hickler T, Hungate BA, Jain AK, Luo Y, Lu X, Lu M, Luus K, Megonigal JP, Oren R, Ryan E, Shu S, Talhelm A, Wang Y-P, Warren JM, Werner C, Xia J, Yang B, Zak DR, Norby RJ. 2019. Decadal biomass increment in early secondary succession woody ecosystems is increased by CO₂ enrichment. *Nature Communications* 10: 454. DOI: 10.1038/s41467-019-08348-1

Yang X, Ricciuto DM, Thornton PE, Shi X, Xu M, Hoffman F, Norby RJ. 2019. The effects of phosphorus cycle dynamics on carbon sources and sinks in the Amazon region: a modeling study using ELM v1. *Journal of Geophysical Research: Biogeosciences* 124. DOI: 10.1029/2019JG005082.

2018

Gonzalez-Meler MA, Poghosyan A, Sanchez-de Leon Y, Dias de Olivera E, Norby RJ, Sturchio NC. 2018. Does elevated atmospheric CO₂ affect soil carbon burial and soil weathering in a forest ecosystem? *PeerJ* 6: e5356. DOI: 10.7717/peerj.5356.

Iversen CM, Childs J, Norby RJ, Ontl TA, Kolka RK, Brice DJ, McFarlane KJ, Hanson PJ. 2018. Fine-root growth in a forested bog is seasonally dynamic, but shallowly distributed in nutrient-poor peat. *Plant and Soil* 424:123-143. DOI: 10.1007/s11104-017-3231-z.

Sánchez-de León Y, Wise DH, Lugo-Pérez J, Norby RJ, James SW, Gonzalez-Meler MA. 2018. Endogeic earthworm densities increase in response to higher fine-root production in a forest exposed to elevated CO₂. *Soil Biology and Biochemistry* 122: 31-38.

2017

Cabugao KG, Timm CM, Carrell AA, Childs J, Lu TS, Pelletier DA, Weston DJ, Norby RJ. 2017. Root and rhizosphere bacterial phosphatase activity varies with tree species and soil phosphorus availability in Puerto Rico tropical forest. *Frontiers in Plant Science* 8:1834. doi: 10.3389/fpls.2017.01834

De Kauwe MG, Medlyn BE, Walker AP, Zaehle S, Asao S, Guenet B, Harper A, Hickler T, Jain A, Luo Y, Lu C, Luus K, Parton WJ, Shu S, Wang YP, Werner C, Xia J, Pendall E, Morgan JA, Ryan EM, Carrillo Y, Dijkstra FA, Norby RJ. 2017. Challenging terrestrial biosphere models with data from the long-term multi-factor Prairie Heating and CO₂ Enrichment experiment. *Global Change Biology* DOI: 10.1111/gcb.13643.

Griffiths NA, Hanson PJ, Ricciuto DM, Iversen CM, Jensen AM, Malhotra A, McFarlane KJ, Norby RJ, Sargsyan K, Sebestyen SB, Shi X, Walker AP, Ward EJ, Warren JM, Weston DJ. 2017. Temporal and spatial variation in peatland carbon cycling and implications for interpreting responses of an ecosystem-scale warming experiment. *Soil Science Society of America Journal* 81: 1668-1688. DOI:10.2136/sssaj2016.12.0422

Liu S, Bond-Lamberty B, Boysen LR, Ford JD, Fox A, Gallo K, Hatfield J, Henebry GM, Liu Z, Loveland TR, Norby RJ, Sohl T, Steiner AL, Huntington TG, Yuan W, Zhang Z, Zhao S. 2017. Grand challenges in understanding the interplay of climate and land changes. *Earth Interactions* Paper 21-002, doi: 10.1175/EI-D-16-0012.1

Norby RJ, De Kauwe MG, Walker AP, Werner C, Zaehle S, Zak DR. 2017. Comment on “Mycorrhizal association as a primary control of the CO₂ fertilization effect”. *Science* 355: 358. <https://doi.org/10.1126/science.aai7976>.

Norby RJ, Gu L, Haworth IC, Jensen AM, Turner BL, Walker AP, Warren JM, Weston DJ, Xu C, Winter K. 2017. Informing models through empirical relationships between foliar phosphorus, nitrogen and photosynthesis across diverse woody species in Panama. *New Phytologist* 215:1425-1437. doi: 10.1111/nph.14319.

Norby RJ, Iversen CM. 2017. Introduction to a Virtual Issue on root traits. *New Phytologist* 215: 5-8.

Walker AP, Carter KR, Gu L, Hanson PJ, Malhotra A, Norby RJ, Sebestyen SD, Wullschleger SD, Weston DJ. 2017 Biophysical drivers of seasonal variability in Sphagnum gross primary production in a northern temperate bog. *Journal of Geophysical Research: Biogeosciences* 10.1002/2016JG003711.

Weston DJ, Turetsky MR, Johnson MG, Granath G, Lindo Z, Belyea LR, Rice SK, Hanson DT, Engelhardt KAM, Schmutz J, Dorrepaal E, Euskirchen ES, Stenøien HK, Szövényi P, Jackson M, Piatkowski BT, Muchero W, Norby RJ, Kostka JE, Glass JB, Rydin H, Limpens J, Tuittila E-S, Ullrich KK, Carrell A, Benscoter BW, Chen J-G, Oke TA, Nilsson MB, Ranjan P, Jacobson D, Lilleskov EA, Clymo RS, Shaw AJ. The Sphagnome Project: enabling ecological and evolutionary insights through a genus-level sequencing project. *New Phytologist*: doi:10.1111/nph.14860

2016

Langford Z, Kumar J, Hoffman FM, Norby RJ, Wullschleger SD, Sloan VL, Iversen CM. 2016. Mapping arctic plant functional type distributions in the Barrow Environmental Observatory using WorldView-2 and LiDAR datasets. *Remote Sensing* 8: Article number 733

Mao J, Ricciuto DM, Thornton PE, Warren JM, King AW, Shi X, Iversen CM, Norby RJ. 2016. Evaluating the Community Land Model in a pine stand with shading manipulations and ¹³CO₂ labeling. *Biogeosciences* 13: 641-657.

Medlyn BE, De Kauwe MG, Zaehle S, Walker AP, Duursma RA, Luus K, Mishurov M, Pak B, Smith B, Wang YP, Yang X, Crous KY, Drake JE, Gimeno TE, Macdonald CA, Norby RJ, Power SA, Tjoelker MG, Ellsworth DS. 2016. Using models to guide field experiments: a priori predictions for the CO₂ response of a nutrient- and water-limited native Eucalypt woodland. *Global Change Biology* 22: 2834-2851.

Norby RJ, De Kauwe MG, Domingues TF, Duursma RA, Ellsworth DS, Goll DS, Lapola DL, Luus KA, MacKenzie AR, Medlyn BE, Pavlick R, Rammig A, Smith B, Thomas R, Thonicke K, Walker AP, Yang X, Zaehle S. 2016. Model-data synthesis for the next generation of forest FACE experiments. *New Phytologist* 209: 17-28.

Schädel C, Bader MKF, Schuur EAG, Biasi C, Bracho R, Capek P, De Baets S, Diakova K, Ernakovich J, Estop-Aragones C, Graham DE, Hartley IP, Iversen CM, Kane E, Knoblauch C, Lupascu M, Martikainen PJ, Natali SM, Norby RJ, O'Donnell JA, Roy Chowdhury T, Santruckova H, Shaver G, Sloan VL, Treat CC, Turetsky MR, Waldrop MP, and Wickland KP. 2016. Potential carbon emissions dominated by carbon dioxide from thawed permafrost soils. *Nature Climate Change* 6: 950-+

2015

Heikoo JM, Throckmorton HM, Newman BD, Perkins GB, Iversen CM, Chowdhury TR, Romanovsky V, Graham DE, Norby RJ, Wilson CJ, Wullschlegel SD. 2015. Isotopic identification of soil and permafrost nitrate sources in an Arctic tundra ecosystem. *Journal of Geophysical Research: Biogeosciences* 120: 1000-1017.

Hockaday, WC, Gallagher ME, Masiello CA, Baldock JA, Iversen CM, Norby RJ. 2015. Forest soil carbon oxidation state and oxidative ratio increase in response to elevated CO₂. *Journal of Geophysical Research – Biogeosciences* 120: 1797-1811.

Iversen CM, Sloan VL, Sullivan PF, Euskirchen ES, McGuire AD, Norby RJ, Walker AP, Warren J, Wullschlegel SD. 2015. The unseen iceberg: Plant roots in arctic tundra. *New Phytologist* 205:34-58.

Mao J, Ricciuto DM, Thornton PE, Warren JM, King AW, Shi X, Iversen CM, Norby RJ. 2015. Evaluating the Community Land Model in a pine stand with ¹³C₂ labeling and shading manipulations. *Biogeosciences Discussion* 12: 6971-7015, doi:10.5194/bgd-12-6971-2015.

McCormack ML, Dickie IA, Eissenstat DM, Fahey TJ, Fernandez CW, Guo D, Helmisaari H-S, Hobbie EA, Iversen CM, Jackson RB, Leppälammil-Kujansuu J, Norby RJ, Phillips RP, Pregitzer KS, Pritchard SG, Rewald B, Zadworny M. 2015. Redefining fine roots improves understanding of below-ground contributions to terrestrial biosphere processes. *New Phytologist* 207:505-518.

Medlyn BE, Zaehle S, De Kauwe MG, Walker AP, Dietze MC, Hanson PJ, Hickler T, Jain AK, Luo Y, Parton W, Prentice IC, Thornton PE, Wang S, Wang YP, Weng E, Iversen CM, McCarthy HR, Warren JM, Oren R, Norby RJ. 2015. Using ecosystem experiments to improve vegetation models. *Nature Climate Change* 5: 528-534.

Treat C, Natali SM, Ernakovich J, Iversen CM, Lupascu M, McGuire AD, Norby RJ, Roy Chowdhury T, Richter A, Santruckova H, Schädel C, Schuur EAG, Sloan VL, Turetsky M, Waldrop M. 2015. A pan-Arctic synthesis of CH₄ and CO₂ production from anoxic soil incubations. *Global Change Biology* DOI: 10.1111/gcb.12875.

Walker AP, Zaehle S, Medlyn BE, De Kauwe MG, Asao S, Hickler T, Parton W, Ricciuto D, Wang YP, Wårlind D, Norby RJ. 2015. Predicting long-term carbon sequestration in response to CO₂ enrichment: How and why do current ecosystem models differ? *Global*

Biogeochemical Cycles 29: 476-495.

Warren JM, Jensen AM, Medlyn BE, Norby RJ, Tissue DT. 2015. Carbon dioxide stimulation of photosynthesis in *Liquidambar styraciflua* is not sustained during a 12-year field experiment. *AoB Plants* 7: plu074 doi:10.1093/aobpla/plu074.

2014

De Kauwe MG, Medlyn BE, Zaehle S, Walker AP, Dietze MC, Wang YP, Luo Y, Jain AK, El-Masri B, Hickler T, Wårlind D, Weng ES, Parton WJ, Thornton PE, Wang S, Prentice IC, Asao S, Smith B, McCarthy HR, Iversen CM, Hanson PJ, Warren JM, Oren R, Norby RJ. 2014. Where does the carbon go? A model-data intercomparison of vegetation carbon allocation and turnover processes at two temperate forest free-air CO₂ enrichment sites. *New Phytologist* 203: 883-899.

Iversen CM, Norby RJ. 2014. Terrestrial plant productivity and carbon allocation in a changing climate. In Freedman B, ed. *Handbook of Global Environmental Pollution: Global Environmental Change*, New York, NY: Springer, pp. 297-316.

Lapola D, Norby RJ. 2014. Amazon-FACE: Assessing the effects of increased atmospheric CO₂ on the ecology and resilience of the Amazon forest – Science plan and implementation strategy. Brasilia: Ministério de Ciência, Tecnologia e Inovação – MCTI. 51 pp.

Sun Y, Gu L, Dickinson RE, Baker J, Cao Y, Damatta FM, Dong X, Ellsworth D, van Goethem D, Jensen AM, Law BE, Loos R, Martins SCV, Norby RJ, Warren J, Weston D, Winter K. 2014. Asymmetrical effects of mesophyll conductance on fundamental photosynthetic parameters and their relationships estimated from leaf gas exchange measurements. *Plant, Cell & Environment* 37: 978-994.

Sun Y, Gu L, Dickinson RE, Norby RJ, Pallardy SG, Hoffman FM. 2014. Impact of mesophyll diffusion on estimated global land CO₂ fertilization. *Proceedings of the National Academy of Sciences* 111: 15774-15779.

Walker AP, Hanson PJ, De Kauwe MG, Medlyn BE, Zaehle S, Asao S, Dietze MC, Hickler T, Huntingford C, Iversen CM, Jain AK, Lomas M, Luo Y, McCarthy HR, Parton WJ, Prentice IC, Thornton PE, Wang S, Wang YP, Wårlind D, Weng ES, Warren JM, Woodward FI, Oren R, Norby RJ. 2014. Comprehensive ecosystem model-data synthesis using multiple datasets at two temperate forest free-air CO₂ enrichment experiments: model performance at ambient CO₂ concentration. *Journal of Geophysical Research: Biogeosciences* 119: 937-964.

Wullschleger SD, Epstein HE, Box EO, Euskirchen ES, Goswami S, Iversen CM, Kattge J, Norby RJ, van Bodegom PM, Xu X. 2014. Plant functional types in Earth system models: past experiences and future directions for application of dynamic vegetation models in high-latitude ecosystems. *Annals of Botany* 114: 1-16.

Zaehle S, Medlyn BE, De Kauwe MG, Walker AP, Dietze MC, Hickler T, Luo Y, Wang YP, El-Masri B, Thornton P, Jain A, Wang S, Warlind D, Weng E, Parton W, Iversen CM, Gallet-Budynek A, McCarthy H, Finzi A, Hanson PJ, Prentice IC, Oren R, Norby RJ. 2014.

Evaluation of eleven terrestrial carbon-nitrogen cycle models against observations from two temperate Free-Air CO₂ Enrichment studies. *New Phytologist* 202: 803-822.

2013

Battipaglia B, Saurer M, Cherubini P, Calfapietra C, McCarthy HR, Norby RJ, Cotrufo MF. 2012. Elevated CO₂ increases tree-level intrinsic water use efficiency: insights from carbon and oxygen isotope analyses in tree rings across three forest FACE sites. *New Phytologist* 197: 544-554.

Cernusak LA, Winter K, Dalling JW, Holtum JAM, Jaramillo C, Körner C, Leakey ADB, Norby RJ, Poulter B, Turner BL, Wright SJ. 2013. Tropical forest responses to increasing atmospheric CO₂: current knowledge and opportunities for future research. *Functional Plant Biology* 40: 531-551.

De Kauwe MG, Medlyn BE, Zaehle S, Walker AP, Dietze MC, Hickler T, Jain AK, Luo Y, Parton WJ, Prentice C, Smith B, Thornton PE, Wang S, Wang YP, Wårlind D, Weng ES, Crous KY, Ellsworth DS, Hanson PJ, Seok-Kim H, Warren JM, Oren R, Norby RJ. 2013. Forest water use and water use efficiency at elevated CO₂: a model-data intercomparison at two contrasting temperate forest FACE sites. *Global Change Biology* 19: 1759-1779.

Franks PJ, Adams MA, Amthor JS, Barbour MM, Berry JA, Ellsworth DS, Farquhar GD, Ghannoum O, Lloyd J, McDowell N, Norby RJ, Tissue DT, von Caemmerer S. 2013. Sensitivity of plants to changing atmospheric CO₂ concentration: from the geological past to the next century. *New Phytologist* 197: 1077-1094.

Lynch DJ, Matamala R, Iversen CM, Norby RJ, Gonzalez-Meler MA. 2013. Stored carbon partly fuels fine-root respiration but is not used for production of new fine roots. *New Phytologist* 199: 420-430.

2012

Iversen CM, Keller JK, Garten CT Jr., Norby RJ. 2012. Soil carbon and nitrogen cycling and storage throughout the soil profile in a sweetgum plantation after 11 years of CO₂-enrichment. *Global Change Biology* 18: 1684-1697.

Luo YQ, Randerson, Abramowitz G, Bacour C, Blyth E, Carvalhais N, Ciais P, Dalmonech D, Fisher JB, Fisher R, Friedlingstein P, Hibbard K, Hoffman F, Huntzinger D, Jones CD, Koven C, Lawrence D, Li DJ, Mahecha M, Niu SL, Norby R, Piao SL, Qi X, Peylin P, Prentice IC, Riley W, Reichstein M, Schwalm C, Wang YP, Xia JY, Zaehle S, Zhou XH. 2012. A framework for benchmarking land models. *Biogeosciences* 9: 3857-3874.

McMurtrie RE, Iversen CM, Dewar RC, Medlyn BE, Näsholm T, Pepper DA, Norby RJ. 2012. Plant root distributions and nitrogen uptake predicted by a hypothesis of optimal root foraging. *Ecology and Evolution* 2: 1235-1250.

Russell LM, Rasch PJ, Mace GM, Jackson RB, Shepherd J, Liss P, Leinen M, Schimel D, Vaughan NE, Janetos AC, Boyd PW, Norby RJ, Caldeira K, Merikanto J, Artaxo P, Melillo J, Morgan MG. 2012. Ecosystem Impacts of Geoengineering: A Review for Developing a Science Plan. *Ambio* 41: 350-369.

Warren JM, Iversen CM, Garten CT Jr, Norby RJ, Childs J, Brice D, Evans RM, Gu L, Thornton P, Weston DJ. 2012. Timing and magnitude of C partitioning through a young loblolly pine (*Pinus taeda* L.) stand using ^{13}C labeling and shade treatments. *Tree Physiology* 32: 799-813.

Weston D, Hanson PJ, Norby RJ, Tuskan GA, Wullschleger SD. 2012. From systems biology to photosynthesis and whole-plant modeling: a conceptual model for integrating multi-scale networks. *Plant Signaling & Behavior* 7(2): 1-3.

Wicklein HF, Ollinger SV, Martin ME, Hollinger DY, Lepine LC, Day MC, Bartlett MK, Richardson AD, Norby RJ. 2012. Variation in foliar nitrogen and albedo in response to nitrogen fertilization and elevated CO_2 . *Oecologia* 169: 915-925.

2011

Brosi GB, McCulley RL, Bush LP, Nelson JA, Classen AT, Norby RJ. 2011. Effects of multiple climate change factors on the tall fescue-fungal endophyte symbiosis: infection frequency and tissue chemistry. *New Phytologist* 189: 797-805.

Chen X, Post WM, Norby RJ, Classen AT. 2011. Modeling soil respiration and variations in source components using a multi-factor global climate change experiment. *Climatic Change* 107: 459-480.

Garten CT, Iversen CM, Norby RJ. 2011. Litterfall ^{15}N abundance indicates declining soil nitrogen availability in a free-air CO_2 -enrichment experiment. *Ecology* 92: 133-139.

Iversen CM, Hooker T, Classen AT, Norby RJ. 2011. Net mineralization of N at deeper soil depths as a potential mechanism for sustained forest production under elevated $[\text{CO}_2]$. *Global Change Biology* 17: 1130-1139.

Kardol P, Reynolds WN, Norby RJ, Classen AT. 2011. Climate change effects on soil microarthropod abundance and community structure. *Applied Soil Ecology* 47: 37-44.

Luo Y, Melillo JM, Niu S, Beier C, Clark J, Davidson E, Dukes J, Evans RD, Field CB, Czimczik C, Keller M, Kimball BA, Kueppers L, Norby RJ, Pelini S, Pendall E, Rastetter E, Six J, Smith M, Tjoelker MG, Torn MS. 2011. Coordinated approaches to quantify long-term ecosystem dynamics in response to global change. *Global Change Biology* 17: 843-854.

Norby RJ. 2011. Carbon cycling in tropical ecosystems. *New Phytologist* 189: 893-894.

Norby RJ, Zak DR. 2011. Ecological lessons from free-air CO_2 enrichment (FACE) experiments. *Annual Review of Ecology, Evolution, and Systematics* 42: 181-203.

Warren JM, Norby RJ, Wullschleger SD. 2011. Elevated CO_2 enhances leaf senescence during

extreme drought in a temperate forest. *Tree Physiology* 31:117-130.

Warren, JM, Pötzelsberger E, Wullschleger SD, Thornton PE, Hasenauer H, Norby RJ. 2011. Ecohydrological impact of reduced stomatal conductance in forests exposed to elevated CO₂. *Ecohydrology* 4: 196-210.

2010

Amthor JS, Hanson PJ, Norby RJ, Wullschleger SD. 2010. A comment on “Appropriate experimental ecosystem warming methods by ecosystem, objective, and practicality” by Aronson and McNulty”. *Agricultural and Forest Meteorology* 150: 497-498.

Castro HF, Classen AT, Austin EE, Norby RJ, Schadt CW. 2010. Precipitation regime is the major driver of changes in soil microbial community structure over CO₂ and temperature in a multifactorial climate change experiment. *Applied and Environmental Microbiology* 76: 999-1007.

Calfapietra C, Ainsworth EA, Beier C, De Angelis P, Ellsworth DS, Godbold DL, Hendrey GR, Hickler T, Hoosbeek MR, Karnosky DF, King J, Körner C, Leakey ADB, Lewin KF, Liberloo M, Long SP, Lukac M, Matyssek R, Miglietta F, Nagy J, Norby RJ, Oren R, Percy KE, Rogers A, Scarascia Mugnozza G, Stitt M, Taylor G, Ceulemans R. 2010. Challenges in elevated CO₂ experiments on forests. *Trends in Plant Science* 15: 5-10.

Classen AT, Norby RJ, Company CE, Sides KE, Weltzin JF. 2010. Climate change alters seedling emergence and establishment in an old-field ecosystem. *PLoS ONE* 5: e13476.

Kardol P, Company CE, Souza L, Norby RJ, Weltzin JF, Classen AT. 2010. Climate change effects on plant biomass alter dominance patterns and community evenness in an experimental old-field ecosystem. *Global Change Biology* 16: 2676-2687.

Norby RJ, Warren JM, Iversen CM, Medlyn BE, McMurtrie RE. 2010. CO₂ enhancement of forest productivity constrained by limited nitrogen availability. *Proceedings of the National Academy of Sciences* 107: 19368-19373.

Souza L, Belote RT, Kardol P, Weltzin JF, Norby RJ. 2010. CO₂ enrichment increased forest understory biomass and accelerates successional development of an understory community. *Journal of Plant Ecology* 3: 33-39.

2009

Engel EC, Weltzin JF, Norby RJ, Classen AT. 2009. Responses of an old-field plant community to interacting factors of elevated [CO₂], warming, and soil moisture. *Journal of Plant Ecology* 2: 1-11.

Franklin O, McMurtrie RE, Iversen CM, Crous KY, Finzi A, Tissue D, Ellsworth D, Oren R, Norby RJ. 2009. Forest fine-root production and nitrogen use under elevated CO₂: Contrasting responses in evergreen and deciduous trees explained by a common principle. *Global Change Biology* 15: 132-144.

Garten CT Jr., Classen AT, Norby RJ. 2009. Soil moisture surpasses elevated CO₂ and temperature in importance as a control on soil carbon dynamics in a multi-factor climate change experiment. *Plant and Soil* 319: 85-94.

Norby RJ. 2009. Introduction to a virtual special issue: probing the carbon cycle with ¹³C. *New Phytologist* 184: 1-3.

Villalpando SN, Williams RS, Norby RJ. 2009. Elevated air temperature alters an old-field insect community in a multifactor climate change experiment. *Global Change Biology* 15: 930-942.

2008

Ainsworth EA, Beier C, Calfapietra C, Cuelemans R, Durand-Tarfid M, Godbold DL, Hendrey GR, Hickler T, Kaduk J, Karnosky DF, Kimball BA, Körner C, Koornneef M, Lafarge T, Leakey ADB, Lewin KF, Long SP, Manderscheid R, McNeil DL, Mies TA, Miglietta F, Morgan JA, Nagy J, Norby RJ, Norton RM, Percy KE, Rogers A, Soussana JF, Stitt M, Weigel HJ, White JW. 2008. Next generation of elevated [CO₂] experiments with crops: A critical investment for feeding the future world. *Plant, Cell and Environment* 31: 1317-1324.

Garten CT Jr., Classen AT, Norby RJ, Brice, DJ, Weltzin JF, Souza L. 2008. Role of N₂-fixation in constructed old-field communities under different regimes of [CO₂], temperature, and water availability. *Ecosystems* 11:125-137.

Iversen CM, Ledford J, Norby RJ. 2008. CO₂ enrichment increases carbon and nitrogen input from fine roots in a deciduous forest. *New Phytologist* 179: 837-847.

Iversen CM, Norby RJ. 2008. Nitrogen limitation in a sweetgum plantation: Implications for carbon allocation and storage. *Canadian Journal of Forest Research* 38:1021-1032.

McMurtrie RE, Norby RJ, Medlyn BE, Dewar RC, Pepper DA, Reich PB, Barton CVM. 2008. Why is plant-growth response to elevated CO₂ amplified when water is limiting but reduced when nitrogen is limiting? A growth-optimisation hypothesis. *Functional Plant Biology* 35: 521-534.

Natali SM, Sanudo-Wilhelmy SA, Norby RJ, Zhang H, Finzi AC, Lerdau MT. 2008. Increased mercury in forest soils under elevated carbon dioxide. *Oecologia* 158: 343-354.

2007

Dermody O, Weltzin JF, Engel EC, Allen P, Norby RJ. 2007. How do elevated [CO₂], warming, and reduced precipitation interact to affect soil moisture and LAI in an old field ecosystem? *Plant and Soil* 301: 255-266.

Finzi AC, Norby RJ, Calfapietra C, Gallet-Budynek A, Gielen B, Holmes WE, Hoosbeek MR, Iversen CM, Jackson RB, Kubiske ME, Ledford J, Liberloo M, Oren R, Polle A, Pritchard S, Zak DR, Schlesinger WH, Ceulemans R. 2007. Increases in nitrogen uptake rather than

nitrogen-use efficiency support higher rates of temperate forest productivity under elevated CO₂. *Proceedings of the National Academy of Sciences* 104: 14014-14019.

Hyvönen R, Ågren GI, Linder S, Persson T, Cotrufo MF, Ekblad A, Freeman M, Grelle A, Janssens IA, Jarvis PG, Kellomäki S, Lindroth A, Loustau D, Lundmark T, Norby RJ, Oren R, Pilegaard K, Ryan MG, Sigurdsson BD, Strömberg M, van Oijen M, Wallin G. 2007. The likely impact of elevated [CO₂], nitrogen deposition, increased temperature, and management on carbon sequestration in temperate and boreal forest ecosystems. A literature review. *New Phytologist* 163: 463-480.

Körner C, Morgan J, Norby R. 2007. CO₂ fertilization When, where, how much? pp. 9-21 In Canadell JG, Pataki DE, Pitelka LF (eds) 'Terrestrial Ecosystems in a Changing World', Springer, Berlin.

Monson RK, Trahan N, Rosenstiel TN, Veres P, Moore D, Wilkinson M, Norby RJ, Volder A, Tjoelker MG, Briske DD, Karnosky DF, Fall R. 2007. Isoprene emission from terrestrial ecosystems in response to global change: minding the gap between models and observations. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 365: 1677-1695.

Norby RJ, Rustad LE, Dukes JS, Ojima DS, Parton WJ, Del Grosso SJ, McMurtrie RE, Pepper DA. 2007. Ecosystem Responses to Warming and Interacting Global Change Factors. pp. 23-36 In Canadell JG, Pataki DE, Pitelka LF (eds) 'Terrestrial Ecosystems in a Changing World', Springer, Berlin.

Norby R., Slater H. 2007. *New Phytologist* and the environment. *New Phytologist* 174: 1-3.

Wan S, Norby RJ, Ledford J, Weltzin JF. 2007. Responses of soil respiration to elevated CO₂, air warming, and changing soil water availability in an old-field grassland. 2007. *Global Change Biology* 13: 2411-2424.

2006

Norby RJ, Iversen CM. 2006. Nitrogen uptake, distribution, turnover, and efficiency of use in a CO₂-enriched sweetgum forest. *Ecology* 87:5-14.

Norby RJ, Wullschlegel SD, Hanson PJ, Gunderson CA, Tschaplinski TJ, Jastrow JD. 2006. CO₂ enrichment of a deciduous forest: The Oak Ridge FACE Experiment. pp. 231-251 In: *Managed Ecosystems and CO₂: Case Studies, Processes, and Perspectives* (Nösberger J, Long SP, Norby RJ, Stitt M, Hendrey GR, Blum H, editors). *Ecological Studies*, Vol. 187. Springer, Berlin.

Nösberger J, Long SP, Norby RJ, Stitt M, Hendrey GR, Blum H (Eds.) 2006. *Managed Ecosystems and CO₂: Case Studies, Processes, and Perspectives*. *Ecological Studies*, Vol. 187. Springer, Berlin. 459 p.

2005

- DeLucia EH, Moore DJ, Norby RJ. 2005. Contrasting responses of forest ecosystems to rising atmospheric CO₂: implications for the global C cycle. *Global Biogeochemical Cycles* 19: GB3006.
- DeLucia EH, Moore DJ, Hamilton JG, Thomas RB, Springer CJ, Norby RJ. 2005. The changing role of forests in the global carbon cycle: responding to elevated carbon dioxide in the atmosphere. pp. 179-214 In: Lal R, Duxbury J, Steward BA Hansen DO, eds. *Climate Change and Global Food Security*, CRC Press.
- Hanson PJ, Wullschleger SD, Norby RJ, Tschaplinski TJ, Gunderson CA. 2005. Importance of changing CO₂, temperature, precipitation, and ozone on carbon and water cycles of an upland oak forest: incorporating experimental results into model simulations. *Global Change Biology* 11: 1402-1423.
- Jastrow JD, Miller RM, Matamala R, Norby RJ, Boutton TW, Rice CW, Owensby CE. 2005. Elevated atmospheric CO₂ increases soil carbon. *Global Change Biology* 11: 2057-2064.
- Norby RJ, Joyce LA, Wullschleger SD. 2005. Modern and future forests in a changing atmosphere. pp. 394-414 In: Ehleringer JR, Cerling TE, Dearing MD, eds, *A History of Atmospheric CO₂ and Its Effects on Plants, Animals, and Ecosystems*. Springer, New York.
- Norby RJ, DeLucia EH, Gielen B, Calfapietra C, Giardina CP, King JS, Ledford J, McCarthy HR, Moore DJP, Ceulemans R, De Angelis P, Finzi AC, Karnosky DF, Kubiske ME, Lukac M, Pregitzer KS, Scarascia-Mugnozza GE, Schlesinger WH, Oren R. 2005. Forest response to elevated CO₂ is conserved across a broad range of productivity. *Proceedings of the National Academy of Sciences* 102:18052-18056.

2004

- Belote RT, Weltzin JF, Norby RJ. 2004. Differential invasive species responses to CO₂ enrichment in a forest understory community. *New Phytologist* 161: 827-835.
- Harrison KG, Norby RJ, Post WM, Chapp EL. 2004. Soil C accumulation in a white oak CO₂-enrichment experiment via enhanced root production. *Earth Interactions* 8(14): 1-15.
- Johnson DW, Cheng W, Joslin JD, Norby RJ, Edwards NT, Todd DE Jr. 2004. Effects of elevated CO₂ on nutrient cycling in a sweetgum plantation. *Biogeochemistry* 69:379-403.
- King JS, Hanson PJ, Bernhardt E, DeAngelis P, Norby RJ, Pregitzer KS. 2004. A multi-year synthesis of soil respiration responses to elevated atmospheric CO₂ from four forest FACE experiments. *Global Change Biology* 10: 1027-1042.
- Matamala R, González-Meler MA, Jastrow JD, Norby RJ, Schlesinger WH. 2004. Response to comment on "Impacts of fine root turnover on forest NPP and soil C sequestration potential". *Science* 304: 1745d.
- Norby RJ. 2004. Forest responses to a future CO₂-enriched atmosphere. pp. 158-159 In: W. Steffen et al. (eds.) *Global Change and the Earth System: A Planet Under Pressure*. Springer, Berlin.

Norby RJ, Luo Y. 2004. Evaluating ecosystem responses to rising atmospheric CO₂ and global warming in a multi-factor world. *New Phytologist* 162:281-294.

Norby RJ, Ledford J, Reilly CD, Miller NE, O'Neill EG. 2004. Fine-root production dominates response of a deciduous forest to atmospheric CO₂ enrichment. *Proceedings of the National Academy of Sciences* 101: 9689-9693.

Sholtis JD, Gunderson CA, Norby RJ, Tissue DT. 2004. Persistent stimulation of photosynthesis by elevated CO₂ in a sweetgum (*Liquidambar styraciflua* L.) forest stand. *New Phytologist* 162: 343-354.

Wan S, Norby RJ, Pregitzer KS, Ledford J, O'Neill EG. 2004. CO₂ enrichment and warming of the atmosphere enhance both productivity and mortality of maple tree fine roots. *New Phytologist* 162: 437-446.

2003

BassiriRad H, Constable JVH, Lussenhop J, Kimball BA, Norby RJ, Oechel WC, Reich PB, Schlesinger WH, Zitzer S, Sehtiya HL, Silim S. 2003 Widespread foliage δ¹⁵N depletion under elevated CO₂: inferences for the nitrogen cycle. *Global Change Biology* 9: 1582-1590.

George K, Norby RJ, Hamilton JG, DeLucia EH. 2003. Fine-root respiration in a loblolly pine and sweetgum forest growing in elevated CO₂. *New Phytologist* 160: 511-522.

Marland G, Pielke RA Sr. , Apps M, Avissar R, Betts RA, Davis KJ, Frumhoff PC, Jackson ST, Joyce LA, Kauppi P, Katzenberger J, MacDicken KG, Neilson RP, Niles JO, Niyogi DS, Norby RJ, Pena N, Sampson N, Xue Y. 2003. The climatic impacts of land surface change and carbon management, and the implications for climate-change mitigation policy. *Climate Policy* 3:149-157.

Matamala R, González-Meler MA, Jastrow JD, Norby RJ, Schlesinger WH. 2003. Impacts of fine root turnover on forest NPP and soil C sequestration potential. *Science* 302: 1385-1387.

Norby RJ, Sholtis JD, Gunderson CA, Jawdy SS. 2003. Leaf dynamics of a deciduous forest canopy: no response to elevated CO₂. *Oecologia* 136:574-584.

Norby RJ, Hartz-Rubin J, Verbrugge MJ. 2003. Phenological responses in maple to experimental atmospheric warming and CO₂ enrichment. *Global Change Biology* 9: 1792-1801.

Sinsabaugh, RL, Saiya-Cork K, Long T, Osgood MP, Neher DA, Zak DR, Norby RJ. 2003. Soil microbial activity in a *Liquidambar* plantation unresponsive to CO₂-driven increases in primary productivity. *Applied Soil Ecology* 24: 263-271.

Williams RS, Lincoln DE, Norby RJ. 2003. Development of gypsy moth larvae feeding on red maple saplings at elevated CO₂ and temperature. *Oecologia* 137:114-122.

Zak DR, Holmes WE, Finzi AC, Norby RJ, and Schlesinger WH. 2003. Soil nitrogen cycling under elevated CO₂: A synthesis of forest FACE experiments. *Ecological Applications* 13: 1508-1514.

2002

Edwards NT, Tschaplinski TJ, Norby RJ. 2002. Stem respiration increases in CO₂-enriched trees. *New Phytologist* 155: 239-248.

Gunderson CA, Sholtis JD, Wullschleger SD, Tissue DT, Hanson PJ, Norby RJ. 2002. Environmental and stomatal control of photosynthetic enhancement in the canopy of a sweetgum (*Liquidambar styraciflua* L.) plantation during three years of CO₂ enrichment. *Plant, Cell and Environment* 25: 379-393.

Norby RJ, Hanson PJ, O'Neill EG, Tschaplinski TJ, Weltzin JF, Hansen RT, Cheng W, Wullschleger SD, Gunderson CA, Edwards NT, Johnson DW. 2002. Net primary productivity of a CO₂-enriched deciduous forest and the implications for carbon storage. *Ecological Applications* 12:1261-1266

Rustad LE, Norby RJ. 2002. Temperature Increase: Effects on Terrestrial Ecosystems. pp. 575-581, In: H. A. Mooney and J. G. Canadell (eds.), *The Earth System: Biological and Ecological Dimensions of Global Environmental Change*. Vol. 2 in *Encyclopedia of Global Environmental Change*. John Wiley and Sons, Chichester.

Wullschleger SD, Gunderson CA, Hanson PJ, Wilson KB, Norby RJ. 2002. Sensitivity of stomatal and canopy conductance to elevated CO₂ concentration BB interacting variables and perspectives of scale. *New Phytologist* 153: 485-496.

Wullschleger SD, Tschaplinski TJ, Norby RJ. 2002. Plant water relations at elevated CO₂ B implications for water-limited environments. *Plant, Cell and Environment* 25: 319-331

2001

Johnson, D. W., R. J. Norby, and B.A. Hungate. 2001. Effects of elevated CO₂ on nutrient cycling in forests. pp. 237-252 In: D. F. Karnosky, R. Ceulemans, G. E. Scarascia-Mugnozza, and J. L. Innes (eds.), *The Impact of Carbon Dioxide and Other Greenhouse Gases on Forest Ecosystems*. CABI, Wallingford, UK.

Karnosky, D. F., Gielen, B., Ceulemans, R., Schlesinger, W. H., Norby, R. J., Oksanen, E., Matyssek, R. and Hendrey G. R. 2001. FACE systems for studying the impacts of greenhouse gases on forest ecosystems. pp. 297-324 In: D. F. Karnosky, R. Ceulemans, G. E. Scarascia-Mugnozza, and J. L. Innes (eds.), *The Impact of Carbon Dioxide and Other Greenhouse Gases on Forest Ecosystems*. CABI, Wallingford, UK

Norby, R. J., K. Ogle, P. S. Curtis, F.-W. Badeck, A. Huth, G. C. Hurtt, T. Kohyama, and J. Peñuelas. 2001. Aboveground growth and competition in forest gap models: An analysis for studies of climatic change. *Climatic Change* 51: 415-447.

Norby, R. J., D. E. Todd, J. Fults, and D. W. Johnson. 2001. Allometric determination of tree growth in a CO₂-enriched sweetgum stand. *New Phytologist* 150: 477-487.

Norby, R. J., K. Kobayashi, and B. A. Kimball. 2001. Rising CO₂ - future ecosystems. *New Phytologist* 150: 215-221.

Norby, R. J., M. F. Cotrufo, P. Ineson, E. G. O'Neill, and J. G. Canadell. 2001. Elevated CO₂, litter quality, and decomposition: A synthesis. *Oecologia* 127: 153-165.

Rustad L. E., Campbell J. L., Marion G. M., Norby R. J., Mitchell M. J., Hartley A. E., Cornelissen J. H. C., Gurevitch J., and GCTE-NEWS. 2001. A meta-analysis of the response of soil respiration, net nitrogen mineralization, and aboveground plant growth to experimental ecosystem warming. *Oecologia* 126:543-562.

Wullschleger S. D. and R. J. Norby. 2001. Sap velocity and canopy transpiration for a 12-year-old sweetgum stand exposed to free-air CO₂ enrichment. *New Phytologist* 150: 489-498.

2000

Canadell, J., Norby, R. J., Cotrufo, M. F., and Nösberger, J., editors. 2000. Litter Quality and Decomposition Under Elevated Atmospheric CO₂. *Plant and Soil*, vol. 224.

Carter, G. A., R. Bahadur, and R. J. Norby. 2000. Effects of elevated atmospheric CO₂ and temperature on leaf optical properties in *Acer saccharum*. *Environmental and Experimental Botany* 43: 267-273.

Gunderson, C. A., R. J. Norby, R. J., and S. D. Wullschleger. 2000. Acclimation of photosynthesis and respiration to simulated climatic warming in northern and southern populations of *Acer saccharum*: laboratory and field evidence. *Tree Physiology* 20: 87-96.

Gunter, L. E., G. A. Tuskan, C. A. Gunderson, and R. J. Norby. 2000. Genetic variation and spatial structure in sugar maple (*Acer saccharum* Marsh.) and implications for predicted global-scale environmental change. *Global Change Biology* 6: 335-344.

Norby, R.J. 2000. Atmospheric CO₂ and ecosystem feedback between carbon and nitrogen cycles: synthesis of an integrated experiment. *Ecological Applications* 10:1-2.

Norby, R. J. and R. B. Jackson. 2000. Root dynamics and global change: seeking an ecosystem perspective. *New Phytologist* 147: 3-12.

Norby, R. J., R. B. Jackson, and A. H. Fitter, editors. 2000. *Root Dynamics and Global Change: An Ecosystem Perspective*. New Phytologist Trust, Cambridge.

Norby R.J., T. M. Long, J. S. Hartz-Rubin, and E. G. O'Neill. 2000. Nitrogen resorption in senescing tree leaves in a warmer, CO₂-enriched atmosphere. *Plant and Soil* 224: 15-29.

Williams, R. S., R. J. Norby, and D. E. Lincoln. 2000. Effects of elevated CO₂ and temperature-grown red and sugar maple on gypsy moth performance. *Global Change Biology* 6: 685-695.

1999

BassiriRad H., S. A. Prior, R. J. Norby, and H. H. Rogers. 1999. A field method of determining NH₄⁺ and NO₃⁻ uptake kinetics in intact roots: Effects of CO₂ enrichment on trees and crop species. *Plant and Soil* 217:195-204.

Edwards, N.T. and R.J. Norby. 1999. Below-ground respiratory responses of sugar maple and red maple saplings to atmospheric CO₂ enrichment and elevated air temperature. *Plant and Soil* 206:85-97.

Norby, R. J., S. D. Wullschleger, C. A. Gunderson, D. W. Johnson, and R. Ceulemans. 1999. Tree responses to rising CO₂: implications for the future forest. *Plant, Cell & Environment* 22: 683-714.

Peterson, A. G., J. T. Ball, Y. Luo, C. B. Field, P. B. Reich, P.S. Curtis, K. L. Griffin, C. A. Gunderson, R. J. Norby, D. T. Tissue, M. Forstreuter, A. Rey, C. S. Vogel & CMEAL participants. 1999. The photosynthesis-leaf nitrogen relationship at ambient and elevated carbon dioxide: a meta-analysis. *Global Change Biology* 5:331-346.

Peterson, A.G., Ball, J.T., Luo Y., Field C.B., Curtis P.S., Griffin K.L., Gunderson C.A., Norby, R.J., Tissue, D.T., Forstreuter M., Rey A., Vogel C.S. & CMEAL participants. 1999. Quantifying the response of photosynthesis to changes in leaf nitrogen content and leaf mass per area in plants grown under atmospheric CO₂ enrichment. *Plant, Cell and Environment* 22: 1109-1119.

1998

Heilman, P. and R. J. Norby. 1998. Nutrient cycling in short rotation systems. *Biomass and Bioenergy* 14: 361-370.

Norby, R. J. 1998. Nitrogen deposition: A component of global change analyses. *New Phytologist* 139: 189-200.

Norby, R. J. and M. F. Cotrufo. 1998. Global change: a question of litter quality. *Nature* 396: 17-18.

Williams, R. S., D. E. Lincoln, and R. J. Norby. 1998. Leaf age effects of elevated CO₂-grown white oak leaves on spring-feeding lepidopterans. *Global Change Biology* 4:235-246.

1997

Norby, R. J. 1997. Carbon cycle: Inside the black box. *Nature* 388: 522-523.

Norby, R. J., N. T. Edwards, J. S. Riggs, C. H. Abner, S. D. Wullschleger, and C. A. Gunderson. 1997. Temperature-controlled open-top chambers for global change research. *Global Change Biology* 3:259-267.

Ringelberg, D. B., J. O. Stair, J. Almeida, R. J. Norby, E. G. O'Neill, and D. C. White. 1997. Consequences from rising atmospheric carbon dioxide levels for the belowground microbiota associated with white oak. *Journal of Environmental Quality* 26:495-503.

Wullschleger, S. D., R. J. Norby, J. C. Love, and C. Runck. 1997. Energetic cost of tissue construction in yellow-poplar and white oak trees exposed to long-term CO₂ enrichment. *Annals of Botany* 80: 289-297.

Wullschleger, S. D., R. J. Norby, and C. A. Gunderson. 1997. Forest trees and their response to atmospheric CO₂ enrichment: a compilation of results. pp. 79-100 In: L. H. Allen, Jr., M. B. Kirkham, D. M. Olszyk, and C. E. Whitman (eds.), *Advances in Carbon Dioxide Effects Research*. ASA Special Publication no. 61, American Society of Agronomy, Madison, WI.

1996

Norby, R. J. 1996. Oaks in a high CO₂ world. *Annales des Sciences Forestières* 53: 413-429.

Norby, R. J. 1996. Forest canopy productivity index. *Nature* 381:564

Norby, R. J., S. D. Wullschleger, and C. A. Gunderson. 1996. Tree responses to elevated CO₂ and the implications for forests. pp. 1-20 In: G. W. Koch and H. A. Mooney (eds.), *Carbon Dioxide and Terrestrial Ecosystems*. Academic Press, San Diego.

O'Neill, E. G. and R. J. Norby. 1996. Litter quality and decomposition rates of foliar litter produced under CO₂ enrichment. pp. 87-103 In: G. W. Koch and H. A. Mooney (eds.), *Carbon Dioxide and Terrestrial Ecosystems*. Academic Press, San Diego.

1995

Norby, R. J., E. G. O'Neill, and S. D. Wullschleger. 1995. Belowground responses to atmospheric carbon dioxide in forests. pp. 397-418, In: W. W. McFee and J. M. Kelly (eds.), *Carbon Forms and Functions in Forest Soils*. Soil Science Society of America, Madison, WI.

Norby, R. J., S. D. Wullschleger, C. A. Gunderson, and C. T. Nietch. 1995. Increased growth efficiency of *Quercus alba* trees in a CO₂-enriched atmosphere. *New Phytologist* 131: 91-97.

Tschaplinski, T. J., D. B. Stewart, P. J. Hanson, and R. J. Norby. 1995. Interactions between drought and elevated CO₂ on growth and gas exchange of seedlings of three deciduous tree species. *New Phytologist* 129:63-71.

Tschaplinski, T. J., D. B. Stewart, and R. J. Norby. 1995. Interactions between drought and elevated CO₂ on osmotic adjustment and solute concentrations of tree seedlings. *New Phytologist* 131:169-177.

Wullschleger, S. D., R. J. Norby, and P. J. Hanson. 1995. Growth and maintenance respiration in stems of *Quercus alba* L. after four years of carbon dioxide enrichment. *Physiologia Plantarum* 93: 47-54.

1994

Cooper, L. W. and R. J. Norby. 1994. Atmospheric CO₂ enrichment can increase the ¹⁸O content of leaf water and cellulose: paleoclimatic and ecophysiological implications. *Climate Research* 4:1-11.

Norby, R. J. 1994. Issues and perspectives for investigating root responses to elevated atmospheric carbon dioxide. *Plant and Soil* 165: 9-20.

van Miegroet, H., R. J. Norby, and T. J. Tschaplinski. 1994. Nitrogen fertilization strategies in a short-rotation sycamore plantation. *Forest Ecology and Management* 64:13-24.

1993

Gunderson, C. A., R. J. Norby, and S. D. Wullschleger. 1993. Foliar gas exchange responses of two deciduous hardwoods during three years of growth in elevated CO₂: No loss of photosynthetic enhancement. *Plant, Cell, and Environment* 16:797-807.

Tschaplinski, T. J., and R. J. Norby. 1993. Physiological indicators of nitrogen response in a short rotation sycamore plantation. II. Nitrogen metabolism. *Canadian Journal of Botany* 71: 841-847.

Tschaplinski, T. J., R. J. Norby, and S. D. Wullschleger. 1993. Responses of loblolly pine seedlings to elevated CO₂ and fluctuating water supply. *Tree Physiology* 13: 283-296.

1992

Norby, R. J., C. A. Gunderson, S. D. Wullschleger, E. G. O'Neill, and M. K. McCracken. 1992. Productivity and compensatory responses of yellow-poplar trees in elevated CO₂. *Nature* 357:322-324.

Tjoelker, M. G., S. B. McLaughlin, R. DiCosty, S. E. Lindberg, and R. J. Norby. 1992. Seasonal variation in nitrate reductase activity in needles of high-elevation red spruce trees. *Canadian Journal of Forest Research* 22:375-380.

Wullschleger, S. D., R. J. Norby, and D. L. Hendrix. 1992. Carbon exchange rates, chlorophyll content, and carbohydrate status of two forest tree species exposed to carbon dioxide enrichment. *Tree Physiology* 10:21-31.

Wullschleger, S. D., R. J. Norby, and C. A. Gunderson. 1992. Growth and maintenance respiration in leaves of *Liriodendron tulipifera* L. saplings exposed to long-term carbon dioxide enrichment in the field. *New Phytologist* 121: 515-523.

Wullschleger, S. D. and R. J. Norby. 1992. Respiratory cost of leaf growth and maintenance in white oak saplings exposed to atmospheric CO₂ enrichment. *Canadian Journal of Forest Research* 22: 1717-1721.

1991

McLaughlin, S. B., and R. J. Norby. 1991. Atmospheric pollution and terrestrial vegetation: Evidence of changes, linkages and significance to selection processes. pp. 61-101, In: G. E. Taylor, Jr., L. F. Pitelka, and M. T. Clegg (eds.), *Ecological Genetics and Air Pollution*. Springer-Verlag, New York.

Moldau, H., O. Kull, J. Sober, and R. J. Norby. 1991. Differential response of CO₂ uptake parameters of soil- and sand-grown *Phaseolus vulgaris* (L.) plants to absorbed ozone flux. *Environmental Pollution* 74:251-261.

Norby, R. J., and E. G. O'Neill. 1991. Leaf area compensation and nutrient interactions in CO₂-enriched yellow-poplar (*Liriodendron tulipifera* L.) seedlings. *New Phytologist* 117: 515-528.

O'Neill, E. G., R. V. O'Neill, and R. J. Norby. 1991. Hierarchy theory as a guide to mycorrhizal research on large-scale problems. *Environmental Pollution* 73:271-284.

Tschaplinski, T. J., D. W. Johnson, R. J. Norby, and D. E. Todd. 1991. Optimum nitrogen nutrition in short rotation sycamore plantations. *Soil Science Society of America Journal* 55:841-847.

Tschaplinski, T. J., and R. J. Norby. 1991. Physiological indicators of nitrogen response in short rotation sycamore plantations. I. CO₂ assimilation, photosynthetic pigments, and soluble carbohydrates. *Physiologia Plantarum* 82:117-126.

1989

Norby, R. J. 1989. Foliar nitrate reductase: a marker for assimilation of atmospheric nitrogen oxides. pp. 245-250 IN National Research Council, *Biologic Markers of Air Pollution Stress and Damage in Forests*. National Academy Press, Washington, D.C.

Norby, R. J. 1989. Direct responses of forest trees to rising atmospheric carbon dioxide. pp. 243-249 IN R. G. Noble, J. L. Martin, and K. F. Jensen (eds.), *Air Pollution Effects on Vegetation Including Forest Ecosystems*. Proceedings of the second US-USSR Symposium; Corvallis OR, Raleigh NC, and Gatlinburg TN, September 13-25, 1988. U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Broomall, PA.

Norby, R. J., and E. G. O'Neill. 1989. Growth dynamics and water use of seedlings of *Quercus alba* L. in CO₂-enriched atmospheres. *New Phytologist* 111:491-500.

Norby, R.J., Y. Weerasuriya, and P.J. Hanson. 1989. Induction of nitrate reductase activity in red spruce needles by NO₂ and HNO₃ vapor. *Canadian Journal of Forest Research* 19:889-896.

Norby, R. J. and L. L. Sigal. 1989. Nitrogen fixation in the lichen *Lobaria pulmonaria* in elevated atmospheric carbon dioxide. *Oecologia* 79:566-568.

1988

McLaughlin, S.B., C.P. Andersen, P. J. Hanson, R. J. Norby, N. T. Edwards, and R. R. Tardiff. 1988. Interactive effects of natural and anthropogenic factors on growth and physiology of southern red spruce. pp. 381-388 IN G. Hertel (tech. coord.), Proceedings of the US/FRG Research Symposium: Effects of Atmospheric Pollutants on the Spruce-fir Forests of the Eastern United States and the Federal Republic of Germany; October 19-23, 1987, Burlington VT. Gen. Tech. Rep. NE-120. U.S. Department of Agric., For. Serv., Broomall, PA.

1987

Norby, R. J. 1987. Nodulation and nitrogenase activity in nitrogen-fixing woody plants stimulated by CO₂ enrichment of the atmosphere. *Physiologia Plantarum* 71:77-82.

Norby, R. J., E. G. O'Neill, W. G. Hood, and R. J. Luxmoore. 1987. Carbon allocation, root exudation, and mycorrhizal colonization of *Pinus echinata* seedlings grown under CO₂ enrichment. *Tree Physiology* 3:203-210.

O'Neill, E. G., R. J. Luxmoore, and R. J. Norby. 1987. Elevated atmospheric CO₂ effects on seedling growth, nutrient uptake, and rhizosphere bacterial populations of *Liriodendron tulipifera* L. *Plant and Soil* 104:3-11.

O'Neill, E. G., R. J. Luxmoore, and R. J. Norby. 1987. Increases in mycorrhizal colonization and seedling growth in *Pinus echinata* and *Quercus alba* in an enriched CO₂ atmosphere. *Canadian Journal of Forest Research* 17:878-883.

1986

Luxmoore, R. J., R. J. Norby, and E. G. O'Neill. 1986. Seedling tree responses to nutrient stress under atmospheric CO₂ enrichment. pp. 178-183 IN Proceedings, 18th IUFRO World Congress, Division II, Vol. I. IUFRO Secretariat, Vienna, Austria.

Norby, R. J., G. E. Taylor, Jr., S. B. McLaughlin, and C. A. Gunderson. 1986. Drought sensitivity of red spruce seedlings affected by precipitation chemistry. pp. 34-41 IN Proceedings, Ninth North American Forest Biology Workshop, Stillwater, Oklahoma.

Norby, R. J., B. K. Takemoto, J. W. Johnston, and D. S. Shriner. 1986. Acetylene reduction rate as a physiological indicator of the response of field-grown soybeans to simulated acid rain and ambient gaseous pollutants. *Environmental and Experimental Botany* 26:285-290.

Norby, R. J., E. G. O'Neill, and R. J. Luxmoore. 1986. Effects of atmospheric CO₂ enrichment on the growth and mineral nutrition of *Quercus alba* seedlings in nutrient-poor soil. *Plant Physiology* 82:83-89.

Norby, R. J., J. Pastor, and J. M. Melillo. 1986. Carbon-nitrogen interactions in CO₂-enriched white oak: Physiological and long-term perspectives. *Tree Physiology* 2:233-241.

Taylor, G. E., Jr., R. J. Norby, S. B. McLaughlin, A. H. Johnson, and R. S. Turner. 1986. Carbon dioxide assimilation and growth of red spruce (*Picea rubens* Sarg.) seedlings in response to ozone, precipitation chemistry, and soil type. *Oecologia* 70:163-171.

1980-1985

- Norby, R. J., D. D. Richter, and R. J. Luxmoore. 1985. Physiological processes in soybean inhibited by gaseous pollutants but not by acid rain. *New Phytologist* 100:79-85.
- Taylor, G. E., Jr., and R. J. Norby. 1985. The significance of elevated levels of ozone on natural ecosystems of North America. pp. 152-175 IN S. D. Lee (ed.), *International Specialty Conference on Evaluation of the Scientific Basis for Ozone/Oxidant Standards*, Air Pollution Control Association, Pittsburgh, PA.
- Norby, R. J., R. J. Luxmoore, E. G. O'Neill, and D. G. Weller. 1984. Plant responses to atmospheric CO₂ with emphasis on belowground processes. ORNL/TM-9426. Oak Ridge National Laboratory, Oak Ridge, TN.
- Norby, R. J., and T. T. Kozlowski. 1983. Flooding and SO₂ stress interaction in *Betula papyrifera* and *B. nigra* seedlings. *Forest Science* 29:739-750.
- Norby, R. J., and R. J. Luxmoore. 1983. Growth analysis of soybeans exposed to simulated acid rain and gaseous pollutants. *New Phytologist* 95:277-287.
- Norby, R. J., and T. T. Kozlowski. 1982. The role of stomata in sensitivity of *Betula papyrifera* seedlings to SO₂ at different humidities. *Oecologia* 53:34-39.
- Norby, R. J., and T. T. Kozlowski. 1981. Response of SO₂-fumigated *Pinus resinosa* seedlings to post-fumigation temperature. *Canadian Journal of Botany* 59:470-475.
- Norby, R. J., and T. T. Kozlowski. 1981. Interaction of SO₂ concentration and post-fumigation temperature on growth of five species of woody plants. *Environmental Pollution Series A* 25:27-39.
- Norby, R. J., and T. T. Kozlowski. 1981. Relative sensitivity of three species of woody plants to SO₂ at high or low exposure temperature. *Oecologia* 51:33-36.
- Norby, R. J., and T. T. Kozlowski. 1980. Allelopathic potential of ground cover species on *Pinus resinosa*. *Plant and Soil* 57:363-374.

Invited(*) and contributed talks since 2005

- *"An Historical Perspective on Elevated CO₂ Research: Early insights guiding today's research agenda" DOE Environmental System Science Principal Investigator Virtual Meeting, May 2020.
- *"Challenges and opportunities in assessment of forest response to elevated atmospheric CO₂", Institute for Advanced Studies, University of Birmingham (UK), January, 2020.
- "Root-soil interactions throughout the soil column at forested sites in Puerto Rico differing in soil phosphorus and the implications for linking root function with root distribution in models" American Geophysical Union annual meeting, San Francisco, CA, December 2019.

- *"An Historical Perspective on Elevated CO₂ Research: Early insights guiding today's research agenda" BIFoR Annual Meeting, University of Birmingham (UK), September 2019.
- "Growth, cover, and productivity of *Sphagnum* decline sharply with experimental warming in a forested peatland" American Geophysical Union annual meeting, Washington DC, December 2018.
- *"Models and measurements: Nutrient interactions in tropical forests and their responses to climate change" Appalachian State University, September 2018.
- *"An Historical Perspective on Elevated CO₂ Research: Early insights guiding today's research agenda" Ecological Society of America annual meeting, New Orleans, LA, August 2018.
- "Process-Data-Models of C-N-P in Leaves-Roots-Soil" DOE Environmental System Science Principal Investigator Meeting, Potomac, MD, April 2018.
- *"Carbon Fluxes at the AmazonFACE Research Site" American Geophysical Union annual meeting, New Orleans LA, December 2017
- "Fine-Root Production in an Amazon Rain Forest: Deep Roots are an Important Component of Net Primary Productivity" American Geophysical Union annual meeting, New Orleans LA, December 2017
- *"The AmazonFACE experiment: A window to the future of the Amazon rainforest" Johns Hopkins University, Baltimore, MD, October 2017.
- * "Modeling and measuring phosphorus at the root-soil interface for improved representation of tropical forests in Earth system models", Annual meeting, Association for Tropical Biology and Conservation, Merida, Mexico, July 2017
- * "The NGEE-Tropics Field Campaign to Inform the ACME Land Model Phosphorus Module", The Future of Tropical Forests in Asia", National Technical University, Singapore, November 2016
- * "The NGEE-Tropics field campaign to inform the ACME Land Model phosphorus module." Workshop, Nutrient Limitation on Land: How accurate are our global land models? Yangling, China, June 2016
- *"The DOE NGEE-Tropics Research Program: Model-inspired measurements of phosphorus at the root-soil interface." Annual meeting, Luquillo Long-Term Ecological Research Program, El Yunque National Forest, Puerto Rico, June 2016
- *"Guiding the next generation of forest FACE experiments with lessons from the past." European Geosciences General Assembly, Vienna Austria, April 2016.
- *"Model-inspired measurements of phosphorus at the root-soil interface", DOE Environmental System Science Principal Investigator Meeting, Potomac, MD, April 2016.
- *"Model-experiment interaction to improve representation of phosphorus limitation in land models", American Geophysical Union annual meeting, San Francisco CA, December 2015.
- "Foliar phosphorus concentration exerts stronger control of photosynthesis than does nitrogen across diverse woody species in Panama", Ecological Society of America annual meeting, Baltimore, MD, August 2015.
- "Relationships between foliar phosphorus, nitrogen and photosynthesis across diverse woody species in Panama", Association of Tropical Biology and Conservation annual meeting, Honolulu HI, July 2015.
- *"The Amazon-FACE Experiment: High Hopes, High Hurdles", Carnegie Institution Department of

Global Ecology, Stanford, CA, April 2015

- *“Accelerating the connection between experiments and models: The FACE-MDS experience”, American Geophysical Union annual meeting, San Francisco CA, December 2014.
- *“The SPRUCE Experiment: Learning from the past to better predict the future”, Ecological Society of America annual meeting, Sacramento, CA, August 2014.
- *“The OCCAM experiment: Was a multi-factor experiment the best approach for revealing responses to atmospheric and climatic change?” INTERFACE workshop, “Using results from global change experiments to inform land model development and calibration”; Beijing, China, May 12, 2014.
- *“How to Start a Big Experiment”. 5th International Forum for Young Ecologists; Kaifeng, China, May 16, 2014.
- *“The science plan for an Amazon FACE experiment" Jet Propulsion Laboratory, Pasadena, CA, January 2014; University of Birmingham, Birmingham, UK, March 2014.
- “Plant and soil nitrogen relationships across polygonal ground at Barrow, Alaska” Annual meeting, Ecological Society of America, Minneapolis, Minnesota, August 2013.
- **“NGEE Arctic Project: A Model-Inspired Study of Climate Feedbacks in High-Latitude Ecosystems” Arctic LTER winter meeting, Woods Hole, MA, March, 2013.
- *“From tundra to tropics and points in between: providing data for climate change models” Ecology & Evolutionary Biology Department, University of Tennessee-Knoxville, February, 2013; Intercollege Graduate Degree Program in Ecology, Penn State University, March, 2013; Conservation Ecology Seminar series, University of Michigan, March, 2013.
- **“Model synthesis of data from free-air CO₂ enrichment experiments” Annual meeting, American Geophysical Union, San Francisco, CA, December 2012.
- *“Carbon-nitrogen interactions in CO₂-enriched ecosystems: An experimentalist’s view on model-data integration.” Distinguished Ecologist Lecture Series, Michigan Technological University, Houghton, Michigan, October 2012.
- **“Forest responses to elevated atmospheric CO₂: Lessons from FACE experiments” International Symposium on The Role of Ecological Institute, National Ecological Institute, Seoul, South Korea, September 2011.
- **“Carbon dynamics in an oldfield ecosystem: Was a multi-factor experiment the best approach for revealing responses to atmospheric and climatic change?” Annual meeting, Ecological Society of America, Austin, Texas, August 2011.
- **“Forest NPP in FACE experiments”, Workshop on Forest Sensitivity to CO₂, University of Sydney, Sydney, Australia, August, 2011.
- *“Forest responses to elevated CO₂: Lessons from a decades-long research program” keynote address at International Scientific Conference, “Functions and Services of Biodiversity”, University of Göttingen, Germany, June 2011
- * “Temperate Tree FACE Studies: Lessons from a decades-long research program” CO₂ Symposium, Smithsonian Tropical Research Institute, Panama City, Panama, March 2011.
- “Leaf and nitrogen distribution in sweetgum canopies after 12 years of CO₂ enrichment” Ecological Society of America annual meeting, Pittsburgh, PA, August 2010
- *“Where did the carbon go? The 12-year saga of the Oak Ridge FACE experiment” University of Sheffield, UK, May 2010

- *“Where did the carbon go? The 12-year saga of the Oak Ridge FACE experiment” University of York, UK, March 2010.
- *“Long-term data from FACE experiments provide a benchmark for ecosystem response models” Ecological Society of America annual meeting, Albuquerque, NM, August 2009.
- *Nitrogen Limitation is Reducing the Enhancement of NPP by Elevated CO₂ in a Deciduous Forest. Annual meeting, American Geophysical Union, San Francisco, CA, December 2008.
- “Ten-year record of forest response to elevated CO₂ provides evidence for declining NPP and growth”. Ecological Society of America annual meeting Milwaukee, WI, August, 2008
- *“CO₂ fertilization and the global carbon cycle” DOE Global Change Education Program annual meeting, Knoxville, TN, June 2008
- *Will CO₂ fertilization of forests counteract global warming? Tennessee Tech University, Cookeville, TN, April 2008
- *“Single-factor and Multi-factor Experiments: Multiple Issues, Multiple Approaches” DOE conference, Exploring Science Needs for the Next Generation of Climatic Change and Elevated CO₂ Experiments in Terrestrial Ecosystems. Washington, DC, April 2008.
- *Will CO₂ fertilization of forests counteract global warming? Tennessee State University, Nashville, TN, February 2008
- *“Uncertainties: Ecosystem responses to climate change...and their feedbacks to the Carbon Cycle” ORNL symposium: Carbon Cycle, Biosequestration, and Ecosystem Response to Climate Change. Oak Ridge, TN, Jan 2008
- *“Open-Top Chambers for Investigating Ecological Responses to Atmospheric and Climatic Change” American Society of Agronomy annual meeting, New Orleans, LA, November 2007
- **Net primary productivity and nitrogen uptake in forest FACE experiments” EcoFizz meeting, Sydney, Australia, Sept. 2007
- *“Will CO₂ fertilization counteract global warming?” Nature Conservancy Climate Change Science Conference, Portland OR, Sept. 2007
- **Will CO₂ fertilization counteract global warming? Lessons from forest FACE experiments” University of Georgia, Athens, GA. Oct 2006
- “Nitrogen uptake and net primary productivity in four forest FACE experiments”. Annual meeting, Ecological Society of America, Memphis, Tennessee, August, 2006.
- **Global Change and Terrestrial Ecosystems: Do Trees Matter?” Oak Ridge Institute for Continued Learning, Oak Ridge TN, Feb. 2006
- **Forest Responses to Elevated Atmospheric CO₂”. Chinese Academy of Sciences and Peking University, Beijing, China, September 2005
- **Forests in a CO₂-rich world: Old questions, new challenges”. Keynote address, International Botanical Congress, Vienna, Austria, July 2005

Funded Proposals (as Principal Investigator)

- “Free-Air CO₂ Enrichment (FACE) Experiment synthesis activities”; DOE, \$677,000, 2012-2015.
- “Partitioning in Trees and Soil”; DOE; \$775,000, 2010-2012.

- "Benchmarking Ecosystem Response Models with Experimental Data from Long-term CO₂ Enrichment Experiments"; NCEAS; \$84,450, 2008-2010.
- "Free-Air CO₂ enrichment of a Deciduous Forest"; DOE (TCP); \$1,100,000 per year; 1999-continuing.
- "Community and Ecosystem Response to Global Change: Interactive Effects of Atmospheric Carbon Dioxide, Surface Temperatures, and Soil Moisture "; DOE (PER); \$371,000 per year; 2002- continuing.
- "Forest FACE Synthesis Workshop"; TERACC; \$2500; 2005
- "Forest FACE Synthesis Workshop: U.S. Forest Service; \$10,000; 2002
- "Root Dynamics and Global Change Symposium "; New Phytologist Trust; \$30,000; 1999.
- "Free-Air Enrichment of a Closed-Canopy Deciduous Forest "; NSF (TECO); \$1,200,000; 1996-1999.
- "A Free-Air CO₂ Exposure Facility in a Deciduous Forest "; ORNL Director's R&D Fund; \$760,000; 1996-1997.
- "Temperature and CO₂ Interactions in Trees "; DOE (TCP); \$600,000 per year; 1995-1998.
- "Temperature Adjustments in Sugar Maple: Implications for Forest Succession in a Warmer Climate "; DOE (PER); \$195,000/year; 1994-1997.
- "Temperature-Controlled Open-Top Chambers for Global Change Research "; ORNL Exploratory Funds Program; \$102,000; 1992-1993.
- "Interactions Between Elevated CO₂ and Drought Stress in Tree Seedlings "; EPA; \$100,000; 1990.
- "Use of D/H and ¹⁸O/¹⁶O Variations in Plant Leaf Water to Monitor Biophysical Responses to Increased Concentrations of Atmospheric CO₂"; ORNL Exploratory Funds Program; \$76,000;1989.
- "Tree Responses to CO₂ Enrichment in the Field "; DOE (TCP); \$2,353,000; 1988-1994."Optimum Nitrogen Nutrition in Short-Rotation Sycamore Plantations "; DOE Biofuels Program; \$190,000 - \$325,000 per year; 1987-1992.