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

Positions
Environmental Sciences Division, Oak Ridge National Laboratory
ORNL Corporate Fellow, 2007 - present
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 Tennessee-Knoxville
Joint Professor, Center for Interdisciplinary Research and Graduate Education, 2011-present
Adjunct Faculty, Department of Ecology & Evolutionary Biology, 1986-present
Research Associate, Graduate Program in Ecology, 1983-1985

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 -
Editorial Board, *Ecological Applications*, 1998 – 2002
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 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 CO_2 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 CO_2 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, CO_2 and Climate Change, Washington, D.C., 1993.

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

Rapporteur, CO_2 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 Plant Biology; Global Biogeochemical Cycles; Global Change Biology; Global and Planetary Change; International Journal of Plant Science; 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; 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.

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 CO_2 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

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
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; Cassandra A. Ott, University of Tennessee; Jennifer A. Liebig, University of Tennessee

PhD Committees: Jessica Bryant (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

2015

Heikoop JM, Throckmorton HM, Newman BD, Perkins GB, Iversen CM, Chowdhury TR, Romanovsky V, Graham DE, Norby RJ, Wilson CJ, Wullschleger 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 CO_2. *Journal of Geophysical Research – Biogeosciences*, in press.

Iversen CM, Sloan VL, Sullivan PF, Euskirchen ES, McGuire AD, Norby RJ, Walker AP, Warren J, Wullschleger 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 $^{13}CO_2$ 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, Leppälammi-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* DOI: 10.1111/nph.13363.

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.

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. 2015. Model-data synthesis for the next generation of forest FACE experiments. *New Phytologist*, DOI: 10.1111/nph.13593.

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 CH_4 and CO_2 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 CO_2 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 CO_2 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, Technologia 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 CO_2 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 CO_2 enrichment experiments: model performance at ambient CO_2 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 CO_2 Enrichment studies. *New Phytologist* 202: 803-822.

2013

Battipaglia B, Saurer M, Cherubini P, Calfapietra C, McCarthy HR, Norby RJ, Cotrufo MF. 2012. Elevated CO_2 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 CO_2: 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, LuoY, 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 CO_2: 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 CO_2 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 CO_2-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 [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 CO_2. *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 CO_2 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 CO_2 experiments on forests. *Trends in Plant Science* 15: 5-10.

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

Kardol P, Campany 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. CO_2 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. CO_2 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 [CO_2], 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 CO_2: 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 CO_2 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 ^{13}C. 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, Kimball1 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 [CO_2] 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 N_2-fixation in constructed old-field communities under different regimes of [CO_2], temperature, and water availability. Ecosystems 11:125-137.

Iversen CM, Ledford J, Norby RJ. 2008. CO_2 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 CO_2 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 CO_2. 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, Strömgren M, van Oijen M, Wallin G. 2007. The likely impact of elevated [CO_2], 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. CO_2 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 CO_2, 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 CO_2-enriched sweetgum forest. Ecology 87:5-14.

Norby RJ, Wullschleger SD, Hanson PJ, Gunderson CA, Tschaplinski TJ, Jastrow JD. 2006. CO_2 enrichment of a deciduous forest: The Oak Ridge FACE Experiment. pp. 231-251 In: Managed Ecosystems and CO_2: 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 CO_2: 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 CO_2: 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 CO_2, 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 CO_2 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 CO_2 and Its Effects on Plants, Animals, and Ecosystems. Springer, New York.

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*"Model synthesis of data from free-air CO_2 enrichment experiments" Annual meeting, American Geophysical Union, San Francisco, CA, December 2012.

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*"Forest responses to elevated CO_2: 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" CO_2 Symposium, Smithsonian Tropical Research Institute, Panama City, Panama, March 2011.

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*Will CO_2 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 CO_2 Experiments in Terrestrial Ecosystems. Washington, DC, April 2008.

*Will CO_2 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 CO_2 fertilization counteract global warming?" Nature Conservancy Climate Change Science Conference, Portland OR, Sept. 2007

*"Will CO_2 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 CO_2". Chinese Academy of Sciences and Peking University, Beijing, China, September 2005

*"Forests in a CO_2-rich world: Old questions, new challenges". Keynote address, International Botanical Congress, Vienna, Austria, July 2005

Funded Proposals (as Principal Investigator)

"Free-Air CO_2 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 CO_2 Enrichment Experiments"; NCEAS; $84,450, 2008-2010.

"Free-Air CO_2 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 CO_2 Exposure Facility in a Deciduous Forest "; ORNL Director's R&D Fund; $760,000; 1996-1997.

"Temperature and CO_2 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 CO_2 and Drought Stress in Tree Seedlings "; EPA; $100,000; 1990.

"Use of D/H and $^{18}O/^{16}O$ Variations in Plant Leaf Water to Monitor Biophysical Responses to Increased Concentrations of Atmospheric CO_2"; ORNL Exploratory Funds Program; $76,000;1989.

"Tree Responses to CO_2 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.