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Research Expertise

Influence of Climatic Change on Eco-physiological Processes
Process-level physiological modeling
Deposition of trace gases to landscape surfaces
Physiology of woody plants
Air Pollution Stress Physiology

Education

Ph.D.	University of Minnesota	Tree Physiology	1986
M.S.	University of Minnesota	Plant Physiology	1983
B.A.	St. Cloud State University	Biology (summa cum laude)	1981

Professional Experience

2012-present Corporate Fellow, Environmental Sciences Division, Oak Ridge National Laboratory

2006-present Group Leader, Ecosystem Sciences Group, Environmental Sciences Division, Oak Ridge National Laboratory

2005-2012 Distinguished R&D Staff Member, Environmental Sciences Division, Oak Ridge National Laboratory.

2004-2009 Chief Scientist, Program for Ecosystem Research, U.S. Department of Energy

2001-2004 Senior R&D Staff Member, Environmental Sciences Division, Oak Ridge National Laboratory.

1996-2001 Research Staff Member II, Environmental Sciences Division, Oak Ridge National Laboratory.

1994-1998 Adjunct Associate Professor, Department of Ecology, University of Tennessee, Knoxville.

1992-1995 Research Staff Member I, Environmental Sciences Division, Oak Ridge National Laboratory.

1989-1992 Research Associate, Physiological Ecology Group, Environmental Sciences Division, Oak Ridge National Laboratory.

1988-1989 Scientist, Automated Sciences Group, Oak Ridge, TN.

1986-1988 Postdoctoral Research Associate, Oak Ridge National Lab, Environmental Sciences Division, Oak Ridge, TN.

Professional Activities

- 2005-present Subject Editor, *Global Change Biology*
- 2009-present Member, North American Carbon Program, Carbon Cycle Science Steering Group
- 2007-present Member, NASA's ORNL DAAC User Working Group
- 2007-2011 Member of EPA's Clean Air Science Advisory Committee (CASAC) NOx & SOx Secondary Review Panel
- 2009 Invited Congressional Testimony, 9 June 2009, Energy and Environment Subcommittee of the House Science and Technology Committee
- 2005-2008 Member of EPA's Clean Air Science Advisory Committee (CASAC) Ozone Review Panel
- 2002-2004 Member, NIGEC National Technical Advisory Committee (NTAC)
- 2003 Panel member, USDA-CSREES Competitive Grants Program
- 1994-2004 Editorial Review Board, *Tree Physiology* (not 1999)
- 1995-2000 Associate Editor, *Journal of Environmental Quality* (two 3-year terms)
- 1998 Ad hoc member of an EPA Technical Qualifications Board
- 1996-1998 Advisory Board Southeast Regional Center of the National Institute For Global Environmental Change
- 1994-1995 Panel Member, DOE's Southeast Regional Center -- National Institute For Global Environmental Change
- 1994-1996 Contributing Author, U.S. Environmental Protection Agency, contributing to the revised Air Quality Criteria Document for Particulate Matter.
- 1992,1994 Panel Member, USDA's National Research Initiative Competitive Grants Program
- 1992 Grand Awards Judge, 43rd International Science and Engineering Fair.
- 1988-1990 Contributing Author, U.S. Environmental Protection Agency, Air Quality Criteria Document for Oxides of Nitrogen.

Awards and Honors

- 2008 Fellow, American Association for the Advancement of Science (AAAS), Section on Biological Sciences elected November 2008.
- 2004 Award for excellence in presentation of a paper, Soil Science Society of America, Division S-7, Annual meeting, October 31 - November 4, 2004, Seattle, Washington.
- 2003 Award of Merit for a Book, Society for Technical Communication.
- 2002 Award for excellence in presentation of a paper, Soil Science Society of America, Division S-7, Annual meeting, November 10-14, 2002, Indianapolis, Indiana.
- 1995 Distinguished Scientific Achievement Award, Environmental Sciences Division Oak Ridge National Laboratory.
- 1994 Award of Merit in Scholarly Articles, Society for Technical Communication
- 1988 Sigma Xi, elected to full membership
- 1986-88 Postdoctoral Fellowship, Oak Ridge Associated Universities
- 1985 Graduate School Fellowship, University of Minnesota
- 1980 Phi Kappa Phi

Active Society Memberships

American Association for the Advancement of Science (AAAS)
American Geophysical Union (AGU)
American Society of Agronomy (ASA)
Ecological Society of America (ESA)
Soil Science Society of America (SSSA)

Students/Teachers Advised

Keith Rott 1987, Kelly Maas 1989, D. Susanne Ramer 1990, Cindy S. Fuhrer 1990, Stephanie Bohlman 1991-92, Todd Tabberer 1993-94, Kristin Harter 1994-1995, James 'Ben' Stringfellow 1995, James Arnett 1995-97, Tracy Misek 1996-97, Jennifer Croker 1995-1997, M. Lala S. Chambers 1994- 1997, T. Brendon Johnson 1996-1997, Morgan Castner 1997-1998, Mark Scannell 1999, Karen Voiles 1999, Philip Allen 2000-01, Bridgette M. Boudreaux 2001&2005, Jason C. Fults 2001, Craig Wayson 2003-05, Rebekah Wagner 2006-07, Mats Fröberg 2006-2008.

Faculty Sabbaticals Hosted

Yuling Fu, Chinese Academy of Science, 2009-2010.
H.-J. Segschneider, Institut für Radioagronomie, Jülich, FRG, 1991.
W. Hoffman, Denison University, Danville, OH, 1991-1992.

Recently Funded Proposals (last five years)

Hanson, P. J. et al. Extended Science Plan for the Terrestrial Ecosystem Science Scientific Focus Area. U.S. Department of Energy, 2013 to 2015, \$8M per year
Hanson, P. J. et al. Science Plan for the Terrestrial Ecosystem Science Scientific Focus Area. U.S. Department of Energy, 2010 to 2012, \$7 to 8M per year
Hanson, P. J. et al. Science Plan for the Climate Change Response Science Focus Area. U.S. Department of Energy, 2010 to 2013, ~ \$5M per year
Hanson, P.J. et al. Task 3 Component of the Science Plan for the Climate Change Forcing Science Focus, U.S. Department of Energy, 2010 to 2013, ~\$400K per year.
Hanson PJ. Climate Change Response Science Focus Area. 2007-2009, ~\$2,500,000 per year.
Hanson PJ. Program for Ecosystem Research Chief Scientist. 2004-2009, ~\$200,000 per year.
Gu L, Hanson PJ, Pallardy SG, Wullschleger SD, Edwards NT. Regulation of carbon sequestration and water use in an Ozark Forest: Proposing a new strategically located Ameriflux tower site in Missouri. U.S. Department of Energy, 2003-2005, ~\$1,397,000 over three years.
Hanson PJ, Tschaplinski TJ, Wullschleger SD, Augé RM. Identifying Critical Thresholds for Plant/Ecosystem Response to Moisture Stress. U.S. Department of Energy, 2002-2004, ~\$900,000 over three years.
Hanson PJ, Trumbore SE, Gaudinski J, Southon J, Torn M, Jastrow J. Enriched Background Isotope Study (EBIS), U.S. Department of Energy, 2002-2004, ~\$2,700,000 over three years.

Hanson PJ. Mechanisms of forest ecosystem adjustments to altered precipitation-the Walker Branch Throughfall Displacement Experiment (TDE). Renewal proposal 2002-2006, \$2,200,000 over five years.

Hanson PJ and others. Mechanisms of Forest Ecosystem Adjustment to Altered Precipitation - The Walker Branch Throughfall Displacement Experiment (TDE). Renewal proposal 1999-2001, \$2,600,000 over three years.

Publications (ISI-based h-index of '43' as of June 2012 with >5200 citations)
ResearcherID: D-8069-2011

Book:

Hanson PJ, Wullschleger SD, Editors (2003) *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes*. Springer, New York, 421 p.

Articles and Book Chapters:

- McFarlane KJ, Torn MS, Hanson PJ, Porras RC, Swanston CW, Callaham MA Jr., Guilderson TP (201?) Comparison of soil organic matter dynamics at five temperate deciduous forests with physical fractionation and radiocarbon measurements. *Biogeochemistry* (accepted in press).
- Gu L, Pallardy SG, Hanson PJ, Wullschleger SD (200?) A comprehensive optimization method and its application to assessing uncertainties in estimated C3 biochemical parameters due to the use of different temperature dependence functions. *Journal of Experimental Botany* (submitted).
- Parsekian AD, Slater L, Sebestyen SD, Kolka RK, Ntarlagiannis D, Nolan J, Hanson PJ (2012) Comparison of uncertainty in peat volume and soil carbon estimated using GPR and probing. *Soil Science Society of America Journal* (accepted in press).
- Gunderson CA, Edwards NT, Walker AV, O'Hara KH, Campion CM, Hanson PJ (2012) Forest phenology and a warmer climate – growing season extension in relation to climatic provenance. *Global Change Biology* 18:2008-2025, doi: 10.1111/j.1365-2486.2011.02632.x
- Tipping E, Chamberlain PM, Fröberg M, Hanson PJ, Jardine PM (2012) Simulation of carbon cycling, including dissolved organic carbon transport, in forest soil locally enriched with ¹⁴C. *Biogeochemistry* 108:91-107, doi 10.1007/s10533-011-9575-1.
- Weston DJ, Hanson PJ, Norby RJ, Tuskan GA, Wullschleger SD (2012) From systems biology to photosynthesis and whole-plant physiology. *Plant Signaling and Behavior* 7:2, 260-262.
- Wagner RJ, Kay MW, Abrams MD, Hanson PJ, Martin M (2012) Tree-ring growth and wood chemistry response to manipulated precipitation variation for two temperate *Quercus* species. *Tree-Ring Research* 68:17-29.
- Gu, L, Massman WJ, Leuning R, Pallardy SG, Meyers T, Hanson PJ, Riggs JS, Hosman KP, Yang B (2011) The fundamental equation of eddy covariance and its application in flux measurements. *Agricultural and Forest Meteorology* 152:135-148, DOI: 10.1016/j.agrformet.2011.09.014

- Vargas R, Baldocchi DD, Bahn M, Hanson PJ, Hosman KP, Kulmala L, Pumpanen J, Yang B (2011) On the multi-temporal correlation between photosynthesis and soil CO₂ efflux: reconciling lags and observations. *New Phytologist* 191:1006-1017, doi:10.1111/j.1469-8137.2011.03771.x
- Wullschlegel SD, Childs KW, King AW, Hanson PJ (2011) A model of heat transfer in sapwood and implications for sap flux density measurements using thermal dissipation probes. *Tree Physiology* 31:669-679.
- Hanson PJ, Childs KW, Wullschlegel SD, Riggs JS, Thomas WK, Todd DE, Warren JM (2011) A method for experimental heating of intact soil profiles for application to climate change experiments. *Global Change Biology* 17:1083–1096.
- Parton WJ, Hanson PJ, Swanston C, Torn M, Trumbore SE, Riley W, Kelly R (2010) ForCent Model Development and Testing using the Enriched Background Isotope Study (EBIS) experiment. *JGR-Biogeosciences* 115:G04001, doi:10.1029/2009JG001193
- Yang B, Pallardy SG, Meyers TP, Gu L-H, Hanson PJ, Wullschlegel SD, Heuer M, Hosman KP, Riggs JS, Sluss DW (2010) Environmental Controls on Water Use Efficiency during Severe Drought in an Ozark Forest in Missouri, USA. *Global Change Biology* 16:2252-2271.
- Kardol P, Todd DE, Hanson PJ, Mulholland PJ (2010) Long-term successional forest dynamics: species and community responses to climatic variability. *Journal of Vegetation Science* 21:627-642.
- Kramer C, Trumbore S, Fröberg M, Cisneros-Dozal LM, Zhang D, Xu X, Santos G, Hanson PJ (2010) Recent (<4 year old) leaf litter is not a major source of microbial carbon in a temperate forest mineral soil. *Soil Biology and Biochemistry* 42:1028-1037.
- Amthor JS, Hanson PJ, Norby RJ, Wullschlegel SD (2009) A comment on “Appropriate experimental ecosystem warming methods by ecosystem, objective, and practicality” by Aronson and McNulty”. *Agricultural and Forest Meteorology* 150: 497-498.
- Riley WJ, Gaudinski JB, Torn MS, Joslin JD, Hanson PJ (2009) Fine-root mortality rates in a temperate forest: estimates using radiocarbon data and numerical modeling. *New Phytologist* 184:387-398.
- Hanson PJ, Gunderson CA (2009) Root carbon flux: measurements versus mechanisms. *New Phytologist* 184:4-6.
- Gaudinski JB, Torn MS, Riley WJ, Swanston C, Trumbore SE, Joslin JD, Majdi H, Dawson TE, Hanson PJ (2009) Use of stored carbon reserves in growth of temperate tree roots and leaf buds: analyses using radiocarbon measurements and modeling. *Global Change Biology* 15:992-1014.
- Fröberg M, Hanson PJ, Trumbore SE, Swanston CW, Todd DE (2009) Flux of carbon from ¹⁴C-enriched leaf litter throughout a forest soil mesocosm. *Geoderma* 149:181-188.
- Bernier P, Hanson PJ, Curtis PS (2008) Measuring litterfall and branchfall. Chapter 7 In: Hoover CM Ed., *Field Measurements for Forest Carbon Monitoring*, Springer, New York, pp. 91-101.

- Gu L, Hanson PJ, Post WM, Liu Q (2008) A novel approach for identifying the true temperature sensitivity from soil respiration measurements, *Global Biogeochemical Cycles* 22, GB4009, doi:10.1029/2007GB003164.
- Gerten D, Luo Y, Le Maire G, Parton WJ, Keough C, Weng E, Beier C, Ciais P, Cramer W, Dukes JS, Sowerby A, Hanson PJ, Knapp AK, Linder S, Nepstad D, Rustad L, Sowerby A (2008) Modelled effects of precipitation on ecosystem carbon and water dynamics in different climatic zones. *Global Change Biology* 14:2365-2379.
- Hanson PJ and others (2008) Ecosystem Experiments: Understanding Climate Change Impacts On Ecosystems and Feedbacks to the Physical Climate. Workshop Report on Exploring Science Needs for the Next Generation of Climate Change and Elevated CO₂ Experiments in Terrestrial Ecosystems. 14 to 18 April 2008, Arlington, Virginia, http://science.energy.gov/~media/ber/pdf/Ecosystem_experiments.pdf
- Luo Y, Gerten D, Le Marie G, Parton WJ, Weng E, Zhou X, Keough C, Beier C, Ciais P, Cramer W, Dukes JS, Emmett B, Hanson PJ, Knapp A, Linder S, Nepstad D, Rustad L (2008) Modeled interactive effects of precipitation, temperature, and [CO₂] on ecosystem carbon and water dynamics in different climatic zones. *Global Change Biology* 14:1986-1999.
- Fröberg M, Hanson PJ, Todd DE, Johnson DW (2008) Evaluation of effects of sustained decadal precipitation manipulations on soil carbon stocks. *Biogeochemistry* 89:151-161.
- Johnson DW, Todd DE Jr., Hanson PJ (2008) The effects of throughfall manipulation on soil nutrient status: results of 12 years of sustained wet and dry treatments. *Global Change Biology* 14:1661-1675.
- Gu L, Hanson PJ, Post WM, Kaiser DP, Yang B, Nemani R, Pallardy SG, Meyers T (2008) The April 2007 freeze in the eastern United States: its damage to vegetation and implication for terrestrial ecosystem structure and functioning in a warming climate. *Bioscience* 58:253-262.
- Luysaert S, Inglisma I, Jung M, Richardson AD, Reichstein M, Papale D, Piao S, Schulze E-D, Wingate L, Matteucci G, Aragao L, Aubinet M, Beer C, Bernhofer C, Black KG, Bonal D, Bonnefond JM, Chambers J, Ciais P, Cook B, Davis KJ, Dolman AJ, Gielen B, Goulden M, Grace J, Granier A, Grelle A, Griffis T, Grünwald T, Guidolotti G, Hanson PJ, Harding R, Hollinger D, Hutrya LR, Kolar P, Kruijt B, Kutsch W, Lagergren F, Laurila T, Law B, LeMaire G, Lindroth A, Loustau D, Malhi Y, Mateus J, Migliavacca M, Mission L, Montagnani L, Moncrieff J, Moors E, Munger JW, Nikinmaa E, Ollinger SV, Pita G, Rebmann C, Rouspard O, Saigusa N, Sanz MJ, Seufert G, Sierra C, Smith ML, Tang J, Valentini R, Vesala T, Janssens IA. (2007) CO₂ balance of boreal, temperate, and tropical forests derived from a global database. *Global Change Biology* 13:2509-2537.
- Yang B, Hanson PJ, Riggs JS, Pallardy SG, Heuer M, Hosman KP, Meyers TP, Wullschleger SD, Gu L (2007) Biases of CO₂ storage in eddy flux measurements in a forest pertinent to vertical configurations of a profile system and CO₂ density averaging. *Journal of Geophysical Research* 112; D20123, doi:10.1029/2006JD008243.

- Hanson PJ, Kurz WA (2007) Commercial and project-based responses and associated research initiatives in the forest sector. In Freer-Smith PH, Broadmeadow MSJ, Lynch JM, Eds. *Forestry and Climate Change*, CAB International, pp. 226-232.
- Garten CT Jr, Hanson PJ, Todd DE Jr, Lu BW, Brice DJ (2007) Natural ^{15}N and ^{13}C abundance as indicators of forest N status and soil C dynamics, pp. 61-82. IN (R.H. Michener and K. Lajtha, eds.) *Stable Isotopes in Ecology and Environmental Science* (second edition). Blackwell Science, Oxford.
- Hanson PJ, Tschaplinski TJ, Wullschleger SD, Todd DE Jr., Augé RM (2007) The Resilience of Upland-Oak Forest Canopy Trees to Chronic and Acute Precipitation Manipulations. In: Buckley DS and Clatterbuck WK, Eds, *Proceedings 15th Central Hardwood Forest Conference, Knoxville, TN February 27–March 1, 2006*, e-General Technical Report SRS–101, United States Department of Agriculture, Forest Service Southern Research Station, pp. 3-12.
- Pallardy SG, Gu L, Hanson PJ, Myers TP, Wullschleger SD, Yang B, Riggs JS, Hosman KP, Mark Heuer M (2007) Carbon Dioxide Fluxes in a Central Hardwoods Oak-hickory Forest Ecosystem. In: Buckley DS and Clatterbuck WK, Eds, *Proceedings 15th Central Hardwood Forest Conference, Knoxville, TN February 27–March 1, 2006*, e-General Technical Report SRS–101, United States Department of Agriculture, Forest Service Southern Research Station, pp. 13-20.
- Mau J, Wang B, Dai Y, Woodward FI, and Hanson PJ, Lomas MR (2007) Improvements of a dynamic global vegetation model and simulations of carbon and water at an upland-oak forest. *Advances in Atmospheric Sciences* 24:311-322.
- Fröberg M, Jardine PM, Hanson PJ, Swanston CW, Todd DE, Tarver JR, Garten CT Jr. (2007) Low Dissolved Organic Carbon Input from Fresh Litter to Deep Mineral Soils. *Soil Science Society of America Journal* 71:347-354.
- Cisneros-Dozal LM, Trumbore S, Hanson PJ (2007) Effect of moisture on leaf litter decomposition and its contribution to soil respiration in a temperate forest. *Journal of Geophysical Research* 112: G01013, doi:10.1029/2006JG000197.
- Gu L, Meyers T, Pallardy SG, Hanson PJ, Yang B, Heuer M, Hosman KP, Liu Q, Riggs J, Sluss D, Wullschleger SD (2007) Influences of biomass heat and biochemical energy storages on the land surface fluxes and radiative temperature. *Journal of Geophysical Research* 112: D02107, doi:10.1029/2006JD007425
- Garten CT Jr., Hanson PJ (2006) Measured forest soil C stocks and estimated turnover times along an elevation gradient. *Geoderma* 136:342-352.
- Gu LH, Meyers T, Pallardy SG, Hanson PJ, Yang B, Heuer M, Hosman KP, Riggs JS, Sluss D, Wullschleger SD (2006) Direct and indirect effects of atmospheric conditions and soil moisture on surface energy partitioning revealed by a prolonged drought at a temperate forest site. *Journal of Geophysical Research-Atmospheres* 111(D16): Art. No. D16102, doi:10.1029/2006JD007161.
- Wayson CA, Randolph JC, Hanson PJ, Schmid HP, Grimmond CSB (2006) Comparison of soil respiration methods in a mid-latitude deciduous forest. *Biogeochemistry* 80:173-189.
- Joslin JD, Gaudinski JB, Torn MS, Riley WJ, Hanson PJ (2006) Fine root turnover patterns and their relationship to root diameter and soil depth in a ^{14}C -labeled hardwood forest. *New Phytologist* 172:523-535.

- Grant RF, Zhang Y, Yuan F, Wang S, Hanson PJ, Gaumont-Guay D, Chen J, Black TA, Barr A, Baldocchi DD, Arain A (2006) Intercomparison of techniques to model water stress effects on CO₂ and energy exchange in temperate and boreal deciduous forests. *Ecological Modelling* 196:289-312.
- Jardine PM, Mayes MA, Mulholland PJ, Hanson PJ, Tarver J, Luxmoore RJ, McCarthy JF, Wilson GV (2006) Vadose zone flow and transport of dissolved organic carbon at multiple scales in humid regions. *Vadose Zone Journal* 5:140-152.
- Wullschleger SD, Hanson PJ (2006) Sensitivity of canopy transpiration to altered precipitation in an upland oak forest: evidence from a long-term field manipulation study. *Global Change Biology* 12:97-109.
- Norby RJ, Wullschleger SD, Hanson PJ, Gunderson CA, Tschaplinski TJ, Jastrow JD. 2006. CO₂ enrichment of a deciduous forest: The Oak Ridge FACE Experiment. In Nösberger J, Long SP, Norby RJ, Stitt M, Hendrey GR, Blum H, Eds. *Managed Ecosystems and CO₂: Case Studies, Processes, and Perspectives* Ecological Studies, Vol. 187. Springer, Berlin, pp. 231-251.
- Cisneros-Dozal LM, Trumbore SE, Hanson PJ (2005) Partitioning sources of soil-respired CO₂ and their seasonal variation using a unique radiocarbon tracer. *Global Change Biology* 12:194-204.
- Hanson PJ, Swanston CW, Garten CT Jr., Todd DE, Trumbore SE (2005) Reconciling Change in Oi-Horizon Carbon-14 With Mass Loss for an Oak Forest. *Soil Science Society of America Journal* 69:1492-1502
- 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.
- Swanston CW, Torn MS, Hanson PJ, Southon JR, Garten CT, Hanlon EM, Ganio L (2005) Initial characterization of processes of soil carbon stabilization using forest stand-level radiocarbon enrichment. *Geoderma* 128:52-62.
- Hanson PJ, Amthor JS, Wullschleger SD, Wilson KB, Grant RF, Hartley A, Hui D, Hunt ER Jr., Johnson DW, Kimball JS, King AW, Luo Y, McNulty SG, Sun G., Thornton PE, Wang S, Williams M, Baldocchi DD, Cushman RM (2004) Oak forest carbon and water simulations: model intercomparisons and evaluations against independent data. *Ecological Monographs* 74(3):443-489.
- King JS, Hanson PJ, Bernhardt E, DeAngelis P, Norby RJ, Pregitzer KS (2004) A multiyear synthesis of soil respiration responses to elevated atmospheric CO₂ from four forest FACE experiments. *Global Change Biology* 10:1027-1042.
- Pendall E, Bridgman S, Hanson PJ, Hungate B, Kicklighter DW, Johnson DW, Law BE, Luo Y, Magonigal JP, Olsrud M, Ryan MG, Thornton P, Wan S (2004) Below-ground process responses to elevated CO₂ and temperature: a discussion of observations, measurement methods, and models. *New Phytologist* 162:311-322.
- Hanson PJ, O'Hara FM Jr (2003) Introduction. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes*. Springer, New York, pp. 3-7.
- Hanson PJ, Huston MA, Todd DE (2003) Walker Branch Throughfall Displacement Experiment (TDE) In: Hanson PJ, Wullschleger SD, Eds, *North American*

- Temperate Deciduous Forest Responses to Changing Precipitation Regimes.*
Springer, New York, pp. 8-31.
- Wilson KB, Hanson PJ (2003) Deciduous Hardwood Photosynthesis: Species Differences, Temporal Patterns and Response to Soil Water Deficits. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 35-47.
- Edwards NT, Hanson PJ (2003) Aboveground autotrophic respiration. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 48-66.
- Tschaplinski TJ, Hanson PJ (2003) Dormant-season nonstructural carbohydrate storage. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 67-84.
- Wullschleger SD, Hanson PJ (2003) Sensitivity of sapling and mature-tree water use to altered precipitation. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 87-99.
- Hanson PJ, O'Neill EG, Chambers MLS, Riggs JS, Joslin JD, Wolfe MH (2003) Soil respiration and litter decomposition. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 163-189.
- Todd DE, Hanson PJ (2003) Rates of coarse-wood decomposition. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 210-214.
- Hanson PJ, Todd DE, West DC, Edwards NT, Tharp ML, Simpson WA Jr. (2003) Tree and sapling growth and mortality. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 255-273.
- Hanson PJ, Todd DE, Joslin JD (2003) Canopy production. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 303-315.
- Wullschleger SD, Hanson PJ, Todd DE (2003) Forest water use and the influence of precipitation change. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 363-377.
- Hanson PJ, Edwards NT, Tschaplinski TJ, Wullschleger SD, Joslin JD (2003) Estimating the net primary and net ecosystem production of a southeastern upland *Quercus* forest from an 8-year biometric record. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 378-395.
- Johnson DW, Hanson PJ, Todd DE (2003) Nutrient availability and cycling. In: Hanson PJ, Wullschleger SD, Eds, *North American Temperate Deciduous Forest Responses to Changing Precipitation Regimes.* Springer, New York, pp. 396-414.
- Hanson PJ, Todd DE, Johnson DW, Joslin JD (2003) Responses of Eastern Deciduous Forests to Precipitation Change. Chapter 10 In: McPherson GR, Weltzin JF, Eds.

- Changing Precipitation Regimes and Terrestrial Ecosystems*, The University of Arizona Press, Tucson, pp. 164-179.
- Norby RJ, Hanson PJ, O'Neill EG, Tschaplinski TJ, Weltzin JF, Hansen RT, Cheng W, Wullschleger SD, Gundersen 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.
- Curtis PS, Hanson PJ, Bolstad P, Barford C, Randolph JC, Schmid HP, Wilson KB (2002) Biometric and eddy-covariance based estimates of annual carbon storage in five eastern North American deciduous forests. *Agriculture and Forest Meteorology* 113:3-19.
- Davidson EA, Savage K, Bolstad P, Clark DA, Curtis PS, Ellsworth DS, Hanson PJ, Law BE, Luo Y, Pregitzer KS, Randolph JC, Zak D (2002) Belowground carbon allocation in forests estimated from litterfall and IRGA-based soil respiration measurements. *Agriculture and Forest Meteorology* 113:39-51.
- Hanson PJ, one of 9 contributing authors. (2002) Chapter 4. Environmental Effects of Particulate Matter. In: *Third External Review Draft of Air Quality Criteria for Particulate Matter*, U.S. Environmental Protection Agency, Washington, D.C.
- Wullschleger SD, Gundersen CA, Hanson PJ, Wilson KB, Norby RJ (2002) Sensitivity of stomatal and canopy conductance to elevated CO₂ concentration – Interacting variables and perspectives of scale. *New Phytologist* 153:485-496.
- Gundersen 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.
- Ehman JL, Schmid HP, Grimmond CSB, Randolph JC, Hanson PJ, Wayson CA, Cropley FD (2002) An initial intercomparison of micrometeorological and ecological inventory estimates of carbon sequestration in a mid-latitude deciduous forest. *Global Change Biology* 8:575-589.
- Johnson DW, Hanson PJ, Todd DE (2002) The effects of throughfall manipulation on soil leaching in a deciduous forest. *Journal of Environmental Quality* 31:204-216.
- Trumbore S, Gaudinski JB, Hanson PJ, Southon JR (2002) A whole-ecosystem carbon-14 label in a temperate forest. *EOS* 83:265,267-268.
- Dale VH, Joyce LA, McNulty S, Neilson RP, Ayres MP, Flannigan MD, Hanson PJ, Irland LC, Lugo AE, Peterson, CJ, Simberloff D, Swanson FJ, Stocks BJ, Wotton BM (2001) Forest disturbances and climate change. *BioScience* 51:723-734.
- Hanson PJ, Todd DE, Riggs JS, Wolfe ME, O'Neill EG (2001) *Walker Branch Throughfall Displacement Experiment Data Report: Site characterization, system performance, weather, species composition and growth*. ORNL/CDIAC-134, NDP-078A. Carbon Dioxide Information Analysis Center, U.S. Department of Energy, Oak Ridge National Laboratory, Oak Ridge, Tennessee, U.S.A. 158 p.
- Hanson PJ, Todd DE, Amthor JS (2001) A six year study of sapling and large-tree growth and mortality responses to natural and induced variability in precipitation and throughfall. *Tree Physiology* 21:345-358.

- Wilson KB, Baldocchi DD, Hanson PJ (2001) Leaf age affects the seasonal pattern of photosynthetic capacity and net ecosystem exchange of carbon in a deciduous forest. *Plant Cell and Environment* 24:571-583.
- Wullschleger SD, Hanson PJ, Todd DE (2001) Transpiration from a multi-species deciduous forest as estimated by xylem sap flow techniques. *Forest Ecology and Management* 143:205-213.
- Joslin JD, Wolfe MH, Hanson PJ (2001) Factors controlling the timing of root elongation intensity in a mature upland oak-hickory stand. *Plant and Soil* 228:201-212.
- Wilson KB, Hanson PJ, Mulholland PJ, Baldocchi DD, Wullschleger SD (2001) A comparison of methods for determining forest evapotranspiration and its components across scales: sap-flow, soil water budget, eddy covariance, and catchment water balance. *Agriculture and Forest Meteorology* 106:153-168.
- Hanson PJ, Weltzin JF (2000) Drought disturbance from climate change: response of United States forests. *Science of the Total Environment* 262:205-220.
- Ehman J, Schmid HP, Grimmond CSB, Hanson PJ, Randolph JC, Cropley FD (2000) A preliminary intercomparison of micrometeorological and ecological estimates of carbon sequestration in a mid-latitude deciduous forest. In R.J. de Dear, J.D. Kalma, T.R. Oke and A. Auliciems (eds). *Biometeorology and Urban Climatology at the Turn of the Millenium*, World Meteorological Organization, pp. 235-240.
- Grimmond CSB, Hanson PJ, Schmid HP, Wullschleger SD, Cropley F (2000) Evapotranspiration rates at the Morgan Monroe State Forest AmeriFlux Site: A comparison of results from eddy covariance turbulent flux measurements and sap flow techniques. *15th Conference on Hydrology*, January 9-14, 2000, American Meteorological Society Long Beach, CA . January 2000, pp 158-161.
- Johnson DW, Susfalk RB, Gholz HL, Hanson PJ (2000) Simulated effects of temperature and precipitation change in several forest ecosystems. *Journal of Hydrology* 235:183-204.
- Joslin JD, Wolfe MH, Hanson PJ (2000) Effects of shifting water regimes on forest root systems. *New Phytologist* 147:117-129.
- Hanson PJ (2000) Large-scale Water Manipulations. Chapter 23 in Sala OE, Jackson RB, Mooney HA, Howarth RW (Eds.) *Methods in Ecosystem Science*, Springer-Verlag, New York. pp. 341-352.
- Wullschleger SD, Wilson KB, Hanson PJ (2000) Environmental control of whole-plant transpiration, canopy conductance and estimates of the decoupling coefficient for large red maple trees. *Agriculture and Forest Meteorology* 104:157-168.
- Wilson KB, Baldocchi DD, Hanson PJ (2000) Quantifying stomatal and non-stomatal limitations to carbon assimilation resulting from leaf aging and drought in mature deciduous tree species. *Tree Physiology* 20:787-797.
- Wilson KB, Hanson PJ, Baldocchi DD (2000) Factors controlling evaporation and energy partitioning beneath a deciduous forest over an annual cycle. *Agriculture and Forest Meteorology* 102:83-103.
- Wilson KB, Baldocchi DD, Hanson PJ (2000) Spatial and seasonal variability of photosynthetic parameters and their relationship to leaf nitrogen in a deciduous forest. *Tree Physiology* 20:565-578.

- Hanson PJ, Edwards NT, Garten CT Jr., Andrews JA (2000) Separating root and soil microbial contributions to soil respiration: a review of methods and observations. *Biogeochemistry* 48:115-146.
- Garten CT Jr., Cooper LW, Post WM III, Hanson PJ (2000) Climate controls on forest soil C isotope ratios in the southern Appalachian Mountains. *Ecology* 81:1108-1119.
- Garten CT Jr., Post WM III, Hanson PJ, Cooper LW (1999) Forest soil carbon inventories and dynamics along an elevation gradient in the southern Appalachian Mountains. *Biogeochemistry* 45:115-145.
- Hanson PJ, Todd DE, Huston MA, Joslin JD, Croker J, Augé. RM (1998) *Description and field performance of the Walker Branch Throughfall Displacement Experiment: 1993-1996*, ORNL/TM-13586, Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Johnson DW, Hanson PJ, Todd DE, Susfalk RB, Trettin C (1998) Precipitation Change and Soil Leaching: Field Results and Simulations from Walker Branch Watershed, Tennessee. *Water Air and Soil Pollution* 105:251-262.
- Luxmoore RJ, Hanson PJ, Beauchamp JJ, Joslin JD (1998) Passive nighttime warming facility for forest ecosystem research. *Tree Physiology* 18:615-623.
- Lindberg SE, Hanson PJ, Meyers TP, Kim KH (1998) Air/surface exchange of mercury vapor over forests: the need for a reassessment of continental biogenic emissions. *Atmospheric Environment* 32:895-908.
- Wullschleger SD, Hanson PJ, Tschaplinski TJ (1998) Whole-plant water flux in understory red maple exposed to altered precipitation regimes. *Tree Physiology* 18:71-79.
- Hanson PJ, Tabberer TA, Lindberg SE (1997) Emissions of mercury vapor from tree bark. *Atmospheric Environment* 31:777-780.
- Kim K-H, Hanson PJ, Barnett MO, Lindberg SE (1997) Biogeochemistry of mercury in the air-soil-plant system. In H. Sigel and A. Sigel, eds. *Metal Ions in Biological Systems, Vol. 34: Mercury and Its Effects on Environment and Biology*. Basel, Hong Kong, pp. 185-212.
- Wullschleger SD, Hanson PJ, Todd DE (1996) Measuring stem water content in four deciduous hardwoods with a time-domain reflectometer. *Tree Physiology* 16: 809-815.
- Wullschleger SD, Hanson PJ, Edwards GS (1996) Growth and maintenance respiration in leaves of northern red oak seedlings and mature trees after three years of ozone exposure. *Plant Cell and Environment* 19:577-584.
- Edwards NT, Hanson PJ (1996) Stem respiration in a closed-canopy upland oak forest. *Tree Physiology* 16:433-439.
- Kelly JM, Samuelson L, Edwards G, Hanson P, Kelting D, Mays A, Wullschleger S (1995) Are seedlings reasonable surrogates for trees? an analysis of ozone impacts on Quercus rubra. *Water Air and Soil Pollution* 85:1317-1324.
- Hanson PJ, Todd DE, Edwards NT, Huston MA (1995) Field performance of the Walker Branch Throughfall Displacement Experiment, In: A. Jenkins, R.C. Ferrier, and C. Kirby, eds., *Ecosystem Manipulation Experiments: scientific approaches, experimental design and relevant results*, Ecosystem Research Report #20, Commission of the European Communities, pp. 307-313.

- Hanson PJ, Lindberg SE, Tabberer TA, Owens JG, Kim K-H (1995) Foliar Exchange of Mercury Vapor: Evidence for a Compensation Point. *Water Air and Soil Pollution* 80:373-382.
- Wullschleger SD, Norby RJ, Hanson PJ (1995) Growth and maintenance respiration in stems of *Quercus alba* after four years of CO₂ enrichment. *Physiologia Plantarum* 93:47-54.
- Tschaplinski TJ, Stewart DB, Hanson PJ, Norby RJ (1995) Interactions between drought and elevated CO₂ on growth and gas exchange of seedlings of three deciduous tree species. *New Phytologist* 129:63-71.
- Hanson PJ, Samuelson LJ, Wullschleger SD, Tabberer TA, Edwards GS (1994) Seasonal patterns of light-saturated photosynthesis and leaf conductance for mature and seedling *Quercus rubra* L. Foliage: Differential sensitivity to ozone. *Tree Physiology* 14:1351-1366.
- Hanson PJ, Hoffman WA (1994) Emissions of non-CH₄ organic compounds and CO₂ from forest floor cores. *Soil Science Society of America Journal* 58:552-555.
- McLaughlin SB, Layton PA, Adams MB, Edwards NT, Hanson PJ, O'Neill EG, Roy WK (1994) Growth responses of 53 open-pollinated loblolly pine families to ozone and acid rain. *Journal of Environmental Quality* 23:247-257.
- Hanson PJ, Wullschleger SD, Bohlman SA, Todd DE (1993) Seasonal and topographic patterns of forest floor CO₂ efflux from an upland oak forest. *Tree Physiology* 13:1-15.
- Luxmoore RJ, Wullschleger SD, Hanson PJ (1993) Forest responses to CO₂ enrichment and climate warming. *Water Air and Soil Pollution* 70:309-323.
- Kim K-H, Lindberg SE, Hanson PJ, Meyers TP, Owens J (1993) Applications of micrometeorological methods to measurements of mercury emissions over contaminated soils. In *Proc. Ninth International Conference on Heavy Metals in the Environment*, Toronto, Canada, Vol 1, pp. 328-331.
- Turner RS, Hanson PJ, Huston MA, Garten CT Jr., Mulholland PJ (1993) A large-scale throughfall manipulation experiment on Walker Branch Watershed. In: Rasmussen L, Brydges T, Mathy P (Eds), *Experimental Manipulations of Biota and Biogeochemical Cycling in Ecosystems: Approach - Methodologies - Findings*, Commission of the European Communities, Copenhagen, Denmark, pp. 96-105.
- Hanson PJ, Garten CT Jr. (1992) Deposition of H¹⁵NO₃ to white oak, red maple, and loblolly pine foliage: experimental observations and a generalized model. *New Phytologist* 122:329-337.
- Taylor GE Jr., Hanson PJ (1992) Forest trees and tropospheric ozone: role of canopy deposition and leaf uptake in developing exposure-response relationships. *Agriculture Ecosystems and Environment* 42:255-273.
- Wullschleger SD, Hanson PJ, Sage RF (1992) PHOTOBIO: Modeling the stomatal and biochemical control of plant gas exchange. *Journal of Natural Resources and Life Science Education* 21:141-145.
- Wullschleger SD, Hanson PJ, Gunderson CA (1992) Assessing the influence of exogenous ethylene on electron transport and fluorescence quenching in leaves of *Glycine max.* *Environmental and Experimental Botany* 32:449-455.

- Hanson PJ, Turner RS (1992) Nitrogen deposition to forest ecosystems: forms, regional inputs, and effects. Proceedings of the 1992 Air and Waste Management Association Annual Meeting, Kansas City, MO, paper No. 92 71.04.
- Pier PA, Thornton FC, McDuffie C Jr., Hanson PJ (1992) CO₂ exchange rates of red spruce during the second season of exposure to ozone and acidic cloud deposition. *Environmental and Experimental Botany* 32:115-124.
- Hanson PJ, Taylor GE Jr., Vose JM (1992) Measurements of reactive nitrogen gas deposition to forest landscape surfaces: biological and environmental controls. In: D.W. Johnson and S.E. Lindberg, eds. *Atmospheric Deposition and Nutrient Cycling in Forest Ecosystems*, Springer-Verlag, New York, pp. 166-177.
- Hanson PJ, Lindberg SE (1991) Dry deposition of reactive nitrogen compounds: a summary of leaf canopy and nonfoliar measurements. *Atmospheric Environment* 25A:1615-1634.
- McLaughlin SB, Anderson CP, Hanson PJ, Tjoelker MG, Roy WK (1991) Increased dark respiration and calcium deficiency of red spruce in relation to acidic deposition at high elevation Southern Appalachian Mountain Sites. *Canadian Journal of Forest Research* 21:1234-1244.
- Wullschlegel SD, Oosterhuis DM, Hurren RG, Hanson PJ (1991) Evidence for light-dependent recycling of respired carbon dioxide by the cotton fruit. *Plant Physiology* 97: 574-579.
- Hanson PJ (one of 6 contributing authors) (1991) Chapter 10. The effects of nitrogen oxides on natural ecosystems and their composition. In: *Air Quality Criteria for Oxides of Nitrogen, Vol II.*, U.S. Environmental Protection Agency, Washington, D.C.
- Garten CT, Hanson PJ (1990) Foliar retention of ¹⁵N-nitrate and ¹⁵N-ammonium by red maple (*Acer rubrum*) and white oak (*Quercus alba*) leaves from simulated acid rain. *Environmental and Experimental Botany* 30:333-342.
- Hanson PJ, Taylor GE Jr. (1990) Modeling pollutant gas uptake by leaves: an approach based on physicochemical properties. In Dixon R et al. (Eds), *Process Modeling of Forest Growth Responses to Environmental Stress*, Timber Press, Portland, Oregon, pp. 351-356.
- Hanson PJ, McLaughlin SB (1990) Continuous gas exchange measurements using individual fascicle cuvettes: the "tubule" system. In Payer HD, Pfirrmann T, Mathy P (Eds) *Environmental Research With Plants in Closed Chambers, Air Pollution Research Report No. 26*, Commission of the European Communities, pp. 143-147.
- Hanson PJ, McLaughlin SB, Garten CT Jr. (1990) Application of artificial rain in experimental systems: methods, results of case studies, and future needs. In Payer HD, Pfirrmann T, Mathy P (Eds) *Environmental Research With Plants in Closed Chambers, Air Pollution Research Report No. 26*, Commission of the European Communities, pp. 223-233.
- Taylor GE Jr, Hanson PJ, Lindberg SE (1990) Deposition and emission of trace gases in controlled environments: A conceptual model, experimental methodologies, and application of results to the disciplines of physiological ecology and biogeochemistry. In Payer HD, Pfirrmann T, Mathy P (Eds) *Environmental*

- Research With Plants in Closed Chambers, Air Pollution Research Report No. 26*, Commission of the European Communities, pp. 194-215.
- Hanson PJ, Rott K, Taylor GE Jr., Lindberg SE, Gunderson CA, Ross-Todd BM (1989) NO₂ deposition to elements of a forest landscape. *Atmospheric Environment* 23:1783-1794.
- Hanson PJ, McLaughlin SB (1989) Growth, photosynthesis, and chlorophyll concentrations of red spruce seedlings treated with mist containing H₂O₂. *Journal of Environmental Quality* 18:499-503.
- Taylor G, Lindberg S, Hanson P, Garten C. (1989) Atmospheric-canopy exchange in forests. *Oak Ridge National Laboratory Review*, Oak Ridge National Laboratory, Oak Ridge, Tennessee, pp. 90-96.
- Norby RJ, Weerasuriya Y, Hanson PJ (1989) Induction of nitrate reductase activity in red spruce needles by NO₂ and HNO₃ vapor. *Canadian Journal of Forest Research* 19:889-896.
- Hanson PJ, Taylor GE Jr, Lindberg SE, Lovett GM (1989) Deposition of reactive nitrogen gases to landscape surfaces. *1988 Annual Report of the Integrated Forest Study, ORNL/TM-11121*, Oak Ridge National Laboratory, Oak Ridge, Tennessee, pp. 96-100.
- Hanson PJ, McLaughlin SB, Edwards NT (1988) Net CO₂ exchange of *Pinus taeda* shoots exposed to variable ozone levels and precipitation chemistries in field and laboratory settings. *Physiologia Plantarum* 74:635-642.
- Hanson PJ, Isebrands JG, Dickson RE, Dixon RK (1988) Ontogenetic patterns of CO₂ exchange of *Quercus rubra* L. leaves during three flushes of shoot growth I. Median Flush leaves. *Forest Science* 34:55-68.
- Hanson PJ, Isebrands JG, Dickson RE, Dixon RK (1988) Ontogenetic patterns of CO₂ exchange of *Quercus rubra* L. leaves during three flushes of shoot growth II. Insertion gradients of leaf photosynthesis. *Forest Science* 34:69-76.
- Taylor GE Jr, Hanson PJ, Baldocchi DD (1988) Pollutant deposition to individual leaves and plant canopies: site of regulation and relationship to injury. In Heck WW, Taylor OC, Tingey DT (Eds) *Assessment of Crop Loss From Air Pollutants*, Elsevier Publishers, pp. 227-257.
- Hanson PJ, McLaughlin SB (1988) Net carbon dioxide exchange characteristics of *Pinus taeda* L. shoots. In *Comparative Sensitivity, Mechanisms, and Whole Plant Physiological Implications of Responses of Loblolly Pine Genotypes To Ozone and Acid Deposition*, ORNL/TM-10777, Oak Ridge National Laboratory, Oak Ridge, Tennessee, pp. 96-123.
- Hanson PJ, McLaughlin SB, Adams MB, Edwards NT (1988) Three techniques for measuring photosynthesis of loblolly pine shoots: comparisons between techniques and their relationship to seedling growth. In *Comparative Sensitivity, Mechanisms, and Whole Plant Physiological Implications of Responses of Loblolly Pine Genotypes To Ozone and Acid Deposition*, ORNL/TM-10777, Oak Ridge National Laboratory, Oak Ridge, Tennessee, pp. 241-254.
- Hanson PJ, Dixon RK, Dickson RE (1987) Effect of container size and shape on the growth of northern red oak seedlings. *HortScience* 22:1293-1295.

- Hanson PJ, McRoberts RE, Isebrands JG, Dixon RK (1987) An optimal sampling strategy for determining CO₂ exchange rate as a function of photosynthetic photon flux density. *Photosynthetica* 21:98-101.
- Hanson PJ, Dixon RK (1987) Allelopathic effects of interrupted fern on northern red oak seedlings: amelioration by *Suillus luteus* L:Fr. *Plant and Soil* 98:43-51.
- Hanson PJ, Isebrands JG, Dickson RE (1987) Carbon budgets of *Quercus rubra* L. seedlings at selected stages of growth: Influence of light. In *Central Hardwood Forest Conference VI. Knoxville, Tennessee, Feb. 24-26*, pp. 269-276.
- Hanson PJ, Dickson RE, Isebrands JG, Crow TR, Dixon RK (1986) A morphological index of *Quercus* seedling ontogeny for use in studies of physiology and growth. *Tree Physiology* 2:273-281.
- Hanson PJ, Sucoff EI, Markhart AH III (1985) Quantifying apoplastic flux through red pine root systems using trisodium 3-hydroxy- 5,8,10- pyrenetrisulfonate. *Plant Physiology* 77:21-24.
- Hanson PJ, Dixon RK (1985) Allelopathic inhibition of northern red oak by interrupted fern and goldenrod. In *Proc. Fifth Central Hardwood Forest Conference, University of Illinois, Urbana-Champaign, IL, April 15-17*, pp. 269-274.

Theses:

- Hanson PJ (1986) *Studies of Quercus rubra L. seedling dry matter accumulation, morphological development, and carbon dioxide exchange under controlled conditions*. Ph.D. Thesis, University of Minnesota, St. Paul, Minnesota, 169 p.
- Hanson PJ (1983) *Apoplastic water flux through root systems of Pinus resinosa Ait. Seedlings*. M.Sc. Thesis, University of Minnesota, St. Paul, Minnesota, 53 p.

Recent Abstracts and Presentations (last 5 years)

- Hanson PJ, Kolka RK, Iversen C, Sebestyen SD, Norby RJ, Palik B, Thornton P, Warren J, Wullschleger SD, Les Hook L (2012) Spruce-Peatland Responses Under Climatic and Environmental Change An *In Situ* Warming by CO₂ Manipulation of a Characteristic High-Carbon Ecosystem. The 14th International Peat Congress Peatlands in Balance, 3 to 8 June 2012, Stockholm, Sweden.
- Iversen CM, Hanson PJ, Childs J, Norby RJ, Kolka RK, Barbier C, Bisht G, Griffiths NA, Hook LA, Palik B, Schadt CW, Sebestyen SD, Steinweg JM, Thomas WK, Thornton PE, Warren JM, Weston DJ, Wullschleger SD (2012) Spruce Peatland Responses Under Climatic and Environmental change: An *in situ* warming by CO₂ manipulation of a peatland ecosystem. 9th INTECOL Wetlands Conference - Wetlands in a Complex World, 3 to 8 June 2012, Orlando, Florida.
- Kolka RK, Hanson PJ, Iversen C, Sebestyen SD, Norby RJ, Palik B, Thornton P, Warren J, Wullschleger SD, Hook L (2012) Spruce-peatland responses under climatic and environmental Change (SPRUCE Experiment): An *in situ* warming by CO₂ manipulation of a characteristic high-carbon ecosystem. BIOGEOMON 2012: The 7th International Symposium on Ecosystem Behavior, 15 to 20 July 2012, Lincolnville, Maine.
- Hanson PJ, Wullschleger SD, Norby RJ, Gunderson CA (2011) Impacts of Environmental and Atmospheric Changes On Carbon Storage and Exchange in Upland Deciduous Forests: Current Patterns and Future Projections. 96th Annual Meeting of the Ecological Society of America, 7 to 12 August 2011, Austin, Texas. [Invited Presentation OOS 11-2]
- Hanson PJ, Kolka RK, Norby RJ, Wullschleger SD, Garten Jr. CT, Sebestyen SD, Thornton PE, Bradford J, Mulholland PJ, Todd DE, Iversen C, Warren J, Hook L. (2011) Spruce Peatland Responses Under Climatic and Environmental Change: a Replicated In Situ Warming By CO₂ Manipulation of a Characteristic High-Carbon Ecosystem. 2011 AmeriFlux/NACP All Investigators Meeting, Poster Abstract G-156.
- Hanson PJ, McFarlane K, Torn MS, Matamala R, Guilderson T, Jastrow JD, Callahan MA, Trumbore S, Parton Jr. WJ, and EBIS-Site Operators (2011) Multiyear Applications of ¹⁴C-Enriched Leaf Litter at Temperate Deciduous Forests Across the Eastern United States: Application to Direct Observations of Soil Carbon Transport and Storage Dynamics In Organic and Mineral Soils. 2011 AmeriFlux/NACP All Investigators Meeting, Poster Abstract G-155.
- Hanson PJ, Kolka RK, Norby RJ, Palik B, Wullschleger SD, Garten Jr. CT, Sebestyen SD, Thornton PE, Bradford J, Mulholland PJ, Todd DE, Iversen C, Warren J (2010) Evaluating spruce peatland responses under climatic and environmental change using a replicated in situ field manipulation. Abstract : B21A-0293 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec
- Mulholland PJ, Sebestyen SD, Hanson PJ, Warren J, Kolka RK (2010) Water research within the spruce experiment, a large-scale study of climate change effects on a northern peatland. Abstract H41G-1178 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec

- Vargas R, Baldocchi DD, Bahn M, Hanson PJ, Hosman K, Kulmala L, Pumpanen J, Yang, B (2010) On the temporal correlation between photosynthesis and soil respiration: reconciling lags and observations. Abstract B11D-0383 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
- Hanson PJ et al. (2010) Simultaneous Above- and Belowground Warming of Intact Ecosystem Plots to Achieve Hypothetical Future Climates. Invited talk presented at the Climate Change Experiments in High-Latitude Ecosystems meeting held in Fairbanks, Alaska 14-15 October.
- Hanson PJ, Wullschleger SD, Todd DE, Augé RM, Fröberg M, Johnson DW (2010) Oak forest responses to episodic-seasonal-drought, chronic multi-year precipitation change and acute drought manipulations in a region with deep soils and high precipitation. Invited presentation for the European Geosciences Union General Assembly 2010, 2-7 May 2010, Vienna, Austria, Session BG2.6.
- McFarlane KJ, Torn MS, Hanson PJ, Swanston C, Guilderson TP, Porras RC (2009) Comparison of Soil Organic Matter Dynamics at Four Temperate Deciduous Forests with Physical Fractionation and Radiocarbon Measurements. AGU Fall Meeting 14 to 18 December 2009, San Francisco, B53G-02.
- Hanson PJ (2009) Spruce and Peatland Responses Under Climatic and Environmental Change: SPRUCE Experiment Overview. U. S. Department of Energy, Program for Ecosystem Research (PER) 2009 Investigators Meeting, 17 and 18 November 2009, Arlington, Virginia.
- Parton WJ, Kelly RH, Swanston CW, Hanson PJ (2009) Ecosystem models: the use of models as an overarching framework to synthesize knowledge of the root-soil continuum. 94th Ecological Society of America Annual Meeting, Albuquerque, New Mexico, 2 to 7 August, 2009, Talk # OOS 3-10.
- Hanson PJ, Kolka RK, Norby RJ, Palik B, Wullschleger SD, Garten CT Jr, Sebestyen SD, Thornton PE, Bradford J, Mulholland PJ, Todd DE, Iversen C, Warren J (2009) Evaluating spruce-peatland responses under climatic and environmental change using an in situ field manipulation. Marcell Experimental Forest 50th Anniversary Symposium, 22 to 25 June 2009, Grand Rapids, Minnesota.
- Hanson PJ (2008) Report on the workshop: "Exploring Science Needs for the Next Generation of Climatic Change and Elevated CO₂ Experiments in Terrestrial Ecosystems" held 14-18 April 2008. DOE BERAC Meeting 18-20 May 2008 (invited speaker).
- Hanson PJ (2008) Organized the DOE-Sponsored Next Generation Ecosystems Experiment Workshop providing introductory comments and a summary of a pre-meeting survey of participant opinions on the topic, 14-18 April 2008, Washington D.C.
- Hanson PJ (2008) Natural and Managed Ecosystems: Direct Impacts of Climate and Atmospheric Change on Ecosystems and Their Role in Climate Forcing through Structural, Compositional, and Functional change. 26 March 2008, DOE Climate Change Grand Challenges Workshop (invited talk).
- Hanson PJ (2008) Carbon cycling and stand dynamics in upland oak forests of the southeastern United States. 25 February 2008, Yale University (invited talk).
- Hanson PJ (2007) Invited Discussant, Soil Respiration Workshop, 11-12 September 2007, Durham, New Hampshire.

- Hanson PJ (2007) Discussion leader on Biogeochemical Cycling observations. Simulation and Modeling at the Exascale for Energy, Ecological Sustainability and Global Security (E3SGS) Town Hall Meeting, Oak Ridge, Tennessee May 17-18, http://computing.ornl.gov/workshops/town_hall/index.shtml
- Hanson PJ (2006) Should We Be Concerned About Future Drought Impacts on Upland-Oak Forest Function and Growth? An invited talk presented to the interdisciplinary climate research group at Penn State University 15 February 2006.
- Jastrow JD, O'Brien SL, Moran KK, Swanston C, Hanson P (2006) Incorporation of radiocarbon from forest litter and roots into microaggregate-protected and unprotected soil carbon pools. 2006 Annual Meeting Abstracts Soil Science Society of America 12-16 November, Indianapolis, Indiana.
- Swanston C, Torn M, Hanson P (2006) Tracing carbon-14 flux and stabilization: the Enriched Background Isotope Study (EBIS). Annual Meeting Abstracts Soil Science Society of America 12-16 November 2006, Indianapolis, Indiana.
- Hanson PJ (2006) Wilton Park Conference on Forestry: a sectoral response to climate change. Invited Rapporteur and Discussant, 21-23 November 2006, England.
- Hanson PJ (2006) Precipitation Change Responses of an Upland Oak Forest and Their Relationship to Future Multi-Factor Environmental Change Scenarios. Invited talk presented to the Institute of Botany, Chinese Academy of Science, September 2006, Beijing, China.
- Hanson PJ, Gunderson CA, Wullschleger SD (2006). Throughfall Displacement Experiment (TDE) Understanding Mechanisms of Eastern Deciduous Forest Ecosystem Adjustments to Altered Precipitation. Invited talk at the Effects of Precipitation Change on Terrestrial Ecosystems (EPRECOT) Workshop, May 2006, Elisionre, Denmark.
- Hanson PJ, Wullschleger SD, Amthor JS (2005) Eastern deciduous forest responses to climatic change drivers: an upland-oak forest case study. U.S. Climate Change Science Program Workshop, Climate Science in Support of Decision Making, 14-16 November 2005, Abstract #P-EC4.5, p. 59.
- Gu, L, Hanson P, Wullschleger S, Yang B, Pallardy S, Meyers T (2005) Challenges to estimating nocturnal terrestrial ecosystem carbon dioxide and water vapor fluxes using micrometeorological techniques. 90th Annual Meeting of the Ecological Society of America. 7-12 August, 2005, Montreal, Canada.
- Wullschleger S, Hanson P (2005) Sensitivity of canopy transpiration to altered precipitation regimes in an upland oak forest. 90th Annual Meeting of the Ecological Society of America. 7-12 August, 2005, Montreal, Canada.
- Hanson PJ, Johnson DW, Wullschleger SD (2005) Oak forest responses to chronic precipitation change over one decade. Talk presented at the XXII IUFRO World Congress 8-13 August 2005, Brisbane, Australia. Abstract published in *The International Forestry Review* 7(5):78.

Ad Hoc Reviewer (Journal and years)

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American Journal of Botany 94
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Nature Geoscience 11
New Phytologist 06 04 02 01 00 95
Oecologia 11 04 03 02 01
Physiologia Plantarum 93 91, 90
Plant, Cell and Environment 07
Plant and Soil 00
Plant Physiology 94
Plant Physiology and Biochemistry 93
Proceedings of the National Academy of Sciences US 08
Science 01
Soil Biology and Biochemistry 05
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Trees 05

Trends in Ecology & Evolution 05
Water Air and Soil Pollution 93
Wetlands Ecology and Management 04

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