

JEFFREY M. WARREN

Plant Physiological Ecology – Climate Change
Environmental Sciences Division, Oak Ridge National Laboratory
Building 2040, Oak Ridge, TN 37831–6422
warrenjm@ornl.gov Phone: (865) 241-3150

9/10/2011

RESEARCH EXPERIENCE

- 2010- Staff Scientist, Oak Ridge National Laboratory
 - Response of climate change on terrestrial ecosystems.
- 2007-2009 Research Associate, Oak Ridge National Laboratory
 - Free-air CO₂ enrichment (FACE) water relations in temperate forests.
- 2002-2007 Postdoctoral Research Forester, USDA Forest Service PNW Research Station
 - Soil, plant, ecosystem water relations in temperate forests
- 1999-2002 Graduate Fellow, US EPA Science to Achieve Results Program
 - UV-B radiation impacts on tree ecophysiology.
- 2001-2002 Research Technician, Washington State University
 - Analytical plant biochemistry
- 1997-2002 IT Administrator, Washington State University
 - Lead administrator of CAHE computer teaching labs
- 1994-1996 Research Assistant, NC State University Forest Nutrition Cooperative
 - Ecophysiology, growth-differentiation balance.

EDUCATION

- 2002 Ph.D. Washington State University (*Tree Physiology*)
- 1996 M.S. North Carolina State University (*Forest Science/Ecology*)
- 1991 B.S. Miami University (*Engineering Physics*)

PROFESSIONAL ACTIVITIES & RECOGNITION

Honors and Awards

- 2010 ORNL Laboratory Directed Research and Development Program, “Neutron imaging of fluids within plant-soil-groundwater systems”, with H. Bilheux, J. Horita and E. Perfect (UT Knoxville). Funding renewed FY 2011, 2012
- 2010- ORNL High Flux Isotope Reactor Beam Time awarded.
- 2009 ORNL Capital Funds Requisition of Picarro water isotope analyzer
- 2008 ORNL Seed Money Proposal, “*In situ* neutron imaging of soil-plant water flux”, with S. Wullschleger and H. Bilheux
- 2003 Dissertations Initiative for the Advancement of Climate Change Symposium I Scholar
- 1999 EPA Science to Achieve Results Graduate Fellowship Recipient
- 1999 Washington State University Competitive Summer Stipend Recipient
- 1995 North Carolina Wildlife Federation Scholarship Recipient

Professional Involvement

- 2011 Technical Program Committee for Future of Instrumentation International Workshop
- 2010- ORNL Seed Money Review Committee
- 2009- Proposal Reviewer: ORNL Neutron Scattering Science Program
- 2008 Member – Instrument Development Team of proposed new neutron research beam line at ORNL: Versatile Neutron Imaging Instrument at the Spallation Neutron Source (*VENUS*)

- 2008 Application Review Committee – *Dissertations Initiative for the Advancement of Climate Change Research Symposium (DISCCRS IV)*, Portland, OR
- 2008 Organizing Committee – ORNL – *Young Evolving Scientist’s Seminar Series*
- 2008 Organizer – Oral session. “Ecohydrology: Integrating Current Knowledge of Water Flux along the Soil-Plant-Atmosphere Continuum.” *Ecological Society of America Annual Meeting*.
- 2001- Reviewer: *Acta Physiologiae Plantarum, ANR –France, NSF, DOE, Ecohydrology, Ecological Applications, Forest Ecology & Management, Forest Science, Frontiers in Zoology, Fungal Ecology, Global Change Biology, Isotopes in Environmental & Health Studies, J. Arid Environments, J. Applied Ecology, J. Environmental Quality, Mycorrhiza, Neutron Imaging & Applications, New Phytologist, Northwest Science, Oecologia, Neutron Scattering Science Program, Plant and Soil, Sensors, Tree Physiology, Water Resources Research*.
- 1993- Member: *American Geophysical Union, Ecological Society of America, Phi Kappa Phi, Society of American Foresters, Soil Science Society of America, Xi Sigma Pi*

University Involvement

- 2010- Adjunct Assistant Professor – Dept. of Forestry, Wildlife and Fisheries, UT-Knoxville.
- 2002- Supervised multiple graduate students, undergraduate students and temporary lab technicians, provided mentoring advice to various undergraduate, graduate and postdoctoral students
- 2005- Guest Lecturer – Dept. of Forest Science, Oregon State University;
Dept. of Natural Resources and Environmental Sciences, Alabama A&M University;
Dept. of Forestry, Wildlife and Fisheries, University of Tennessee
- 1998 Silviculture Instructor – Dept. of Natural Resource Sciences, Washington State University
- 1997-1999 Teaching Assistant – Dept. of Natural Resource Sciences, Washington State University
- 1993-1996 Teaching Assistant & Tutor – Dept. of Forest Resources, North Carolina State University

Presentations (by Warren) – Invited Papers & Posters

- (1) Warren, JM. 2000. “Effects of enhanced UV-B radiation on tree biochemistry and herbivory.” *Poster*, EPA STAR Graduate Fellowship Conference, Washington, D.C.
- (2) Warren, JM. 2001. “Alteration of foliar flavonoid composition induced by enhanced UV-B radiation in field-grown *Pinus ponderosa*, *Quercus rubra* and *Pseudotsuga menziesii*.” *Poster*, William R. Wiley Research Exposition, WSU, Pullman, WA.
- (3) Warren, JM. 2003. “UV-B radiation, Trees, and Herbivory.” *Oral*, Dissertations Initiative for Climate Change Research Symposium, Guanica, Puerto Rico.
- (4) Warren, JM. 2005. “Tree response to environment: radiation, nutrients and water.” *Oral*, Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC.
- (5) Warren, JM. 2006. “Hydro-physiology in Pacific NW conifers - from fungi to foliage.” *Oral*, USDA, Agricultural Research Service, Crops Pathology/Genetics Research Unit Special Seminar, UC Davis, Davis, CA.
- (6) Warren, JM. 2006. “Plant Response to Environment - growth vs. defense.” *Oral*, USDA, ARS, Tree Fruit Research Laboratory, Wenatchee, WA.
- (7) Warren, JM. 2007. “Hydro-physiology in Pacific NW conifers - from fungi to foliage.” *Oral*, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN.
- (8) Warren, JM. 2008. “Ecohydrology in a changing world.” *Oral*, Dept. of Natural Resources and Environmental Sciences, Alabama A&M University, Normal, AL.
- (9) Warren, JM. 2008. “Hydro-physiological response to drought by trees developed under elevated CO₂.” *Oral*, Young Evolving Scientist’s Seminar Series, Oak Ridge National Laboratory, Oak Ridge, TN.

- (10) Warren, JM, RJ Norby & SD Wullschleger. 2008. "Extreme climatic events drive ecosystem water flux under elevated CO₂ in a temperate forest." *Poster*, Joint BSD-ESD Advisory Committee Meeting Reception, Oak Ridge National Laboratory, Oak Ridge, TN.
- (11) Warren, JM. 2008. "Physiological and environmental controls of tree water use." *Oral*, Annual Meeting of the Ecological Society of America, Milwaukee, WI.
- (12) Warren, JM, H. Bilheux, S. Wullschleger. 2009. "Neutron imaging of plant-soil systems at Oak Ridge National Lab." *Poster*, Office of the Laboratory Director LDRD annual poster session, Oak Ridge National Laboratory, Oak Ridge, TN.
- (13) Warren, JM. 2009. "FACE Drought or Die - Climate Change and Terrestrial Plant Water Relations." *Oral*, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN.
- (14) Warren, JM. 2010. "Terrestrial water relations and climate change." *Oral*, Department of Forestry, Wildlife and Fisheries, University of Tennessee, Knoxville, TN.

Presentations (by Warren) – Offered Papers & Posters

- (15) Warren, JM, HL Allen and FL Booker. 1996. "Mineral nutrition, resin flow and phloem phytochemistry in loblolly pine." *Oral*, Annual meeting of the Ecological Society of America, Providence, RI.
- (16) Warren, JM, JH Bassman, DS Mattinson, JK Fellman, GE Edwards and R Robberecht. 2000. "Alteration of foliar flavonoid composition induced by enhanced UV-B radiation in *Pinus ponderosa*, *Quercus rubra* and *Pseudotsuga menziesii*." *Poster*, Workshop on the Impacts of UV Radiation on Terrestrial and Aquatic Ecosystems, "Stratospheric Processes and their Role in Climate, World Climate Research Program," Mar del Plata, Argentina.
- (17) Warren, JM. 2000. "UV-B radiation, poplar phytochemistry and herbivory." *Oral*, 16th North American Forest Biology Workshop & the Western Forest Genetics Association Conference, "The Impact of Global Environmental Change on Forests, and Impacts of Forests on Global Environmental Change," Merida, Mexico.
- (18) Warren, JM, JH Bassman and S Eigenbrode. 2001. "Phytochemical changes induced in *Populus trichocarpa* by UV-B radiation and effects on cottonwood leaf beetle behavior." *Poster*, IUFRO Forest Canopy Processes Traveling Workshop in Oregon and Washington.
- (19) Warren, JM, FC Meinzer, JR Brooks, J-C Domec, R Coulombe. 2003. "Soil H₂O dynamics and hydraulic redistribution at Wind River." *Oral*, Wind River Canopy Crane Research Facility annual meeting, Carson, WA.
- (20) Warren, JM, JR Brooks, FC Meinzer, J-C Domec, R Coulombe. 2003. "Similarities in hydraulic redistribution of soil water in dry and moist coniferous forests." *Oral*, 4th North American Forest Ecology Workshop, Corvallis, OR.
- (21) Warren, JM, FC Meinzer, J-C Domec and JR Brooks. 2003. "Initiation, control and magnitude of hydraulic redistribution." *Oral*, 3rd International Symposium on Dynamics of Physiological Processes in Woody Roots, Perth, Australia.
- (22) Warren, JM, FC Meinzer, JR Brooks and JC Domec. 2004. "Vertical stratification of soil water storage and release dynamics in Pacific Northwest coniferous forests." *Oral*, Annual meeting of the Ecological Society of America, Portland, OR.
- (23) Warren, JM, FC Meinzer, JR Brooks, J-C Domec, R Coulombe. 2004. Soil water hydraulic redistribution and release dynamics in Pacific Northwest coniferous forests. *Poster*, Wind River Canopy Crane Research Facility annual meeting, Stevenson, WA.
- (24) Warren, JM, JR Brooks, FC Meinzer. 2006. "Can mycorrhizal fungi transport water between trees?" *Oral*, Wind River Canopy Crane Research Facility annual meeting, Stevenson, WA.
- (25) Warren, JM, JR Brooks, FC Meinzer. 2006. "Hydraulic redistribution via mycorrhizal symbiots of pine." *Oral*, Annual meeting of the Ecological Society of America, Memphis, TN.
- (26) Meinzer, FC, JM Warren, JR. Brooks. 2006. "Partitioning of soil water resources in an old-growth Douglas-fir/western hemlock forest." *Poster*, Annual meeting of the Ecological Society of America, Memphis, TN.

- (27) Warren, JM, JR Brooks, MI Dragila, FC Meinzer. 2007. "Separating hydraulic redistribution from unsaturated liquid and vapor flow of soil water." *Poster*, Annual meeting of the Ecological Society of America, San Jose, CA.
- (28) Warren, JM, R Norby, S Wullschleger. 2007. "Do extreme climatic events drive ecosystem water flux under elevated CO₂ in a temperate forest?" *Poster*, Fall meeting of the American Geophysical Union, San Francisco, CA.
- (29) Warren, JM, C Iversen, J Ledford, RJ Norby. 2008. "Fine Root Dynamics Alter Biogeochemical Fluxes at Soil Depths up to 60 cm in a CO₂-Enriched Sweetgum Plantation." *Oral*, Joint annual meeting of GSA, SSSA-ASA-CSSA, Houston, TX.
- (30) Warren, JM, R Norby, S Wullschleger. 2009. "Elevated CO₂ reduces water use, and shifts extraction downward in sweetgum." *Oral*, Annual meeting of the Ecological Society of America, Albuquerque, NM. (presented by Norby)
- (31) Warren, JM, S Wullschleger, H Bilheux. 2009. "Neutron imaging of plant-soil systems at Oak Ridge National Lab." *Poster*, SSSA-ASA-CSSA International Annual Meetings, Pittsburgh, PA. (Nov 1-5).
- (32) Warren, JM, R Norby, S Wullschleger. 2009. "Elevated CO₂ reduces water use, and shifts extraction downward in sweetgum." *Oral*, Annual meeting of the Ecological Society of America, Albuquerque, NM. (presented by Norby)
- (33) Warren, JM, 2010. "Sweetgum plantation water use under elevated CO₂." *Oral*, A watershed perspective on bioenergy sustainability workshop, Oak Ridge, TN (Feb 3-4)
- (34) Warren, JM, RJ Norby, BE Medlyn. 2010. "Elevated CO₂ initially stimulates photosynthesis in sweetgum, but effects dissipate after a decade." *Poster*, Annual meeting of the Ecological Society of America, Pittsburgh, PA.
- (35) Warren, JM, J Childs, C Gunderson, P Hanson, S Wullschleger. 2011. "Ecophysiology of woody plants in an ombrotrophic spruce bog – potential impacts with climate change." *Oral*, Annual meeting of the Ecological Society of America, Austin, TX.

Publications

- (1) Warren, JM, HL Allen and FL Booker. 1999. "Mineral nutrition, resin flow and phloem phytochemistry in loblolly pine." *Tree Physiology* 19: 655-663.
- (2) Warren, JM, JH Bassman and S Eigenbrode. 2002. "Leaf chemical changes induced in *Populus trichocarpa* Torr. & Gray by enhanced UV-B radiation and concomitant effects on herbivory by *Chrysomela scripta* Fab. (Coleoptera: Chrysomelidae)." *Tree Physiology* 22: 1137-1146.
- (3) Warren, JM, JH Bassman, DS Mattinson, JK Fellman, GE Edwards and R Robberecht. 2002. "Alteration of foliar flavonoid composition induced by enhanced UV-B radiation in *Pinus ponderosa*, *Quercus rubra* and *Pseudotsuga menziesii*." *Journal of Photochemistry and Photobiology B: Biology* 66: 125-133.
- (4) Drobot, S, D Porinchu, K Arzayus, V Barber, L Delissio, L M Smith and JM Warren. 2003. "The 'ideal' climate change Ph.D. program." DISCCRS I. Dissertations initiative for the advancement of climate change research working group. <http://www.discdrs.org/reports/discdrsclimatechange.pdf>
- (5) Warren, JM, JH Bassman, JK Fellman, DS Mattinson and S Eigenbrode. 2003. "Ultraviolet-B radiation alters phenolic salicylate and flavonoid composition of *Populus trichocarpa* leaves." *Tree Physiology* 23: 527-535.
- (6) Meinzer FC, JR Brooks, S Bucci, G Goldstein, FG Scholz and JM Warren. 2004. "Converging patterns of uptake and hydraulic redistribution of soil water in contrasting woody vegetation types." *Tree Physiology* 24:919-928.
- (7) Domec, J-C, JM Warren, FC Meinzer, JR Brooks and R Coulombe. 2004. "Native root xylem embolism and stomatal closure in stands of Douglas-fir and ponderosa pine: mitigation by hydraulic redistribution." *Oecologia* 141:7-16.

- (8) Meinzer FC, BJ Bond, JM Warren and DR Woodruff. 2005. "Does water transport scale universally with tree size?" *Functional Ecology* 19:558-565.
- (9) Warren, JM, FC Meinzer, JR Brooks and J-C Domec. 2005. "Vertical stratification of soil water storage and release dynamics in Pacific Northwest coniferous forests." *Agricultural and Forest Meteorology* 130:39-58.
- (10) Brooks, JR, FC Meinzer, JM Warren, J-C Domec and R Coulombe. 2006. "Hydraulic redistribution in a Douglas-fir forest: Lessons from system manipulations." *Plant, Cell and Environment* 29:138-150. *Received an EPA Scientific and Technological Achievement Award (STAA Level III).*
- (11) Meinzer, FC, JR Brooks, J-C Domec, BL Gartner, JM Warren, D Woodruff, K Bible and DC Shaw. 2006. "Dynamics of water transport and storage in conifers studied with deuterium and heat tracing techniques." *Plant, Cell and Environment* 29:105-114.
- (12) Warren, JM, FC Meinzer, JR Brooks, J-C Domec and R Coulombe. 2007. "Hydraulic redistribution of soil water in two old-growth coniferous forests: quantifying patterns and controls." *New Phytologist* 173:753-765.
- (13) Meinzer, FC, JM Warren, JR Brooks. 2007. "Species-specific partitioning of soil water resources in an old-growth Douglas-fir/western hemlock forest." *Tree Physiology* 27:871-880.
- (14) Woodruff, DR, KA McCulloh, JM Warren, FC Meinzer, BL Gartner. 2007. "Impacts of tree height on leaf hydraulic architecture and stomatal control in Douglas-fir." *Plant, Cell and Environment* 30:559-569.
- (15) Warren, JM, JR Brooks, FC Meinzer, JL Eberhart. 2008. "Hydraulic redistribution of water from *Pinus ponderosa* trees to seedlings: evidence for an ectomycorrhizal pathway" *New Phytologist* 178: 382-394.
- (16) Domec, J-C, BL Lachenbruch, FC Meinzer, D Woodruff, JM Warren, KA McCulloh. 2008. "Maximum height in a conifer is associated with conflicting requirements for xylem design." *PNAS* 105:12069-12074.
- (17) Domec, J-C, JM Warren, FC Meinzer, BL Lachenbruch. 2009. "Safety factors for xylem failure by implosion and air-seeding within roots, trunks and branches of young and old conifer trees." *IWA Journal* 30:100-120.
- (18) Hanson, PJ, KW Childs, SD Wullschleger, JS Riggs, WK Thomas, DE Todd, JM Warren. 2010. "A method for experimental heating of intact soil profiles for application to climate change experiments" *Global Change Biology* 17:1083-1096.
- (19) Norby RJ, JM Warren, CM Iversen, BE Medlyn, RE McMurtrie. 2010. "CO₂ enhancement of forest productivity constrained by limited nitrogen availability." *PNAS* 107: 19368-19373.
- (20) Warren, JM, E Pötzelsberger, SD Wullschleger, PE Thornton, H Hasenauer, RJ Norby. 2011. "Ecohydrologic impact of reduced stomatal conductance in forests exposed to elevated CO₂" *Ecohydrology* 4:196-210.
- (21) Warren, JM, RJ Norby, SD Wullschleger. 2011. "Elevated CO₂ enhances premature leaf senescence during extreme climatic events in a temperate forest." *Tree Physiology* 31:117-130.
- (22) Warren, JM, JR Brooks, MI Dragila, FC Meinzer. 2011. "In situ separation of root hydraulic redistribution of soil water from liquid and vapor transport." *Oecologia* 166:899-911.