

Andrew J. Burton - Research Associate Professor

School of Forest Resources and Environmental Science
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931

Phone: (906) 487-2566 Email: ajburton@mtu.edu

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Research Interests:

Forest responses to global change factors Belowground processes
Carbon and nutrient cycling Physiological ecology of tree roots
Undergraduate involvement in research

Education:

Ph.D. 1997 Forest Science (Forest Ecology), Michigan Technological University
M.S. 1986 Forestry (Soils and Hydrology), Michigan State University
B.S. 1983 Forestry, Michigan State University

Professional Experience:

2005 to present Research Associate Professor and Lecturer, School of Forest Resources and Environmental Science, Michigan Technological University
Assistant Director, Midwestern Regional Center of the National Institute for Climatic Change Research
2003 to 2005 Research Assistant Professor, School of Forestry and Wood Products, Michigan Technological University
2001 to 2003 Research Assistant Professor, School of Forestry and Wood Products, Michigan Technological University
1994 to 2001 Research Scientist, Forest Ecology Lab, School of Forestry and Wood Products, Michigan Technological University.
1995 Lecturer, School of Natural Resources & Environment, University of Michigan. (Winter Semester only)
1987 to 1994 Research Specialist, Forest Ecology Lab, Department of Forestry, Michigan State University.
1984 to 1986 Graduate Research Assistant, Department of Forestry, Michigan State University.

Awards and Honors:

Certified Senior Ecologist by the Ecological Society of America

Certified Forester (#3355) by the Society of American Foresters

Member of honorary societies Sigma Xi, Phi Kappa Phi, and Xi Sigma Pi

Included in Who's Who Among America's Teachers for 2004 and 2005. Must be nominated by a student who is on The National Dean's List. Only 2% of the nation's teachers are included in more than one edition.

Top 10% of MTU instructors on student evaluation forms (Fall 2003)

Best paper, 1998 Soil Science Society of America meeting (Division S-7, Session 8)

Best paper, 2003 Soil Science Society of America meeting (Division S-7, Session 13)

National Merit Scholar (1979)

Michigan State University Board of Trustees Award (1983) for placing 2nd out of 1,901 Fall 1983 graduates

Teaching:

Instructor	FW3330, "Soil Science", School of Forest Resources and Environmental Science, Michigan Technological University, Fall Semester 2006.
Instructor	FW3190, "Multi-resource Assessment", School of Forest Resources and Environmental Science, Michigan Technological University, Fall Semester 2005. Significantly revised this existing course.
Instructor	FW3180, "Geomorphology, Landscapes and Ecosystems", School of Forest Resources and Environmental Science, Michigan Technological University, Fall Semester 2005. Revised the landscape and ecosystem portions of this existing course.
Instructor	FW2020, "Basic Ecology Field Skills", School of Forest Resources and Environmental Science, Michigan Technological University, Fall Semester 2004 - 2006. Developed and implemented this new course for Fall Semester 2004.
Instructor	FW2050, "Measuring Forest Resources", School of Forestry and Wood Products, Michigan Technological University, Fall Semester 2000 - 2004. Developed and implemented this new course for Fall Semester 2000.
Lecturer	NR432, "Hydrology and Watershed Management", School of Natural Resources & Environment, University of Michigan, Winter 1995.
Teaching Assistant	Forest Hydrology (2 years), Dendrology, and Forest Ecology at MSU.
Guest Lecturer	Dendrology, Forest Soils, Forest Hydrology, Forest Ecology, and Advanced Forest Ecology.

Research Projects:

Michigan Gradient Study (Co-PI). 1987 - 2007. Nitrogen (N) saturation of terrestrial ecosystems is one of the most important contemporary ecological issues. Researchers at Michigan Technological University and the University of Michigan are adding nitrate (NO_3^-) to northern hardwood forests in Michigan to learn how this common Lakes States forest type responds to chronic N additions. The Michigan Gradient study was established in 1987 to examine the effects of climate and atmospheric deposition on ecosystem processes in the Great Lakes region and continues today with support from NSF. Four northern hardwood study sites extend 500 km from northwestern Upper Michigan to southern Lower Michigan. Since 1994, these study sites have received experimental N additions ($30 \text{ kg NO}_3^- \text{-N ha}^{-1} \text{ y}^{-1}$), intended to simulate high levels of chronic atmospheric N deposition. The purpose of this field experiment is to understand the mechanisms controlling carbon (C) and N cycling in the face of chronic N deposition and the long-term consequences of N saturation.



The N additions have caused advanced stages of N saturation to occur in this very common northern hardwood ecosystem that spans an entire biome in the Great Lakes region of the USA. Current work is designed to elucidate the mechanisms and consequences of altered ecosystem metabolism resulting from N saturation. Specifically, increased N availability is hypothesized to induce an “enzymatic latch”, which decreases decomposition and enhances C storage in the soil. Decreased soil CO_2 efflux and increased surface soil C content have been measured at the study sites, in agreement with this hypothesis. It is predicted that nitrate (NO_3^-), dissolved organic carbon (DOC) and dissolved organic nitrogen (DON) will continue to leach from these ecosystems, as they have done thus far in response to the NO_3^- deposition treatment. These forests are becoming totally N saturated, with leaching outputs that equal simulated atmospheric inputs.

REU Site for Ecosystems in Transition (PI). 2004 - 2006. Each summer, ten Research Experiences for Undergraduates (REU) students spend the summer at Michigan Technological University examining ecosystems in transition. The students work with faculty mentors on existing large-scale, long-term, interdisciplinary experiments examining the responses of forest ecosystems to climatic variations, anthropogenic pollutants, changing wildlife populations, exotic species invasions and ecosystem restoration efforts. During the ten-week program, each student develops and carries out an independent research project examining a specific aspect of an important environmental issue. During the second half of the program, many of the students spend periods of time off-campus at field research locations.



In addition to their research, the REU students participate in educational training sessions on experimental design, communicating science to professional and lay audiences, and ethics in science. Through a series of Case Study discussions, they also examine the role that basic research plays in improving our understanding of ecosystem function and the development of environmental policy. At the end of the ten-week session, the students present their research findings at a symposium sponsored by MTU. The work of all REU students will be published by MTU, and students are encouraged to submit their results to peer-reviewed journals. The REU students are able to explore career possibilities through meetings with invited speakers from universities, government agencies and private industry, attendance at a national scientific meeting, and a career workshop.

Cross-Site Study: A cross-biome examination of belowground C allocation (Co-PI). 1997 - 2001. Plants devote considerable energy to the production and maintenance of small-diameter roots and their associated mycorrhizal fungi. How this belowground allocation of carbon responds to environmental variables, such as temperature and moisture, and to altered availability of resources, such as nitrogen, is fundamental to our understanding of ecosystem function.



To address these questions, researchers in the Forest Ecology group at MTU quantified root and soil respiration, root system architecture, root production and mortality, and mycorrhizal community composition in ten common North American forest ecosystems.

The research was conducted in cooperation with co-investigators at the University of Alaska-Fairbanks, the University of Georgia, and the University of California-Riverside. The study sites represent a wide range of environmental conditions and spanned several North American biomes. They included flood plain balsam poplar and white spruce forests at the Bonanza Creek LTER in Alaska; a red pine plantation and a sugar maple-dominated northern hardwood forest in Michigan; a pinyon-juniper woodland at the Sevilleta LTER in New Mexico; mixed hardwood, oak-hickory, and yellow-poplar forests at the Coweeta LTER in North Carolina; a mixed-oak forest in Central Georgia; and a slash pine plantation in Florida.

Carbon and Nutrient Cycling in Olympic National Park (Co-PI). 1998-2002

This study was a collaborative research between MTU, the Environmental Protection Agency and the National Park Service. The project investigated the influences of climatic variability and N deposition on belowground indicators of ecosystem integrity in Olympic National Park. Eleven diverse study sites were used to learn how soil CO₂ efflux (soil respiration) and the production of dissolved organic carbon (DOC) and dissolved organic nitrogen



(DON) were affected by seasonal changes in temperature and moisture availability at a given location and by climatic differences that existed along mountain elevation gradients. At seven of the sites, experimental N additions (1.0 and 2.0 g urea-N m^{-2} yr^{-1}) were made to learn how belowground C cycling would respond to increased availability of this limiting nutrient. Plot-level results were linked to the larger watershed scale by examining DOC/DON and ions in streams draining the study areas. In order to gain a more mechanistic understanding of the factors that might underlie observed responses in soil respiration and DOC/DON production, soil foodweb dynamics were examined by using natural abundance isotopic signatures and experimental ^{15}N tracer additions to examine the flow of C and N into soil microarthropods and mycorrhizal fungi.

Research Grants:

Plant-Microbe Interactions and the Production of Dissolved Organic Carbon and Nitrogen. 2006-2009. Sponsored by National Science Foundation. \$815,000 (co-PI)

REU Site for Ecosystems in Transition: The Role of Research in Assessing Ecosystem Responses to Changing Environment. 2004-2006. Sponsored by National Science Foundation. \$155,463 (PI).

Nitrogen saturation: mechanisms and consequences of altered ecosystem metabolism. 2003-2007. Sponsored by National Science Foundation. \$810,000 (co-PI).

Plant-microbe interactions and the production of dissolved organic carbon and nitrogen. 2000-2004. Sponsored by National Science Foundation. \$883,480 (co-PI).

The movement of elements through ecosystems: major research instrumentation for the integration of research and education. 2000-2004. Sponsored by National Science Foundation. \$894,130 (co-PI).

Collaborative research on belowground ecosystem function: merging long-term climate monitoring with soil, root and foodweb dynamics to understand mechanisms regulating C and N transformations. 1998-2002. Sponsored by EPA. \$387,595 (co-PI).

Factors regulating belowground carbon allocation in terrestrial ecosystems: a cross-site experiment. 1997-2001. Sponsored by National Science Foundation. \$261,302 (co-PI).

Cycling of NO_3-N in northern hardwood forests: regulation and consequences of N saturation. 1996-2000. Sponsored by National Science Foundation. \$690,000 (co-PI).

Research Experiences for Undergraduates (REU) supplements to existing NSF grants for undergraduate summer research projects. 1996-2006. \$53,000 in funding for nine students was received. (wrote the supplement requests and helped mentor the students).

Professional Organizations and Service

Member of professional societies: Society of American Foresters
Ecological Society of America
Soil Science Society of America
Council on Undergraduate Research
Agronomy Society of America.

Proposal reviews proposals for: National Science Foundation (9)
US Department of Agriculture (3)
US Civilian Research & Development Foundation
DOE-BER National Institute for Climatic Change Research
(24)

Manuscript reviews for: *Ecology/Ecological Monographs* (2)
Global Change Biology (11)
Forest Science (9)
Soil Science Society of America Journal (3)
Forest Ecology and Management (3)
New Phytologist (4)
Canadian Journal of Forest Research (3)
Tree Physiology (6)
Plant Ecology
Journal of the Torrey Botanical Society (2)
Plant and Soil (4)
American Midland Naturalist
The Ohio Journal of Science
Journal of Forest Research (Japan)

Editorial Review Board of *Tree Physiology*, 2000 - 2002

Presidential Committee on University Safety and Environmental Health, MTU, 1998 – 2007.

Chemical Hygiene Officer, School of Forest Resources and Environmental Science, MTU,
1998 – 2007.

Publications

Refereed Journals:

- Pregitzer, K.S., A.J. Burton, D.R. Zak, and A.F. Talhlem. 2007. Chronic nitrogen additions increase carbon storage in northern hardwood forests. *Global Change Biology* *in review* (submitted February 2006)
- Smemo, K.A., D.R. Zak, K.S. Pregitzer, and A.J. Burton. 2007. Characteristics of DOC exports from northern hardwood forests receiving chronic atmospheric NO_3^- deposition. *Ecosystems* *in press*.
- Zak, D.R., W.E. Holmes, M.J. Tomlinson, K.S. Pregitzer, and A.J. Burton. 2006. Microbial cycling of C and N in northern hardwood forests receiving chronic atmospheric NO_3^- deposition. *Ecosystems* 9:242-253. [Abstract](#)
- DeForest, J.L., D.R. Zak, K.S. Pregitzer, and A.J. Burton. 2005. Atmospheric nitrate deposition and enhanced dissolved organic carbon leaching: Test of a potential mechanism. *Soil Sci. Soc. Am. J.* 69:1233-1237. [Abstract](#)
- Burton, A.J., K.S. Pregitzer, J.N. Crawford, G.P. Zogg, and D.R. Zak. 2004. Simulated chronic NO_3^- addition reduces soil respiration in northern hardwood forests. *Global Change Biol.* 10:1080-1091. [Abstract](#)
- DeForest, J.L., D.R. Zak, K.S. Pregitzer, and A.J. Burton. 2004. Atmospheric nitrate deposition, microbial community composition, and enzyme activity in northern hardwood forests. *Soil Sci. Soc. Am. J.* 68:132-138. [Abstract](#)
- DeForest, J.L., D.R. Zak, K.S. Pregitzer, and A.J. Burton. 2004. Atmospheric nitrate deposition and the microbial degradation of cellobiose and vanillin in a northern hardwood forest. *Soil Biol. Biochem.* 36:965-971.
- Pregitzer, K.S., D.R. Zak, A.J. Burton, J.A. Ashby, and N.W. MacDonald. 2004. Chronic nitrate additions dramatically increase the export of carbon and nitrogen from northern hardwood ecosystems. *Biogeochem.* 68:179-197. [Abstract](#)
- Zak, D.R., K.S. Pregitzer, W.E. Holmes, A.J. Burton, and G.P. Zogg. 2004. Anthropogenic N deposition and the fate of $^{15}\text{NO}_3^-$ in a northern hardwood ecosystem. *Biogeochem.* 69:143-157. [Abstract](#)
- Burton, A.J., and K.S. Pregitzer. 2003. Field measurements of root respiration indicate little to no seasonal temperature acclimation for sugar maple and red pine. *Tree Physiol.* 23:273-280. [Abstract](#)
- Crocker, T.L., R.L. Hendrick, R. Ruess, K.S. Pregitzer, A.J. Burton, M.F. Allen, J. Shan, and L.A. Morris. 2003. Substituting root numbers for length: Improving the use of minirhizotrons to study fine root dynamics. *Appl. Soil Ecol.* 23:127-135 [Abstract](#)
- Kane, E.S., K.S. Pregitzer, and A.J. Burton. 2003. Soil respiration along environmental gradients in Olympic National Park. *Ecosystems* 6:326-335. [Abstract](#)

- Ruess, R.W., R.L. Hendrick, A.J. Burton, K.S. Pregitzer, B. Sveinbjornsson, M.F. Allen, and G.E. Maurer. 2003. Coupling fine root dynamics with ecosystem carbon cycling in black spruce forests of interior Alaska. *Ecol. Monogr.* 73:643-662. [Abstract](#)
- Burton, A.J., K.S. Pregitzer, R.W. Ruess, R.L. Hendrick, and M.F. Allen. 2002. Root respiration in North American forests: effects of nitrogen concentration and temperature across biomes. *Oecologia* 131:559-568. [Abstract](#)
- Burton, A.J., and K.S. Pregitzer. 2002. Measurement carbon dioxide concentration does not affect root respiration rates of nine tree species in the field. *Tree Physiol.* 22:67-72. [Abstract](#)
- Pregitzer, K.S., J.L. DeForest, A.J. Burton, M.F. Allen, R.W. Ruess, and R.L. Hendrick. 2002. Fine root architecture of nine North American trees. *Ecol. Monogr.* 72:293-309. [Abstract](#)
- Brown, S.E., K.S. Pregitzer, D.D. Reed, and A.J. Burton. 2000. Predicting daily mean soil temperature from daily mean air temperature in four northern hardwood forest stands. *Forest Sci.* 46:297-301.
- Burton, A.J., K.S. Pregitzer, and R.L. Hendrick. 2000. Relationships between fine root dynamics and nitrogen availability in Michigan northern hardwood forests. *Oecologia* 125:389-399. [Abstract](#)
- Pregitzer, K.S., J.S. King, A.J. Burton, and S.E. Brown. 2000. Responses of tree fine roots to temperature. *New Phytol.* 147:105-115. [Abstract](#)
- Zogg, G.P., D.R. Zak, A.J. Burton, and K.S. Pregitzer. 2000. Microbial immobilization and the retention of anthropogenic nitrate in a northern hardwood forest. *Ecology* 81:1858-1866. [Abstract](#)
- Burton, A.J., K.S. Pregitzer, G.P. Zogg, and D.R. Zak. 1998. Drought reduces root respiration in sugar maple forests. *Ecol. Appl.* 8:771-778. [Abstract](#)
- MacDonald, N.W., J.A. Witter, D.D. Reed, A.J. Burton, K.S. Pregitzer, and H.O. Liechty. 1998. Environmental stress effects on vigor, mortality, and growth in northern hardwood forests along a pollution-climate gradient. *Michigan Academician* XXX:27-47.
- Pregitzer, K.S., M.J. Laskowski, A.J. Burton, V.C. Lessard, and D.R. Zak. 1998. Variation in sugar maple root respiration with root diameter and soil depth. *Tree Physiol.* 18:665-670. [Abstract](#)
- Burton, A.J., G.P. Zogg, K.S. Pregitzer, and D.R. Zak. 1997. Effects of measurement CO₂ concentration on sugar maple root respiration. *Tree Physiol.* 17:421-427. [Abstract](#)
- Burton, A.J., K.S. Pregitzer, G.P. Zogg, and D.R. Zak. 1996. Latitudinal variation in sugar maple fine root respiration. *Can. J. For. Res.* 26:1761-1768.
- Zogg, G.P., D.R. Zak, A.J. Burton, and K.S. Pregitzer. 1996. Fine root respiration in northern hardwood forests in relation to temperature and nitrogen availability. *Tree Physiol.* 16:719-725. [Abstract](#)
- Gross, K.L., K.S. Pregitzer, and A.J. Burton. 1995. Spatial variation in nitrogen availability in three successional plant communities. *J. Ecol.* 83:357-367. [Abstract](#)

- MacDonald, N.W., A.J. Burton, J.A. Witter, and D.D. Richter. 1994. Sulfate adsorption in forest soils of the Great Lakes region. *Soil Sci. Soc. Am. J.* 58:1546-1555.
- Reed, D.D., K.S. Pregitzer, H.O. Liechty, A.J. Burton, and G.D. Mroz. 1994. Productivity and growth efficiency in sugar maple forests. *For. Ecol. and Manage.* 70:319-327. [Abstract](#)
- Burton, A.J., K.S. Pregitzer, and N.W. MacDonald. 1993. Foliar nutrients in sugar maple forests along a regional pollution-climate gradient. *Soil Sci. Soc. Am. J.* 57: 1619-1628.
- MacDonald, N.W., J.A. Witter, A.J. Burton, K.S. Pregitzer, and D.D. Richter. 1993. Relationships among atmospheric deposition throughfall, and soil properties in oak forest ecosystems. *Can. J. For. Res.* 23:2348-2357.
- MacDonald, N.W., A.J. Burton, H.O. Liechty, J.A. Witter, K.S. Pregitzer, G.D. Mroz, and D.D. Richter. 1992. Ion leaching in forest ecosystems along a Great Lakes air pollution gradient. *J. Environ. Qual.* 21:614-623.
- Pregitzer, K.S., A.J. Burton, G.D. Mroz, H.O. Liechty, and N.W. MacDonald. 1992. Foliar sulfur and nitrogen along an 800-km pollution gradient. *Can. J. For. Res.* 22:1761-1769.
- Burton, A.J., K.S. Pregitzer, and D.D. Reed. 1991. Leaf area and foliar biomass relationships in northern hardwood forests located along an 800 km acid deposition gradient. *For. Sci.* 37:1041-1059.
- Burton, A.J., C.W. Ramm, K.S. Pregitzer, and D.D. Reed. 1991. Use of multivariate methods in forest research site selection. *Can. J. For. Res.* 21:1573-1580.
- MacDonald, N.W., A.J. Burton, M.F. Jurgensen, J.W. McLaughlin, and G.D. Mroz. 1991. Variation in forest soil properties along a Great Lakes air pollution gradient. *Soil Sci. Soc. Am. J.* 55:1709-1715.
- Pregitzer, K.S., and A.J. Burton. 1991. Sugar maple seed production and nitrogen in litterfall. *Can. J. For. Res.* 21:1148-1153.
- Burton, A.J., J.B. Hart, and D.H. Urie. 1990. Nitrification in sludge amended Michigan forest soils. *J. Environ. Qual.* 19:609-616.
- Reed, D.D., H.O. Liechty, and A.J. Burton. 1989. A simple procedure for mapping tree locations in forest stands. *For. Sci.* 35:657-662.

Conference Proceedings and Book Chapters:

- Burton, A.J., and K.S. Pregitzer. 2007. Measuring forest floor, mineral soil, and coarse root carbon stocks. Chap. 12 *In* R. Birdsey and C. Hoover (eds). *Handbook of Measurements for Landscape Scale Carbon Monitoring in review*
- Moyano, F.E., O.K. Atkin, M. Bahn, D. Bruhn, A.J. Burton, A. Heinemeyer, W. Kutsch, and g. Wieser. 2007. Respiration from roots and the associated microorganisms. Chap. 6 *In* W. Kutsch, A. Heinemeier and M. Bahn (eds). *Soil Carbon Flux Measurements: An Integrated Methodology*. Cambridge University Press. *in press*.

- Pregitzer, K.S., D.R. Zak, W.M. Loya, J.S. King and A.J. Burton. 2007. The contribution of root – rhizosphere interactions to biogeochemical cycles in a changing world. Chapter 7. p. 155-178 *In* Z. Cardon and J. Whitbeck (eds). *The Rhizosphere: An Ecological Perspective*, Academic Press.
- Reed, D.D., G.D. Mroz, H.O. Liechty, K.S. Pregitzer, A.J. Burton, D.R. Zak, J.A. Witter, and N.W. MacDonald. 1994. Studying the effects of air pollution on forests along exposure gradients: experiences in the United States and opportunities for cooperation. p. 109-115 *In* *Proceedings of the Conference on Climate and Atmospheric Deposition Studies in Forests* (J. Solon, E. Roo-Zielinska, and A. Byternowicz, eds.). Nieborow, Poland, October 6-9, 1992. Polish Academy of Sciences.
- Burton, A.J., D.H. Urie, and J.B. Hart. 1987. Nitrogen transformations in four sludge amended Michigan forest types. p. 142-153 *In* *The forest alternative for treatment and utilization of municipal and industrial wastes*. Univ. of Washington Press, Seattle. (*5 citations through Mar. 2006*)

Book Reviews:

- Burton, A.J. 1998. Review of “Impact of air pollutants on southern pine forests”, S. Fox and R.A. Mickler, eds. *Quarterly Rev. Biol.* 73:101.

Theses:

- Burton, A.J. 1997. Sugar maple fine root respiration and longevity along a latitudinal gradient. Ph.D. dissertation. Michigan Technological University, Houghton. 104 p.
- Burton, A.J. 1986. Nitrogen transformations and nitrate leaching following sludge application to four Michigan forest types. M.S. thesis, Michigan State University, E. Lansing. 144 p.

Presentations

Presentations at Scientific Meetings and Conferences:

- Burton, A.J. 2006. Root system responses to chronic N additions. Invited oral presentation and published abstract, annual meeting of the Soil Science Society of America, Indianapolis, Indiana, Nov 12-16.
- Smemo, K.A., D.R. Zak, K.S. Pregitzer, and A.J. Burton. 2005. Qualitative chemistry of dissolved organic carbon exports from northern hardwood forests in response to chronic experimental nitrate deposition. Oral presentation and published abstract, annual meeting of the Soil Science Society of America, Salt Lake City, Utah, Nov 6-10.
- Burton, A.J. and J.W. Culclasure. 2005. Root respiration and biomass in the forest floor and surface mineral soil of northern hardwood forests receiving chronic N additions. Poster presentation and published abstract, annual meeting of the Ecological Society of America, Montreal, QC, Aug 7-12.
- Brown, S.E., A.J. Burton, A.L. Pickett, and K.S. Pregitzer. 2005. A field comparison of two dynamic chamber instruments for measuring forest soil respiration. Poster presentation

- and published abstract, annual meeting of the Ecological Society of America, Montreal, QC, Aug 7-12.
- Rothstein, D.E., A.J. Burton, D.R. Zak, and K.S. Pregitzer. 2005. Effects of long-term nitrogen amendment on leaf and wood decomposition in northern hardwood forests. Poster presentation and published abstract, annual meeting of the Ecological Society of America, Montreal, QC, Aug 7-12.
- Burton, A.J., and K.S. Pregitzer. 2004. Tree mortality and decay in northern hardwood forests. Oral presentation and published abstract, annual meeting of the Soil Science Society of America, Seattle, Washington, Oct. 31-Nov. 4.
- Burton, A.J., and K.S. Pregitzer. 2004. Soil respiration in common North American forests: interactive effects of temperature, moisture and nitrogen availability. Oral presentation and published abstract, 18th North American Forest Biology Workshop, Michigan Technological University, Houghton, Michigan, July 12-15.
- Burton, A.J., and K.S. Pregitzer. 2003. Root and microbial contributions to soil CO₂ efflux in northern hardwood forests with and without chronic N additions. Presentation and published abstract, annual meeting of the Soil Science Society of America, Denver, Colorado, Nov. 2-6.
- Crawford, J.N., K.S. Pregitzer, A.J. Burton, and D.R. Zak. 2002. Effect of experimental N-additions on soil and root respiration in northern hardwood stands. Presentation and published abstract, annual meeting of the Ecological Society of America, Tucson, Arizona, Aug. 5-9.
- Eikenberry, J.R., K.S. Pregitzer, A.J. Burton, and D.R. Zak. 2002. Chronic N effects on root and leaf litter chemistry of northern hardwood forests. Presentation and published abstract, annual meeting of the Ecological Society of America, Tucson, Arizona, Aug. 5-9.
- Pregitzer, K.S., and A.J. Burton. 2002. The Michigan gradient study – Evaluation of nutrient cycling processes along a gradient of temperature and N deposition. Presentation at the Terrestrial Ecosystem Responses to Atmospheric and Climatic Change (TERACC) workshop: From Transient to Steady State Response of Ecosystems to CO₂-Enrichment and Global Warming, Durham, New Hampshire, Apr. 28 – May 1.
- Burton, A.J. 2001. Belowground C and N fluxes along a climatic gradient in Olympic NP. Presentation at PRIMENet annual meeting, Hawaii Volcanoes National Park, Nov. 5-8.
- Burton, A.J., K.S. Pregitzer, and K.L. Bradley. 2001. Spatial and temporal variation of soil respiration in a pinyon-juniper woodland. Poster presentation and published abstract, annual meeting of the Ecological Society of America, Madison, Wisconsin, Aug 5-10.
- Kane, E.S., K.S. Pregitzer, and A.J. Burton. 2001. Soil CO₂ efflux along a diverse environmental gradient in Olympic National Park, Washington. Poster presentation and published abstract, annual meeting of the Ecological Society of America, Madison, Wisconsin, Aug. 5-10.
- Pregitzer, K.S., A.J. Burton, R.W. Ruess, R.L. Hendrick, and M.F. Allen. 2001. Soil temperature, moisture, and nitrogen interact to influence soil respiration in North American forests. Poster presentation and published abstract at the International

Geosphere-Biosphere Programme (IGBP) global change open science conference:
Challenges of a Changing Earth, Amsterdam, Netherlands, July 10-13.

- Burton, A.J., K.S. Pregitzer, G.P. Zogg, and D.R. Zak. 2000. Northern hardwood soil respiration after six years of N additions. Poster presentation and published abstract, annual meeting of the Soil Science Society of America, Minneapolis, Minnesota, Nov. 5-9.
- Burton, A.J., and K.S. Pregitzer. 2000. Field measurements of root respiration in sugar maple and red pine forests indicate no temperature acclimation. Poster presentation and published abstract, annual meeting of the Ecological Society of America, Snowbird, Utah, Aug. 6-10.
- Burton, A.J., and K.S. Pregitzer. 1999. Fine root respiration rates in North American forests. Poster presentation at Sevilleta Research Symposium, Sevilleta National Wildlife Refuge, New Mexico, January 12-14.
- Zogg, G.P., D.R. Zak, A.J. Burton, and K.S. Pregitzer. 1999. Belowground fate and flow of nitrate in a northern hardwood forest. Presentation and published abstract, annual meeting of the Ecological Society of America, Spokane, Washington, Aug. 8-12.
- Burton, A.J., and K.S. Pregitzer. 1998. Fine root respiration rates in North American forests. Poster presentation and published abstract, annual meeting of the Soil Science Society of America, Baltimore, Maryland, Oct. 18-22.
- Burton, A.J. K.S. Pregitzer, G.P. Zogg, and D.R. Zak. 1997. Belowground carbon allocation in sugar maple forests with differing nitrogen availability. Presentation and published abstract, annual meeting of the Soil Science Society of America, Anaheim, California, Oct. 26-30.
- Burton, A.J., K.S. Pregitzer, G.P. Zogg, and D.R. Zak. 1997. Drought reduces root respiration in sugar maple forests. Presentation and published abstract, annual meeting of the Ecological Society of America, Albuquerque, New Mexico, Aug. 10-14.
- Pregitzer, K.S., M.J. Laskowski, A.J. Burton, and V.C. Lessard. 1997. Variation in northern hardwood root respiration with root diameter and soil depth. Poster presentation and published abstract, annual meeting of the Ecological Society of America, Albuquerque, New Mexico, Aug. 10-14.
- Zogg, G.P., D.R. Zak, A.J. Burton, and K.S. Pregitzer. 1996. The contribution of fine roots to carbon dioxide flux from forest soils. Presentation and published abstract, annual meeting of the Soil Science Society of America, Indianapolis, Indiana, Nov. 3-8.
- Burton, A.J., K.S. Pregitzer, and G.P. Zogg. 1995. Latitudinal variation in sugar maple fine root respiration. Presentation and published abstract, annual meeting of the Ecological Society of America, Snowbird, Utah, July 30-Aug. 3.
- Burton, A.J., K.S. Pregitzer, and G.P. Zogg. 1995. Temperature and nitrogen effects on fine root longevity in sugar maple forests. Presentation and published abstract, annual meeting of the Soil Science Society of America, St. Louis, Missouri, Oct. 29-Nov. 3.
- Zogg, G.P., D.R. Zak, A.J. Burton, and K.S. Pregitzer. 1995. Patterns of fine-root respiration in northern hardwood forests in relation to temperature and nitrogen availability.

- Presentation and published abstract, annual meeting of the Ecological Society of America, Snowbird, Utah, Aug. 6-10 .
- Burton, A.J., K.S. Pregitzer, and N.W. MacDonald. 1993. Insect defoliation effects on northern hardwood nutrient cycling. Presentation and published abstract, annual meeting of the Soil Science Society of America, Cincinnati, Ohio, Nov. 7-12.
- MacDonald, N.W., J.A. Witter, A.J. Burton, K.S. Pregitzer, and D.D. Richter. 1992. Relationships among atmospheric deposition, throughfall, and soil properties in oak forest ecosystems. Presentation and published abstract, annual meeting of the Soil Science Society of America, Minneapolis, Minnesota, Nov. 1-6.
- MacDonald, N.W., A.J. Burton, H.O. Liechty, G.D. Mroz, and J.A. Witter. 1991. Soil solution chemistry and ion leaching in northern hardwood forests across an 800 km pollution gradient. Poster presentation and published abstract at Emerging Issues in Northern Hardwood Management: Air Pollution, Climate Change and Biodiversity, Mackinac Island, Michigan, May 20-23.
- Pregitzer, K.S., A.J. Burton, G.D. Mroz, H.O. Liechty, and N.W. MacDonald. 1991. Northern hardwood foliar stoichiometry across an 800-km pollution gradient. Presentation and published abstract at Emerging Issues in Northern Hardwood Management: Air Pollution, Climate Change and Biodiversity, Mackinac Island, Michigan, May 20-23.
- MacDonald, N.W., A.J. Burton, M.F. Jurgensen, and J.W. McLaughlin. 1990. Variation in soil properties along an air pollution gradient in the northern Great Lakes region. Presentation and published abstract, annual meeting of the Soil Science Society of America, San Antonio, Texas, Oct. 21-26.
- Mroz, G., A. Burton, O. Hua, M. Jurgensen, H. Liechty, N. MacDonald, K. Pregitzer, D. Reed, R. Stottlemyer, J. Witter, and D. Zak. 1990. Effects of an air pollution gradient on northern hardwood forests in the northern Great Lakes Region: Part 2 - Nutrient cycling and forest productivity. Presentation and published abstract at the NAPAP International Conference, Hilton Head, SC, Feb. 11-16.
- Witter, J., G. Mroz, K. Pregitzer, A. Burton, M. Jurgensen, D. Karnosky, H. Liechty, N. MacDonald, D. Reed, D. Richter, R. Stottlemyer, and D. Zak. 1990. Effects of an air pollution gradient on northern hardwood forests in the northern Great Lakes Region: Part 1 - Overview. Presentation and published abstract at the NAPAP International Conference, Hilton Head, South Carolina, Feb. 11-16.
- Burton, A.J., and K.S. Pregitzer. 1989. Specific leaf area and leaf area index in Great Lakes northern hardwood forests. Presentation and published abstract, annual meeting of the Ecological Society of America, Toronto, Ontario, Canada, Aug. 6-10.
- Mroz, G.D., D.D. Reed, J.A. Witter, K.S. Pregitzer, M.F. Jurgensen, H.O. Liechty, A.J. Burton, J.R. Stottlemyer, N.W. MacDonald, D.R. Zak, and O. Hua. 1989. Effects of an air pollution gradient on northern hardwood forests in the northern Great Lakes Region: Part 2 - Nutrient cycling and forest productivity. Poster presentation and published abstract at International Congress on Forest Decline Research: State of Knowledge and Perspectives, Friedrichshafen, Lake Constance, Federal Republic of Germany, Oct. 2-6.

- Witter, J., G. Mroz, K. Pregitzer, A. Burton, M. Jurgensen, D. Karnosky, H. Liechty, N. MacDonald, D. Reed, D. Richter, R. Stottleyer, and D. Zak. 1989. Effects of an air pollution gradient on northern hardwood forests in the northern Great Lakes Region: Part 1 - Overview. Poster presentation and published abstract at International Congress on Forest Decline Research: State of Knowledge and Perspectives: Friedrichshafen, Lake Constance, Federal Republic of Germany, Oct. 2-6.
- Hendrick, R.L., K.S. Pregitzer, A.J. Burton, and P.V. Nguyen. 1988. Fine root dynamics in northern hardwood forests along an acid deposition gradient. Poster presentation and published abstract, annual meeting of the Soil Science Society of America, Anaheim, California, Nov. 27-Dec. 2.
- Liechty, H., A. Burton, M. Jurgensen, G. Mroz, K. Pregitzer, D. Reed, D. Richter, R. Stottleyer, and J. Witter. 1988. Relationships of throughfall chemistry to precipitation in six northern hardwood stands along a sulfate deposition gradient. Poster presentation at International Symposium on Acidic Deposition and Forest Decline, Rochester, New York, Oct. 20-21.
- Burton, A.J., J.B. Hart, Jr., and D.H. Urie. 1985. Sludge nitrogen form and acidity effects on nitrogen transformations in Michigan forest soils. Presentation and published abstract, annual meeting of the Soil Science Society of America, Chicago, Illinois, Dec. 1-6.
- Burton, A., D. Urie, and J.B. Hart, Jr. 1985. Nitrogen cycling and potential nitrate groundwater pollution. Presentation and published summary at Conference on Forest Land Application of Wastewater Sludge, Grayling, Michigan, Sep. 11-12.
- Burton, A.J. 1985. Nitrogen transformations in four sludge-amended Michigan forest types. Poster presentation and published abstract, Forest Land Applications Symposium, Univ. of Washington, Seattle, June 25-28.

Other Presentations:

- Lectures and field presentations on weather and climate, site quality and productivity, and hydrology at the MTU sponsored Program of Advanced Studies in Silviculture for U.S. Forest Service personnel. Houghton, Michigan, May 16 and 24, 2006.
- Lectures and field presentations on: acid rain, N deposition and N saturation; climate change, temperature and moisture; and designing global change experiments to high school teachers attending Global Change Teacher Institute. Houghton, Michigan, July 18, 19, and 21, 2006.
- Lectures and field presentations on soils, tree physiology (root growth and crown growth), nutrient cycling, and climate and air quality at the MTU sponsored Program of Advanced Studies in Silviculture for U.S. Forest Service personnel. Alberta, Michigan, July 18 and 19, 2005.
- Lectures and field presentations on: acid rain, N deposition and N saturation; climate change, temperature and moisture; and designing global change experiments to high school teachers attending Global Change Teacher Institute. Alberta, Michigan, July 11, 12, 14 and 15, 2005.

- Lectures and field presentations on plant identification and forest measurements to high school teachers attending Forest Resources and Environmental Science Teacher Institute. Alberta, Michigan, June 27, 2005.
- Lectures and field presentations on plant identification and forest measurements to high school teachers attending Forest Resources and Environmental Science Teacher Institute. Alberta, Michigan, July 12, 2004.
- Lecture and field presentation on forest measurements to visiting Korean high school teachers. Alberta, Michigan, August 5 and 8, 2003.
- Lecture and field presentation on nutrient cycling and population, community and ecosystem ecology at the MTU sponsored Program of Advanced Studies in Silviculture for U.S. Forest Service personnel. Alberta, Michigan, September 13, 2002.
- Burton, A.J. 2002. Alteration of Belowground Carbon Cycling by Chronic Nitrate Additions to Northern Hardwood Forests. Invited presentation to the School of Forest Resources and Environmental Science, Michigan Technological University, Houghton, Michigan. April 30, 2002.
- Gave report on the MTU School of Forestry and Wood Products' soils related research activities at the Michigan Soil Survey Cooperators Meeting. East Lansing, Michigan, March 5, 2002.
- Gave field presentation on NSF Cross-Biome study to the Board of Trustees of the Great Lakes Forestry Alliance. Atlantic Mine, Michigan, October 10, 2001.
- Field presentation on the Michigan Gradient Study to attendees of IUFRO's 19th International Meeting for Specialists in Air Pollution Effects on Forest Ecosystems: Air Pollution, Global Change and Forests in the New Millennium. Twin Lakes, Michigan, May 31, 2000.
- Forest ecology training for Trees for Tomorrow high school students from Wisconsin. Houghton, Michigan, April 21, 2000.
- Lecture on effects of forest management on soil properties at the MTU sponsored Program of Advanced Studies in Silviculture for U.S. Forest Service personnel. Alberta, Michigan, October 21, 1999.