

GAIUS R. SHAVER

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Education

B.S. with departmental honors, Biological Sciences, Stanford University, 1972
M.A., Biological Sciences, Stanford University, 1972 (B.S. and M.A. awarded coterminally)
Ph.D., Botany, Duke University, 1976

Appointments

The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts
Assistant Scientist, 1979 - 1984
Associate Scientist, 1984 - 1990
Senior Scientist, 1990 - present
Brown University, Providence, Rhode Island
Professor (MBL), Department of Ecology and Evolutionary Biology, 2004-present
National Science Foundation, Washington, DC (on leave from The Ecosystems Center)
Program Director, Division of Environmental Biology, 1996-1998
University of Alaska, Fairbanks
Research Associate, 1976 - 1984
Senior Research Associate, 1984 - 1986
Principal Research Associate, 1986 - present
San Diego State University, San Diego, California
Research Associate, June 1976 - January 1979
Instructor in Ecology, Spring 1977 - Fall 1978

Teaching Experience

Duke University: Teaching Assistant (Ecology and General Biology)
San Diego State University: Ecology, Physiological Ecology
Marine Biological Laboratory: Ecology, Ecology and Management of Resources, Interns in Science, Semester in Environmental Sciences
Brown University: Ecosystem Ecology
Advisory Committee/External Examiner for graduate students at Boston University, Duke University, University of Toronto, University of Göteborg, Australian National University, Umeå University, Uppsala University, Lund University, University of Durham, and Brown University.
Research Experiences for Undergraduates: Summer research mentor for 1-4 students per year since 1993.

Research Grants and Contracts

ERDA-DOE #EE-77-03-1525. Research on dynamics of tundra ecosystems and their potential response to energy resource development. June 1976 - May 1979. (Co-principal investigator and subcontractor.)
NSF-DEB-77-13944. Community organization and resource utilization by vegetation in convergent ecosystems. October 1977 - May 1979. (Co-principal investigator and subcontractor.)
NSF-DEB-79-05842. Effects of mineral nutrition and temperature on mobile carbon pools in arctic tundra plants. June 1979 - May 1982. (Subcontractor and principal investigator.)
NSF-DEB-79-23329. The world carbon budget: An analysis through modelling. March 1980 - February 1982. (Co-principal investigator.)
DOE-P800014. The effect of changes in terrestrial carbon pools on the CO₂ content of the atmosphere: A pilot study using satellite imagery. October 1980 - September 1982. (Co-principal investigator.)
NSF-DEB-80-04174. Recovery of nutrients from senescing plant tissues: Its controls and its role in nutrient cycling. July 1980 - June 1982. (Principal investigator.)
U.S. Army CRREL DACA89-80-M-1453. Baseline studies in arctic plant growth: Effects of latitude and annual climatic variation. June - November 1980; renewed June 1981 - June 1982; renewed June 1982 - June 1983; renewed June 1983 - 1984. (Principal investigator.)
NSF-DEB-81-10477. The biota and the global carbon cycle. November 1981 - October 1984. (Co-principal investigator.)

- U.S. Army Research Office DAA629-76-6-0296. Revegetation of Alaskan disturbed sites by native tundra species. May 1979 - April 1982; renewed May 1982 - April 1985. (Subcontractor and co-principal investigator.)
- NSF-DEB-82-05344. The relationship of relative growth rate of plants to ecosystem processes in Alaskan tundra. July 1982 - June 1985. (Subcontractor and co-principal investigator.)
- DOE-U8406034. Nutrient cycling on river floodplains in Arctic Alaska: Variation in biogeochemistry and response to disturbance. July 1984 - December 1986. (Principal investigator.)
- NSF-BSR-8509732. Nutrient cycling in an arctic landscape: Interactions between ecosystems along a riverside toposequence. September 1985 - September 1988. (Principal investigator.)
- NSF-BSR-8509732. The biota and the global carbon cycle: Effects of changes in climate and in global element cycles. October 1985 - October 1987. (Co-principal investigator.)
- NSF BSR-8702328. An LTER Program for the Alaskan Arctic. September 1987 - August 1992. (Principal investigator and co-principal investigator.)
- NSF-BSR-8718426. A comparative study of the response of terrestrial ecosystems to changes in the global environment. March 1988 - February 1991. (Co-principal investigator.)
- NSF-BSR-8806635. Biogeochemical diversity in the Arctic landscape: Element transport and the spread of disturbance effects. 15 September 1988 - September 1991. (Principal investigator.)
- NSF-BBS-8714281. A biological facility center for application of stable isotope technology in environmental science. September 1987 - August 1989. (Co-principal investigator.)
- DOE-19X-SC968V. Response of northern ecosystems to global climate change. October 1988 - September 1989. (Subcontractor.)
- NSF-BSR-9019055. Global Change and the Carbon Balance of Arctic Ecosystems: The Importance of Carbon/nutrient Interactions. November 1991-October 1994. (Principal Investigator.)
- NSF-BSR-9024188. The Arctic LTER Project: Terrestrial and Freshwater Research on Ecological Controls. September 1992-August 1998. (Co-Principal Investigator.)
- US EPA. Current and Future Global Terrestrial Carbon Pool Distribution. May 1992-May 1994. (Co-Principal Investigator.)
- NSF-DEB-9307888: "Recovery of terrestrial ecosystems from major disturbance: Constraints due to carbon/nutrient interactions" August 1993-July 1996; 2 months/yr; \$850,000 (Co-principal Investigator)
- NSF-OPP-9415411: "Primary production in arctic ecosystems: Interacting mechanisms of adjustment to climate change" April 1995-March 2001; 3 months/yr; \$1,080,000 (Principal Investigator)
- American Geophysical Union: Travel grant to attend NATO workshop on Disturbance and Recovery of Arctic Terrestrial Ecosystems, Rovaniemi, Finland, September 1995; \$2200.
- NSF-DEB-9509613. "Multiple Resource Interactions and Ecosystem Functions" April 1996-March 1999; 1 month/yr; \$400,000 (Co-principal Investigator)
- NSF-OPP-9614308: "Modeling Canopy and Energy Balances in the Pan-Arctic: Scaling from Leaf to Region" March 1997-February 2000; 0, 1, 2 months/yr; \$292,000 (Co-principal Investigator)
- NSF-DEB-9615563. Global Change and the Carbon Balance of Arctic Ecosystems: The Importance of Carbon/nutrient Interactions in Soils. April 1997-March 2000; 0,1,2 months/yr; \$743,000 (Principal Investigator and Co-principal Investigator)
- NSF-DEB-9810222: "The Arctic LTER Project: The Future Characteristics of Arctic Communities, Ecosystems, and Landscapes" October 1998-September 2004; 1 month/year; \$4,199,882 (Co-principal Investigator)
- NSF-DEB-0087046: "LTER Cross Site 2000: Interactions between climate and nutrient cycling in arctic and subarctic tundras" January 2001-June 2003; 1,1, 0 Month/yr; \$300,000 (Principal Investigator)
- NSF-OPP-0096523: "Primary production in arctic ecosystems: Interacting mechanisms of adjustment to climate change" April 2001-March 2004; 3 months/yr; \$520,000 (Principal Investigator)
- NSF-DEB-0089585: Turnover and Retention of Nitrogen in an Arctic Watershed: Links to Organic Matter Accumulation and Response to Climate"; September 2001-August 2004; 2 months/yr; \$1,088,000 (Principal Investigator)
- NSF-DEB-0108960: "Species-, Community-, and Ecosystem-Level Consequences of the Interactions Among Multiple Resources" July 2001-June 2004; 1 month/yr; \$418,000 (Co-principal Investigator)
- NSF-OPP-0352897: "Resource Allocation and Allometry of Plant Growth in the Arctic: Key Constraints on Change and Predictability of the Arctic System"; 2/15/04-2/14/07; 3 months/year; \$870,809 (Principal Investigator)
- NSB-DBI-0301231" Controlled Environment Facilities for Examination of the Effects of Climate Change and Human Land Use on Terrestrial and Aquatic Ecosystems"; 9/4/2003-10/4/2006; 0 months per year; \$271,230 (Principal Investigator)
- NSF-DEB 0444592; "Loss And Retention Of Nitrogen In An Arctic Landscape: Key Pathways And Process Regulation"; 12/1/2004-11/30/2007; 2 months/year; \$900,000 (Principal Investigator)

- NSF-DEB-0423385; “The Arctic LTER Project: Regional Variation in Ecosystem Processes and Landscape Linkages”; 1/15/2005-1/14/2011; 1 month/year; \$4,920,000 (Co-Principal Investigator)
- NSF-OPP-0632139, “IPY: Collaborative Research on Carbon, Water, and Energy Balance of the Arctic Landscape at Flagship Observatories and in a PanArctic Network”; 2 months/year; \$1,398,346 (Principal Investigator)

Theses

- Shaver, G. R. 1972. The significance of leaf angle and absorptance in the distribution of selected species of *Arctostaphylos* (Ericaceae). Undergraduate honors thesis, Stanford University.
- Shaver, G. R. 1976. Ecology of roots and rhizomes in graminoid plants of the Alaskan coastal tundra. Ph.D. thesis, Duke University.

Papers Published

- Billings, W. D., G. R. Shaver and A. W. Trent. 1973. Temperature effects on growth and respiration of roots and rhizomes in tundra graminoids, pp. 57-63. In: L. C. Bliss and F. E. Wielgolaski (eds.), Primary Production and Production Processes, Tundra Biome. Proceedings of the Conference, Dublin, Ireland, April 1973. University of Alberta Press, Edmonton.
- Shaver, G. R. and W. D. Billings. 1975. Root production and root turnover in a wet tundra ecosystem, Barrow, Alaska. *Ecology* 56(2):401-410.
- Shaver, G. R. and W. D. Billings. 1976. Carbohydrate accumulation in tundra graminoid plants as a function of season and tissue age. *Flora* 165:247-267.
- Billings, W. D., G. R. Shaver and A. W. Trent. 1976. Measurements of root growth in simulated and natural temperature gradients over permafrost. *Arctic and Alpine Research* 8:247-250.
- Billings, W. D., K. M. Peterson, G. R. Shaver and A. W. Trent. 1977. Effect of temperature on root growth and respiration in a tundra ecosystem, Barrow, Alaska, pp. 111-116. In: J. K. Marshall (ed.), *The Belowground Ecosystem: A Synthesis of Plant-Associated Processes*. Range Science Dept. Science Series #26, Colorado State University, Fort Collins, Colorado. 351 pp.
- Shaver, G. R., and W. D. Billings. 1977. Effects of daylength and temperature on root elongation in tundra graminoids. *Oecologia* 28:57-65.
- Billings, W. D., K. M. Peterson, G. R. Shaver and A. W. Trent. 1977. Root growth, respiration, and carbon dioxide evolution in an arctic tundra soil. *Arctic and Alpine Research* 9:129-137.
- Billings, W. D., K. M. Peterson and G. R. Shaver. 1978. Growth, turnover, and respiration rates of roots and tillers in tundra graminoids. Chapter 18. In: L. L. Tieszen (ed.), *Vegetation and Production Ecology of an Alaskan Arctic Tundra*. Ecological Studies Series, Vol. 29. Springer-Verlag, New York. 686 pp.
- Miller, P. C., W. A. Stoner, L. L. Tieszen, M. L. Allesio, B. H. McCown, F. S. Chapin, III and G. R. Shaver. 1978. A model of carbohydrate, nitrogen, and phosphorus allocation and growth in tundra production. Chapter 25. In: L. L. Tieszen (ed.), *Vegetation and Production Ecology of an Alaskan Arctic Tundra*. Ecological Studies Series, Vol. 29. Springer-Verlag, New York. 686 pp.
- Shaver, G. R. 1978. Leaf angle and light absorptance of *Arctostaphylos* species along environmental gradients. *Madroño* 25:133-138.
- Shaver, G. R. and J. C. Cutler. 1979. The vertical distribution of phytomass in cottongrass tussock tundra. *Arctic and Alpine Research* 11(3):335-342.
- Shaver, G. R., F. S. Chapin, III and W. D. Billings. 1979. Ecotypic differentiation in *Carex aquatilis* as related to icewedge polygonization in the Alaskan coastal tundra. *Journal of Ecology* 67:1025-1046.
- Shaver, G. R. and F. S. Chapin, III. 1980. Response to fertilization by various plant growth forms in an Alaskan tundra: nutrient accumulation and growth. *Ecology* 61(3):662-675.
- Shaver, G. R. 1981. Mineral nutrition and leaf longevity in an evergreen shrub, *Ledum palustre* ssp. *decumbens*. *Oecologia* 49:362-365.
- Shaver, G. R. 1981. Nutrient and nonstructural carbon utilization. Chapter 9. In: P. C. Miller (ed.), *Resource Utilization in Two Mediterranean-type Ecosystems*. Springer-Verlag Ecological Studies Series, Volume 39. Springer-Verlag, New York.
- Chapin, F. S., III and G. R. Shaver. 1981. Changes in soil properties and vegetation following disturbance of Alaskan arctic tundra. *Journal of Applied Ecology* 18:605-617.
- Moore, B., R. D. Boone, J. E. Hobbie, R. A. Houghton, J. M. Melillo, B. J. Peterson, G. R. Shaver, C. J. Vorosmarty and G. M. Woodwell. 1981. A simple model for analysis of the role of terrestrial ecosystems in the global carbon budget, pp. 365-385. In: B. Bolin (ed.), *Modelling the Global Carbon Cycle*, SCOPE 16. John Wiley and Sons, New York.
- Chester, A. L. and G. R. Shaver. 1982. Reproductive effort in cottongrass- tussock tundra. *Holarctic Ecology* 5:200-206.

- Chester, A. L. and G. R. Shaver. 1982. Seedling dynamics of some cottongrass tussock tundra species during the natural revegetation of small disturbed areas. *Holarctic Ecology* 5:207-211.
- Fetcher, N. and G. R. Shaver. 1982. Growth and tillering patterns within tussocks of *Eriophorum vaginatum*. *Holarctic Ecology* 5:180-186.
- McGraw, J. B. and G. R. Shaver. 1982. Seedling density and seedling survival in Alaskan cottongrass-tussock tundra. *Holarctic Ecology* 5:212-217.
- Lechowicz, M. J. and G. R. Shaver. 1982. A multivariate approach to the analysis of factorial fertilization experiments in Alaskan Arctic tundra. *Ecology* 63:1029-1038.
- Shaver, G. R. 1982. Mineral nutrient and nonstructural carbon pools in shrubs from two Mediterranean-type ecosystems, pp. 286-299. Chapter 16. In: F. J. Kruger, D. T. Mitchell and J. U. M. Jarvis (eds.), *Mediterranean-Type Ecosystems: The Role of Nutrients*. Springer-Verlag Ecological Studies Series, Volume 43. Springer-Verlag, New York. 552 pp.
- Shaver, G. R. 1983. Mineral nutrition and leaf longevity in *Ledum palustre*: The role of individual nutrients and the timing of leaf mortality. *Oecologia* 56:160-165.
- Fetcher, N. and G. R. Shaver. 1983. Life histories of tillers of *Eriophorum vaginatum* in relation to tundra disturbance. *Journal of Ecology* 71:131-148.
- Houghton, R. A., J. E. Hobbie, J. M. Melillo, B. Moore, B. J. Peterson, G. R. Shaver and G. M. Woodwell. 1983. Changes in the carbon content of biota and soils between 1860 and 1980: Effects on atmospheric CO₂. *Ecological Monographs* 53:235-262.
- Shaver, G. R., B. L. Gartner, F. S. Chapin, III and A. E. Linkins. 1983. Revegetation of Arctic disturbed sites by native tundra plants, pp. 1133-1138. In: *Proceedings 4th International Conference on Permafrost*. National Academy Press, Washington, D.C. 1524 pp.
- Woodwell, G. M., J. E. Hobbie, R. A. Houghton, J. M. Melillo, B. Moore, B. J. Peterson and G. R. Shaver. 1983. The contribution of global deforestation to atmospheric carbon dioxide. *Science* 222:1081-1086.
- Gartner, B. L., F. S. Chapin, III and G. R. Shaver. 1983. Demographic patterns of seedling establishment and growth of native graminoids in an Alaskan tundra disturbance. *Journal of Applied Ecology* 20:965-980.
- Woodwell, G. M., J. E. Hobbie, R. A. Houghton, J. M. Melillo, B. Moore, A. Park, B. J. Peterson and G. R. Shaver. 1984. Measurement of changes in vegetation of the earth by satellite imagery, pp. 221-240. In: G. M. Woodwell (ed.), *The Role of Terrestrial Vegetation in the Global Carbon Cycle: Measurement by Remote Sensing*. SCOPE 23. John Wiley and Sons, New York. 247 pp.
- Shaver, G. R. and J. M. Melillo. 1984. Nutrient budgets of marsh plants: Efficiency concepts and relation to availability. *Ecology* 65:1491-1510.
- Shaver, G. R. and F. S. Chapin, III. 1984. Limiting factors for plant growth in northern ecosystems, pp. 49-60. In: T. R. Moore (ed.), *Future Directions for Research in Nouveau-Quebec*. McGill Subarctic Research Paper No. 39, McGill University, Montreal.
- Chapin, F. S. III and G. R. Shaver. 1985. Arctic. pp. 16-40. In: B. Chabot and H. A. Mooney (eds.), *Physiological Ecology of North American Plant Communities*. Chapman and Hall, London. 351 pp.
- Chapin, F. S., III and G. R. Shaver. 1985. Individualistic growth response of tundra plant species to manipulation of light, temperature, and nutrients in a field experiment. *Ecology* 66:564-576.
- Mark, A. F., N. Fetcher, G. R. Shaver and F. S. Chapin, III. 1985. Estimated ages of mature tussocks of cotton sedge, *Eriophorum vaginatum*, along a latitudinal gradient in central Alaska. *Arctic and Alpine Research* 17:1-5.
- Shaver, G. R. and M. J. Lechowicz. 1985. A multivariate approach to plant mineral nutrition: Dose-response relationships and nutrient dominance in factorial experiments. *Canadian Journal of Botany* 63:2138-2143.
- Gartner, B. L., F. S. Chapin, III and G. R. Shaver. 1986. Reproduction by seed in *Eriophorum vaginatum* in Alaskan tussock tundra. *Journal of Ecology* 74:1-19.
- Chapin, F. S. III, G. R. Shaver and R. A. Kedrowski. 1986. Environmental controls over carbon, nitrogen, and phosphorus chemical fractions in *Eriophorum vaginatum* L. in Alaskan tussock tundra. *Journal of Ecology* 74:167-196.
- Shaver, G. R., F. S. Chapin III and B. L. Gartner. 1986. Factors limiting growth and biomass accumulation in *Eriophorum vaginatum* L. in Alaskan tussock tundra. *Journal of Ecology* 74:257-278.
- Shaver, G. R. 1986. Woody stem production in Alaskan tundra shrubs. *Ecology* 67:660-669.
- Shaver, G. R., and F. S. Chapin, III. 1986. Effect of fertilizer on production and biomass of tussock tundra, Alaska, U.S.A. *Arctic and Alpine Research* 18:261-268.
- Shaver, G. R., N. Fetcher and F. S. Chapin, III. 1986. Growth and flowering in *Eriophorum vaginatum*: Annual and latitudinal variation. *Ecology* 67:1524-1525.
- Houghton, R. A., R. D. Boone, J. R. Fruci, J. E. Hobbie, J. M. Melillo, C. A. Palm, B. J. Peterson, G. R. Shaver, G. M. Woodwell, B. Moore, D. L. Skole and N. Myers. 1987. The flux of carbon from

- terrestrial ecosystems to the atmosphere in 1980 due to changes in land use: geographic distribution of the global flux. *Tellus* 39B:122-139.
- Chapin, F. S., III and G. R. Shaver. 1988. Differences in carbon and nutrient fractions among arctic growth forms. *Oecologia* 77:506-514.
- Chapin, F. S., III and G. R. Shaver. 1989. Differences in growth and nutrient use among arctic plant growth forms. *Functional Ecology* 3:73-80.
- Chapin, F. S., III and G. R. Shaver. 1989. Lack of latitudinal variations in graminoid storage reserves. *Ecology* 70:269-272.
- Chapin, F. S., III, J. B. McGraw and G. R. Shaver. 1989. Competition causes regular spacing of alder in Alaskan shrub tundra. *Oecologia* 79:412-416.
- Shaver, G. R., K. J. Nadelhoffer and A. E. Giblin. 1990. Climatic change, nutrient cycling, and primary production in the Arctic landscape. pp. 134-135 In: *Arctic Research: Advances and Prospects (Part 2)*. Proceedings of the Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, USSR. Nauka, Moscow. 446 pages.
- Fetcher, N. and G. R. Shaver. 1990. Environmental sensitivity of ecotypes as a potential influence on primary productivity. *American Naturalist* 136:126-131.
- Shaver, G. R., K. J. Nadelhoffer and A. E. Giblin. 1991. Biogeochemical diversity and element transport in a heterogeneous landscape, the North Slope of Alaska. pp. 105-126 In: M. G. Turner and R. H. Gardner (eds.), *Quantitative Methods in Landscape Ecology*. Springer-Verlag, New York.
- Nadelhoffer, K. J., A. E. Giblin, G. R. Shaver and J. A. Laundre. 1991. Effects of temperature and organic matter quality on C, N, and P mineralization in soils from six arctic ecosystems. *Ecology* 72:242-253
- Shaver, G. R. and F. S. Chapin, III. 1991. Production/biomass relationships and element cycling in contrasting arctic vegetation types. *Ecological Monographs* 61:1-31.
- Rastetter, E. B., M. G. Ryan, G. R. Shaver, J. M. Melillo, K. J. Nadelhoffer, J. E. Hobbie and J. D. Aber. 1991. A general biogeochemical model describing the responses of the C and N cycles in terrestrial ecosystems to changes in CO₂, climate, and N deposition. *Tree Physiology* 9:101-126.
- Giblin, A. E., K. J. Nadelhoffer, G. R. Shaver, J. A. Laundre and A. J. McKerrow. 1991. Biogeochemical diversity along a riverside toposequence in arctic Alaska. *Ecological Monographs* 61:415-436.
- Chapin, F.S., III, R. Jefferies, J. Reynolds, G. Shaver and J. Svoboda (eds.). 1992. *Arctic Ecosystems in a Changing Climate: An Ecophysiological Perspective*. 469 pp. Academic Press, New York.
- Nadelhoffer, K. J., A. E. Linkins, A. E. Giblin and G. R. Shaver. 1992. Microbial processes and plant nutrient availability in arctic soils. pp. 281-300 In: F. S. Chapin, III, R. Jefferies, J. Reynolds, G. Shaver, and J. Svoboda (eds.), *Arctic Ecosystems in a Changing Climate: An Ecophysiological Perspective*. Academic Press, New York.
- Shaver, G. R. and J. Kummerow. 1992. Phenology, resource allocation, and growth of arctic vascular plants. pp. 193-212 In: F. S. Chapin, III, R. Jefferies, J. Reynolds, G. Shaver, and J. Svoboda (eds.), *Arctic Ecosystems in a Changing Climate: An Ecophysiological Perspective*. Academic Press, New York.
- Chapin, F. S., III, R. Jefferies, J. Reynolds, G. Shaver and J. Svoboda. 1992. Arctic plant physiological Ecology: A challenge for the future. pp. 441-452 In: F. S. Chapin, III, R. Jefferies, J. Reynolds, G. Shaver, and J. Svoboda (eds.), *Arctic Ecosystems in a Changing Climate: An Ecophysiological Perspective*. Academic Press, New York.
- Chapin, F.S., III, R. Jefferies, J. Reynolds, G. Shaver and J. Svoboda. 1992. Arctic physiological ecology in an ecosystem context. pp. 3-10 In: F. S. Chapin, III, R. Jefferies, J. Reynolds, G. Shaver, and J. Svoboda (eds.), *Arctic Ecosystems in a Changing Climate: An Ecophysiological Perspective*. Academic Press, New York.
- Shaver, G. R., W. D. Billings, F. S. Chapin, III, A. E. Giblin, K. J. Nadelhoffer, W. C. Oechel and E. B. Rastetter. 1992. Global change and the carbon balance of arctic ecosystems. *BioScience* 42:433-441.
- Rastetter, E. B., R. B. McKane, G. R. Shaver and J. M. Melillo. 1992. Changes in C storage by terrestrial ecosystems: How C-N interactions restrict responses to CO₂ and temperature. *Water, Air, and Soil Pollution* 64:327-344.
- Rastetter, E. B. and G. R. Shaver. 1992. A model of multiple element limitation for acclimating vegetation. *Ecology* 73:1157-1174.
- Giblin, A. E., J. A. Laundre, K. J. Nadelhoffer and G. R. Shaver. 1994. Measuring nutrient availability in arctic soils using ion exchange resins. *Soil Science Society of America Journal*. 58:1154-1162.
- Rastetter, E. B. and G. R. Shaver. 1994. Functional redundancy and process aggregation: Linking ecosystems to species. pp. 215-223 In: C.G. Jones and J.H. Lawton, eds. *Linking Species and Ecosystems*. Chapman and Hall, New York.

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- Shaver, G. R. 1995. Plant functional diversity and resource control of primary production in Alaskan arctic tundras. pp. 199-212 In: C. Körner and F.S. Chapin, III, eds. Arctic and Alpine Biodiversity: Patterns, Causes, and Ecosystem Consequences. Springer-Verlag Ecological Studies Series, vol. 113. Springer-Verlag, New York. 332 pp.
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- Nadelhoffer, K. J., A. E. Giblin and G. R. Shaver. 1988. Biogeochemical diversity in an arctic landscape. In: *Observations Across Scales: Function and Management of Landscapes. Proceedings of the 3rd Annual Landscape Ecology Symposium, US-IALE, Albuquerque, New Mexico*.
- Nadelhoffer, K. J., A. E. Giblin and G. R. Shaver. 1988. Soil element interactions on a tundra toposequence. Paper presented at S.S.S.A. invited symposium "The Interface Between Microbiology and Ecosystems Science", November 29, 1988, Anaheim, CA. *Agronomy Abstracts, American Society of Agronomy*. Page 222.
- Rastetter, E. B. and G. R. Shaver. 1988. A model of multiple resource limitation for an acclimating plant. *Bull. Ecol. Soc. Amer.* 69:270-271.
- Shaver, G. R., A. E. Giblin and K. J. Nadelhoffer. 1988. Biogeochemical diversity in the arctic landscape. *Bull. Ecol. Soc. Amer.* 69:294.
- Davis, S. J., J. S. Pallant, M. G. Ryan, E. B. Rastetter, J. D. Aber, J. M. Melillo, K. J. Nadelhoffer, G. R. Shaver and J. E. Hobbie. 1989. A general model for predicting the effects of environmental change on terrestrial ecosystems: production and allocation of C and N in biomass. *Bulletin of the Ecological Society of America* 70(2):221.
- Nadelhoffer, K. J., A. E. Linkins, A. E. Giblin and G. R. Shaver. 1989. *Bulletin of the Ecological Society of America* 70(2):241.
- Pallant, J. S., S. J. Davis, M. G. Ryan, E. B. Rastetter, K. J. Nadelhoffer, G. R. Shaver, J. D. Aber, J. M. Melillo and J. E. Hobbie. 1989. A general model for predicting the effects of environmental change on terrestrial ecosystems: decomposition and C and N cycling in litter and soil. *Bulletin of the Ecological Society of America* 70(2):93.

ESA 1990 (2)

INTECOL 1990 (2)

- ESA 1991 (2)
- ESA 1993 (2)
- GCTE Woods Hole 1994 (4)
- ESA 1994 (3)
- ESA 1995 (3)
- ESA 1996 (2)
- ESA 1997 (2)
- ESA 1999 (3)
- ESA 2000 (2)
- ESA 2005 (2)
- ESA 2006 (2)

Book Reviews

- 1980 High Altitude Geoecology, ed. by P. J. Webber. *BioScience* 30: 191.
- 1980 Comparative Mechanisms of Cold Adaptation, ed. by L. S. Underwood, L. L. Tieszen, A. B. Callahan and G. E. Folk. *Science* 209:395.
- 1982 Stress Effects on Natural Ecosystems, ed. by G. W. Barrett and R. Rosenburg. *Ecology* 63:1613.
- 1986 The Living Tundra, by Yu. I. Chernov. *Ecology* 67:1107-1108.
- 2000 Global Environmental Change: Research Pathways for the Next Decade. NRC Committee on Global Change Research. *BioScience* 50:1124-1129

Seminars and Meetings

- March, 1979 MBL/Boston University Marine Program. Seminar on "Plant growth form and response to disturbance in Alaskan arctic tundra."
- October 1979 Virginia Polytechnic Institute. Seminar on "Plant growth forms and response to disturbance in Alaskan arctic tundra."
- December, 1979 University of Connecticut. Seminar on "Ecotypic variation in Carex aquatilis among microhabitats of wet tundra."
- March, 1980 San Diego State University. DOE-sponsored workshop on "Carbon in boreal and tundra ecosystems." Brief presentation of the MBL/TCM model.
Washington, DC. Review of DOE-sponsored arctic research programs. Brief presentation on plant responses to disturbance in the Arctic.
- April, 1980 MBL/Ecosystems Center. Seminar on "Carbon-nutrient interactions and primary production in tundras."
- May, 1980 University of Alaska, Fairbanks. Workshop on "Environmental protection of permafrost terrain." Brief presentation of the MBL/TCM model.
- August, 1980 University of Arizona. Annual Meeting of the Ecological Society of America. Paper presented on "Community structure, plant nutrition, and turnover in microhabitats of polygonal wet tundra."
- October, 1980 University of North Carolina. Seminar on "Plant nutrition and leaf turnover in Ledum palustre."
Duke University. Seminar on "The biota and the world carbon budget" (with J. M. Melillo).

December, 1980	The New England Center. NSF/MBL/UNH Workshop on "The role of tropical forests in the world carbon budget."
January, 1981	National Research Institute of the Amazon, Manaus, Brazil. Discussions on the role of tropical forests in the world carbon budget.
February, 1981	Johnson State College, Vermont. Seminar on "The biosphere, the atmosphere, and the world carbon budget."
March, 1981	MBL/Ecosystems Center. Seminar on "Mineral nutrition and leaf turnover in Alaskan moist tundra."
August, 1981	Indiana University. Annual Meeting of the Ecological Society of America. Joint author of three papers presented. MBL Botany Seminar Series. "Limiting factors for plant growth in Alaskan tundra."
October, 1981	University of Alaska. Seminar on "The biosphere, the atmosphere, and the global CO ₂ problem."
November, 1981	MBL/Boston University Marine Program. Seminar on "The regulation of plant biomass, litter mass, and litter nutrient content in Alaskan cottongrass."
April, 1982	MBL/Ecosystems Center. Seminar on "Disturbance and recovery in Alaskan tundra vegetation."
June, 1982	University of California, Santa Barbara. Seminar on "Disturbance and recovery in Alaskan tundra vegetation."
August, 1982	Pennsylvania State University. Annual Meeting of the Ecological Society of America. Organized symposium on "Carbon-nutrient interactions in plants and ecosystems" and author of 2 papers presented.
November, 1982	Duke University. Seminar on "Carbon-nutrient interactions in phytotron-grown marsh plants." U.S. Army CRREL, Hanover, New Hampshire. Workshop on "Tundra impact and recovery." Boulder, Colorado. NAS-DOE Workshop on "Arctic terrestrial environmental research."
December, 1982	San Diego State University. Seminar and discussions on arctic plant growth.
March, 1983	MBL/Ecosystems Center. Seminar on "Nitrogen uptake, nitrogen recovery, and nitrogen use in marsh plants."
May, 1983	Washington, D.C. DOE Workshop on "Plant uptake and soil-plant processes."
July 1983	Fourth International Conference on Permafrost, Fairbanks, Alaska. Paper titled - "Revegetation of arctic disturbed sites by native tundra plants."
September, 1983	University of Massachusetts, Amherst. Seminar on "Nutrient use by marsh plants: Efficiency concepts and relation to nutrient cycling."
October, 1983	U.S. Army CRREL, Hanover, New Hampshire. Workshop on tundra impact and recovery.
February, 1984	McGill University, Montreal. Two talks on "Limiting factors for plant growth in arctic ecosystems" and "Demographic approaches to production/biomass relationships in arctic tundra." Johnson State College, Vermont. Seminar/lecture on "Environmental regulation on plant growth form abundance in tundra ecosystems."
March, 1984	Cornell University. Seminar on "Nutrient budgets of marsh plants: Efficiency concepts and relation to availability."
April, 1984	University of Washington, Seattle. Seminar on "Limitation of primary production in Alaskan tundra ecosystems." U.S. DOE Arctic Research Program Planning Meeting, Seattle, Washington.

May, 1984 Cornell University. Seminar on "Limiting factors for plant growth in Alaskan tundra ecosystems."

August, 1984 Colorado State University. Annual Meeting of Ecological Society of America and co-author of 2 papers presented.

November 1984 Laval University, Quebec. Seminar on "The regulation of primary production and plant biomass in Alaskan tundra."
San Diego State University. Seminar on "The regulation of primary production and plant biomass in Alaskan tundra."

February, 1985 University of Rhode Island. Seminar on "The regulation of primary production and plant biomass in Alaskan tundra."

April, 1985 U.S. DOE Arctic Research Program Planning Meeting, San Diego.

November, 1985 U.S. DOE Arctic Research Program Planning Meeting, Easton, Maryland.

January, 1986 University of Georgia. Symposium on "The role of landscape heterogeneity in the spread of disturbance."

February, 1986 Marine Biological Laboratory. Seminar on "Comparative element cycles of contrasting Alaskan vegetation types."

April, 1986 U.S. DOE Arctic Research Program Planning Meeting, San Diego.
NASA-Ames Research Center. Seminar on "Production/biomass relationships and element cycling in contrasting Alaskan ecosystems."

August, 1986 Syracuse University. Annual meeting of the Ecological Society of America and co-author of 2 papers presented.

September, 1986 Colorado State University. Workshop on "The use of supercomputers in landscape ecology."

October, 1986 Syracuse University. Two seminars.

December, 1986 Institute of Ecosystem Studies. Seminar on "Production/biomass relationships and element cycling in contrasting Alaskan ecosystems."

December, 1986 Ecosystems Center, MBL. Seminar.

May, 1987 Ecosystems Center, MBL. Seminar.

July, 1987 International Symposium on Vegetation Structure, Utrecht, The Netherlands. Paper presented.

October, 1987 University of Colorado. Seminar.
Colorado State University. Seminar.
Woods Hole, Massachusetts. DOE CO₂ Workshop.

November, 1987 Washington, DC. NSF Committee on Long term technological needs of the LTER program.

January, 1988 Washington, DC. 2 NSF LTER committee meetings.

February, 1988 Woods Hole, Massachusetts. Arctic LTER workshop.

March, 1988 San Diego State University. Consulting on research planning for DOE Arctic research.

April, 1988 SUNY, Binghamton. 2 seminars.
University of Virginia. Workshop on global modeling.

May, 1988 Oak Ridge National Laboratory. Workshop on the role of northern peatlands in response to global climate change; seminar.

June, 1988 University of Washington, Seattle. Seminar.

August, 1988 University of California, Davis. Presented 1 paper and co-author of 3 others at annual meeting of ESA.

November, 1988 Kellogg Biological Station, Michigan. LTER CC Meetings.

December, 1988 Leningrad, USSR. Conference of Arctic and Nordic Countries on coordination of research in the Arctic.

February, 1989. San Diego State University. Consulting on research planning for DOE Arctic Research.

March, 1989 Woods Hole, Massachusetts. Arctic LTER Workshop. Co-organizer.
Colorado State University. Landscape Ecology Symposium. Presented paper.
University of Minnesota, Duluth. Meeting on effects of global climate change on northern ecosystems.

April, 1989 Woods Hole, Massachusetts. SCOPE workshop on effects of climate change on production and decomposition in coniferous forests and grasslands.
Woods Hole, Massachusetts. IGBP CP4 workshop on modeling.

May, 1989 Woods Hole, Massachusetts. LTER workshop on decomposition.
San Diego State University. Consulting on research planning for DOE Arctic research.

August, 1989 University of Toronto. Annual meeting of ESA.
Toronto, Canada. Workshop on Arctic physiological processes in a changing climate.

September, 1989 Woods Hole, Massachusetts. LTER Stable Isotopes workshop.

October, 1989 University of New Mexico, Albuquerque. International workshop on long-term ecological research.
Harvard Forest, Massachusetts. LTER coordinating committee meeting.
Woods Hole, Massachusetts. Intergovernmental Panel on Climate Change.

January 1990 Woods Hole, Massachusetts. SCOPE modeling workshop.

February 1990 University of Colorado, Boulder. ARCUS workshop on planning of terrestrial research for Arctic Systems Science (ARCSS).
Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

April 1990 San Diego State University, San Diego. DOE-R4D arctic research planning meeting.

June 1990 University of Alaska, Fairbanks. Meeting of the steering committee for Land/Atmosphere/Ice Interactions, Arctic System Science Program.

July 1990 Snowbird, Utah. Annual meeting of the Ecological Society of America (presented paper).

September 1990 King's College, London, England. SCOPE modeling workshop (presented paper).
Estes Park, Colorado. LTER All-Scientists' Meeting.

December 1990 Kellogg Biological Station, Michigan State University. Workshop on an International Tundra Experiment (ITEX).
Duke University. Review of EPRI-funded research on CO₂ effects on ecosystems.

February 1991 Pacific Northwest Laboratories, Richland, Washington. Planning workshop for development of a US consortium for wetlands and climate change research.

March 1991 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.
University of Massachusetts, Amherst. Annual meeting of the Arctic Research Consortium of the United States, and meeting of steering committee for Arctic Systems Science Program.

April 1991 University of Colorado, Boulder. Seminar on "Alaskan moist tundra: A model ecosystem."

July 1991 Prudhoe Bay, Alaska. EPA, Consultant on development of an Arctic North Slope Ecorestoration Research Strategy (ANSWERS).

August 1991 San Antonio, Texas. Annual meeting of the Ecological Society of America (presented paper).

September 1991 Woods Hole, Massachusetts. Workshop on design of soil warming experiments.

November 1991 Desert Research Institute, Reno, Nevada. Review of EPRI-funded research on CO₂ effects on ecosystems.

January 1992 INSTAAR, University of Colorado. Planning meeting for proposals to NSF-ARCSS program.

March 1992 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group. Washington, DC. Annual meeting of the Arctic Research Consortium of the United States.

May 1992 Washington, DC. NSF-DPP planning workshop on development of a field laboratory for ARCSS research.
Washington, DC. DOE planning workshop on development of a new "Program for Ecosystem Research."

July 1992 Cedar Creek, Minnesota. Site review of NSF Cedar Creek LTER program.

October 1992 Washington, DC. NSF-Ecosystem Studies Panel meeting.

January 1993 Duke University. Review of EPRI-funded research on CO₂ effects on ecosystems.
Duke University. Seminar on "Multiple Resource Limitation in a Changing World."
University of Virginia. IGBP-GCTE workshop on plant Functional Types and Global Change.

February 1993 Kellogg Biological Station, Michigan State University. Seminar on "Ecosystem Stoichiometry in a Changing World."
San Diego State University. Seminar on "Ecosystem Stiochiometry in a Changing World."

March 1993 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

April 1993 Washington, DC. NSF-Ecosystem Studies Panel meeting.

May 1993 Washington, DC. Scope workshop on CO₂ effects on terrestrial ecosystems.

August 1993 Madison, Wisconsin. Annual meeting of the ESA.
Kongs vold, Norway. Workshop on functional significance of biodiversity in arctic ecosystems.

September, 1993 Fort Collins, Colorado. Site review of Central Plains LTER program.

October 1993 Washington, DC. NSF-Ecosystem Studies Panel meeting.

January 1994 Lake Tahoe, Nevada. Review of EPRI-funded research on CO₂ effects on ecosystems.
Woods Hole, Massachusetts. Seminar on "Plant diversity and the regulation of primary production in Alaskan arctic tundras."

March 1994 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.
St. Petersburg, Russia. Annual workshop of the ITEX program. Talk on "Short-term versus long-term controls of primary production in arctic ecosystems."

May 1994 Washington, DC. NSF-LTER Panel Meeting.
Woods Hole, Massachusetts. GCTE Science Conference. Presented paper and coauthor of three others.

October 1994 Washington, DC. Annual Meeting of the Arctic Research Consortium (ARCUS).
Washington, DC. Planning meeting of Committee for Future Needs of Toolik Field Station.
Dillard, Georgia. LTER Coordinating Committee.

February 1995 Bodega Bay, California. Toolik Field Station Planning Workshop (Organizing Committee)
Woods Hole. IPCC Working Group meeting on CO₂-water tradeoffs

March 1995 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

- University of Toronto. Seminar on “The carbon balance of arctic ecosystems: Do species matter?”
- April 1995 Washington, DC. NSF-Ecosystem Studies Panel meeting.
University of Ottawa. 6th Annual ITEX Workshop. Presented paper on “Leaf elongation, leaf exsertion, and leaf senescence in Alaskan tundra graminoids.”
- May 1995 Lake Tahoe, California IGBP-GCTE Workshop on “Stress effects on future carbon fluxes”
- July/August 1995 Snowbird, Utah. Annual meeting of the Ecological Society of America (presented paper, coauthor of 2 others).
- September 1995 Rovaniemi, Finland. NATO workshop on Disturbance and Recovery of Arctic Terrestrial Ecosystems (presented paper)
- October 1995 Washington, D.C. NSF-Ecosystem Studies Panel meeting
Duke University. Review of EPRI-funded research on CO₂ effects on ecosystems.
Gothenburg, Sweden. “Opponent” at Ph.D. defense of Mats Havstrom, Univ. Gothenburg
- November 1995 Washington, D.C. NSF Division of Environmental Biology -seminar on “A Model Landscape: The Arctic Tundra at Toolik Lake, Alaska”
- December 1995 Dartmouth College, N.H. International Conference on Arctic Research Planning
- February 1996 Seattle, WA. Arctic Systems Science/Land-Atmosphere-Ice Interactions Workshop (presented paper)
- March 1996 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.
Washington, D.C. Annual meeting of Arctic Research Consortium of the United States.
Presented a paper on “Terrestrial and aquatic research at Toolik Lake, Alaska”
- April 1996 Washington, D.C. NSF-Ecosystem Studies Panel meeting
Copenhagen, Denmark. 7th Annual ITEX workshop (presented paper, chaired session)
- May 1996 Snowbird, Utah. NSF-ARCSS “All-Hands” Workshop
- June 1996 Abisko, Sweden. Workshop on Long-Term Experiments in Arctic Tundra (presented paper)
- August 1996 Providence, RI. Annual meeting of the Ecological Society of America (coauthor of 2 papers presented).
- November 1996 Santa Barbara, CA; National Center for Ecological Analysis and Synthesis. Workshop on “Synthesis in Ecology—Applications, Opportunities, and Challenges.”
- December 1996 Fairbanks, Alaska, Institute of Arctic Biology. Meeting of Toolik Field Station Steering Committee and invited seminar on “Production and biomass regulation in tundra vegetation: Does species composition make any difference?”
- January 1997 Smithsonian Environmental Research Laboratory, Edgewater, MD. Invited seminar.
- March 1997 Salt Lake City, Utah. Steering committee meeting, GCTE Focus 1: Ecosystem Physiology and Global Change
Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

Montpellier, France. IGBP-GCTE Workshop on Terrestrial Primary Productivity.
Presented a paper on Arctic Productivity

April 1997 London, England. 8th Annual ITEX meeting (presented paper)

Andrews Experimental Forest, Oregon. Spring meeting of the LTER Coordinating Committee

June 1997 Puerto Rico. Site review of Luquillo LTER program

July 1997 Cedar Creek, Minnesota. Site review of Cedar Creek LTER program

Palo Alto, CA. GCTE NETFLUX workshop.

September 1997 Sevilleta NWR, New Mexico. Site review of Sevilleta LTER Program

October 1997 Jasper National Park, Canada. Workshop on Ecosystem Experiments; presented paper

Santa Barbara, CA. LTER Coordinating Committee, fall meeting

November 1997 Taipei, Taiwan. International LTER Program, annual meeting and workshop

February 1998 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

March 1998 Stony Brook, NY. Invited seminar at SUNY-Stony Brook

Fairfax, Virginia. Invited seminar at George Mason University

April 1998 Kansas State University, Manhattan, KS Invited Seminar

Colorado State Univ., Ft. Collins, CO. LTER Coordinating Committee, Spring meeting

May 1998 Las Vegas and Reno, Nevada. NSF-EPSCOR site visits and talks with faculty, University of Nevada campuses

Desert Research Institute, Reno, NV. Fritz Went Laboratory advisory committee

June 1998 Portland, Maine. Organizing meeting for Workshop on Ecosystem Warming

August 1998 Baltimore, Maryland. Annual meeting of the Ecological Society of America

Tromsø, Norway. IASC workshop on Role of the Polar Regions in Global Change (presented paper)

September 1998 Abisko, Sweden. Workshop on Plant Ecology at High Altitudes and Latitudes (presented paper)

October 1998 Estes Park, Colorado. Workshop on “The contribution of long-term ecological research and monitoring to broad-scale management needs: Integrating up from research intensive sites to develop regional perspectives”

Madison, Wisconsin. LTER Coordinating Committee, Fall meeting

November 1998 Woods Hole, MA. Ecosystems Center Seminar.

December 1998 Fairbanks, Alaska, Institute of Arctic Biology. Meeting of Toolik Field Station Steering Committee

January 1999 East Lansing, Michigan. 9th ITEX workshop. Presented 2 talks

February 1999 Santa Barbara, California. Workshop on "A Cross-Biome Synthesis of Ecosystem Response to Global Warming" (Organizing Committee)

March 1999 Ottawa, Canada. Canadian National Science and Engineering Research Council (NSERC) Major Facilities Access Panel meeting
Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

April 1999 Luquillo, Puerto Rico. LTER Coordinating Committee, Spring meeting

June 1999 Abisko, Sweden. Workshop on "How nutrient cycles constrain carbon balances in boreal forests and arctic tundra" (Invited speaker)

August 1999 Spokane, Washington. Annual meeting of the Ecological Society of America. Talk presented and coauthor of 2 others

October 1999 Hubbard Brook, NH. LTER Coordinating Committee, Fall meeting. Speaker in Symposium on Primary Production at LTER sites

November 1999 University of Rhode Island. Invited seminar, Department of Biological Sciences

January 2000 St. John's, Newfoundland. Canadian National Science and Engineering Research Council (NSERC) Major Facilities Access Panel Site Review

February 2000 Washington, DC. LTER Executive Committee Meeting
Seattle, Washington. Annual ARCSS-LAII Workshop. Presented paper, attended Steering Committee (member)

March 2000 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

August 2000 Snowbird, Utah. LTER All-Scientists meeting. Workshop participant and speaker
Snowbird, Utah. Annual meeting of the Ecological Society of America. Coauthor of 2 talks.

September 2000 Abisko, Sweden. 10th ITEX workshop. Presented 1 talk and coauthored 1 poster

November 2000 Pomona College, California. Seminar on "Global Warming and Arctic Tundra Ecosystems: the Carbon-Nutrient Connection"
Fort Collins, CO. LTER Network Executive Committee

December 2000 Fairbanks, AK. Annual meeting of Toolik Field Station Steering Committee

January 2001 Sevilleta NWR, NM. LTER Executive Committee/Principal Investigators

February 2001 Seattle, WA . ARCSS-LAII Steering Committee
Washington, DC. LTER EXEC/National Advisory Board
Boulder, CO. ITEX Community Change Synthesis workshop

March 2001 Copenhagen, Denmark. Visiting Fellow at University of Copenhagen Global Change Program. Three seminars presented.

April 2001 Tempe, AZ. LTER EXEC/Coordinating Committee

October 2001 Ithaca, NY. Seminar on "Species composition interacts with N supply to control long-term change in an Alaskan tundra ecosystem". Biogeochemistry group, Cornell University

October 2001 LTER 20 Year Review, University of New Mexico, Albuquerque

November 2001 ARCSS-LAII All-Scientists' Meeting, Salt Lake City

January 2002 Umea, Sweden. Opponent for thesis defense of Joachim Strengbom

January 2002 ITE Banchory, Scotland. Invited seminar on "Species composition interacts with N supply to control long-term change in Alaska tundra"

February 2002 Seattle, WA. ARCSS All-Hands meeting (LAII Steering Committee member)

February 2002 Arlington, VA. LTER minisymposium at NSF; talk on "LTER in the next Decade"

March 2002 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

April 2002 Sevilleta NWR, New Mexico. LTER Exec/Coordinating Committee

May 2002 Durham, NH. GCTE-Terrestrial Ecosystem Responses to Atmospheric and Climate Change (TERACC). Organizing committee, session chair.

May 2002 Woods Hole, MA. Invited talk on "The LTER Network" to Watson Scholars of the Environment, Brown University

August 2002 Tucson, AZ Annual meeting of the Ecological Society of America

September 2002 Niwot Ridge, CO LTER Exec/Coordinating Committee Presented paper on "Causes and Consequences of Species Change in Ecosystems: A Perspective from the Arctic LTER Site"

October 2002 Study of Environmental Arctic Change (SEARCH) planning meeting, University of Washington, Seattle

November 2002 Study of Environmental Arctic Change (SEARCH) Scientific Steering Committee/Interagency Working Group (SSC/IWG), Orlando, FL

December 2002 Fairbanks, AK. Annual meeting of Toolik Field Station Steering Committee

March 2003 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

March 2003 Brown University. Seminar on "Biodiversity regulates biogeochemistry of arctic ecosystems"

April 2003 Lamont-Doherty Earth Observatory, Columbia University. Seminar on "Biodiversity regulates biogeochemistry of arctic ecosystems"

April 2003 Ecosystem Center, Woods Hole, MA Seminar on "Biodiversity regulates biogeochemistry of arctic ecosystems"

April 2003 Uppsala University, Sweden. Opponent for Ph.D. thesis defense of Sofie Sjögersten

April 2003 Cary Conference, Millbrook, NY. Panelist and speaker.

May 2003 Kellogg Biological Station, Hickory Corners, MI. LTER Network Coordinating Committee

August 2003 Savannah, Georgia. Annual meeting of the Ecological Society of America

September 2003 Abisko, Sweden. Workshop on development of international collaboration in arctic research

September 2003 Seattle, WA. LTER network All-Scientists' meeting

October 2003 Seattle, WA. Study of Environmental Arctic Change (SEARCH) Open Science meeting. Steering Committee and panelist

February 2004 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

March 2004 Cumberland, Simons, and Cambridge, MD. University of Maryland Center for Environmental Science. Center Review team and site visits

April 2004 Santa Barbara, CA. US LTER network Coordinating Committee meeting

May 2004 Uppsala University, Sweden. Organizing meeting of the Circum Arctic Terrestrial Biodiversity Project (European Union)

May 2004 University of Edinburgh, Scotland. Seminar on “C-N interactions in Arctic Tundra Ecosystems”

May 2004 Washington, DC. Ecological Society of America Governing Board

August 2004 Portland, Oregon. Annual meeting of Ecological Society of America (2 posters)

September 2004 Washington, DC Steering Committee, Study of Environmental Arctic Change (SEARCH)

October 2004 Lund University, Sweden. Seminar on “Long-Term Experiments in Arctic Tundra at Toolik Lake, Alaska”

October 2004 Lund University, Sweden. Opponent at thesis defense of Maria Olsrud

November 2004 Washington, DC. Governing Board, Ecological Society of America

November 2004 Woods Hole, MA. Host, international workshop on “Flagship Observatories in Arctic Ecological Research”

December 2004 San Francisco. Annual meeting of Toolik Field Station Steering Committee

December 2004 San Francisco. Annual meeting of the American Geophysical Union (poster presented)

December 2004 University of Massachusetts, Boston. Seminar on “Climate Change and Ecosystem Stoichiometry in an Arctic Landscape, Toolik Lake, Alaska”

January 2005 Fort Myers, FL GSCTE-TERRAC Workshop on “Model-Experiment Interactions in Global Change Research” Meeting organizer

January 2005 Seattle, WA. Research Planning Workshop of the ARCSS-LAIH program

February 2005 Woods Hole, Massachusetts. Annual workshop of the Arctic LTER research group.

February 2005 Boulder Colorado. Seminar on “Climate Change and Ecosystem Stoichiometry in an Arctic Landscape, Toolik Lake, Alaska”

February 2005	Washington, DC ESA Governing Board planning meeting on new initiatives in Public Affairs
March 2005	Irvine, CA. Seminar on “Climate Change and Ecosystem Stoichiometry in an Arctic Landscape, Toolik Lake, Alaska”
April 2005	Vrije Universitet, Amsterdam. Seminar on “Climate Change and Ecosystem Stoichiometry in an Arctic Landscape, Toolik Lake, Alaska”
May 2005	Dourdan, France. International workshop on “Biodiversity and Global Climate Change”
May 2005	Washington, DC. ESA Governing Board
May 2005	Washington, DC. Study of Environmental Arctic Change: Steering Committee
July 2005	Longyearbyen, Svalbard, Norway. Field work and gave 2 lectures in an international summer field course in Arctic Plant Ecology, organized by UNIS, the University Center in Svalbard
August 2005	Montreal, Quebec. Annual meeting of the ESA (2 talks presented, session organizer) and ESA Governing Board
August 2005	Sydney, Australia. Workshop on Plant N-P strategies (talk presented)
September 2005	Virginia Coast Reserve, Virginia. LTER Coordinating Committee and Symposium (talk presented)
September 2005	Amsterdam, Netherlands. Opponent at thesis defense of Ellen Dorrepaal, Vrije Universitet Amsterdam
October 2005	Washington DC. ESA Governing Board
November 2005	Copenhagen, Denmark. International Conference on Arctic Research Planning (ICARP II).
December 2005	Fairbanks, Alaska. SEARCH Steering Committee
January 2006	Merida, Yucatan, Mexico Joint meeting of Ecological Society of America and Mexican Ecological Society
January 2006	Miami, Florida. 13 th ITEX meeting (talk presented)
February 2006	Durham, England. Seminar on ““Changing vegetation composition—does it make any difference to CO ₂ flux, productivity, or biomass accumulation in arctic ecosystems?” Also, external examiner on Ph.D. defense of James Cook
March 2006	Sydney, Australia. 2 nd Workshop on Plant N-P strategies (talk presented)
March 2006	Providence, RI. Workshop on “Impacts of Disaster: Comparing Ecological and Social Resilience. Talk presented on “Resilience and Sustainability in a World of Constant Change: What is the reference state?”
March 2006	Boston, MA. Boston University Center for Ecology and Conservation. Seminar on “Changing vegetation composition—does it make any difference to CO ₂ flux, productivity, or biomass accumulation?”
May 2006	Cedar Creek National History Area, Minnesota. LTER Coordinating Committee

May 2006	Washington DC. ESA Governing Board and Science Committee
May 2006	Helsingor, Denmark. International Workshop on “Effects of Precipitation Change on Terrestrial Ecosystems”
May 2006	Abisko Natural Science Research Station, Sweden. Workshop on Arctic Carbon Cycling Research
August 2006	ESA Annual meeting and Governing Board, Memphis, TN
September 2006	Estes Park, CO US LTER All Scientists’ meeting. Workshop organizer and speaker in two workshops
October 2006	Woods Hole Oceanographic Institute. US Arctic Research Commission, invited speaker on upscaling of plot-scale research results
November 2006	Washington DC. Search Steering Committee Meeting
November 2006	Washington DC. ESA Governing Board
December 2006	Hartford, CT NEON RFI organizational meeting
February 2007	Washington DC. Invited briefing to NSF-OPP on interactions of LTER, IPY, and NEON at Toolik Lake
March 2007	Brown University, Providence RI. Meeting on “Ecological Foundations of Sustainability in a Constantly Changing World” (Meeting host & organizer)
March 2007	Boulder, CO IPY-AON Principal Investigators meeting
April 2007	University of Georgia, Athens, GA. LTER planning meeting, Integrated Science for Society and the Environment
May 2007	Washington, DC ESA Governing Board
May 2007	Portland, OR LTER Science Council

Reviews

Proposals:

1979 -	NSF Ecology Program (2 proposals)
1980 -	NSF Ecology Program
	NSF Ecosystems Analysis
	NSF Population Biology and Physiological Ecology
1981 -	NSF Ecology Program (2 proposals)
	NSF Ecosystems Analysis
	NSF Population Biology and Physiological Ecology (2)
1982 -	NSF Ecosystems Analysis
	NSF Ecology
	NSF Population Biology and Physiological Ecology (2)
1983 -	NSF Ecosystems Analysis (3)
	NSF Population Biology and Physiological Ecology (3)
	NSF Polar Programs (4)
	NSF Ecology
1984 -	NSF Ecosystems
	NSF Ecology
	NSF Population Biology and Physiological Ecology (5)
	DOE CO ₂ Program

- 1985 - NSF Ecology
NSF Population Biology and Physiological Ecology (2)
NSF Polar Programs (2)
- 1986 - NSF Ecosystems (4)
NSF Polar Programs (3)
- 1987 - NSF Population Biology and Physiological Ecology (2)
NSF Ecosystems (7)
NSF Polar Programs
- 1988 - NSF Ecology (2)
NSF Ecosystems (7)
DOE CO₂ Program
NSF Climate Dynamics
NSF Polar Programs
Earthwatch
- 1989 - NSF Ecosystems (2)
DOE Theoretical Ecology
NSF Ecology
NSF Population Biology and Physiological Ecology (2)
Electric Power Research Institute (9)
- 1990 - NSF Ecosystems (3)
NSF Population Biology and Physiological Ecology (3)
NSF Polar Programs (2)
British Natural Environment Research Council (2)
- 1991 - USDA/NRICGP Forest/Rangeland/Crop Ecosystems Program
NASA Earth Systems Science
Earthwatch/Center for Field Research (2)
NSF Ecosystems
NSF Ecology
NSF Division of Polar Programs (ARCSS-PALE)
BION (Netherlands Organization for Scientific Research)
British Natural Environment Research Council
- 1992 - USDA/NRICGP Forest/Rangeland/Crop Ecosystems Program
USDA/NRICGP Plant Responses to Environment Program
NASA-Global Change Fellowship Program (2)
New York Sea Grant Institute
NSF Ecosystems (Panel member)
NSF DPP-ARCSS
- 1993 - NSF Ecosystems (Panel member 2x)
NSF OPP
- 1994 - NSF Ecosystems (1)
NSF Long-term Studies (1)
NSF LTER Program (Panel member)
NASA Global Change Research Graduate Fellowship Program (2)
- 1995 - NSF Ecosystems (Panel member 2x)
Natural Environment Research Council, Great Britain (4)
DOE Global Change Research Program
- 1996 - NSF Ecosystems (Panel member and Program Officer)
National Geographic Society
NSF-OPP, Arctic Systems Science
- 1997 - NSF Ecosystems (Program Officer)
NSF Environmental Geochemistry and Biogeochemistry (Program Officer)
Natural Environment Research Council, United Kingdom
- 1998 - NSF/BIO Doctoral Dissertation Improvement Awards (Program Officer)
NSF/Interagency TECO Program (Program Officer)
NSF Ecosystems (Program Officer)
Nature Conservancy
- 1999- Canadian NSERC Major Facilities Access Program (Panel Member; 54 proposals)
USDA Plant Responses to the Environment

- NSF Ecological and Evolutionary Physiology
 NSF Ecology
 NSF Ecosystem Studies (3)
 NSF Integrated Research Challenges in Environmental Biology
 NSF Office of Polar Programs—Arctic systems Science Program
 NSF Population Biology
 IGBP-GCTE Core Research Program (2)
 Chilean National Fund for Science and Technology (FONDECYT)
 Earthwatch
- 2000- Canadian NSERC Major Facilities Access Panel Site Review, St. Johns, Newfoundland
 Nebraska EPSCOR
 NSF Ecology (2)
 NSF Biocomplexity
 NSF Office of Polar Programs—Arctic Natural Sciences Program
- 2001- NSF Ecological and Evolutionary Physiology
 USDA Plant Responses to the Environment
 NASA Carbon Cycle Studies (2)
 NSF Ecology
 NSF LTREB
- 2002- NSF Arctic Systems Science
 USDA Soils and Soil Biology
 NSF Ecosystems (2)
 NSF OPP Arctic Natural Sciences
 NSF Integrated Research Challenges in Environmental Biology
 NSF GEO Carbon Cycle Science
 NSF OPP Antarctic Sciences
- 2003- Netherlands Organization for Scientific Research
 NSF Ecosystems (2)
 NSF FIBR
 NSF Ecology
 NSF OPP Arctic Natural Sciences
- 2004- Ecological and Evolutionary Physiology
 NSF Ecosystem Studies
 NSF OPP Arctic Systems Science
 NSF LTREB
 NSF FIBRE
 Australian Research Council Discovery Projects
 US National Academy of Sciences INTREU program
 NSF OPP “SNACS” program
- 2005- DOE Program for Ecosystem Research
 NSF-DEB Ecosystem Studies (2)
 NSF-IOB Environmental and Structural Systems
 NSF OPP Postdoctoral Program
- 2006- NSF OPP ARCSS Synthesis competition
 NSF Integrative Organismal Biology
 NSF OPP
 NSF OPP Arctic Systems Science
 NSERC Government of Canada Program for International Polar Year
 NSF Long Term Research in Environmental Biology (LTREB)
 NSF Ecosystem Studies (2)
- 2007- NSERC (Canada) International Polar Year
 Global Change Biology
- Publications:
 1979 - Ecology
 Ecological Monographs
 1980 - Ecology
 Canadian Journal of Botany

- 1982 - Ecology (2)
Polar Biology
Canadian Journal of Forest Research
- 1983 - Proceedings 4th International Conference on Permafrost
Ecology (2)
Arctic and Alpine Research (3)
Oikos (2)
Holarctic Ecology (2)
- 1984 - Ecology (3)
American Midland Naturalist
Arctic and Alpine Research (2)
Canadian Journal of Botany
Environmental and Experimental Botany
- 1985 - Ecology (4)
Canadian Journal of Botany
Arctic and Alpine Research
American Journal of Botany
American Naturalist
- 1986 - Ecology (2)
Arctic and Alpine Research
American Naturalist
Biogeochemistry
- 1987 - Arctic and Alpine Research (2)
Symposium on Chaparral Ecology
American Journal of Botany
Journal of Ecology
American Midland Naturalist
Science
Biogeochemistry
Ecology
- 1988 - Science
Canadian Journal of Botany (2)
Journal of Ecology
Holarctic Ecology (2)
BioScience
Ecology
- 1989 - Arctic and Alpine Research
American Journal of Botany
Canadian Journal of Botany
Ecology (3)
Landscape Ecology (2)
Oecologia Plantarum
- 1990 - Oecologia
Holarctic Ecology
Arctic and Alpine Research
Biogeochemistry
Landscape Ecology
Ecology (3)
Science
Acta Oecologia
American Naturalist
- 1991 - Blackwell Scientific Publications, Inc.
Arctic and Alpine Research
Estuaries
Oecologia (2)
Ecology
Holarctic Ecology
Canadian Journal of Botany

- Vegetation
Journal of Vegetation Science
- 1992 - Ecology and Ecological Monographs (Editorial Board)
Oecologia (2)
Journal of Ecology
American Journal of Botany
Nature
- 1993 - Ecology and Ecological Monographs (Editorial Board)
Trends in Ecology and Evolution
Oecologia
Encyclopedia of Environmental Biology
- 1994 - Ecology and Ecological Monographs (Editorial Board)
Global Change and Arctic Terrestrial Ecosystems (Proceedings)
Oecologia
Biogeochemistry
Canadian Journal of Forest Research
- 1995 - Ecology and Ecological Monographs (Editorial Board)
Arctic, Antarctic, and Alpine Research (Interdisciplinary Advisory Board)
Global Change and Arctic Terrestrial Ecosystems (Proceedings)
Biogeochemistry
Ecological Bulletins (Swedish NFR)
Journal of Ecology
- 1996 - Ecology (ad hoc editor)
Biogeochemistry
Journal of Ecology (2)
Canadian Journal of Botany
Nature
Vegetatio
- 1997- Arctic, Antarctic, and Alpine Research (Interdisciplinary Advisory Board)
Ecology (2)
Academic Press (book)
Cary Conference
Oecologia
Biogeochemistry
- 1998- Arctic, Antarctic, and Alpine Research (Interdisciplinary Advisory Board)
Tree Physiology
Oikos
Plant Ecology
Proceedings Workshop on Role of the Polar Regions in Global Change
- 1999- Ecosystems (Editorial Board)
Arctic, Antarctic, and Alpine Research (Interdisciplinary Advisory Board)
Polar Biology (2)
Ecological Applications
Ecography (2)
Oikos
Oecologia
Journal of Climate (2)
Journal of Ecology (2)
Proceedings National Academy of Sciences (2)
Biogeochemistry
- 2000- Ecosystems (Editorial Board)
Plant and Soil (Editorial Board)
Arctic, Antarctic, and Alpine Research (Interdisciplinary Advisory Board & reviewer)
Nature
Ecography
Journal of Climate
Science
Oecologia (2)

Climate Change
 Functional Ecology
 Journal of Vegetation Science
 Oikos
 Ecology
 Biogeochemistry
 2001- Ecosystems (Editorial Board)
 Plant and Soil (Editorial Board)
 Oikos
 Journal of Vegetation Science
 Nature (3)
 Natural History
 Journal of Ecology (2)
 Biogeochemistry
 2002- Ecosystems (Editorial Board)
 Plant and Soil (Editorial Board)
 Functional Ecology
 Nature (2)
 Arctic, Antarctic, and Alpine Research (2)
 Ecology (2)
 JGR-Atmospheres
 Plant and Soil
 Advances in Ecological Research
 American Naturalist
 2003- Ecosystems (Editorial Board)
 Island Press
 Functional Ecology
 Permafrost and Periglacial Processes
 BioScience
 Biogeochemistry (2)
 Global Change Biology
 Cary Conference (Proceedings)
 Frontiers in Ecology and the Environment
 2004- Global Change Biology
 Nature
 Ecology
 Biogeochemistry
 Millennium Ecosystem Assessment
 Oikos
 IGBP-GCTE Synthesis Volume
 Journal of Ecology (2)
 Arctic, Antarctic, and Alpine Research
 2005- Nature
 Soil Biology and Biochemistry
 Ecology Letters
 Frontiers in Ecology and Environment
 Global Change Biology
 Oecologia
 Oikos
 2006- Ecology
 Journal of Ecology (2)
 Ecological Applications
 2007- Global Change Biology
 Nature (2)

Educational Activities

1980 Ecology (January Course)

1981	Basic Ecology and the Management of Resources (January Course)
1980-81	Ecosystems Center Interns-in-Science Program (Preceptor)
1982-83	Graduate Student Advisory Committee (B. Howes - BUMP)
1986-89	Graduate Student Advisory Committee (D. Valentine - Duke Univ.)
1995	External "Opponent" University of Göteborg, Sweden (Mats Havström)
2002	External "Opponent" Umeå University, Sweden (Joachim Strengbom)
2003	External "Opponent" Uppsala University, Sweden (Sofie Sjögerstrom)
2004	External "Opponent" Lund University, Sweden (Maria Olsrud)
2005	External "Opponent" Vrije Universitet Amsterdam, Netherlands (Ellen Dorrepaal)
2006	External Examiner, Durham University, UK (James Cook)
1998-2006	MBL Semester in Environmental Sciences
1993-2006	Supervisor, NSF-REU students, Toolik Lake, Alaska, and Abisko, Sweden
2006-	Brown University, Lecturer in ES150

Committees, Consulting, and Advice

1982	Conservation Law Foundation of New England, on off-road vehicle use in Cape Cod National Seashore.
1984-86	Thornton Burgess Society, Greenbriar Nature Center, Research Advisory Committee.
1987	EPA, Advisory Panel on Research Needs in Climate Change
1987-88	NSF, Advisory Panel on Long-Term Technological Needs of the LTER Program
1987	Swedish Natural Sciences Research Council, Review and Evaluation of Candidates for Research Fellowship in Ecophysiology.
1988-94	Ecological Society of America, Membership Committee (Chairman, 1991-1994)
1989-91	Year-Round Scientists' Council, Marine Biological Laboratory
1989-90	Green Mountain Power Corporation, on effects of hydropower development on greenhouse gas emissions to the atmosphere
1990-91	Steering Committee, Land/Atmosphere/Ice Interactions, NSF Arctic Systems Science Program
1990-95	EPRI, CO ₂ program Review Panel
1991	EPA, Consultant on development of an Arctic North Slope Ecorestoration Research Strategy (ANSWERS)
1991-1992	Audit Committee, Marine Biological Laboratory
1992-1995	Editorial Board, Ecology and Ecological Monographs
1992-1996	Panel member, NSF Ecosystem Studies Program
1992-1993	Site reviews of NSF-LTER sites at Cedar Creek, Minnesota, and Central Plains Experimental Range, Colorado
1993-1995	Council member, Arctic Research Consortium (ARCUS)
1994	Panel Member, NSF LTER Program
1994-1995	Organizing committee, Workshop on future needs of Toolik Field Station
1995- 2006	Interdisciplinary Advisory Board, Arctic and Alpine Research, Univ. Colorado
1996- present	Steering Committee, Toolik Field Station, Institute of Arctic Biology
1996-98	Program Director, NSF Ecosystem Studies Program
1997-2004	Steering Committee, IGBP/GCTE Focus 1, "Ecosystem Physiology"
1997	Program Director, NSF Environmental Geochemistry and Biogeochemistry (EGB) Program (NSF Director's award for Collaborative Integration)
1998	Site reviews of NSF-LTER sites at Cedar Creek, Minnesota, Sevilleta NWR, New Mexico, and Luquillo NF, Puerto Rico
1998	Program Director, NSF/BIO Doctoral Dissertation Improvement Program
1998	Program Director, NSF Terrestrial Ecology and Global Change (TECO) Program
1998	Advisory Committee, Fritz Went Laboratory, Desert Research Institute, Univ. Nevada Reno
1999-present	Editorial Board, ECOSYSTEMS
1999	Canadian National Science and Engineering Research Council (NSERC) Major Facilities Access Program (Panel Member)
1999	Chilean National Fund for Science and Technology (FONDECYT)
2000	Site Review of Ocean Science Center, Memorial University of Newfoundland, for Canadian National Science and Engineering Research Council (NSERC) Major Facilities Access Program
2000-2002	Editorial Board, Plant and Soil
2000-2002	Executive Committee, US LTER Network
2000-2003	Steering Committee, ARCSS-LAII program

8 January, 2008

2001	Steering Committee, Study of Environmental Arctic Change (SEARCH)
2003-2004	Science Fair Judge, Falmouth Academy
2004	University of Maryland Center for Environmental Research. Review team and site visit
2004-2007	Ecological Society of America, Vice President for Science