

# ALLISON L. DUNN

Professor  
Department of Earth, Environment, and Physics  
Worcester State University  
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## RESEARCH AND TEACHING INTERESTS

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My teaching focuses on engaging students with the process of science. I do so through data-driven and case-based approaches towards scientific investigation and projects emphasizing critical analysis of scientific data and literature.

My research uses principles from the geosciences, biology, and chemistry to understand the terrestrial carbon cycle. Areas of focus include ecosystem response to climate, urbanization effects on carbon fluxes and pools, and how forest management affects atmospheric carbon sequestration. Much of my research is locally-based and designed to facilitate undergraduate participation.

## EDUCATION

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**Ph.D., Harvard University**, Cambridge, MA, 2006.  
Department of Earth and Planetary Sciences  
Thesis title: "Carbon Fluxes and the Boreal Forest Mosaic"

**A.M., Harvard University**, Cambridge, MA, 2003.  
Department of Earth and Planetary Sciences

**B.A., Oberlin College**, Oberlin, OH, 1996.  
Department of Geology (minors in Chemistry and Environmental Studies)

## APPOINTMENTS

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**Professor, Worcester State University**, 2018 – present

**Associate Professor, Worcester State University**, 2013 – 2018

**Assistant Professor, Worcester State University**, 2007 – 2013

*Teaching:* Teach 24 contact hours per academic year. Responsible for all aspects of course development, assessment, and administration. Please see "Teaching Experience" section below for detailed information.

*Research:* Engage in four major research efforts, including

- Assessing and quantifying carbon metabolism across the urban-rural gradient of Boston to Petersham, MA
- Measuring carbon fluxes and pools in regenerating New England forests and system response to biophysical pulses such as the December 2008 ice storm
- Developing and disseminating teaching materials to improve undergraduate climate literacy
- Investigating the long-term carbon balance of a boreal black spruce forest, Thompson, Manitoba, Canada.

*Advising:* Advise Geography and Environmental Science majors year on course selection, academic issues, and post-college plans. Additionally, intensive mentoring of a smaller group of students on research projects of their choosing.

**Postdoctoral Fellow, University of Manitoba, 2006 - 2007.**

Analyzed and synthesized data from Northern Old Black Spruce research site in Manitoba, Canada. Incorporated new research protocols to integrate site into the Fluxnet-Canada Research Network. Supervised and trained technicians in instrumentation maintenance and data processing.

*Postdoctoral Advisor:* Brian Amiro, Department of Soil Sciences, University of Manitoba, Winnipeg, Canada.

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**PUBLICATIONS**

**JOURNAL ARTICLES**

27. Hebig M, J Waddington, P Alekseychik, B Amiro, M Aurela, A Barr, A Black, P Blanken, S Carey, J Chen, J Chi, A Desai, A Dunn, E Euskirchen, T Friborg, L Flanagan, I Forbrich, A Grelle, S Harder, M Heliasz, E Humphreys, H Ikawa, H Iwata, P-E Isabelle, R Jassal, J Kurbatova, M Korhonen, L Kutzbach, A Lindroth, T Ohta, M Löfvenius, A Lohila, T Maximov, I Mammarella, P Marsh, J Melton, P Moore, D Nadeau, E Nicholls, M Nilsson, M Peichl, R Petrone, R Petrov, W Quinton, N Roulet, D Reed, B Runkle, A Rutgersson, E Sahlee, O Sonnentag, I Strachan, P Taillardat, E-S Tuittila, J-P Tuovinen, J Turner, M Ueyama, A Varlagin, M Wilmking, S Wofsy, Peatland-dominated boreal ecoregions at risk of drying in a warmer climate. *Nature Climate Change*, *in review*.
26. Soloway AD, BD Amiro, AL Dunn, SC Wofsy, Carbon neutral or a sink? Uncertainty caused by gap-filling long-term flux measurements for an old-growth boreal black spruce forest. *Agricultural & Forest Meteorology* 233, 110-121, 2017.
25. Briber BM, LR Hutryra, AB Reinmann, SM Raciti, VK Dearborn, CE Holden, AL Dunn, Tree productivity enhanced with conversion from forest to urban land covers, *PloS one* 10 (8), e0136237, 2015.
24. Meredith LK, R Commane, A Dunn, JW Munger, J Tang, SC Wofsy, RG Prinn, Ecosystem fluxes of hydrogen: a comparison of flux-gradient methods, *Atmospheric Measurement Techniques*, *Atmospheric Measurement Techniques* 7, 2787-2805, 2014.
23. Fu D, B Chen, H Zhang, J Wang, B Amiro, TA Black, G Bohrer, P Bolstad, R Coulter, F Rahman, A Dunn, H McCaughey, T Meyers, S Verma, Estimating landscape net ecosystem exchange at high spatiotemporal resolutions based on remote sensing and eddy covariance flux measurements, *Remote Sensing of Environment* 141, 90-104, 2014.
22. Briber BM, LR Hutryra, AL Dunn, SM Raciti, JW Munger, Variations in atmospheric CO<sub>2</sub> and carbon fluxes across a Boston, MA urban gradient, *Land* 2, 304-327, 2013.
21. Coursolle C, HA Margolis, M-A Giasson, P Bernier, B Amiro, A Arain, A Barr, A Black, M Goulden, H McCaughey, J Chen, AL Dunn, R Grant, P Lafleur, Influence of Stand Age on the Magnitude and Seasonality of Carbon Fluxes in Canadian Forests, *Agricultural and Forest Meteorology* 165, 136-148, 2012.
20. Brümmer C, TA Black, RS Jassal, NJ Grant, DL Spittlehouse, B Chen, Z Nestic, BD Amiro, MA

- Arain, AG Barr, CPA Bourque, C Coursolle, AL Dunn, LB Flanagan, ER Humphreys, PM Lafleur, HA Margolis, JH McCaughey, SC Wofsy, How climate and vegetation type influence evapotranspiration and water use efficiency in Canadian forest, peatland, and grassland ecosystems, *Agricultural and Forest Meteorology* 153, 14-30, 2012.
19. Yuan W, Y Luo, X Li, S Liu, G Yu, T Zhou, M Bahn, A Black, A Desai, A Cescatti, B Marcolla, C Jacobs, J Chen, M Aurela, C Bernhofer, B Gielen, G Bohrer, DR Cook, D Dragoni, AL Dunn, D Gianelle, T Grünwald, A Ibrom, MY Leclerc, A Lindroth, H Liu, L Beileli Marchesini, L Montagnani, G Pita, M Rodeghiero, A Rodrigues, G Starr, PC Stoy, Redefinition and global estimation of basal ecosystem respiration rate, *Global Biogeochemical Cycles*, doi:10.1029/2011GB004150, 2011.
  18. Gea-Izquierdo G, A Mäkelä, H Margolis, Y Bergeron, TA Black, A Dunn, J Hadley, KP U, M Falk, S Wharton, R Monson, DY Hollinger, T Laurila, M Aurela, H McCaughey, C Bourque, T Vesala, F Berninger, Modeling acclimation of photosynthesis to temperature in evergreen conifer forests, *New Phytologist*, doi: 10.1111/j.1469-8137.2010.03367.x, 2010.
  17. Yi C, D Ricciuto, R Li, J Wolbeck, X Xu, M Nilsson, L Aires, JD Albertson, C Ammann, MA Arain, AC De Araujo, M Aubinet, M Aurela, Z Barcza, A Barr, P Berbigier, J Beringer, C Bernhofer, TA Black, PV Bolstad, FC Bosveld, MSJ Broadmeadow, N Buchmann, SP Burns, P Cellier, J Chen, J Chen, P Ciais, R Clement, BD Cook, PS Curtis, DB Dail, E Dellwik, N Delpierre, AR Desai, S Dore, D Dragoni, BG Drake, E Dufréne, A Dunn, J Elbers, W Eugster, M Falk, C Feigenwinter, LB Flanagan, T Foken, J Frank, J Fuhrer, D Gianelle, A Goldstein, M Goulden, A Granier, T Grünwald, L Gu, H Guo, A Hammerle, S Han, NP Hanan, L Haszpra, B Heinesch, C Helfter, D Hendriks, LB Hutley, A Ibrom, C Jacobs, T Johansson, M Jongen, G Katul, G Kiely, K Klumpp, A Knohl, T Kolb, WL Kutsch, P Lafleur, T Laurila, R Leuning, A Lindroth, H Liu, B Loubet, G Manca, M Marek, HA Margolis, TA Martin, WJ Massman, R Matamala, G Matteucci, HMcCaughey, L Merbold, T Meyers, M Migliavacca, F Miglietta, L Misson, M Mölder, J Moncrieff, RK Monson, L Montagnani, M Montes-Helu, E Moors, C Moureaux, MM Mukelabai, JW Munger, M Myklebust, Z Nagy, A Noormets, W Oechel, R Oren, SG Pallardy, JS Pereira, K Pilegaard, K Pintér, C Pio, G Pita, TL Powell, S Rambal, JT Randerson, C Von Randow, C Rebmann, J Rinne, F Rossi, N Roulet, RJ Ryel, J Sagerfors, N Saigusa, MJ Sanz, G-S Mugnozza, HP Schmid, G Seufert, M Siqueira, J-F Soussana, G Starr, MA Sutton, J Tenhunen, Z Tuba, J-P Tuovinen, R Valentini, CS Vogel, J Wang, S Wang, W Wang, LR Welp, X Wen, S Wharton, M Wilkinson, CA Williams, G Wohlfahrt, S Yamamoto, G Yu, R Zampedri, B Zhao, X Zhao, Climate control of terrestrial carbon exchange across biomes and continents, *Environmental Research Letters* 5(3), 1–10 doi: 10.1088/1748-9326/5/3/034007, 2010.
  16. Dunn AL, SC Wofsy, AvH Bright, Landscape heterogeneity, soil climate, and carbon exchange in a boreal black spruce forest, *Ecological Applications* 19(2), 495-504, 2009.
  15. Grant RF, AG Barr, TA Black, HA Margolis, AL Dunn, J Metsaranta, S Wang, JH McCaughey, CA Bourque, Interannual variation in net ecosystem productivity of Canadian forests as affected by regional weather patterns – a Fluxnet-Canada synthesis, *Agricultural and Forest Meteorology* 149(11), 2022-2039, 2009.
  14. Yuan W, Y Luo, AD Richardson, R Oren, S Luysaert, IA Janssens, R Ceulemans, X Zhou, T Grünwald, M Aubinet, C Bernhofer, DD Baldocchi, J Chen, AL Dunn, J Deforest, D Dragon, AH Goldstein, E Moors, JW Munger, RK Monson, AE Suyker, G Starr, RL Scott, J Tenhunen, SB Verma, T Vesala, SC Wofsy, Latitudinal patterns of magnitude and interannual variability in net ecosystem exchange regulated by biological and environmental variables, *Global Change Biology* 15(12), 2905-2920, 2009.
  13. Grant RF, HA Margolis, AG Barr, AL Dunn, PY Bernier, O Bergeron, Changes in net ecosystem productivity of boreal black spruce stands in response to changes in temperature at diurnal and seasonal time scales, *Tree Physiology* 29(1), 1-17, 2009.

12. Ise T\*, AL Dunn, SC Wofsy, PM Moorcroft, High sensitivity of peat decomposition due to physical-biogeochemical feedback, *Nature Geosciences*, doi:10.1038/ngeo331, 2008. . (\*cited in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014)
11. Mahadevan P, SC Wofsy, DM Matross, X Xiao, AL Dunn, JC Lin, C Gerbig, JW Munger, VY Chow, EW Gottlieb, A satellite-based biosphere parameterization for net ecosystem CO<sub>2</sub> exchange: Vegetation Photosynthesis and Respiration Model (VPRM), *Global Biogeochemical Cycles*, 22, GB2005, doi:10.1029/2006GB002735, 2008.
10. Dunn AL\*, CC Barford, SC Wofsy, ML Goulden, and BC Daube, A long-term record of carbon exchange in a boreal black spruce forest: means, responses to interannual variability, and decadal trends, *Global Change Biology* 13,577-590, doi: 10.1111/j.1365-2486.2006.01221.x, 2007. (\* cited in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007)
9. Hutrya LR, JW Munger, SR Saleska, E Gottlieb, BC Daube, AL Dunn, DF Amaral, PB de Camargo, SC Wofsy, Seasonal controls on the exchange of carbon and water in an Amazonian rain forest, *Journal of Geophysical Research* 112, G03008, doi:10.1029/2006JG000365, 2007.
8. Schwalm C, B Amiro, A Arain, A Barr, TA Black, CP-A Bourque, AL Dunn, L Flanagan, M-A Giasson, P Lafleur, H Margolis, H McCaughey, S Wofsy, Photosynthetic light use efficiency of three biomes across an east-west continental-scale transect in Canada, *Agricultural and Forest Meteorology*, 140, 269-286, 2006.
7. Bergeron O, HA Margolis, TA Black, C Coursolle, AL Dunn, AG Barr, SC Wofsy, Comparison of carbon dioxide fluxes of three boreal black spruce forests in Canada, *Global Change Biology*, 13, 89-107, doi: 10.1111/j.1365-2486.2006.01281.x, 2006.
6. Coursolle C, HA Margolis, AG Barr, TA Black, BD Amiro, JH McCaughey, LB Flanagan, PM Lafleur, NT Roulet, CP-A Bourque, MA Arain, SC Wofsy, A Dunn, K Morgenstern, AL Orchansky, PY Bernier, JM Chen, J Kidston, N Saigusa, N Hedstrom, Late-summer carbon fluxes from Canadian forests and peatlands along an east-west continental transect, *Canadian Journal of Forest Research*, 36, 783-800, 2006.
5. Rocha AV, ML Goulden, AL Dunn, SC Wofsy, On linking interannual tree ring variability with observations of whole-forest CO<sub>2</sub> flux, *Global Change Biology*, 12, 1378-1389, 2006.
4. Heinsch FA, M Zhao, SW Running, JS Kimball, RR Nemani, KJ Davis, PV Bolstad, BD Cook, AR Desai, DM Ricciuto, BE Law, WC Oechel, H Kwon, H Luo, SC Wofsy, AL Dunn, JW Munger, DD Baldocchi, L Xu, DY Hollinger, AD Richardson, PC Stoy, MBS Siqueira, RK Monson, S Burns, LB Flanagan, Evaluation of remote sensing based terrestrial productivity from MODIS using regional tower eddy flux network observations, *IEEE Transactions in Geosciences and Remote Sensing*, 44, 1908-1925, 2006.
3. Turner DP, W Ritts, M Zhao, S Kurc, A Dunn, S Wofsy, E Small, SW Running, Assessing Interannual Variation in MODIS-based Estimates of Gross Primary Production, *IEEE Transactions in Geosciences and Remote Sensing*, 44, 1899-1907, 2006.
2. Turner DP, WD Ritts, WB Cohen, TK Maeirsperger, ST Gower, AA Kirschbaum, SW Running, M Zhao, SC Wofsy, AL Dunn, BE Law, JL Campbell, WC Oechel, HJ Kwon, TP Meyers, EE Small, SA Kurc, JA Gamon, Site-level evaluation of satellite-based global terrestrial GPP and NPP monitoring, *Global Change Biology*, 11, 1-19, doi: 10.1111/j.1365-2486.2005.00936.x, 2005.
1. Turner DP, WD Ritts, WB Cohen, ST Gower, M Zhao, SW Running, SC Wofsy, S Urbanski, AL Dunn and JW Munger, Scaling Gross Primary Production (GPP) over boreal and deciduous forest landscapes in support of MODIS GPP product validation, *Remote Sensing of Environment*, 88(3), 256-270, 2003.

## BOOK CHAPTERS

Ise T, A Dunn, S Wofsy, P Moorcroft, Simulating Peatland Methane Dynamics Coupled to a Mechanistic Model of Biogeochemistry, Hydrology, and Energy: Implications to Climate Change. *Climate Change and Variability*, p. 327-336. Simard, SW and Austin, ME, eds, Sciyo, Sep. 2010.

Black TA, D Gaumont-Guay, RS Jassal, BD Amiro, PG Jarvis, A Dunn, ST Gower, FM Kelliher, Measurement of CO<sub>2</sub> exchange between Boreal forest and the atmosphere. *Carbon Balance of Forest Biomes*, p. 151-186. Griffiths, H. and Jarvis, P. J., eds, Garland Science/BIOS Scientific Publishers, Dec. 2004.

## PEER-REVIEWED TEACHING MATERIALS

Dunn AL, R Mackay, P Resor, Earth's Thermostat, InTeGrate, [https://serc.carleton.edu/integrate/teaching\\_materials/global\\_energy/index.html](https://serc.carleton.edu/integrate/teaching_materials/global_energy/index.html), 2016.

Dunn AL, Google Earth, Streams, and Glaciers, On The Cutting Edge Reviewed Teaching Collection, <http://serc.carleton.edu/NAGTWorkshops/intro/activities/23748.html>, 2008.

## INVITED TALKS

Dunn AL, Not for Scientists Only: Engaging *All Students with Primary Data*, Celebration of Science and Times of Professor Steven C. Wofsy, Harvard University, Cambridge, MA, June 23, 2018.

Dunn AL, Carbon Dynamics and the Massachusetts Land Cover Mosaic, Clark University Geography Seminar, Worcester, MA, February 2, 2017.

Dunn AL, From Forests to the Financial District: Exploring carbon dynamics in Central and Eastern Massachusetts, Massachusetts Department of Environmental Protection, Worcester, MA, December 6, 2016.

Dunn AL, BM Briber, AB Reinmann, LR Hutyra, Impacts of land use/land cover change on regional carbon dynamics: an investigation along an urban-to-rural gradient in Massachusetts, USA, European Geosciences Union General Assembly, Vienna, Austria, April 17-22 2016.

Dunn AL, LR Hutyra, BM Briber, SR Raciti, V Dearborn\*, N Volk\*, R Salmonson\*, Carbon Dynamics Following Land-use Change across an Urbanization Gradient, AAG Annual Meeting, Tampa, FL, April 8-12, 2014 (\* undergraduate author)

Dunn AL, From Forests to the Financial District: Exploring carbon dynamics in Central and Eastern Massachusetts, Clark University Geography Seminar, February 1, 2013.

Dunn AL, BR Briber, LR Hutyra, JW Munger, Hourly, Daily, and Seasonal Patterns of Atmospheric CO<sub>2</sub> Along an Urbanization Gradient. NOAA Earth System Research Laboratory Global Monitoring Annual Conference, Boulder, CO, May 15-17 2012.

Wofsy SC, KM McKain, L Hutyra, M Brondfield, S Raciti, JW Munger, AL Dunn, T Nehrkorn, J Eluszkiewicz, J Ehleringer, E Crosson, D Wunch, PO Wennberg, Urban emissions of greenhouse gases and pollutants: Quantifying fluxes for the "urban dome", and impacts at the scale of the neighborhood. American Geophysical Union Fall Meeting, San Francisco, December 5-9 2011.

Hutya LR, M Brondfield, B Briber, A Dunn, S Raciti, S Wofsy, Carbon cycling across the Boston urban to rural gradient: Integrating emissions estimates and atmospheric observations, Ecological Society of America Annual Meeting, Austin, TX, August 7-12, 2011.

- Hutyra LR, M Alberti, N. Philips, AL Dunn, et al., Terrestrial carbon dynamics across gradients of urbanization, Emerging Issues Along Urban-Rural Interfaces: Linking Science and Society, Atlanta, GA, April 11-14, 2010.
- Dunn AL, The New England Forest Landscape, Worcester State College Community Seminar: The Forests of Massachusetts; Past, Present and Future, November 11, 2009.
- Amiro BD, MS Mkhabela, JO Rapai, AL Dunn, SC Wofsy, Carbon flux measurements from 1994 to 2008 in the boreal forest of northern Manitoba, Canadian Society of Agricultural and Forest Meteorology Meeting, Guelph University, Guelph, Ontario, Canada, August 5-7 2009.
- Dunn AL, Climate change and carbon sequestration: What role does the New England landscape play?, Share Our Scholarship seminar series, Worcester State College, Oct. 31 2008.
- Dunn AL, The Search for the Missing Sink: Carbon, Climate, and the New England Landscape, Department of Physical and Earth Sciences lecture series, Worcester State College, Oct. 16 2008.
- Dunn AL, Using Google Earth to investigate concepts in physical geography, Teaching Introductory Geoscience Courses in the 21<sup>st</sup> Century, Carleton & St. Olaf Colleges, Northfield, MN, July 14-17, 2008.
- Ise T, AL Dunn, SC Wofsy, PR Moorcroft, Fast limits to peat bog growth: A dynamic, mechanistic simulation of interacting peat carbon, hydrology, and thermal dynamics, Ecological Society of America/Society for Ecological Restoration Joint Meeting, San Jose, CA, Aug. 5-10 2007.
- Wofsy SC, AL Dunn (*presenting author*), BD Amiro, A Barr, TA Black, AV Rocha, ML Goulden, Lagged processes and critical timescales in boreal forest response to climate, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 11-15 2006.
- Dunn AL, Pathmathevan M, G Winston, A McMillan, B Amiro, M Goulden, S Wofsy, Seasonal and interannual variability in carbon exchange along a boreal black spruce chronosequence: Tower-based observations and MODIS-driven predictions using the Vegetation Photosynthesis and Respiration Model, American Meteorological Society 27<sup>th</sup> Conf. on Agricultural and Forest Meteorology, San Diego, CA, May 22-26 2006.
- Dunn AL, Interannual variability of carbon exchange at a mature black spruce forest, The Chronosequence Approach for Studying Boreal Carbon Dynamics (workshop), University of California – Irvine, Irvine, CA, March 2-4 2005.
- Dunn AL, SC Wofsy, JW Munger, AG Barr, TA Black, DY Hollinger, Interannual variability at five North American Fluxnet sites: Magnitude, regional coherence, and drivers, Fluxnet 2004 Open Workshop, Firenze, Italy, December 13-15 2004.
- Dunn AL, SC Wofsy, AVH Bright, Whole forest and understory measurement of carbon dioxide fluxes at a boreal black spruce forest. American Meteorological Society 26<sup>th</sup> Conf. on Agricultural and Forest Meteorology, Vancouver, BC, August 23-26 2004. **Received Outstanding Oral Presentation Award.**
- Dunn AL, JW Munger, BC Daube, JW Budney, CM Jones, SC Wofsy, Carbon cycle response to climatic variability using a statistical model. American Geophysical Union Spring 2001 Meeting, Boston, MA, May 29 – June 2, 2001.

## DATA

Milliman, T., K. Hufkens, A.D. Richardson, D.M. Aubrecht, M. Chen, J.M. Gray, M.R. Johnston, T. Keenan, S.T. Klosterman, M. Kosmala, E.K. Melaas, M.A. Friedl, S. Frohling, M. Abraha, M. Alber, M. Apple, B.E. Law, T.A. Black, P. Blanken, D. Browning, S. Bret-Harte, N. Brunsell, S.P. Burns, E. Cremonese, A.R. Desai, A.L. Dunn, D.M. Eissenstat, S.E. Euskirchen, L.B. Flanagan, B. Forsythe, J. Gallagher, L. Gu, D.Y. Hollinger, J.W. Jones, J. King, O. Langvall, J.H. McCaughey, P.J. McHale, G.A. Meyer, M.J. Mitchell, M. Migliavacca, Z. Nestic, A. Noormets, K. Novick, J. O'Connell, A.C. Oishi, W.W. Oswald, T.D. Perkins, R.P. Phillips, M.D. Schwartz, R.L. Scott, O. Sonnentag, and J.E. Thom..  
PhenoCam Dataset v1.0: Digital Camera Imagery from the PhenoCam Network, 2000-2015. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1560>, 2018

Dunn A. Tree Growth and Coarse Woody Debris in Regenerating Forests at Harvard Forest since 2008. Environmental Data Initiative.  
<https://doi.org/10.6073/pasta/746ffc4112a7701b58df8ec87ddc09cf>, 2017.

Wofsy, S.C., and A. Dunn. 2001. BOREAS Follow-On FLX-01 NSA-OBS Derived Data - NEE, GEE, and Respiration. ORNL DAAC, Oak Ridge, Tennessee, USA.  
<https://doi.org/10.3334/ORNLDAAC/603>

#### **ABSTRACTS & POSTER PAPERS**

Dillon D\*, AL Dunn, Early Successional Dynamics in a Central New England Forest Following Clearcut, Massachusetts Undergraduate Research Conference, Amherst, MA, April 26, 2019.

Etheridge A\*., AL Dunn, Ten Years of Carbon Sequestration by a Central New England Forest: Long-Term Trends and Response to Climate, Massachusetts Undergraduate Research Conference, Amherst, MA, April 26, 2019.

Mogren R\*, AL Dunn, Using GIS technologies to map field sites for monitoring carbon dynamics in Massachusetts forests, Massachusetts Undergraduate Research Conference, April 27, 2018.

Stanley L\*, AL Dunn, Carbon Dynamics in Two Central New England Forest Stands, Massachusetts Undergraduate Research Conference, April 27, 2018.

Resor PG, AL Dunn, RM MacKay, Hands On with Earth's Thermostat, a data-rich introduction to the climate system for introductory science courses, Geological Society of America annual meeting, Seattle WA, October 22-25 2017.

Resor PG, AL Dunn, RM MacKay, Earth's Thermostat, a data-rich introduction to the climate system for introductory college science courses, Geological Society of America annual meeting, Denver, CO, September 25-28, 2016.

AL Dunn, Carbon sequestration dioxide in regenerating New England forests: quantifying pools, constraining fluxes, and characterizing response to disturbance, 26th annual Harvard Forest Ecological Symposium, Harvard Forest, Petersham, MA, March 17, 2015.

- AL Dunn, Carbon dynamics and responses to disturbance in two New England forest stands, 24<sup>th</sup> annual Harvard Forest Ecological Symposium, Harvard Forest, Petersham, MA, March 19, 2013.
- Morgan K\*, AL Dunn, Carbon exchange of two New England forest stands & differential response to ice storm disturbance, 22<sup>th</sup> Annual Harvard Forest Ecological Symposium, Harvard Forest, Petersham, MA, March 15, 2011 (\* undergraduate author).
- Dunn AL, K Morgan\*, Legacies of an ice storm on the long-term carbon exchange of a temperate forest, American Geophysical Union Fall Meeting, San Francisco, Dec. 13-17, 2010 (\*undergraduate author).
- Dunn AL, W Hansen, S Healy, Engaging secondary students in geoscience investigations through the use of low-cost instrumentation, American Geophysical Union Fall Meeting, San Francisco, Dec. 13-17, 2010.
- Hutyra LR, SM Raciti, P Rao, B Yoon, AL Dunn, N Phillips, et al., Terrestrial carbon dynamics across gradients of urbanization, American Geophysical Union Fall Meeting, San Francisco, Dec. 13-17, 2010.
- Morgan K\*, AL Dunn, Carbon dynamics and ice storm impact on Harvard Forest, Worcester State College Celebration of Scholarship and Creativity, April 28, 2010 (\* undergraduate author).
- Dunn AL, Sequestration of atmospheric carbon dioxide in regenerating New England forests: quantifying pools and constraining fluxes, 20<sup>th</sup> Annual Harvard Forest Ecological Symposium, Harvard Forest, Petersham, MA, March 17, 2009.
- Dunn AL, B Amiro, Update from the Northern Old Black Spruce site: Decadal trends, hydrological drivers, and new initiatives, Fluxnet-Canada Annual Science Meeting, Ottawa, ON, Canada, Mar. 9-11 2007.
- Dunn AL, B Amiro, S Wofsy, The long-term carbon balance of a mature black spruce forest: Results from NOBS, Fluxnet-Canada Annual Science Meeting, Victoria, BC, Canada, Feb. 24-26 2006.
- Dunn AL, SC Wofsy, CC Barford, JW Munger, BC Daube, AVH Bright, A decade of carbon exchange at a boreal black spruce forest: long-term mean behavior and response to climate variability, Fluxnet-Canada Annual Science Meeting, Quebec City, QC, Canada, Feb. 25-27 2005.
- Dunn AL, SC Wofsy, CC Barford, The long-term carbon balance of a mature black spruce forest in Manitoba, Canada, Ameriflux Annual Meeting, Boulder, CO, Oct. 5-8 2004.
- Dunn AL, SC Wofsy, CC Barford, The long-term carbon balance of a mature black spruce forest in Manitoba, Canada: Sensitivity to temperature, precipitation, and soil moisture, International Boreal Forest Research Association 12th Annual Science Conference, Fairbanks, AK, May 3-6 2004.
- Dunn AL, SC Wofsy, JW Munger, ML Goulden, BC Daube, AVH Bright, CM Jones, JW Budney, Nine years of carbon exchange at BOREAS-NOBS, Fluxnet-Canada Annual Science Meeting, Banff, AB, Canada, Feb. 27-29 2004.
- Dunn AL, SC Wofsy, AVH Bright, Boreal soil hydrology and the carbon cycle, Fluxnet-Canada Annual Science Meeting, Banff, AB, Canada, Feb 27-29 2004.
- Dunn AL, SC Wofsy, JW Munger, ML Goulden, BC Daube, AVH Bright, CM Jones, JW Budney, Nine years of carbon exchange in the boreal forest, Ameriflux Annual Science Team Meeting, Boulder, Colorado, October 14-16, 2003.

## **TEACHING EXPERIENCE**

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## Worcester State University

Responsible for the development of the following courses:

- **GS101: Physical Geography**  
Introductory course for non-science majors studying the processes that shape the earth. The course uses a systems approach towards understanding Earth's four major spheres: the atmosphere, the hydrosphere, the lithosphere, and the biosphere. Developed weekly hands-on assignments to engage students with tools used by physical geographers, including: topographic maps, pressure and weather maps, GeoMapApp software for mapping earthquakes and volcanoes, atmospheric data for analyzing climate change, and Google Earth to investigate the genesis of Earth's surface features.
- **GS110: Meteorology**  
An introduction to the atmosphere and the processes that determine weather and climate. Weekly activities focus on both the quantitative and qualitative skills used by meteorologists and climatologists to understand the atmosphere. In these activities, students engage real-time weather data sources from across the world to understand atmospheric phenomena.
- **EV150: Environmental Science**  
An interdisciplinary study of the interrelationships between humans and both the living and nonliving parts of their environment. The goals of environmental science are to understand how life on earth functions and how humans can interact with the environment in a sustainable way. Course activities focus on field- and data-based investigations that complement and reinforce course content.
- **GS250: Hydrology**  
This course investigates the role that water plays in atmospheric, earth surface, and underground processes. Hands-on labs emphasize understanding of concepts in the text, such as groundwater flow, porosity and permeability, and water quality. Data analysis activities include examining streamflow data to determine influence of deforestation on hydrology, using Google Earth to estimate impermeable surface area and effects on runoff, and analyzing precipitation patterns across the country.
- **GS230: Biogeography**  
In this course, students learn about the distribution of species across the earth and how this distribution varies in space and in time. Biogeography integrates both geographical and biological concepts to investigate the underlying reasons behind species distribution. These concepts are reinforced through in-class activities where students hone their skills at data analysis and hypothesis generation and testing. Activities include analyzing IPCC climate projections to identify potential species shifts, comparing primary productivity and climate data from different biomes to identify unifying ecosystem principles, and recreating MacArthur's Equilibrium Theory of Island Biogeography through populating simulated "islands" with different species.
- **GS235: Contemporary Climate Change**  
In this course, students learn about the factors controlling past, present, and future climate through a two-pronged approach: first, by traditional textbook readings and class discussion, but second, by analyzing datasets that allow climatic principles to emerge through their work. This approach was specifically chosen to encourage students to engage with climatic processes first-hand and to become more informed citizens. Activities include analyzing climate trends for cities across the world, using the Educational Global Climate Modeling Suite (EdGCM) to assess climate

predictions, examining data from the Vostok ice core, and predicting changes in United States wheat production due to climate shifts.

- **GS338: Atmospheric Science**

Atmospheric Science introduces students to the physics and chemistry of the atmosphere, and examines the science behind current issues such as global climate change, air pollution, and reductions in stratospheric ozone. Atmospheric physics includes both weather (clouds, rain, winds) and climate (weather averaged over longer timescales, as well as trends in climate over time). Atmospheric chemistry investigates processes controlling the chemical composition of the atmosphere, including related processes in the biosphere, as well as anthropogenic pollution (smog, stratospheric ozone loss, etc.)

### **Harvard University**

- **Science A-30: The Atmosphere**, Head Teaching Fellow, 2000, 2003, Teaching Fellow 1997  
Developed new, writing-intensive curriculum based on primary scientific literature for a class in atmospheric processes and chemistry dominated by non-science majors. Taught one weekly section, administered course, and handled logistics.
- **Science A-43: Environmental Risks and Disasters**, Teaching Fellow, 2006  
Course on environmental risks that impact humans, designed for non-science majors. Introduced concepts of plate tectonics, earthquakes, volcanoes, and hurricanes during three weekly sections.
- **Science A-30: The Atmosphere**, Web Pedagogy Assistant, 2002.  
Developed web-based modules to enrich student knowledge and assist in evaluation.

### **GRANTS AND FELLOWSHIPS**

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#### **Science Education Resource Center, 2014-2016, \$15,000**

Developed educational module (“Earth’s Thermostat”) as part of Interdisciplinary Teaching about Earth for a Sustainable Future (InTeGrate), a NSF-funded project

Worked in collaboration with Dr. Robert MacKay (Clark College) and Dr. Phil Resor (Wesleyan University)

Final module available at

[https://serc.carleton.edu/integrate/teaching\\_materials/global\\_energy/index.html](https://serc.carleton.edu/integrate/teaching_materials/global_energy/index.html)

#### **National Aeronautic and Space Administration, Sept. 2012 – Aug. 2015, \$1,150,000**

“4-D Modeling of the Regional Carbon Cycle in and Around Urban Environments: An Interdisciplinary Study to Advance Observational and Modeling Foundations”

Principal Investigator: Mark Friedl, Boston University

Co-Investigators: Kelly Chance (Harvard-Smithsonian Center for Astrophysics), **Allison Dunn**, Lucy Hutyra (Boston University), Steven Wofsy (Harvard University), Curtis Woodcock (Boston University),

#### **WSU Alden Excellence in Teaching Award, May 2011, \$500**

**WSC Davis Grant**, June 2010, \$300

Grant to develop a Math Across the Curriculum course for the Liberal Arts and Science Curriculum during Summer 2010.

**National Science Foundation, Directorate of Geosciences**, Sept. 2009 – Aug. 2012, \$199,710

“Creating a Pipeline for Diversity in the Geosciences: A Sustainability-based Approach”

Principal Investigator: William Hansen

Co-Investigators: **Allison Dunn**, Stephen Healy

**National Science Foundation, Directorate of Geosciences**, Sept. 2009 – Mar. 2012, \$300,000  
“Metabolism of Boston”  
Principal Investigator: Nathan Phillips, Boston University  
Listed Collaborator: Allison Dunn

**WSC Davis Grant**, November 2008, \$882  
Grant to attend the Association of American Colleges and Universities conference entitled  
“Engaging Science, Advancing Learning”, Providence, RI, November 6-8, 2008.

**WSC Mini-Grant**, July 2008 – June 2009, \$2600  
“Sequestration of atmospheric carbon dioxide in regenerating New England forests: quantifying  
pools and constraining fluxes”  
Principal Investigator: Allison Dunn

**National Science Foundation, Division of Undergraduate Education**, July 2008, \$300  
Award to support attendance at “Teaching Undergraduate Geosciences in the 21<sup>st</sup> Century”  
workshop, St. Olaf & Carleton Colleges, July 14-17 2008.

**WSC Davis Grant**, July 2008, \$1915  
Grant sponsoring departmental workshop for development of courses for Worcester State College's  
Liberal Arts and Science curriculum

**NASA NNG05GA76G**, August 2004 – July 2005, \$86,999.  
"Fluxes of Carbon, Water, and Energy in a Boreal Forest-Peat Ecosystem:  
Short-Term Variance, Long-Term Trends, and Sensitivity to Climate"  
Principal Investigator: Steven Wofsy

**American Meteorological Society Outstanding Oral Presentation Award**, 2004, \$75  
Awarded for the presentation “Whole forest and understory measurement of carbon dioxide fluxes  
at a boreal black spruce forest”. Presented at American Meteorological Society 26th Conf. on  
Agricultural and Forest Meteorology, Vancouver, BC, August 23-26 2004.

**NASA NGT5-30366**, September 2001 – August 2004, \$70,000.  
“Hydrological and Environmental Controls on the Carbon Balance of Boreal Forests”  
Earth System Science Graduate Fellowship

**Harvard University Web Pedagogies Fellowship**, June 2001, \$300  
Supported participation in week-long Web Pedagogies workshop investigating ways to incorporate  
web-based technologies into the classroom.

**NASA NAG5-7534**, June 1998 – May 2002, \$1,159,850.  
“Long-Term Net Ecosystem Exchange at the Boreas Northern Old Black Spruce Site: Mechanisms  
for Response to Climatic Variation”  
Principal Investigator: Steven Wofsy

**National Science Foundation Research Experiences for Undergraduates Program**, 1995, \$1200  
Supported undergraduate thesis work in Cyprus

## **REVIEWER FOR**

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- Agricultural and Forest Meteorology
- Biogeosciences
- Ecological Engineering
- Ecological Modeling
- Geophysical Research Letters
- Global Change Biology
- Journal of Geophysical Research-Biogeosciences
- Journal of Hydrometeorology
- Mitigation and Adaptation of Strategies for Global Change
- National Oceanic and Atmospheric Administration Climate Program
- National Science Foundation Division of Earth Sciences
- Science of the Total Environment
- Silvia Fennica
- Tellus B
- U.S. Civilian Research & Development Foundation (CRDF)

## **PROFESSIONAL ACTIVITIES & MEMBERSHIPS**

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- American Geophysical Union (member)
- Climate Literacy and Energy Awareness Network (consultant)
- National Association of Geoscience Teachers (member)
- Science Education Resource Center (SERC; resource contributor)
- Scientist Referral Service, American Geophysical Union (provides scientific expertise to media)
- Sigma Xi (member)